The Jersey Broadcaster

NEWSLETTER OF THE NEW JERSEY ANTIQUE RADIO CLUB

December 2004 Volume 10 Issue 12

MEETING/ ACTIVITY NOTES

MEETING NOTICE

HOLIDAY PARTY

Saturday, December11th at the David Sarnoff Library, Princeton NJ

Social Hour: 5:00 PM Buffet Diner: 6:00 PM

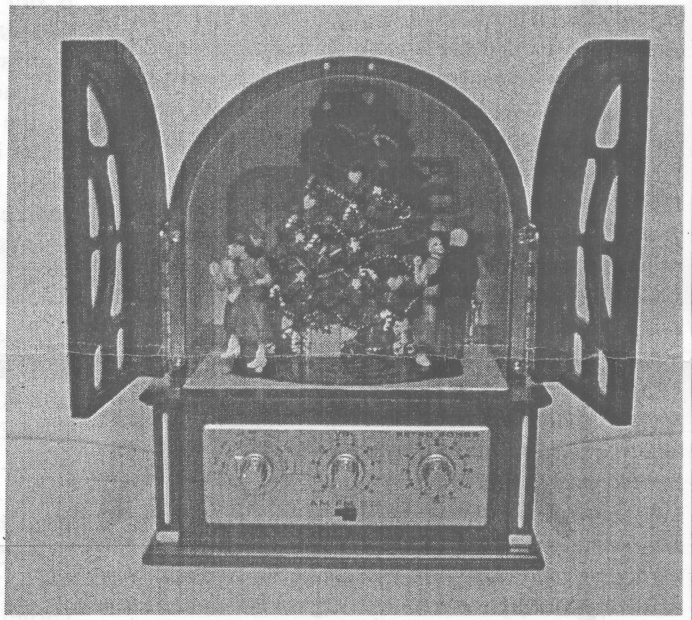
(Don't forget your grab bag gift)

Reported by Marv Beeferman

Failure to receive last month's *Broadcaster* can't be blamed on the Post Office...work commitments which included an outrageous schedule took precedence over the November issue. On the positive side, it was a nice break from a consecutive string of over 100 issues based on less than 1% of material contributions from NJARC members.

Membership secretary Marsha Simkin reports nearly 65 reservations for our upcoming holiday party on Saturday, December 11th. Our host, Sarnoff Library Director Alex Magoun, has graciously offered use of the library area for the 5:00 - 6:00 PM social hour (snacks and soda) preceding the buffet in the auditorium. Unlike previous years, there will be no radio scavenger hunt or contests and you don't need to bring a desert. However, to participate in the Mystery Grab Bag, you'll need a wrapped, radio-related gift (new or used/$15 to $20 value). If tradition holds true, participating is more fun than watching, so, for our new members, here's how it works...

Each participant's name is placed in a hat. Two gifts are chosen at random and marked "Do Not Open." The first person whose name is drawn may select a "Do Not Open" gift (which cannot be unwrapped until the end of the game) or any other un-opened gift. This gift is unwrapped and shown to all players. A second person's name is then drawn and a gift is selected but not opened! This person has a choice to either exchange it unseen with the first player's **unwrapped** item or keep it. If a "Do Not Open" item was selected, it remains wrapped under all conditions. If any other item was chosen and not "swapped" with the first player's unwrapped gift, it is unwrapped and shown to all players. If a swap was made with the first player, the first player unwraps the gift and shows it to all players.



A new novelty radio for the holidays...see page 3

Play progresses with each new player having the opportunity to "steal" any unwrapped item in the "pot" in exchange for a wrapped item that was chosen. To add a little spice to the game, the two gifts marked "Do Not Open" may be chosen or stolen, but not unwrapped until the game is over (all names have been selected).

A few simple rules: 1) People left with "Do Not Open" gifts at the end of the game (all names drawn) are stuck with what they are left with...no exchanges allowed. 2) You need to keep your unwrapped gift in view at all times...it can't be hid behind your back, in your pocket, under your skirt or in back of the curtains on the auditorium stage. 3) "Abandon good nature, all who enter here!" Spite, malice, ill-will, malignity, retaliation, revenge and reprisal are all encouraged. To get in the mood, you might want to fantasize about November 2nd...just think about your opponent as a red or blue state resident (depending on your persuasion).

In the October issue, we featured the club's relationship with the Infoage Science-History Center and urged mem-

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 $20 per year and meetings are held the second Friday of each month.

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bers to join this great undertaking. This month, we'll talk about another important New Jersey landmark that the NJARC is proud to partner with...the David Sarnoff Library.

David Sarnoff is considered an icon of international reputation and is immensely relevant to both today's world of electronic technologies and to the history and development of radio technology encouraged by the NJARC. The David Sarnoff Library, with NJARC member Alex Magoun as its director, is an unendowed 501(c)(3) non-profit organization containing Mr. Sarnoff's papers as well as artifacts, memoirs, reports, lab notebooks, publicity, serials, and over 25,000 photos documenting developments in radio, television, computers, electron microscopy, integrated circuits, digital cameras and many other technologies. Visitors to the Library can compare the changing uses of radio, television, computers, and other inventions with their uses today. They can examine the roles of the many people who define inventions and the uses of a technology, from an idea on paper to the product and application we take for granted.

In addition to the archives and website (daviddarnoff.org), the Library is working with the New Jersey Principals and Supervisors Association and the New Jersey Antique Radio Club to develop the "Innovarium" concept. This interactive learning center will contain exhibits on David Sarnoff's role in leading the innovation of communications technologies and interactive workstations for classes in everything from history and science to engineering and leadership.

The NJARC Board of Directors is encouraging all NJARC members to help in this effort by considering joining the Friends of the David Sarnoff Library. Your annual membership will help maintain the Library's staff to organize, preserve and make available the collections as they join with other organizations and individuals in making Library a dynamic center for innovation studies. A membership application is included in this month's *Broadcaster*.

A lot has transpired since the October issue; here's some highlights:

•The October meeting featured a talk by Scott Marshall questioning the paternity suit over who actually was the "father" of modern (electronic) television. Urban legend? Media hype over a cute story about farming in a haypotato-field? Whatever the case, Scott makes a good case for which came first - the Zworykin chicken or the Farnsworth egg. Perhaps we can have him sum it up in a future article.

•The November 7th swapmet at Hazelet went smoothly - some concern about enough tables evaporated when a cache was discovered in a back room. For those awaiting canceled checks, don't blame this one on treasurer Sal Brisindi. I forgot to turn over the advanced reservation money. We'll try to include some photos in this month's *Broadcaster*.

•Work continues at InfoAge...with a little help from our friends, the cottage is taking shape.

•We'll have a report on November's Homebrew Contest from Sal Brisindi.

•An "open to the public" repair clinic will be held on January 29th at the Sarnoff Library. We're also planning a "member auction" for the January meeting...a good chance for a Winter cleanup. We'll have all the details and rules in the December *Broadcaster* and on the NJARC website. If you have an idea of some of the items you plan to offer, e-mail them to me for a little advanced advertising.

John Ruccolo posted a revealing piece on the NJARC Reflector regarding tube prices in the latest Newark Electronics catalog. He noted that "it really makes you appreciate the NJARC Tube Program!!" Thanks for the plug, John...

5R4GA..... $69.18
5U4GB..... $36.11
6BK4C..... $201.42 (Just in case your 1968 Zenith 23" color set needs one.)
6H6..... $37.39
7F7..... $65.78 (Who the hell uses this tube?)
25AV5GA..... $75.12
50L6GT..... $52.23 (My personal favorite!)
812A..... $221.61
304TL..... $1,603.84 (Weren't these like 50 cents after the war?)
931A..... $215.23 (Make sure you pull this from your B+K Analyst before you junk it!)
931B..... $197.90

THE "RETRO" MUSIC RADIO

(see page 1)

By Marv Beeferman

OK you novelty radio collectors...here's one that combines it all. Dubbed the "Retro Music Radio" (from Mr. Christmas - http://www.mrchristmas.com), the doors of its cathedral-shaped cabinet open to an animated 50's Christmas scene. In the "retro mode," the Christmas tree lights up, the figures rotate as if they are dancing and 12 different songs play in sequence (each for about 40 seconds). The songs include such traditional favorites as "White Christmas," "Santa Baby" and "Jingle Bells" and retro favorites like the Diamond's "Little Darlin' " and Buddy Holly's "Peggy Sue." The unit also gives you the ability to select each song individually rather than in succession.

The 10" high unit can also be used as an AM/FM radio but reception is limited mostly to local stations and fidelity is not all that impressive. Unfortunately, the dancers still do their "shtick" even in the radio mode. The radio is powered by three, 1-1/2V "C" batteries or a 6V AC adapter (included). Shop around for this one; prices start at $69.95 and drop from there.

2004 HOMEBREW CONTEST

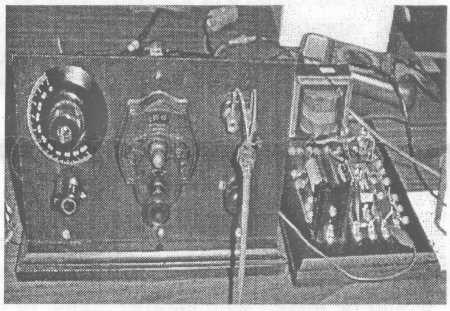
By Sal Brisindi

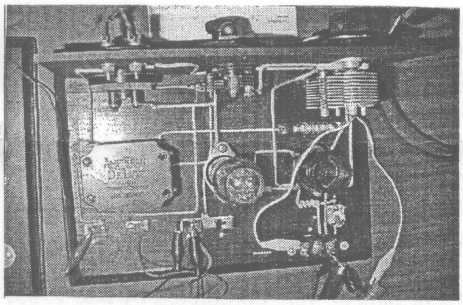
Compared to last year's turnout with over 10 entries, interest in the club's 2004 home-brew receiver contest was a little disappointing. However, both entries deserve a lot of credit for their originality and craftsmanship.

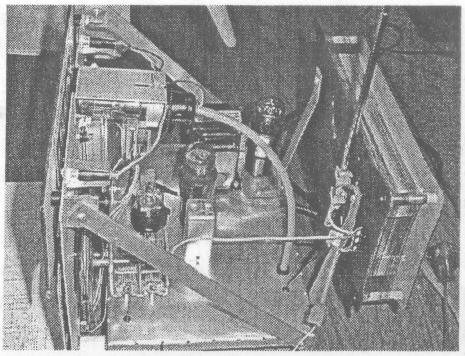
John Acacia entered a multiband regenerative radio based on a 1936 Jones Radio Manual. The heart of the receiver is a 2 volt filament #19 twin triode. John said he gathered all the parts from our swapmeets and auctions and wound 6 plug-in coils to cover all the bands. John spent some 50 hours in building the set, rewinding ticklers and experimenting until he could get his creation to work just right. With 20 feet of antenna wire, he was able to listen to stations in Germany, Canada and Cuba. Success was all the more sweet for John since this was his first tube radio built within the last 50 years.

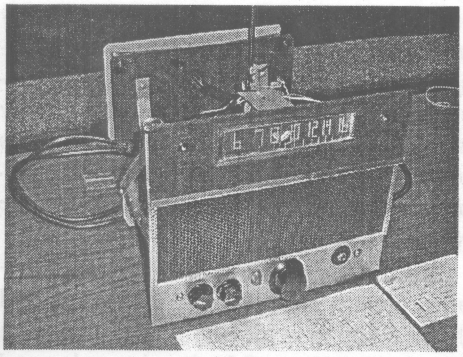
Walt Heskes entered a superhet with grid leak detection using a 6A8 mixer and a 6AD7 for audio output. Nice touches were an eye tube for tuning and an edge lit dial glass with two #47 light bulbs. The dial glass was made from Plexiglas and the numbers burned in with a sharpened soldering iron. The chassis was fashioned from aluminum and the dial pulleys were made from HO train wheels glued together. The antenna consists of two loose-coupled coils wired in parallel. In his acceptance speech, Walt thanked Marty for the Lexan, Owen for the transformer, Sal for the neon pilot light and K. Hertz, the Radio Muse, for inspiration.

The happy winners!







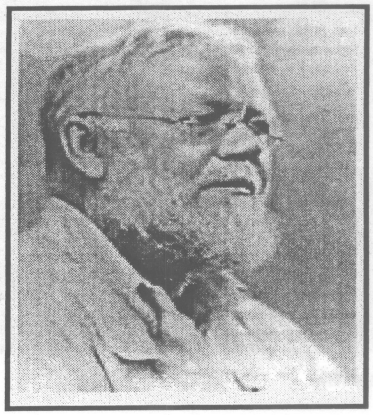


REGINALD FESSENDEN- THE FORGOTTEN FATHER OF RADIO

Edited by Marv Beeferan

From time-to-time, we attempt to offer general interest articles with less of a technical content. The following is based on a piece by the same name by William S. Zull published in the Summer 2001 edition of "Invention & Technology"...Ed

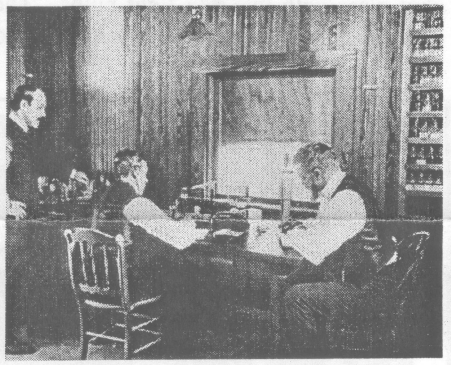
PART II



Fessenden began his daring vision of making a signal leap 3,000 miles by establishing experimental stations at Machrihanish, in Scotland, and at Brant Rock, Massachusetts, a small seaside community near Plymouth. In July 1905, he moved his family into a cottage at Brant Rock and set about building a 400-foot-high cylindrical tower.

The stations at both Brant Rock and Machrihanish were completed by late 1905, and on January 10, 1906, the world's first successful transatlantic wireless two-way transmissions were made. However, atmospheric conditions made it impossible to exchange successful transmissions every night, and, as the days grew longer, signals began to fade. Finally, transatlantic communications had to be abandoned, not to be resumed until October.

By that time, Fessenden had taken another great step. For years he had realized that the key to achieving greater clarity in the transmission of both telegraphy and telephony lay in the use of higher frequencies. The plan required a way to convert audible signals into higher-frequency electromagnetic waves, transmit them, and then convert them back to sound at the receiving end. In attempting to solve this problem, Fessenden came up with a pair of epochal advances, one theoretical and one practical.



In 1906, Fessenden achieved 2-way voice transmission between Machrihanish, Scotland and Brant Rock Station, Mass. (Marconi had sent radio signals from England to Newfoundland in 1901, but only one-way and in Morse Code.)

The theoretical advance turned out to be the most enduring of Fessenden's many inventions, the heterodyne (Greek for "different power") principle. This principle is based on the fact that when two vibrations are created at the same time, additional vibrations, known as beats, will be heard at the sum and difference of their frequencies. Not long after he began his experiments with wireless telephony, Fessenden had seen how this principle could be used to transmit sounds.

He would send out a high-frequency signal that was modulated (varied in frequency) by a speaker's voice. That signal would be mixed with another signal of the same high frequency, except this one would be held constant. The two signals would differ by the amount of the modulation - in other words, by the frequency of the sounds being transmitted. Therefore, the beat frequency, equal to the difference of the two, would reproduce the voice that had modulated the original signal.

Although considered a simple principle today, in 1905, the concept of heterodyning was way ahead of its time. Anyone receiving the signal would need to have expensive and probably finicky apparatus on hand to generate a matching frequency. It would take the addition of the vacuum tube, which was integrated with Fessenden's principle in Edwin Armstrong's superheterodyne system in 1912, to make voice transmission simple and reliable enough to become widespread.

Fessenden's great practical advance would also be important in future radio developments. Since humans can hear up to about 20,000 cycles per second, he wanted to transmit at well above that level. But the best alternators on the market could generate signals only as high as 10,000 cycles. In the fall of 1904, though, Fessenden hired General Electric to leap forward an order of magnitude by building him a 100,000-cycle alternator.

A little-known GE engineer named Ernst Alexanderson came up with an innovative design that included a pair of disks moving in opposite directions, sandwiched around a rotating armature. Throughout 1905 and 1906, Fessenden peppered Alexanderson with suggestions on how the design might be improved. While most of his ideas were quite valuable, Alexanderson could only shake his head at Fessenden's insistence on using wood for the armature instead of iron.

In August 1906, GE delivered the finished alternator to Brant Rock. Fessenden tested it up to 76,000 cycles, though in actual use he held the frequency down to 50,000 to increase its power output. By late 1906, his voice-transmission system was ready for demonstration.

On December 21, reporters listened as Fessenden established voice transmission with a fishing boat at sea. Then, on Christmas Eve, he made history's first public radio broadcast. Intended for ships at sea, it consisted of the playing of a recording of a largo by Handel; Fessenden himself performing "O, Holy Night" on the violin and singing the last verse; a Bible reading; and finally Fessenden wishing everyone a Merry Christmas. Ships equipped with Fessenden's apparatus had been told several days earlier to listen for the broadcast. It was remarkably successful, being picked up as far away as the West Indies. But even more impressive was the unintentional receipt of later transmissions between Brant Rock and Plymouth at Machrihanish and Scotland.

The 1906 broadcasts turned out to be the high point of NESCO's ill-fated existence. In early December, a fierce storm tore down the Machrihanish tower and

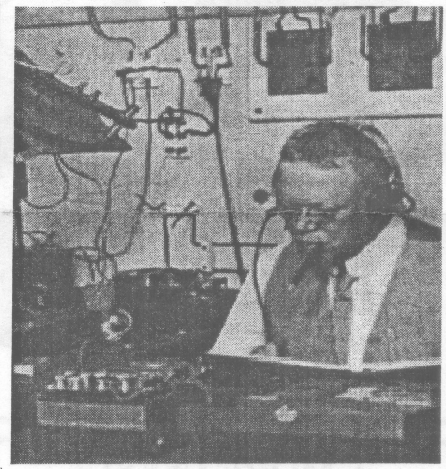
funds were not available to rebuild it immediately. Soon after, Marconi began providing transatlantic wireless telegraph communication on a regular basis. An economic panic the next year hurt the company's goal to sell point-to-point communication and clashes between Fessenden and his backers continued.

NESCO's fortunes picked up briefly after the company hired its first salesman in 1908 while Fessenden concentrated on improving spark-gap telegraphy. The company made some sales to the Navy and the United Fruit Company but the equipment was too expensive for most potential customers and there was too little money in selling it directly to users.

Exasperated by Fessenden's attempts to dictate business strategy, NESCO tried to remove him from the company presidency, ostensibly so he could concentrate on research and development. In May 1912, Fessenden won a judgment of $400,000 from what remained of NESCO, but the company went into receivership before he could collect and the judgment was reversed on appeal. (NESCO, whose assets by this point consisted almost entirely of Fessenden's patents, would eventually be purchased by Westinghouse in 1920 and then by RCA in 1921, prompting Fessenden to sue yet again.)

Following the fall of NESCO, Fessenden would make no more major contributions to radio. But in August 1912, he met an old friend named Harold Fay who was an executive with the Submarine Signaling Company of Boston. Fay invited Fessenden to come learn about the communications work his company was doing. Within three months, Fessenden had invented an array of underwater sending and receiving apparatus including, most notably, a very sensitive oscillator. The device consisted of a copper cylinder that was subjected to a constant magnetic field and oscillating electric currents induced with a solenoid. The interaction of these forces produced longitudinal vibrations in the tube that were transmitted to the water by means of a diaphragm. Fessenden developed further uses for the oscillator in iceberg detection and by incorporating it in a fathometer. Late in life, he ranked his marine inventions equally with those in radio as his most important technological accomplishments.

During World War I, the tireless inventor inundated the British War Office with ideas, among them the concept of massing airplanes (which would be built in Canada using a light-weight engine of Fessenden's design) to bomb enemy lines of communications; ways to locate concealed artillery by sound; submarine finders and navigational aids; and schemes for improving rifle and machine-gun sights. Following the armistice, he devised a primitive form of television he called the pheroscope.



Fessenden about the time he was working for the Submarine Signaling Company

Following the war, heart and circulatory problems, continuing legal troubles, a conviction that his best work had been stolen and a general hostility toward large corporations began wearing down the pioneering inventor. During the 1920s, as radio exploded in popularity, the world's first broadcaster turned away from the laboratory and devoted himself to research in ancient history and defending his own place in history. The legal suits that had consumed much of his life finally came to an end on March 31, 1928, in an out-of-court settlement in which he was said to have won $2.5 million from RCA. This enabled the Fessendens to purchase property in Bermuda, and there Reginald Fessenden's heart gave out, on July 22, 1932.

While his business partners may have wished he had spent more time in the present day, few inventors of any era have been more farsighted than Fessenden. On the heels of a century that saw wireless progress from the dots and dashes of Morse code to the 0's and 1's of the Internet, the magnitude of his achievements becomes more apparent every day.

THE "RADIO NEWS" SUPER SUPERHETERODYNE

By Ray Chase

Being a fan of early superheterodyne radios I was surprised to find articles about a special super-het radio in some Radio News magazines that I recently acquired.

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Since the earliest days of radio, the superheterodyne circuit was considered the ultimate for obtaining the most in receiver performance. First there were those four or five-foot long eight-tube battery powered kit sets such as the Victoreen and the Ultradyne along with the ten tube Golden-Leutz's, Norden-Haucks and Remler Infradynes. In the 1930's, Scott and McMurdo Silver battled for the high end of the market with seventeen to twenty eight tube super-het radios that cost as much as a small house.

Of course, all radios of that period were now super-hets, some with only four tubes but the mainliners like Philco, Stromberg Carlson, Midwest and others also put out "super" radios of ten to fifteen tubes or more. Then in 1941 the Radio News magazine decided to enthrall its readers with what they decided to design as the ultimate superheterodyne that they called the "Super Superheterodyne." This was to be a "Radiomans" dream receiver, embodying all the best technical features of the period and unencumbered by manufacturer's cost constraints or marketing limitations.

Being a large circulation monthly radio magazine enabled them to "wheedle" parts and technical assistance from many of the major radio suppliers. They created a long list of goals to be accomplished in this radio; the salient ones are as follows: band coverage from 540 Khz. to 31.6 MHz in the AM spectrum & 42 MHz. to 50 MHz in the FM spectrum, two RF stages, controlled regeneration in the IF stages, variable IF bandwidth, "S" meter, dB/vu audio meter, variable delay AVC, automatic squelch, volume expander cir-

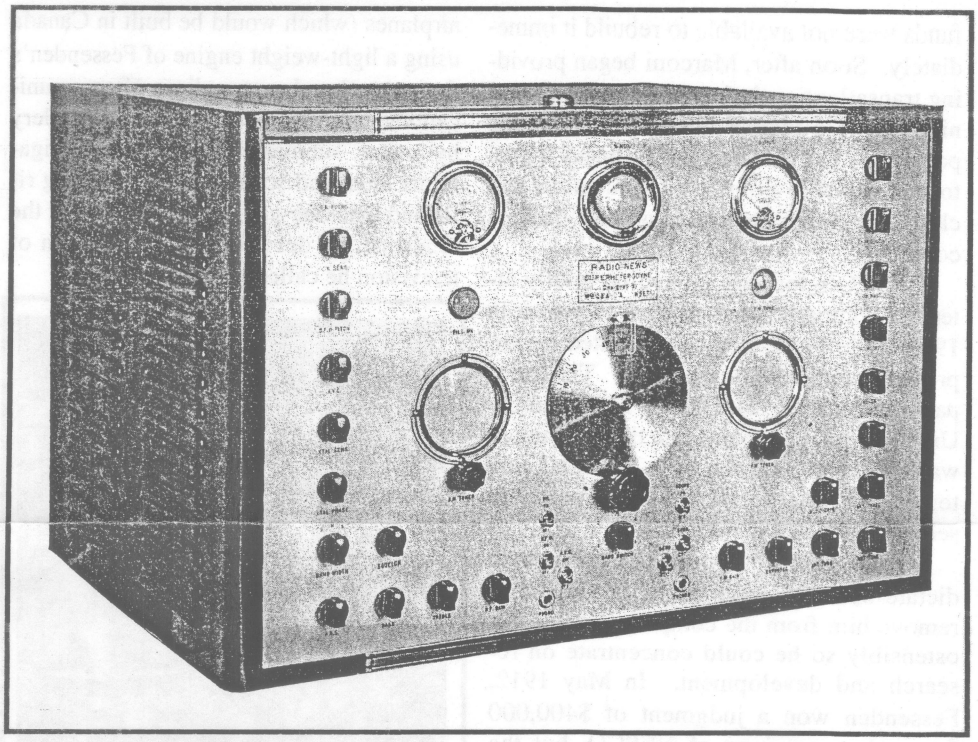
cuit, treble and bass equalizers, CRT for modulation monitoring, noise limiter, antenna noise phasing system, crystal filter, variable BFO, RF gain control, output circuits for a record cutter, and an FM resonance indicator. All this added up to the use of 35 tubes split between octals and the newly introduced loctals.

The audio output stage was strictly class A with a pair of 6B4G's. All this on a chassis 26" wide and 24" deep. The front panel was 26" by 24" and contained no less than 34 controls including six toggle switches. No speaker was mounted on this chassis or metal cabinet; rather the intent was to set the radio on top of a Jensen bass reflex enclosure.

The authors of this project are listed as Karl A. Kopetzky (W9QEA0 and Oliver Read (W9ETI) and the project was described in three monthly installments, the April, May and June 1941 issues of Radio News. Included were schematics, parts lists and alignment details. The authors acknowledged assistance from Radio Manufacturing Engineers of Peoria, IL, the National Co., Hallicrafters, and others. In the final article they reported that the operation of the finished receiver met all their goals and expectations.

They went on to indicate that several readers had started work on their own versions. They then added: - - "It may be said that this is not the time to build a large receiver, the national situation being as it is. In answer to that, we may say that we know of no plan of our Government, or any agency thereof, to limit radio receivers in any respect". Ominous thoughts in the summer months of 1941.

An interesting experiment and perhaps a fitting final tribute to radio's "Golden Age" of the thirties. Very soon radio building would be curtailed if not totally eliminated to ramp up for vital war work. After the war the FM band would be shifted upwards, miniature tubes would surpass loctal and octal tubes, dual conversion receivers would become the norm in communications and single sideband reception was not far off. So technical advances quickly made obsolete this grand effort but what a find it would be to discover one of these radios lurking in an attic somewhere.



A MORE USEFUL RF SIGNAL GENERATOR

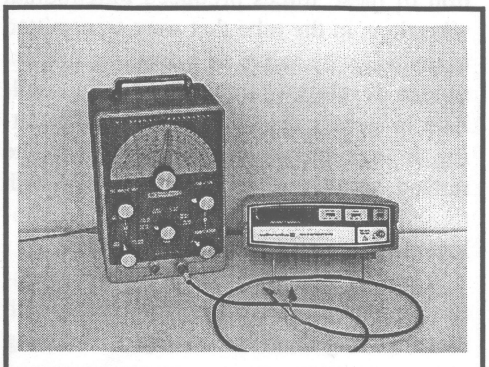
Edited by Marv Beeferman

The following was contributed to the August 2004 "Sound Waves" by Mike Grimes...Ed

Tube-type RF frequency signal generators are relatively inexpensive. Just look around eBay or your local radio club sales/auctions. A good RF frequency signal generator, however, is a good, almost necessary tool to restore vintage radios. Alignment, trouble-shooting, and performance testing are among the applications. Most of the less expensive units have small scales for tuning and very little vernier action so it is difficult to know exactly what frequency to which it is tuned. Scale accuracy most often is a problem. If you don't want to spend a lot for a state-of-art signal generator with crystal stability, digital read-out, etc., here is a suggestion that you might want to consider.

The solution is to add a frequency counter to the signal generator. The counter will give the precise output and allow tuning to the desired frequency. The difficulty here is that most low-end frequency counters require a good solid, strong signal for stability. With most counters, a direct connection to the signal generator output will provide a stable reading at full output. However, if the signal generator attenuation is turned up for a minimum signal, the counter can lose its lock and appear unstable. It is desirable in some cases, like during alignments, to provide a minimum signal generator output.

The solution is to provide a high-level RF sampling port on the signal generator. It's quite simple - most tube-type generators of the '50s era used a 12AU7 or 12AT7 oscillator tube. To this tube, add a 1000-ohm resistor in series with a 0.01 uf capacitor from pin 3 (cathode) to the center pin of an RF sampling connector. Use good RF techniques of short leads and coax to run the sampling port outside or to a newly installed connector on the signal generator. The resistor can be adjusted to between 330 and 2.2 Kohms if you have trouble driving the counter.
That's all there is to it.



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Your contact information will not be released.

MEMBERSHIPS:

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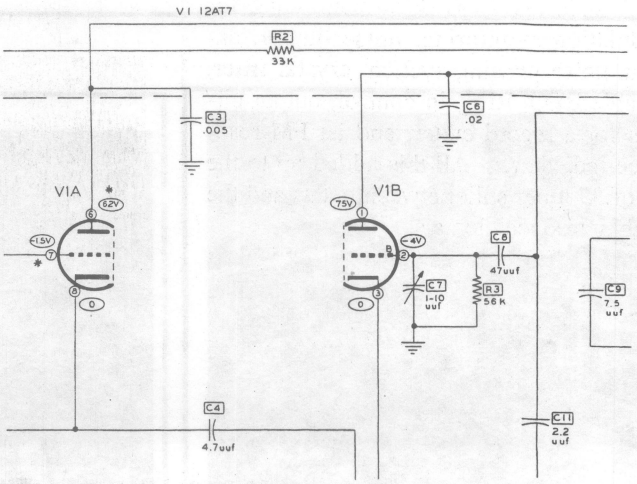
Archives Museum Website
Development Finance Legal

Members of the David Sarnoff Library receive

- Quarterly newsletter
- Discounts on photos and reproductions
- Free entrance to events
- Free use and tours of the Library
- A portion of your membership fee is tax deductible

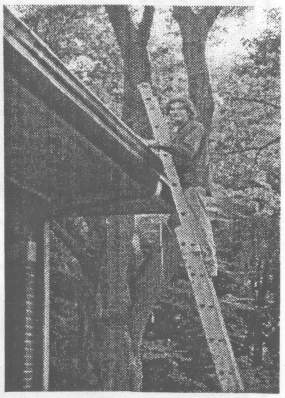
Return form with check to:

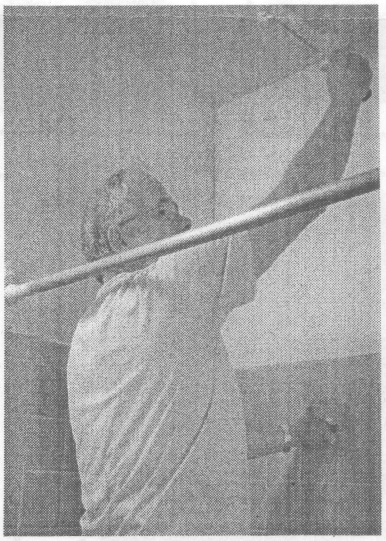
David Sarnoff Collection, Inc.
201 Washington Rd., CN 5300
Princeton, NJ 08543-5300

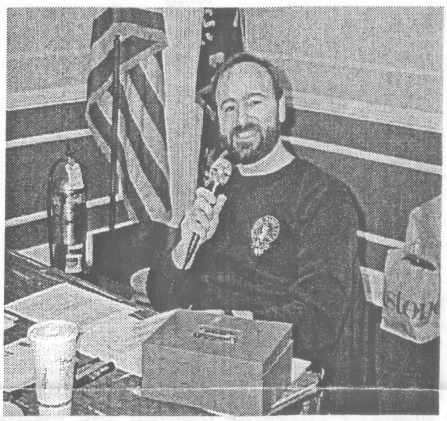


Oldies but goodies...the bottom of the previous page shows a Heathkit IG-102 RF Signal Generator feeding my kit-built Sabtronics (remember those?) frequency counter. Counter connections are to pin 3 of the 12AT7.

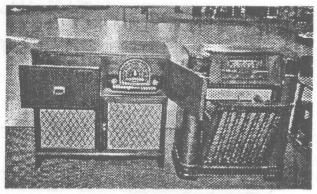
WORKING HARD AT INFOAGE







HAZELET SWAPMEET



NOVEMBER 2004