



# The Jersey Broadcaster

NEWSLETTER OF THE NEW JERSEY ANTIQUE RADIO CLUB

June 2020

Volume 26 Issue 06



## MEETING/ ACTIVITY NOTES

Reported by  
Marv Beeferman

### The ON-LINE Broadcaster

The *Jersey Broadcaster* is now on-line. Over 190 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](mailto:mbeeferman@verizon.net). Be sure to include your full name.

Our monthly meetings continue to be quite successful using the Zoom app with some 65 members in attendance in May. The scheduled "show-and-tell" brought some very interesting items to the screen which I usually document in the *Broadcaster* but a video probably does a much better job. You can check out the April or May meetings by clicking on the link on the homepage of the club's website (<http://www.njarc.org>).

Membership Secretary Marsha Simkin reports 230 members as of June 4th with 178 current in dues payment. President Richard Lee has sent out postcard reminders to those members who are still due for renewal. Considering the circumstances, your Board will continue to be liberal with regard to 2020 dues, but there will come a time in the near future when a cutoff date will be announced.

Member Nevell Greenough reminds all OM's and YL's that it's time to start planning for Field Day (June 27-28). Please send your name, e-mail and call directly at [ngreenou@optonline.net](mailto:ngreenou@optonline.net) so plans may be discussed without QRM'ing up the entire NJARC Communicator. Please also indicate whether you can attend, when, and your operating interests. Interested others are welcome as well.

Technical Coordinator Al Klase is scheduling a recurring Zoom meeting for the NJARC membership every Tuesday and Thursday until the beginning of September. (Note: These are not the monthly



## MEETING NOTICE

The next NJARC meeting will take place on Friday, June 12th, at 7:30 PM. The meeting will be conducted "on-line" via the video conferencing app Zoom. Information may be found at the club's website (<http://www.njarc.org>) with a link being provided by the NJARC Communicator prior to the meeting. This month, Prof. Joseph Jesson will present a topic titled "RCA AR-88 - RCA's Greatest Communications Receiver." In addition, the possibility exists for a Zoom radio auction. Place close attention to the NJARC Communicator and club website for further updates prior to the meeting.

full membership meetings!) Al has posted the required credentials on the Communicator a number of times and hopefully you have printed them out. They will remain constant for all meetings. However, Al can't guarantee he will send a reminder email for each meeting. If you are a recent new member and wish to participate, I'm sure Al will send you the necessary information. ([ark@ar.88.net](mailto:ark@ar.88.net))

It has been a pleasure to view all the recommended reading and viewing that our membership has offered via the Communicator. A good example is a posting by James Doran from Erik Larson's book *Thunderstruck* concerning Marconi's early work and thoughts on wireless communication. *Thunderstruck* is a great read in itself where historical fiction writer Erik Larson tells the interwoven stories of two men - Hawley Crippen, a very unlikely murderer, and Guglielmo Marconi, the obsessive creator of a seemingly supernatural means of communication - whose lives intersect during one of the greatest criminal chases of all time.

For those WWII history buffs, I highly recommend Larson's latest, *The Splendid and the Vile*. While Hitler waged a relentless bombing campaign, it was up to Churchill to hold the country together and persuade President Roosevelt that Britain was a worthy ally. There's lots of references to beam guidance technology which I'm sure many of you radar people will enjoy.

I found a great little piece of history in the book that I'm sure Larson could never have anticipated when he wrote it that is very apropos to today's times and I hope it will give you a little snicker:

"At least one brand of toilet paper was also in perilously short supply, as the

king himself discovered...With kingly discretion, he wrote to his ambassador [in the British embassy]. "We are getting short of a certain type of paper which is made in America and is unprocurable here. A packet or two of 500 sheets at intervals would be most acceptable. You will understand this and its name begins with B!!!" The paper in question was identified by historian Andrew Roberts as Bromo soft lavatory paper."

Nothing new under the sun!

### Upcoming Events (Tentative)

- June 27-28 - ARRL Field Day on InfoAge grounds
- July 10 - Monthly Zoom meeting; talk by Alan Wolke (topic TBA)
- July 25 - Summer Tailgate/Hamfest on InfoAge Grounds
- August 8 - Summer Repair Clinic, InfoAge Bldg. 9032A, 9AM - 4PM
- August 14 - Monthly Zoom meeting, Prof. Tom Perera talk on "Phil Weingarten, Master Duplicator"
- September 11 - Monthly meeting at InfoAge Bldg. 9032A, Larry Rubins audio demonstration
- September 18-19 - Kutztown Radio Show
- October 9 - Monthly meeting at Princeton's Bowen Hall, talk by Mike Molnar (topic TBA)
- November 13 - Monthly meeting at InfoAge Bldg. 9032A, (topic TBA)
- November 20 - Fall Repair Clinic at InfoAge Bldg. 9032A, 9AM - 4PM
- December (date TBA) - Holiday Party at West Lake Golf and CC
- January 8 - Monthly meeting at InfoAge Bldg. 9032A, Members Only Auction, dues collection

**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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## 2020 ANNUAL FIELD DAY ANNOUNCED

By  
Al Klase &  
Nevill Greenough

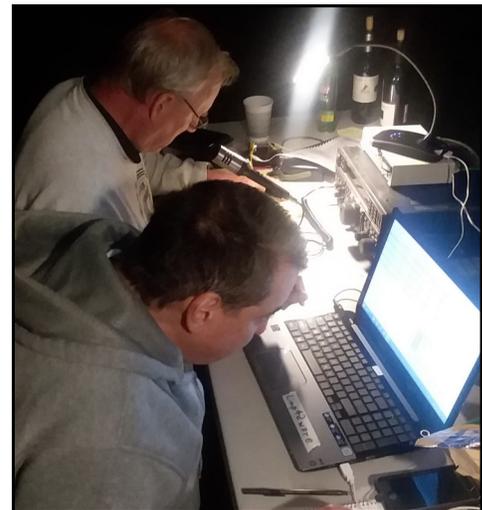
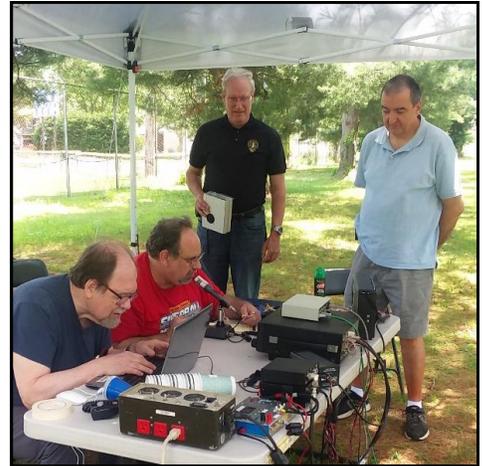
Field day is an annual, on-the-air radio event sponsored by The American Radio Relay League, publisher of QST Magazine. It is an on-the-air contest where the objective is to contact as many participating stations as possible from temporary radio installations. There are extra points for running on non-commercial power. The underlying motivation is to foster a community of hams who can establish communications in case of disaster.

The June Field Day was established in 1933 and since then 40,000 hams throughout North America have demonstrated ham radio's science, skill and service to our communities and our nation. The event combines public service, emergency preparedness, community outreach and technical skills all in a single event.

Last year, the NJARC decided to further inaugurate our new station W2RTM by participating in our first Field Day. Soon the lawn outside InfoAge building 9032A was filled with antennas, a generator, tables, cables, microphones, telegraph keys, cans of insect spray and an expansive collection of amateur transceivers and equipment. Several hours later, it all came together to a rousing chorus by our operators of "CQ, CQ, CQ Field Day - this is W2RTM, Whisky-Two-Radio-Tango-Mike", accompanied by the hum of the generator.

The cacophony continued almost non-stop for 24 hours until 2 PM Sunday under a 10' x 10' canopy when the contest ended in exhaustion and lost voices. We made about 325 contacts with other amateurs around the country at similar, emergency-operations style setups. About 45 of those contacts were made via Morse code with good-old-telegraph-key. Our main transceiver was a Yaesu FT-950 graciously acquired from the late Joe Cro estate. Joe certainly would enjoy that.

This year's Field Day 2020 is 27-28 June. Our club station, W2RTM will be again setting up at InfoAge. With a modest, but successful, first effort last year, we are hoping to improve our performance this year. Feel welcome to pitch in if you can. Watch for further developments and announcements on the club's Communicator.



"The contest ended in exhaustion and lost voices."

## SALVAGE OF TITANIC'S RADIO EQUIPMENT APPROVED

Edited by  
Marv Beeferman

*The following article is based on reporting by various sources like CNN, Yahoo and "Popular Mechanics."*

A judge in Virginia has ruled that a designated salvage company can open up the hull of the RMS *Titanic* to retrieve the ship's Marconi radiotelegraph. It's not exactly a done deal because the RMS *Titanic* company must still submit a funding plan for approval before work can begin.

As expected, this decision has resulted in some agreement but mostly dissent. Is it right to open up what amounts to a mass grave to loot what's inside? Does the technological significance of the equip-

ment make a difference? As NJARC member Dr. Alex Magoun noted: "...what could the equipment possibly tell about 'some of the secrets about a missed warning message and distress calls sent from the ship?'" AWA member and retired attorney Bart Lee (K6VK) stated: "This ruling permitting salvage is likely to be reversed on appeal. The RMS *Titanic* IS a marine grave of exceptional importance. Both the US government and the British government want it to be left alone." Our own *Tube Lore* author Ludwell Sibley was more emphatic: "This is gross. We have grave robbers at work. The site is deteriorating. Yeah, leave it alone!" Another AWA member commented: "I don't see what's wrong with salvaging the radio. I can't imagine there is much left know other than a pile of dissolved metals and encrusted pieces." Finally, Joe Koester of MAARC wrote: "Agree. I would not want someone digging up a grave of one of my ancestors for any reason. They know what the radio looks like and surely there are others. If not, recreate one to show what the Titanic had on board. Leave the wreck alone from now and forevermore."

In her ruling, the judge wrote that retrieving the radio "will contribute to the legacy left by the indelible loss of the Titanic, those who survived, and those who gave their lives in the sinking." During a video session, Bretton Hunchak, president of RMS Titanic, said the expedition would focus on the Marconi radio for a number of reasons:

- It's not just a radio but "the voice of the Titanic."
- The radio is emblematic of the 700 passengers who survived the Titanic's sinking who faced a similar adversity we are experiencing today.
- The only reason there were survivors and the only reason we can research the wreck today is because of the radio.
- Putting the radio on exhibit will help the world to "re-engage with the Titanic."

The company said that the radio transmitter could unlock some of the secrets about a missed warning message and distress calls sent from the ship. It would try to avoid cutting into the ship by accessing the telegraph room via a skylight that was already open.

### What Treasures Might be Found?

A system-level description of the Marconi apparatus aboard the Titanic was presented in a two-part article published in the AWA's (Antique Wireless Associa-

tion) *Old Timer's Bulletin* in November 2001 and February 2002. This makes a good starting point for those who are more interested. However, an excellent article in the *AWA Review* (Volume 15, 2002) by Parks Stephenson goes down to the component level. The article is based on an exploration of the Marconi radio-telegraph suite during James Cameron's attempt to film the wreck for his documentary *Ghosts of the Abyss*. It is also based on a comparison to the Olympic's Marconi Room, the Olympic being the Titanic's sister ship. There is not enough space here to summarize a full description of all components covered by Stephenson, but I highly suggest that you try to obtain a copy for some in-depth reading.

As Stephenson points out, based on Cameron's discoveries, it appears that although the Marconi Room was completely destroyed by hydrodynamic forces acting inside the superstructure as the ship settled on the ocean floor, the more substantial walls of the adjacent room that housed the transmitting apparatus provided a measure of protection. This room was called the "Silent Room," because its walls were heavily insulated with asbestos to prevent the loud noise of the electric motors and spark generating equipment of the transmitter from distracting the operator while he attempted to receive faint signals through his headphones. The Silent Room is presently open to view since most of the interior walls have been eaten away. This has resulted in what Stephenson describes as a "gold mine of information." Revealed is an almost complete 5-kW Marconi transmitting set still connected together by the original circuit wiring.



**Replica of the Titanic Marconi Room.**  
(Photo Credit: Cliff1066/Flickr/  
Creative Commons)

The Marconi wireless apparatus consisted of both transmitting and receiving sets. The transmitter consisted of five distinct circuits that converted the ship's direct current into regulated, high-power, RF oscillations transmitted by way of the

ship's antenna. Much of this equipment was located in the Silent Room previously described. The receiving set, located on or adjacent to the aft-facing operators' desk in the Marconi Room, was connected into a single circuit that converted RF oscillations into audible signals. An emergency transmitting set, also located in the Marconi Room and capable of producing a plain spark in the event of a casualty to the main transmitter, was also provided.

A good example of what might be discovered from Cameron's film in conjunction with examining artifacts recovered from the ship is the condition of the discharger box. In order to muffle the sound of the spark discharge, a heavy teak box was positioned and hinged so that it could be lowered over the transmitter's disc discharger. This discharger box was found locked open in the remains of the Titanic's Silent Room. Stephenson speculates that this would seem to reinforce the scenario wherein one of the Marconi operators, most likely junior operator Harold Bride, took station in the Silent Room towards the end to adjust the spark in response to the failing ship's power. The reason for lifting the box would have been to hear the spark clearly as the discharger motor was adjusted to provide more output from less power.

The interior of the Marconi Room, briefly glimpsed during a 1993 expedition, appeared to be nothing more than a featureless wasteland. As far as anyone knew, any surviving equipment was either buried underneath piles of debris or torn loose and scattered. However, this assumption was dispelled by Cameron's 2001 expedition. The transmitting set was still intact with each of its components located in or near its original location. Switches and plugs could even be seen in their final settings. The preserved contents of the Silent Room provided a sharp contrast to the almost total lack of artifacts in the adjacent Marconi Room.

In his final summary, Stephenson points out that retrieval of the Titanic's radio artifacts may make some sense when viewed in "the context of the history of the disaster." Although addressed by Stephenson in 2002, it is yet to be discovered what toll some twenty years has taken and whether the project will still be worth it:

"Had there been no wireless telegraph apparatus to send distress calls across the æther, Titanic's lifeboats might have drifted for days before being spotted. Because of Carpathia's rapid response to Titanic's CQD, the majority of survivors who

found their way into (or onto) a lifeboat were saved. Cameron discovered in the wreck the very instrument that Titanic used to alert the world to her plight. It is fitting that the transmitting portion of the apparatus that was directly responsible for saving the lives of over 700 souls has itself survived the sinking and subsequent decay of the ship. Hopefully, the equipment can someday be recovered and restored to operating condition. Failing that, though, at least we can now tell the complete story of this vital apparatus."

## WHEN BRUTE FORCE TRANSMITTERS RULED THE AIR

### Part II

By  
James E. O'Neal

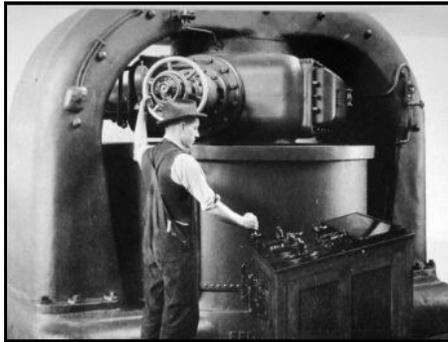
*NJARC member James O'Neal (K4XAR) has been involved in broadcasting for nearly 60 years including a 37-year-long career in television engineering. This included more than 30 years with the television side of the Voice of America. In 2005, he launched a second career in journalism including editing "TV Technology" and writing for "Radio World," and other periodicals, concentrating largely on radio's colorful history and the individuals who helped make it possible. Mr. O'Neal is the editor of "IEEE Broadcast Technology" and serves on the boards of two radio and television-oriented museums. The following article, with Part I printed in the May 'Broadcaster,' was first published in the April 26th issue of "Radio World" and is carried below with the kind permission of the author and "Radio World"...Ed*

### TRANSMITTING SPEECH AND MUSIC

Early on, experimenters found that the continuous wave output of the converters could be modulated with speech. Elwell used this feature to advantage, establishing a two-way radiotelephone service between Sacramento and Stockton, Calif., in competition with Ma Bell. It was claimed that the wireless audio quality was better than that of the wired service.

Others, most notably Lee De Forest and Charles "Doc" Herrold, began broadcasting speech and music via arc or "arcphone" transmitters. However, as pointed out, the machine's output, if close to a sine wave, was not exactly; and the

center frequency, if close, did vary a little. Early adopters referred to this as "fuzz" or "hair" on the signal. Today, we would likely refer to it as phase noise.



*An operator gets ready to place a Federal 1,000 kW transmitter on the air.*

(Although not stated in his patent claims, Herrold may have burned his arc under water in an attempt to filter out some of the fuzz and possibly to supply the needed hydrogen through electrolysis.)

Audio modulation was achieved by simply connecting a carbon microphone (telephone "transmitter") in the antenna or ground leg of the transmitter output. (Fessenden modulated his high-frequency alternator in the same fashion.) The varying resistance of the microphone element with sound produces a corresponding change in antenna current. Of course, with higher power converters, some means for dissipating the I-squared-R losses in the carbon element had to be provided, with solutions ranging from a water-cooled mic, the use of multiple microphones connected together, and even a "lazy Susan" arrangement for rapidly switching a fresh mic into the circuit while the one previously in use cooled down.



*Charles "Doc" Herrold (center, in the doorway) powered his early-1900s San José, Calif. AM radio station with arc technology of his own design. This photo appears to show two of the converters built into the table at the left. A phonograph turntable is visible as is a microphone. Although Federal's transmitters were designed to operate in the*

*VLF portion of the spectrum, the size of Herrold's air-core inductors above the arc chambers would seem to indicate that he operated considerably higher up into the RF spectrum. The station was licensed in 1915 as 6FX. After WWI, it moved to vacuum tube technology and was relicensed as KQW, later becoming San Francisco's KCBS (Courtesy of History San José)*

### GAS ON THE FIRE

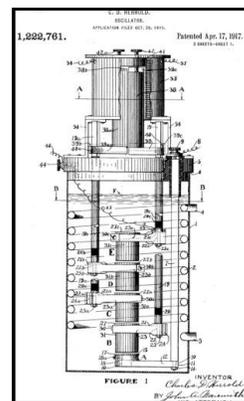
Early on, the upper frequency of the arc transmitter's oscillations was limited by the curve describing the negative resistance; however, it was discovered, likely by accident, that introduction of a hydrocarbon-containing vapor or substance (it was actually the hydrogen component) greatly enhanced the performance of the arc and could move its frequency upward.

As the arc transmitter technology progressed, a number of hydrogen-containing substances were tried, including alcohol, kerosene, methane, acetylene, hydrogen gas and even steam. Interestingly, the converter's operating frequency range could be shifted by substitution of these liquids, gases or vapors. (Of course, the operation of an intense source of heat in close proximity to flammable compounds was not without risk, as will be pointed out later.)

Ethyl alcohol seemed to be the favored hydrocarbon, at least for the lower-powered arcs, and one can't help but wonder if this might not have been an added incentive when looking for employees to pull an overnight shift at the transmitter site. The alcohol used was likely pure 200 proof ethanol, or close to it, as "denatured" alcohol didn't come into widespread use until after the Volstead Act ushered in prohibition in 1920.

### TRUTH IN ADVERTISING

It should be noted that while the arc converter was a simple way of transforming DC into radio waves, its operating efficiency was not that great, bordering at best a-



*The patent drawing for Herrold's arc transmitter. The arc burned under water and the electrodes are broken into several sections.*

round 50%, so with the larger units, a carefully engineered cooling system was essential. Also, Federal, likely bolstered by their ad agency, seemed to overlook this efficiency factor in their product catalog. For instance, their “one megawatt” converter actually delivered only about 500,000 watts of RF. The rest of the DC power had to be dispersed as heat, and just as in “modern” vacuum tube transmitters, the water-cooling system had to be electrically isolated from the converter’s copper anode. In the very high-power installations, this required two cooling loops with a heat exchanger and an outdoor “spray pond” in the secondary loop.

**OSHA, PLEASE LOOK THE OTHER WAY**

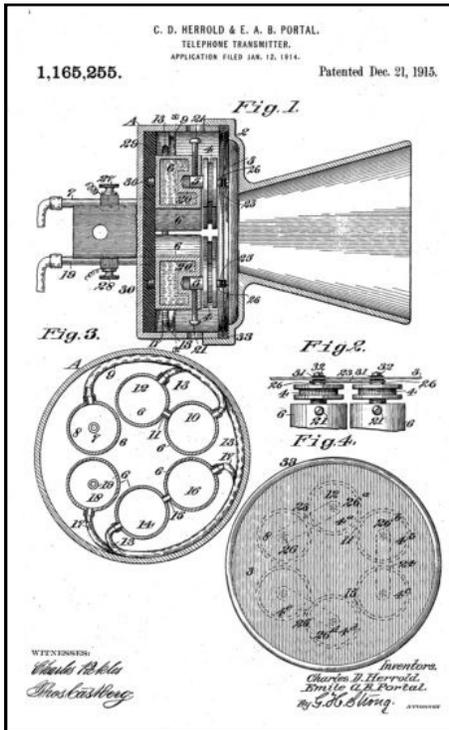
Obviously, the high-voltage, high-current potentials (typically from 500 to 2,000 volts and upwards of 500 amps, depending on converter output power) employed in larger arc transmitters were dangerous to the point of lethality. However, arc transmitters posed another very serious hazard to life and limb. This was their propensity to explode violently if operating instructions weren’t followed to the letter, due to the aforementioned requirement for the continuous introduction of hydrocarbon-containing compounds into the arc chamber. Precautions against the electrocution threat included these words to the wise: “Great care must be taken by operators working about an arc in operation, and any part of the oscillatory circuit, starting from the copper, must be avoided. An operator at one high-power station on the Atlantic Coast once started to refill the alcohol feed cup from a large metal can while the arc was in operation — he never did it again.”

Equally lethal accidents, but not always causing immediate death, included opening the arc chamber while the converter was in operation, or even after it was shut down if a prescribed amount of “cooling down” time was not observed. Violation of this rule could result in the transmitter literally becoming a “flame thrower.” “Another stunt to be avoided is the opening of the arc chamber door immediately after the arc has been extinguished, for the sudden contact of the internal heated hydrogen with the external atmosphere will cause an outburst of flame which may result in severe burns to anyone within range. With large arcs, a period of ten minutes should elapse before the door is opened.”

The “always read the instructions completely before plugging it in” type of disclaimer also included the following, hope-

fully circumventing a slightly different type of “flamethrower” event:

“At least one fatality and several serious injuries have come to the attention of the writer owing to the operator having ‘struck’ the arc when the carbon [electrode] had not been properly fastened in its receptacle. In these instances, [with] the hydrocarbon gas having reached a sufficiently great pressure, the loosened carbon was blown out of its holder followed by a stream of flame, proving disastrous to the operator, who invariably stands on that side of the arc when starting it.”

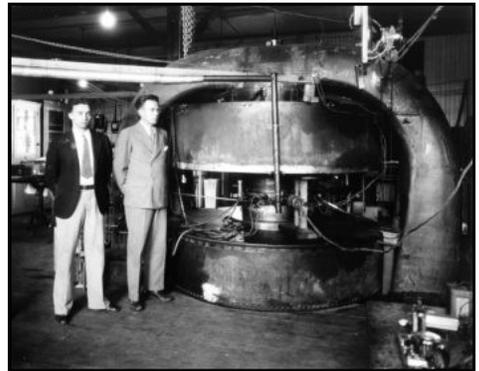


*As the microphone used to modulate an arc transmitter in the simplest way carried large RF currents and became quite hot in normal operation, a means for removing heat was necessary. Several schemes were devised, including water cooling. Charles Herrold and E.A.B. Portal were issued a U.S. patent for the water-cooled mic used at his “arcphone” radio station.*

(Another precaution was offered for those working around the giant “converters” that would be of little worry in today’s world of quartz-movement clocks and watches. This was the avoidance of bringing one’s prized timepiece near an operating converter, as the intense magnetic field could permanently damage the steel mainspring-driven movement.)

There were a number of early arc converter martyrs, and doubtless the list

would have kept growing if the technology had not been pushed out of the way by the perfection of the vacuum tube as an RF oscillator and power amplifier in the 1920s. Actually, as late as 1922 - at least according to a U.S. Bureau of Standards publication that year, the arc was still the “go-to” source for high-power long-distance communications, with an estimated “80 percent of all the energy actually radiated into space for radio purposes during a given time” emanating from arc transmitters. (This excluded amateur stations, which still largely utilized damped wave spark apparatus.)



*At least one big arc transmitter was reborn as a nuclear particle accelerator. This Federal 1,000 kW unit was transformed into what was then the world’s largest cyclotron. It’s shown with cyclotron inventor Ernest Lawrence, right. At left is Stanley Livingston, a graduate student who had worked with Lawrence in perfecting the cyclotron. (Courtesy of History San José)*

**LIFE AFTER OBSOLESCENCE**

Once more modern and efficient ways of producing a continuous wave emerged, not all of the dangerous, and sometimes problematic, arc converters were reconciled to the metal recycler. At least one, and probably more, were tapped for nuclear research. In the late 1920s, a race of sorts was underway on several shores to “split” the tiny atom in an effort to learn more about its internal workings. One of those heavily involved was the University of California’s Ernest O. Lawrence, future Nobel Laureate. He devised a tabletop model of a machine that could accelerate subatomic particles faster and faster until they had sufficient energy to pass through the electrostatic barrier of the atomic nucleus and send its constituents flying in all directions.

Once Lawrence, aided by a grad student, succeeded in making the tabletop nuclear particle accelerator - or “cyclo-

tron” as Lawrence dubbed the device - work, the challenge was on to build a bigger and better model. (The cyclotron’s operation is based around a large magnetic field, just as in the arc converter.)

It so happened that once the vacuum tube had sunset activities at Federal Telegraph, there were some unsold arc converters literally rusting away at the company’s Palo Alto, Calif., facility. Lawrence learned of this from Leonard Fuller, chairman of the university’s EE department, and it was not difficult to secure one of the last of this breed of transmitter and relocate it to the Berkeley radiation research lab for just the cost of the move. There, it was stripped of the arc chamber, and the magnetic core became the heart of the first big cyclotron, known as the “27-incher,” the diameter of the magnetic poles formed from the big electromagnetic. This machine produced energies of 5,000,000 electron volts, and was later upgraded to give an 8 MeV push to deuterons, and it could also eject alpha particles at energies of up to 16 MeV.

*This appears to be a good stopping point. Please stayed tuned for the final installment of this article in the July 'Broadcaster' where James O'Neal will discuss the physics of arc converter operation and a 1963 oral history in which a former Federal Telegraph employee was interviewed. In celebration of "Radio at 100," Mr. O'Neal is posting a series of articles for 'Radio World.' I highly suggest his latest from May 15th titled 'They Set the Stage for the Birth of Radio.' Since we occasionally have problems with links and I want to make sure you can easily access it, just Google the article's title and it will immediately come up...Ed*

## THE RCA AR-88

Edited by  
Marv Beferman

Next month, the club will have the pleasure of hearing a talk by Prof. Joseph Jesson on RCA's AR-88 which he describes as "RCA's greatest communications receiver." Joe's bio is as follows:

Thanks to his Civil Defense "Elmers" in the early 60's and his Delaware Valley Radio Association (DVRA) founding club radio shop boss, Les Allen, Joe (W2JEJ) had moved his early love for Radios (HRO, Hammerland, and Hallicrafters) into a great career in engineering and technology management. Joe was award-

ed General Electric's top Innovation prize, the Edison Award, in 2007, and received over 15 patents, and is currently IEEE Princeton Life Chair. Joe is the proud owner of the AR-88 show below.



As a preview to Joe's talk, he has provided us with the following abstract as to the topics that may be covered:

During WWII, the interception of German encrypted wireless communication by Britain's many Y-stations, where operators, listening to banks of RCA AR-88 receivers, provided the captured encrypted messages in order for Bletchley Park to then process these messages into plaintext. Messages to be decrypted were handed to Alan Turing's (of the movie's *Imitation Game* fame) Hut 8 team at Bletchley Park. Often, overshadowed by the truly great Alan Turing, the unsung heroes I found were the intercept, or Y-station, operators such as Gordon Welchman (Hut 6), and General David Sarnoff. Joe will explain how their groundbreaking methods have been adopted by today's NSA!

Joe will also describe the design requirements issued from RCA's General David Sarnoff to his engineering team - tough and expensive to meet production targets. RCA production was started in Camden, NJ but the international WWII partner demand (Soviet, British, and Canadian) was handled by RCA's Export Sales under Charles Roberts in Camden, New Jersey. Joe will discuss the design requirements through "winning through performance" and contrast the AR-88 receiver with the competitive receiver, of its day, e.g. National's HRO. Restoration details will also be discussed.

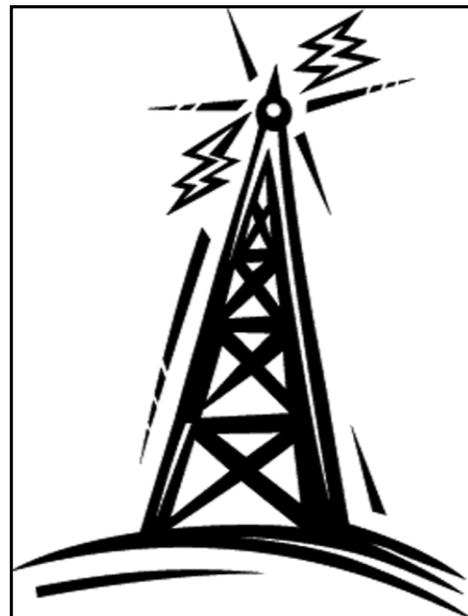
Finally, Joe will discuss the results of a project conducted by his TCNJ Electronics Lab students - to compare a SPICE RF bandpass AR-88 filter simulation with a vacuum tube SPICE library mode to a corrected (biased) FET amplifier model.

As a third-generation New Jersey native researching WWII communications, Joe says he was proud of the leadership shown by General David Sarnoff and estimated 2- year reduction of the duration of WWII by the great work at Bletchley Park.

## THE TRUE POWER OF RADIO

Edited by  
Marv Beferman

*The following information comes by way of a reddit post and Hackaday...Ed*



The following short video clip shows a crew working on a 15,000-watt AM radio tower. They appear to be preparing to do tower maintenance, which means de-energizing the antenna. As the engineer explains, antennas for AM radio stations in the medium-wave band are generally the entire tower structure, as opposed to the towers for FM and TV stations, which generally just loft the antenna as high as possible above the landscape.

The fun starts when the crew disconnects a jumper and an arc forms across the clamp and the antenna feed. The resulting ball of plasma acts like a speaker, letting us clearly hear the programming on the station. It's like one of the plasma speakers many of us have heard about before, albeit exceptionally more dangerous.

[youtube.com/watch?v=GHSuInSkHtA](https://www.youtube.com/watch?v=GHSuInSkHtA)

It's an impressive display of the power coursing through broadcast towers, and a vivid reminder to not mess with them. Such warnings often go unheeded, sadly, with the young (and sometimes old) and foolish paying the price. After all, there's a reason they put fences up around radio towers.

## A TUBE FAMILY TREE

By  
Marv Beferman

The vacuum tube may have been one of the 20th century's greatest inventions. Magnetron, photomultiplier, traveling wave, compactron, klystron, backward wave, pencil, lighthouse, cathode ray, indicator, nuvistor, acorn, peanut, T-R, electrostatic, cat's-eye, orlithon, and loctal, are just a few of the many types of vacuum tubes that have been used in various

## MY FIRST RADIO

Edited by  
Marv Beferman

"My first radio" could be interpreted in two ways. It could be the first radio that someone purchased with his own funds or it could mean the first radio that someone was first aware of and familiar with. A string of Communicator postings got me searching for a group of photos that I remember of my brother and I (about five years old) standing alongside a console in our living room (the brand escapes me) that were taken by a professional photographer. You could hire these guys to come to your home and take some quality pictures. The photos still haven't shown up and I'd offer \$1,000 to recover this little bit of family history and this very strong memory of "my first radio."

I felt a little sad that the posted examples from our members would be lost to the æther, so I decided to capture them here. After thinking about it, I thought it would be great to capture as many examples as possible, so I'm inviting members to dig deep into their subconscious and send me a paragraph or two describing your memories. A photo would be a nice addition, but if the original radio is no longer in existence, an example from the internet would work just fine.

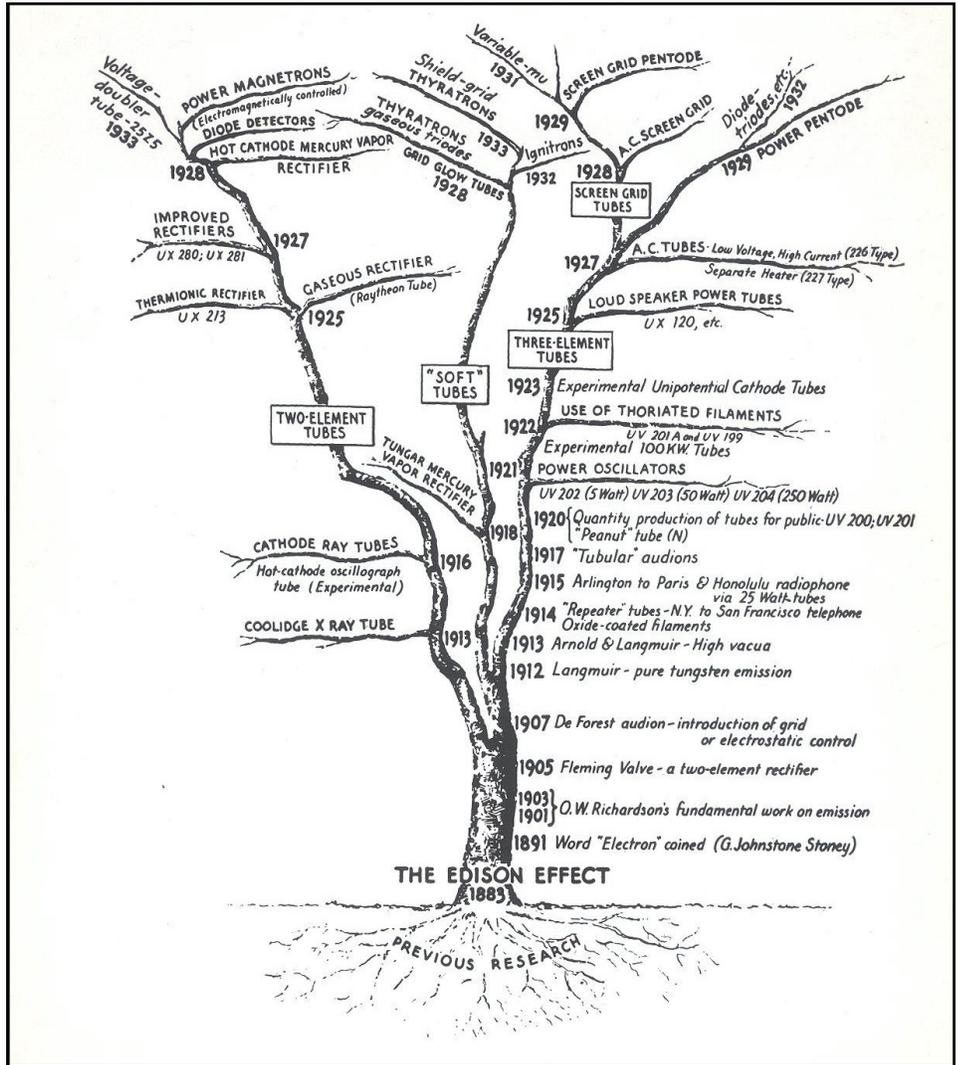
[mbeferman@verizon.net](mailto:mbeferman@verizon.net)

The parents of Alex Magoun had one of those Grundig multiband receivers that were popular in the late 50s or early 60s, probably because of some tariff cut to support the West German economy. His family listened to basically nothing but

types of electronic equipment. In 1963, *Popular Electronics* published a three-part series by Louis E. Garner Jr. titled "The Tube Family Tree." It's a wonderful series with good illustrations and a nice tutorial in understanding the basic principles of the majority of tube types. The series can be easily found at the "RF Café" by Googling the title of the series. A pictorial representation of the relation-

ships of various tube types was included in the series.

Recently, member Al Klase sent me another tube family tree brought up by Jerry Proc on Boatanchors. It starts with the Edison Effect of 1883 and continues until 1934. It was first published in *Electronics* in 1933. The copy that Al sent me was a little blurred but I located a better copy with only one minor difference.



WCRB out of its studio in Waltham, Mass. Alex said that the station offered good classical music (none of which he specifically remembers) and a very funny "WCRB Saturday Night" comedy show which you could write to for a free ticket. Alex remembers the only Dxing he did was with this radio using its internal antenna. "St. Louis sticks in my mind as the most distant and therefore most exotic; at least one Spanish-speaking station (one of those Cuban stations or perhaps a Mexican border buster?) and at least one French Canadian one from Montreal or Quebec. That might have been pretty good range from

a hill northeast of Boston, but most of you know better than me how much less noise pollution there was then in the electronic environment."

Bob Bennett submitted the following photo that was taken around 1965-1966. He's guessing it shows someone's birthday party. It shows Bob along with his sister and unhappy cousin at his grandmother's. At the right of his sister's shoulder is his late uncle's H-500 Transoceanic. Bob said it was purchased while his uncle was serving in the Navy. "It opened my ears to the world of shortwave listening as well as AM hams. Now you might wonder why I may be slightly biased towards Zenith

Transoceanics. Oh yes, the tie...I probably just got home from Catholic school."



When he was about three years old, Al Klase got a look inside his grandfather's radio - a TRF McMillan from about 1930. "It's been downhill ever since. My grandparents, who were folks of modest means, had received an inheritance and splurged on indoor plumbing and a nice radio. I recovered it from the attic years later without a speaker. I still have the set."



Rob Flory said he had to dig deep into the dusty crevices of his mind to find his first radio. As the son and grandson of electrical engineers, Rob was "born with a soldering iron in my hand" but it was a little while before he was allowed to plug it in. He remembers an electronics kit that had a bunch of components on a board with little springs connected to the leads. Little tinned wires were used to wire them up. He believes his first radios might have been crystal and simple crystal with audio amplifier sets made with that kit.

Rob said that his dad drew him a schematic diagram and gave him a pile of parts and let him figure out how to wire up an audio amplifier with built-in speaker on a perforated board. But the radio that really got Rob going was an Archer (Radio Shack) "Space Patrol" AM/CB base station. He hooked it up so that it played through both its own speaker and the homemade audio amp so that it was "stereo." Rob said he listened to a lot of WABC which played cool music. He also did some DXing and learned Morse code with my neighbor. "Before long, I got my novice license and the rest is history."



Jon Butz Fiscina said that his "first radio" was a 1948 Philco from his grandfather. He didn't understand why the pilot light was always so dim. Many years later, he discovered that the light was replaced by an odd 24-volt bulb that would have been used in aircraft. "24,000 flying hours later, I wonder how much it affected my choice of career."



Jonathan Allen said his first experience with a short wave radio was a 1937-38 Philco console at his grandparent's house. The cabinet was a beautiful piece of furniture. He recalls an amber celluloid tuning dial with perhaps five bands. The pointer was an arrowhead optically projected from behind the dial onto the selected band; this allowed reading the correct scale and prevented parallax errors. Jonathan was able to tune in SW stations from around the world.

Besides a number of small transistor radios, the radio Robert Tevis will never forget is the Remco Caravelle. It had the capability to transmit over the AM radios in the house. "How cool!" Robert said his favorite use, though, was when he discovered that he was able to use it to somehow detune the other radios. He doesn't recall how he did it or even understand the principle behind what he did. He just remembers surprising his father who was listening to a football game when, at a climatic moment, he detuned his radio and the touchdown was missed. "Still, best toy I ever had."

But Robert said his love of radio really goes back to his Uncle Ed who owned a Hallicrafters S-38. "Loved to hear the BBC over that whenever I would visit."



Steve Cafiero could remember building a Heathkit AR-29 stereo receiver in 1970 with his dad. He was 10 years old and it was the first of many of their electronic kits. Steve said that Heathkits started his interest in electronics and he restored his AR-29 a few years ago. The restoration may be found on a YouTube search of Heathkit AR-29.

William Coffman's "first radio" was a simple RCA 8X541 that belonged to his great grandmother who bought it new. It was in working condition when he first got it but it somehow ended up in a box that was put into an out building and forgotten for years. William is beginning to bring it back to life.



Greg Wilson's "first radio" was his dad's 1957(?) Blaupunkt "Barcelona." It sits in his living room presently and "works just fine."



Next month, we'll continue with your "first radio" stories that include Harry Klancer's 1935 Airline, Aaron Hunter's Cub Scout radio from 1955 and James Doran's Japanese transistor radio and a European console that initiated his love of radio. Hopefully, I will receive some additional submittals by then to add to the group.