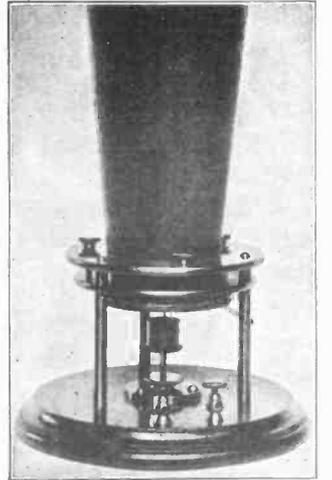


THE NEWSPAPER FOR
THE HOBBYIST OF VINTAGE
ELECTRONICS AND SOUND

TELEPHONE CENTENNIAL
1876 - 1976

THE HORN SPEAKER



This is the transmitter used by Bell when on March 10, 1876, he telephoned to his assistant: "Watson, please come here, I want you."

1932

FOURTEEN YEARS OF

RADIO'S EVOLUTION

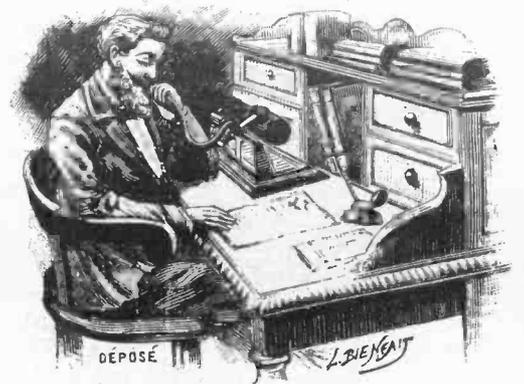
RADIO NEWS FOR AUGUST, 1932



other phases that will shine more brilliantly and profitably and with far greater satisfaction.

In a book written by R. P. Clarkson, and aptly titled by him "The Historical Background of Radio," the author quotes two scientists as follows:

"The day will come when we are all forgotten, when copper wires, gutta-percha covers and iron bands are only to be found in museums, that a person who wishes to speak to



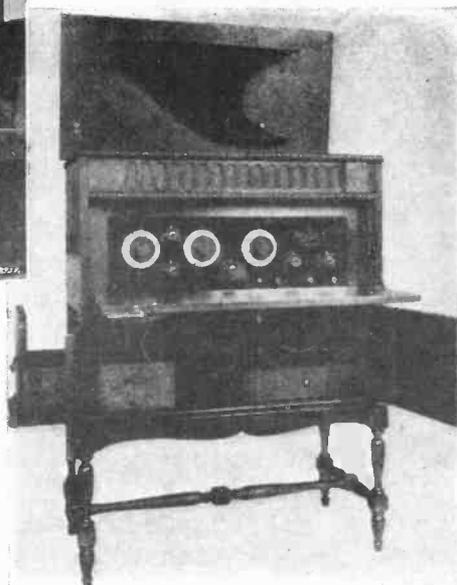
Typical designs for radio receivers of the last year or two include the latest improvements in radio technique, including both radio and phonograph in a cabinet suitable for any home

By E. L. Bragdon*

FOURTEEN years is not a long period of time as generations come and go, yet within the compass of these years the world has seen the birth of a new industry—the slow but persistent early progress of the radio enterprise and an awe-inspiring pace in development which places that industry among the wonders of the age. With these deeds to look back upon, RADIO NEWS should experience a feeling of pride in the fact that it fostered the start, heralded the accomplishments and shared in the returns. A child fourteen years of age is but beginning a useful existence. This publication of the same age has experienced all the benefits as well as the hardships that would ordinarily be encountered only in a span many times longer than this. And the present phase apparently is but the beginning of

FORERUNNERS

Above we see a high-powered long-distance receiver in an early type of cabinet. Right: One of the first efforts to put a receiver in a cabinet, with the loud-speaker horn attached to the lid and battery compartments below



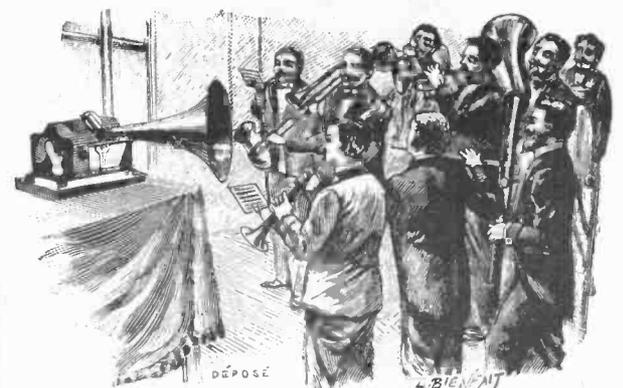
a friend, but does not know where he is, will call with an electrical voice which will be heard only by him who has a similarly tuned electrical ear. He will cry 'Where are you?' and the answer will sound in his ear, 'I am in the depths of a mine, on the summit of the Andes, or on the broad ocean.' Or perhaps no voice will reply and he will know that his friend is dead."

Thus spoke W. E. Ayrton many, many years ago. Again a quotation, this time from a publication of 1898:

"It (broadcasting) might be desirable for the purpose of following the day's happenings, such as army maneuvers, for reporting races and other sporting events, and generally for all important matters occurring beyond the range of the permanent lines (of communication)."

This was the forecast of Sir Oliver Lodge, whose name is linked with scientific developments of the highest magnitude.

Broadcasting, of course, in the modern sense is a modern development but not a modern idea. It required a groundwork of knowledge for these laboratory wizards to clear away

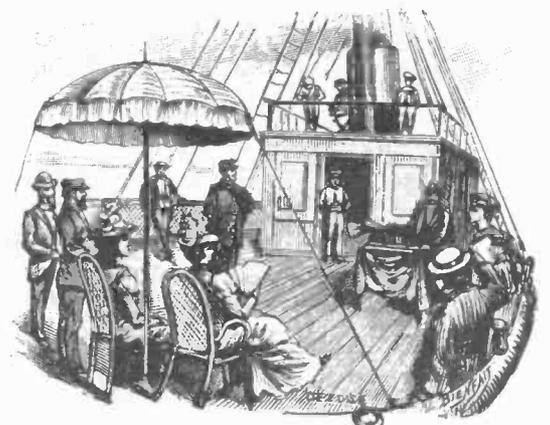


Orchestre devant le graphophone.

RADIO PIONEERS



Dr. Lee DeForest with his first radio vacuum tube, and, above, Dr. Frank Conrad, pioneer broadcaster



Le Phonographe à bord du navire.

Drawings from the Pathe Brothers French catalog of 1898.

(Continued on page 4)

FIND OF THE MONTH

Thought I'd let you know of my recent "finds." From our local Goodwill store; 1) Working pair of Western Electric 509W headphones..\$1.00. 2) A Philco Model 70 Grandfather clock radio..\$35.00.

Also picked a RCA Model 33 and 100A speaker from the owner of a local banjo store.

Larry V. Flegle
25 NE. 185th Terr.
No. Miami Bch, Fla. 33179

LETTERS

EDITOR'S MAILBAG

Dear Jim:

Inclosed is my postal money order for \$4.50 for another year's subscription to The Horn Speaker.

I don't get to do much electronics experimenting this year or much of any kind of work in my workshop this year because the neighbors have me very busy doing farm work by day and I can't do much in a workshop at night by oil lamp light or not even by my one flame type gravity feed gasoline lamp or my coleman gasoline pressure lantern.

However I still experiment with different vacuum tubes and different A and B and C battery voltages and different grid leaks (glass tube type) in the radios I still listen to. These radios I still listen to are pre 1924 vintage. One of them is a Kennedy model 220 intermediate wave one tube regenerative set, this set still gets more standard broadcast stations than any modern fine tube superheterodyne receiver or any modern portable transistor radio I ever did turn on and tune in yet. And so does my old Stromberg Carlson 1-A neutrodyne receiver. I've logged about 70 standard broadcast stations lately, on these receivers with a good horn loudspeaker.

After reading the article by John Alford on how to neutralize a neutrodyne receiver in the September issue, I'm going to tell you how easy and conveniently I do it in my receivers with a separate fil-rheostat for each vacuum tube in the set.

I tune in a strong and very steady loud broadcast station with all three or four tuning dials somewhere near the same wave length, then I turn off the filament rheostat on the last stage of T.R.F. and adjust it's glass and sliding brass tube type neutralizing condenser, then readjust the tuning dials a little bit and then re-adjust the neutralizing condenser a little more for completely zero signal, then turn on that last T.R.F. stage filament rheostat and then turn off the preceding T.R.F. am-

plifier fil-rheostat and neutralize that stage. Then turn that rheostat back on and repeat the above procedure on the first T.R.F. stage. It's necessary to use a hard rubber or glass rod with a little hole or cavity in one end to push those neutralizing condenser brass tubes and avoid human hand capacity effects.

And I do find that when ever I put different vacuum tubes (even of the same brand and type) in the T.R.F. tube sockets, it becomes necessary to reneutralize the T.R.F. stages for exact balance again or the receiver will break into self oscillation when all tuning dials are set at the exact same frequency. No two radio tubes are exactly the same.

Yours truly,
LaVerne Lastz
R.R. 1
Marseilles, Ill. 61341

Dear Jim,

Many thanks for printing my "Find of the Month!" It was a pleasant surprise. I'm sorry I didn't send a picture. Will visit my brother in N.J. and swipe his Polaroid Camera and send a picture. Still cannot trace the radio. Can find no information on it at all. My guess is that it was made about 1929 or 1930, as it uses very early parts and a fairly primitive screen-grid TRF circuit. I have seen identical parts in a Scott All-Wave (early) and this has aroused my curiosity. Is this set a one-off prototype? Not too likely, it has fancy metal labels all over the chassis, like production sets. Both the front panel and the cabinet have metal labels saying "R. H. Macy and Co." The power pack cover on the chassis has a label "Vreeland Model R6, Patent nos....etc." Chassis and covers finished in shiny brown enamel, similar to the Atwater-Kent paint.

The radio is very well made and is neatly wired. It sits in the dining room, usually holding up several bowls of fruit, and plays classical music during dinner! (From my AM transmitter).

Again thanks,
Richard Modafferi
Rd 1 Skyline Drive
Vestal N.Y. 13850

Dear Jim,.....

Here is something I read in the "Scientific Humor" section of Science and Invention magazine for October 1923.

Or Go To The Movies--"Who is Thomas A. Edison?"

"He's the man that invented the phonograph to keep us awake, so we would stay up all night using his electric lights."

I enjoyed reading "Yesterday Radio Service," by Lawrence Beitman.

Thanks again for helping me find the gear for my phono.

Yours truly,
A. Wayne Beever
620 W. Main Cross St.
Palmyra MO 63461

Dear Jim:

Renew my subscription for another year. Enclosed is check for the amount of \$4.50.

I started in radio in 1933 but never did any collecting. I only started collecting in 1973. On Oct. 13, 1973 I have collected 55 battery sets from 1920 to 1925 and 20 horn speakers also some electric sets, and radio magazines and catalogs. Keep up the good work in your paper. I am still looking for a diagram for the DeForrest D-12 4 tube Reflex set also a loop antenna for set.

Thank you,
Julius H. Pilger
123-09 18th Ave.
College Point, N.Y. 11356

The Newcomer

INDUCTANCE AND TRANSFORMER

By

O. H. McDonald

In the study of basic radio to learn to repair the oldies we must have some understanding of inductance and transformers. First, let's remember that a magnetic field is set up around a wire when a current is passed through the wire. The larger the current the stronger the electromagnetic field. If the wire is wound in a coil, the magnetic lines of force are greatly concentrated in figure #1. Close the switch and the lines of force build up causing the compass to fluctuate. Open the switch and the current

BACK ISSUES

The Horn Speaker

All 20 back issues for 1973 and 1974.....\$10.00

Any issue from January 1973 to now.....50¢ea.

Later, we should have complete volumes for 1972.

The Horn Speaker

Box 12 Kleberg, Texas

75145

stops flowing and the lines of force collapse and the compass returns to the normal position. Now by opening and closing the switch rapidly, notice that the compass fluctuates continuously. Of course this action will be the same if an alternating current is used since the A.C. actually goes on and off.

Now let's take a coil of wire and connect to a micro or milliamp meter as in figure #2. Pass a magnet back and forth near the coil and notice the meter, indicating a current flow. This is magnetic inductance, or an electric current induced by a magnetic force. Now take the experiment of the fig. #1 and that of fig. #2 and place the two coils next to each other. Now run through the first experiment again but this time notice the meter instead of the compass. This illustration shows how a varying electrical signal (caused by switch) induces an electrical current into a second circuit. Notice, that a current is induced only when current is started or stopped. There is no induced current when the current is constant in the primary side.

The strength of a magnetic field about a coil depends on the number of turns the current flows through and the amount of current. This is referred to as the ampere turns. The amount of voltage induced into the secondary of a transformer depends on the voltage applied to the primary and the ratio of the turns of wire on the primary and secondary. In other words, 100 volts on the primary of a transformer having 50 turns of wire will induce 400 volts on the secondary if the secondary has 200 turns. This would be a step up transformer having a ratio of 1:4. Watts law applies to the transformer in this way: The wattage on the secondary side of a transformer will equal the wattage on the primary side less a small loss in the efficiency of the transformer.

A choke is basically a coil of wire wound around a metal core. A current variation will cause a build up and collapse of the magnetic field. This field collapsing induces a voltage in the coil actually in reverse to the produced voltage. This is called self inductance and retards a varying current from reaching its maximum and also tends to delay it from falling to a minimum. In other words a choke gives great opposition to an alternating or fluctuating current. The choke was used in the early electric radio power supplies.

In transferring electrical energy of radio frequencies from one circuit to another, the secondary must be in resonance with the desired frequency coming from the primary. This is done mostly by a variable condenser placed across the secondary of the coil. This condenser is 'tuned' to the desired frequency, and this is the only

signal or frequency that will pass through this transformer.

Figure 3 shows how a transformer (usually air core) is connected in the first stage of a receiver. Sometimes a receiver has two or three of these stages. The incoming signal is an alternating voltage type signal. This signal is induced to the secondary where it is applied to the grid of the vacuum tube. Figure 4 shows another application of a transformer where the primary is a pulsating direct current for the signal causing it to be induced into the secondary or grid circuit.

Well thats about it for this month.

Article by O. H. McDonald on the rejuvenation of tubes coming soon.

Club News

NATIONAL HISTORICAL RADIO CONFERENCE ANTIQUA WIRELESS ASSOCIATION

William Breniman of Santa Rosa, California won the 1975 Houck Award for historical documentation. He is familiar to most readers of radio history through his important publications of the Society of Wireless Pioneers. Stewart Davis of Union, New Jersey won the same award for historical preservation.

Contest prize winners were: Ralph Muchow, Spark Radiophone transmitter; Bill Lightfoot, Clapp-Eastham speaker; Larry Whitlock, DeForest amplifier and if others, we have no information.

ANTIQUA RADIO CLUB OF AMERICA

During the last year there has been no information about any activities of the A.R.C.A. which was going strong several years ago. Does anyone know anything about their activities?

EDISON ENTHUSIASTS

About seventy people gathered at the Edison National Historic Site in West Orange, New Jersey. With all the people interested in Edison the number of people present would have been much greater if there would have been adequate publicity about the event. It happened way back on October 17th.

There was a cylinder and disc recording techniques program, which Martin Bryan in "Voices from the Past," issue No. 15 of The New Amberola Graphic described as..."much too long as well as too ambitious an undertaking,"

Bryan mentioned with enthusiasm that Milford Fargo, the Ada Jones "expert" was there and that Fargo had interviewed Van Brunt.

Thomas Edison's son Theodore, was there and told the enthusiasts about the activities of the Edison Company in the 20s.

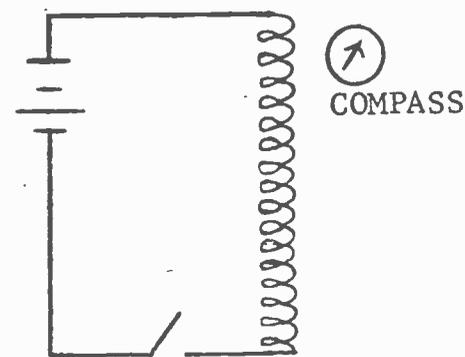


FIG.#1

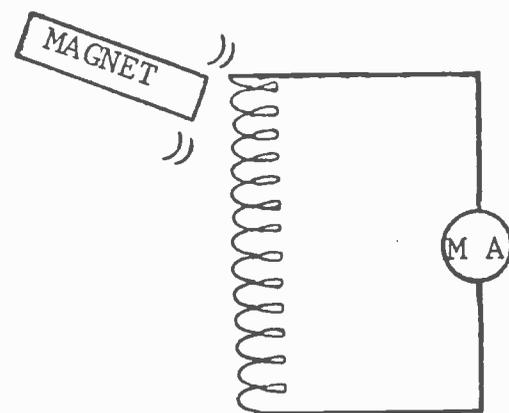


FIG.#2

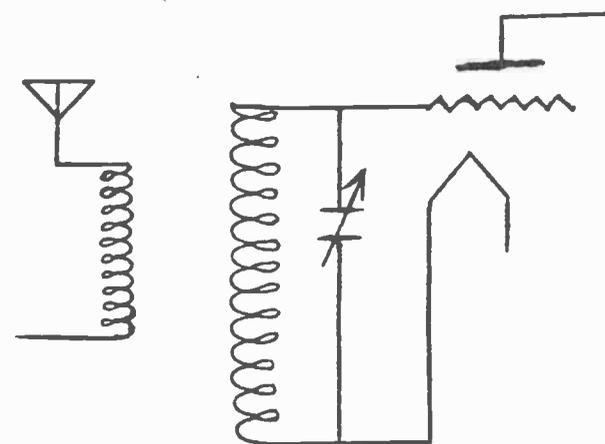


FIG.# 3

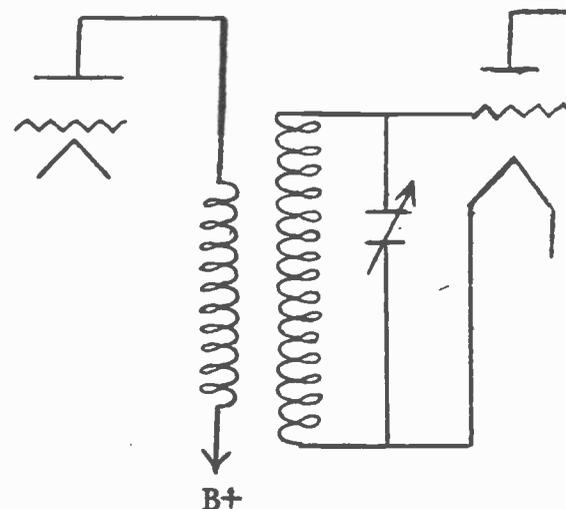


FIG.#4

Coming next month sources of foreign radios and phonographs.

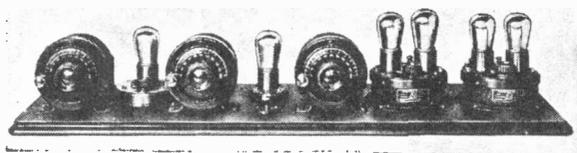
Radio's Evolution

the walls of ignorance and mystery before the day foreseen by Ayrton should come to pass.

To label the researches of engineers, physicists and field workers in the early part of this century as "mere ground-work" of the world-wide network of communication as we know it today does not detract one whit from their glory. Without their conquering of stubborn problems, many of them so discouraging in aspect that they must have seemed insurmountable, the world would be poorer today by many billions of dollars in material things and trillions of hours of domestic enjoyment, not to mention the welding together of international viewpoints, all due to the universal appeal of broadcasting.

This little tribute to fourteen years of broadcasting might well be carried through to its end without recalling the years that preceded them, but a brief mention inevitably makes the story more complete and understandable.

Back in 1901, Marconi flew his kite over wind-swept Glace



EARLY SIX-TUBE SET

This receiver, in which the parts and tubes were mounted on a breadboard layout, was once considered the latest word in home radio reception apparatus

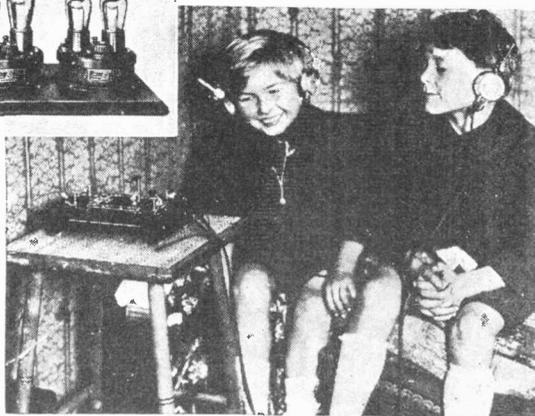
Bay and brought down a different kind of lightning. The act was heralded as one of the greatest accomplishments of all time. In the decade that followed, a long list of workers continued the enthusiasm engendered by the Marconi achievement. Gradually the crude mechanics of reception were refined and new elements added which displaced the old. De Forest took a glass bulb and inserted a little piece of metal in a space left unfilled by J. J. Fleming. In that one stride, broadcasting was drawn within the limits of practicability. The war altered the picture at this point, and radio took its place in the ranks alongside the other engines of offense and defense. At the conclusion of hostilities, engineers who had been forced to untoward ends to develop communication through the ether immediately saw the great possibilities of the agency as a supplement to the other great communication systems. At this point radio broadcasting of entertainment, information and education had its birth. And at this same point RADIO NEWS entered the scene as an aide,

a counselor, a contemporary history and a reference source.

From the moment that the late Harry P. Davis and Frank Conrad, working before a crude transmitter in a garage at East Liberty, Pa., voiced the returns of the Harding-Cox election, not for the edification of millions of listeners but for the curiosity of two score of friends who had been provided with special receivers, our daily life was threatened with changes. If the prosaic figures of a presidential election could be made so interesting that people would listen to them, then there must be a demand for the same system expanded and refined. The astonishing fact that a family could sit in comfort in its home, there to be supplied with happenings of the day, musical selections and even addresses by notable men whose messages were sought after, swept over the country like the news of a staggering earthquake. The demand for receivers sprang up and an industry was born. The first part of Oliver Lodge's prophecy was coming true, exactly twenty years after it was uttered. But Ayrton, in thought at least, was still ahead of the art.

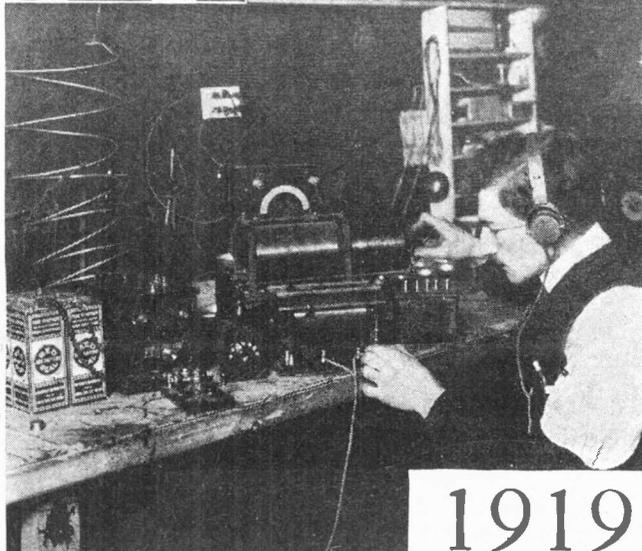
Who is there today who does not remember the awe-inspiring collections of coils, tubes and wires that preceded any concerted manufacturing move? Historians are one in agreeing that this era of home building was the spark-plug that energized inventors and engineers.

There is an erroneous belief that the attic inventor was for several years the (Continued on page 122)



MEMORIES

Some of us do not forget the first crystal sets, as shown above, that brought such a thrill to young and old alike. Right: Fewer remember the good old days when radio was a collection of batteries, mysterious looking coils and parts in scrambled confusion all over the experimenter's table



1919

sole producer of radio sets. But this is not quite the truth. Almost coincident with the first stations there were complete receivers, but their high cost limited their sales. These early instruments were plain box-like affairs

with, first, three tubes, then four and finally five. The tubes were fed from storage batteries, because no one had yet refined the battery eliminator. Selectivity was incidental; sensitivity depended almost entirely on the luck of the owner in getting good tubes. Yet, despite these handicaps, the public expressed a demand for radio receivers that astonished industry and created a horde of manufacturing organizations. The radio industry had passed the childhood stage.

The next phase was one of invention. Not from the extensive research laboratories of the great corporations, but from the kitchens and cellars of the individual and the private workshops of smaller firms, came a constant stream of improvements. A grid leak ceased to be a crude pencil mark on a strip of fibre and became a carefully calibrated thread of resistance material in a glass tube. Transformers were improved and the voices of orators no longer sounded alike. Loudspeakers graduated from a combination of earphone and horn into a matched assembly of magnetic unit and air column. Refinements in accessories made it certain that the receiver could be depended upon to function, day after day and week after week. By 1923, the plaything had become an instrument, crude, of course, as compared with those of today, but imposing enough to meet all the requirements of the public except one—electrician.

In 1924, when RADIO NEWS was but six years of age, its pages carried the first stories of socket-power-operated receivers. The ponderous storage battery had done its work, and the small, compact dry cells were to be replaced. All that one needed was a connection to any handy electric-light socket. The toy stage had definitely passed and in its place came the era of utility.

Professor Hazeltine contributed his method of counterbalancing the sources of squeals, and there was no longer a definite limitation to the number of tubes that could be used.

This development came at a time when the amazing increase in broadcasting stations seemed about to curtail the usefulness of the set, due to interference. More tubes meant greater selectivity, and electrification meant that the increase in tubes could be accommodated without depleting the source of power.

During all this time the loudspeaker sat at one side of the receiver or perched on its top like an added thought—albeit a mighty essential one. Designers (with vision) saw the desirability of making the radio set a complete instrument, fit to take its place in the room alongside the piano or any other piece of furniture. Consoles appeared on the market with the speakers built into some portion of the unit. The magnetic speaker was soon replaced by the dynamic speaker; early tubes were outmoded by newer types with less hum and greater volume. Tube experts realized that the same tube could not be expected to perform efficiently in radio-frequency, detector and power stages, and their attention to these special conditions soon bore fruit. The result was an improvement in quality that brought thousands of doubting Thomases to radio stores. Undoubtedly, as we see them in retrospect, these were the halcyon days of radio.

On the transmission end of the industry, engineers had not been nodding. The rapid advance of receiving technique had produced instruments that were able to reproduce better quality than stations were actually transmitting. But not for long! Transmission engineers soon realized that radio could not tolerate quality no better than that of the telephone. Programs, to be acceptable, must first of all be lifelike. Orchestras must sound like orchestras; the voices of speakers must be hurtled through the air and recreated in homes with all their original timbre, intonations and nuances of tone. This called for a complete redesign of equipment, which was not long in coming, so that after ten years of broadcasting, research workers were able to point to their transmitters and say: "We are transmitting more than your receivers will recreate." And that, today, in the majority of instances, is a condition that still exists.

There is no place here to comment on the so-called "American system" of broadcasting. It has its adherents even as it has its opponents. The fact remains that commercial interests have made it possible for the highest-paid stars of theatre, opera, screen and concert stage to come into your homes and entertain you with their priceless talents. Their voices are in the air through all the hours of the day, to be enjoyed by anyone who possesses the proper combination of tubes and coils to reach out and get them.

But radio has not been limited to the relatively simple task of corraling artists in a studio, there to send their voices far and wide. To prevent satiety, there must always be variety, and the broadcasting interests have not hesitated to descend into the ground, ascend to the upper air to cross continents and oceans to satisfy the ever-broadening desires of the millions of listeners who comprise this vast audience. Microphones have been lowered to mines and tunnels; they have been carried in planes during mimic warfare and on cross-country flights; they have been placed on the dais before statesmen of all countries, and war lords of the Orient have used them to bring their messages five thousands of miles to this country.

In 1932, the fourteenth year of broadcasting, those prophetic utterances of Ayrton have at last been realized. You may claim that it is not yet possible for the householder to step to his receiver and call his friend, wherever he may be. But this is not directly a limitation of radio. Does not the amateur converse with his friends on the other side of the world? Is it not possible for any man to enter a telephone booth and by a combination of wire and radio hold conversation with the object of his interest in Buenos Aires, London or Honolulu? Do not these accomplishments meet in a sense the prophecies made over three decades ago?

So much for the present. What of the future? No man, unless he be an Ayrton or a Lodge, can determine with accuracy what form broadcasting will take in the years ahead. But there is television, with its great hopes and promises. As an adjunct to mere sound, it will add a missing quality to home entertainment. An artist heard is only partially appreciated; the same performer heard and seen must have twice the appeal. But just how soon this accessory to sound broadcasting will be offered as a market commodity, no one knows with certainty. Is it not sufficient at this time to realize that it is coming and that its arrival can scarcely fail to herald the beginning of another fourteen-year era of wonderful accomplishment, in all of which RADIO NEWS will participate just as it has shared in the fourteen years that have led up to the day?

RADIO NEWS FOR AUGUST, 1932

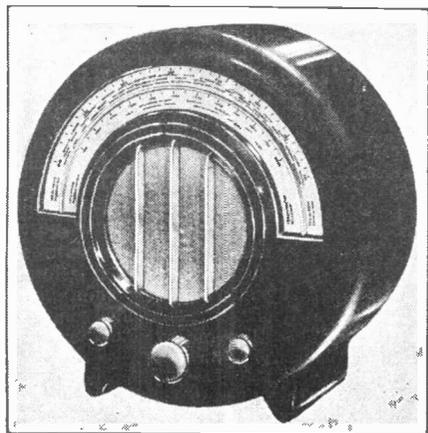


Fig. A

A modernistic receiver of high efficiency.

A "SPOTLIGHT" SET

A RADIO receiver that is now in the English spotlight is the receiver shown at A. According to a July issue of THE BROADCASTER AND WIRELESS RETAILER (weekly), this instrument has aroused considerable interest because of its unique housing, which is reminiscent of a spotlight. The cabinet is circular and so is the speaker opening; the full-vision scale, which is calibrated for the foremost European stations, is semi-circular. The controls carry out the "circular" motif, being arranged in an arc. The cabinet is made of bakelite.

This receiver incorporates a 6 tube superheterodyne chassis. The modernistic trend is accentuated by the chromium-and-black finish.

The circuit incorporates such features as A.V.C., light-beam and shadow station indicator, dynamic reproducer, A.C.-D.C. operation, band-pass tuning, and dual-range reception, thus indicating that this set, far from being a toy, is a practical radio receiver of great utility.

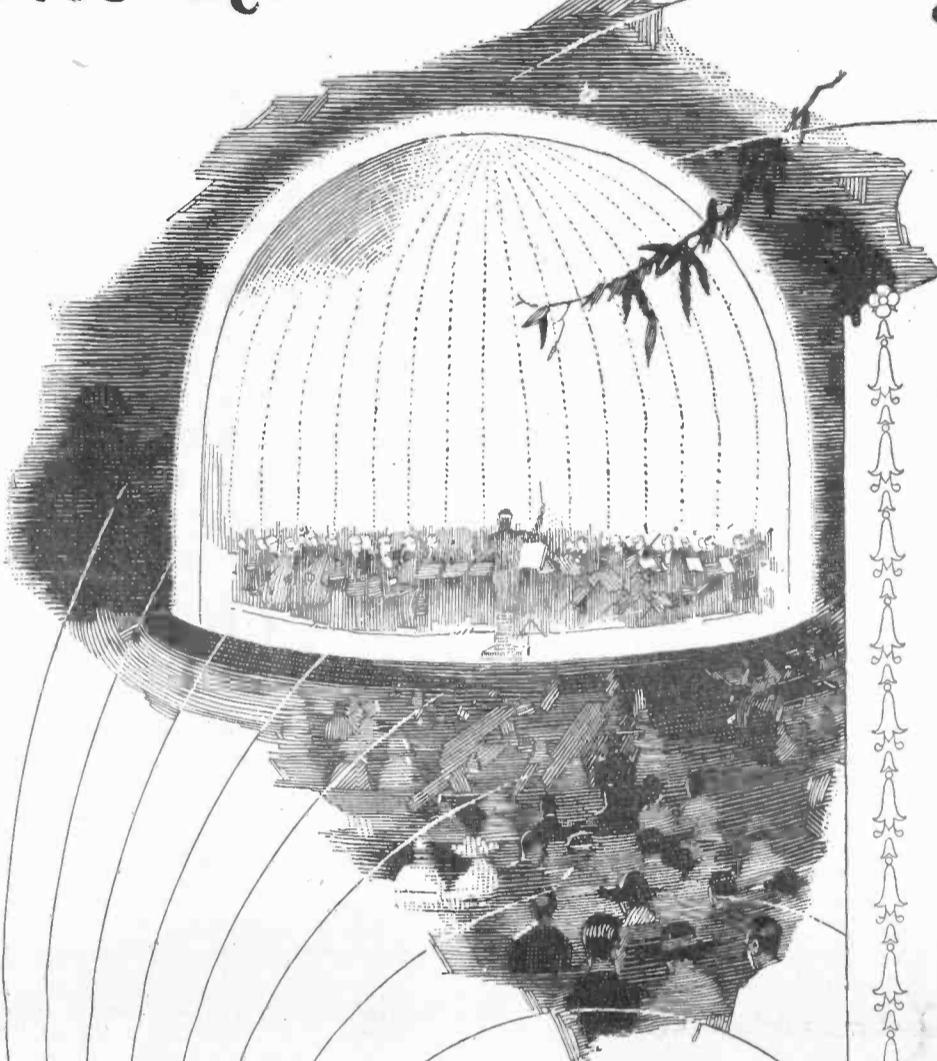
RADIO-CRAFT for

NOVEMBER, 1934

THE SATURDAY EVENING POST

October 16, 1920

The Rounded Dome of the Band "Shell"— Why?



NEXT TIME you hear an open-air concert, note particularly the band "shell"—its concave, rounded dome—the sweeping, circular lines of its back wall.

Never straight, never angular, never flat—always *curving*, always *rounded*, always *circular*.

Have you ever wondered why?

The reason is scientific—involving the troublesome problem of outdoor acoustics.*

If the lines of the band "shell" were straight, plane, right-angled, the music would reach the ears of the favored few—that part of the audience seated nearest the stage. The enjoyment of those farther off would be materially lessened.

By curving the walls and ceiling of the band "shell," the music is amplified. Reflex sounds are eliminated. The music is sent out to the hearers in a smooth, steady stream—not gathered together and flung at them in a confused, echo-y heap.

The proven principle of the curving, rounded band "shell" is the principle of the curving, rounded Emerson Music Master Horn.

Every Emerson Phonograph delivers full, round, voluminous tone, because every Emerson Phonograph is equipped with the Emerson Music Master Horn. And the Emerson Music Master Horn is fashioned of seasoned, kiln-dried, rounded, vibrant spruce—solid spruce, not veneered.

Hear the Emerson Phonograph. Note how pure and clear the tone is—how full and *round*. Notice the absence of annoying echoes—the smooth, *round* quality of each note which flows from the round, flaring, trumpet-like mouth of the Emerson Music Master Horn.

*Elementary Treatise on Physics (*Ganot*), Pages 194-5.

The full line of Emerson Phonographs is shown and described in our loose-leaf catalog, a copy of which will be sent you on request. In it is explained briefly the natural principle underlying the Emerson Music Master Horn.

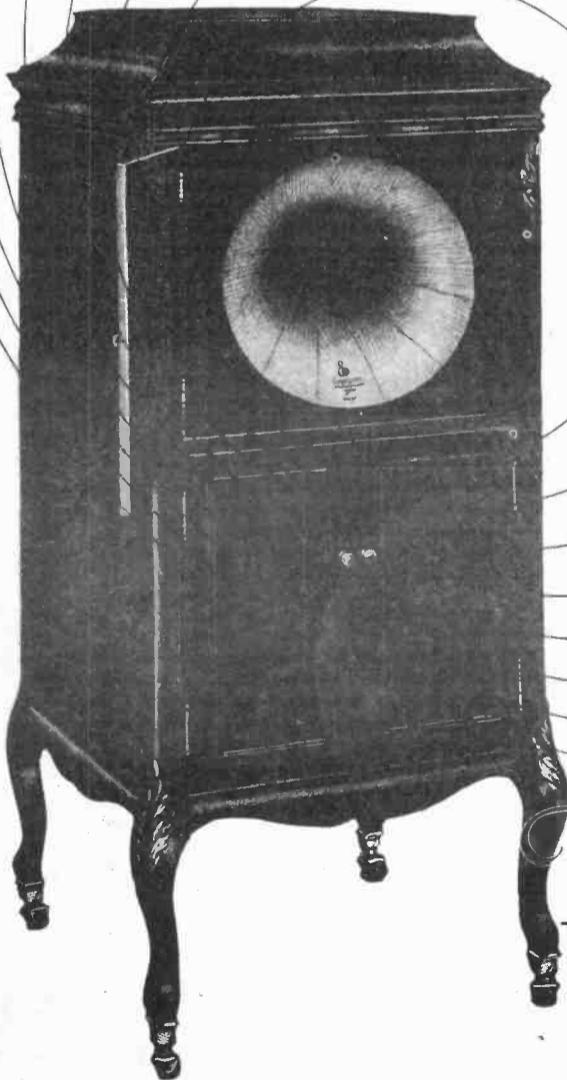
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Makers of
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EMERSON
Phonograph
Standard Model 20
Mahogany
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Fumed Oak
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Master Horn; Emerson
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Universal Tone Arm;
Emerson True Tone
Reproducer; Emerson
Special Gold-
Edge Clamp-Ring
Turn Table; Emerson
New Style Pat-
ented 21st Century
Filing System; Emerson
Perfect Tone
Control; Emerson
Flush Motorboard.
Other Emerson
Models, with Emerson
Music Master
Horn,
\$80 to \$1,000.



The Emerson Phonograph

WITH THE EMERSON MUSIC MASTER HORN





AT WHN 1924

Billy West and Billy Murray broadcasting.

What was Marconi's discovery?

William Marconi, an Italian, discovered that electric vibrations caused by an oscillator passed through a hill. Subsequent experiments showed that signals apparently could be sent through blocks of buildings in London to a distance of three hundred feet, passing seven or eight walls. Marconi believes that the electric rays pass through the general ether, and calls them electric X Rays, or Y Rays. Much is expected from these experiments. Marconi's apparatus was kept secret.

From The Fireside University, John McGovern, Union Publishing House, Chicago, 1898, p. 102.

1975 ad

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- M29 "RADIO EQUIPMENT" DAVID KILLOUGH CO. 1927 12B5 \$8.00
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- M33 "RADIO CONSTRUCTION FOR THE AMATEUR", BY MERLE DUSTON, 1923, A REAL CONSTRUCTION BOOK LIKE LOOSE COUPLERS, DIFFERENT RECEIVERS, AND TEMPLATES FOR PROJECTS. I'VE HAD A FEW OF THESE IN THE PAST.... \$13.50

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DALLAS, TEXAS 75219

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Old time equipment is displayed on the American Freedom Train to demonstrate the progress of American technology. It is good to see our interests on display in association with American history.

NEW BOOKLET FOR RADIO COLLECTORS

Jim Fred has done it again. He has published a convenient booklet with 16 pages for beginning antique radio buffs for only a \$1.00. It measures 3 1/4 X 5 1/2. It even tells where to find the oldies and where to get help.



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1975 AD

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ANNOUNCING THE
NEW CLASSIC
RADIO NEWSLETTER
FOUR PAGES, SIX
ISSUES PER YEAR,
\$5.00 PER YEAR.
STARTS JAN. 1975.

SILVER GHOSTS

BY JWF PUETT

PHOTOGRAPHS - SCHEMATIC DIAGRAMS - STORIES
OF EVERY KNOWN RECEIVER MANUFACTURED BY \$10.00

THE EH SCOTT RADIO LABORATORIES

WE ARE SLOWLY BUT SURELY RECEIVING MORE ORDERS FOR SILVER GHOSTS. WE HOPE TO GO TO PRESS WITHIN FOUR TO SIX WEEKS. THANK YOU FOR YOUR PATIENTS.

FOR SALE OR TRADE

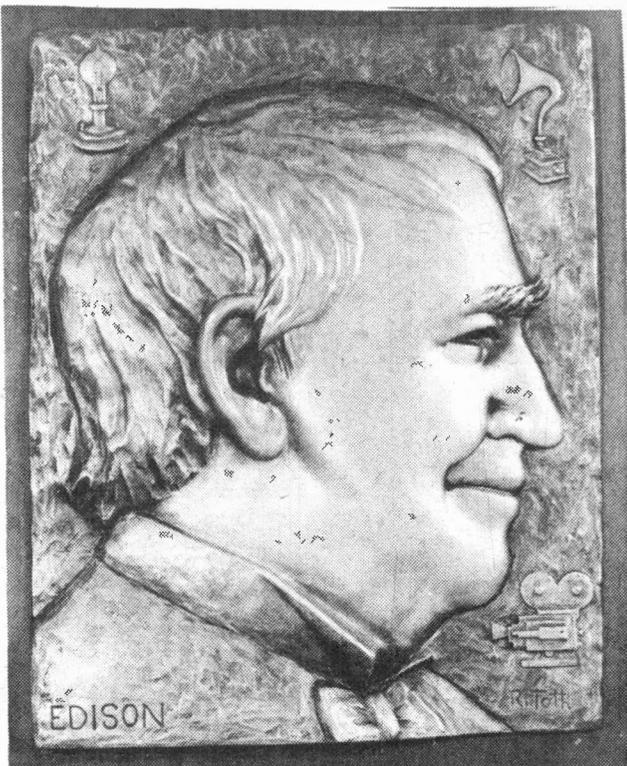


Photo of Thomas Edison plaque
Robert Toth, Sculptor

"THOMAS EDISON MEMORABILIA WALL
PLAQUE - Illustrates the Genius
and his three major inventions -
the incandescent light, phonograph
and motion picture camera. 13-3/4"
X 16-1/4" bronze finish \$18.00 ppd.
Also have 9" bust of Edison - \$21.95
ppd. or send for free brochure.
Toth Gallery of Fine Art, P.O. Box
355, Kearny, N.J. 07032."

OHM'S LAW and ELECTRON THEORY,
knowing the importance of these
two theories to the understand-
ing of basic radio, I have pre-
pared 10 pages crammed with in-
formation, illustrations and
problems to assist the pro and
teach the beginner \$2.00 for
quick return package. O. H.
McDonald, 1606 Lebanon, Dallas,
Texas 75208.

WD11 Adaptors, use UX199, 120, VT24.
No wiring changes, Radiola III's
battery hook-up included \$5.25 pp.,
2 for \$9.25. Keith Parry, 17557
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RADIOS FOR SALE: Specify your needs
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fundable. Radio Americana, Box 128,
Woodstock, N.Y. 12498.

\$1.00 for the newly published booklet
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Blank will form protects your family.
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FOR SALE: Two matched telegraphy
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Each has key and sounder. Perfect
operating condition \$36.00 pair.
Sensitive research millimeter, com-
plete but needs repair, \$7. ordered
with above. J. Denny, 2929 N. West-
moreland St., Arlington VA 22213.

Out of print, The Faubous Phono-
graph book. From Edison to Stereo by
Roland Gelatt. \$9.95 each, postpaid,
The Horn Speaker, Box 12, Kleberg
Texas 75145.

WANTED

WANTED: One later model, prefer-
ably Western Electric, wide fre-
quency range, permanent alnico
magnet, dynamic type driver unit
about 10 to 15 watts size for a
horn loudspeaker, maximum out-
side diameter of driver unit not
more than 3-1/8 inches. LaVerne
Laatz, R. Route 1, Marseilles,
Illinois 61341.

WANTED: David Grimes INVERSE DUPLEX
Radio Model 4DL. This is a reflex
battery radio - "Radio News" mag-
azines - 1925 and earlier.
J. Albert Warren, Box 279, Church St.,
Waverly PA 18471.

NEED TWO TUNING CONTROLS for
Atwater Kent models 55-AC early,
60-C early 2nd type. Any good
ideas on satisfactory made-up
substitute? Darcy Brownrigg,
Chelsea, Que., JOX 1W, Canada.

WANTED: Crystal sets, battery and
electric radios and televisions Mfg.
before 1935. Need all related items.
Will buy one set or complete collect-
ion. Young, 11 Willow Court, Totowa,
N.J. 07512.

WANTED: Old auto radios, uibrators,
parts, and related items. Please
describe and price in first letter.
Marvin Roth, 14500 LaBelle, Oak Park,
Michigan 48237.

WANTED: Radio - all 1920, 1921, Oct.
1922. Many wireless age 1920, 1925,
Q.S.T. Feb, March 1920. Radio Craft
Aug. 1929, Feb. 1931. Thompson, 2930
Delavina, Santa Barbara CA 93105.

WANTED: Power transformer pack No.
107-264 for Knight KG 2000DC to 5MC
laboratory oscilloscope. Give price.
J. C. Winnette, P.O. Box 639, Shelby-
ville, Tenn. 37160.

WANTED: Radio parts and magazines
1920s. Trade 2 Saturday Evening Post
4-12: National Geographic 8-18, 4-23.
WANT BAKELITE PANELS. W6ME, 4178
Chasin Street, Oceanside CA 92054.

WANTED: Early table model coin operat-
ed radio. Must be all original.
Everett Boese, Box 423, Moundridge,
Kansas 67107. Pho: 316 345-2492.

GREAT THINGS ARE HAPPENING IN THE SOUTHWEST VINTAGE RADIO AND PHONOGRAPH SOCIETY

Arkansas, Louisiana, Oklahoma, Texas
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Write for application: S.V.R.P.S.,
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MISC.

PHONOGRAPH COLLECTORS, join the Amer-
ican Phonograph Society. Receive the
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ters. Receive free reprints and ster-
eoscopic phonograph cards. For more
information send 10¢ stamp. For one
year membership, send \$6.50. The Amer-
ican Phonograph Society, P.O. Box
5046, Berkelay CA 94705.

PROFESSIONAL CW operators, retired or
active, commercial, military, Gov't,
police, etc., invited to join Society
of Wireless Pioneers, W7GAQ/6, Box
530, Santa Rosa CA 95402.

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FOR SALE: New 1976 Quarterly Radio
Antiquer's Directory and Collector
Guide Services.

Who's Who of Radios/Wireless Col-
lecting. No collector or dealer
should be without or miss being in
MIDCO's new 1975 Radio/Wireless
Antiquer's Directory & Collectors
Guide. NOW AVAILABLE, over 650
names/addresses, call letters, phone
numbers of buyers, traders, sellers,
museums, clubs, associations, societ-
ies, collections, old radio reprints,
experimenters projects & hints for
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SERVICES OFFERED: Repairing, ap-
praising, restoring & friendship.
ONLY ONE KNOWN, experts keep at their
fingertips & in autos when traveling.
Order \$5. ppd., a little more than a
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you want appraised? Send all details,
model No., photos. \$2. each plus re-
turn postage. Order MIDCO HSI, Box
1537, Long Beach CA 90615.

FOR SALE: Edison receiving unit type
R, SF #748223, Edison cabinet factory
#18, Pat. # 1674603.
Philco Radio Superhetrodyne Model #
112, 115V ac, 50-60 cy, 105 watts, also
pat. #11785114-1875 Hozetinelatour
Corp. Cabinet by Desi Norman Ceddes.
Will send pictures of front and back
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highest bidder. James F. Smallwood,
12414 Military Road So., Seattle,
Washington 98168.



PUETT ELECTRONICS

P.O. BOX 28572 DALLAS TEXAS 75228
PUBLISHERS OF
THE CLASSIC RADIO NEWSLETTER

LIST NO. 12

HOW TO ORDER

- (1) Make checks and money orders payable to PUETT ELECTRONICS.
- (2) Please state whether new or used tubes are desired and whether a half-price used tube is desired when a new tube is out of stock. REFUNDS are mailed with your invoice for out-of-stock tubes, or when, by customer request, a used tube is substituted for an out-of-stock new tube.
- (3) ALL ORDERS ARE SHIPPED PARCEL POST, NO C.O.D. INCLUDE 15% FOR POSTAGE AND HANDLING. INSURANCE RATES ARE 30¢ FOR ORDERS UNDER \$50.00. TEXAS RESIDENTS ADD 5% STATE SALES TAX.

MINIMUM ORDER \$3.00

CUSTOMER SATISFACTION GUARANTEED - If you are not satisfied with your order for any reason, tubes may be returned within ten days for refund or replacement with exception of tubes which are shorted or have open filaments. It will be assumed that returned tubes with open filaments or shorts were damaged in shipment. Shipping damage claims will be handled promptly through the post office on insured orders. PUETT ELECTRONICS assumes no liability for orders which are not insured, and no liability beyond that which is covered by postal insurance. ALL TUBES ARE THOROUGHLY TESTED ON A MUTUAL CONDUCTANCE TUBE CHECKER BEFORE SHIPMENT.

TABLE 1 - OLDER TYPE-NUMBER TUBES

Prices listed for new tubes.
Used tubes are half new tube price.

| | | | | | | | | | | | | |
|-----|------|------|-----|-----|------|-----|------|----|----|---|------|----|
| 0A2 | 1EE3 | 5Y4 | 6P6 | 6U7 | 724 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 0A3 | 1EP3 | 5Z4 | 6P8 | 6V6 | 10 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 0A4 | 1EG5 | 5Y4 | 6P8 | 6V6 | 10 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 0B3 | 1LH4 | 5A3 | 505 | 6W6 | 13A5 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 0C3 | 1LN5 | 5A4 | 502 | 6X5 | 12A7 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 0D3 | 1N5 | 5A5 | 502 | 6X5 | 12A8 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 0Y4 | 1P5 | 5A6 | 502 | 6Y5 | 12A7 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1A1 | 1R5 | 5A7 | 502 | 6Y7 | 12A7 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1A3 | 1R5 | 5A8 | 502 | 6Z5 | 12A7 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1A5 | 1R5 | 5A8 | 502 | 6Z5 | 12A7 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1A6 | 1R5 | 5A8 | 502 | 6Z5 | 12A7 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1A7 | 1R5 | 5A8 | 502 | 6Z5 | 12A7 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1B4 | 1R5 | 5A8 | 502 | 6Z5 | 12A7 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1B5 | 1R5 | 5A8 | 502 | 6Z5 | 12A7 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1B6 | 1R5 | 5A8 | 502 | 6Z5 | 12A7 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1B7 | 1R5 | 5A8 | 502 | 6Z5 | 12A7 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1B8 | 1R5 | 5A8 | 502 | 6Z5 | 12A7 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1C1 | 2A1 | 6AL7 | 6N2 | 7A7 | 12C8 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1C2 | 2A1 | 6AL7 | 6N2 | 7A7 | 12C8 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1C3 | 2A1 | 6AL7 | 6N2 | 7A7 | 12C8 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1C4 | 2A1 | 6AL7 | 6N2 | 7A7 | 12C8 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1C5 | 2A1 | 6AL7 | 6N2 | 7A7 | 12C8 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1C6 | 2A1 | 6AL7 | 6N2 | 7A7 | 12C8 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1C7 | 2A1 | 6AL7 | 6N2 | 7A7 | 12C8 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1C8 | 2A1 | 6AL7 | 6N2 | 7A7 | 12C8 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1C9 | 2A1 | 6AL7 | 6N2 | 7A7 | 12C8 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1D1 | 2E5 | 6AV6 | 6S4 | 7B4 | 12E6 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1E1 | 2E5 | 6AV6 | 6S4 | 7B4 | 12E6 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1E2 | 2E5 | 6AV6 | 6S4 | 7B4 | 12E6 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1E3 | 2E5 | 6AV6 | 6S4 | 7B4 | 12E6 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1E4 | 2E5 | 6AV6 | 6S4 | 7B4 | 12E6 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1E5 | 2E5 | 6AV6 | 6S4 | 7B4 | 12E6 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1E6 | 2E5 | 6AV6 | 6S4 | 7B4 | 12E6 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1E7 | 2E5 | 6AV6 | 6S4 | 7B4 | 12E6 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1E8 | 2E5 | 6AV6 | 6S4 | 7B4 | 12E6 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1E9 | 2E5 | 6AV6 | 6S4 | 7B4 | 12E6 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1F1 | 2X2 | 6B6 | 6S7 | 7C7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1F2 | 2X2 | 6B6 | 6S7 | 7C7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1F3 | 2X2 | 6B6 | 6S7 | 7C7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1F4 | 2X2 | 6B6 | 6S7 | 7C7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1F5 | 2X2 | 6B6 | 6S7 | 7C7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1F6 | 2X2 | 6B6 | 6S7 | 7C7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1F7 | 2X2 | 6B6 | 6S7 | 7C7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1F8 | 2X2 | 6B6 | 6S7 | 7C7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1F9 | 2X2 | 6B6 | 6S7 | 7C7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1G1 | 3A3 | 6C6 | 6S7 | 7E8 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1G2 | 3A3 | 6C6 | 6S7 | 7E8 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1G3 | 3A3 | 6C6 | 6S7 | 7E8 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1G4 | 3A3 | 6C6 | 6S7 | 7E8 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1G5 | 3A3 | 6C6 | 6S7 | 7E8 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1G6 | 3A3 | 6C6 | 6S7 | 7E8 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1G7 | 3A3 | 6C6 | 6S7 | 7E8 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1G8 | 3A3 | 6C6 | 6S7 | 7E8 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1G9 | 3A3 | 6C6 | 6S7 | 7E8 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1H1 | 3V4 | 6D6 | 6S7 | 7F7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1H2 | 3V4 | 6D6 | 6S7 | 7F7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1H3 | 3V4 | 6D6 | 6S7 | 7F7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1H4 | 3V4 | 6D6 | 6S7 | 7F7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1H5 | 3V4 | 6D6 | 6S7 | 7F7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1H6 | 3V4 | 6D6 | 6S7 | 7F7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1H7 | 3V4 | 6D6 | 6S7 | 7F7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1H8 | 3V4 | 6D6 | 6S7 | 7F7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1H9 | 3V4 | 6D6 | 6S7 | 7F7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1I1 | 3V4 | 6D6 | 6S7 | 7F7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1I2 | 3V4 | 6D6 | 6S7 | 7F7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1I3 | 3V4 | 6D6 | 6S7 | 7F7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1I4 | 3V4 | 6D6 | 6S7 | 7F7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1I5 | 3V4 | 6D6 | 6S7 | 7F7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1I6 | 3V4 | 6D6 | 6S7 | 7F7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1I7 | 3V4 | 6D6 | 6S7 | 7F7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1I8 | 3V4 | 6D6 | 6S7 | 7F7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1I9 | 3V4 | 6D6 | 6S7 | 7F7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1J1 | 3V4 | 6D6 | 6S7 | 7F7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1J2 | 3V4 | 6D6 | 6S7 | 7F7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1J3 | 3V4 | 6D6 | 6S7 | 7F7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1J4 | 3V4 | 6D6 | 6S7 | 7F7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1J5 | 3V4 | 6D6 | 6S7 | 7F7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1K1 | 3V4 | 6D6 | 6S7 | 7F7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1K2 | 3V4 | 6D6 | 6S7 | 7F7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1K3 | 3V4 | 6D6 | 6S7 | 7F7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1K4 | 3V4 | 6D6 | 6S7 | 7F7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1K5 | 3V4 | 6D6 | 6S7 | 7F7 | 12S4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1L1 | 5R4 | 6DB6 | 6S7 | 7S7 | 12V6 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1L2 | 5R4 | 6DB6 | 6S7 | 7S7 | 12V6 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1L3 | 5R4 | 6DB6 | 6S7 | 7S7 | 12V6 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1L4 | 5R4 | 6DB6 | 6S7 | 7S7 | 12V6 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1L5 | 5R4 | 6DB6 | 6S7 | 7S7 | 12V6 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1L6 | 5R4 | 6DB6 | 6S7 | 7S7 | 12V6 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1L7 | 5R4 | 6DB6 | 6S7 | 7S7 | 12V6 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1L8 | 5R4 | 6DB6 | 6S7 | 7S7 | 12V6 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1L9 | 5R4 | 6DB6 | 6S7 | 7S7 | 12V6 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1M1 | 5V4 | 6D6 | 6S7 | 7V7 | 12W4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1M2 | 5V4 | 6D6 | 6S7 | 7V7 | 12W4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1M3 | 5V4 | 6D6 | 6S7 | 7V7 | 12W4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1M4 | 5V4 | 6D6 | 6S7 | 7V7 | 12W4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1M5 | 5V4 | 6D6 | 6S7 | 7V7 | 12W4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1M6 | 5V4 | 6D6 | 6S7 | 7V7 | 12W4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1M7 | 5V4 | 6D6 | 6S7 | 7V7 | 12W4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1M8 | 5V4 | 6D6 | 6S7 | 7V7 | 12W4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1M9 | 5V4 | 6D6 | 6S7 | 7V7 | 12W4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1N1 | 5V4 | 6D6 | 6S7 | 7V7 | 12W4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1N2 | 5V4 | 6D6 | 6S7 | 7V7 | 12W4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1N3 | 5V4 | 6D6 | 6S7 | 7V7 | 12W4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1N4 | 5V4 | 6D6 | 6S7 | 7V7 | 12W4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1N5 | 5V4 | 6D6 | 6S7 | 7V7 | 12W4 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1O1 | 5Y3 | 6E6 | 6S7 | 7X7 | 14A5 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1O2 | 5Y3 | 6E6 | 6S7 | 7X7 | 14A5 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1O3 | 5Y3 | 6E6 | 6S7 | 7X7 | 14A5 | 1B8 | 35W4 | 82 | 81 | 6 | 5664 | 22 |
| 1O4 | 5Y3 | 6E6 | | | | | | | | | | |