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Philo T. Farnsworth • Those Wild Hams of the '20's
Protecting Broadcasting's Past • Collector Spotlight: Jim England
Majestic Radio Restoration • The Fleming Valve

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CONTENTS

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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.

THE OFFICIAL JOURNAL of CHRS is published quarterly and furnished free to all members. The first issue (published in Sept. 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.

Those Wild Hams of the '20's

by Charles C. Hay, WØLCE

It was a glorious time to live -- back in the 1920's, when radio communication was just beginning to emerge. Only a very few top scientists knew anything about this new medium -- and most of the things they "knew" were incorrect. But that didn't deter them from displaying their errors -- what they thought were "facts" -- in the public press.

One of the notable "facts" that got around was the statement that radio communication was impossible below a wavelength of 200 meters. (for those of you familiar with only hertz, 200 meters is 1500 kHz.) So, Congress dreamed up a radio law that confined all amateur communication to the bands below 200 meters -- or above 1500 kHz. The law also specified that all radio stations had to be licensed. Little problem that, since a license was granted upon request and without the applicant having to submit to an examination.

Another part of the law stipulated that only in the big cities were licenses to be granted. Needless to say, since many experimenters lived a long way from the big cities, a lot of transmitters were on the air without the benefit of licenses. Whatever call letters were used were self-assigned.

We Built Our Own Equipment: All of the equipment we early hams used was homemade. There were only two companies in the entire United States that sold radio parts, and their prices were quite steep. For example $20 would buy a link coupler, while a variable condenser (now called capacitor) went for $15. So, most of us were forced to build our own equipment.

The usual receiver consisted of a coil of wire wound around an empty oatmeal box; another coil inside the box was rotated by a lead pencil pushed through the box and both coils. This pair of coils was connected to a fine wire sharpened to a point. The point made contact with the surface of a galena crystal. The body of the crystal was connected to one lead of a pair of headphones, and the other lead of the phones was connected to ground. With a long-enough length of wire for the antenna, this contrivance could receive radio signals from as far away as 1000 miles. It needed no outside power since all the power was furnished by the radio waves themselves.

While vacuum tubes were known in the early 1920's (they were used in World War I), they weren't available, except to a very few lucky individuals. Everyone used a tubeless spark transmitter, anyway.

A spark transmitter was easy to build. It required simple materials, like a spark coil from a Model T Ford, a pair of sharpened zinc strips (to act as the spark gap), a telegraph key, and an antenna. By connecting the spark coil through the telegraph key to an automobile battery, and the secondary of the coil through the spark gap to the antenna, a guy

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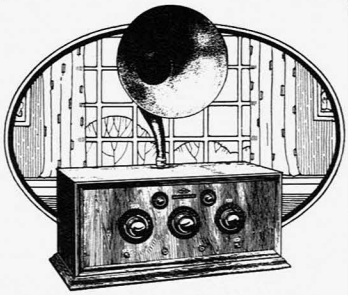

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was in business. When he pressed the key, he drew a lovely spark from the gap. The spark could be received clear across town, if the town wasn't too big, that is.

Although the receiving station had a tuner, it wasn't necessary. Those spark transmitters were the original all-band transmitters. When they came on the air, any nearby receiver, no matter where tuned, would pick them up.

Along Came Tubes: Late in the 1920's, vacuum tubes became available. About the same time, commercial broadcasting reared its head. People with money could buy broadcast receivers, precipitating the unpopularity of the neighborhood experimenter, with his all-wave spark transmitter.

Government regulations, which instituted "silent hours" for Sunday mornings and until 10 o'clock each evening, came into effect. Not that this did much to the experimenter. He usually didn't read government publications, so he knew nothing of the regulations.

At the time the new regulations came into effect, radio communication was administered by the Department of Commerce, which had other things to do besides supply money for radio enforcement. With the absence of enforcement, the young radio experimenter wasn't much troubled. But there were neighborhood relations to consider, and if interference was overdone, the neighbor with his high-priced broadcast set was likely to take the matter up with the offender's parents. This usually resulted in the enforcement of "quiet hours" -- if it didn't terminate experimentation altogether.

I was one of the experimenters in the early days of amateur radio. The fact that I could hear broadcasts on my crystal-detector tuner intrigued my parents to the point where they shelled-out enough money for a vacuum tube, a Crosley book-condenser and a variable tuner. With these treasures on hand, I was able

to build a new-fangled super-regenerative receiver.

A by-product of my new receiver was the fact that the superregen was itself a transmitter. It interfered mightily with our neighbor's neutrodyne receiver. But that was a problem between my parents and the neighbor.

The superregen would pick up commercial broadcasts. It was also adept at picking up amateur transmissions (after my parents had gone to bed, of course). By this time, amateur operators had acquired vacuum tubes. Some of them were even communicating via voice ('phone)!

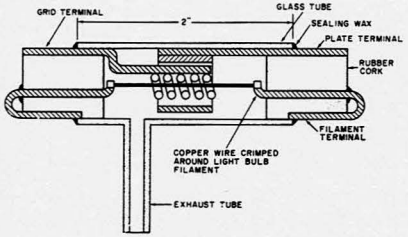
My desire for a tube transmitter could be described as a "consuming passion." But while my parents were deeply interested in broadcasting, the idea of an amateur radio transmitter in the same house left them cold. No money was forthcoming.

I had read of a Chicago ham who had built every part of an amateur radio station. He even built the vacuum tube. So, I thought, anything he could do, I could do. Building the vacuum tube, however, was the big problem. Vacuum tubes grew from Mr. Edison's incandescent lamp. They were large and had four-pronged bases. Making the base was beyond my powers. Fortunately, one of the broadcast set dealers I happened to visit showed me a receiver made in Canada. It used Myers tubes. While the American tubes were descended from a light bulb, the Myers tube was fathered by a cartridge fuse. Now, this was something I could duplicate.

I bought a test tube, and from it cut away the lip and closed end. To the body of this 2-inch-long glass cylinder, I fused a length of 1/4" glass tubing over a hole made previously. Then, after rolling a strip of copper into a cylinder and soldering to it a length of heavy wire, I slipped the assembly into the glass tube. Next, I wound a coil of wire, much smaller in diameter than the inner diameter of the copper cylinder, soldered to it a length of wire, and slipped the new assembly into the copper cylinder. When I was finished with this step, the wires from both assemblies protruded from opposite ends of the glass tube.

Recovering a length of filament wire from a light bulb, I slipped this down the center of the coiled wire. After using rubber stoppers to seal both ends of the glass tube (with the wires protruding, of course), I applied sealing wax to assure an airtight seal. Later, at school, I attached a rubber hose to the 1/4" glass tube and used a vacuum pump to evacuate the air until the rubber tubing went flat. The only thing left was to use a blow pipe to seal the 1/4" glass tubing.

My first vacuum tube had the filament wire exiting from it through the centers of the rubber stoppers. When power was applied to the filament, it heated up as expected -- and so did the stoppers. The vacuum left the tube with a piercing shriek, and a strong smell of burning rubber filled the air.



My next vacuum tube (see drawing) produced better results. Instead of having the heater wire exit the tube, a pair of copper wires, crimped around the heater wire, did the exiting, and all the heat was contained within the tube. This arrangement functioned quite well. In fact, I had three QSO's using the tube before the vacuum got up and slowly walked away.

Condensers and Resistors: There were other components

we early hams had to make by hand. Some were easy to make, like tubular bypass condensers. Back then, Hershey chocolate bars were wrapped in real solderable tin foil. This foil, some waxed paper, copper wire, and a soldering iron and solder were all an experimenter needed to make his own condensers.

To make the condenser, we would cut two pieces each of tin foil and waxed paper to 4 inches by 1 inch. After lightly tacking soldering leads to the short edges of the foil, the waxed paper and foil sheets were interleaved with overhangs to obviate any possibility of the plates (or leads) from touching each other when the condenser was assembled. Then the whole was tightly rolled into a cylinder. When finished, the condenser had one lead coming out of the center of the cylinder and one lead to one side. After bending the side lead to live up with the center, the foil was crimped around the leads and soldered. A bit of sealing wax over the soldered foil and along the exposed seam of the waxed paper properly sealed the condenser. A strip of adhesive tape held the whole thing together.

A variable condenser also had to be hand-made. The Crosley book-condenser didn't have enough insulation resistance between its plates. So, 4-inch-square pieces of sheet zinc were cut and fitted into every-other sawed groove in a pair of pine guides. An end piece which had sawed grooves that mated with the empty ones in the other assembly had fastened to it the rest of the zinc plates. When the two were meshed, we had a crude variable condenser.

Resistors were more of a problem. The carbon cores from flashlight batteries could be used, but they were rather limited in their resistance. Even when a number of them were connected in series, the resistances obtained were often unsatisfactory. Nor could the resistance be controlled. The way to go was to insert a couple of copper wires through a rubber cap into a bottle half-filled with water, and change the resistance by varying the depth of the wires in the water. Excitement was added when the water boiled during a transmission.

The Power Supply: The power supply was more difficult to make. Hams with lots of money had dc motor generators to supply their power. Most of us, however, had to find another means of obtaining power. For example, I took a number of copper plates, about 4 inches square, and oxidized one side of each with a blow torch. I drilled a hole through the center of each plate, and, after slipping a rubber tube around a long bolt and insulating the head and nut with rubber from an old inner tube, put the bolt through the stack of plates. When finished, the plates were bolted together, ozide face to bare copper. This rectifying setup, with a couple of my home-made bypass condensers and the coil from an old telegraph sounder made a 117-volt dc plate power supply.

Finally, there came that magic night when my parents were in bed safely asleep. I crept downstairs and assembled the set with a galena crystal where the tube would be. With the headphones tightly over my ears, I moved the variable condenser until I heard another amateur. Then I quickly tuned him in on the superregen.

Taking the galena crystal out and inserting the tube, I fired up my rig and gave him a call. I was lucky. He came back to me, and that was my first QSO, the high point of my life. The QSL card I received from him still hangs on my shack wall, some five decades after it was sent.

The Editor would like to thank Carles Hay for his permission to use this article. The preceeding article is not for reproduction.

Greening of the Grid

During the early experiments with the first crude handmade radio tubes, it was the custom of Dr. DeForest to give directions to his assistants somewhat in the following manner:

"Here. . .hook this to that, and that to this. Bring this wire over to that post and move this over there."

In the rapidly shifting tests it was, at times, difficult to differentiate between what was "this, that or the other thing," so one day, in a state of exasperation, an assistant impulsively asked:

"Doc, why don't you name some of these parts, so we'll know what you're talking about and what we are doing?"

"All right," snapped De Forest in reply. "You know what the filament is and which is the 'wing' (now known as 'plate'), so we'll call this other jigger -- the GRID, -- because that's what it looks like -- a roaster grid." Then, quickly adding, as if it were equally important:

". . .and remember this. . . in fact make a sign and paste it on the wall: REMEMBER, GREEN TO GRID and Red to Wing."

To this day, that order has never been countermanded, and we find that -- in every country in the world where electronic circuits are planned or used -- the "lead to grid" is always specified in the color code as -- GREEN!

Radio-Craft, January 1947;
- submitted by Elliott Vinson.

"BLOW, BLOW, BREATHE AND BLOW—"

An advertisement in RADIO NEWS for August announces that "you can get stations 1,000 to 2,000 miles away with the AIR of the Super-Booster." All we got to say is if you can do this with the "air" of the super-booster, it must have one awful strong breath. Does it work on "bootleg" tubes?

Contributed by Porfirio T. Regalado.

Rights of Reciprocity

The CHRS grants Rights of Reciprocity to other vintage radio organizations. The purpose of the agreement is to improve communication between clubs and to promote the exchange of ideas. A part of this agreement is an exchanging of journals, and the right to reproduce each other's articles.

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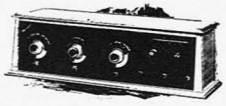
The CHRS requires full disclosure as to source and author and requests a copy of any journal in which our articles appear.

If your organization is interested in establishing rights of reciprocity, please contact the Secretary, Dave Brodie.

Please note the following Journal deadlines:

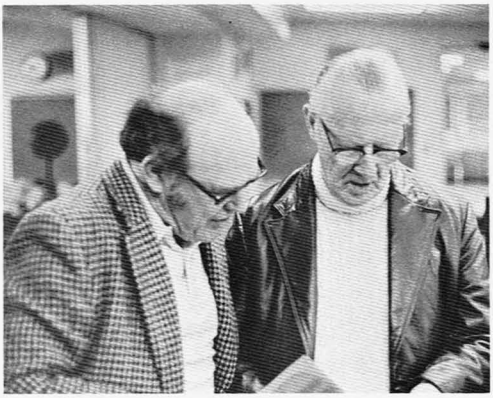
June issue -- May 1, 1979
September issue -- August 1, 1979
December issue -- November 1, 1979



The Cats Whisker

Response to the offering of the "Cats Whisker" book has been excellent. On March 1, the final order was placed with the publisher. These books will be mailed out to individuals as soon as they arrive. No other mail orders will be accepted. There will be a small supply of hard- and soft-cover editions available at the Foothill Meet -- while they last.

- Allan Bryant



meet

by George Durfey.

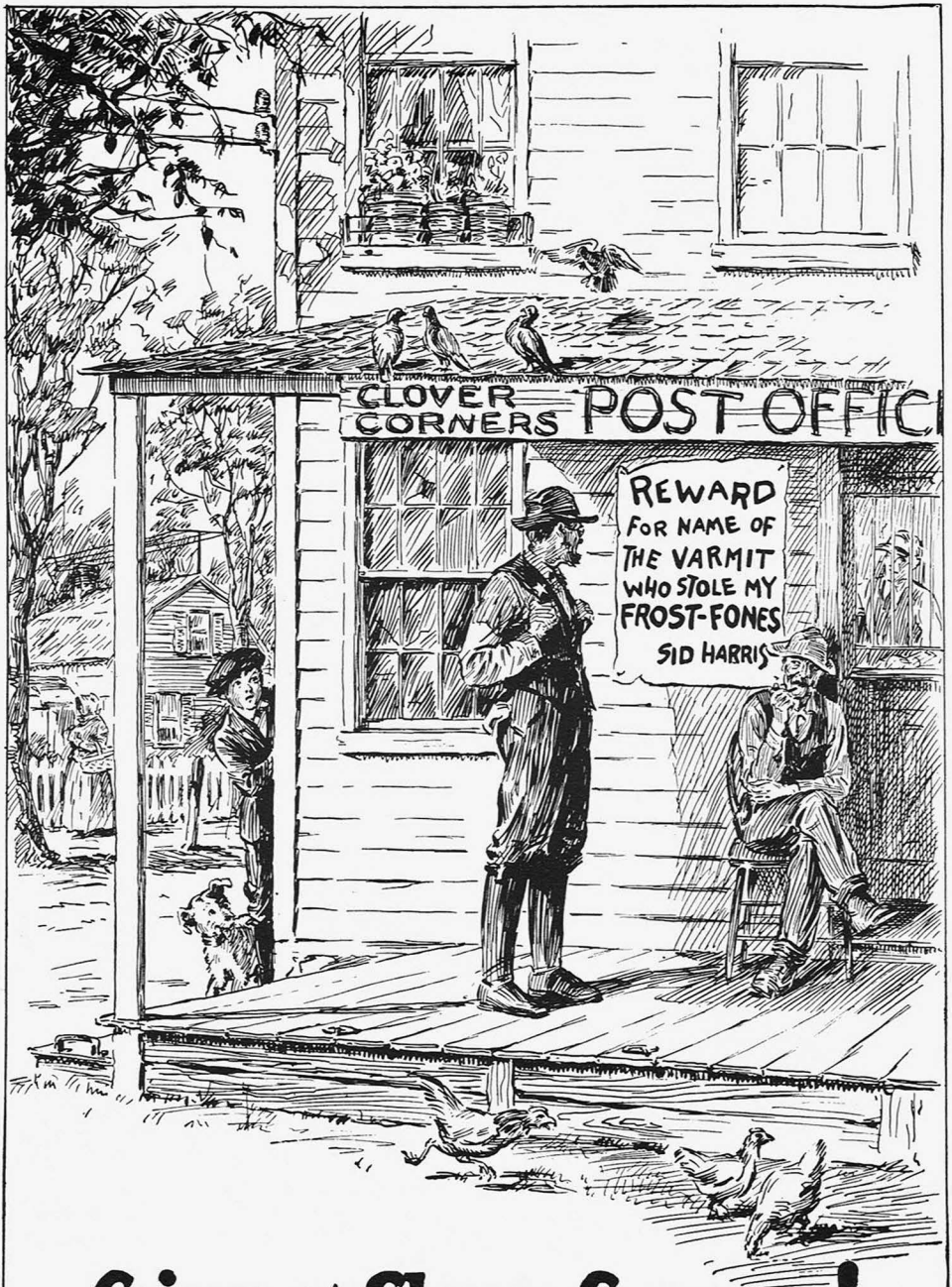
The CHRS holds several swap meets each year for the benefit of its members. Members are encouraged to invite potential new members to attend these meets. However, a complaint has been made to CHRS that antique dealers in the area have been invited to swap meets by certain members. We request that antique dealers not be invited to our swap meets. The reason being, at a recent swap meet, one of our members wanted to buy a reasonably-priced radio, but found it was already sold. He later found this very same set at a local antique shop, priced at five times the price asked at our meet. This type of action defeats the whole purpose of our swap meets, and only succeeds in driving up the prices of antique radios to an artificially high level.

If complaints continue to come in, in regards to this matter, CHRS has the right to refuse admission. Let's keep the meets for members and their guests only -- not for dealers!

the Cover

RCA

Famous RCA Trademark Rejuvenated: Here is one version of the famous Dog and Phonograph trademark, showing how it will be used in TV and print advertising as an adjunct to the bold contemporary "RCA" letters. Plans also call for the "Nipper" trademark to be gradually phased into useage on RCA products, shipping cartons, sales promotion literature and company vehicles. The dog and phonograph symbol is regarded as one of the world's most popular animal trademarks in use today. The trademark has been a standard for more than 70 years.



Crime at Clover Corners!

Protecting Broadcasting's Past

by John Palcewski

Until recently, anyone interested in radio or television programs of the past had to wait for reruns or documentaries, or get special permission to search through such sources as network archives, university or private collections. Now, scholars, teachers, researchers, historians -- and even the merely curious -- can visit The Museum of Broadcasting on New York's East 53rd Street, and review an array of historical audio and video tapes that cover a half-century of American broadcasting.

For a suggested contribution of a dollar per visit, or an inexpensive yearly membership, anyone can replay such television gems as General Douglas MacArthur addressing a joint session of Congress shortly after his firing by President Truman, or Edward R. Murrow's 1954 interview with historian/poet Carl Sandburg, or Vladimir Horowitz's Carnegie Hall Recital, or even the premiere broadcast of "I Love Lucy," starring Lucille Ball and Desi Arnaz.

The Museum's collection is not restricted to television; also available is a diverse range of radio programs from the earliest days of broadcasting. A visitor may tune in a 1935 broadcast of "Major Bowes and His Original Amateur Hour," "Amos 'n' Andy," "The Lone Ranger," "Ma Perkins," and many other popular hits of that era. In the collection are speeches by US Presidents beginning with Warren G. Harding, and including 38 of the speeches delivered by Herbert Hoover and Franklin Roosevelt during the campaign of 1932. An extensive collection of World War II material is planned by the Museum, beginning with the coverage of a full day of broadcasting at the start of the war in September 1939, and at its conclusion in August 1945.

Access to this wealth of material is surprisingly quick and easy. A visitor goes through a computer-generated card catalog, much like that found in a public library. Listed are more than a thousand individual radio and television programs, indexed not only by title, subject and date, but also by director, producer, writer and technical and cast credits. A typical program in the collection may be listed under as many as 15 different headings.

Once a particular program is located, a librarian sends the call number to the Museum's storage area. Within a few minutes, the desired tape is placed into one of eight modern broadcast consoles, containing audio and video playback machines. The tape is loaded into the machine, and the visitor views or hears his program selection. Each of the broadcast consoles can accommodate three people at one time, and all eight of the consoles -- or any combination -- can be

plugged into the same program at the same time. The entire operation, with its ultramodern television monitors, keyboard buttons, knobs, switches and earphones, resembles a scaled-down version of the control room at the Manned Spacecraft Center in Houston.

Repository Established: The Museum of Broadcasting is the brainchild of CBS chairman William S. Paley, who decided that "some serious thought" should be given to the preservation and collection of important examples of broadcasting. He feared that a myriad of radio and television records of important cultural events, political landmarks, milestones of social history, and even classic comedy would, through neglect, simply disintegrate or disappear. Paley reasoned that some sort of an institution should be built as a repository, so he commissioned feasibility studies and seminars to find out if such an idea was practical.

The conclusion of the studies was -- yes! Miniaturized electronics and modern recording techniques could reduce a mountain of cumbersome materials such as radio recording discs, kinescope film and bulky videotape to manageable size. Plenty of material existed which could be collected and catalogued.

That much being established, Paley did not wait for a lengthy fund-raising drive. He contributed $2 million of his own money to insure the Museum's operation for its first five years. The doors opened in November 1976.

The valuable collection, which is growing at the rate of about 4,000 programs per year, is stored in two vaults that are about as close to being completely burglarproof as possible. Temperature and humidity are carefully controlled. Windows of the building are bricked over, not only for added security, but also to prevent any stray magnetic fields from affecting the tapes. All wires are carefully shielded; none is placed within three feet of any tape storage rack.

This security consciousness extends, naturally, to safeguarding the tape collection from fire. If room temperatures exceed 140 degrees, Du Pont's Halon 1301 fire extinguishant is immediately discharged. Through a special chemical reaction, any fire would be snuffed in seconds. The extinguishant is clean and dry, leaves no residue, causes no damage, and requires no extensive cleanup following discharge.

The Museum of Broadcasting is helping to preserve for posterity the bizarre video comedy of Ernie Kovacs, the somber memorial to President John F. Kennedy, and Ed Sullivan's laconic announcement that"sitting in our audience tonight . . ."

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Horn Speakers

by Floyd A. Paul

Horn Speaker Definition: The horn speaker is a device to reproduce audio sound waves from electrical energy and distribute the acoustical energy through a horn-shaped element. Horn loudspeakers contain two elements, a signal reproducer and a horn-shaped acoustical coupler. When the signal reproducer (phone or loudspeaker unit) is driven by electrical energy, a diaphragm is vibrated by a magnetic field (directly or indirectly) and an acoustical sound energy is delivered from the diaphragm. The column of air in the open horn tube is displaced, creating amplified audible sounds. Neglecting other parameters, the acoustical volume will be somewhat in proportion to the size of the horn and the amount of air displaced by the diaphragm.

Background Material: Rather than reprint much of the already printed literature on horn speakers, this article will reference a few significant articles on the subject, touch on some high-lights of horn speakers, describe the author's collection, show some frequency characteristics of horn speakers, and list known manufacturers. The reader may know of other good reference material, but the author recommends the following three articles for preferred reading: "Early Horn Speaker Development," Old Timer's Bulletin, December 1976, Vol. 17, No. 3; "What Is a Good Loud Speaker," Fred Canfield, Radio News, August 1928; "Loud Talkers," Walt Sanders, Radio Age, January 1978.

Horn Speaker Popularity and Evolution of Design: The era for the popularity of horn speakers was 1922 to 1926. Before 1922, earphones were the common listening device. During 1926, the paper-cone reproducer became popular, and by 1927, it was difficult to find horn speaker advertisements in radio magazines. Early horn speaker designs were trial-and-error oriented. Early horn speakers tended to be straight-line vertical cone-shaped tubes, with a right-angle turn to a bell opening. Improvements occurred by curving the cone-shape tube of the horn into a continuous curve. This design improvement was to become the basic shape of most horn speakers. Two benefits occurred from this continuous curving: The curved shape created a longer air column and a larger air column (more volume) and it was possible to move all masses of the mechnaical design toward or over the center of gravity, and hence greatly improve the physical stability of top-heavy horn speaker design.

Designs were copied and many innovations occurred during the first few design years. New materials were continually being experimented with, in the construction and fabrication of horn speakers, and advertise-

ments exaggerated all types of benefits from these modified designs. Some manufacturers made all parts of their horn speakers, such as Western Electric and Magnavox, while others made some parts and bought from others, such as RCA.

Horns were fabricated from wood, laminated wood, pressed wood, bakelite, plastic, aluminum, cast-iron, brass, copper, papier mache and sheet-iron. The following design features and attendant benefits became guidelines to good horn speaker design.

(1) In general, horn materials should be made of fibre or non-metallic substances which have no natural period of vibration in the audio range. These materials do not exhibit a ring or resonance, which many metal horns had.

(2) Horns should have roughened interior surfaces, such as wrinkled paint on metal surfaces, which tend to diffuse the sound and reduce metallic ringing.

(3) The shape of the horn should be exponential rather than straight line (megaphone) shape, for optimum reproduction of sounds.

(4) A longest column of air in the horn (longer horn) gives a better low-frequency response. Short horns have higher cut-off frequencies.

(5) A largest volume of air in the horn design gives a greater volume of sound.

Horn Speaker Driver Mechanisms: There were three basic driver mechanisms by which most designs could be classified. The benefits, limitations and characteristics of these three types are described here:

(1) Earphone -- Simple design, seldom if ever need adjustment, magnet drive to an iron diaphragm, fairly rugged and not easily damaged, limited frequency response from the diaphragm, limited volume, volume control (when used) is an adjustment which moves the coils and magnet closer to and further from the diaphragm, but when moved closer increases the volume of the lower audio levels but may limit the louder audio signals because increased diaphragm movement may cause the diaphragm to chatter against the magnetic poles.

(2) Driver Arm -- Somewhat more complex than earphones, fairly rugged, magnetic drive of an armature which is coupled mechanically to a diaphragm, diaphragm of mica or aluminum or bakelite, coupling is a rod or pole, subject to misalignment with use and aging, and may result in possible pole chatter, difficult to clean out magnetic particles that accumulate in magnetic field areas, no simple mechanical volume control can be used, higher volume, fair efficiency, mechanical linkage can be resonant.

(3) Voice Coil Driver -- Somewhat complex, alignment of dynamic parts important, hollow coil suspended in a magnetic field, coil coupled mechanically to a diaphragm, mica is the typical diaphragm material, subject to magnetic and non-magnetic particles lodging between moving coil form and pole pieces, better frequency response than drivers and earphone, higher volume.

Author's Collection: The author has a collection of 12 horn speakers, and one additional speaker which may barely qualify as a horn speaker. The Reflectone speaker is a bit of a maveric, but its possible qualification is based upon the horn speaker design concept of an air column driven by a driver unit. See fig. 1 for a sketch of the Reflectone design. The cross-section shows how the sound from the earphone located in the base facing upward impinges upon the internal surface of a 1½" diameter reflector cup, then is reflected backward onto the inside surface of a larger 3" diameter cup wrapped completely around the smaller internal cup opening and reflecting sound outward through a grating to the listener. There is an air column, small as it is, with a definable length (about 4"), and the speaker's design is to

move a column of air into two reflectors, which in effect simulates an air column of a horn speaker.

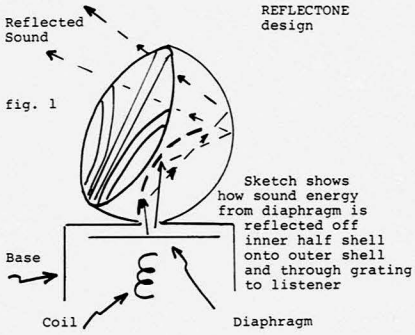
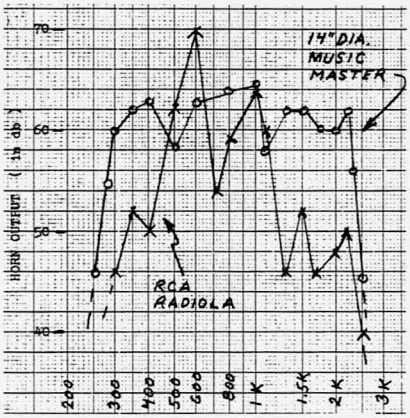


fig. 1

The author's collection of horn type speakers is summarized in Table 1. Useful information is supplied in this table to help in describing some of the pertinent characteristics of these speakers. The column titles are listed as follows: The type of driver column identifies each speaker as having one of the three driver mechanisms described earlier in this paper -- namely earphone, driver arm or voice coil. The bell diameter column gives diameter to the next-closer whole smaller inch. The dc resistance is accurate to about ±10%, as is the ac impedance measurement, which was made by using a 4V ac signal at 1K hz and driving a General Radio Decade resistance box, type 602 L in series with each speaker's driver coil. The decade box resistance taps were adjusted until the voltage across the decade box equalled the voltage across the driver coil and the resistance value was noted. A Micronta 22-204 multimeter with a 10V ac scale was used to make voltage measurements. It can be seen from the measurements that ac impedances of the various horn speakers varied considerably (3K ohms to 40K ohms). The table shows that most of the speakers have an ac impedance to dc resistance ratio of between 5;1 and 10;1 at 1K hz.

Evaluation and Performance Test: To get some comparative performance evaluations of the author's horn speakers, a test was designed and performed by putting a known frequency of a known intensity into each speaker and making an intensity sound level reading at a given distance from each speaker. The test equipment consisted of an Audio Generator, AG-3, made by Measurement Engr. Ltd. of Canada, a General Radio Audio Frequency Microvolter, Type 546-C and a Hermon Hosmer Scott Inc. Sound level meter, Type 410-A. The sound meter is a commercial device for testing sound levels and has a flat frequency response of ±1 db throughout the audio range. It reads directly in db from 35 db (a very low whisper) to 140 db (which is above the threshold of pain for most people). The audio oscillator supplied a 2.2V ac signal at all audio frequencies into the General Radio Type 546-C Microvolter. The Microvolter was adjusted to provide a 1 volt ac signal output at all frequencies into each speaker in this test. Two frequencies were chosen, and all speakers were tested at 350 hz and 1K hz. Any very pronounced resonances and nulls (anti-resonances) were looked for between 350 and 1K hz and noted. The sound level meter was located 2 feet directly in front of the horn bell openings. The results of the test are given in Table 2. Background noises from the street and dogs barking interfered with measurements below 45 db. Therefore, low level measurements should be considered marginal in accuracy.

There was a vast difference in efficiencies of these speakers, as can be seen by the db measurements. A statistician will also advise against quoting data based upon one sample size in a test, and particularly when the tested devices are over 50 years of age. However, the data should be at least considered as a qualitative result, if not quantitative. Two speakers were chosen for an overall frequency response



FREQUENCY (in hz per sec.)

Frequency Response Curve
of RCA Radiola and 14"
Music Master

fig. 2

measurement, and the test results are shown in flg. 2. It can be seen there are many peaks and dips in the response curves. The frequency response between 250 hz and 2.5K hz is anything but linear. It should also be pointed out that this test which selects a standard testing condition for all speakers doesn't necessarily give results that might not be altered when a speaker is coupled to a battery set's final output circuit. Let the reader be reminded that the impedance coupling characteristics of the final driver tube would also affect the volume output of the speaker, so that, for a given driver tube with a given E_p/I_p condition and a given speaker's non-linear impedance response, there would be a different audio output reproduced for the listener.

Observations: A few observations are in order about the testing of these various speakers. The AK "H" horn speaker did not respond anywhere near the db level of the other speakers, but the AK could not be restored or adjusted as some others were, since the pot-metal parts in the base of the speaker had expanded and siezed, and no adjustment could be made. Therefore, the AK speaker response should not be considered as typical of a good AK speaker. Most of the horn speakers had a frequency response that dropped off rapidly below 250 hz, on the low end, and about 2.5K hz, on the high end. One horn speaker, the Rola, responded well at up to 4.5K hz. Three of the speakers with earphone drivers had volume controls which varied the spacing between the magnetic poles and the iron diaphragm of the driver unit. The Radiola volume control gave a 3 db delta in volume. The BTH control gave over a 20 db range of volume. The Dictograph speaker control gave a 15 db range adjustment. The WE 10D had no significant resonances. The Silvertone speaker had a generally increasing db response slope from 350 to 1K hz (smoother than most speakers). Two of the speakers had a very pronounced dip (anti-resonance) and these are so noted in the table. The Radiola UZ 1325 could not be adjusted for a maximum output. It was not possible to turn the earphone mechanism extremely close to the diaphragm, so as to achieve maximum volume. Some parts may have aged and caused mechanical binding. The Magnavox R-3 speaker was operated in this test with 6 volts applied to the field coil. The amperage was 1 amp at that voltage. To test the effectiveness of the field coil a decreasing field voltage was applied to the R-3 field with a 700 hz signal applied to the reproducer's voice coil. The frequency of 700 hz was chosen because the R-3 peaked and responded well at that frequency region. As the field voltage was reduced (and hence current), no noticeable decrease in sound volume was discernable down to the half-voltage point (3V), but as voltage was reduced further, very noticeable sound level changes were noted. With 2V applied to the field coil, greater than 6 db reduction was noted. Below 2V the drop off in sound level continued to be pronounced

Photographs: Six photographs of the horn speakers are shown and referenced as pictures 1 through 14. Descriptive comments are included about the various speakers in the following paragraphs. Pictures 1 and 2 show the smallest and largest horn speakers in the author's collection.

Picture 1: Reflectone 3" diameter speaker (which the author describes as barely qualifying as a horn speaker) is at least an oddity. Being extremely small, using an earphone as a driver unit, it has a very low audible output. It is made of simulated tortoise shell and was advertized in Radio News Magazines of 1925. This speaker weighs less than 1 pound.

Pictures 2 and 7: The Music Master horn speakers (14" and 22" diameter bells) have nearly identical goose-neck, cast-iron bell support tubes, but the two earphone driver units have quite different ac impedance responses at 1K hz. The 14" bell is made of light-tan spruce wood (laminated), and is original. The 22" diameter oak bell is a Victor phonograph bell made of cross-banded oak veneers (Victor #31) that had several inches cut off the small diameter part of the bell, and was custom-fitted to the goose-neck part with a Music Master adapter ring. Since the 22" diameter bell seemed to closely match the shape and size of the original 21" diameter Music Master bell, it was included in these tests for comparison and tests.

Pictures 3 and 6: The Magnavox M-20, Mod. A., is a unique construction shape, being best described as a driver arm reproducer coupled into a U-shape cone-tube. The horn is totally encased in a walnut, rectangular box cabinet, with a cloth door cover.

Picture 4: The Magnavox R-3 is an electro-dynamic speaker with a movable voice coil anchored to a metal diaphragm. The movement of the coil is limited only by the elastic limit of the diaphragm. The impedance of the coil is very low, so that a step-down transformer needs to be used from the output of an amplifier. The electromagnetic field consumes 1A at 6V. Resonance of the diaphragm is near 4700 hz. This speaker is the heaviest of all the author's speakers, and weighs 13 pounds.

Picture 5: The Magnavox M-1 has a driver coil resistance of 400 ohms, and impedance at 1K hz of 3K ohms, the lowest of all speakers tested. The steel bell is painted gold, one of two colors available with this early Magnavox horn. It is one of the prettier horns in the author's collection.

Picture 8: The RCA Radiola UZ-1325 has a molded rubber horn and a volume control. It has a more upright shape than most other speakers.

Picture 9: The Rola, Re-Creator, has an aluminum horn and was in fact one of the better sounding horn speakers of the collection. The frequency tests of Table 2 show the horn had better volume at 350 and 1K hz than most speakers.

Picture 10: The Dictogrand is an earphone-type horn speaker, with an adjustable volume control. The numbered dial on the front of the chassis box, when turned, varies the air gap between the magnetic poles and the diaphragm, thereby increasing and decreasing the pull of the magnetic field upon the diaphragm and hence its adjustment varies the volume.

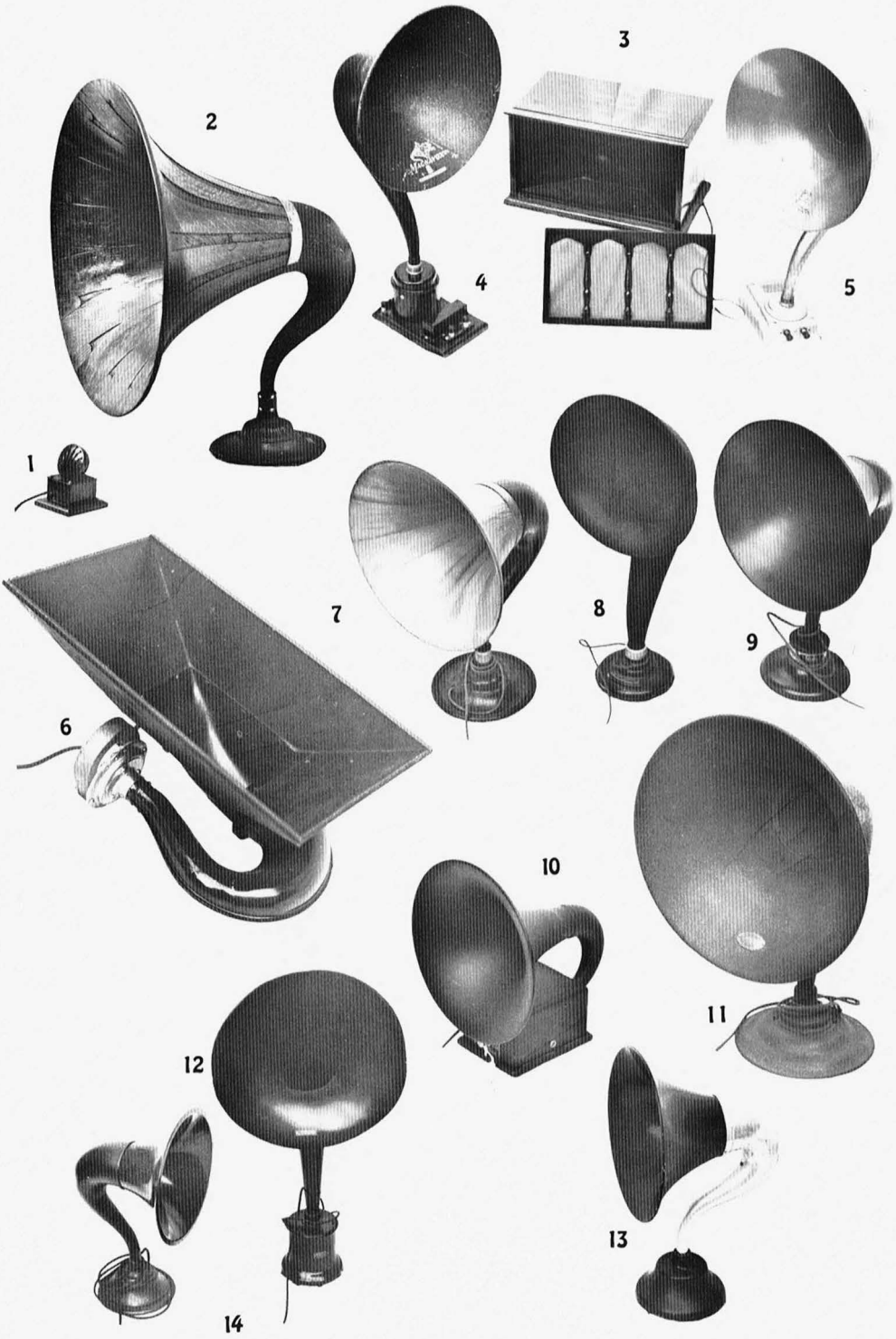
Picture 11: The AK "H" is a very ruggedly-constructed steel horn speaker, with brown crackled paint. The type of driver is an earphone. The aesthetic shape of this speaker is most pleasing. Unfortunately, the driver parts (made of pot-metal) had siezed up, and made adjustment impossible (note: a second AK "H" speaker was acquired during the writing of this article, also had siezed parts and did not perform adequately).

Picture 12: The Western Electric, 10D, has a heavy metal base which contains a step-down transformer to drive the low impedance driver arm assembly. The papier mache 14" diameter horn is a bit distorted on the edges because of time aging and wear. The horn is one of the earliest of all shown in Table 1. It weighs 9 pounds.

Picture 13: The British Thomas-Houston (BTH) is a British-make horn speaker with an earphone driver and an aluminum horn. The outer bell is painted brown, and the volume control is a knob in the base that gives an extreme range of control (over 20 db). The tonal quality was as good as any US-make earphone horn.

Picture 14: The Sears Silvertone WLS horn is one of the smaller horns, having an 11" diameter bell. The horn is molded bakelite, brown-colored, with a very low driver dc resistance and ac impedance.

In conclusion, the author has made a listing of horn speaker manufacturers and model identifications of the 1920's, and lists 65 such manufacturers in Table 3.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14

Table 3

Manufacturer	Model-Name-Style
Ackerman	Aristocrat 21, 25
Ajax Elect. Spec.	-
Aldine Radio & Mf.	Microphone
American Art Mache	Madera
Amplion	AR 102, 111, 114, Dragonfly, Jr., Jr. deluxe (also identified as AR 15, 19, 35, 45)
Arkay	-
American Elect.	Burns 205B, D
Atwater Kent	H, L, M. R
Baldwin	Nathaniel
Bel Canto	-
Brandes	Audiophone "S," "J," Baby Grand, Baby
Bristol	R 1202
Cannon & Miller	Camco
Chanson	-
Davis	Majestic
Dictograph/Grand	Dictogrand Portable, Upright
Dual L. S. Co.	Charmitone H-8, J-10
Federal	Pleiophone
Florentine	-
Frost	Musette
Hardsocg	-
Holtzer-Cabot	Herald
Jewett Radio & Phono	Superspeaker
Jodra Mfg. Co.	The Enchanter
Kilbourne & Clark	K & C
Kirkman Engr. Corp.	K-E
Liberty Metal Prod.	-
Madera	Madera
Magnavox	M1, M4, R2, R3, A1-R, A2-R, TS-2
Manhattan	Jr.
Metro Elect. Co.	Metro L. S. 10
Mozart-Grand	Baby Grand
Multiple Elect. Prod.	Atlas Amplitone 101, 102
Murdock	500
Music Master	-
O'Neil	Audiophone
Orchestrion	-
Ovenshire	-
Radialamp	Lamp speaker
Radio Cabinet Co.	-
Radio Industries	Rico 120
RCA	Radiola 1320, 1325
Reichmann	Thorola
Rhamstine	Adapt-O-Phone
Rice & Hochster	Reflectone
Rola	Re-Creator
Rollersmith -	Universal
Saal	Soft Speaker, Jr.
Sadler	Trutone, Sr., Little Sr.
Sanford Bros.	Timbretone
Standard Metal	15, 17, 114, Gem
Stewart Warner	400
Stromberg Carlson	1A, 2A
Telephone Maint. Div.	Telmalco
Thompson	Magnaphone
Tower	Little spitfire, Scientific
Triangle Electro Trad.	Berwick
Trimm	Acousticola, 80
Trinity	A-1
United Radio Peerless	-
Utah	Super flex 18
Vocarola	-
Vogue Products	-
Westinghouse	FL
Western Elect.	10D
Winkler-Reichmann	Thorophone S5
Work Rite Mfg.	Sr., Jr.

LISTING OF AUTHOR'S HORN SPEAKERS

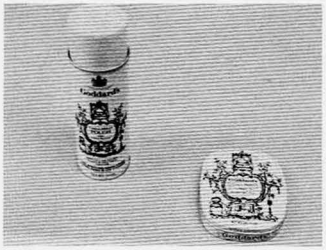
Mfgr. - Model	Type of Driver	Bell dia. in in.	(ohms) dc resistance	ac imp. (ohms) at 1K hz
Atwater Kent, "H"	earphone	14	2,000	10K
British Thomas-Houston, BTH	earphone	14	2,000	12K
Dictograph Prod., Dictogrand	earphone	10	4,000	40K
Magnavox, M-1	driver arm	14	400	3K
Magnavox, M-20 Mod. A	driver arm	8x14	1,800	7K
Magnavox, R-3, Mod. B	voice coil	14	1,400	7K
Music Master, 14D	earphone	14	1,200	13K
Music Master, 22D	earphone	22	1,400	6K
RCA, Radiola UZ-1325	earphone	12	1,800	16K
Rice & Hochster, Reflectone	earphone	3	1,100	12K
Rola, Re-Creator	driver arm	14	2,000	16K
Sears, Silvertone	driver arm	11	800	5K
Western Elect. 10D	driver arm	14	1,000	24K

Table 1

DECIBEL LEVELS OF HORN SPEAKERS WITH RESONANCES AND ANTI-RESONANCE POINTS

Name	decibel level at 350 hz	decibel level at 1K hz	Resonances Freq.	Resonances db.	Anti Resonances Freq.	Anti Resonances db.
AK "H"	40	40	-		-	
BTH	64	57	640	74		
			360	68	-	
Dictogrand	52	59	540	68		
			380	64	-	
Magnavox M-1	55	75	650	80	-	
Magnavox M-20	44	57	700	50	-	
Magnavox R-3	50	72	750	74		
			650	74	-	
Music Master 14"	62	67	700	70	-	
Music Master 22"	59	63	950	67		
			700	67		
			450	67	-	
RCA UZ-1325	55	54	600	70	-	
Reflectone	40	62	-		-	
Rola	58	72	-		380	45
Silvertone	49	62	540	58	400	46
Western Elect. 10D	48	60	-		-	

Table 2



Beautify That Old Radio

by Edward W. Sage

People that know me personally will attest to my pickiness, best exemplified through my old radio collection.

I have been using a very good product that I feel should be known to one and all. When it comes to giving that radio an exterior bath, I use Goddard's Cabinet Makers Polish, along with their paste wax. Goddard's polish can help restore and beautify old or worn surfaces, and may often eliminate the need for refinishing.

First, I either vacuum the dirt off of an old radio, or if it is not too heavily soiled, I wipe it lightly with a soft clean cloth. Then I spray a generous amount of Goddard's polish on the finish, turning the cloth occasionally for maximum shine. After the original lustre comes back to life, I go one step further by using Goddard's paste wax on the finish. I apply the paste wax on the finish with a 4-0 steel wool, rubbing lightly with the grain. After the wax has dried to a haze, I spray Goddard's polish on the wax to help loosen it, thus making it easier for me to remove the excess layer of wax off of the finish. Results: A beautiful piece of yesterday's past restored to its original lustre.

If you have difficulty locating Goddard's products, you can write to the distributor, requesting the names of stores that carry it in your immediate area. Write to: J. Goddard & Sons Division, S. C. Johnson & Son, Inc., Racine, Wisconsin 53403.

The Fate *of*

Rufus McGoofus

By J. H. Reed

Rufus McGoofus knew radios by heart;
He could put them together—
or take them apart.
A handy mechanic was he to have 'round,
For he knew his profession right
the
from
up

Now Rufus McGoofus was one of those guys
Who were always infernally radio-wise.
He would look at a set and remark:
"You poor hoob,
You ain't got no trouble,
you need a new

The worst of it was that Rufus was good.
He tamed the wild radios that no one else could.
He'd tinker around in a manner erratic
And when he got through there
would be no more

Oh, Rufus was clever—
and Rufus was shrewd,
But as the years sped he got more
and more rude
It meant not a thing to his business existence
That he couldn't abide
the least bit of

So Rufus McGoofus got sure and then surer:
His place as an expert secure and securer.
If possession of knowledge made
greater men meeker,
It just made McGoofus
turn up his loud

One day Rufus McGoofus, in very good form,
Was repairing a set in the midst of a storm.
He was right at his best when fate—the grim
jester—
Caught him squarely without
any lightning

Yes, Rufus MsGoofus knew radios so well
He got to believe he was smarter than hell!
So now on the blistering roof of Gehenna
He is fixing the devil's
own radio

Radio Retailing, November, 1930

Philo T. Farnsworth

by Kenneth W. Miller

To say that the name is not a household name is definitely an understatement, but in 1930, at the age of twenty-four, Philo T. Farnsworth was granted the patents that are the basis of modern television. In fact, Philo Farnsworth was sixteen in 1922, when he diagrammed his plans for electronic television on a blackboard in his high school in Rigby, Idaho.

In 1926, Farnsworth began developing his ideas into an operational system in a laboratory in San Francisco, California. At the time, similar efforts ere under-way by V. K. Zworykin at RCA Laboratories in Camden, New Jersey. Mechanical scanning television was, of course, already in existence, but Zworykin and Farnsworth were developing systems involving electronic scanning. Zworykin had the facilities and finances of RCA at his disposal, but Farnsworth worked independently with a small staff on a fraction of Zworykin's budget. There were countless problems to be solved and Farnsworth made advances in a variety of fields. After mastering the special glassblowing problems, there were details like making a photoemissive coating only one molecule thick on the face of his scanning tube. Farnsworth eventually earned more than 165 patents covering the entire spectrum of engineering and physics, and including the fundamental television patents for scanning, sychronizing and focusing.

After high school, lacking the funds to attend college, Farnsworth spent a short time in the Navy until his father's death in 1924. He then returned to help support his mother, and managed to attend classes at Brigham Young University. But before long his part-time job ran out, and he moved to Salt Lake City to open a radio repair shop. However, the shop was not a success, so Farnsworth went to work for Community Chest. His employer was George Everson, a professional fund raiser who administered Community Chest campaigns throughout the Western states. Everson was impressed with Farnsworth's ideas for electronic television, and arranged the $5,000 Farnsworth thought it would take for a working model.

Farnsworth moved to Southern California, where he would have access to the California Institute of Technology. But after a few months the $5,000 was gone and Everson had to stump for more money. Farnsworth now estimated that he needed an additional $12,000. So, a somewhat wiser Everson started looking for $25,000. That support finally came from W. W. Crocker of Crocker Bank and other investors in San Francisco. Farnsworth then moved into a loft owned by Crocker Bank at 202 Green Street in San Francisco to continue his work.

The air of secrecy that surrounded the experiments led to a raid by police, who found the strange glassworks, but not the still they expected. Then, only one year after moving into the laboratory on Green Street, Farnsworth succeeded in transmitting electronically-scanned video images. It was the fall of 1927, and he had just turned twenty-one years old. A slide

with a hand-painted triangle was placed in front of the crude camera, and a few yards away the blurred outline of the triangle appeared on a one-and-a-half-inch screen. After this beginning, Farnsworth quickly improved the quality of the picture and succeeded in transmitting a film clip of Mary Pickford combing her hair, in a scene from "The Taming of the Shrew."

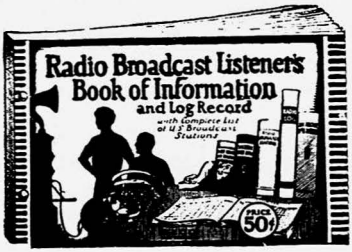
In September 1928, the original budget of $30,000 had been overrun by 100%, and it was time for a public demonstration. The Mary Pickford clip was included in the demonstration, and it was said that she combed her hair a thousand times that year, in demonstrations of Farnsworth's television. Farnsworth caught RCA by surprise when he applied for a patent for the system.

Farnsworth's lab had a number of impressive visitors in those days, including Zworykin himself, who expressed great admiration for what he saw. RCA was becoming painfully aware at this point that they would have to deal with Farnsworth, as dreams of a completely independent RCA electronic television system went up in smoke. It wasn't until 1941, however, that Farnsworth won a long-standing suit with RCA, which awarded him the basic patents. RCA's patent attorney is said to have had tears in his eyes when the royalty agreements were signed.

Farnsworth's San Francisco days came to an end in 1931, when his company reached an agreement with Philco for the production of television receivers. The agreement included the stipulation that Farnsworth move his lab to Philco headquarters in Philadelphia. In 1938 Farnsworth's Television Laboratories bought Capehart

Radio and began plans to produce their own television sets. The company became Farnsworth Television and Radio Corporation, based in Ft. Wayne, Indiana. In 1948 the sets came off the line, but proved an immediate failure. By 1949 the company was bought out by ITT, and Farnsworth became President of the Farnsworth Research Division. He remained with ITT until his retirement in 1967, and on March 11, 1971 he died in Salt Lake City.

Farnsworth was one of an almost extinct breed. In an age of corporate research and large budgets, he was the romantic maverick inventor working by his own wits, with independent financing and limited budgets. It's saddening that he never escaped relative obscurity. Only with the coming of the 50th anniversary of his 1928 demonstration, has some recognition been given Farnsworth. Ceremonies in late 1978 included one at Foothill College in Los Altos, which featured a re-creation of the original setup and demonstration. In addition, a plaque was placed on the building at 202 Green Street, where Farnsworth helped give birth to modern television, more than 50 years ago.



The preceeding is based largely on the book by George Everson, titled The Story of Television: The Life of Philo T. Farnsworth, (NY, Norton, 1949), as quoted in Erik Barnouw's The Golden Web, (NY, Oxford University Press, 1968). Also a magazine article, "Tom Swift in San Francisco," by James Minton (November, 1972, San Francisco Magazine).

RESTORATION HINTS

Most Grebe receivers I have come across have the fine-tune rubber friction drive flattened or hardened with age -- such that they will not turn the main dial. The way I repaired my Grebe CR-8 was to loosen the main components from the panel and remove the fine-tune wheels. Care should be taken not to do any soldering if possible. Also use the best fitting screw driver available, so as not to nick the black screw heads. Remove the old rubber O-Ring from the grooved wheel. Fill the groove with small rubber bands (or string or smaller O-Ring), to bring the surface of rubber bands approximately flush with the top of the groove. Then take a 1/2-inch (3/8-inch inside diameter) rubber chassis grommet and slip it over the grooved wheel. The outside diameter of the rubber grommet is identical to the original Grebe rubber O-Ring and fine-tunes as smooth as silk.

An excellent reprint of an early Crosley Radio Apparatus Catalog is now available. It contains many illustrations of various sets and parts, ranging from the model XXV to the small experimental units. The catalog is 32 pages in length, and is priced at $4.00 + 50¢ for mailing. You may order it from Vestal Press, PO Box 97, 320 North Jensen Road, Vestal, New York 13850.

Vestal Press also has books on automated musical instruments, juke boxes, phonographs, gambling machines, etc. Write for details.

NOVELTY NOOK

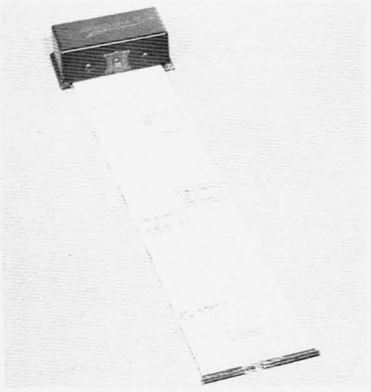
by Don Stoll

This issue I've tapped into the extensive collection of Jim Cirner and come up with two of his treasures that I really like.

The first is the "Radio Owl" which was advertised in Radio Retailing in 1928-1930 and sold for $3.50. Standing about 6" high, and weighing almost 2-lbs, this finely detailed statue is cast of heavy metal with a hydraulic and spring mechanism that can be set to automatically turn off your radio up to 2-hrs after activating. The bronze color finish on the owl is very attractive but the plastic eyes are not as well done as the casting (perhaps they should have been lighted). If anyone out there has one of these birds and would be willing to part with it, please let me know.

Time Switch

An automatic device made in the form of an owl, for automatically shutting off the radio receiver, has been introduced by the Radio Owl, 2269 East 51st Street, Los Angeles, Calif. This instrument will operate on either A.C. or battery sets. Its operation is hydraulic and may be set for any period from 5 minutes to 1½ hours. The switch has a capacity of 5 amperes. It is to be installed in series with the A-supply with D.C. sets and on the 110 volt side of A.C. sets. It is about 5½ in. high and finished in brown. The intended retail price is $3.50.—*Radio Retailing,* August, 1928.



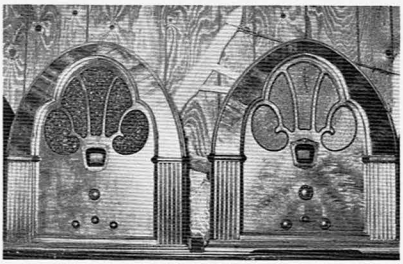
The second item from Jim's collection is an unusual promotional device that I can't find mentioned in any of the early publications. It's a miniature model of a radio set (probably battery), 4"-wide, 2"-deep, and 1½"-high. Made of sheet metal with dark-brown crackle finish, the top of the cabinet is imprinted with "Hauschildt Music Company, Oakland". The bottom front edge of the cabinet pulls out and becomes the handle of a roll (approx. 14" long) of impregnated fabric with an alphabetical-log sheet printed on one side and a one-week daily "favorite programs" log sheet printed on the other side. The original owner had written in west coast stations (KLY, KGO, KFRC, KTAB, KEX, KNX, KLX, KFI, KECA, KQW, KSL, KFWI) and programs such as News Item-KLX, Amos & Andy-KGO, and Cecil & Sal-KPO. This radio novelty was manufactured by Midland Specialty Corp.-Des Moines, Ia.

If you have any interesting radio novelties, please let me know (a quick picture is good). Write: Don Stoll, Foundation XIV, 2245 Old Middlefield Way, Mountain View, CA 94043.

COLLECTOR SPOTLIGHT

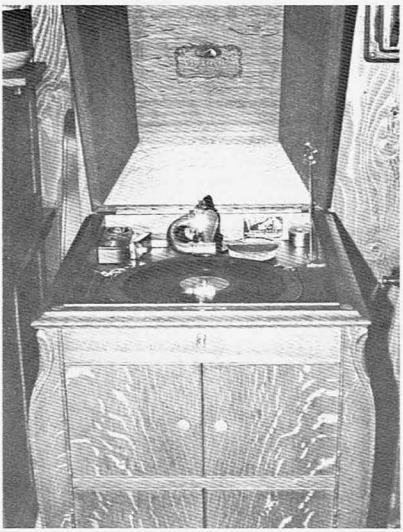
Jim England

I began my radio collecting about 18 months ago. It all started when I walked into an "Antique Store," where I noticed my "First Radio." From that time on, I attended auctions, garage sales, etc. My collection totals 30 radios, at present.



My reasons for settling on "Cathedrals" seem to center around their design.

It quickly became apparent that there are many different "makes and models." Each "new radio" I find is a new experience. And, I might add, a very enjoyable one! As fellow radio collectors know, some of the more prominent names in "Cathedral Radios" are: Philco, Atwater-Kent, Jackson-Bell and so forth.



As time passes, I plan on "branching out" my radio collecting. I enjoy collecting literature on radio gear, as well as pictures, etc.

Jim England
6875 Escallonia Drive
Orangevale, CA 95662
(916) 725-6625

ps: I am currently looking for Atwater-Kent Cathedrals, especially: Model 558, Model 82, Model 84.

TECHNICAL SPOT

Majestic Radio

MIGHTY MONARCH OF THE AIR

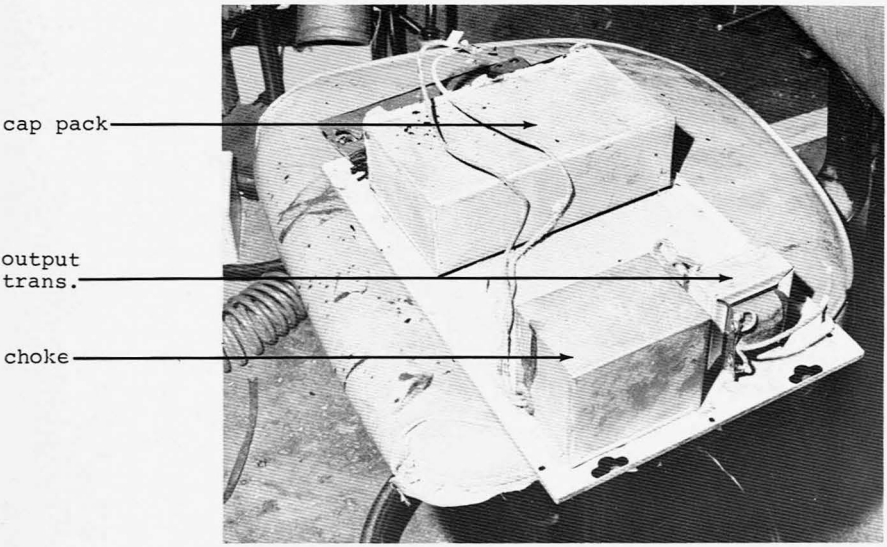
Help!!

Have you ever restored a Majestic radio model 20, 21, 22 or 23, manufactured by Grigsby Grunow Co., year 1931?

This radio is a very difficult chassis to restore for several reasons. The large power supply capacitor pack, the power supply choke and the output transformer are all mounted on the bottom plate.

In order to expose inside of chassis, remove both sides first (fig. 1). Then it is necessary to cut or unsolder several wires to remove bottom plate. I don't feel that it is practical to attempt to recap capacitor pack. If you reconnect capacitor pack as originally designed, the radio becomes unserviceable again. You could extend all the wires from the pack, but this might cause oscillations, etc. This is the way I suggest you restore it. Look

Figure 1



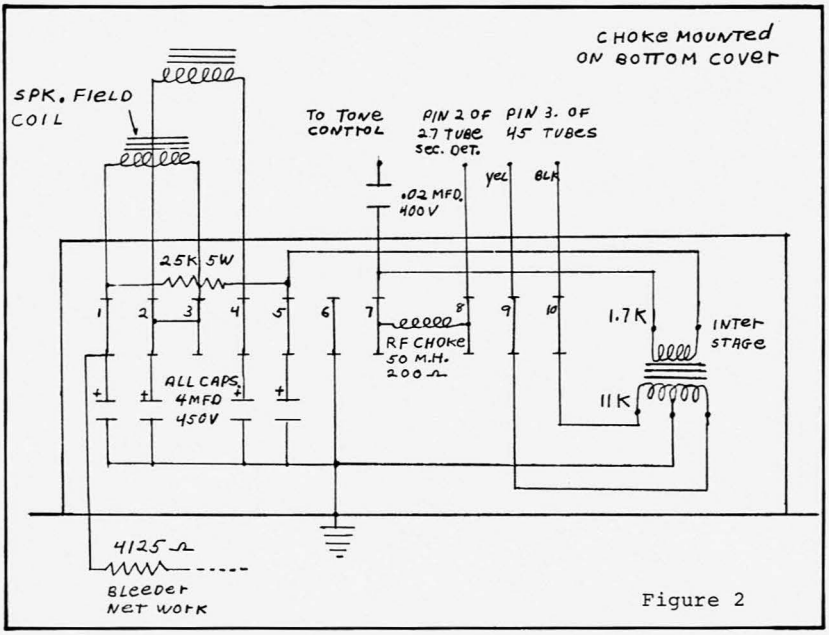
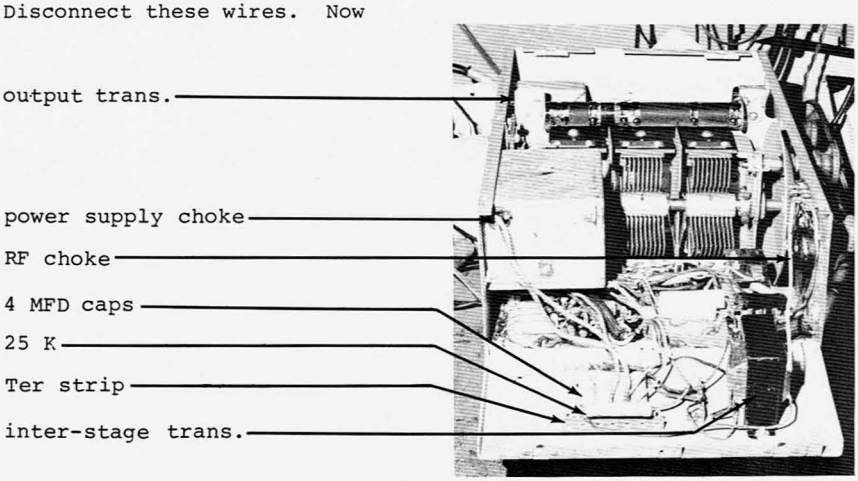


Figure 2

at my schematic (fig. 2), showing what is in the capacitor power pack. You will observe there is a 200 MH RF choke between terminals 7 and 8. Remove brass 6/32 screw on terminal strip. This screw helped hold RF choke in place when unit was being manufactured. Carefully pry up terminal strip slightly. You will be able to see RF coil wires connecting to the underside of terminals 7 and 8. Disconnect these wires. Now it is safe to lift terminal strip higher. Cut all the old capacitor wires and cut the interstage transformer wires as long as possible.

Take a 500-degree F. shrink-tubing heatgun and melt the tar around the RF coil. When it loosens from the tar, remove it from pack. This

Figure 3



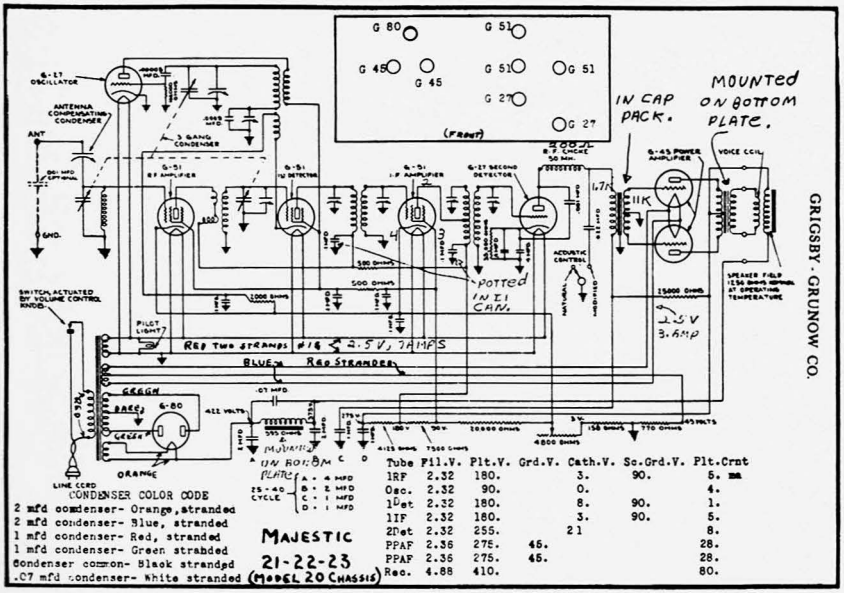
will be reinstalled elsewhere later. If the interstage transformer is good, take a pair of tin snips and cut the metal side of the capacitor pack case from one side of the transformer. Use a heat-gun to melt tar away to retrieve interstage transformer. Throw away the rest of capacitor pack. If you don't have a heatgun, heat the pack in an oven. This takes longer and is messier. The 25k resistor between terminals 1 and 5 should be saved for later use.

As shown (fig. 3), mount a terminal strip on side panel of chassis. Install four 4 MFD at 450 VDC, and the original 25k resistor to the new terminal strip. It will be necessary to extend a few wires to connect up the new capacitors.

Also, make up a mounting bracket and install the interstate transformer on the side panel. This allows you to be able to lower side panel and make the rest of the components serviceable. Remount the RF choke near the tone control. Remove all the old capacitors and replace with new ones. Mount the power supply choke as shown (fig. 3) and wire to new capacitor pack.

NOTE: The two .1 MFD 200 VDC plate bypass capacitors are potted in tar, one in each IF transformer. It is necessary to remove IF transformers from set and carefully remove rivets. Heat IF cans and pull the IF transformers out of the melted tar. Throw the tar away. Remove old plate bypass capacitors. Suggest you install new ones outside IF cans, one on either side of the 500 ohm resistor as shown in schematic.

Remount speaker output transformer on front side of chassis (fig. 3), on power transformer end and rewire as shown in schematic. Speaker cord wires are the old rubber-covered wires, and will probably require replacement. Realign IF transformers if necessary. IF frequency is 175 K. HZ. This set is a lot of work to restore, but you will discover it is a very good sounding radio. Don't forget to check the resistance on all resistors, coils, etc., for possible problems. If any further questions, contact me: Jim Cirner, 13366 Pastel Lane, Mountain View, CA 94040 (415) 967-7672.



The Fleming Valve

by Russ Winenow W6AVG

John Ambrose Fleming was born in England in 1849. In 1882 he was appointed to the Edison Electric Light Co. of London. While there, he presented a discourse before the Royal Institution on the problems of the electric lamp. He also reviewed the work of Edison and confirmed the rectifying properties of the lamp with an added element. In 1896 he wrote a book in which he noted that Hertzian Waves had been suggested for use in Wireless telegraphy. In the same year, he gave all honor to Marconi for being the first to demonstrate the practicality of using Hertzian waves. In 1899 Fleming joined the British Marconi Research Staff and built a special transmitter for the famous Poldhu-St. Johns transatlantic tests. He applied for a British patent in 1904, which subsequently was assigned to the British Marconi Co. The patent was for what he called an "oscillation valve." The British still refer to tubes as "valves."

Contrary to some accounts, he did not simply make use of Edison's discovery. He did a great deal of work on it before he realized its potential as a detector for wireless use. This was 21 years after Edison had concluded his experiments.

Marconi used the Fleming Valve in some of his early receivers but it was soon supplanted by the electrolytic detector which was more servitive.

The Valve is nothing more than a two-element vacuum tube. Many versions were made. As it had a very limited application, not much can be said about its characteristics. Sizes and shapes varied considerably and, since they were hand-made, it follows that filament voltages and currents varied widely.

Many claims were made for two-element tubes using an external grid. Various circuit arrangements were recommended, all of which showed the external element connected to the antennae. I have tried several of these, but was never successful in making any of them work.

A much more detailed account of Fleming's life may be found in the "Scientific American" magazine of March, 1969. Time prevents me from adding more details, which the reader can find in the following references:

"Conquerer of Space," Corneal, Liveright, N. Y.
"Father of Radio," DeForest Autobiography.
"Fire of Genius," Heyn, Anchor Press.
"Marconi," Degna Marconi, McGraw-Hill.
"Radio & TV Almanac," Dunlap.
"Modern Wonder Workers," Kaempffert, Blue Ribbon.
"Radio World Magazine," June 17, 1922.
"Saga of the Vacuum Tube," Tyne.

CORRECTION: The following typing error appeared in the last issue, under the Tube Column. After the heading 1927, the GE should read WE.
submitted by Lauren Peckham

Electronics in the West -- The First Fifty Years

by Jane Morgan

(pub., 1967; $3.75, plus tax)

As collectors, we devote considerable time to reading technical material, studying schematics, and familiarizing ourselves with antique equipment by perusing catalogues, magazines, Vintage Radio, etc. Perhaps we tend to neglect a most important segment of our hobby -- its historical aspects.

Here is a book which will painlessly introduce you to the development of radio and electronics in the San Francisco Bay Area. The authoress makes no attempt to be technical or provide an in-depth study of any of the great pioneers. Instead, she covers the period in 188 pages, by touching upon the lives of DeForest, Herrold, Elwell, Farnsworth, Heintz, Kaufman, the Varians and many others. Herein you will find references to the Bay Area companies which appeared on the scene throughout the years. You will also read the story of the Perham Collection, its transfer to the New Almaden Museum, the formation of the Perham Foundation and the transfer of the collection to the Foothill Electronics Museum.

In summary, this is an easily-read brief history of the subject, amply illustrated and modestly priced.

Copies available at: Foothill Electronics Museum, 12345 El Monte Road, Los Altos Hills, CA 94022.

THE MAGNAVOX LOUD SPEAKER

This loud speaker is the result of considerable experimenting and research in the design of radio loud talkers, and is an instrument that does not require any electric current for its field excitation. It is designed primarily for use with radio

sets that employ dry cell tubes. Unlike the famous electro-dynamic type employing an electro-magnet, this instrument employs a powerful permanent magnet for its field. It is called the Semi- Dynamic, type M1, Magnavox, and is manufactured by the Magnavox Co., Oakland, California. This instrument has a D.C. resistance of 400 ohms and an impedance at 1,000 cycles of about 5,000 ohms. It is exceptionally sensitive throughout the wide range of audible frequencies and reproduces powerful signals without rattling. It is noted for its excellent quality and faithfulness of reproduction. The base and horn are of metal, highly finished in gold.

Arrived in excellent packing.

AWARDED THE RADIO NEWS LABORATORIES CERTIFICATE OF MERIT NO. 292.

Sounds Vintage

This is a new monthly magazine, edited and published in England. The first issue just arrived, and as stated on the cover, the publication is devoted to vintage wireless sets, phonographs, gramaphones, records, news, history and books.

This is an ambitious undertaking. In-depth coverage will be provided after I have had the opportunity to examine one or two more issues. Annual subscription ь 6.80 airmail (approximately $13.60, based on current rate of exchange).

- Dave Brodie

COLLECTOR AIDS

Wanted: 1st Volume of the 4-Vol. Set, "Everyman's Guide to Radio" (1926), published by Popular Radio. Also, April 1921 issue of "Radio News" with cover. Last, Pilot vernier dial (Greenwood, pg. 204, lower right). Floyd Lyons, 456 Post Street, San Francisco, CA 94102 (415) 396-6866.

Wanted: Radiola 24 cabinet lid or parts set. Grebe Synch 7. Has anybody replicated the pot metal end pieces for the SLF tuning condensers? Need WD11 duds (bakelite base). Need original owners' manuals for any make. Jerry Newton, Route 1, Box 262, Woodland, CA 95695.

Wanted: Pre-1940 National Receivers. For Sale: Non-octal tubes. Tested OK, $.50 to $1.00, SASE for needs. F. R. Tesche, 3728 Mosswood Drive, Lafayette, CA 94549 (415) 284-5608.

Wanted: Grandfather clock radios. Prefer Philco 70. Want mint Freed-Eisemann Model 14 speaker, Philco 90 and Philco 51 clock radio. Sell or Swap: Hallicrafter SX-25 with matching speaker, Kolster 8-B and 6-J, Crosley 51 SD and ACE. Edward W. Sage, 559 Civic Center Street, Richmond, CA 94804 (415) 236-8093.

For Sale or Trade: SE 1899, Ip-501A, English Crystal Set, Federal 110, Crosley 51, Audiotron, Murdock Neotrodyne and others. Paul Giganti, 2429 San Carlos Avenue, San Carlos, CA 94070 (415) 593-4723.

Free: Uncle Al's Radio "Makers of Miracle and Melotone Radios" Service cards. While they last! SASE please. Scott Welch, 3167 Eastman Avenue, Oakland, CA 94619.

For Trade: Grandmother clock-radio, Westinghouse Columaire Jr. Model WR 12. Restored and in good condition. Jim Cirner, 13366 Pastel Lane, Mountain View, CA 94040 (415) 967-7672.

Wanted: Riders Volumes 1-5 (unabridged) and 20-23; also information on obtaining a replacement phono cartridge for a Motorola Model 58-FRC. I have Riders Volumes 6-10, 12 and 17, and a Philco Cathedral Model 38-123 to sell or swap. Stan Lopes, 1201 Monument Blvd.#74, Concord, CA 94520 (415) 825-6865.

Wanted: Rider's Perpetual Trouble Shooter's Manuals, Vols. 1-16 plus Indexes. Also need chassis to AK 49, plus AK literature. Roark Vane, 6839 Havenside Drive, Sacramento, CA 95831.

Wanted: Cabinet for Majestic Model 70 or if you cannot part with your cabinet, make me an offer for my chassis and speaker. Russ Goodlive, 1401 Franchere Place, Sunnyvale, CA 94087 (408) 732-1472.

Wanted: Any model Elkay Receiver -- state condition, price and model number. Keith Parry, 17557 Horace Street, Granada Hills, CA 91344.

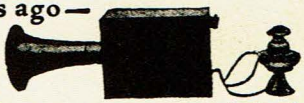
Wanted: Metal tube can for DV5 tube. Also need good or bad DL4 tube without can, former for Crosley 51. Allan Bryant, 38262 Ballard Drive, Fremont, CA 94536.

Wanted: Base and driver for 24" Magnavox horn. Two Bremer Tully variable capacitors in good condition, split stator type - 17 plates each section. Must be in good condition. Single socket for WE 215A peanut tube. Output transformer for Howard neutrodyne (Model A). Transformers for RADA and Radiola III. Dave Brodie, 315 Cotton Street, Menlo Park, CA 94025.

Wanted: Member who has drafting equipment and ability, to re-draw schematics, etc., to be used in the Journal. Contact the Editor: Allen Bryant, 38262 Ballard Drive, Fremont, CA 94536.

The Amplion Pedigree

Thirty-eight years ago—



In 1887 Mr. Alfred Graham invented and demonstrated the first practical loud speaker which the world had ever heard (illustrated above).

In 1893

Graham Loud Speakers placed upon market. Illustration shows the "1893 model."

In 1894 Graham Loud Speakers first used in British Navy. Graham transmitters applied to phonographs for loud speaker reproduction.

In 1896 Graham Loud Speaking Naval Telephones developed and adopted by British Admiralty.

In 1898 Graham Watertight Loud Speakers patented. Placed on many warships and mercantile vessels, throughout world.

In 1902 Complete Graham Loud Speaker installations, on central battery plan, erected on warships as sole means of communication.

In 1906 The most extensive loud speaking naval installation to date was made by Grahams. Included a Graham exchange system fitted to H. M. S. Dreadnought.

Onwards Graham Loud Speakers applied to all sorts and conditions of service at home and abroad, ashore and afloat.

By 1919 No less than 12,000 Graham loud speaking installations in operation on ships alone.

1920 Model

In 1920 (before radio loud speakers were in common use) "AMPLION" Loud Speakers produced for radio by Alfred Graham & Co. "AMPLION" trademark registered.

In 1922 Amplions adopted as standard equipment by leading makers of radio sets abroad.

1922 Model

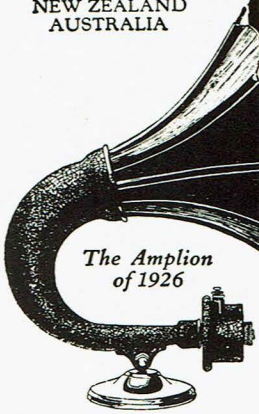
In 1923 Amplions introduced into United States, Canada and other countries. Quickly attained largest throughout-the-world sale of any loud speakers.

In 1924 To supply demand The Amplion Corporation of America was formed to market and manufacture Amplions here.

In 1925 More Amplion companies formed and agents appointed throughout world to keep pace with international demand. The Amplion Corporation of Canada, Limited, organized.

Created by the actual originators and world's oldest makers of loud speakers, it is only logical that the Amplion should be "the world's finest" radio reproducer. Some of the countries in which Amplions rule as favorites:

UNITED STATES
DOMINION OF CANADA
ENGLAND
SCOTLAND WALES
IRELAND
NORWAY SWEDEN
DENMARK
HOLLAND BELGIUM
FRANCE SPAIN
SWITZERLAND
ITALY JAPAN
SOUTH AFRICA
NEW ZEALAND
AUSTRALIA



The Amplion of 1926

AMPLION

Alfred Graham & Co., London, England Patentees

The World's Standard Loud Speaker

To hear this new Amplion Dragon AR-19 is to appreciate why Amplions, year after year, internationally lead in sales. Six models, including phonograph units, $12 to $42.50. Write for interesting literature and dealer's address.

THE AMPLION CORPORATION OF AMERICA

Executive Offices: Suite S, 280 Madison Ave., New York City

Canadian Distributors: Burndept of Canada, Ltd., Toronto

Associated Companies and Agents: Alfred Graham & Co., London, England; The Amplion Corporation of Canada, Limited, Toronto; Compagnie Francaise Amplion, Paris, France; Compagnie Continentale Amplion, Brussels, Belgium; Amalgamated Wireless (Australasia), Ltd., Sydney and Melbourne; British General Electric Company, Ltd., Johannesburg and Branches; Indian States and Eastern Agency, Bombay and Calcutta; C. J. Christie E. Hijo, Buenos Ayres; David Wallace & Co., Valparaiso; Mestre & Blatge, Rio de Janeiro; F. W. Hammond & Company, London and Tokio.