

**CHRS**

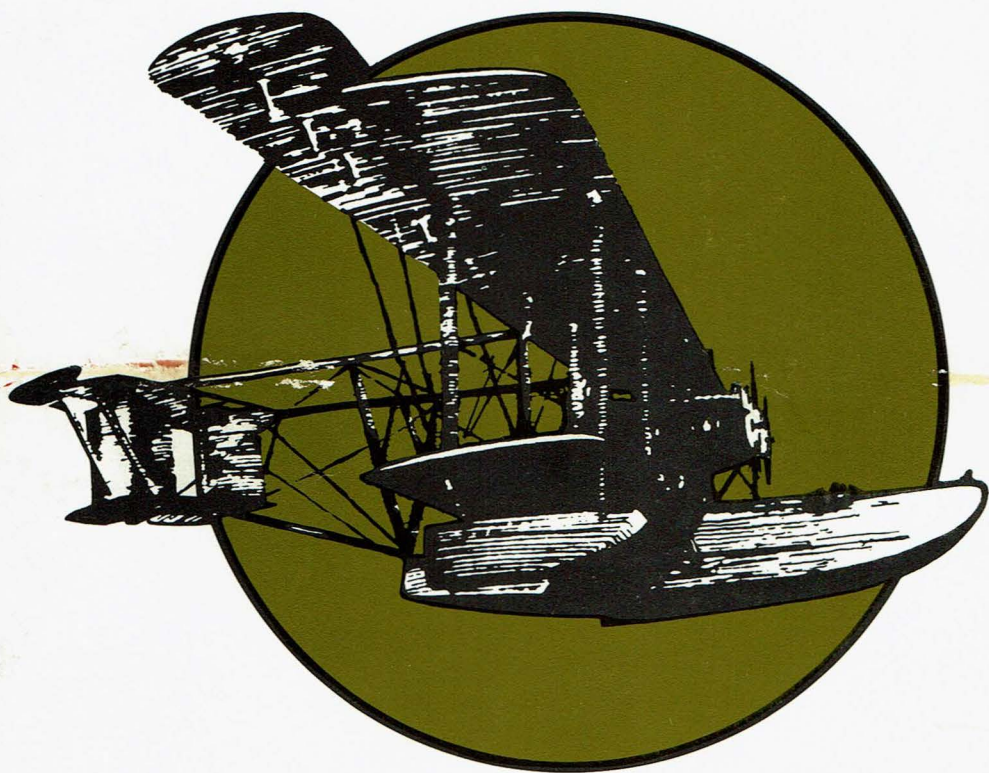
**official**

# **JOURNAL**

**Vol.4 No.2**

**June 1979**

## **SAGA OF THE NCs**



**1979 AWA CONFERENCE • Feature Set: A-K Model 5**  
**Collector Spotlight: Pat Stewart • Vacation in the Land Down Under**  
**A Two Circuit Crystal Set • Herrold Award: Joe Horvath**

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Dr. Charles D. Herrold Award:  
Bruce Kelley (1978)  
Joe Horvath (1979)

Honorary Lifetime Member:  
Paul Courtland Smith (1978)

**THE SOCIETY:** The California Historical Radio Society is a non-profit corporation chartered, in 1974, to promote the restoration and preservation of early radio and radio broadcasting. CHRS provides a medium for members to exchange information on the history of radio, particularly in the west, with emphasis in areas such as collecting, cataloging and restoration of equipment, literature and programs. Regular swap meets are scheduled at least four times a year, in the San Jose area.



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CHRS Official Journal is published by California Historical Radio Society, Box 1147, Mountain View, CA 94040.

Address membership correspondence to James Cirner, CHRS Treasurer, 13366 Pastel Lane, Mountain View, CA 94040. Articles and non-commercial ads for the Journal should be submitted to Allan Bryant, Editor, 38262 Ballard Drive, Fremont, CA 94536. Historical data for copying or donation should also be sent to the Editor.

The OFFICIAL JOURNAL of CHRS is published quarterly and furnished free to all members. The first issue (published in September 1975) is still available (\$2.00), other early issues are \$1.00 each. Articles for the Journal are solicited from all members. Appropriate subjects include restoration hints, information on early radio broadcasts and personalities, anecdotes about the pioneers, etc. Anyone interested in assisting in producing the Journal should contact the Editor.

## 1979 AWA CONFERENCE



On May 5, 1979 the annual Western Region Meet of AWA and the co-sponsoring CHRS was held at Foothill Electronics Museum. Despite the combined attack of inclement weather and the critical gas shortage, 130 devoted collectors attended and assured a successful Meet.

After a morning of swap or sell (curbed somewhat by an unseasonal dew which was later identified as rainfall), together with a successful equipment contest, the members adjourned for lunch at the College cafeteria.

The afternoon session featured a slide/audio show which depicted a day at the 1978 AWA Conference in Canandaigua, New York. The inimitable Bruce Kelley taped the show in his usual professional style and, at the conclusion, I am sure every member in the

audience who had never attended this annual event had resolved to somehow and someday make the trip. Our thanks to Bruce for the show and for traveling across country to be with us in person.

This show was followed by another winner, a presentation by W. I. Orr (W6SAI). Bill gave us a superb account of the origin and development of the Hallicrafters Company. Bill is one of the best known amateurs in the country by reason of his prolific writings. Editor of "The Radio Handbook," contributing author of articles in "CQ" and "Ham Horizons" monthly ham magazines and author of several books on Ham Antennas, we were indeed fortunate to have Bill with us. Fortunately he shares our interest in vintage radio as witnessed by his authoritative articles on National receivers.

## Contest Results

Our thanks to the members who brought 33 items of equipment to the attention of the judges, who had a difficult task in arriving at their decisions. Our special congratulations to the following winners:

### AC RECEIVERS

- 1st Place -- German Air Force Superhet  
Roberto Suarez
- 2nd Place -- Flint Cathedral  
Tom Caldwell
- 3rd Place -- Philco 90 Cathedral  
Glen Johnson

### TUBE TRANSMITTERS

- 1st Place -- Homemade Transmitter  
Fred Tesche

### SUPERHETERODYNES

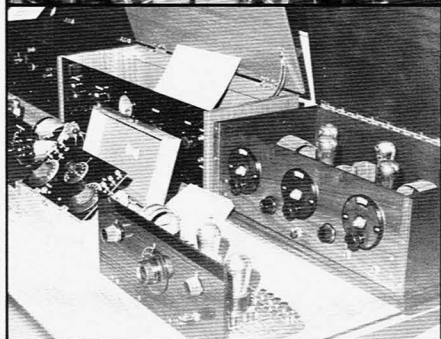
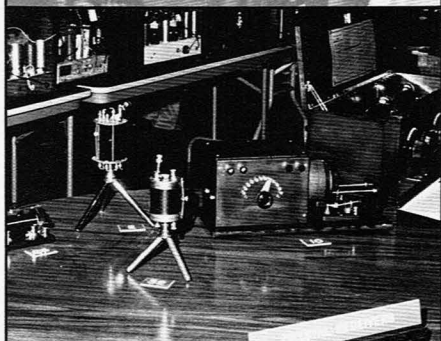
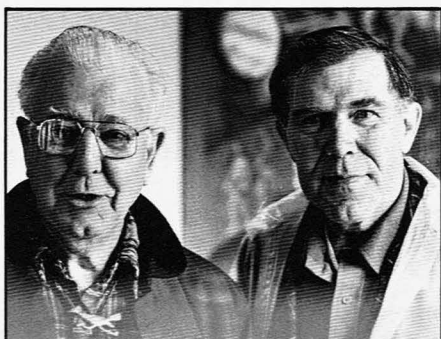
- 1st Place -- General Electric Portable  
Roberto Suarez

### WIRELESS EQUIPMENT

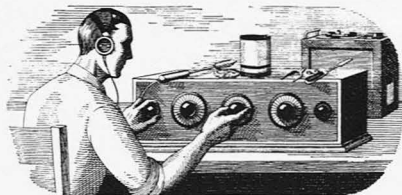
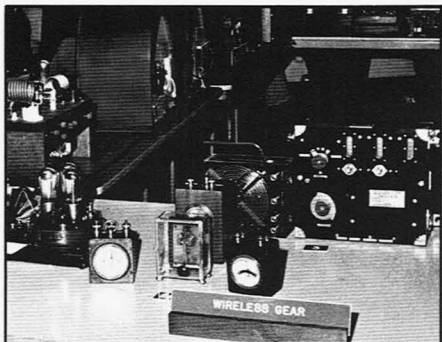
- 1st Place -- SCR59 Receiver and SCR65A  
Transmitter  
Alan Patmore
- 2nd Place -- Four Pieces of British Early  
Wireless Gear  
Roberto Suarez

### CRYSTAL SETS

- 1st Place -- Little Gem  
Ed Sage
- 2nd Place -- Unidentified Set  
Roberto Suarez
- 3rd Place -- Martian  
Woody Wilson







### TRF SETS

- 1st Place -- Metro with Speaker  
Floyd Paul
- 2nd Place -- Atwater Kent 10  
Glen Johnson
- 3rd Place -- Eagle Neutrodyne  
Henry Meyer

### REGENERATIVE SETS

- 1st Place -- DeForest Interpanel  
Alan Patmore
- 2nd Place -- Grebe CR13  
Woody Wilson
- 3rd Place -- Atlantic Pacific (One tube)  
Ed Sage

### HOMEBREW EQUIPMENT

- 1st Place -- Superheterodyne (GM Best  
Circuit Eight Tube)  
Floyd Lyons
- 2nd Place -- Crystal Set  
Floyd Lyons
- 3rd Place -- Regenerative Receiver  
(Two tubes)  
Henry Meyer

### BEST OF SHOW

- METRO TRF Receiver and Matching  
Speaker  
Floyd Paul



# Dr. Charles D. Herrold Award



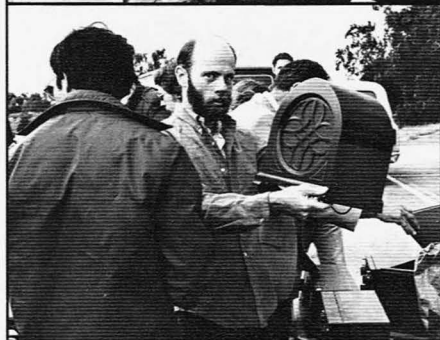
This prestigious award is made by CHRS in memory of this famous Pioneer of Early Broadcasting. The award is presented to an individual who, in the opinion of the Award Committee, has been outstanding in the field of preservation and restoration of early radio. This year's recipient:

## Joe Horvath

A longtime collector, amateur and general radio enthusiast, Joe listened to his first radio signal in 1922 and has been hooked on radio ever since. Joe is featured in the "Collector Spotlight" article in the Vol. III No.1 issue of the CHRS Journal (1978).



We commend the Award Committee on their choice, and extend our sincere congratulations to Joe.





## New Members

- William Alvarez  
Walnut, California
- Wm. Herbert Brams  
Berkeley, California
- Norman S. Braithwaite  
Redding, California
- Leo J. Cherne  
Santa Monica, California
- John J. Campbell, Jr.  
Livermore, California
- Alan Eaton  
Pleasanton, California
- Thomas W. Evins  
Whittier, California
- M. R. Everitt  
Los Angeles, California
- Douglas E. Furney  
Golden, Colorado
- Charles C. Gough  
Scotts Valley, California
- Warren L. Green  
Mercer Island, California
- James E. Hoyland  
Glendale, California
- Charles J. Hinkle  
Fredricksburg, Virginia
- Jon W. Karstens, Sr.  
San Jose, California
- Thorn Mayes  
Saratoga, California
- Don Pettee  
Sunnyvale, California
- J. W. F. Puett  
Dallas, Texas
- Bruce H. Rogers  
Salt Lake City, Utah
- Sheldon Reingold  
San Francisco, California
- William I. Russell  
Van Nuys, California
- David Stout  
Santa Monica, California
- Richard G. Swanton  
Sunnyvale, California
- Robert A. Suarez  
Fountain Valley, California
- Doug Smith  
Concord, California
- Dennis M. Trimble  
San Jose, California
- James L. Troe  
Morristown, New Jersey
- Roark Vane  
Sacramento, California
- John G. Webb  
San Jose, California
- Fenton M. Wood  
Sugar Land, Texas
- Roy Yost  
Redwood City, California

## The Journal

Two well-known CHRS members have recently joined the Journal staff.

Edward Sage will cover the "Collector Spotlight" column, and Dave Brodie will review publications made available to CHRS members through the Journal.

I would like to thank these two collectors for helping out, and again solicit all members to take an active interest in the Journal. I realize that we are all busy with our jobs, collections, families, etc. -- but without your support, our Journal cannot continue to improve.

Presently the Journal needs a draftsman to improve the appearance of our schematics. Also, we need members to contribute newspaper clippings or magazine articles (old or new) which apply to antique radios, broadcasting, or broadcasting personalities.

Members critiques on the Journal are always welcome.

The following dates are the article deadlines for coming Journals. All ads, stories, etc., should be submitted prior to these dates.

September issue: August 1, 1979

December issue: November 1, 1979

March issue: February 1, 1980

## Next Issue

- ★ A visit with Bob Herbig
- ★ CHRS visits Foothill Museum
- ★ The Nernst Glower

Much more...

Allan Bryant



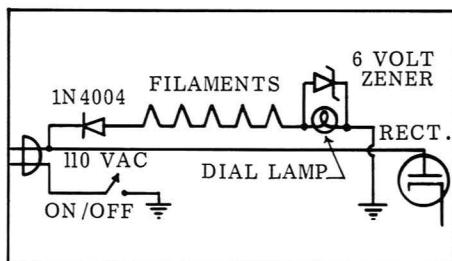
## Errata

The Grebe Restoration article (March issue, page 22) was written by Alan Patmore. An interesting side-light to this article is that the excellent condition Grebe CR-8, which Alan repaired and recently purchased from Paul Giganti, is the one mentioned in Paul's article in Vol. 3, No. 4. It is the one that Greenwood kicked and said, "How about adding this?"

## Restoration Hints

by Wm. Herbert Brams

Old series-string AC-DC radio sets with 25 volt and 6 volt tubes often had line cord resistors or ballast tubes in the filament circuit. These are now difficult to obtain. Replacing them with a fixed resistor is dangerous as about 15 watts of heat have to be dissipated. Instead, replace them with a silicon rectifier diode (e.g. 1N4004). The heating effect of the rectified AC on the filaments is adequate to operate the tubes normally. Add a 6 volt Zener diode across the dial lamp to prevent its burning-out due to current surges when the set is turned on.







# PUBLICATIONS



## "THE STORY OF PYE WIRELESS"

by Dave Brodie

"Vintage Crystal Sets 1922-1927" was published in Great Britain in 1976 and is probably the most complete source of reference on British crystal sets at this date. The author, Gordon Bussey, has completed a new book titled "The Story of Pye Wireless" which will be published by Pye Ltd., and will be available free of charge. The author has recently advised me that the book contains superb illustrations and photographs from circa 1900 and, in my opinion, should be an interesting addition to the collector's library.

Sufficient to say that the history of this British company traces its origin back to 1896, at which time the founders were instrument makers. The company rapidly expanded during World War I, and then entered the radio field during the early 1920's. From then on the company's success paralleled that of our United States major radio manufacturers with subsequent expansion into commercial communications, television and specialized fields. Through natural growth plus mergers and acquisitions Pye became multinational and, finally, on January 1, 1977 the entire capital stock of Pye Ltd. was acquired by the gigantic Philips Industries.

Individual copies of Mr. Bussey's book are available, free of charge, by writing to:

PYE LIMITED  
Public Relations Department  
137, Ditton Walk  
Cambridge,  
England



## "CATS WHISKER"-- LAST CALL

The Editor has 1 hard-cover and 9 soft-cover books available:

Soft-cover. . . . . \$ 7.36  
Hard-cover . . . . . \$11.18  
While they last.

Tube collectors may be interested in a booklet sold by Puett Electronics, PO Box 28572, Dallas, Texas, 75228. As a matter of fact, any collector might well benefit from having this handy little reference booklet on hand. The publication consists of eight pages, the first three of which provide narrative material as to the early DC and AC tubes which we find in our sets of the '20's. Here you will find comments as to the origin of the 200, 201, 11, 12, 99, 26, 27, 80, etc. series. Page 4 provides a graphic display of the most widely-produced tubes from 1920 to 1936, and pages 5 and 6 list the tubes by type and date or original issue. The final two pages provide certain envelope and a few detailed descriptions.

If interested, refer to Booklet # 4, "When Was That Old Tube Made?"

Other Puett antique radio booklets are also available:

- # 1 - "The Acquisition of Antique Radios."
- # 2 - "The Complete Restoration of Battery-powered Antique Radios."
- # 3 - "The Complete Restoration of AC-powered Antique Radios."
- # 5 - "Antique Radio Tube Substitution."

They are priced at \$2.00 each, or three for \$5.00, or four for \$6.00, or all five for \$7.00.

## SOUNDS VINTAGE REVISITED

Our last issue referred to the British publication "Sounds Vintage" and indicated that this is a new venture which covers a wide spectrum of interests in addition to wireless. The second issue has just been received and is a bi-monthly magazine of 30 pages, professional in all respects and designed to appeal to a wide variety of collectors. The March/April issue contained one interesting article on early British tubes, but the remaining contents would not appeal to most collectors of antique radios unless their interest extended to phonographs, records, early gramophones, etc. For further information contact Dave Brodie

I had been going to sea as a Merchant Marine Staff Officer, better known as a Purser, with Moore-McCormack Steamship Lines for a number of years on the Pacific Coast. Then they up and sold my happy home to States Steamship Company in August 1966. But all of that is another story. I figured here was a good spot to finally take a much-postponed vacation, that I had wanted to make for a long time. What better time of the year could one choose for rest and rejuvenation, than approaching Spring in Australia and New Zealand! We made our arrangements for Passport, Visas, vaccinations and what-have-you for approximately one month and were soon on our way. Part of the trip was pre-planned and part just sort of evolved along the way. We were to make six major stopovers, total.

We arrived in Sydney, Australia on a weekday about 10:00 AM -- having crossed the International Date Line and incurred many time-zone changes. And, yes, we had a mixture of sunshine and scattered showers, just like Spring! I find the Australian people to be fine hosts, and very interested in making your stay a pleasant one. But this came as no surprise for I had had the good fortune to visit there a number of times in 1944 and '45 during the war, when I was stationed at Biak, New Guinea. I also happened to be in Townsville, Queensland, in NE Australia, the day that President Roosevelt died. People stopped me on the streets to extend their sympathy and to say how sorry they were.

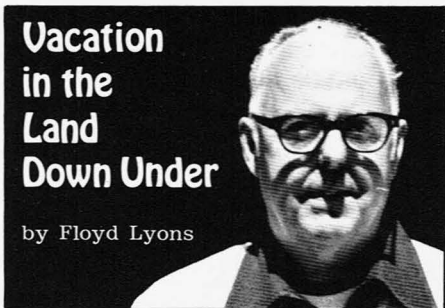
I had been corresponding with Fin Stewart, who lived in a nearby suburb of Sydney. After he got off from work, he came by the hotel where I was staying. It was nice, at long last, to meet him in person and chat about our common interests. I later spent a full day as their house guest, and got to see his famous collection. He has a fine Museum now -- and, of course, has added much since then.

A flash-back here is in order. Sometime around 1962, Paul Giganti brought his friend, Grote Reber, up to San Francisco, so Grote and I could meet, and he could see my modest museum. Grote, as many of you already

know, is a foremost Radio Astronomer, and has done much of his research in Hobart, Tasmania. Tasmania is an Island and a part of Australia -- sort of like Santa Catalina is to Southern California, and Hawaii is to the US. On parting, Grote invited me to come visit him in Tasmania, if ever I got to that neck of the world.

## Vacation in the Land Down Under

by Floyd Lyons



Well, one morning while still resting in bed in Sydney, it suddenly dawned on me -- heck, I'm not too far from Tasmania. So, I gave Grote a phone call. His immediate questions were, "Where are you?", and "You're coming to Hobart, aren't you?". With hospitality like that, I said "Yes". Then he proceeded to give me leads on where to go in Sydney and look at goodies. Many swaps and outright gifts resulted from his kind efforts. I shall always be grateful.

I flew to Hobart via Melbourne and found it to be a delightful trip -- free of air pollution, and truly where you can see forever. This, of course, was one of the reasons the Radio Astronomy Project was set up here, in the first place. Spent two days in Hobart, and here again he introduced me to a new contact of mutual interest. Came away with more early radio tubes and light bulbs. By this time, I was getting loaded down, so mailed home a large parcel of acquired goodies. Again my host called ahead and made arrangements for me to stop in Launceston, Tasmania on my way back to Melbourne. Picked up two outstanding light bulbs at this stop. Also was told of a man in Melbourne who had six Nernst-type Glowlers (called Nerod); I eventually acquired these.

Stopped over in Melbourne and visited their fine Museum. Received a most pleasant welcome and got to visit "The Caves", where they store gear, tubes, bulbs that seldom get displayed due to lack of space. In brief, they had a 20-year cycle, whereby they rotate various categories of displays -- so it all gets "upstairs" at least once



every 20 years. Some mint gear down there, just asking to get displayed.

Moving along, we made another short stop in Sydney to say our goodbyes to so many people who had been nice to this Yank. Then it was on to Auckland, New Zealand for a visit with John W. Stokes, a member of our AWA. We, too, had corresponded for a number of years, and he had invited me to stop by for a few days, so we could swap yarns, etc. New Zealanders parallel the Australians in their friendship and

hospitality. You can go from one country to the other, and feel like you never left home, so to speak. John is a very knowledgeable man on tubes and tube history. He is, at present, writing a book on this subject. I can assure you, that it will be a book you will treasure.

Prior to my arrival, John had notified the New Zealand newspapers that a "collector of early light bulbs and radio tubes" was arriving from San Francisco. What a surprise! Photos, interview sessions, the whole bit. It turned out to be a very pleasant happening, in many ways. I would climb into a Cab, or call some Museum -- and as soon as they heard my American accent, would immediately say, "I'll be you're that bloke from San Francisco!" Well, now, that may not be construed as a compliment, we have to admit. But it certainly was recognition.

John was a member of the Museum of Transportation and Technology (MoTaT) in Auckland. He suggested that I contact one of the wheels at the Museum and see what they had to trade. Another swap was made here, with them getting some hard-to-find tubes for their Display Boards -- and me acquiring some available tubes they had in duplicate. I also visited one of the local Museums and came away with some juicy British Light Bulbs. Visited a Power Plant of one of the local Light Companies there, and one of the employees gave me a German 3NF Loewe Tube. And he told me why. I feel that it is worth repeating here. He said that he was one of many New Zealanders who were stationed on Biak during WWII, and the Yanks were always so good to them. And, he continued, this was his way of saying thanks to all of you Yanks for those pleasant memories.

As I headed for home, I reflected upon all the pleasant meetings with all these nice people, and all the juicy gear distributed over this globe, and considered myself fortunate indeed to be enjoying all of this. I stopped over in Honolulu and Waikiki Beach for three days to sort of unwind from the jet lag. October 2nd saw me back home in San Francisco, a month to the day since my departure. A happy vacation that I shall always remember.

## A-K Model 5

by Mel Prater and  
Floyd A. Paul

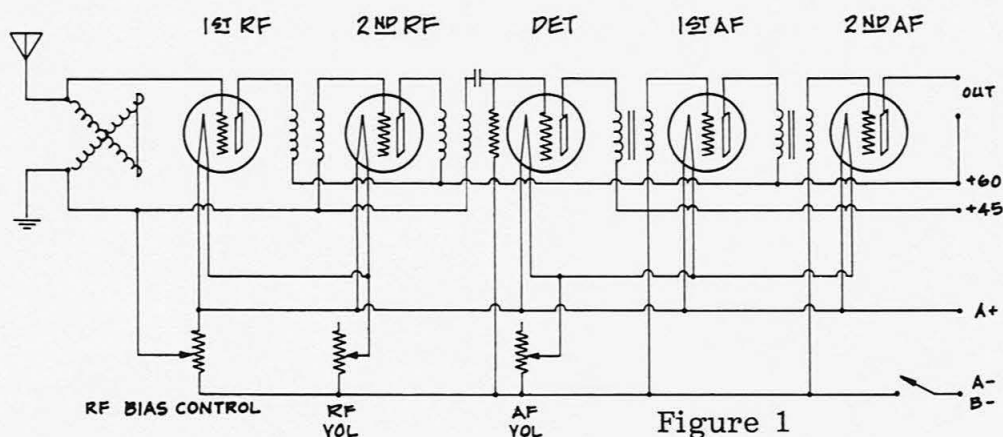


Figure 1

The Atwater Kent Co. first manufactured and introduced to the market in 1922 a complete line of radio parts, including transformers, variometers, variocouplers, switches, tube sockets, and sealed amplifier units. Sometime in 1922, in the attic of his home, he made his first complete radio receiver. It is reported that 100 Model 5 radio sets were sent to each of AK's nationwide auto parts distributors. This was the manner of AK introducing radios to the public. One set (similar, but not an identical set to the 5)

which was probably a prototype, was presented to President Harding in August 1921. As of 1923, AK was in the radio set manufacturing business, and would become a major contender for selling sets to the public during the next decade.

The Model 5 set, electrically, is typical of the circuits in the early '20's. The schematic is shown in Fig. 1. The recommended plate voltage for all amplifier tubes was 60 volts. One rheostat controls the filaments to the Det. and two audio tubes. One rheostat



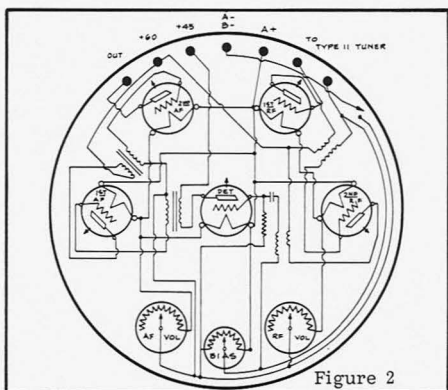


Figure 2

controls the filaments of the two RF tubes and the third rheostat controls RF bias. Fig. 2 shows the bottom view of the 5 tube island and shows pictorially the terminal connections, tube locations and how the wiring is connected electrically. Two photographs show a top view and a front view of the Model 5.

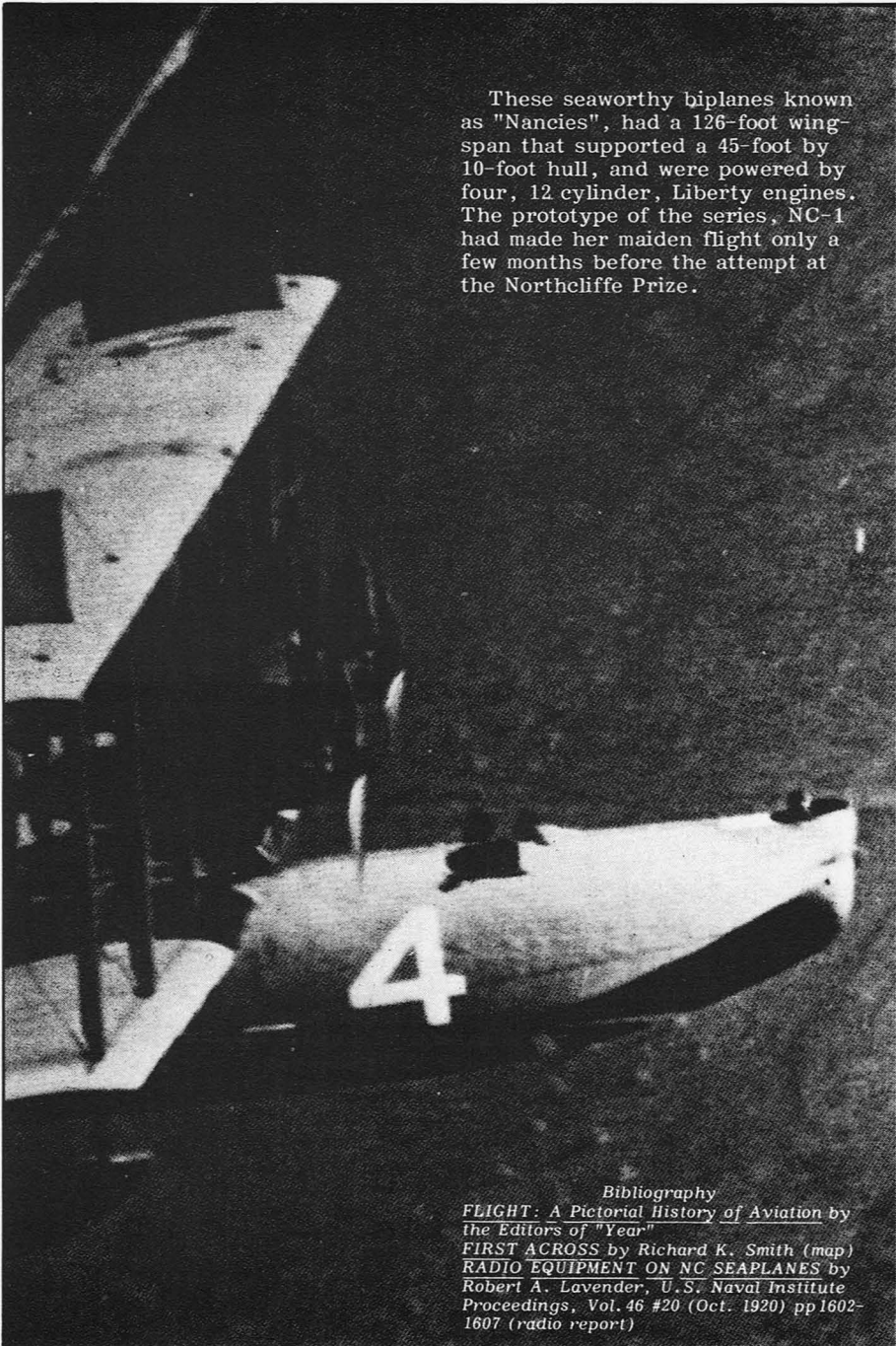
The Model 5, 5-tube TA island contains all the parts and elements to make the set play except for the tuner. All the audio transformers were sealed in tar in the metal container. The RF

transformers are about 1500 ohms on the primaries and 50 ohms on the secondaries. The AF transformers are about 1000 ohms on the primaries and 3000 ohms on the secondaries. A horn speaker or earphone was used to reproduce the audio and a power supply (of batteries) was used to power the set. The RF transformers, tube sockets, rheostats, audio transformers, a resistor and a capacitor are housed in the 5-tube island. If the reader ever gets a chance to look into the can with the bakelite top lifted, he will note a very compact design for its time. Atwater Kent, indeed, contributed to forthcoming radio designs that were to be used in the next few years to miniaturize the size of radios.

All of the tubes are coupled by transformers. Because there is only one tuned circuit before the 5-tube TA unit receives the signal, the selectivity of the set is very poor. Untuned RF transformers contributed to broad tuning. In addition the untuned RF transformers did not give a flat frequency response across the broadcast band. Later models were to incorporate two and three tuned circuits, and hence give far better selectivity. In the early days of broadcasting there were so few stations, selectivity was not an absolute requirement; but as stations sprang up and a dozen local signals could be heard, the ability to select among them became a requirement.

The schematic and pictorial drawings in this article are the work of Ms. Jo Evans, from some sketches made up by Ralph Williams, the noted authority on Atwater Kent radios. He also restored the set in this article to playing condition. This Model 5 set, owned by Mel Prater, is designated "Atwater-Kent Receiving Set 4333". This set has serial # C1232 as indicated by the labels attached to the bottom of the mahogany board that the Type II Tuner and island can is mounted on. This particular set was received by the original Santa Cruz, CA A-K dealer and was presented to a friend of his some years later. It was found in Watsonville, CA by the present owner.





These seaworthy biplanes known as "Nancies", had a 126-foot wing-span that supported a 45-foot by 10-foot hull, and were powered by four, 12 cylinder, Liberty engines. The prototype of the series, NC-1 had made her maiden flight only a few months before the attempt at the Northcliffe Prize.

*Bibliography*

FLIGHT: A Pictorial History of Aviation by the Editors of "Year"

FIRST ACROSS by Richard K. Smith (map)

RADIO EQUIPMENT ON NC SEAPLANES by Robert A. Lavender, U.S. Naval Institute Proceedings, Vol. 46 #20 (Oct. 1920) pp 1602-1607 (radio report)

# SAGA OF THE NCs

by Edward W. Sage

Lieutenant Commander Robert A. Lavender, Radio Officer of the NC-3, presented this gift to Otis B. Moorhead commemorating the historical flight across the Atlantic Ocean in the Spring of May, 1919. I might add that aside from Lavender, the other five crew members of the NC-3 consisted of:

*Commander John H. Towers, Commanding Officer and Navigator  
Commander Holden G. Richardson, Pilot*

*Lieutenant David H. McCulloch, Co-Pilot*

*\*Lieutenant (jg) Braxton Rhodes, Engineer*

*Chief Boatswain Lloyd R. Moore, Engineer*

**THE FLIGHT:** The flight made in 1919, took a six-man crew nearly three weeks to complete. Several million people will fly the Atlantic this year, and every plane in those busy air corridors -- whether a Vickers VC-10 or Boeing 747 -- flies under a system of radio communications, weather intelligence, and air-sea rescue that is a legacy of the US Navy's 1919 flight operation, which culminated in the trans-Atlantic success of the NC-4.

Authorization for the construction of NC seaplanes was signed by Secretary of the Navy Josephus Daniels in December 1917. Work began at the Curtiss Engineering Corp. in Garden City during January, 1918. The first plane, the NC-1, was successfully flown Oc-

tober 4, 1918. Planned as anti-submarine weapons, they were also designed for possible Atlantic crossing.

The Armistice on November 11, 1918, curtailed aircraft procurement, and only four of the Curtiss seaplanes were built. The idea of an ocean flight was revived with new intensity in December 1918, when the "London Daily Mail" offered £10,000 for the first crossing. Government planes were excluded from the competition, but the US Navy was in a unique position to win the honor if not the prize.

After much training and technical preparation, during which the NC-2 was dismantled to provide parts for the other craft, the NC-1, NC-3, NC-4 left Rockaway Beach on May 08 for Halifax, Nova Scotia, thus beginning the first attempt at a crossing of the Atlantic by heavier-than-air machines.

By May 15, all three seaplanes had flown from far Rockaway to Trepassey, Newfoundland, a distance of 1000 nautical miles. On May 16, with the promise of a full moon to help them, the three seaplanes took off into the gathering darkness of the Atlantic.

Lost in dense fog, the NC-1 and NC-3 alighted on the open sea, May 17, to get bearings. Hindered by high seas, neither plane could take off again. The badly damaged flagship, NC-3 managed to taxi under its own power to Ponta Delgada in the Azores after 205 mile, 52 hour trip on ocean's surface. The NC-1, after taxiing for five hours, was found by the Destroyer Ionia, which picked up the crew. The huge seaplane sank off Corvo on May 20, 1919.

The NC-4 reached Horta on May 17, continued to Ponta Delgado, May 20, and on May 27 made a brilliant crossing to Lisbon, Portugal. Only one more leg was left, the flight to Plymouth, and May 31, 1919, Commander Read and his crew landed there. Their flight of 3,936 nautical miles, in a flying time of 52 hours and 31 minutes, they made possible the first Atlantic crossing by air.



\* Rhodes was left behind in Trepassey, Newfoundland, along with the CG-1104 emergency radio transmitter, due to too much weight.

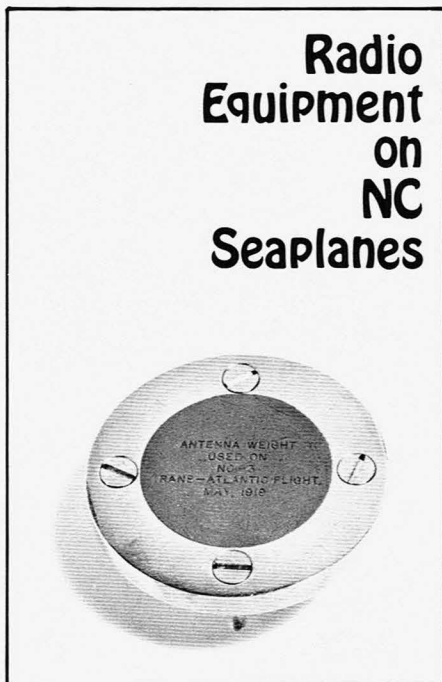
The following article appeared in the U.S. Naval Institute Proceedings, Vol. 46 #20 (Oct. 1920) 1602 - 1607

## Radio Equipment on NC Seaplanes

The prominent part taken by radio apparatus in the trans-Atlantic flight of the NC seaplanes has emphasized the uses and needs of such radio apparatus during long flights along the coast, and the absolute necessity of efficient apparatus within reasonable limits of weight for the commercial trans-Atlantic air lines which will be organized in the future. It is a curious fact, but yet to be expected, that when the designers and the pilots of aircraft think of radio sets, they invariably think in pounds. Pounds of weight and pounds of head resistance mean pounds of gasoline and oil. And pounds of gasoline and oil mean speed and endurance. But what good would extra pounds of gasoline and oil do if communication and navigation were made uncertain and the lives of the crew and passengers jeopardized when lost during a fog or when drifting on the water with no means of communication? The 26 pounds of radio equipment (emergency transmitter) removed from the NC-3 at Trepassey Bay, because the plane could not get off the water with full load, should have remained on board, for it would have been worth its weight in gold when the NC-3 came down on the water, a few hours later, 50 miles south of the Azores, with 160 gallons of gasoline, but with no means of communication.

When the radio apparatus was selected for the NC seaplanes, the greatest consideration was to carry a minimum of weight and still to have a small factor of safety. A limit of 260 pounds -- less than 1% of full load -- was allowed for the radio apparatus, although the designers of the seaplanes really expected this amount to be exceeded. The apparatus was to include two complete and separate antenna systems; the radio compass; a receiver and amplifier; two complete and independent transmitters; and sufficient electrical energy in storage and dry batteries to give continuous operation over the longest leg of the route, and to have four hours of continuous operation on the water with the emergency set.

All this apparatus, except the spark transmitter and the coil of the radio compass, was assembled on a small table located in one corner of the After Gasoline and Engineer's compartment. Much to the relief of the designers and the



*Antenna weight used on the NC-3, trans-Atlantic flight, May, 1919*

pilots, no accident occurred during any of the tests or final flights due to the sparking of the radio apparatus in the strong gasoline fumes which were always present in the compartment, and almost equally important in the eyes of the designers and the pilots was the fact that the total weight of the radio apparatus was only 250 pounds, 12% less than was allowed and 27% less than had really been expected.

The two antenna systems on the planes consisted of a "trailing" antenna and a "fixed" or "skid-fin" antenna. The trailing wire was 250 feet in length and led out through the hull directly above the radio table, and thence aft to an insulator on a brace wire, from which point it was suspended. The wire was held in a vertical position by a small, streamlined lead weight suspended at the end. When the planes were getting on or off the water, the wire was reeled in on a drum. Connections were made to this wire as it pass-



by  
Lt. Cmdr.  
Robert A. Lavender  
U.S. Navy



*Moorhead amplifier tube SE-1444 used on the NC-3. #629 is also inscribed on the envelope*

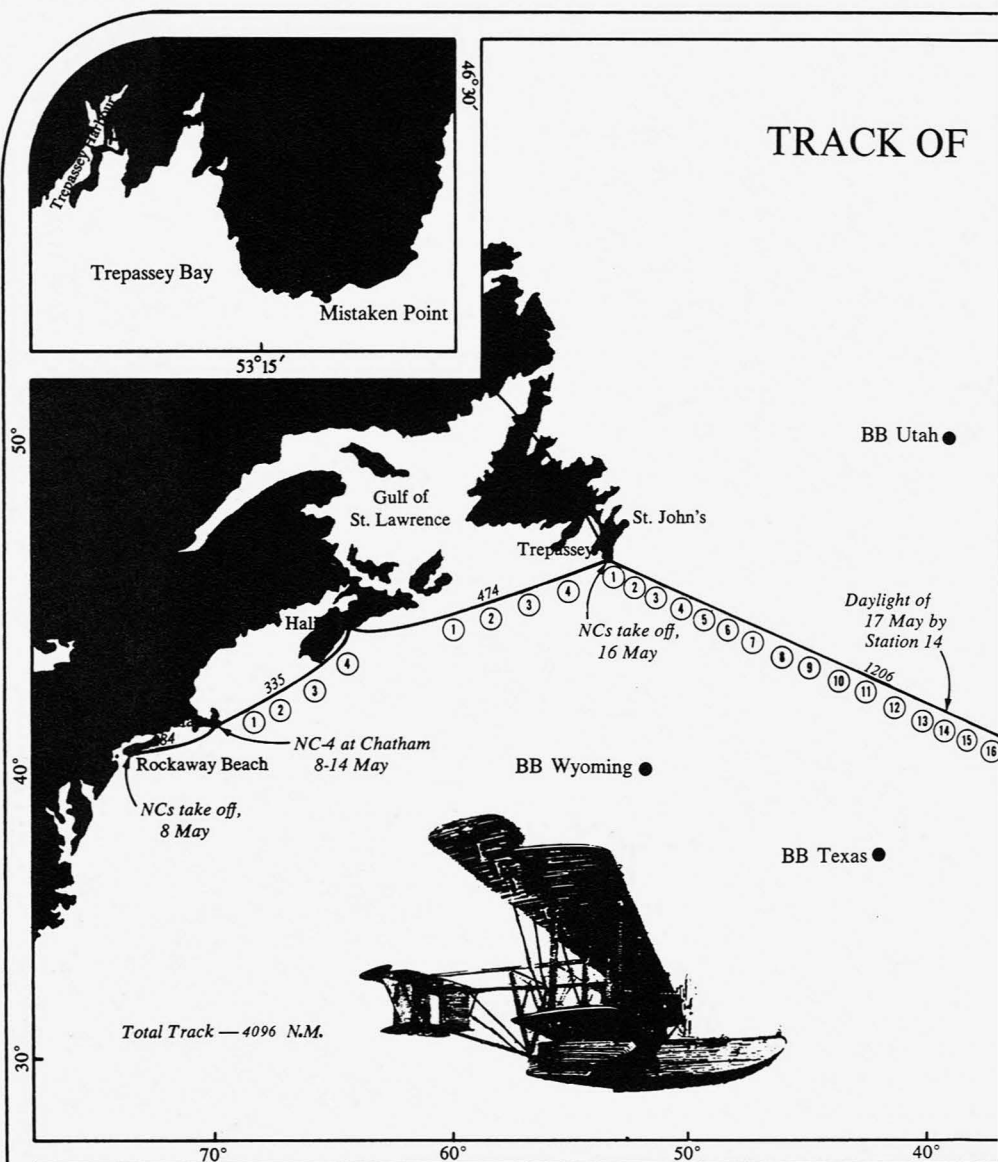
ed through the metal core of the deck insulator. The fixed antenna consisted of a rectangular coil of wire suspended from the skid fins above the upper wing. As the brace wires in and between the wings of wire grounded, the effective range of the fixed antenna was only less than one-quarter of the range of the trailing wire. It was designed for use only when on the water, but it served a more important purpose when the trailing wire was ripped off while flying low. Without the fixed antenna we would have been without communication during part of two legs of the flight.

Particularly important in seaplane radio installations is the radio compass. Much has been said and written about the use of the radio compass on board ships and at shore stations where ideal conditions can be realized. There, the location can be selected for its distances away from masses of steel and wires not enclosed in metal conduit. It is to be

expected that the radio compass ashore and on ships will work and work well. But on board seaplanes the radio compass has been handicapped, especially so on board the NC type, in which the radio compass was not easily placed or its location freely determined. By force of circumstances and by the necessity of limited space, the radio compass was installed in the only position for it, in the After compartment of the hull, amidships. There it was surrounded not only by the interior electric lighting wires and the brace wires in the hull, but also by the control wires passing back to the tail. These wires shielded and distorted the radio waves as they passed around the compass coils, and caused errors which had to be determined and allowed for. But still more disastrous to the operation of the radio compass was the fact that these wires, being connected to the common ground of the ignition system, formed an antenna to radiate and bring closer the effect of the ignition disturbances, which disturbances are of the same general nature as radio waves and have the same effect as radio waves on the compass coils and apparatus. Nevertheless, with all these difficulties, electrical remedies were applied such that the effect of the ignition system, though not eliminated, was somewhat reduced. Operating the compass revolving control cables with one hand, and the electrical controls with the other hand, listening with both ears to the signals, and watching the pointer over the coils, it required the greatest of concentration on the part of the operator to listen to the signals through the outside disturbances, and it required the greatest of care to judge the intensity and thus the direction of the signals.

During the preliminary tests of the radio compass on the NC-2, an accurate range of 50 miles was attained, but before the flight was taken with the NC-1, the NC-3 and the NC-4, the connections of the ignition system were changed to increase the ignition efficiency, but which reduced the radio compass range to 15 miles. Unfortunately no opportunity was given, while the resources of a research laboratory were nearby, to overcome these disturbances, and the flight was attempted with this range.

# TRACK OF



## U.S. Destroyers Serving as Station Ships

### Cape Cod to Halifax

- 1 McDermut
- 2 Kimberly
- 2 Delphy
- 4 Ludlow

### Halifax to Trepassey

- 1 Stevens
- 2 McKee
- 3 Robinson
- 4 McKean

### Trepassey to Azores

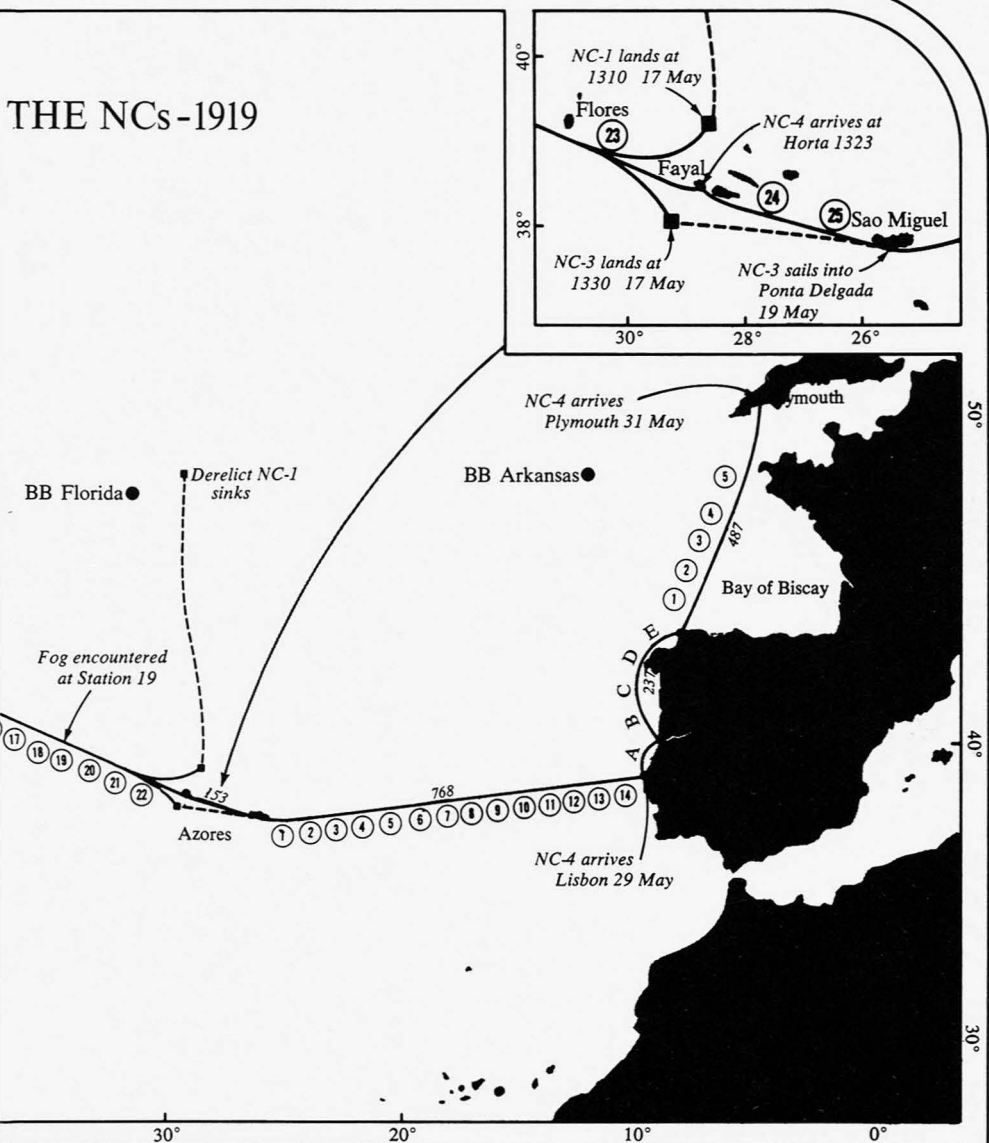
- 1 Greer
- 2 Aaron Ward
- 3 Buchanan
- \*4 Upshur
- 5 Boggs
- 6 Ward

- 7 Palmer
- \*8 Walker
- 9 Thatcher
- 10 Crosby
- 11 Kalk
- \*12 Meredith
- 13 Bush
- 14 Cowell

- 15 Maddox
- \*16 Hopewell
- 17 Stockton
- 18 Craven
- 19 Dent
- \*20 Philip
- 21 Waters
- 22 Harding

\*Meteorological Ships

# THE NCs -1919



**Azores Detachment**  
 23 Gridley  
 24 Fairfax  
 25 Columbia

**Azores to Lisbon**  
 1 Sampson  
 2 DuPont  
 3 Cassin  
 4 Wilkes  
 5 Lamberton  
 6 Gamble

7 Robinson  
 8 Conyngham  
 9 Wadsworth  
 \*\*10  
 11 Winslow  
 12 Ericsson  
 13 O'Brien  
 14 McDougal

**Lisbon to Ferrol**  
 A Conner  
 B Rathburne  
 C Woolsey  
 D Yarnall  
 E Tarbell

**Ferrol to Plymouth**  
 1 Harding  
 2 Mahan  
 \*3 Gridley  
 4 DuPont  
 5 Biddle

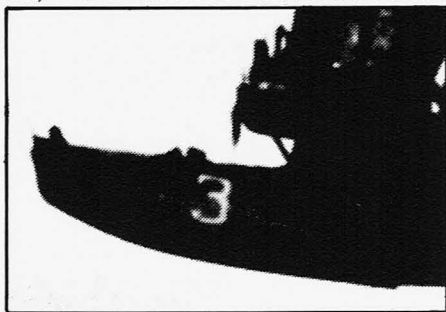
\*\*No ship; 9 and 11 closed in to cover Station 10

At the Azores the connections of the ignition system on the NC-4 were again changed, but to no advantage to the radio compass. Shortly after leaving the Azores, the auxiliary or duplicate spark plug part of the system was put out-of-commission by burnt-out contacts and as in this part of the ignition system had been located the cause of the greater portion of the ignition disturbances, the radio compass functioned with its former range of 50 miles. It was providential that this part of the ignition system did fail at this time, as the NC-4 had drifted nearly forty miles off her course due to rough air and an accident to her magnetic compasses, and was practically lost. It was the radio compass which brought the NC-4 back to the line of destroyers and thence into Lisbon.

Closely allied with the radio compass was the radio receiver. The radio compass itself may be considered a directive receiver, but owing to the small area that it embraces, and because all of its wire was so close to the ignition disturbances, it could not be used for long-range reception. Fortunately, the shortcomings of the radio compass as a receiver were not found in the trailing wire, which made an ideal receiver. A notable case in point was a message intercepted while the NC-4 was in flight, approaching the Azores. It came from the USS George Washington, 1800 miles away. She was getting into Brest, France, and her radio message which was intercepted was one reserving space on the next morning's train for Paris. This is the record for long-range reception by any plane in flight.

The sensitiveness of the radio compass and the receiver and the long ranges obtained with them depended almost entirely upon the amplifier, which was of a six stage vacuum tube type. The amplifier was mounted on elastic supports to prevent the vibrations of the hull from affecting it. The amplifier complete was only 12" x 9" x 4" and weighed by 12 pounds. Yet this 12 pounds of apparatus amplified the incoming signals to 50 times the strength they would have been had the best previously known receiver and amplifier been used in its place.

Another interesting feature in the equipment of the NC planes was the interior telephone system. This system made it possible for any two persons in the plane to carry on a conversation at any time. A specially improved helmet was developed to hold, directly over the ears, two deep soft rubber ear cups in which were located the head telephone receivers. The sides of these ear cups were high enough to allow each cup to be fitted to each individual person by cutting it away in places. The helmet itself was received from the factory open at the back and then was fitted to the head of each individual. The microphone, or the part into which one talked, was so constructed that the back of

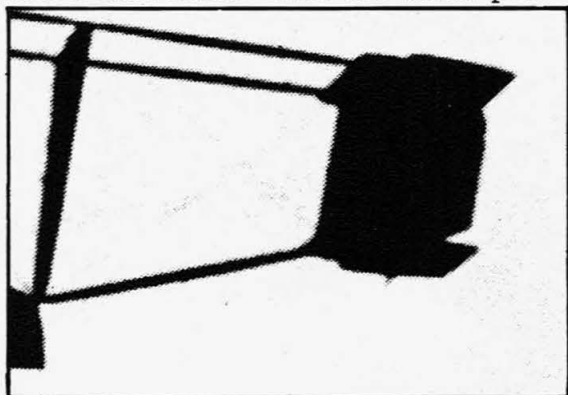


the diaphragm as well as its outward face was exposed to the engine noises. The effect of the engine noises on the diaphragm was therefore balanced, and it failed to respond to any sound waves coming from a distance, and only when the lips were placed directly in front of the diaphragm and the sound waves of the voice were thus concentrated on one side, did the diaphragm respond and was speech transmitted. With the sound proof helmets and the special anti-noise microphones, it was not only possible but easy to carry on a conversation, in spite of the 48 cylinders which were roaring continuously only a few feet away. Before the NC-3 descended near the Azores, the question of landing was fully discussed over the telephone by the two pilots and the navigator. The opportunity of a conference in the air can not be appreciated until after one has been placed in such a position as was the crew of the seaplane, lost in a fog with only a limited supply of gasoline.

The transmitter on which the greater



reliance was placed as a 1/2 kilowatt wind-driven spark set mounted on a strut under one of the engines, where it was exposed to the passing air. All the circuits, except the field switch and the variometer, were mounted behind the generator, in the hollow shell required to make the generator "streamlined" or adapted to air resistance. The spark gap and closed- and open-oscillating circuits were so arranged that the various leads passed back from one circuit to another until the high-tension current, ready for the antenna, was picked off from a clip connection in the tip end of the tail. The complete set weighed but 44 pounds, and yet was heard 1200 miles. The two-blade pro-



peller was designed to deliver full power when the seaplane was flying at its slowest flying speed, 65 miles per hour, and as this air speed is approximately the speed of the air behind one of the propellers of an engine when run while the plane was on the water, the same radio set could be used as an emergency set, provided that the engines could be run. But when the NC-3 landed on the water and the set was thus mounted the forward motion given to the plane by the pull of the engine caused heavy strains on the already weakened hull, which jumped over and dived into the waves instead of drifting over them. For this reason, grimly as the need was felt, it was considered too dangerous to try to use the set.

The other transmitter, known as the emergency set, was mounted on the radio desk. The high voltage required for this set was obtained from a dynamotor driven by a storage battery, which battery also furnished directly the low voltage current. This little transmitter was capable of radiating .8

of an ampere, which under normal conditions would give a range of 75 miles. The transmitter proper weighed but 8 pounds, and with the dynamotor weighed only 26 pounds. It paid for its weight when the NC-3 landed 40 miles from Halifax. Communication was established with the Tender, the USS Baltimore, within 50 seconds. The Tender was informed of the location of the plane, the trouble encountered, and the fact that no assistance would be required. This set, because of its 26 pounds of weight, was removed at Trepassy Bay.

Some unit of the radio apparatus above described was in use practically every moment from the time the planes left Rockaway Beach until they reached their several destinations. The radio operator was constantly either sending a message or listening to the radio compass signals or copying a message from the Destroyers. Just as the planes were off Chatham, on Cape Cod, the noon-time signal from Washington was received in the planes and the chronometers given another check. Secretary Roosevelt in Washington desired to send a message to one of the planes and to receive a reply. So quickly was the communication carried out that (1) the message was forwarded to a shore radio station, (2) the plane was called and the message delivered to the plane, (3) it was referred to the commanding officer by telephone, (4) the reply was given to the operator, (5) the shore radio station was called and the reply sent to the station, (6) the reply was forwarded to Washington and (7) before three minutes had elapsed, Secretary Roosevelt received the reply.

In contrast to this efficient service of the radio equipment was the urgent need of communication by the NC-3 floundering about in the heavy seas off the Azores, unable to send any message at all because the apparatus designed for such a crisis was left behind on account of its weight. Only the receiving equipment could be used, which told of the plans of search and the "estimate of the situation." Later as we were drifting into port, the apparatus did its final bit: we intercepted -- "NC-3 sighted on water seven miles from breakwater Ponta Delgada under her own power."

The following excerpts are from the January 8, 1979 issue of the Palo Alto Times (newspaper). C.H.R.S. members should be aware of this unfortunate demolition which was quietly and quickly executed without opposition, since city ordinances and procedures do not include measures to protect buildings of historical value when those buildings are privately owned. Perhaps the time will come when historical societies will at least be consulted before a significant site is casually demolished.

The solitary sign, standing before a now vacant lot, reads:

**"Birthplace of Electronics"**

Discoveries at this location in 1912 by Lee deForest "Father of Radio" with Charles F. Logwood & Herbert Van Etten paved the way for the development of Radio and the Electronics Age.  
Research undertaken for Cyril F. Elwell, communications pioneer.

The house at 913 Emerson St., designated the "birthplace of electronics" and a State Historical Landmark, was quietly bulldozed to the ground recently by its owner.

Its destruction has been labeled shameful by historians in the area, who note that inventor Lee deForest worked in a laboratory in the house to improve his vacuum tube with an amplifier and oscillator that made radio possible, and led to the predominant industry of the peninsula.

All that remains on the site is a sign erected by the Palo Alto Historical Association noting that deForest and two other electronic pioneers made discoveries there that "paved the way for the development of radio and the electronic age".

Several yards away is a large rock bearing a plaque designating the site a California State Historical Landmark.

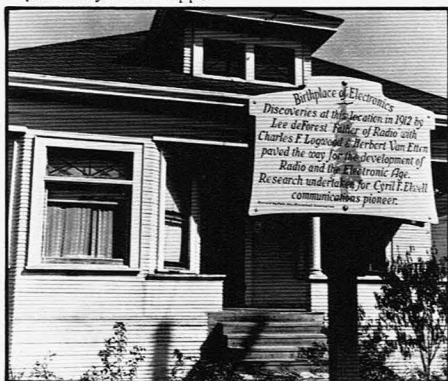
The house, unoccupied for about two years, had been condemned, and the city issued a demolition permit at the owner's request.

The owner furnished the city with a letter from a structural engineer that the house was in danger of collapsing. The city has no means of making the

## De Forest House Bulldozed



photos by Gene Tupper



owner repair the home, or even delay its razing. The fact that the site has historical significance plays no role in the matter.

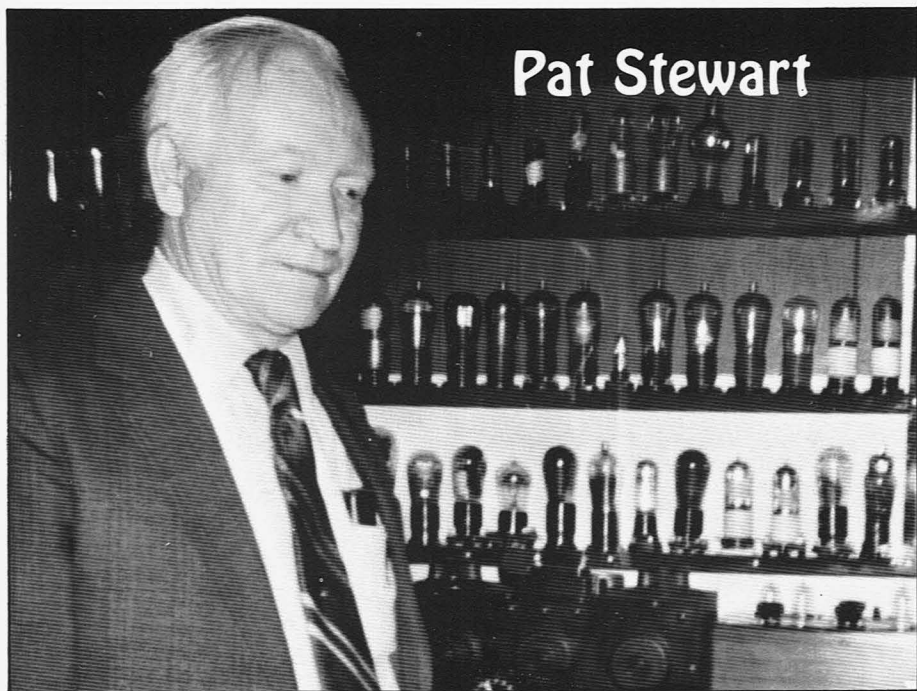
If it were known that the building was to be demolished, perhaps a drive could have been started to move the building to another site if the money could be obtained.

It was on the site that the laboratory, owned by the pioneer Federal Electric Company, was used by deForest and his co-workers during the years 1910 to 1912 to work on the vacuum tube he had invented several years earlier.

His tube could be made to regulate the flow of current, swelling the smallest electrical signals to almost unlimited size.

When the amplifier was sold to the Bell System for \$140,000, it paved the way for trans-continental telephone service.

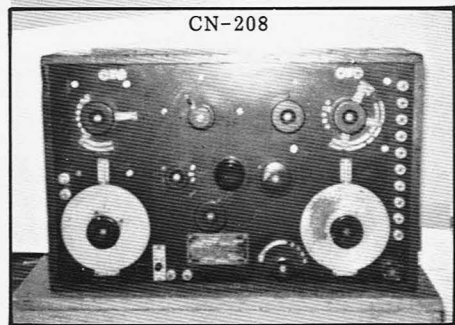
DeForest died in 1961 at the age of 87, holding 300 electronic patents.



## Pat Stewart



CN-208



I have been playing around with radio for 50 years. I got my first crystal set in 1929. The next few years were spent building sets and dozens of experiments with Ford coils. In 1938 I received my ham license, W7GVC. I never threw anything away. Many years after WW II, my son Craig, K7SKP, started organizing it into a museum.

Our collection includes tubes, crystal sets, books, sockets, earphones, keys and early ham sets, as well as pre-1925 radios.

One of our favorite items is a receiver, Model CN-208, built by National Electrical Supply Co. for the Bureau of Steam Engineering on 1/27/1917. Its Serial # 1. Actually, it is only an RF tuning unit -- there is no built-in detector. We also have several spark items from the old Navy spark station NAA at Arlington, Virginia. Visitors are always welcome.

Pat Stewart, 1404 Ruth, Walla Walla, Washington 99362



How would you like to build yourself an old-style crystal set, one that brings in a station almost every ten KHZ without interference from other stations close by?

If you have a good antenna and a good Crystal detector, the set described here will do just that!

The circuit that I have drawn up is copied from several other sets, using the best features of each. The two important features of the circuit is that the antenna circuit is tuned to resonance on each station and the L2-C2 is tuned to resonate with the L1-C1 antenna circuit at all times. So you get peak sensitivity and selectivity on each station that you are tuned to, so you have peak performance at all times.

The antenna circuit consists of L1, tap switch points with selector lever and C1, the 43 plate variable condenser. This all tunes the antenna circuit to the resonate frequency for the frequency desired.

The station selector circuit L2, the Crystal tap switch lever and the 43 plate variable condenser C2 is inductively coupled to the antenna circuit and when C2 is varied it resonates with the antenna circuit, so if the L1 circuit is tuned to the frequency of a station, you hear the station in the L2 circuit, that and nothing else!

This antenna tuning arrangement will work on most any antenna; mine is only fifty feet long and I get all of the Bay Area stations, even right alongside of KCBS, which is 50 KW and only ten miles away! The ordinary crystal set only gets KCBS all over the dial, here.

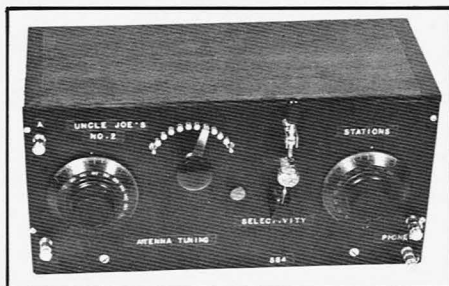
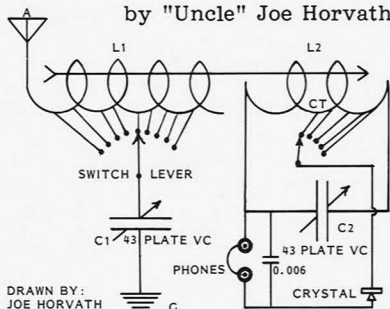
It's very important that you get yourself a real good crystal detector. I tested about 20 before I found the one that I wanted. I would suggest at first to use a modern Diode detector to compare to the crystal that you are testing. I used small Alligator clips on the Diode to clip in and out for quick reference.

This set is so selective that you should log the dial settings once a station is tuned in and identified. The antenna tap switch should also be noted for each station.

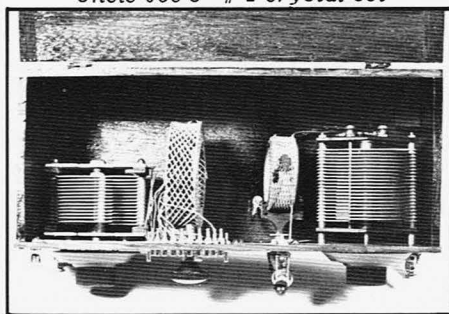
The crystal tap switch control is very broad; a lot depends on the size

## A Two Circuit Crystal Set

by "Uncle" Joe Horvath



"Uncle Joe's" # 2 crystal set

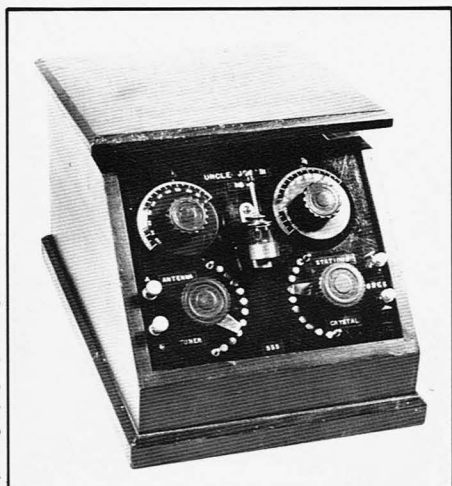


of the antenna being used. Mine helps on selectivity around KCBS.

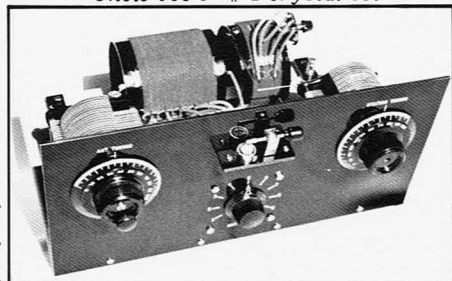
Spend plenty of time learning how to tune this receiver, and you will get lots of enjoyment out of it, I'm sure. Be sure and jot down the dial and tap switch positions each time, or you will get lost!

As the photos in this article illustrate, the construction of the set is

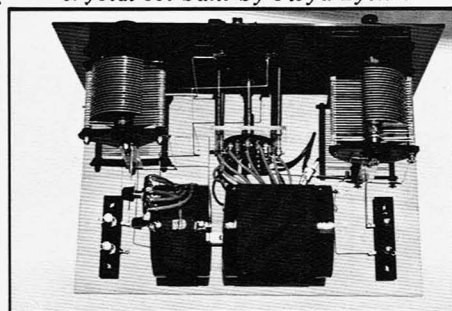




"Uncle Joe's" # 1 crystal set



crystal set built by Floyd Lyons.



very flexible -- if you have a cabinet with a panel to fit, it can be used, though it would be hard to build on a panel smaller than 6x11-inches. Uncle Joe's sets # 1 and # 2 were constructed in this manner. It's not necessary to use a cabinet; one can use just the panel and baseboard, as Floyd Lyons' design shows.

## Parts List

- 14-tap switch points
- 2-tap switch levers
- 2-43 plate variable condensers
- 1-0.006 phone condenser
- 1-real good crystal detector
- 1-pair of good headphones
- 2-ant. and gnd. binding posts
- 2-headphone binding posts
- 3-wooden cleats ( $\pm 7"l. \times 1/2"sq.$ )
- 145-feet of # 24 DCC wire

Wind 100 turns of the # 24 wire on a 3-1/2" tubing; the end will be the first tap for the tap switches, from there tap each ten turns. Best way is to raise and wire and slip a piece of heavy insulation paper under the raised wire and solder a piece of wire about 10" long (flexible insulated wire), remove the piece of insulated paper and repeat this same way for each of the rest of the taps until you have nine, counting the end one too. This coil will be L1. The other end winding will be the antenna connection. Wind 35 turns of wire on a 3-1/2" tubing; here it would be best to use a bigger size wire, if available -- # 18 or # 20 -- as this coil is so much smaller. In the center put a tap as mentioned above, then put three more taps about six turns apart. This is coil L2.

When mounting the coils on the base-board, place two of the cleats about where you would want the coils to be and about 1-1/2" apart; fasten them securely. Place the two coils on the cleats; place the third cleat inside of the two coils so that it can hold them down and in place; fasten it down but not too tight, so that you can slide L2 in or away from L1. It should be able to move from right up against the coil L1 to at least 3" away; this is what will give you your selectivity. The further away L2 is from L1, the more selective the receiver will be. But of course if you are too far, the receiver will lose sensitivity but be real selective. You must find the correct spacing by trial. I use 2-1/2" spacing.

Good luck and have lots of fun!

Joe Horvath





## Radio Confab

US representatives will sit down with officials of 153 other nations to determine how the radio spectrum will be used in the next two decades. The Radio Conference will be held in Geneva, Switzerland next September.

Although the decisions reached at the conference could clear the way for the FCC to implement new services on various frequencies, it would be up to the agency to decide actual domestic uses in future proceedings.

Besides expanding the AM radio band to accommodate another 700 radio stations, mobile frequencies, navigational channels and satellite systems, the FCC would expand the frequencies available for shortwave, or high frequency, broadcasting and maritime and amateur communications.



## Membership Applications

*As a service to our members, we have applications for membership available for the following organizations:*

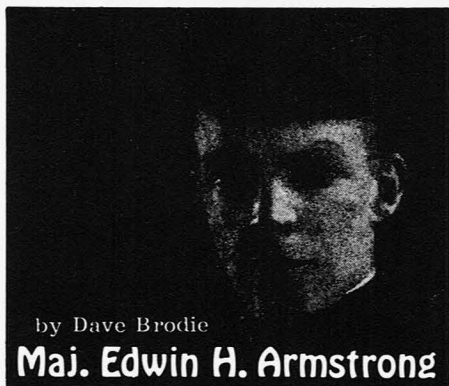
*Antique Wireless Association  
British Vintage Wireless Society  
The Canadian Vintage Wireless Association  
Indiana Historical Radio Society*

*Contact Dave Brodie for applications and/or additional data.*



## Powerhouse

One December day in 1925, Thomas Edison was touring an Indian reservation. He was so shocked by the poor living conditions and poverty, that he wanted to help. He offered to wire the only permanent building on the settlement, the outhouse, for electricity and light. Thus, through his generosity, Thomas Edison became the first man to wire a head for a reservation.



It would seem appropriate at this time that we recognize the 25th anniversary of the death of this brilliant inventor who gave us the vital circuits which are used in virtually all radio apparatus to this day. After years of successful effort in his laboratory, but constantly interrupted by costly litigation in the Courts, he deemed himself a failure and calmly dressed himself immaculately before stepping out of the window of his apartment on the 13th floor of his New York apartment building on February 1, 1954.

In 1967, 13 years later and 17 years after the last of his patents had expired, Armstrong's legal claims were finally successfully settled and he was vindicated.

Such was the tragic end of the man who gave us the regenerative feedback circuit for amplification, the super-regenerative circuit, the superheterodyne circuit we find so common today and his final achievement, the practical development of frequency modulation.

A condensed story of Armstrong's contributions and of his legal battles against monstrous odds is to be found in the February 1979 issue of the "New Scientist." For those of you who are more deeply interested in the history of the development of radio I refer you to the publication "Man of High Fidelity" by Lawrence Lessing, the second edition of which was published by Bantam in March 1969. This is a comprehensive story of the life of Major Edwin Howard Armstrong.



by Don Stoll  
Foundation XIV  
2245 Old Middlefield Way  
Mt. View, CA 94043



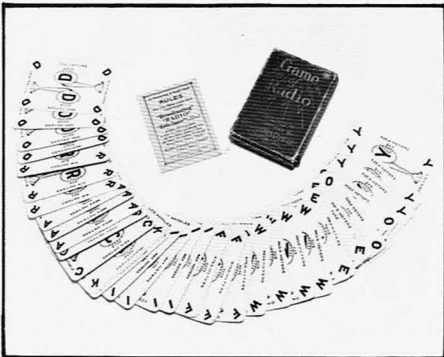
Recently I was pleased to receive a visit from Ed Sage and he brought along a box of radio novelties that kept me smiling for hours afterwards.

The two "radio-banks" shown are in primo condition, made of cast iron, with the original finish in "like new" condition.

The Majestic console is a beautiful coppertone metallic color with incredibly fine detail in the casting.

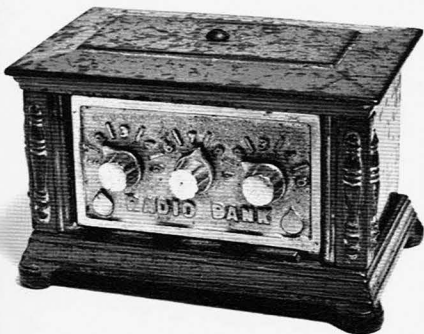
The "Three-Dialer Bank" is equally impressive, especially considering that the three dials are the combination knobs which unlock the front panel door.

Since antique toy banks are popular collector items in general, these "radio-banks" probably exist in homes of collectors who are not antique radio enthusiasts. I am especially interested in acquiring photos and information on any other radio banks, so if you have one, please let me know.



The third item I've selected from Ed's treasures is the playing-card "Game of Radio". Manufactured by "Radio Games Company" of Peoria, Ill. in 1925, it consists of 35 playing cards and instructions "for the three great new card games: Broadcasting, RADIO, and Radio-Junior (for children)". The cards all have the same horn speaker drawing with different broadcast station call letters, city, and wave-length printed on them.

Has anyone seen a cast-iron radio-doorstop? Glass radio-bottle or dish? Bookends, paperweight, kitchen utensils or other household items designed in the shape of a radio? If you have something like these, let me know!



I don't claim to be an expert, but am fortunate to have among my friends, several professional photographers who have patiently pointed out my errors as I learned. Now to get right down to business, here it is --the inevitable HORRIBLE EXAMPLE. Compare these two photographs:

# A Few Tips on Radio Photography

by Alan Douglas



- A. Too close, and too high; distorted perspective.
- B. Too little depth-of-field; bottom of panel out of focus.
- C. Panel reflects part of paper foreground and tripod; lid reflects white background.
- D. One direct floodlight, 45-degree off axis.



- A. Shot with a medium telephoto lens from 7 feet away.
- B. Lens stopped down to f16.
- C. Paper adjusted for uniform reflections in panel (but some panels will look better black). Black cloth hung above set to kill lid reflections.
- D. Two diffuse lights, 45-degree off.

More tips: if your focus is perfect, you didn't move the camera during exposure, and you still can't read the dials in the photo, you are up against the limitations of your lens or film. If you were using Plus-X, try Panatomic-X. Try a lens with better resolution or lower flare level (borrow a friend's Nikon or whatever). Use your lens at its point of maximum resolution -- usually one or two stops down from its maximum aperture. Keep light sources,

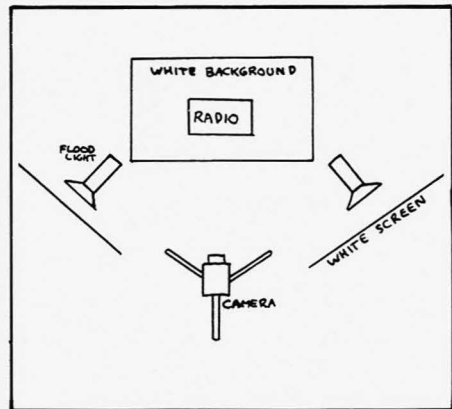


Alan Douglas is a contributing writer for "Radio Age" magazine, and an avid collector. Alan resides in Pocasset, Massachusetts.

reflections, and large white areas out of the lens' field of view. Or get a larger-format camera. For what it's worth, I use a Bronica S2A (2-1/4" square format) and Plus-X developed in D-76.

If you're shooting a black panel with black knobs and a dark cabinet, you can increase the tonal separation between the shades of black by over-exposing about two stops. Light areas of course will go completely white, but this usually won't matter.

For long exposures at low light levels, you must correct for 'reciprocity.' (Briefly, this means that a certain ex-



Here is the setup for the second photo. The two lights are aimed backward at white sheets hung from the ceiling, for diffuse light. The background is white seamless paper. No, the subject is not a radio, but a Radio Disease Killer quack medical machine of 1926.

posure time at a certain light level is not the same as ten times that exposure at one-tenth of the light). If your light meter says one second, use 2; if 5, use 20; if 10, use 50 seconds, and so on.

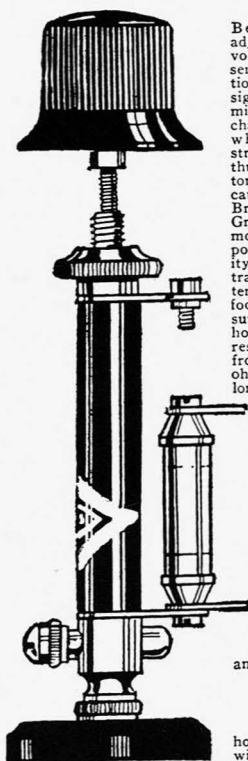
The proper exposure is best determined by a light-meter reading from a Kodak gray card, 18% reflectance. Alternatively, you can meter from a white area (90% reflectance) and divide by 5.

A black panel will not necessarily photograph as black -- it depends on what it is reflecting. It often looks better if it reflects a white area and comes out gray, as in the 'good' example above.

## Better by Far

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## Reproduction Parts

by Ray Harland

Authentic reproduction parts are becoming readily available to the radio collector. This article will acquaint you with some of the items on the market. I suggest you contact the industries mentioned as to prices and availability.

Need nickel-plated brass or plain brass machine screws or nuts? Many sizes are available in flat, round, filister, truss, binding, and qual heads. Also nickel-plated crystal cups are available from:

Ray Harland  
2602 Mary Lane  
Escondido, CA 92025

Tired of looking for that Radiola dial lite hood? Construction details and tab mounting material only are available for \$2.00 postpaid from:

Franklin C. Haas  
207 West 30th  
Hutchinson, Kansas 67501

A new AK breadboard transformer is now available. It comes complete with new iron. The transformer has an input resistance of 1300 ohms, and a secondary of approximately 2800 ohms. These are laboratory and breadboard tested; they work very well. This transformer was developed by Ron Scranton and Donald Patterson. For information write:

Donald O. Patterson  
636 Cambridge Road  
Augusta, Georgia 30909

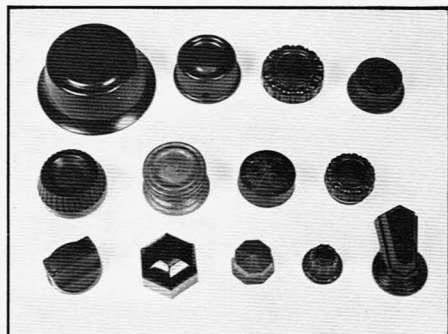
Vintage tubes are available from:  
Micro Electron Tube  
PO Box # 55, Park Station  
Paterson 3, New Jersey 07513

AC types 19 and 89 are stocked, and 01's and 99's are sometimes available. For a complete list and prices, write to the above address.

Zenith dial pointers and a wide assortment of plastic knobs and parts are available from:

Keith Parry  
17557 Horace  
Granada Hills, CA 91344

Keith can make almost anything. The knobs are of such high quality that in some cases it is difficult to detect the reproduction from the original.



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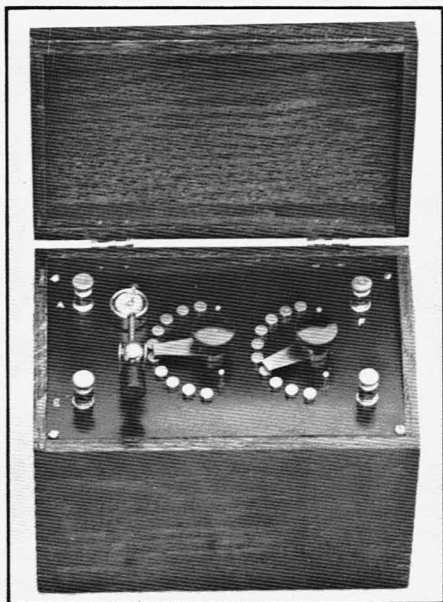
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A vintage Lemco Crystal Set. . . Right? Wrong! This set was made by Bob Herbig, 4178 Chasin Street, Ocean-side, CA 92054. The next Journal will feature Bob and his sets, in the "Collector Spotlights" column.



## The Navy and the Audion

by Elliott Vinson

A short time after the first few audions were made, Dr. deForest took his original mahogany receiver cabinet with the "peep window" in front, together with a seven-plate Witherbee storage battery to the Navy Department in Washington, hoping to interest them in his new discovery. The story of how "they entirely missed the boat" is a classic example of many similar incidents ascribed to dumb officialdom.

The several officers rendered an unfavorable decision based upon six counts:

- (1) The device can in no way be of service to the Department either on land or sea.
- (2) The device is found impractical.
- (3) It is undesirable on shipboard because the motion of the ship at sea would permit the battery fluid to escape from the vent holes of the battery, splashing the acid on and ruining the deck of the wireless room.
- (4) The price of \$30.00 is excessively high in comparison with a good crystal detector.
- (5) The device is shortlived and bulbs would have to be replenished too often.
- (6) It is regarded as unreliable and unwanted because it is too new. It is untried. It is not Standard Equipment.



### HAROLD TEEN—A RUMPUS ON THE RADIO





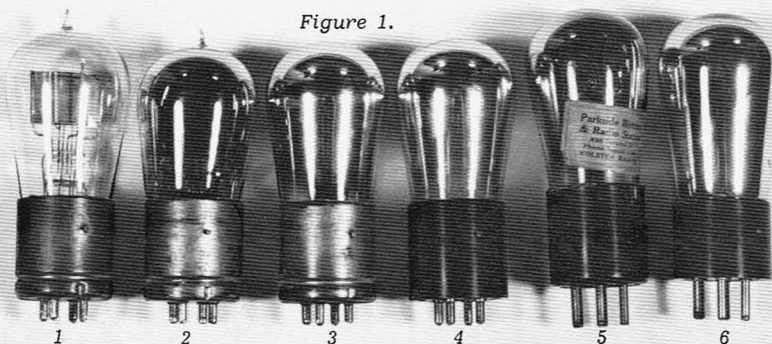
# TUBE COLUMN



*This article first appeared in "Radio" magazine, Sept. 1928, written by G.M. Best. With this printing we have updated the article and added some tube base information. The tubes illustrated are from Russ Winenow's collection.*

## Improvements in the All-Purpose Tube

Figure 1.



Delving into the history of radio usually makes dry reading, and the reader may find this compilation of historical data in the same category. However, useful information on vacuum tubes is always valuable as a handy reference.

In Fig. 1 are shown six tubes which represent the development of the "A" tube, which, until the advent of a.c. sets, was the most popular tube in use. While some of the changes represent details in the base or glass bulb alone, the picture has been prepared with the idea of enabling anyone to identify any of the tubes he now has in use, particularly as to their approximate age.

When broadcasting first became popular in 1921, the tube then in general use was the type '01, used for all purposes in the sets of that day, except that a special detector of the same mechanical design, with gas filled bulb, was used. This "soft" tube was later designated by various distributors as the 00A. The '01 required 1 ampere of filament current at 5 volts, and had about the same characteristics as regards impedance and power output as the '99 dry cell tube. If a set had seven or eight tubes, an enormous load was placed on the battery, and even a lowly two-tube set drew as much current as the later eight-tube outfits. The '01 is Tube No. 1 in Fig. 1.

In the spring of 1922, this was super-

ceded by the '01A, tube No. 2 in the picture, having a  $\frac{1}{4}$  ampere filament at 5 volts, a plate impedance of 10,000 ohms, and a mutual conductance of 800 micromhos at 90 volts plate and zero grid voltage. By cutting the filament consumption to one-fourth, a great incentive to multi-tube sets was created, and thereafter five- and six-tuned r.f. sets came into general use. The first "A" tube had a tipped bulb, and the interior of the glass was coated with a rainbow-colored deposit, created by the combination of gases within the tube and a compound of phosphorous and magnesium, during the process of manufacture. The base was the so-called "Navy" four-prong standard, of brass, with short prongs for contact with the socket springs. The bases were hollow with a ceramic wafer at the bottom for insulation between the contact pins. A small short pin was carefully located on the side of the base which served to prevent the tube from being inserted in its socket in any but the proper relationship between the tube pins and the contact springs. It also served as a locking device since the pressure of the spring was upward which have had a tendency to push the tube back out of the socket. Needless to say, the pin had to be carefully located in the verticle dimension as well (the base on some W.E. tubes was

by G.M. Best & Russ Winenow

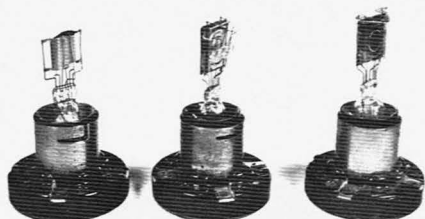


Figure 2.

the same design with short pins, but it was soon found that the horizontal location differed preventing its use in radios not designed for it.

In 1923 the tube was improved by the use of a tipless bulb, No. 3 in Fig. 1, thus minimizing the possibility of damage due to contact of the tip with other objects. The coating on the interior of the glass was silver in color, as in all later day tubes, due to the use of magnesium without phosphorous in the "getter" or gas-absorbing material.

In the fall of 1924, electrical, as well as mechanical, improvements were made, and the tube No. 4 in the picture was the result. Besides constructing the base of bakelite instead of brass, the elements of the tube were made more rugged, and the grid and plate structures were moved closer together, and closer to the filament, thereby increasing the mutual conductance of the tube to 1000, and reducing the plate impedance to 8000-8500 ohms. This change, due to the increased mutual conductance, improved the performance of sets using the tube. Only a very slight increase in grid-plate capacity resulted from the change.

The next change came in 1925, when the X type base was announced, this tube being shown as No. 5 in the picture. This new version would fit in the old sockets but also in sockets design-

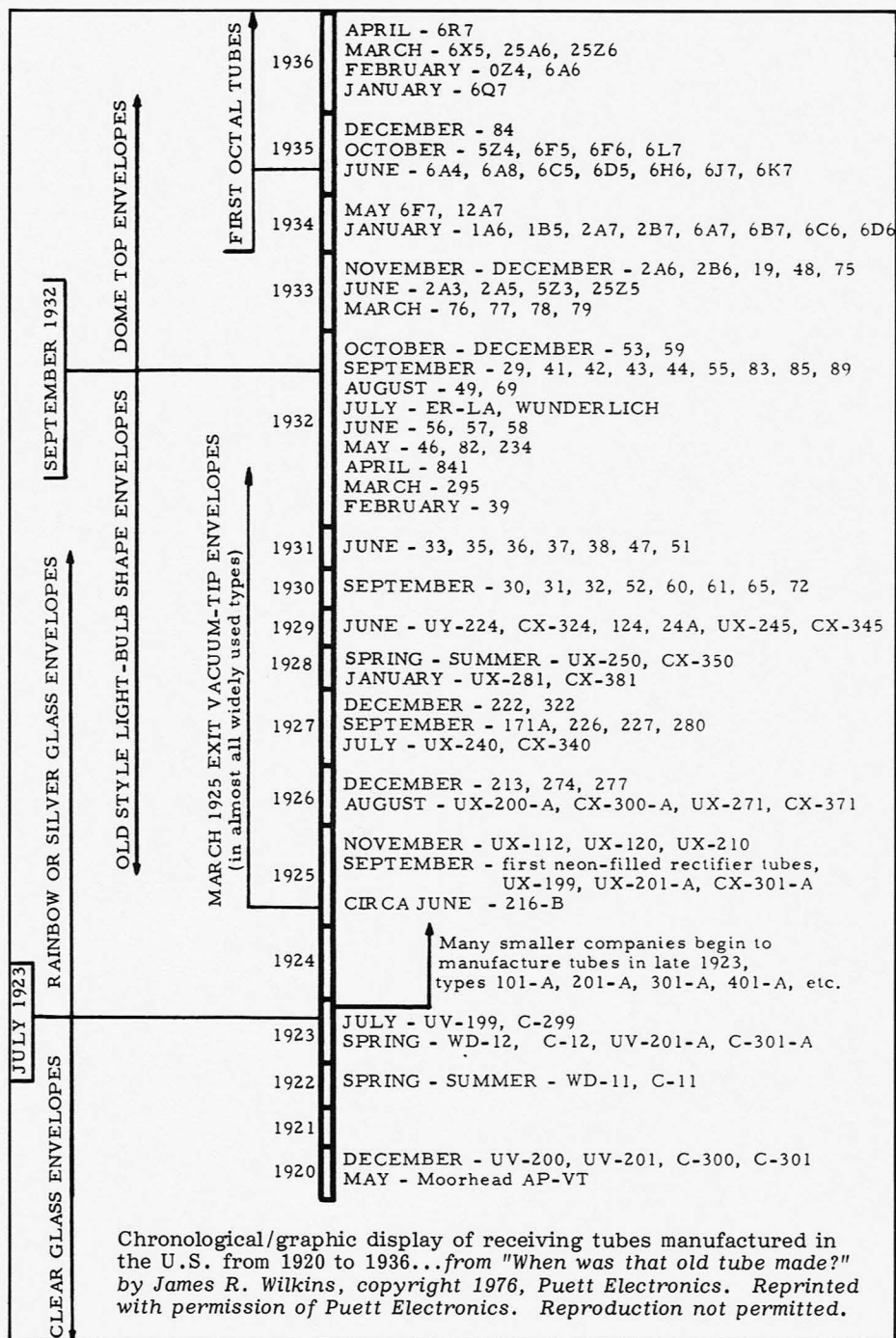
ed for better contact in which the springs engaged the tube pins on the sides rather than on the bottoms. The two filament pins were heavier, being approx. 0.156 (5/32)" in diameter while the other two were 0.125 (1/8)" in diameter. This arrangement allowed the newer built tubes to fit into sockets in which the side pin was not required. The different pin sizes prevented the tube from being inserted incorrectly. No other change was made in the construction of the tube, and its characteristics were the same as its predecessor. In 1927, however, the length of the bakelite base was shortened, and the bulb made longer, to improve the appearance of the product.

This tube, No. 6 in Fig. 1, continued in use until the spring of 1928, when another, and to date the last, improvement in the tube was made. This tube, which looks the same as No. 6 in the picture, employed a new construction, known as the "mica disc" principle of filament suspension. This change can be seen more clearly in Fig. 2. Tube A is the original "A" tube, as of 1922, with the bulb removed so as to show the structure of the elements. Tube B is the improved tube, with closer spaced elements and more rugged construction, and Tube C is the new mica disc type. By changing to the new method of filament suspension, and arrangement of the grid and plate structure, the tube is practically free from liability to damage during shipment, and the microphonic noises have been greatly reduced. The contact pins were nickel plated, insuring better contact with the socket springs.

The improvements in construction of the tube have been accompanied by greatly improved production methods, enabling savings to be made which have been rapidly passed on to the user. For this reason the improved rugged tube available today [1928] costs only a little more than one-eighth as much as the first "A" tubes, which sold at \$9.00 for a short time after their introduction.

So if you plan to buy some 01A's for that old set of your's, be sure that the bases correspond to the sockets in use.







## COLLECTOR AIDS



**WANTED:** AK 20: Rheostat dial cluster with or without knobs, switch, etc. (Right side, face of set)  
Radiola 24: Cabinet lid or parts set.  
Grebe Synch 7: Anybody replicated the pot metal end frames for the SLF tuning condensers?

Need WD II cuds.

Jerry Newton, Route 1, Box 262,  
Woodland, CA 95695

**WANTED:** Base and driver for 14" Magnavox horn; two Bremer Tully variable capacitors (split stator); output transformer for Howard neotrodyne (Model A); transformers for RADA and Radiola 111; schematics for ERLA-S51 and Hammarlund Roberts 4-tube receiver.

Dave Brodie, 315 Cotton Street,  
Menlo Park, CA (415) 323-0353

**WANTED:** Older HRO with coils, also FB-7 or FB-X.

F. R. Tesche, 3728 Mosswood Drive,  
Lafayette, CA 94549 (415) 284-5608

**FOR SALE:** Reproductions of red pushbuttons for late '30's Philco radios (\$5.50 for a set of 8). Send me an original button so that I may match the length.

Wm. Herbert Brams, 2427 Durant  
# 4, Berkeley, CA 94704

**WANTED:** Starting "Radio News" collection, need all issues up to 1940. Sell me your duplicates. Also want "Electrical Merchandising" and "Radio Retailing", same period.  
Don Stoll, c/o Foundation XIV,  
2245 Old Middlefield Way, Mtn. View,  
CA 94043 (415) 965-0112.

**WANTED:** Art-Deco radios from 1930's. Cabinets must have heavy use of glass, mirror, chrome, bakelite or plastics. Don Stoll, c/o Foundation XIV, 2245 Old Middlefield Way, Mtn. View, CA 94043 (415) 965-0112.

**NEED INFORMATION On The Radio Shop of Sunnyvale, Calif. which existed from 1921 to 192? ... then became (part of) Echophone. Want info on company, people involved, or radios manufactured. Don Stoll, c/o Foundation XIV, 2245 Old Middlefield Way, Mtn. View, CA 94043 (415) 965-0112.**

**FOR SALE:** Low loss five-tube TRF, all good parts, beautiful walnut cabinet, \$75.00; five-tube Neutrodyne, all good parts, nice cabinet, \$65.00; Crosley Trirdyn 3R3, good condition, beautiful cabinet, \$85.00; Fada neotrodyne, five tubes, all good parts, nice cabinet, \$75.00; five-tube and Speaker Bosch Cruiser TRF set, single dial tuning, all good parts, \$85.00; Code practice set with one tape, \$25.00; Browning-Drake Regenerative and one RF, all good parts, nice cabinet, \$75.00. All less tubes and shipping extra.  
Joe Horvath, 522 Third street, San Rafael, CA 94901.

**SEND LARGE SASE** for list 79-1, showing the radios, parts, and literature I have for sale or trade.

David McKenzie, 170 West 53rd  
Street, Hialeah, Florida 33012

**WANTED:** Condenser, 16m 4d 250 VDC oil-filled type with screw-in base from Philco model 39-30 or similar. Philco part # 30-2331, pat. nos., re-issue 19370, needed for appearance so it does not have to work. Info. on Philco Safety Aerial part no. 40-6371 -- what was it, what did it look like, etc.? Also need speaker reconed -- who can help? Doug Smith, 1369 Tree Garden Place, Concord, CA 94518 (415) 686-3336

**WANTED:** Cabinets for a Federal 59, Radiola X, Grebe Synchrophase, National 1-10 Receiver complete.  
Pat Stewart, 1404 Ruth, Walla Walla, Washington 99362

**TRADE** my 334 Murdock Loose Coupler for National Receiver early HRO, SW-3, or FB-7 with appropriate balancing cash.

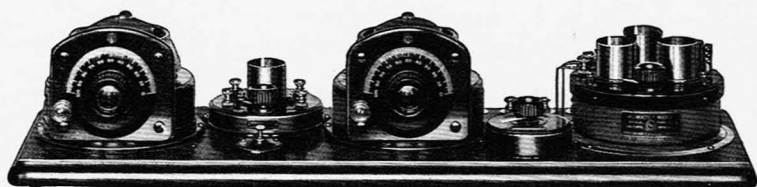
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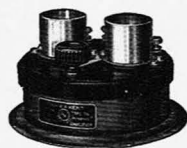
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*Literature describing the entire line of Atwater  
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