RADIO AGE

The Vintage Radio Journal of the Mid-Atlantic Antique Radio Club

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1ZP—BANISHED YOUNG RADIO PIONEER

BY ED LYON

A few months ago, a Bostonian, Marc Peloquin, contacted me to see if I could identify some old-time wireless apparatus from some photographs he had. After some Photoshop sharpening and gamma adjustments, I could piece together most of the devices in the pictures. But the story behind these pictures, much of it derived from Marc's research into scrapbooks and newspaper files, was memorable. Thanks to this research [1], I am able to relate the gist of the story here. Parts of this article are copyrighted to individuals.

In the first decade of the 20th century, Archibald (Archie) Thomas [2] was a quiet teen-ager who was deeply interested in the new art of wireless, or radio, as we prefer to call it. He was born on the island of Barbados in 1892, but in 1902, before he thought much about radio, his parents emigrated to America, landing in Boston. His father, James A. P. Thomas, was refused permission to enter the country, owing to what appeared to be a serious skin disease, but 10-year-old Archie and his mother were admitted, and went to Upton, Massachusetts to live. At the time Upton was a village west of Boston that was mainly rural in nature. Archie's father was returned to Barbados, was diagnosed as having leprosy (he probably had the disease for some time), and soon died. At the time, leprosy was considered a very contagious and deeply feared disease in most locations, but it was known that in this country over 95% of the population had a natural immunity to the disease, making it a rarity here. In Upton, Archie's mother worked as a hatter in a factory there, and graced with managerial skills, soon became supervisor of about 100 workers making straw hats. Meanwhile Archie went to school and grew up acquiring a serious interest in electricity and wireless, all the time seeking magazines, pamphlets, and books on the subject, all of which were scarce. Archie built simple transmitting equipment using small spark coils with small wire gaps, and at first simply threw a wire from his upstairs room to a tree to act as an antenna. Later he would erect a pole from which he hung the compulsory four or five wires, twisted into a rat-tail to enter his bedroom window. Receiving was always a more complex job than transmitting in the period before 1910, because nobody bothered with tuning components in the transmitter, but they were needed for reception; for detection he

Archie Thomas (picture courtesy Marc Peloquin)

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ABOUT MAARC and *RADIO AGE*. *Radio Age* became the monthly newsletter of the Mid-Atlantic Antique Radio Club in June 1994. Prior to that date, the *MAARC Newsletter* and *Radio Age* were separate publications.

Subscription to *Radio Age* begins with the next available issue after the membership application and dues are received. Dues are $20 per year in the US, $30 in Canada, and $50 elsewhere, all payable in US dollars*. Two-year, three-year, and life memberships are available; contact the Membership Chair . All checks are payable to MAARC and, for new members, must accompany the membership application, which is available from the Membership Chair or the MAARC website (www.maarc.org). If you change your mailing address, email, or phone number, please notify the Membership Chair immediately so corrections can be made to *Radio Age's* mailing list. The Post Office will not forward your newsletters.

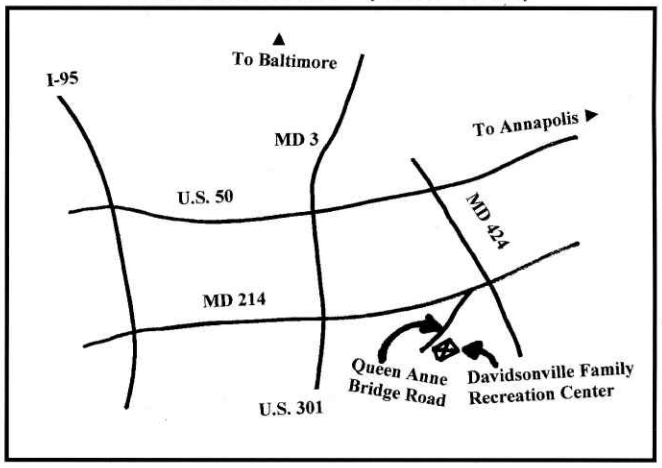
Back issues of the *MAARC Newsletter* from Vol. I, No. 1 (August 1984) and most issues of *Radio Age* from Vol. 1, No. 1 (October 1975) are available for $3.50 each postpaid from the Membership Chair. 10 percent discount on orders of 12 or more back issues and 15 percent on orders of 60 or more back issues. Make checks payable to MAARC.

Submissions to *Radio Age* are welcomed. Typewritten copy is preferred to handwritten. Articles should be submitted in PC format, preferably via email or on a CD or flash drive, in MS Word, Word Perfect, Wordpad, or RTF format, without fancy formatting, because the editors will have to modify it anyway. Photographs, if hardcopy, should be high quality black and white or color. Softcopy graphics files should be in TIFF or JPEG formats; contact the editors for further guidance. Send your submission to either editor and include your name, address, phone, and email.

MAARC MONTHLY MEETINGS. Most months MAARC meetings are held at the Davidsonville Family Recreation Center, 3789 Queen Anne Bridge Rd., Davidsonville, MD (map below). From U.S. 50, take MD 424 south for 2.5 miles. Turn right on MD 214 for 0.6 miles, and angle left on Queen Anne Bridge Road for 1.1 miles. The entrance will be on your left. April and December meetings are usually held at the Sully Station Community Center in Northern Virginia. Check the calendar on page 16 for details.

*** Note Dues will increase to $24 domestic, $36 in Canada, and $60 elsewhere as of 1 July 2012. Members can extend at current rates until that date.**

Map — Davidsonville Family Recreation Center (not to scale)



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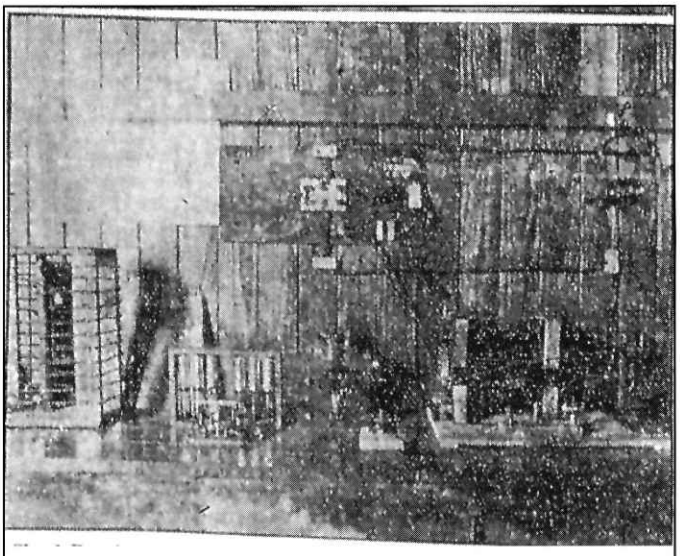
experimented with coherers, needle-against-carbon detectors, electrolytic cells, and mineral crystals, but could usually communicate only around his own neighborhood, especially limited by how far he could transmit with the small ignition coils he used to make sparks.

Possibly Archie's intense interest in radio was a way of putting the tragic separation and death of his father out of his mind, but in the process of his pursuit of the art, he learned about all the latest methods of sending and receiving wireless messages. Some of the strongest signals he could pick up were Navy stations, both aboard ships and ashore. He heard about the Navy's method of receiving through naval operator chit-chat, and their preference for loose couplers and rugged detectors. Most amateurs made up their own loose couplers, some with a single slider for tuning, but having a fixed antenna connection. This changed the selectivity with tuning [3], however, giving the operator a false impression of where the noise level was worst (was it at longer wavelengths or shorter wavelengths?), therefore many hams added a second slider to vary the antenna coupling. The best of the professionally-made loose couplers, or "receiving transformers," as the learned would call them, were more complex, even in those relatively early years of 1908 to 1910. They had multi-tapped fixed coils, movable secondaries (to get the "coupling looseness" desired), many of which were also tapped and switched for tuning, and most loose couplers had a sliding contact on the fixed coil for tuning. For detection, the Navy liked the sensitivity of Fessenden's nitrate barretter, but it was far too delicate, unless made more heavy in wire size, and thereby reduced in sensitivity. The Navy engineers leaned also toward the rugged crystal detector, not the later galena type, with its delicately positioned cat-whisker, but, instead, the carborundum or binary perikon types with firm contact between surfaces. It would be 1910 before these were commonplace in the amateur world. Archie's experimental radio work in Upton was probably done under a made-up callsign, as was the case with most amateurs before 1912; that was the year the law came down [4]. At some point, it is recorded [5] that he used "RO" as a callsign, mainly so others could direct messages specifically to him.

We can be sure that this lad read the scant available radio literature voraciously, including whatever component catalogs he could find, magazines, and books. Of course, much was also learned by word-



Picture (endnote 8, page 9) of Archie's radio setup soon after he arrived at Penikese. Left to right on table: helix, condenser jars (tubes), spark coil (rear), key (marble base), two detectors on board, and loose coupler behind detectors.

of-mouth (or, more properly, word-of-fist) in his radio contacts with others within range of his radio system. The problem for Archie was sorting out all these "facts," to find out which were legitimate. At his home in Upton, in late evenings and at night he was able to listen in on ships' communications to and from shore stations, in which operators often had good or bad things to say about their latest radio-room hookups, but he couldn't transmit a reply; the sea was just too far away. Strong nighttime signals like those from *SA* in San Juan or, later, the Navy's *NAA* time signals were handy for testing different detectors for sensitivity and reliability. Initially, he thought he had to have a good coherer, since that was what the Marconi systems used, and he heard signals from many ships that used Marconi systems. Experiments with electrolytic detectors were pursued,

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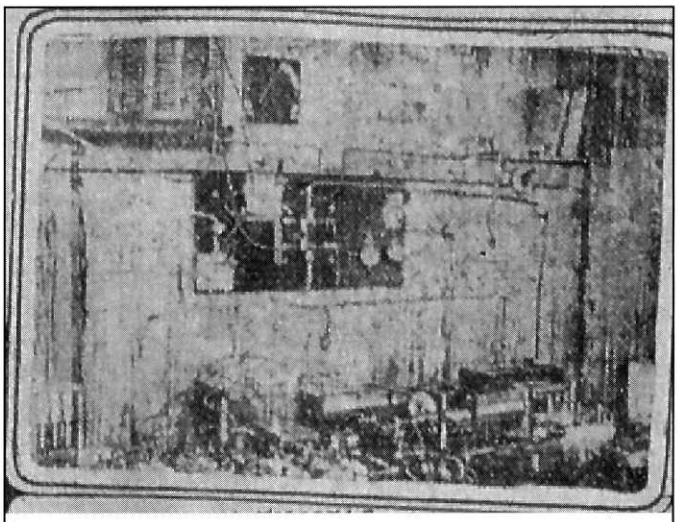
but they required purchase of a kit which included a half-inch length of Wollaston wire, such as that from Manhattan Electrical Supply Co. (MESCo). Fashioning the wire into a holder and then adjusting it to dip carefully into the vial of acid or potassium nitrate (he probably tried every chemical the local druggist could come up with) was painstaking, but yielded a good detector, good, that is, for a night or two, before the chemical would evaporate or get disturbed. He found that crystal detectors had the most promise, but there were many different kinds, and each had many critics on the airwaves.

In 1909 Archie was in high school, either a junior or senior, and in February he became ill with a pneumonia-like respiratory infection. Concerned because of the nature of her late husband's illness and death, his mother took him to specialists in Boston to see what the problem was. On March 22 he was officially diagnosed with leprosy, and within five days he was involuntarily enroute to tiny Penikese Island, 13 miles off Cape Cod in Buzzard's Bay, which the State of Massachusetts had set aside in 1905 as a leprosarium [6]. When Archie arrived there were perhaps 10 patients on the island, housed in small cottages on the northwest side of the island, while the medical and support staff stayed in two larger buildings to the east, where there were also storehouses, a large barn, and a pier, with its sheds. No one else was on the island; however Archie's mother, devastated that she was facing loss of the rest of her family, appealed to the authorities, and was allowed to go to live on the island with her son, supporting the staff as best she could.

She asked Archie what she could get him, aside from books and newspapers, to help him cope with his confinement and help make the days and months not drag so. He told her he wanted to continue tinkering with radio gear, so he could talk with his old radio pals, and make new friends on the outside. Furthermore in radio experimentation, he thought he would keep busy, keep his mind sharp, and possibly handle messages for the other patients, who were anxious to hear from their families or friends. News and mail came infrequently to the island, via small boat, while the New Bedford-to-Cuttyhunk ferry carefully avoided passing closer than 5 miles as it skirted the island. The administrator, Dr. Parker, agreed that a wireless would be good for all concerned.



Newspaper picture of Archie's setup after 1½ years at Penikese. Helix moved to spot high on shelf; two new loose couplers on right, old loose coupler rear center; several detectors on table.

His mother corresponded with the New Bedford Women's Club, and they graciously financed the construction of a first-class work-bench, tools, and a variety of radio components that Archie had listed for his mother to consider. She had to go to his radio friends back in Upton and New Bedford to shop for the components, for Archie's list was all Greek to her. The list included sufficient wood timber and guy wires to erect a 40-foot mast next to Archie's cottage at the Penikese Island compound. Archie had the foresight to know that he would need an antenna, and might not be able to erect it himself. As a result a couple of his ham friends came to the island, with special permission from the state health authorities, and erected the antenna mast and a four-wire vertical, sloping down to a rat-tail lead-in at a window near his radio setup. The antenna was barely large enough to handle transmission of signals of wavelengths up to perhaps 400 meters, but not efficiently. In the room under the mast Archie set up his radio gear, including his old Upton receiving kit, augmented by his mother's shopping spree, and the same small spark-coil transmitter he had in Upton, later improved in size, but only marginally. His tests showed he could receive quite well, as there was very little locally-generated electrical noise on the island, but he could not be heard when he transmitted, except by boats and ships transiting Buzzard's Bay, less than five or six miles away.

The figure on p. 5 shows the only known photo [7] of Archie's improved setup as of late 1911. Photos are especially scarce because the state forbid

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photography on the island, a measure to protect the privacy of the patients there. We are quite sure that Archie took the photo here. The transmitting gear is on the left, with the induction coil in the left foreground, and the large helix behind it. It appears that the induction coil might be a MESCo model of about "1/2-inch" capability, but it looks like Archie re-mounted it on a new base that has porcelain knob insulators at the corners to isolate it from the table. The tuning coil (or helix) is large, probably large enough for wavelengths well above the 200-meter limit that would later be set aside for amateurs, and it appears to be heavy enough to handle a kilowatt or more. Above the tuning coil and mounted on the wall can be seen a home-brew glass-plate capacitor for resonating the antenna and helix. The antenna feedline can be seen running to the right and upward to a lightning switch and the antenna monitor panel, on which are mounted two hot-wire ammeters to allow monitoring of antenna current under key-down conditions. The Morse key is visible on the right-hand edge of the transmitting area, just to the left of the receiving tuners. A large throw-over transfer-knife-switch is also prominent between the induction coil and the Morse key, for switching from transmit to receive, it also being mounted on porcelain knobs.

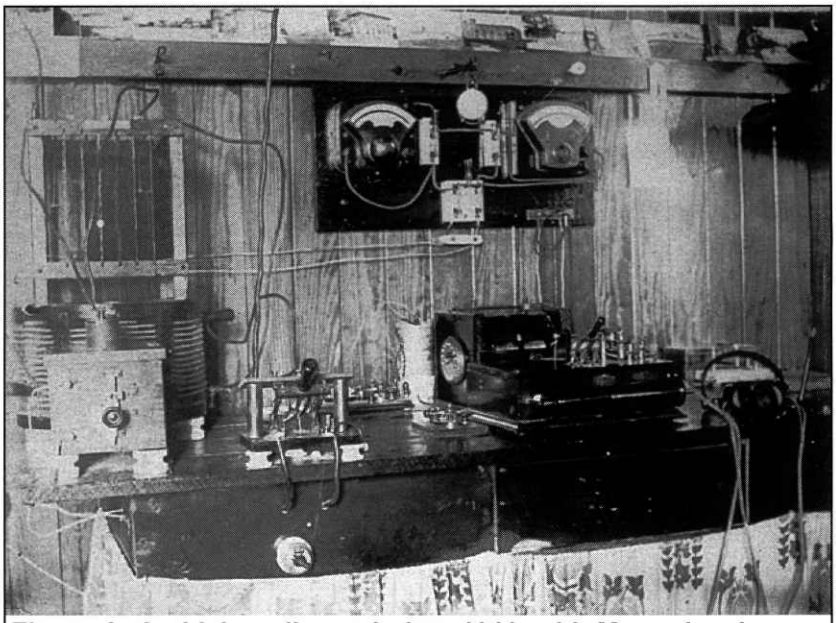

Figure A. Archie's radio set in late 1911, with Morse key in center, receiving gear to right of it, and transmitting gear to its left; note new spark coil, far left, with glass pane condenser on wall. Picture courtesy Marc Peloquin.

The receiving setup to the right of the transmitting gear is quite advanced for 1911. In the figure, there appears to be a United Wireless Telegraph (UWT) Type B tuner, which was fairly new, having been developed in 1907 by Harry Shoemaker, and first made in quantity in 1908 or 1909. Directly behind the UWT tuner is a loose coupler, which could well be home-made, but is similar to commercial units that came out a year or two later. It is likely that it is a commercial model, like MESCo's, Clapp-Eastham's or the like, that Archie modified by adding a tapped primary that he may have made up from parts. It has a slide-contactor on top, and the rotary switch contacts can be seen on the left end, apparently tapping the primary coil. The inner, movable coil can just be seen on the right end of this big outer coil. This receiving transformer, when used with the UWT tuner, makes the latter into a Shoemaker (UWT) Type E. This is not the same tuning system he had in Upton, since a picture he had taken of that system [8], right after having moved it to Penikese, shows a simpler loose coupler (possibly Murdock) that had one slider for tuning. To the left of the loose coupler, and behind the Morse key, is what appears to be a sensitive relay, possibly by Bunnell, with a coherer, both mounted on an ogee-edged baseboard. On the right of the loose coupler, behind the headphones, is a marble-based component that may be a barretter or electrolytic detector, not unlike models that were sold by Electro Importing Co. It looks as if Archie was still experimenting with various detectors, just like everyone else in radio at the time. And, of course, he spent far more time receiving than transmitting.

This is the setup most likely used by Archie throughout the 1912-1913 period. During this time he heard from many of his old contacts on mainland New England, and with ships and boats traversing the Cape Cod area. One such contact was Lester Jenkins of New Bedford, who was a reporter and wireless operator for the New Bedford Times newspaper. It was said that Jenkins had all the latest wireless gear in his setup, likely all purchased by the paper. All the while, Archie kept trying modifications to his receiving system, taking advice from Jenkins, no doubt, trying to get reliable sensitivity improvements. One of these improvements would be an Audion detector for his receiver, but that would be a year later on. Meanwhile the year 1912 had arrived, and with it came, as promised, the radio law, aimed at

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forcing commercial users to narrow their bandwidths, and for hams to move out of the way of commercial interests to "below 200-meters wavelength." The Commerce Department, for reasons tied into folklore, rather than science [9], interpreted this to mean that practically all hams would have to operate nominally on one wavelength, 200 meters. But 1912 also ushered in momentous events on Penikese.

Two staple items were habitually in short supply on Penikese: firewood (or coal), and fresh water. The firewood was needed to heat the main buildings and the four cottages for the patients, and for the main building's cookstove. As for water, there was no well, but there was a catchment reservoir and some pumps to allow collection of rainwater and snow. Trees, other than the fruit trees planted by the staff for food, were few and far between, making firewood scarce. In winter, the reservoir would freeze, and in that season and in summer, the islanders had to ration water most of the time. On January 13th, 1912, the long-standing island practice of saving, for firewood, all wooden packing crates in which supplies arrived on the island suddenly backfired. Creosote and tar from the green softwood used in these crates had built up in the chimney of the administration building, the former Penikese mansion of famous (or infamous) naturalist Louis Agassiz, and the chimney exploded in flame. Chimney fires are always serious, but the bitter windy weather at the time spread the flames immediately to fill the kitchen, then the whole building. Dr. Parker, his invalid wife, and her 85-year-old mother were quite lucky to escape with their lives, but all medical records and treatment research data were lost [10]. From his cottage Archie chanced to see the fire leaping high over the administration building, and he immediately sent signals out to any ship passing that there was a large and dangerous building fire on the island. His signals were heard at a salvage boat station on Cuttyhunk Island some four miles away and were quickly relayed to the revenue cutter Acushnet at the pier north of New Bedford, and to the tug J. T. Sherman, then at Cuttyhunk Island. The tug came to the scene towing a lifeboat with fire-fighters aboard. By manhandling the lifeboat through the ice-choked water near the pier at Penikese, the crew got to the site of the fire, and made sure it wouldn't spread to other buildings, for it was too late to save the administration building. The Boston-area newspapers carried dramatic stories of the "young hero and his apparatus" who helped save the islanders. But in a few weeks, after the reporters had left, the island returned to its former state, while Dr. Parker and his staff got along in one of the auxiliary storehouses, and Archie went back to trying to improve his radio system.

But, on the mainland, the nearly-catastrophic fire and Archie's radio calls to get help had got the attention of state health officials, the Massachusetts Board of Charities, and the District 1 radio inspector. All recommended that the island be equipped with an up-to-date wireless. Clearly, the place needed wire or wireless connection to the mainland. Jenkins and Archie's other ham friends in New Bedford and Boston appealed to the public and the Board of Charities to get him a decent transmitting capability, and the radio inspector began making plans to get Archie an official amateur license. He was looking ahead to the day when amateurs would have to be licensed and their spectrum occupation controlled. The New Bedford Times kept the island's plight in the newspaper, largely egged on by Jenkins, their wireless operator.

Archie's labors during the balance of 1912 were toward getting an Audion-equipped detector for his receiver. Jenkins and the other hams who had tried them had told him of the improvement in sensitivity and selectivity one could get with the Audion. Ever since 1911 he had heard both good and bad things about it. On the good side was its phenomenal sensitivity, made very tricky by the tendency of the tube to break into full ionization (the deadly "blue haze") with a consequent loss of all sensitivity to signals, producing, instead, a sizzling noise. Oddly there were several spots in the B+ voltage plot that yielded the extreme sensitivity, and moving off these spots caused loss in gain or the blue haze. Later, experimenters learned that the gassy Audion had several anode voltage levels where minor ionization occurred, in tiny pockets near the anode, and these gave the tube exceptional sensitivity to RF signals. It was when these tiny cells of ions broke-over into massive chain-reaction ionization that the tube became useless, and had to be cooled by removing all B+ and then re-applying the voltages, gradually. Archie found that several other amateurs he could work had Audions, even though advertisements for them were scarce to non-existent. He must have thought it strange that deForest would invent such a marvel, but couldn't seem to improve or promote it. In fact, though, deForest had actually tried selling simple Audion detector units as early as September 1909, copied from his 1907 Great White Fleet bridge-to-bridge radio complement, but nobody could afford them [11], and nobody seemed to know how to get

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them. But sometime early in 1912, Lester Jenkins told Archie about his Wallace Valve Detector, a box that used an Audion [12]. Someone, perhaps Archie's mother, then bought him one, for about $30.00, but apparently, the tubular Audion did not work, for Archie left no record of ever using the Wallace unit as received. In seeking a replacement Audion, he learned from Jenkins that Wallace also sold a tuned detector unit, which was basically a Wallace Valve Detector, but with a loose coupler/tuner added plus a wing bypass condenser for the headphones. This was something Archie could do himself; he didn't need Wallace's tuner or bypass capacitor. He could integrate the Wallace Audion-enabling components with his existing receiver/detector, and then worry about a replacement Audion.

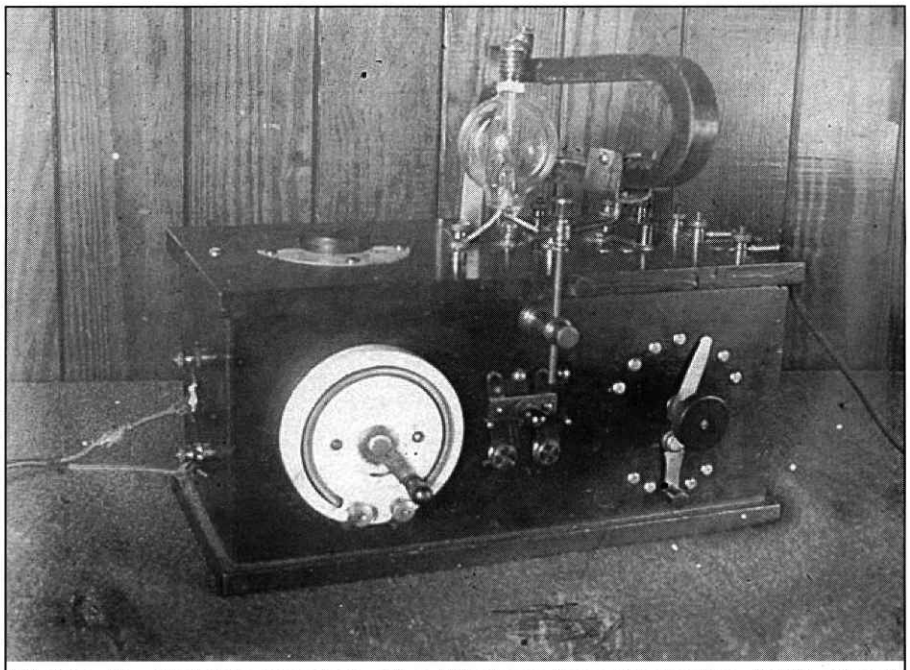

Figure B. Archie's version of a Wallace tuner/detector, built about 1913, likely first used in 1914. Note horseshoe magnet near Audion, and variable condenser scale on top of box. © Jean Oxanduburu 2012

So he went to his cherished workbench and began design and fabrication of a control box to house the Audion switches and rheostat from the Wallace unit plus a Blitzen capacitor (and its dial and knob), the bypass capacitor, and terminals for the loose coupler, battery, and headphone connections. But by the time Archie had completed the new tuner-cum-detector box (shown in Fig. B), Wallace was no longer in business, and tubular Audions were passé. The Audion was now globe-shaped, McCandless finding that style easier to manufacture. Jenkins helped him get one, which was no easy trick, now that deForest was back East and in charge, but luckily Archie must have saved his defective Audion (lucky because now you had to turn one in to get a new one). Archie obtained a candelabra socket for the new Audion, and mounted it on a bracket on the top of the box, where there was more room. It seemed that nearly every day Audion hints and kinks were being thrown out there in the airwaves for Archie to assimilate, and one of these made some sense to him. This was the rumor that placing the Audion in or near a strong magnetic field could bias the flow of current inside the Audion, improving the percentage of filament-generated electrons that actually passed through the grid and got to the anode or wing. Like several other amateurs he worked [13], he thought that the addition of a horseshoe magnet on the top of his box, with the pole-pieces of the magnet strategically placed near the Audion, and clamped there, might give him a

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FOR THE RECORD

The March 2012 MAARC meeting was held, as usual, at the Davidsonville Family Recreation Center, in very nice weather, allowing a brisk tailgating activity before the meeting. We had a well-represented Show-'n'-Tell and interesting program, followed by the usual auction that brought in about $70 for the treasury.

The April meeting of MAARC was held in Northern Virginia at Sully Station, with a very nice turnout in fine weather. At least 20 tailgaters were active in the lot. Willie's Show-'n'-Tell brought out some rarities, including a prototype sub-miniature radio by Bendix, a novelty booze-bottle set, and another great radio find by Geoff Shearer. We were treated to a presentation on a subminiature solid-state precision signal generator that can be made up for about $20 in components. The auction was smaller than usual, but the attendance was very good for this venue, with just over 38 members and guests present.

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further boost in Audion sensitivity at yet lower filament current, thus prolonging the tube life [14]. So he added the magnet and clamp assembly, probably supplied by his ham buddies in New Bedford. He also used a two-tier tap-switch to select B+ voltage, hearing that very careful selection of this voltage could maintain sensitivity at further reductions in filament temperature. (Archie was likely fixated on not losing another Audion.)

Archie Thomas's Audion detector is shown in Fig. B, this photo also taken by Archie [7], probably in early 1914. He was justifiably proud of this detector, we are certain. In the spring, donations and the Board of Charities allowed the New Bedford hams to purchase a good transmitting capability for Archie, to go along with the Audion receiver he had just completed. In addition, they brought out a crew who erected a good antenna, capable of operating at wavelengths as long as 600 meters. Although we have no picture of this new transmitter, Archie described it for the benefit of radio enthusiasts as being power-line energized, rather than battery-fed (like his old gear), using a Holzer-Cabot 110-volt a-c motor driving a generator producing 250 volts at 500 Hz, so that his new half-kilowatt induction coil could run directly from the generator, with no need for an interruptor. The new spark gap was a quenched gap, which Archie liked, mainly because it wasn't deafening when operated. He had two Blitzen helices, now, apparently supplied by Clapp-Eastham, and bigger capacitors, using two Leyden jars. The antenna was now a two-masted flat-top over 100 feet in length, with a six-wire spread, and a bigger rat-tail coming down the side of the pole and house to the operating room. About this time World War 1 erupted in Europe, and since most of the lepers on the island were of European descent or birth, they were most concerned about happenings there. Archie collected news from many sources, relying considerably on Marconi News that came in by wireless, and the volume of news in that channel was so great that Archie's mother helped by typing the island newsletter for him, letting him compose the stories as he received them [15].

With this new receiver setup and his new transmitter, Archie proudly demonstrated his radio operating skills for the District 1 inspector in mid-1914, and was granted a special amateur license, callsign 1ZP, operating legally on wavelengths of 200, 325, 400, and 600 meters. He began to work hams all around New England on 200 meters, while working ships and shore stations on the longer wavelengths, using the new detector to advantage, being able to slip his receiver's passband between interfering signals. His transmitter had a nice tone, not such a rasping voice as with the old interruptor, and he had developed a good fist, soon recognized by all the local traffic operators. Even though his authorization to operate as 1ZP was granted in the first half of 1914, Archie didn't show up in the Commerce Department *Radio Service Bulletin* listing new ham licenses until very late in 1914.

The new year 1915 opened with Archie and his mother working the radio and typewriter (respectively) to continue bringing news to Penikese Island. The final week of January heralded a plunge into the bitterest weather of the winter season, especially bad on the island. Sadly, by February his tubercular form of leprosy suddenly become quite severe, most likely aggravated by a bout of pneumonia, he weakened quickly, and died on the 17th of that month. A minister and an undertaker were summoned by boat (since nobody could work the radio), and came to inter Archie on the island, as he had requested. He was buried on February 20th in the tiny leper's graveyard on Penikese. In March 2015, the Commerce Department *Radio Service Bulletin*, in the column on license amendments, carried the simple notice: "*1ZP: Strike out all particulars*," a terse ending, indeed.

EPILOG:
Just a month before Archie's death, the Orlando (FL) *Morning Sentinel* carried a story of his radio system and how he was using it to help cheer the lives of the other patients on Penikese. The story concluded with an appeal to readers to send picture postcards to Archie, and his mail address was given. The news of Archie's death prompted many kind newspaper reports, from as far away as Toledo, OH, Utica, NY, and many major cities. His home-brew Audion receiver box turned out to be a forerunner of the deForest RJ9 model of Audion-receiver-in-a-box that came out in about 1916. His two-tier tap-switch for delicate adjustment of the Audion's B+ voltage was bypassed by deForest adopting a potentiometer for doing the same thing. Most of what Archie learned about using an Audion and keeping it alive was spelled out in detail by A. B. Cole, deForest's sales manager, in an article in a 1916 issue of QST. Archie's 1ZP callsign was reissued in May 1915 to a Ralph C. Waltrous, of Rhode Island.

(Continued on page 9)

(Continued from page 8)

After the Penikese Island lepers were transported by quarantined rail coaches to the Carville, Louisiana National Leprosarium in 1921, a patient there named Stanley Stein started a newsletter for the residents, much like Archie's (and his Mom's) much earlier. In it he had news of the outside world and news from within the institution, including interviews of some patients. One interview in 1944, with Hyman Small, one of the ex-Penikese patients, was published in the July 1944 issue. In it, Small recalled the "good old days" at Penikese, comparing them with their present (1944) conditions. Small noted that just the previous month (June 1944) he had glued his ear to the radio, hungry for news of the Normandy invasion, and that back in Penikese, he recalled Archie gluing his ear to the wireless to catch news of WW1 from Europe, spreading it throughout the colony by newsletter, some 30 years earlier, just as Stein was currently doing (July 1944).

References:

[1] Marc Peloquin obtained permission to search for and photograph most of the old newspaper clippings and related Archie Thomas personal history plus the two unique photographs of the wireless gear described here. The balance of research, mainly into the technology story-line and timeline was done by the author.

[2] The Department of Commerce lists Archie Thomas as "James A. B. Thomas" in their licensing records, but we have no evidence that his given name was anything but Archibald. Commerce must have confused his father's name with his.

[3] A Commerce Department *Radio Service Bulletin* (January 1915) remarked that operators may have to improve their selectivity by loosening the antenna coupling in their tuner to avoid being interfered with by the powerful Poulsen arc undamped wave transmitters coming on.

[4] Public Law 264 of 13 August 1912 required amateurs to be licensed in order to transmit, either as (1) regular amateur operators, with callsigns consisting of a numeral indicating the inspection district (1 through 9) plus two or three letters, the initial letter *never* being X, Y, or Z, (2) experimenters, working to improve the art, with ham callsigns, but always with X as the initial letter , (3) radio training or educational organizations, with ham callsigns, except with Y as the initial letter, or (4) special amateur operators, recognized as advanced or outstanding in their field, with ham callsigns, except with Z as the initial letter. Notables such as Hiram Percy Maxim (1ZM) and Clarence Tuska (1ZT) carried this class of callsign.

[5] As reported in the *Boston American*, Sept. 20, 1914.

[6] A Harvard-associated natural science school had been established on the island, which is located just north of the last island (Cuttyhunk) in the chain extending southwest from Cape Cod, just north of Martha's Vineyard, in the 1800s, but closed after a fire had razed it. The state assumed ownership of the island and established a quarantined hospital and home for lepers there in 1905. The island was an isolated leprosarium from 1905 until about 1920, when all the surviving patients were transported to the U.S. official leprosarium in Carville, Louisiana. A graveyard remains on Penikese, cared for by a school for disturbed boys located there. The ferry from New Bedford to Cuttyhunk passes by the island, stopping there as required.

[7] This photo and the picture of Archie's Audion receiver (Figs. A and B) are published here by permission of the owner and copyright holder, Mrs. Jean Oxanduburu, third-cousin of one of the nurses who cared for Archie and his fellow outcasts on Penikese.

[8] This picture of Archie's initial radio system on Penikese appeared in the *Boston Post*, Feb. 26, 1911.

[9] In the early years of wireless, nearly everyone believed that the larger the antenna, the farther would be the "throw" of the transmitter, and, practical operations supported this belief. Of course, the antenna was the principal tuned circuit in those transmitters: large antennas equated to long wavelengths, and vice versa. This was translated to mean that the longer the wavelength the farther one could communicate. It was hard to shake this belief, so that when the Commerce Department released all wavelengths below 200 meters to the hams, they all clustered to the longest legal wavelength, 200 meters, and before long the Department considered all hams to be operating at or very close to 200 meters.

[10] Including results of experimental medicine performed by a Dr. Honej which had negative (and final) outcomes for some 12 or more patients.

[11] It is reported by Tyne that deForest sold his 1910 detector box for over $100.

[12] For a good summary of this strange chapter in radio history, see *Tube Collectors Association Special Publication No. 15*, "The RJ4 Detector and the Wallace Mystery, by Gerald F. J. Tyne.

[13] One famous ham who swore by the horseshoe magnet adjunct to an Audion was C. Apgar, who was made famous by his interception and decoding of secret messages sent to Germany from the German operators at the Sayville transmitting station in 1916, precipitating the Navy seizure of the station.

[14] The sales manager for deForest, A. B. Cole, wrote in a 1916 issue of QST a complete compendium of how to get increased life out of the Audion.

[15] Archie Thomas had learned to type early in his confinement at Penikese, and issued a periodic "newsletter" for the staff and patients on the island, telling them of the news from the outside. The volume of news coming in after 1914, however, required him to enlist help in typing.

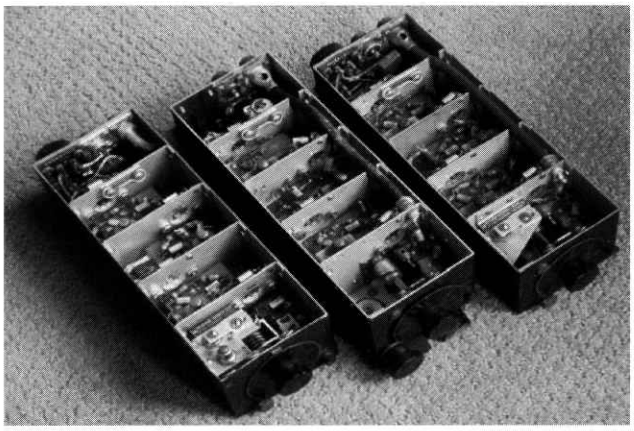
§§§§

Tidbits

1. MAARC member Jack Moir wrote recently that he discovered that those cheap 3-ring binders with the slick vinyl finish can be taken apart by slitting the vinyl, and the fibre-board inside then makes a good replacement back-board for that little table radio you found at the recent flea market. The thickness and stiffness is about the same as the original back, and it can be spray-painted to match the appearance of the original.

2. Jack also wrote remarking on Eric Stenberg's March article on restoring the black trim strips of his radio. Jack ran into the same type restoration working on a G.E. F-74 set, and found a substance called "gimp" in a craft store that worked out to be a good replacement for the original.

3. We received several comments on the ZB homing receiver adapter story in the March issue. One came from Phil McCoy, who enjoyed the article, and then correctly pointed out that the ZB adapter was actually a TRF unit that converted signals to the associated broadcast-band radio by simple diode detection, whereas we described the process as a superhet operation. Thanks, Phil, and glad you enjoyed the article. Alan Douglas appreciated the same article because it explained the purpose of those obscure war surplus pieces. He had bought many such goodies in the immediate postwar years, in part because they were very inexpensive, as they were not really radios and obviously of little use for the home, or even for the ham. Alan has a number of the ZB-series and ARR-1 series converters, and sent some pictures, one of them shown here.



4. And we must not forget that "Aloha-Joe" Sousa, who had been trying to win a rare Oriole receiver (made by Winther-Kenosha) on Ebay, did, in fact, eventually win it, but it arrived in somewhat damaged condition. This inconvenience, plus his six-week vacation on Kauai .....(yes, that was six weeks; it sounds nearly French!)... set back his schedule for refurbishing it and writing up the performance secrets of its cathode follower front end a bit. He has committed to generate the data for an article for these pages, don't forget, Joe.

5. Radiomuseum researchers have obtained actual output transformer design data (turns ratios, etc.) for small table-top radios of the 1950s and 1960s, and went through a detailed analysis of the function of the tapped-primary type that became popular here in the 'states, as well as overseas. An analysis done here some time ago showed that the effect on hum or additional B+ filtering was not spectacular, but it did relieve some of the d-c that would otherwise pass through the primary of the output transformer and tend to saturate the iron core. This latter effect was deduced based on tests of the effect of canceling some of the d-c in the primary on the primary inductance, and the result convinced us that the purpose of the tapped primary was to allow use of less silicon-iron in the core, a real dollar saving. But Radiomuseum research on a German radio of the period, using full-wave rectification, showed very effective hum cancellation, after all. But the conditions required use of a pentode output tube with unbypassed cathode resistance bias source, so as to get upward of 500K ohms plate resistance. Not too likely in a 50L6 in an AA5. Perhaps with proper selection of tap location, tube choice, and other circuit parameter choices, one could actually get by with less iron plus lower electrolytic condenser capacity, a win-win situation. Thanks to Ron Roscoe and Joe Sousa for bringing this to our attention.

6. Someone asked if a radio that used one or more transistors, but whose basic power came from crystal rectification of a nearby broadcast station's signals could be classified as a "passive receiver" for Old Equipment Contest purposes. This editor believes it could be so classified. We can imagine a basic crystal set that might produce a volt or two of d-c output, along with strong audio output, all owing to a powerful nearby broadcaster. That d-c component could be saved from being wasted, now, couldn't it?

THE "OTHER" FM RADIOS

BY ED LYON

This journal and many other media have expounded repeatedly on E. H. Armstrong's successful patent – wideband FM radio. We have been using FM radio of this sort ever since 1936 or so, despite counter-efforts by industry giants and FCC meddling, to broadcast music and other program material to the public. The beauty of wideband FM is that it is significantly free of interference from spiky RF burst noise and co-channel subordinate-signal crosstalk. But there have been other FM radio systems in use ever since the beginnings of Armstrong's FM research, and these have seldom received much notice. We attempt here to fix that situation.

WHEN John Renshaw Carson wrote his paper on modulation theory [1], he was attempting to explain how and why the bandwidth taken up by a radio signal can be no smaller than the bandwidth of the intelligence carried by the signal. The impetus behind the paper derived from claims being promoted by ill-informed radiomen that they had discovered methods of radio modulation in which a very narrow-band signal could be carrying program material, such as music, whose audio bandwidth far exceeded the signal bandwidth. These claims were becoming popular in the late 1920s when it was becoming apparent that we would need more broadcast band spectrum space to contain all the signals the burgeoning numbers of would-be broadcasters wanted to send out. Many of the schemes for "cheating" on Carson's Law, as it was dubbed, involved frequency modulation. The cheaters thought that they could confine the frequency swing of a station to a few hundreds of Hz and still broadcast hi-fi music. They apparently thought that in FM the frequency swing, or deviation, controlled only the loudness or amplitude of the audio program material, and that the program's audio frequency had nothing to do with the deviation. The proponents of the schemes felt that with each broadcaster taking but a fraction of his present channel-width not only would the spectrum hold more broadcasting signals, but each, being narrower in bandwidth than formerly, would be plagued with less noise, for everyone knew that the total noise power in a channel went up as the channel width was increased. It looked like a win-win situation, all right.

Edwin H. Armstrong, however, went against these schemes with his idea of FM for broadcasting. His insistence that the new service be conducted at VHF guaranteed reduced noise, relative to the old AM broadcast band, because "everyone" knew that the higher the absolute operating frequency, the less was the atmospheric noise. At least "everyone" had that part right. Then, he suggested that FM, being entirely different in concept compared with AM, would not be susceptible to noise bursts or spikes, which looked to him like AM signals. His resultant FM system used a lot of bandwidth; his experiments showed that the wider his FM swing the less was the susceptibility to noise spikes. Fortunately, his move of the whole system from the broadcast band region of the spectrum up to the VHF region (around 40 MHz) allowed the use of these new wide bandwidth signals. Today, we would class his system as a spread-spectrum system: it spreads the program spectrum (music and voice frequencies) over a 75 kHz band, making it less vulnerable to noise and jamming than any system that used the music and voice frequencies directly, as in AM or narrow-band FM.

This freedom from interference and noise enjoyed by wide-band FM (at VHF) became the main advertising feature of FM during the 1940s, when its proponents were trying to sell the system to the public. But broadcasting of hi-fi music and other quality programs was not the only beneficiary of this improved signal medium. Police and fire departments all over the country were alert to the promises made by several FM proponents that FM could have many advantages for their communications between base and mobile units. And the military took notice, encouraged by Armstrong, himself, who pushed FM as a jam-proof and difficult-to-intercept communications system, especially between mobile units, and between mobile unit and base. By 1940, Armstrong was also suggesting to the Army that they would soon need a new kind of radar – something entirely different than the pulsed systems that were being developed at the time by both the Signal Corps and the Naval Research Laboratory. Armstrong's radar would use FM (why am I not surprised?) instead of AM pulses. To sweeten the pot, he promised to donate free rights to all his FM inventions for any system used for national defense. So the engineers at Ft. Monmouth started a small project toward development of an FM radar, and Armstrong turned his own laboratory loose toward the same end.

Back in the civilian world, FM broadcast radio was still struggling to survive. Two major factors were trying to thwart its development: the war and RCA. The war (even the pre-war lend-lease period) was making major FM transmitter installations hard to accomplish – broadcasters and their contractors did not get high priority ratings from the War Production Board, and, after January 1942, most radio manufacturers were transitioning to defense production and not broadcast receivers. But there were exceptions. Some of Armstrong's corporate disciples had decided that FM might be a good way to carry out communications with mobile units. They had developed very good mobile transceivers and base stations that seemed perfect for fire fighters and police departments. Two of these companies were Fred M. Link Co., of New York and Radio Engineering Laboratories, better known as REL. Both

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companies designed FM base stations and vehicular radios for local New York-New Jersey police stations and fire companies. The nice thing about FM transmitters was that their modulators were low-powered, and did not require the huge vacuum tubes that AM transmitters used. This was convenient for mobile or vehicular installations, because the transmitter/receiver units could be built in matching enclosures, and sometimes both in the same small cabinet, the whole thing fitting easily in the trunk of the police car or in the cab of a fire truck or ambulance.

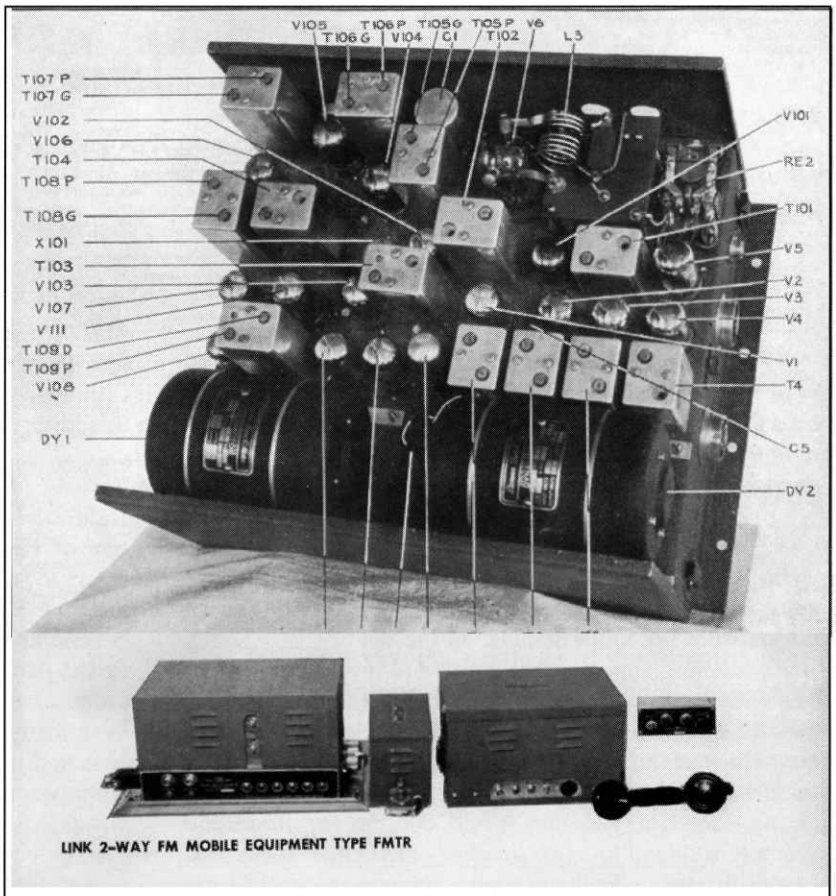


Figure 1. Upper photo is REL's "Victory" model transmitter-receiver. Link's 118-MHz version is shown below.

Figure 1 shows typical FM mobile radio sets from these two companies. Both use the Armstrong designs throughout, with no short cuts, like ratio detectors or superregenerative front-ends, and, as a result, their receivers had typically 10 or 11 tubes, and the transmitters had about 8 or 9. Dynamotors supplied the power for the transmitter, and sometimes for the receiver, as well, but in many designs, vibrator supplies, just like in ordinary car radios of the period, were used. These FM sets operated in the 20 to 40 MHz region of the spectrum. There were, at the time, two general areas these radios could be licensed for, 20-28 MHz and 35-40 MHz. These frequencies were high enough to escape the worst of the atmospheric noise (caused by lightning in tropical thunderstorms, in which there are an average of a million such strokes each hour). Above 20 MHz, there is poor propagation of radio signals from the tropical regions to the US northern tier of states, especially at night, and, of course, FM receiving techniques tend to ignore most of the AM crash static that constitutes atmospheric noise. Later (in the early 1950s), Harvey Radio (Cambridge, Mass.) developed very similar police and fire department fleet radios in the 152-162 MHz band, in a basic 30-watt vehicular size and in a fixed-base model running at 250 watts.

Aside from his encouragement of Link and the REL crowd, Major Armstrong was also in constant contact with Army brass at Ft. Monmouth and in Washington. He pointed out several distinct advantages of FM radio for Army vehicular use, especially in tanks. US tanks used gasoline engines, and therefore made spark-plug RF noise, which made radio communications difficult. Armstrong devised a series of tests for the Chief Signal Officer in 1940 showing the quality of voice communications from tank to tank and from tank to home-base when his FM was used, relative to that obtainable with the then-current AM tank radios. Armstrong ran tests at 25 MHz and at 35 MHz, obtaining similar results, with possibly a slight edge given to the higher frequency. Army engineers objected to the use of quartz crystals for frequency control in these trial radios, though, insisting that the US supply of quartz suitable for this use was severely taxed already, and that they would never be able to get enough for all the vehicular radios they would need in a real war. Tests were repeated, this time with the radios set for manual tuning, and the results were not so spectacular. Tank vibration levels were serious, and tuning was difficult to maintain in a network of radios supposed to be working with a single controlling station. Most of the problem was in operator functions, not mechanical/electrical stability. Radio operators had a difficult time tuning in a desired station with the tank bumping over rough terrain.

Then Armstrong pointed out that not only would his crystal-controlled FM sets provide clear communications to the tankers, but the same radios, free of all the weight and bulk of AM modulators, could be devised as man-packs and for spotter aircraft, tying the whole battlefield together for coordinated attack or defense. Then he added a casual comment that in addition, the enemy would not be able to eavesdrop on the tactical FM radio traffic, because the Germans and Japanese used AM, and FM is not readily demodulated by AM receivers. This sounded to the Army brass like some sort of miracle. Here was everything they could ask for in a battlefield radio system. They decided they had to have FM for their tactical radios, no matter that the quartz situation was critical [2]. A series of quick trials were put together using Link and

(Continued from page 12, Other FM)

REL FM police radios in some trucks, tanks, and Jeeps, each vehicle also equipped with an AM capability, for backup. Most of these AM sets used the reliable BC-312 receiver, and the tanks had BC-223 25-watt AM transmitters installed. A few vehicle operators also carried BC-222 man-pack VHF AM transceivers, but found them almost useless, for except in open Jeeps there was nowhere to deploy the whip antennas, so these radios were used only for pre-test setup and coordination by dismounted troops. These tests were conducted at Ft. Monmouth, NJ, and Aberdeen Proving Ground, MD, and showed rather convincingly that the FM radios were far superior to the AM sets of the period, producing clearer sound with no interference from vehicle engines or .other radios in operation. The AM radios were interfered-with by the subharmonic of the FM frequency in use, no doubt caused by incidental feedthrough of the fundamental in the FM transmitter frequency doubler [3}. Careful retuning of the offending FM transmitter stage tank circuit took most of this interference away, but it continued to be a problem. The reason the main FM signal itself did not cause interference to the AM radios was simply that the FM sets operated in the 20-30 MHz band and the AM radios did not tune above 18 MHz.

The Signal Corps technicians were skeptical about Armstrong's strong sales pitch before the tests, but were quickly convinced that FM might really prove superior in the battlefield [4]. An Air Corps captain, "Pete" Quesada, who heard of the tests came to Ft. Monmouth for a briefing on the results, and was treated to a hands-on test in a tank, where he communicated with another tank and a mocked-up headquarters radioman on FM, all the while accidentally jamming attempted communications on AM on half the frequency used by the FM channel. He pressed for the Signal Corps to devise a version of the Link FM transmitter/receiver for aircraft use, mainly by reducing its weight through the substitution of aluminum alloys for the steel used in the vehicular radios, and by adapting the dynamotors for 24-volt use. Quesada's pet project was close-air-support of ground forces by strafing fighter planes, and his pet dread was accidental fratricide of friendly troops. Good universal jam-proof radio was the answer, he felt. He added that it might also be good to make a man-pack version for dismounted troops. So thus was born the basic design of a series of FM vehicular radios with companion models made for use in aircraft and in portable form, as well. These radios were largely copied from the REL and Link police radio concepts, but with some innovations and simplifications, by Western Electric, forming the SCR-508, SCR-509, and SCR-510 suites. Later versions for vehicles became the SCR-528 and SCR-538. While these sets were being developed by the phone company engineers, an advanced development team at Western Electric offered simplified versions of vehicular/man-pack FM radios, called SCR-293 and SCR-294, the two types comprising a receiver/transmitter (BC-500 in SCR-293) and a receive-only box, called BC-499, in SCR-294. A battlefield headquarters might use one SCR-293 and several SCR-294s to monitor other channels. Link, already swamped with police radio orders, was slower to respond, but developed an interim series called SCR-298, closely patterned on their 35-UFM 35-watt transmitter and 11-UF receiver, already in production and being installed in police fleets throughout the east.

The well-liked "Walkie-Talkie," SCR-300, a good FM transceiver built by several manufacturers.

These initial versions operated in the 20-27.9 MHz band, and used crystal control, but could be switched to VFO-control. Later, a series of very similar radios was developed in the 30-39.9 MHz band. The earlier models also used octal tubes while most of the later models used loctals, to reduce the tendency for the tubes to loosen due to vibration and shock. They also configured an SCR-600 series of aircraft and vehicular radios that would be compatible with the beloved SCR-300 "Walkie-Talkie," a 40+ MHz FM hand-held set that worked well in the field.

Quesada, soon a colonel, became General Patton's air coordinator, and he put together a very effective and safe set of close-air-support battle-plans [5] that were very beneficial in Patton's high-speed thrusts from France well into Czechoslovakia, and then back again to help rescue the Americans in the Battle of the Bulge in December 1944. That battle was turned in favor of the Americans by two forces, one important one being the change in the weather from stormy and snow-laden to bright and sunny, enabling air support, but the other being the use of FM by US troops and AM by the Germans. For the first time in warfare, the battle was joined by B-24 and B-17 aircraft carrying JACKAL jammers, which broadcast high-powered broadband RF noise from belly-mounted antennas carried by these big aircraft. The frequencies covered included both the US 20-27.9 MHz band and the 30-39.9 MHz band, and extended upward to about 55 MHz. The German communications capability was reduced to hand signals and blinker-lights, but the American tanks did not notice the jamming, except for an occasional dropped syllable. Even when the JACKALs were not in use, the American FM

(Continued on page 14)

(continued from page 13)
signals would disrupt German signaling, while the converse was absent.

Of course, this advantageous use of FM in wartime was made possible by the breakthrough in quartz crystal manufacture that was largely attributed to the scientists at Western Electric and Bell Labs, Mason, Cady, and Lack, who developed the AT-cut quartz crystal [6]. Aside from this form of crystal being useful over a wide range of temperatures, its cut multiplied the extant yield in useful crystals from raw Brazilian quartz by a factor of about 20. This enabled the manufacture of the hundreds of thousands of frequency-control crystals needed for these tank/man-pack/aircraft radios. It is doubtful that radio designers could have made VFO-controlled transmitters and manually-tuned receivers stable enough for the VHF (and near-VHF) operation that was essential for wideband FM employed in close-air-support of ground troops, where there is no time for fiddling with controls, especially in a vehicle or aircraft.

References:

[1] Carson, J. R., "Notes on the Theory of Modulation," *Proc. IRE*, **10**, *1*, pages 57-64, Feb. 1922.

[2] Lyon, Ed, "Making Radio Signals Stable," *Radio Age*, **27**, *7*, page 4, ff., July 2001.

[3] All the Army FM sets, and all in use by police and firemen in the civilian world utilized the genuine Armstrong system, in which the transmitter used a crystal oscillator that was phase-modulated by the audio signal, followed by several stages of frequency doublers and triplers which converted the phase modulation to frequency modulation.

[4] The most severe form of interference in battlefield AM radio was caused by heterodyne whistles among many transmissions on the "same" frequency. Armstrong type FM radio, though, used clippers and similar forms of amplitude limiting, so that only the strongest signal was heard on any channel. Interference was possible, just as in AM, but in FM it simply comprised clean substitution of a stronger signal for the one you had been listening to. In this way, FM transmitters became good AM radio jammers, but AM radios were poor FM jammers.

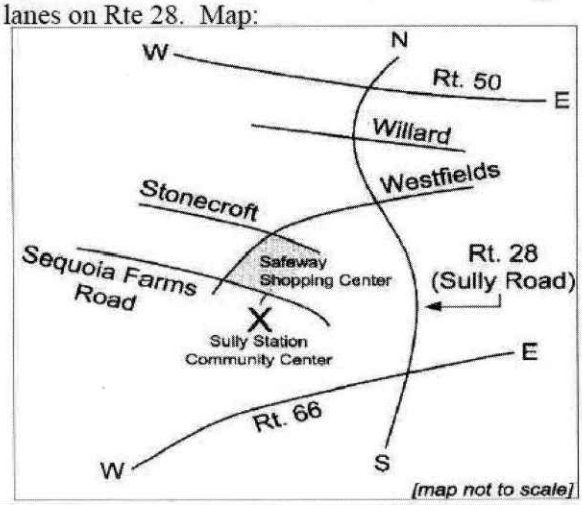
[5] So well respected were these plans that when Col. John Rothrock was asked to formulate a close-air-support general battle plan for the 1991 Gulf War he dusted off the Quesada plan and adapted it for the planes, vehicles, and radios that were current, and it was followed rather closely, with repeated success, with Gen. Schwartzkopf replacing Patton.

[6] The AT cut was very thin and relatively small in overall size. It was also relatively immune from frequency drift due to temperature changes.

The original "Handy-Talkie," shown here, also operated FM, made by Motorola.

OBITUARY - We were saddened to hear that a long-time MAARC member and well respected gentleman, John Robinson, died in early March 2012. John lived in Springfield, VA, and before he retired, he was a manager at the FCC for a long time. After retirement he attended most MAARC meetings and events, and was a volunteer at the Radio and Television Museum in Bowie. MAARC extends condolences to John's family and friends.

Remember, the **December** and **April** MAARC meetings are held at Sully Station, near Dulles Airport. Also note that the intersection of Rte 28 and Westfields is a full cloverleaf, with local bypass lanes on Rte 28. Map:



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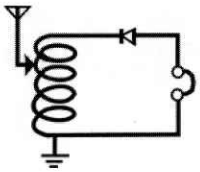
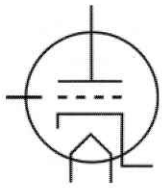


Ads are free of charge to club members. Please, one ad per member per month, limited to 100 words. All ads are subject to editing. Ads will not be repeated unless resubmitted. Send ads to editors, whose addresses are on page 2. The usual deadline for **receipt** of ads is the 1st of the month **preceding** publication.



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Book: Mahlon Loomis, who experimented and demonstrated Wireless in 1864, by sending signals 18 miles using 400-foot wire antennas, and keying same to ground using free power available at 2000 foot elevations on top of mountains in northern Virginia. Loomis received a patent in 1872 and Corporation Charter by US Congress in 1873. Describing his work and the File in the US Library of Congress is the book by Thomas Appleby, **Mahlon Loomis Inventor of Radio**, (c) Copyright 1967, 188 pages, now available for $35 + s&h $5; Contact Svanholm Research Laboratories, 1604 Elson St., Adelphi, MD 20783 , n3rf@earthlink.net , http://N3RF.home.netcom.com

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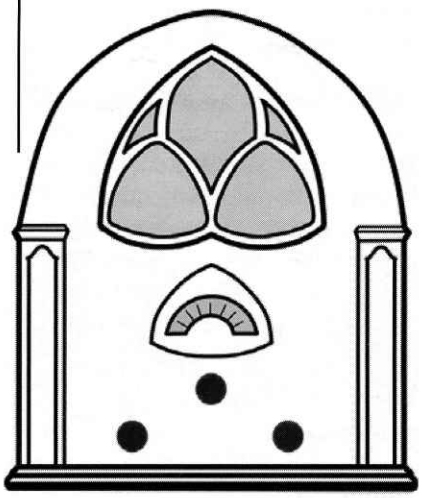

MAARC Your Calendar!

Sun., May 20	MAARC meeting at the Davidsonville Family Recreation Center. See p. 2 for map and directions. Tailgating at 11:30, meeting at 1:30. Display table radio year = 1949, Presentation: Don Cavey on the Blonder-Tongue agile modulator.
Thu.-Sat. Jun. 21-23	MAARC annual convention, RadioActivity-2012, starts Thursday evening with special tube/estate/ephemera auction, then full day of fleamarketing, seminars, old equipment contest, banquet, and entertainment Friday, then seminars, huge auction and more fleamarketing Saturday. At the Sheraton Washington North, SW corner of I-95 and MD Rt 212, in Beltsville, MD. Contact: Chris Kocsis, e-mail address p. 2. For full agenda, see blue centerfold, March and April 2012 issues of *Radio Age*.
Thu-Sat, Jul 12-14	**Extravaganza-2012—See ad, page 15**
Sun., July 15	MAARC meeting at the Davidsonville Family Recreation Center. See p. 2 for map and directions. Tailgating at 11:30, meeting at 1:30. Display table radio year = 1950, Presentation: Perhaps Paul Bernhardt, The NRL Rail Gun.
Sun., Aug.19	MAARC meeting at the Davidsonville Family Recreation Center. See p. 2 for map and directions. Tailgating at 11:30, meeting at 1:30. Display table radio year = 1951, Presentation: TBD.