



The Jersey Broadcaster

NEWSLETTER OF THE NEW JERSEY ANTIQUE RADIO CLUB

Jul7 2019

Volume 25 Issue 07



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.

Thanks to Darren Hoffman for his unique presentation at the June meeting on the topic of "Receiving Tubes in the Post War Years." Some of the more interesting "takeaways" from Darren's talk included:



- Every U.S. tube manufacturer eventually became a "re-brander." That is, they sold stock under their own name that was manufactured by another company.
- Re-branding wasn't arbitrary. Sometimes a company could not justify the equipment required to produce a specialized tube. Sometimes a company would run out of stock for a certain production run. And sometimes, technical limitations and material shortages prevented a company from producing a particular tube.
- Most "rejected" tubes sold by "reject peddlers" came from the Harrison, NJ plant and had the Sears, Lafayette, Zenith,



MEETING NOTICE

The next NJARC meeting will take place on Friday, July 12th, at 7:30 PM at Princeton's **Computer Science Hall**. 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 "SDR (Software Defined Radio) for the Antique Radio Listener" presented by Alan Wolke. We'll also be holding a small auction that includes items pictured in last month's *Broadcaster*. Please take notice of the temporary building location change from Bowen Hall to the Computer Science Hall. Signs will be posted in the Bowen Hall parking garage showing directions to the Science Hall.

Dumont, Magnavox and Admiral names. Although of poorer quality, they would work in most applications. Reject sales took a hit when RCA started destroying their "seconds."

- Companies sold tubes to each other at wholesale prices - they produced only enough to satisfy immediate requirements and sold any excess to other buyers. This prevented a manufacturer from having to re-tool to meet smaller orders.
- You can tell who manufactured a tube by various criteria such as font, tooling, screening, design, etc.
- Some original tube manufacturers (Raytheon, Channel Master, ITT, Sonatone, etc.) eventually only sold imported tubes.
- By 1974, most tubes were phased out of consumer electronic equipment except for some low-end TV's and other limited uses.
- With the internet explosion and rediscovery and increased desirability of tube equipment, why wasn't some tube production maintained in the U.S.? One needs to note that most tube parts were not made by the tube manufacturer. With stricter environmental rules, an increase in material cost and the shut-down of most tube parts manufacturers, U.S. companies could not produce tubes cheaply enough to make them profitable.
- There are many examples that belong in the "Tube Hall of Shame." For example, the Russian 6P3S will work in some 6L6GC applications but, because of its lower plate rating, not all. Also, Darren has found mistakes in the etching process where a substitute was attempted to replace a rare tube.

There's a lot more to be learned from Darren's talk and it can be seen as part of a beautifully produced video of our June meeting courtesy of Dave Sica. It can be easily located by visiting our club's web site, <http://www.njarc.org>.

With regard to streaming of our monthly meetings, president Richard Lee announced that starting with our June 14th meeting, we were back on YouTube. He would like to thank all those who were out "crowd sourcing" on the club's behalf, pushing the subscription numbers over the YouTube threshold of 1,000. He would also like to thank webmaster Dave Sica for "his intrepid quest to bring us back to YouTube." The link is always available on the club's web page.

I've been following a thread on the NJARC Communicator concerning the introduction of technology, both new and old, to kids. A great example (as suggested by John Ruccolo) is where the "Martians" on Sesame Street try to figure out the purpose of an old Philco Radio. It really is a joy and I hope you get a chance to watch it:

https://m.youtube.com/watch?v=z_trSIBCGf0

Apropos to the NJARC Radio Technology Museum (RTM) at InfoAge, member Jules Bellisio has been working hard to get a pay phone in working order as a new exhibit. If you want to see how visiting kids might react to this vintage piece of equipment, go to:

<https://www.youtube.com/watch?v=ACIDZsuy1e>

If the link doesn't work, just Google "Kids react to pay phones." Nothing will make you feel older than talking to someone

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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who has never used, or even heard of, a public phone.



Jules Bellisio sets up public pay phone at the RTM.

Beyond being upset that the phone has no apps and games, and calling the pound button a "hashtag," the kids seem to show wonder, confusion, disgust and happiness to live today where you don't have to memorize phone numbers. Some of the video highlights include the kids complaining about the short cord attached to the phone; being confused about not being able to text; making fun of the device for having actual buttons; and perplexed that people had to physically go somewhere to make a phone call.

Member John Ruccolo has described via the Communicator a recent thrift shop find. The "Age of Television" is narrated by Milton Berle, Hugh Downs and Arlene Francis and comes with an illustrated booklet.



These types of historical TV and radio compilations show up from time to time at swapmeets and the price is pretty reasonable. They contain a lot of material, including old radio shows and commentary, that you don't find on cassette and I usually grab them when I find them. Also, the fact that they're in a record format gives them a little more of that "vintage" feel when you listen to them.

Former NJARC member John Dilks

reminds us that he has recently updated his Ham Radio web page:

<http://www.k2tqn.net/>

It includes a huge history of early hams in the Atlantic City, Southern NJ area. It also contains links to many of his QST "Old Radio/Vintage Radio" columns.

Upcoming Events

July 14 - SCARC Sussex Hamfest, 37 Plains Rd., Augusta, NJ 07822

July 20 - Summer Tailgate Swapmeet/Hamfest at InfoAge

August 3 - Summer Repair Clinic at InfoAge

August 9 - Monthly meeting at Princeton Computer Science Hall; Homebrew displays and contest

August 13-17 - AWA annual convention, Henrietta, NY

September 13 - Monthly meeting at InfoAge; "Homebrew Radios"

September 19-21 - Kutztown Antique Radio Swapmeet

October 11th - Monthly meeting at Princeton's Bowen Hall; presentation by Mike Molnar (topic TBA)

November 2 - Fall NJARC Swapmeet-Hamfest at Parsippany PAL

November 8 - Monthly meeting at InfoAge building 9032A; Show-and-Tell/Hints and Kinks

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

NJARC "RADIO BOYS" CELEBRATE A FIRST FIELD DAY

By
**Nevell Greenough &
 Ray Chase**

Since 1933, ham radio has held an annual Field Day in June. Forty-thousand hams throughout North America have set up temporary transmitting stations in public places to demonstrate ham radio's science, skill and service to our communities and our nation. It combines public service, emergency preparedness, community outreach, and technical skills all in a single event.

NJARC decided to further inaugurate our new station W2RTM by participating in this event. Volunteer members met Saturday morning, June 22, to set up our first Ham Radio Field Day operation in NJARC history.

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 rousing choruses 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, field day setups. About 45 of those contacts were made via Morse code with a 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!

Participants included Al Klase, N2FRQ; John Ruccolo, KC2UAK; Ted Copp, N2KPS; Bill Zukowski, N2YEG; Nevell Greenough, N2GX and a host of visitors. The operators were fortified with Al's "famous" chili and rice dinner plus plenty of snacks. Richard Lee added to the event with wine left over from the Wall of Honor event Saturday evening. This definitely helped Nevell and Ted make it through the night with CW code contacts.

Near-perfect weather, and insects were not an issue. We'll plan to make this an annual event.

Editor's Notes:

1. Member Nevell Greenough notes "a spectacularly well-done video on Field Day goings-on in Vancouver, BC, both for the videography and the Field Day effort put on by the hams." Nevell suggests searching YouTube on "Field Day 2019 in 4K" and picking the one by "12voltvids."

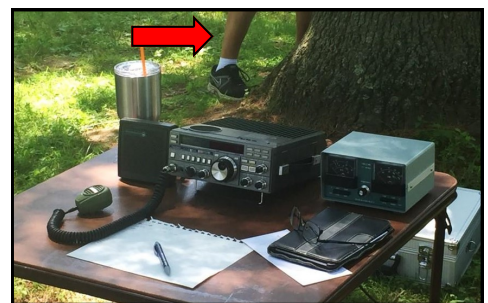
2. Member John Ruccolo recommends a short film that was recently shown at the David Sarnoff Radio Club meeting documenting the Radio Society of Great Britain's Field Day of 1947. It can be found at the following address:

<https://m.youtube.com/watch?v=TeLecrhytw>

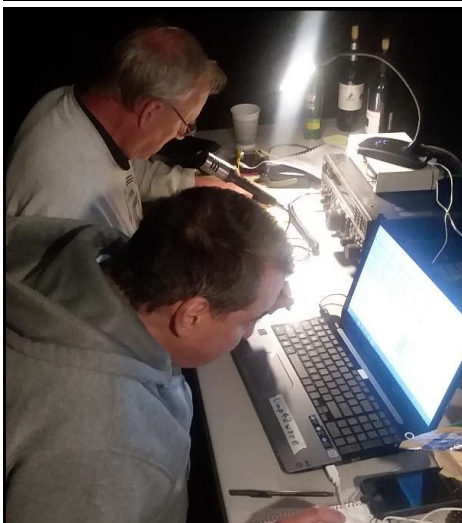
John asked if viewers could spot the classic American-built receivers that were exported to Great Britain in large numbers during the war, and were widely available as surplus afterward. Member Mike Shaw identified an HRO-5, RCA AR-88, and a Canadian CM-11a (not part of the U.S. Lend-Lease program). He also identified G5RV, "a design guy that invented a multi-band antenna that carries his call."

3. It was great to learn that the club's first field day was so successful, conducted safely and went off "without a hitch." This says a lot about the NJARC folks. Unfortunately, this is not always the case. The ARRL reported on June 19th that a 62 year-old Union Dale, Pennsylvania amateur - Leland L. "Lee" parsons III, N3LPJ - was killed on June 14th during a tower installation project when a tower section he was working on collapsed. Authorities said Parsons was apparently attempting to attach a guy wire to the bottom tower section when it went over.

The online *Wireless Estimator* called the incident "a stark reminder of the dangers present this weekend during Field Day." The article cited a 2009 Field Day tower collapse that claimed the life of 57-year-old Larry Prelog, KE4PM - an experienced climber - while he was installing an antenna. In that incident, two legs at the base of the tower buckled.



Looks like Bill Zukowski had a "leg up" on everyone else with this rig.



Somebody came well-prepared!



Member John Ruccolo explains to the FCC (Federal Cookout Controller) who has a strange resemblance to NJARC president Richard Lee that the lack of the required burgers and hot dogs under Part 47:BARB:E:QUE was not observed due to the club falling under a loophole exemption. "The controller apologized and left some homemade brownies to calm our nerves." Interestingly, this same individual was later seen on site brandishing a bottle of wine.

**KLANCER AND DORAN
"ILLUMINATE"
THE TWIN LIGHTS**

**By
Jim Doran**



On Saturday, June 22nd, two NJARC members, Harry Klancer and Jim Doran, spoke to an audience at the Twin Lights Historic Site lighthouse in Highlands NJ. The talk focused on Marconi and his time in America, particularly at the Twin Lights and the Belmar Station. Harry gave a detailed description of Marconi's role in two famous America's Cup races (including the inaugural race in 1900), his scientific and commercial significance, as well as his later achievements.

Jim led off with a brief introduction to Marconi, his family, upbringing and career prior to relocating to the United

Kingdom. The presentation included a short video on Marconi's first successful demonstration of his ability to send messages out of sight and voice range, and a PowerPoint presentation on the America's Cup races. Harry then gave a demonstration of two Radio Technology Museum (RTM) artifacts; replicas of Marconi-style spark gap transmitters. Jim ended the session with a description of the RTM, as well as InfoAge in general, and encouraged attendees to visit our campus.

The presentation was very well received, with the audience asking cogent, thoughtful questions and congratulating the speakers on an interesting and informative talk. The audience, including the museum staff, were particularly appreciative of the information on the role wireless played in the America's Cup races since it is part of the history of the Twin Lights site. Afterwards, the lighthouse staff invited the speakers on a behind-the-scenes tour of their facility (areas not usually open to the public) and exchanged views on the rewards and challenges of running and promoting a non-profit historic site and museum. The InfoAge speakers were invited back to do a future reprise or related talk in the coming months.

The presentation will be added to our Speakers Bureau library for future use.

Editor's Note: Kudos to Harry and Jim for volunteering their time and energy to advance the exposure of the NJARC and InfoAge to other interested history and radio enthusiasts.

**THE JOY OF
HOMEBREW...
NEW TAKE ON AN
OLD CONTEST**

**By
Marv Beeferman**

"Homebrew" is an amateur radio slang term for home-built, non-commercial radio equipment. In the early years of radio, long before factory-built gear was easily available and affordable, radio enthusiasts built their own receiving and transmitting equipment. Homebrewing differs from kit building in that it describes the process of constructing equipment using parts and designs from varied and often improvised sources.

Constructing one's own equipment using relatively simple designs and easily obtainable or "junk box" electronic components can be very rewarding. Homebrew enthusiasts say that building one's own radio equipment is fun and gives them the satisfaction that comes from mastering electronic knowledge. To help preserve this tradition and have some fun at the same time, we've decided to come up with a slightly different take on past NJARC homebrew contests. The inspiration for this comes from silent key Bill Corkutt (WZ21) who was a homebrew enthusiast and collector and whose articles can be found throughout past issues of *Antique Radio Classified* (ARC). Perhaps NJARC members can remember the auction of his extensive collection of homebrews some years back and who, like your editor, might still own some of his radios. In his ARC article "The Joy of the Home Brew," Bill summed up his passion quite nicely:

"In 1920, there were few radio manufacturers. Radio amateurs and experimenters - boys or young men imbued with the challenge of a new technology - built their own. They "homebrewed," a term borrowed from prohibition. When broadcasting boomed in 1922, it was logical to build broadcast-band receivers for themselves or for friends. Some bootlegged (another prohibition term) manufactured radios for illicit sales that violated patent rights.

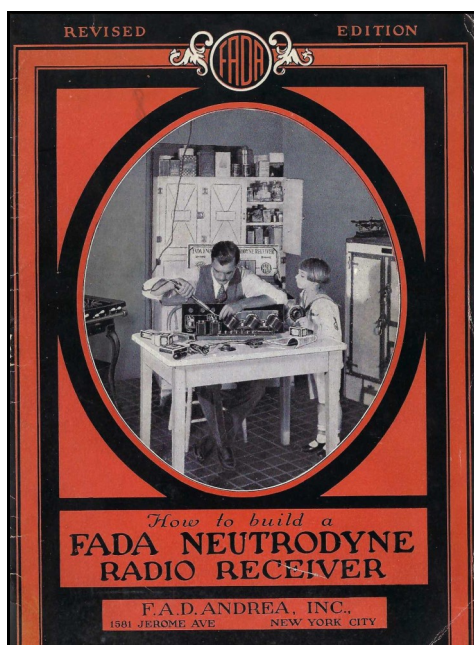
Probably a million homebrews were built every year up until 1925 when the manufacturers finally caught up. After all, you could save 75 or 80 percent by building your own. Radio magazines were abundant and contained plans for all the latest circuits: regeneratives, TRFs, neotroynes, reflexes, even superhets. The plans (sometimes in the form of blueprints) were an extension of the mechanical world and provided exact dimensions and detailed instructions, though it's doubtful that many of the builders understood the electronics involved.

What is it that makes a homebrew so fascinating to a modern antique collector? To begin with, a homebrew is often unique, one-of-a-kind, like a work of art conceived by an inspired creator. In the early days, radio was often referred to as an "art" rather than a science. In addition, an old homebrew presents a technical challenge since the original may never have worked, may have been abandoned before completion, or suffered considerable modification over the years. Extra panel and baseboard holes, mixed wiring,

and sloppy soldering attest to the difficulties involved.

On the plus side, homebrews are inexpensive to buy and easy to work on (big parts and open breadboard layouts). In addition, you don't have to worry about altering an expensive manufactured radio.

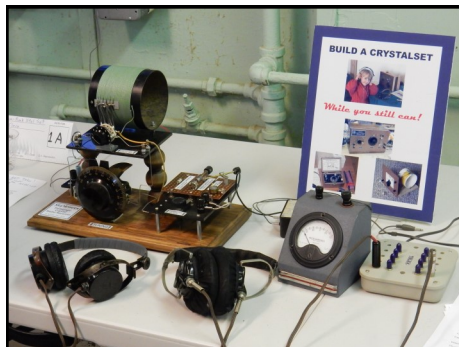
Over the years I've acquired a few dozen home brews. Some I junked and stripped for parts; most I restored to operation. Some I consider as true works of art. The simple 1-tube home brews show a high degree of conformity, but the larger sets are often unique."



We've decided to make this year's activity, scheduled for the August 9th meeting at Princeton, more of a combination show-and-tell and contest. Recently, except for the early years of the club when competition was quite stiff, the number of entries has deteriorated to a disappointing level. It seemed that members "never got around" to building their homebrews even though we allowed up to six months for the project. This year, we have set aside a non-contest portion of the meeting for members to bring in interesting homebrews in their collection and describe special features of their radio or transmitter - circuit details, unique construction features, history, etc. Along with the radios themselves, a few slides or drawings would be appropriate. (We'll update you on the slide format at a later date.) Regenerative receivers are fine but it would be nice to see some Reinartz's, early superhets (LR-4, Tropadyne, etc.), early "dyne" radios and crystal sets. Sets that you may have built many years back are also welcome.

For the "contest" portion of the meeting, we'll be judging any recently built (within the last few years) homebrew radio receiver or transmitter. If you are new to homebrewing, there are hundreds of examples and significant guidance on the internet. For starters, you might want to try "Dave's Homemade Crystal and Tube Radios" at makearadio.com. Entries are limited to "scratch-built" radios as opposed to kits or modified production sets. Receivers must be capable of receiving at least one station. Contestants should be prepared to demonstrate their creation and say a few words about the design and construction of the entry. The membership in attendance will vote for the three best entries (perhaps via an "applause meter") and first, second and third place prizes will be awarded.

Let's make this a true celebration of the homebrew...I'm sure that you can build or find something in your collection that will entertain and inform our NJARC audience.



Homebrew crystal set from one of our past contests.

THE FUTURE OF ALL-DIGITAL, AM, HD RADIO

By
Marv Beeferman

I have recently begun subscribing to the online version of *RadioWorld*, a leading news source for broadcast radio owners, managers and engineers all over the world. One of the recent topics of major discussion has been the National Association of Broadcasters (NAB) push to have the FCC formally look into allowing AM radio stations to voluntarily (and solely) broadcast in all-digital. The consequences of such a decision is quite obvious to antique radio collectors - no more broadcast band DXing and no more

showing off our restored 1920s radios actually working by receiving local and distant stations.

The NAB supports the comments submitted by Bryan Broadcasting, which asked the commission to initiate a proceeding that would look at allowing AM stations to solely operate in the MA3 all-digital mode of HD Radio service. According to a May 13, 2019 filing by the NAB, such a service would "provide substantially improved sound quality that can help AM stations to retain and attract listeners in the increasingly competitive audio marketplace."

The NAB filing detailed the technical challenges facing broadcasters, ranging from the proliferation of noise-causing devices like fluorescent light bulbs, phone chargers, flat-screen TVs, computer monitors and other Part 15 devices. This higher noise floor is causing pervasive interference to AM radio stations, resulting in a decline in AM listenership. According to Bryan Broadcasting, the noise floor jumped from anywhere between 10 dB and 40 dB between the 1970s and the early 2000s. Bryan said that "even setting aside empirical demonstration, one only has to listen to an AM broadcast inside a home where smart phone chargers and computer monitors are operating to understand the magnitude of the problem."

One of the biggest concerns for the future of AM radio is the electric car. A few manufacturers have already eliminated AM radios from their electric car models, and several more have made it clear they will not have AM radios in their future models. The cost to filter the interference to AM radio gets into the hundreds of dollars per car and in surveys, fewer and fewer people list AM radio as something they expect in the future car.

But all-digital AM radio also has its skeptics, noting obstacles to possible implementation. Some say it would not be in the best interests of AM broadcasters to force a conversion from spectrally efficient analog broadcasting to spectrally inefficient digital broadcasting, especially in the MA3 standard. Analog broadcasting on AM only takes up 10 kHz of spectrum; it provides a decent quality of sound. The MA3 standard wastes 40 kHz of valuable spectrum space.

Another major issue is the lack of the robustness of the signal. Without a strong RF signal, as you drive into weaker signal areas or approach strong power line interference, the signal frequently drops out and goes to silence. At night, the robustness is typically even worse. The received signal quality is either sufficient for reception or not. The audio drops in

and out completely rather than being affected by increasing noise gracefully. This is one of the most annoying things about the digital radio listening experience.

Related to the above problem is the acquisition time to reacquire the signal, which is typically 5 seconds or longer. This might seem like an eternity to some users when they are waiting for the signal to lock back in. This is something that "younger" listeners might not understand or perhaps even tolerate.

Finally, a forced conversion would not benefit consumers. Since MA3 is not compatible with current AM receivers, consumers would be required to shell out money to buy new receivers.

THE DEVELOPMENT OF THE DIRECTIONAL AM BROADCAST ANTENNA

PART I

By
John Schneider

This article originally appeared in "Spectrum Monitor" magazine and later in "Radio World." It is reprinted here with the kind permission of John Schneider. John retired in 2015 after a long career in radio electronics, most recently in international sales with Broadcast Electronics and HD radio. He is a lifetime radio historian, author of two books and dozens of articles on the subject, and is a Fellow of the California Historical Radio Society...Ed.

In the early years of AM radio broadcasting, all stations utilized non-directional antennas. Most all of these were wire antennas suspended between towers or buildings. Interference, especially at night, was severe. An interfering signal of 5% or less in signal strength was enough to disrupt reception of the desired station, and if the frequencies of the two stations were slightly separated, there would be a heterodyne beat note. As a result, only a few widely-spaced stations could operate on each of the AM broadcast channels in the entire country at night. This limited the number of stations that could coexist to about 500 nationwide, with many of them sharing time on a single frequency.

As antenna technologies were developed and improved in the early 1930s, a few progressive stations began experimenting with multi-element directional arrays. This approach offered two attractive benefits: 1) It could reduce radiation towards other stations on the same or adjacent frequencies, permitting more stations to share a frequency; and 2) a broadcaster could direct more signal towards the desired coverage area, and away from wasted areas such as open water in the case of coastal stations.

WFLA-WSUN

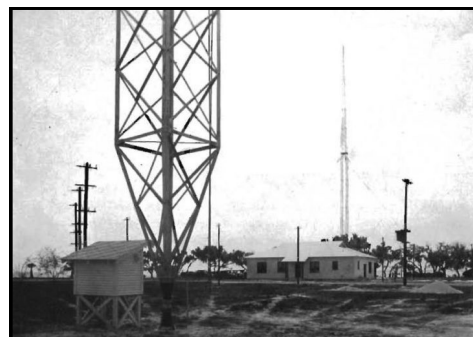
The first known use of a directional antenna was by a pair of stations in Tampa/St. Petersburg, Fla. In 1927, the Clearwater Chamber of Commerce acquired station WGHB and changed the call sign to WFLA. A companion station, WSUN, was operated by the St. Petersburg Chamber of Commerce. The two stations shared the frequency of 900 kHz, broadcasting on alternate evenings to promote tourism and business opportunities in their respective communities. In reality, they operated with two station licenses, but there was only one transmitter and one antenna.

In 1929, in a nationwide realignment of radio frequencies, the Federal Radio Commission moved WFLA-WSUN to 620 kHz with a power of 2 kW daytime and 1 kW nighttime. Immediately, WTMJ in Milwaukee, Wis., which also operated on 620 kHz, filed an objection with the radio commission, stating that its coverage was being impacted by interference from the Florida stations. The commission responded by reducing WFLA-WSUN's power to 500 watts daytime and 250 watts nighttime. This news was distressing to the two chambers of commerce — at those power levels, they would not have the nighttime coverage they needed to promote their communities to the rest of the country.

WFLA-WSUN contacted a Washington consulting engineer in desperation to try and find a solution. That consulting engineer was T.A.M. Craven, a former high-ranking naval communications officer who had resigned his commission in 1930 to go into private practice as a radio consulting engineer.

Craven, in turn, called on Dr. Raymond Wilmotte, a British radio engineer who had experimented with radio direction-finding technologies in Europe. Wilmotte immigrated to the USA in 1929 and was working for the Boonton Aircraft Corp. Craven encouraged Wilmotte to leave his job and open his own con-

sulting practice. Together, Craven and Wilmotte proposed the erection of a directional antenna that would reduce WFLA-WSUN's radiation towards Milwaukee, allowing the stations to operate at a higher power level.

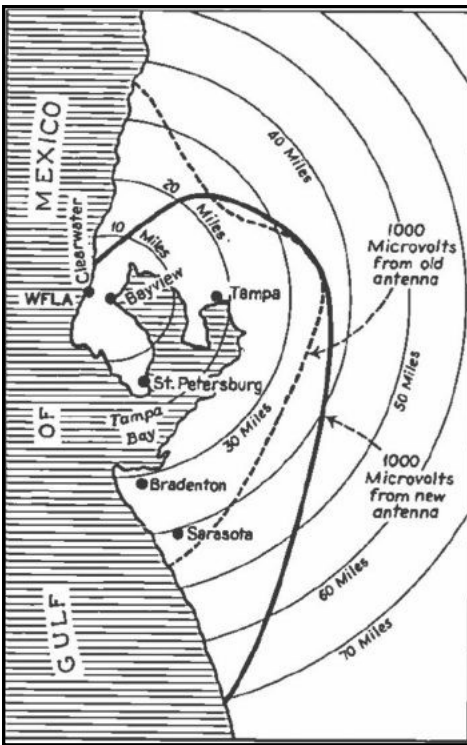


An early 1930s view of the WFLA-WSUN antenna system, showing the station building and two towers. This appeared in *RCA Broadcast News*, July 1932.

At first, the owners were skeptical of investing in an untried technology. Other equally-respected engineers believed that a working directional antenna was not possible — they thought the ionosphere would distort the signal's directional properties. But Wilmotte was certain it would do the job, and he proposed that he not be paid unless the project was a success. With such an assurance, WFLA-WSUN gave him the go-ahead.

Wilmotte had two base-isolated vertical towers constructed. Each was 200 feet high, separated by a quarter wavelength on a bearing towards Milwaukee. The towers were on opposite sides of what is now the Courtney-Campbell Causeway in Clearwater. The power from a new 5 kW Western Electric transmitter was divided at the transmitter building and sent to each tower via open-wire transmission lines suspended from poles. The system was configured so that the two towers could be operated in-phase during the day and 90 degrees out of phase at night, creating a cardioid pattern with a sharp null towards Milwaukee.

The first tests were conducted in May 1932. There were lots of trial-and-error adjustments as they became educated in the unexpected complication of mutual impedances (the adjustment of one tower would change the tuning of the other tower). Finally, a precise adjustment was achieved and the system worked even better than expected — so much so that the government engineer in Atlanta who was assigned to measure the signal strength asked why the station was off the air — he could not hear the signal at all!



WFLA-WSUN in Clearwater, Fla., built the country's first AM broadcast directional antenna in 1932. This coverage map shows how the signal was reduced to the north of the transmitter to protect a Milwaukee station, while improving the signal to the east, west and south. The image is from *Radio Engineering* magazine, June, 1934.

This feat of engineering immediately caught the fascination of the country's broadcasters, and it boosted the careers of both engineers. Broadcasting Magazine foresaw the significance of directional antenna technology when it wrote:

"The day when broadcasting stations will be enabled to predetermine their coverage and actually steer the course of their signals in given directions is envisioned ... Interference troubles, through the use of this new directional radiating system, can be sharply curtailed, and at the same time make possible substantial increases in coverage in given directions, by putting the punch in the signals covering desired markets, and by cutting off propagation over useless areas."

WFLA-WSUN was allowed to increase its power, and operated successfully from the two-tower system for the next 18 years. (The stations separated in 1941 when WFLA moved to another frequency and both became full-time.)

A few years later, T.A.M. Craven would become the FCC's chief engineer,

and then was appointed by Franklin Roosevelt as an FCC commissioner. He held the position from 1937 to 1944, and was the only engineer ever to serve as a commissioner. For his part, Dr. Wilmotte went on to patent an anti-fading two-section vertical AM antenna. He also helped create direction-finding systems for airports, was involved with the development of radar, and then joined RCA to help develop the first communications satellites. In the 1970s, the FCC tapped him to develop a high-performance UHF-TV tuner. He died on Jan. 27, 2000, at the age of 98.

KYW PHILADELPHIA

In 1932, the Federal Radio Commission determined that the clear-channel 1020 kHz frequency should be reassigned from the Midwest to the mid-Atlantic states, in an effort to equalize the distribution of clear-channel frequencies across the country. That 1020 frequency was occupied by KYW in Chicago, owned by the Westinghouse Corporation. A number of other broadcasters applied to the FRC to take over the channel, but Westinghouse ultimately convinced the commission to allow it to move KYW from Chicago to Philadelphia.

As one of the foremost innovators in the art of radio electronics, Westinghouse had the advantage of employing some of the country's best radio engineers. They set to work designing an innovative directional antenna system for the new 10,000-watt KYW transmitter site that was to be built at Whitemarsh, 12 miles north of Philadelphia.



This view shows the transmitter building and two of the four towers that Westinghouse built in 1934 for KYW at Whitemarsh, 12 miles outside of Philadelphia. Image is from a 1930s KYW publication.

The array consisted of four 200-foot steel poles that formed the four corners of a rectangle, spaced by a half wavelength on the long side of the rectangle and one-third wavelength on the short side. Each pole was mounted in an insulated cradle atop a 45-foot-tall lattice wooden base. The towers were fed by individual transmission lines from a phasing circuit that separately controlled the current and phase of each tower. For the ground system, 55,000 feet of copper wire was formed into counterpoise cages suspended horizontally 10 feet off the ground around the base of each mast.

The resulting figure-eight antenna pattern was designed to maximize signals over Philadelphia and Allentown while creating a null towards New York City to protect WHN. The raised tower bases were chosen to minimize fading at the edges of the KYW ground wave service area.

The KYW transmitter building and its contents were equally innovative. The colonial-style stone building was designed to blend in with the surrounding residential neighborhood. The custom-built Westinghouse transmitter was the first high-power rig to be completely operated from AC power, eliminating the use of troublesome DC motor-generators. It incorporated nitrogen-filled capacitors, which were more compact than the air-dielectric capacitors then in common use. All transmitter components were built on open steel frames which were completely enclosed inside a room-within-a-room. Interlocks on the doors prevented the operators from entering while the transmitter was in operation.

After several weeks of testing from the new site after sign-off in Chicago, Westinghouse made the official switch to Philadelphia on Dec. 3, 1934. In 1940, KYW's transmitter power was increased to 50,000 watts, and the station moved to 1060 kHz in the 1941 NARBA treaty nationwide frequency realignment. The original antenna system operated until 1949, when it was replaced with the two 450-foot towers that are still in use today.

Orient your directional antennas and tune in next month's August *Broadcaster* where we'll pick up with Part II of this story with WOR of Newark, NJ and WLW of Cincinnati. WLW was the first and only AM radio station in the United States ever authorized to operate with the remarkable transmitter power of 500 kW!



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