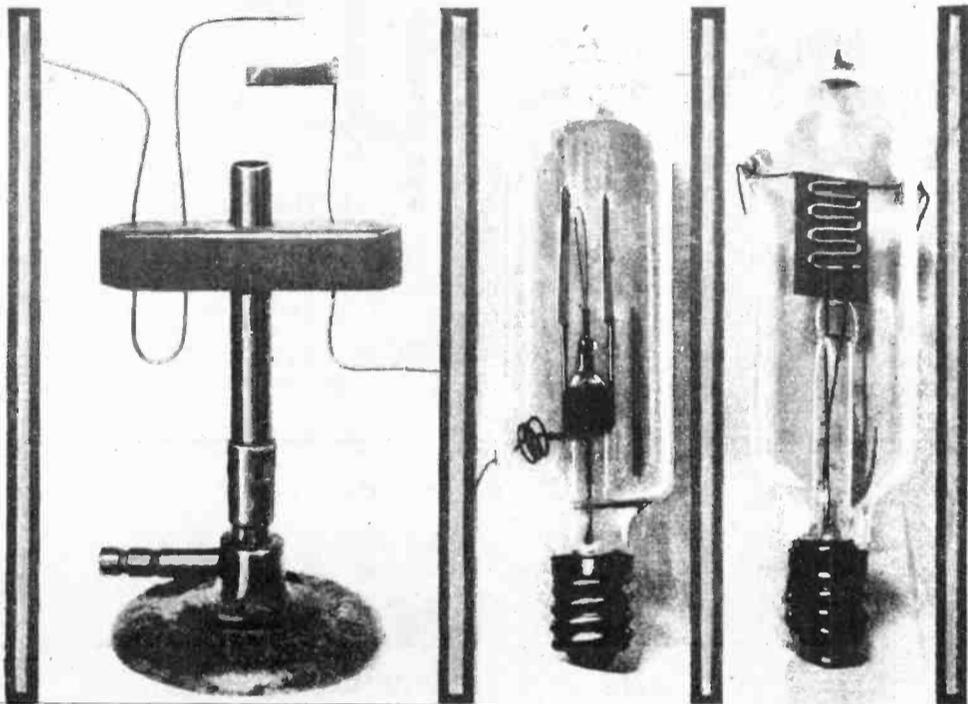


THE NEWSPAPER FOR
THE HOBBYIST OF VINTAGE
ELECTRONICS AND SOUND

THE HORN SPEAKER



First vacuum tube detector with a control element in the form of a plate

The first vacuum tube with the control element in the form of a grid

Vacuum Tube

WITHOUT the audion, or three-element vacuum tube, it is unlikely that there would be a radio industry. At least, the radio industry would not be catering to the public at large, supplying millions of radio sets and tens of millions of radio tubes each year, and maintaining over six hundred broadcasting stations, pouring forth a steady stream of entertainment and enlightenment—and considerable advertising. Rather, there would be a relatively small communication business for the handling of marine and transoceanic traffic. In the final analysis, it is the three-element tube that has brought about simplified and practical radio. Hence, in the production of radio tubes—the veritable footlights of the world's stage—is reflected the rapid progress of the radio art, science and industry.

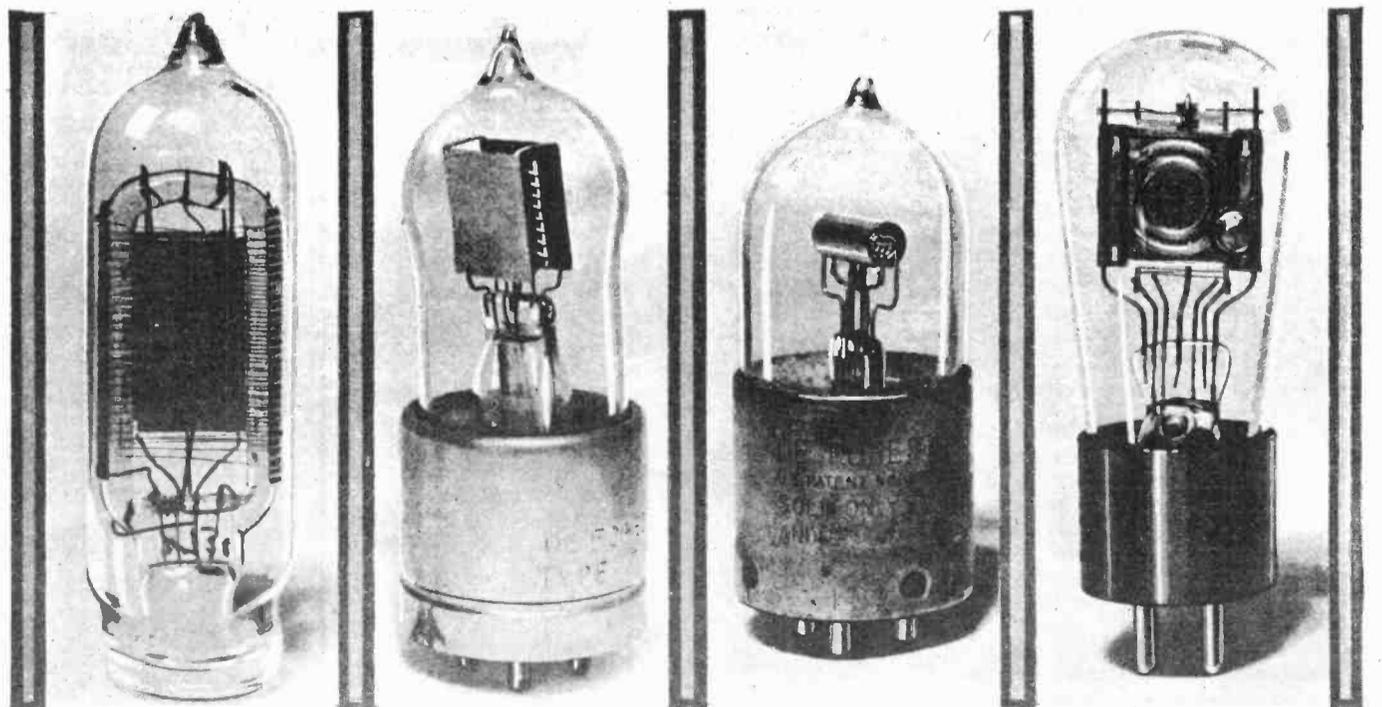
The giant radio tube industry of today came about through an accident. Many readers may recall the story. However, for the newer members of the radio fraternity, I may be permitted to repeat the brief details.

Back in 1904, while engaged as Associate Editor of *The Western Electrician*, I spent my spare time in wireless experiments. Among my possessions was a large spark coil. One evening I noticed that each time the spark jumped the gap, the nearby Welsbach mantle would flicker. It occurred to me that

RADIO NEWS FOR MAY, 1930

By Dr. Lee

De Forest



An improved audion with the first grid completely surrounding the filament

An audion used by the Navy. This tube had the first welded grid

Storage battery tube similar in general characteristics to present design

A three-element tube using high-output long-life oxide-coated filament

the Hertzian or wireless waves must have some influence on the particles of heated gas in the Welsbach mantle. Perhaps, after all, this might be the basis for a new wireless detector, which was sorely needed.

The first gaseous detector took the form of a standard bunsen burner, with a trough-like electrode containing common table salt and a piece of platinum wire above it, placed in the blue flame of the burner. A battery and receiver were shunted across the flame, through the electrodes. The salt was used to improve the action. The antenna and ground were connected to the two electrodes. Fair results were obtained from this detector.

However, marine wireless was our main consideration in those days. And since there was no illuminating gas available on shipboard, I decided to use a glass bulb filled with gas, and a heated filament as the source of heat, operated entirely by batteries. One discovery led to another. The fact that much of the signal energy passed through the battery and head-phone instead of through the gaseous medium, led to the idea of a separate and distinct path for the wireless signal, and in turn the third element made its appearance, first as a metal band around the outside of the glass bulb, then as a second plate quite close to the first or real plate, and finally in the shape of a zigzag length of wire which, for want of a better name, I called the grid. So by 1906 I had developed the audion or three-element tube, in all respects similar to the standard radio tube of today.

The next step was to manufacture the audion. At first I tried to interest the large lamp companies, since the audion was very much in their line, being a modified electric lamp. But to no avail. The lamp companies had no time to bother with this fantastic experiment. Somewhat of a contrast, to be sure, with present-day conditions when so many lamp companies have rushed into the vacuum tube business because of the greater profits therein.

Finally, I succeeded in interesting one McCandless, a producer of miniature electric lights, located on Park Place in New York City. His plant became the first vacuum tube factory. His men, skilled glassblowers, made the early audions, which were sold mainly to wireless experimenters, for use as a detector. The audion was supplied with a wooden cabinet containing the flashlight batteries for the B circuit, and with binding posts and switches for the necessary connections. According to one of our early advertisements: "The audion detector is operated by heated gases, employs a local battery and is complete with switches, batteries, rheostat and necessary connections. It is fully protected by U. S. Patents Nos. 879 532, 979 275 and others granted to Dr. Lee DeForest and held by the Radio Telephone Company. It is pronounced by experts to be the very best detector obtainable anywhere. Renewal audion bulbs may be secured, in exchange for old or broken ones, for \$3.50 and \$5.00 each. All tubes are tested before shipment, but the 'X' or \$5.00 bulbs, are tested for the maximum possible sensitiveness. With the audion you can easily increase your range from 50 to 100 per cent."

Our first audions made use of tantalum filaments. Usually, a double loop filament was employed, with three pigtail leads, so that one or the other loop might be used. When one loop or filament burned out, another was still available, thereby giving the short enough life of those audions a double span, so to speak. The tubes were quite gassy. The plate voltage had to be delicately adjusted so as to be set at the most critical value. If increased beyond a given point, the tube would suddenly light with a purplish glow, and the signals would become garbled.

In time, the audion came into use for telephone purposes. It was in 1915 that the American Telephone & Telegraph Company, employing the DeForest amplifier, inaugurated the first transcontinental telephone service between New York and San Francisco. The same year that organization, using my oscillations or oscillating audions, made successful wireless telephone tests between Arlington, Va., and the Eiffel Tower, in Paris, and again with Pearl Harbor, in Hawaii. So thoroughly convinced were wire and wireless men of the value of the audion that the device received no end of research and engineering development. In 1917, I entered into an agreement with the American Telephone & Telegraph Company, whereby that organization secured certain rights under the DeForest audion patents, and whereby sufficient audions might be made available to the Army and Navy for radio communication during the World War. The telephone company, in turn, relicensed others to make and use the audion, so that today every reputable vacuum tube manufacturer is a

relicensee under the DeForest audion patents.

First Tubes on Laboratory Basis

Until the dawn of broadcasting vacuum tubes were made by means of more or less laboratory equipment. The relatively small volume of production could be cared for by glassblowers, with a minimum of machinery. The existing lamp-making machinery was found ample, particularly since the tolerances for vacuum tubes were fairly wide. The prices asked for vacuum tubes were such that they could be made piecemeal and without much regard for cost.

Machine Production

By degrees, the radio tube industry geared itself to the demands. Automatic equipment was installed in the better plant. The skilled glassworker was replaced by the automatic machine, with its batteries of blue gas flames, its mechanical arms and fingers, and its constant merry-go-round operation for continuous production. Girl operators came into the industry, mounting and spot-welding the metal parts in place on the glass stem, and loading and unloading the automatic machines, followed by testing, inspection, wrapping and packaging. The greater accuracy of automatic machinery made possible closer tolerances, and more accurate tubes. If one will glance at an early DeForest audion, with elements spaced 1/4 inch or more apart, and then at the first tube of early broadcasting days, and again at the present -27 heater type a. c. tube, one is immediately struck with the growing delicacy of vacuum tube construction.

Tube Makers Increasing

More and more vacuum tube makers have been attracted to the field during the past few years, until there are in the neighborhood of eighty tube manufacturers today. New, high-speed automatic equipment is imperative. No manufacturer can afford to use equipment even a few years old, and still remain in business. The tube industry is a big league game, and has no place for the smaller boys, now that inventive talent is being put to work on the production end. And for the public, it means better and cheaper tubes.

EXCELLO RADIO



STYLE NO. 154

Genuine Screen Grid radio with dynamic speaker and high grade cabinets for radio or radio-phonograph combinations.

Write today for free illustrated catalog of Radio and Radio Cabinets

EXCELLO PRODUCTS CORPORATION

4832 West 16th Street
CICERO, ILLINOIS

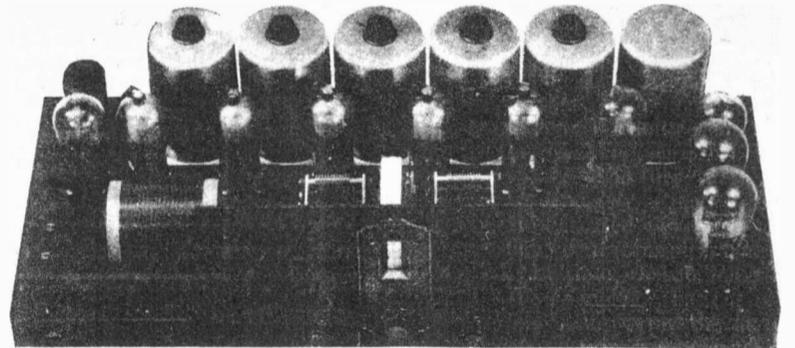
1930 AD

1930 AD

Your Money Should Buy You

GUARANTEED PERFORMANCE

The Lincoln DeLuxe 10 Will Give It To You



**SELECTIVITY—10 KC From LOCAL
POWER—Any Distance—Volume of Local
REGISTER—Every channel 550 kc to 1500 kc**

Will your present equipment register every channel in the broadcast band, including channels 10 KC from locals, at one trip across the dial?

Will it bring in every one of these stations with a volume equal to local with quality of tone?

Will it tune both adjacent 10 KC channels of a powerful local with the receiver located 200 feet from transmitting antenna?

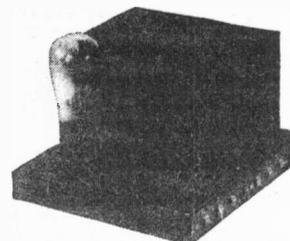
Will it tune, located in Los Angeles with KNX on the air, WTIC, Hartford, Conn., and KTHS?

IF IT WILL DO THIS, WE CANNOT INTEREST YOU.

Excerpts from recent letters:

Valparaiso, Ind.: I have been in the radio game for the past 7 years. I have had and sold nearly all makes of receivers, but have never found one that would equal the Lincoln Super 10. I have worked this receiver from different locations and under various conditions and find that it works perfect. It's the only receiver that I have ever seen that will tune equally well over the entire wave band from 200 to 550 meters and bring in distant stations within 10 KC of the high powered locals without interference. I took this receiver to a friend's house one evening and tuned in 78 stations, 13 of them being on the Pacific Coast, which I consider marvelous in this location. Some of them only had 50 watt power. I sincerely think that anyone looking for the best to be had in a receiving set will find it in the Lincoln Super and I want to congratulate you on this wonderful piece of engineering.

Nashville, Tenn.: Your Lincoln DeLuxe model is the only machine I have ever seen in this territory, being in the close proximity of from one to two and one-half miles of WSM, which would give an absolute 10 KC separation regardless of locals. Last night, Feb. the 21st, this machine consistently brought in WMAQ, WSM and KFI. These stations as you know are 10 KC apart. This reception was perfect without interference, the distant stations coming in with equal volume and clearness as to locals. Should anyone wish proof of this statement, I will be pleased to demonstrate same.



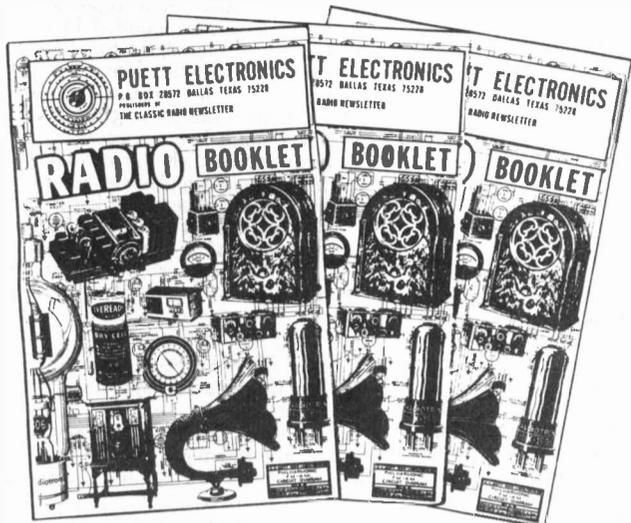
Lincoln DeLuxe B

SELLS ON PERFORMANCE. Six weeks before one single ad appeared, the reputation of the DeLuxe spread over the country like wild-fire. You can put this receiver in the finest homes in this country. Write at once for details.

LINCOLN RADIO CORPORATION

Dept. N., 329 South Wood Street, Chicago, Ill.

BE A RADIO EXPERT



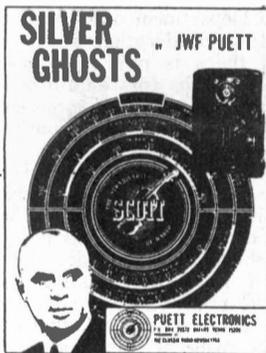
ATTENTION

REVISED SECOND EDITIONS --

If you enjoyed the first editions of our booklets, you will want these revised copies. The second editions contain everything from the first editions, but we have added much more through the use of a new kind of type. ORDER TODAY!

- (1) THE ACQUISITION OF ANTIQUE RADIOS
- (2) THE COMPLETE RESTORATION OF BATTERY POWERED ANTIQUE RADIOS
- (3) THE COMPLETE RESTORATION OF AC POWERED ANTIQUE RADIOS

all three by J. W. F. Puett for \$5.00 postpaid or \$2. each.



WE HAVE ONLY TWELVE COPIES LEFT -- ACT NOW!

OUR AGENTS HAVE INFORMED US THAT THEY ARE SOLD OUT.

WE HAVE NO IMMEDIATE PLANS TO REPRINT SILVER GHOSTS.

ORDER YOUR COMPLETE HISTORY OF THE E. H. SCOTT RADIO LABORATORIES TODAY!

ONLY \$7.95 POSTPAID



ANTIQUe cameras

IF YOU COLLECT ANTIQUe CAMERAS SEND A 13¢ STAMP FOR OUR PRICE LIST.

NEW! JUST OUT!! **ANTIQUe RADIO CATALOG - 8 PAGES**
65¢ or five 13¢ STAMPS

EVERYTHING FOR ANTIQUe RADIO RESTORATION
TUBES - SCHEMATIC DIAGRAMS - RADIO BOOKLETS

CAPACITORS - RESISTORS - INTERSTAGE & POWER TRANSFORMERS, SPEAKERS, CHOKES, DIAL LAMPS, RF COILS, I.F. TRANSFORMERS, SWITCHES, VOLUME CONTROLS, DRIVE BELTS, TUBE SOCKETS & ADAPTORS, HOOK-UP WIRE, DIAL LAMPS, BATTERIES, METERS, ETC.

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



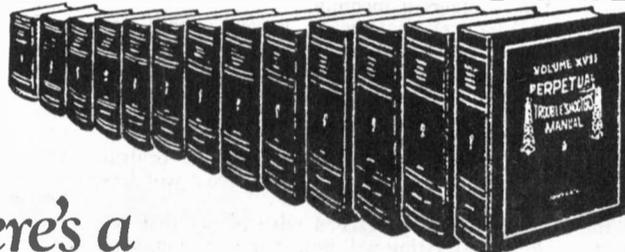
OUR CATALOG NO. 16 IS OBSOLETE!
SEND 65¢ or FIVE 13¢ STAMPS FOR OUR NEW CATALOG NO. 17 NOW!

NEW CASSETTE

RECORDINGS OF OLD TIME RADIO SHOWS
\$3.00 EACH POSTPAID!
SEND A 13¢ STAMP FOR OUR COMPLETE LIST TODAY!

- (1) AMOS AND ANDY - excerpts from different shows - nostalgia at its very best!
- (2) THE SHADOW - The Ghost Who Walks and The Mark Of The Black Widow!
- (3) FIBBER MCGEE & MOLLY - Cat Under The Porch (10/14/47) & Magic Act (1/6/48)!
- (4) MERCURY THEATER - The War Of The Worlds!
- (5) Side 1 - THE GREEN HORNET (Mummy Murders) & Side 2 - GANGBUSTERS (Al Semoni)!
- (6) Side 1 - SUSPENSE (The Enormus Radio) & Side 2 - INNER SANCTUM (Hangman's Island)!
- (7) THE LONE RANGER - The Indian Girl & The Alien Smugglers!
- (8) THE WHISTLER - Death In The Air & Mirage!
- (9) DIMENSION X - The Veldt & Childs Play!
- (10) I LOVE A MYSTERY - Highlights of Temple Of Vampires!
- (11) X MINUS ONE - Tunnel Under The World & There Will Come Soft Rains!
- (12) ATWATER KENT RADIO COMMERCIALS & Other old time radio commercials!

RIDER MANUALS



ONLY \$10.95 each
POSTPAID!

WE HAVE VOLUMES:

- 6, 7, 9, 10, 11, 12,
13, 14, 15, 16, 17,
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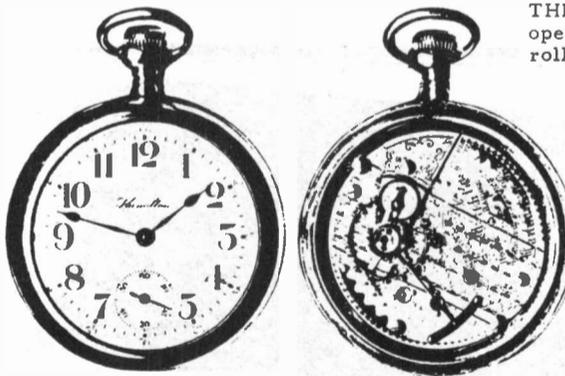
Here's a
bright idea

COMPLETE YOUR SET OF RIDER MANUALS

NOW!

ANTIQUe WATCHES

SEND A 13¢ STAMP FOR OUR PRICE LIST



THIS BEAUTIFUL HAMILTON Model 940 open face, 21 jewel, motor barrel, double roller, 18 size, lever set, railroad watch in a gold Windsor B. W. C. Co. case, shows some wear, but not to base metal, design with flowers and a bird on back of case, adjusted five positions, porcelain dial with no hair line cracks, keeps good time and has recently been cleaned, checked and timed by antiquarian horologist.
Serial No. 1407424 Circa 1914

ONLY \$150.00 POSTPAID!!

WE HAVE OTHER WATCHES
SEND FOR OUR LIST TODAY!

COLLECTORS ITEM



IT'S NEW *radio ideas*

THE ANTIQUe RADIO TUBE SUBSTITUTION BOOKLET WILL BE PUBLISHED CIRCA 1 JULY 1978. WHEN IT SEEMS IMPOSSIBLE TO FIND A CERTAIN TUBE TYPE, IT IS OFTEN POSSIBLE TO SUBSTITUTE A CERTAIN OTHER TYPE WHICH IS AVAILABLE. THIS CAN BE DONE WITHOUT ANY CIRCUITRY CHANGES! OUR TUBE SUBSTITUTION BOOKLET WILL LIST NEARLY ALL TUBES USED IN ANTIQUe RADIOS IN NUMERICAL ORDER WITH THEIR SUBSTITUTES. REGULAR PRICE WILL BE \$2.00 - PRE-PUBLICATION PRICE UNTIL JULY 1 st. - \$1.50 pp.

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YOU MAY CALL J. W. F. PUETT AT HIS RESIDENCE FROM 9:00 AM TO 10:00 PM CENTRAL STANDARD OR CENTRAL STANDARD DAYLIGHT TIME PLEASE.

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OUR NEW ACQUISITIONS LIST CONTAINS RARE TUBES AND OTHER ITEMS WHICH CAN NOT BE STOCKED IN QUANTITY. SUBSCRIBERS RECEIVE

THEIR COPIES ONE WEEK BEFORE COPIES OF A GIVEN ISSUE ARE MAILED TO NON-SUBSCRIBERS. SUBSCRIPTION RATE -\$2.00 PER YEAR. THE NEXT ISSUE WILL CONTAIN A COUPON ENTITLING SUBSCRIBERS TO A SUBSTANTIAL DISCOUNT ON MERCHANDISE ORDERED FROM PUETT ELECTRONICS! SUBSCRIBE TODAY!!



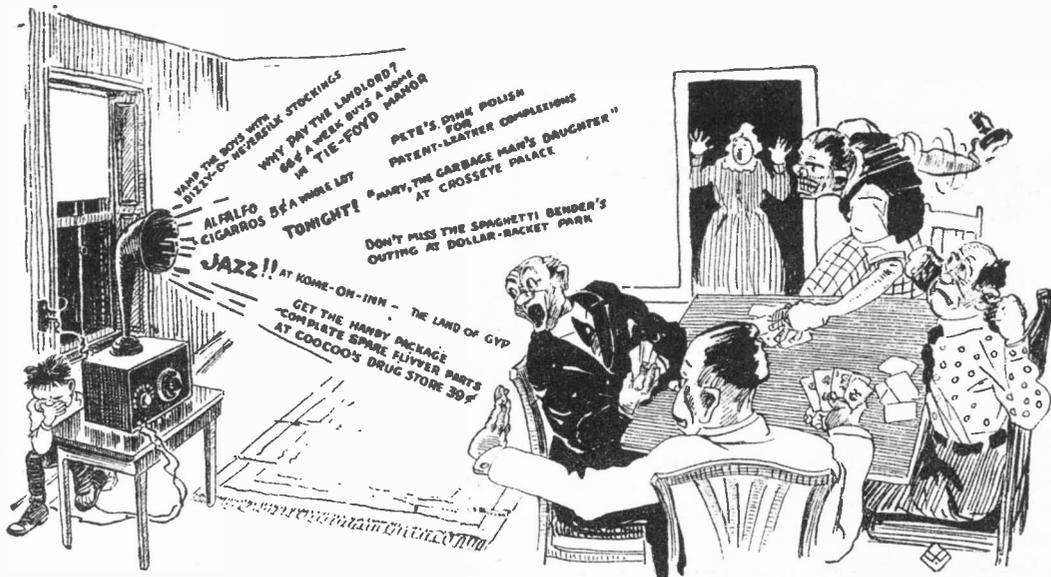
PUETT ELECTRONICS

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

Radio News for August, 1922

Advertising by Radio, Can It and Should It Be Done?

By J. C. McQUISTON*



Advertising by Radio Cannot Be Done; It Would Ruin the Radio Business, for Nobody Would Stand for It. Mr. McQuiston in this Article, Explains Why.

THE full possibilities of the radiophone are not yet known. The popular reception given to it during the past year has been sufficient to stir the whole of our population. Radio now takes the place of both the weather and health as the chief subject of conversation. It is no wonder that just as soon as the public recognized the use of radio, advertisers gave consideration to this wonderful agency for spreading selling information. The experience that has been gained in the short time that the radiophone has been rendering service to the general public may even now give us a

*Manager, Dept. of Publicity, Westinghouse Co.

fair idea of some important limitations to this wonderful medium.

Whatever statements, however, that are now made are based wholly upon the possibilities of the present development of radio sending and receiving apparatus. Of course, what may follow no one can tell, but even with the present limitations the radiophone, as a means of broadcasting from a central point to great distances, will prove a wonderful benefit to mankind.

By way of preface, I wish to say that radio broadcasting will not, in my opinion, supplant, or interfere with newspapers as a

medium of disseminating news, nor with concerts, churches, theatres or movies, as entertainment features.

On the contrary, it has been proved that the broadcasting of news bulletins by radio, and the publication of radio programs have increased materially the circulation of newspapers. I will risk the statement that since radio broadcasting was begun, the total circulation of all newspapers has been considerably enlarged, and I believe the publishing of radio broadcasting programs and other features pertaining to radio by the newspapers have been responsible in a very large measure for this increase.

Churches that have broadcasted their services have actually found that the attendance of services has increased rather than diminished; and although it is true that some few members of the church may prefer to hear the services while lying in bed, there are

hundreds who never go to church and who, hearing the appeal of the pastors, are not satisfied to receive all their sermons by radio, but will respond to that natural desire to hear direct, and to see the speaker.

The same thing is true with reference to amusements. Certain amusement houses have had connection with our radio service for over a year and they are very glad, indeed, to continue the service because the hearing of artists by radio simply intensifies the desire to actually be present in the theater to witness the performance.

In the sporting field, the hearing of the reports from the baseball diamond; play by play, and inning by inning, will not keep people away from the game. On occasions they will take their reports in this fashion, particularly, if confined in a hospital, or at home, indisposed, or too far away to get to the ball grounds. However, the listening by radio will intensify a desire to be present at another time. I might go on to enumerate, but I think it is unnecessary to do so. It is clear enough, I think, that the radiophone will simply supplement the newspaper work, and entertainment work of all kinds, and is not an agency to fear, but rather one to make use of in the right way.

Amusement promoters, singers and other artists were alarmed when the phonograph was introduced. However, as we all know, there was no need for alarm because the phonograph has actually stimulated business for the theatres and other entertainment enterprises.

People, hearing the reproduction of voice on the phonograph, are impelled, when they can, to go to hear and see the artist.

We now arrive at the most important point of our discussion. If radio broadcasting is an agency that is rendering, and can continue to render, valuable service to the people, it must be protected. You remember the old song:

"Everybody's doing it,
Everybody's doing it,
Everybody's doing it now."

When there were few stations broadcasting from widely separated centers, the reception was satisfying; at least, there was little to disturb outside of the natural static conditions. However, quickly one sending station after another has been started and today there are all over the country pretty close to 100 stations putting out programs, if not nightly, occasionally.

It is clear, I think, that since all these stations are on the same wave-length, 360 meters, there is bound to be increasing confusion and that a Government regulation of wave-lengths is positively imperative to maintain the efficient service of radio broadcasting. This control of the use of radio is in the hands of the Department of Commerce, now giving careful consideration to the general subject, and there is now recommended a band of wave-lengths for radio broadcasting for the purpose of avoiding experiences of recent months of three and four stations broadcasting simultaneously.

However, irrespective of all this, let us come to the real subject of advertising by radio. Can it be done, and should it be done? Already the conference that has been in session in Washington to consider the proper regulation of radio broadcasting has recommended the prohibiting of advertising by radio. It is perfectly natural that this ruling should be made at this time, because if advertising were permitted, it goes without saying that all the good work that has been done in giving valuable information and pleasant entertainment for the people would be destroyed. This action of the committee is at this time very necessary, and those who have been enjoying radiophone service will surely appreciate the necessity for such action.

Let us think of the billboard for a few minutes. Why is it that the billboard has always had trouble? From the beginning there have been those who would remove it from the face of the earth. I think the answer is that somehow or another the billboard has been offensive to the people, and even though billboard promoters have raised the art to an exceedingly high standard, even in the face of this, billboard sign work is always in trouble with local and state associations.

We all know how persistently the advertising man has worked to get free advertising through the movies, and we know that it is pretty generally true that he hasn't secured it. The reason is well known. The public will not stand for direct advertising when they go to see high class moving pictures.

Let me ask you whether the public will wish advertising to come to them through the agency of radio broadcasting. Remember that this advertising will go right into the home. It will invade the place where the family is enjoying the full benefits of privacy and detachment from business cares. The broadcasting to thousands of homes of advertising information concerning, say, "Things for women and things for men," probably the butcher with his meats; the baker with his bread; the tailor with his clothes, and the grocer with his crackers and cheese—what kind of a home will it be anyhow? You may say you can turn it on at will and turn it off when you want to, but even so, who will want it? How valuable will be the media if the public will not support it? Personally, I don't think they will support it.

Radio News for August, 1922

MOST SENSITIVE!

Better Than a Regenerative Set

MU-RAD BROADCASTING RECEIVER, TYPE M.A. 12

Use With Indoor Loop Aerial

Reduce Static and Interference

THE VERY FINEST RADIO RECEIVING SET

A three stage radio frequency amplifier and detector set developed with the deliberate idea of producing a receiver of superior sensitiveness. Direct comparison with the best sets proves the astounding accomplishment of our engineers. Many times more sensitive than a regenerative tuner and far easier to operate. This set on a 1½ foot square indoor coil aerial will bring in the radio programs several times louder than a regenerative tuner and a 40 foot antenna. May be used with Radiotrons or A.P. Tubes. The most highly developed set on the market. Very reasonably priced.

BEST in Appearance and Performance

Enclosed in handsome, highly polished mahogany cabinet with Radion panel. All connections in the rear. Thoroughly tested and covered by an absolute money back guarantee of satisfaction. Write for Bulletin No. 13.

Dimensions:

19" Long \$142.50
6½" High
6" Deep

DEALERS Write for Proposition

The demand for this remarkable set will be tremendous everywhere. A simple demonstration of its extreme sensitiveness will bring all the orders you can handle. Get our proposition. Ask for Bulletin No. 13.

MU-RAD LABORATORIES, Inc.

800 Fifth Avenue - - Asbury Park, N. J.

Club News

Niagara Fronteir Wireless Assoc. April Meet

Our fourth meet was considered quite a success by all who attended. Based primarily upon earlier medical apparatus and the beginnings of television, we were privileged in receiving a basic knowledge of these fields.

Dr. Ole Lindan from Ohio gave an excellent speech and slide show using some of his own collection of early medical apparatus, mainly ultra-violet ray machines and shocking machines. A few were lucky to try them out, and all agreed that it was indeed a shocking experience!

Larry Babcock gave an extremely interesting talk which dealt with the pioneering of television or 'radiovision' as it was sometimes originally labeled. He branched out somewhat into "Stratovision," a method used in the late 1940's whereby airplanes received signals from a ground control and were directed back to enlarge the viewing area.

Chris Fandt also did a fine job informing our group about the early manufacture of television.

Dick Levy, who was responsible in part for bringing some of the first TV's into the area, namely the Philco 2500 series, also put in a few words. He will speak in depth on the same at a later date.

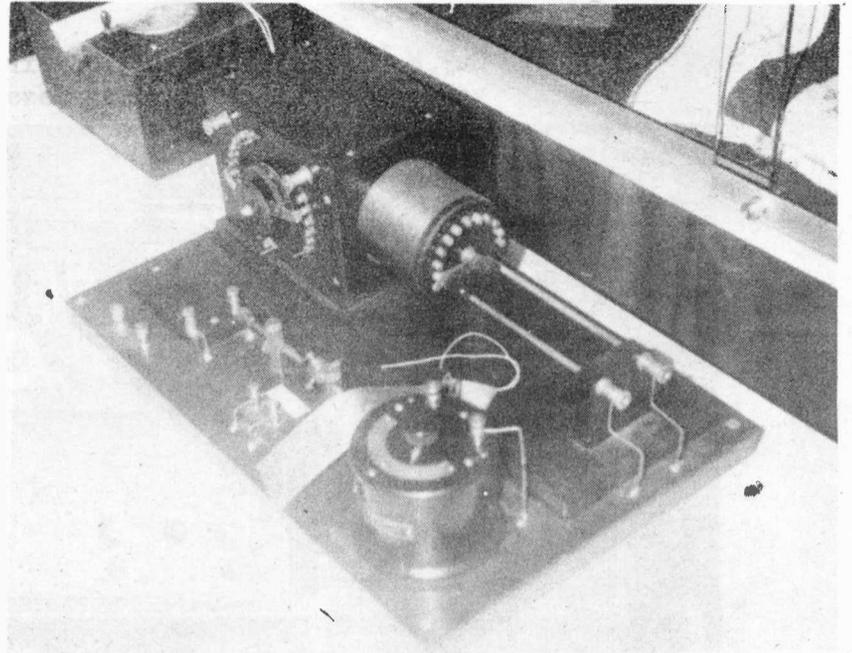
The contest brought together a very nice selection of crystal sets including a 1915 Navy Loose Coupler set which took first place for Jim Kreuzer and Felicia Reid. Dick and Ann Schamberger, always first rate in the Federal department, stole second place with their mint Federal Jr. crystal set. Third prize was awarded to a nice Aeriola Jr., also belonging to Jim Kreuzer and Felicia Reid.

The TV contest brought together many varieties of early televisions including a huge projection set which played for a good portion of the meet. Jim & Tom Kreuzer won first place with this entry. Larry Babcock walked away with a second place ribbon on his Hallicrafter's TV with Channel 1, pushbuttons and a magnifier. He also took third place with a Teletone portable.

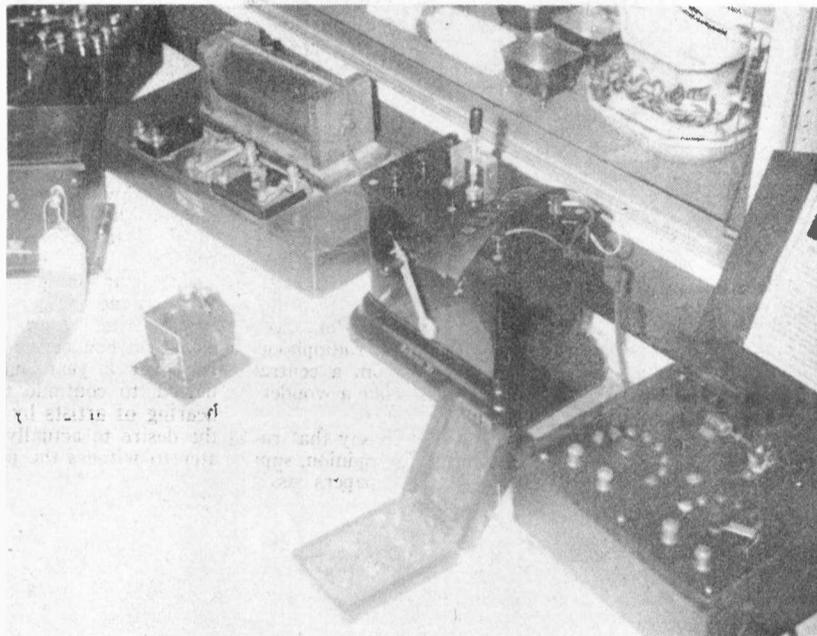
The judging was accomplished by Dick Levy, Mark Pommereck and Gay Ewing. We were all very pleased with their abilities in this field.

The flea market was indoors due to the frigid weather conditions. There were definitely some 'goodies' including a Federal DX-58 and a Magnavox horn.

Cooperation from the Old Amherst Colony Museum was outstanding. Approximately 90 attended bringing together a few strays from Ohio, Canada and some outlying areas. It was quite and enjoyable experience to share some pieces of the past with friends both old and new.

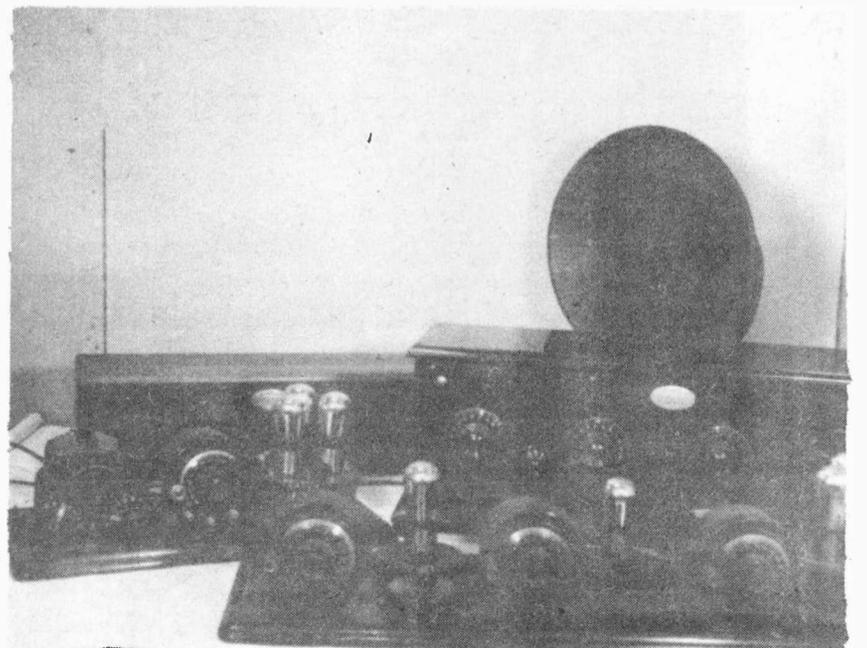


The Blue Ribbon winner in the crystal class. This 1915 Navy loose coupler set belongs to Jim Kreuzer and Felicia Reid.

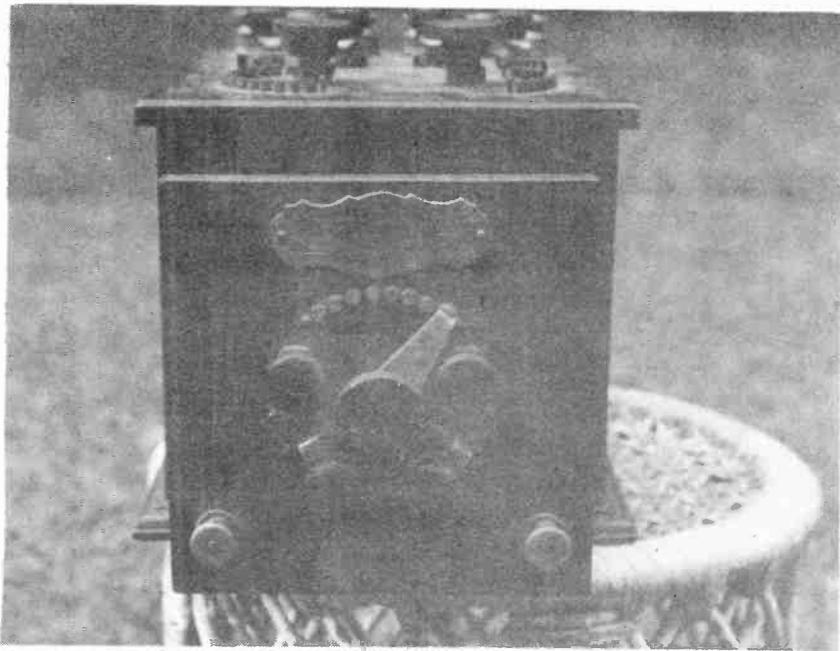
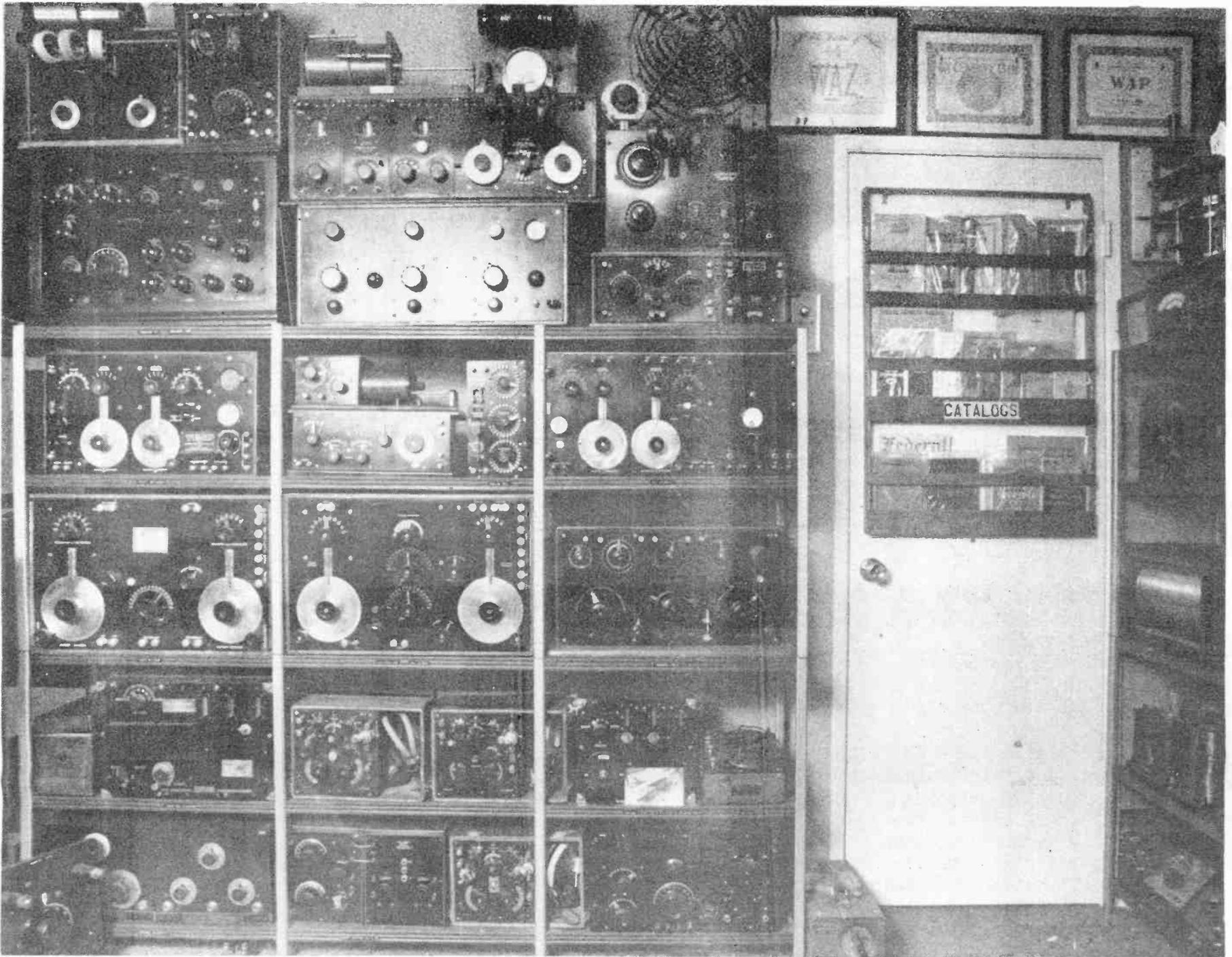


An excellent grouping of crystal sets on display at the April NFWA contest.

Just a few of the Atwater Kents to be seen at the August 12th NFWA meet: An AK10B, a DX model on the left, an AK 20D, an AK 49 and of course an AK horn.

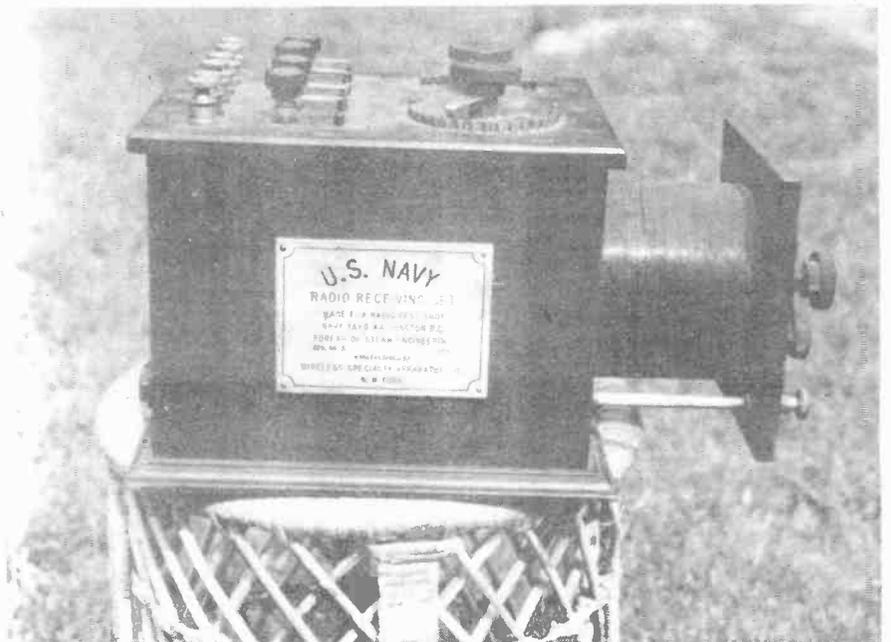


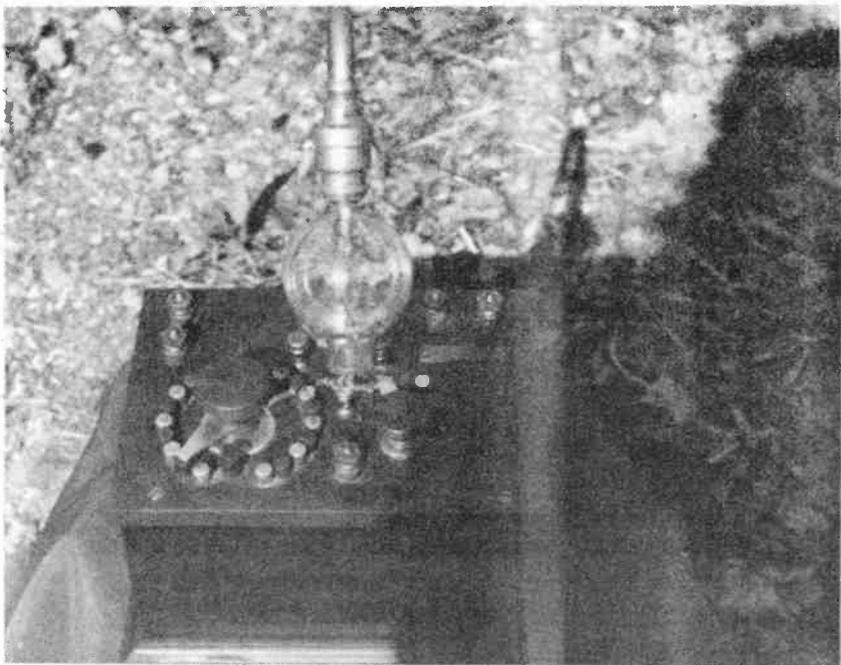
Guy M. Martin's display of wireless communication equipment that was used right at the very beginning of sending messages without wires.



Front view of a 1908, serial #3, Wireless Specialty IP 76.

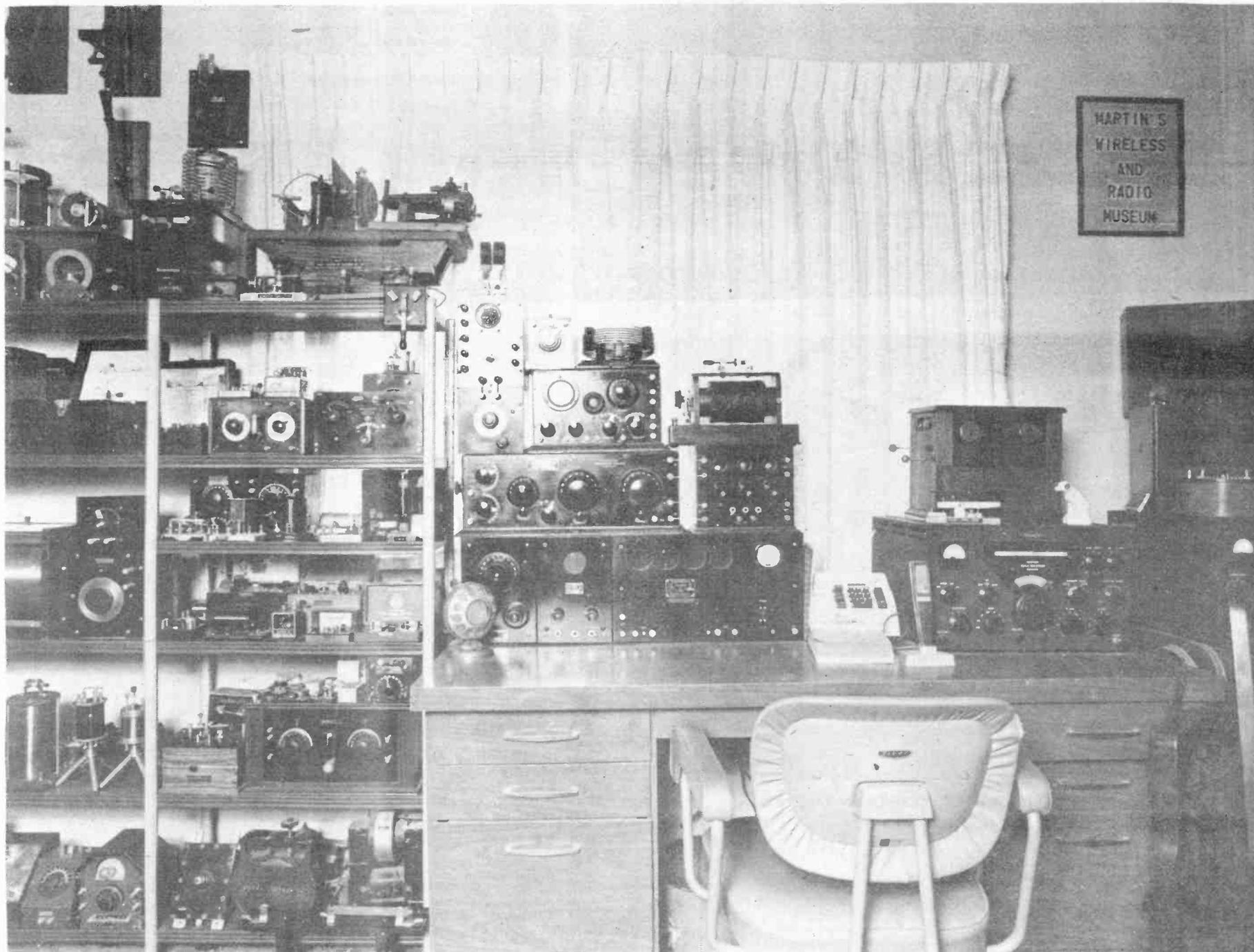
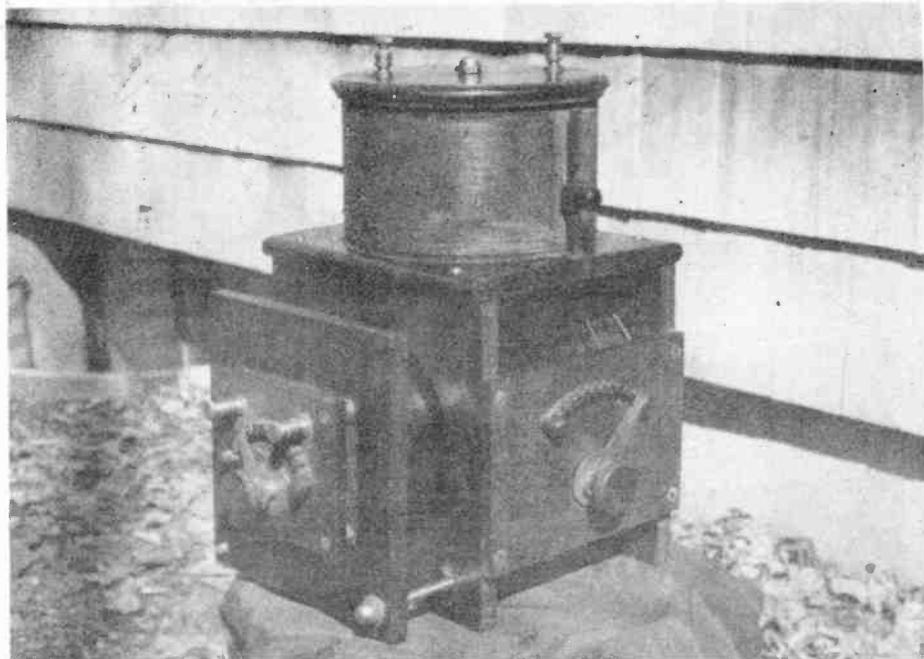
Side view of the 1P76.





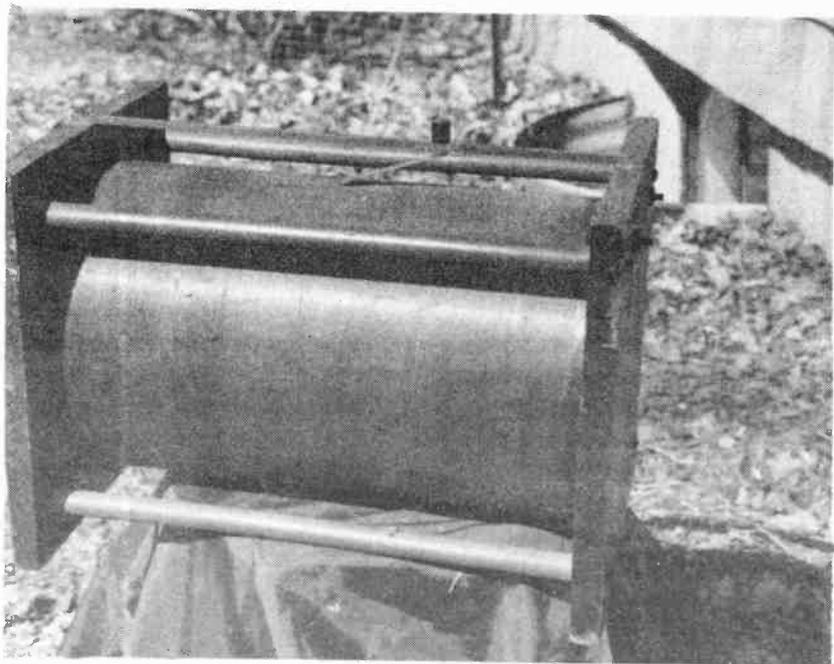
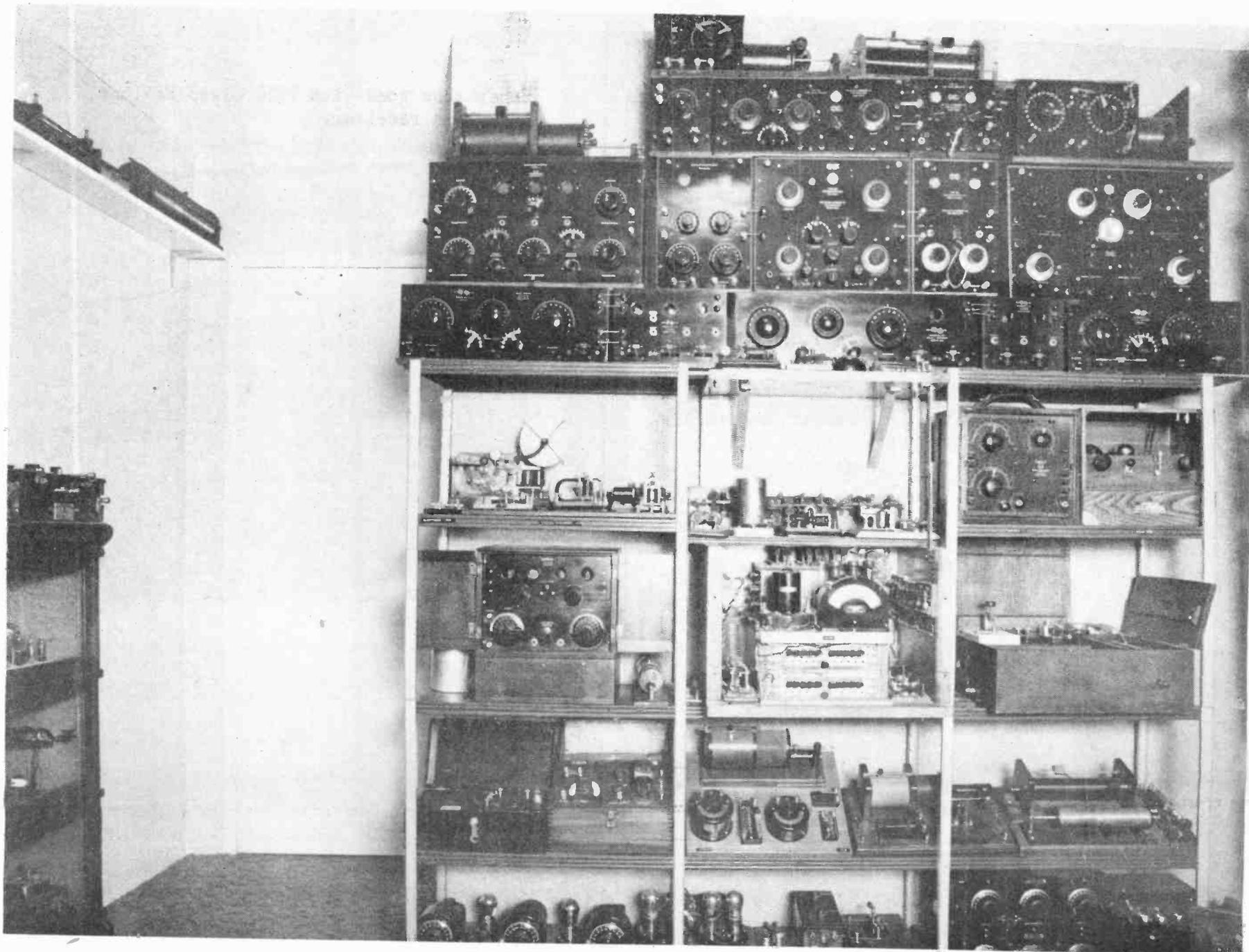
A prototype 1914 Clapp Eastham, which once belonged to L. W. Stevens, chief engineer of Clapp Eastham.

Tuner that goes with 1914 Clapp Eastham, to make a receiver.



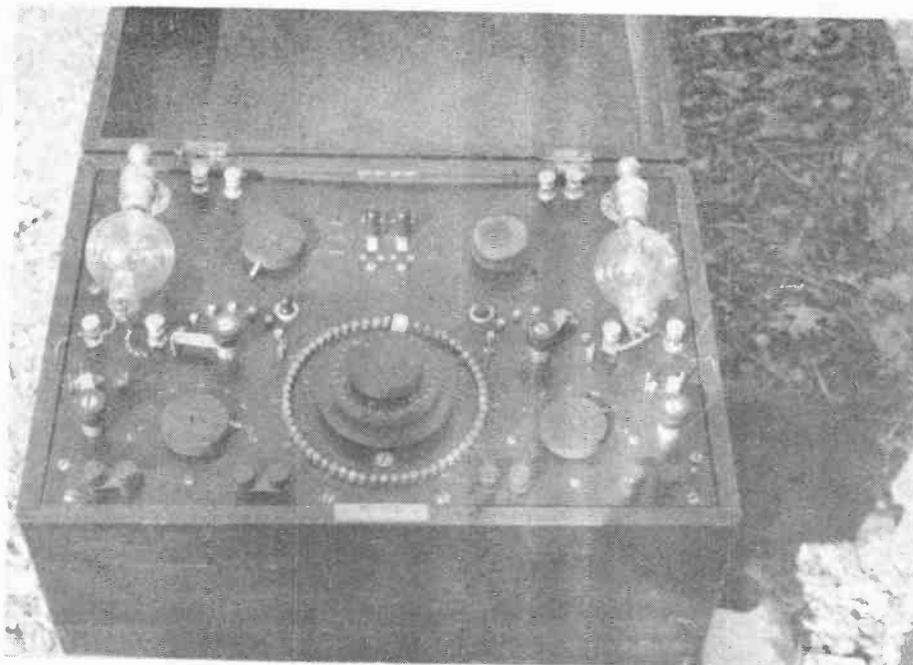
Guy M. Martin of Glendora California can experience the exciting world of white increments on black knobs with these rare sets.

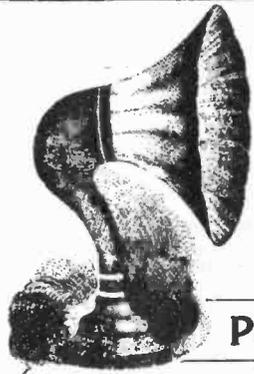
Some more of Guy's early wireless items that expose the craftsmanship that went along with the early electrical ideas.



Experimental early wireless tuner.

Another 1914 prototype Clapp Eastham.





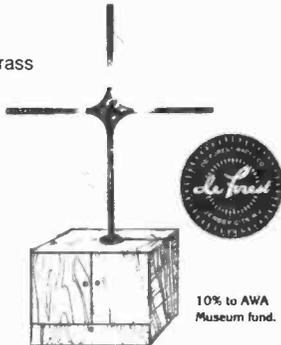
For Sale...
G. S. STREETER
1924

PROFESSIONAL REPRODUCTIONS

DeForest LOOP ANTENNA

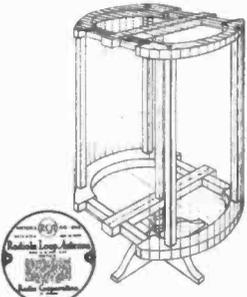
Beautifully prefinished and assembled with over 100 machined brass fittings and Bakelite parts, with a DeForest decal. Fits all D-7, 7A, 10, 12, and 17 sets. "DeForest wire included."

\$67.50 postpaid



10% to AWA Museum fund.

RADIOLA LOOP ANTENNA AG-814



Precut Mahogany frame with an etched brass name plate and 1924 instruction card. This loop is a great addition to any collection and fun to assemble. Includes radiola type wire.

\$43.50 postpaid

10% to AWA Museum fund.

Radiola Grand Speaker Grills

Unfinished Mahogany is precision cut to the 1922 pattern. Needs only staining to complete your rare and unusual radio.

PRICE \$15.50 postpaid

Radiola Antenna Wire

Multi strand copper wire with a brown braided Celulon cover just like the original 500' roll —

PRICE \$35.00 postpaid
Smaller Lengths — 9¢ ft.

Radiola V & VI Wooden Tops

Always missing, this solid Maple reproduction is the crowning compliment to another uncommon set. Unfinished.

PRICE \$19.50 postpaid

NEW! DeForest Type Green Wrapped Litz Wire Avail.

100' Roll

PRICE \$10.00 postpaid

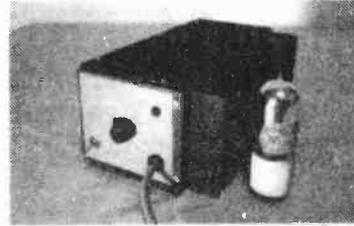
SATISFACTION GUARANTEED ON ALL ITEMS OR RETURNED FOR FULL REFUND.

GLENN S. STREETER 4133 VIA NIVEL, PALOS VERDES ESTATES, CA 90274 • (213) 375-5522



For Sale...

H-10 POWER SUPPLY



Now! For the first time a premium quality power supply. The H-10 power supply is made of specially designed and the highest quality components (not surplus or used parts).

And it's not being assembled in someone's garage. The H-10 has been contracted by a top-rate manufacturer who builds power supplies primarily for the laser industry. Thus it is fully warranted for a full year.

And no other power supply offers as many regulated outputs.



The Model H-10 is a premium quality regulated power supply designed to power over 99% of all battery radios. The Model H-10 was developed primarily for the radio collector but is capable of operating virtually all battery sets manufactured between 1920 and the end of the vacuum tube era around 1960.

The Model H-10 contains three independent, electrically isolated, regulated power supplies. The 'A' supply provides 12 switched outputs between 1.1 and 9V. The 'B' supply can deliver up to 6 simultaneous regulated outputs. The 'C' supply can deliver up to 8 simultaneous outputs. All outputs feature electronic short circuit protection.

TYPICAL SPECIFICATIONS

Input	117V AC, 50-60Hz, 80W maximum.
Volts	1.1, 1.5, 2.0, 2.5, 3.3, 3.3, 4.5, 5.6, 7.5, 8, 9
A Output	Single output switch selected, short circuit protected, ripple less than five millivolts RMS @ 5V and 5A, regulation 0 to full load 0.2% @ 5V, voltage tolerance 5%, overload protection Using the 1.1V, 3.3V and 5.0V output, allow operation of appropriate tubes with no danger of burn-out from improper filament rheostat adjustment.
B Output	22.5V, 45V, 67.5V, 90V, 135V and 180V may be used in any combination with a maximum total output of 50mA. Ripple is less than five millivolts RMS @ 22.5V and 50mA to less than 25mV RMS @ 180V and 50mA. voltage tolerance 5%, voltage regulation 0-50mA 2.5%, fold-back current limiting.
C Output	1.5, 3.0, 4.5, 9, 10.5, 13.5, 16.5 and 22.5V, 50mA @ 22.5V, ripple less than five millivolts, voltage tolerance 5%, regulation 0.1% at 22.5V. All other voltage obtained by a 25mA resistive voltage divider. Overload protected.
Controls	Power switch, A voltage selector switch, LED pilot light
Line Cord	Three-wire, 6 ft., heavy duty
Size	3" H x 5" W x 9" L (includes controls)
Weight	5 lbs., 14 oz.
Limited Warranty	Warranty is limited to repair or replace, at our option, of any defect in materials or workmanship for a period of one year. Warranty does not cover shipping costs.
Ordering Information	Include check or money order for \$149.95 to Glenn S. Streeter, 4133 Via Nivel, Palos Verdes Estates, CA 90274. We will pay shipping by UPS.

MAKE PLANS NOW TO ATTEND
THE 3rd ANNUAL CONVENTION

ROYAL COACH INN
DALLAS, TEXAS
JULY 28, 29, 30

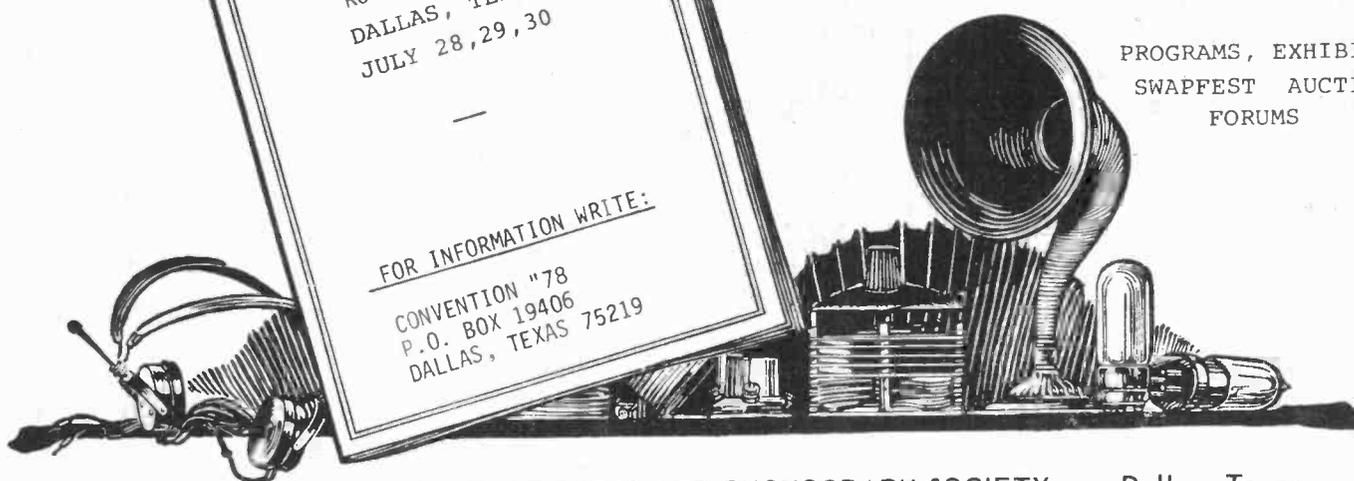
FOR INFORMATION WRITE:

CONVENTION '78
P.O. BOX 19406
DALLAS, TEXAS 75219

CONVENTION '78

\$5.00 Pre-Registration (No charge for spouse)
\$7.50 Registration after June 30, 1978

PROGRAMS, EXHIBITS
SWAPFEST AUCTION
FORUMS



VINTAGE RADIO AND PHONOGRAPH SOCIETY Dallas, Texas

Club News

FREE TROPHIES

Who said "you can't get anything for free"? We're giving away FREE trophies, over 14 in all. Don't forget second place, and honorable mention. These carry with them beautiful ribbons. When you count the giant "BEST OF SHOW" trophy, that's over 40 awards in all. What's the occasion? CONVENTION '78....that's what. The largest display of antique radios, antique phonographs, and related items in the Southwest.

Join us in Dallas, Texas at THE ROYAL COACH INN. Everyone is welcome, July 28-29-30. For more information, write us at once. Better yet, join the club, and receive our News Letter FREE each month. Membership is only \$5.00 per year.

P.S. Bring the entire family to CONVENTION '78. This year, there is something for everyone.

Vintage Radio and Phonograph Society, P.O. Box 19406, Dallas, Texas 75219. by Bill Bragg

NIAGARA FRONTIER WIRELESS ASSOCIATION

Everything is looking good for the August 12th meet, which will center on Atwater Kent history. Ralph Williams promises to be a real treat as guest speaker and we hope to see as many as possible at this time.

For more information on our August meet, drop a note to: NFWA c/o Old Amherst Colony Museum, 500 Smith Rd., East Amherst, New York 14051.

Felecia Reid, Board of Directors, NFWA
Jim Kreuzer, Treasure, NFWA.

LETTERS

Dear Jim:

Thank you for your fine coverage of our last meet. We hope that you can use the text and photos included.

Also if you could give us a bit of publicity on our August meet we would really appreciate it. As you can see from our flyer we have gone to a lot of trouble to bring what we consider an out standing program.

Again thanks for your support.

Sincerely,
Dick Schamberger
Prs. NFWA
515 Crescent Ave.
Buffalo NY

Rates for THE HORN SPEAKER

One year.....\$5.50
Two years.....\$11.00
Special rates for one year
(mailed in envelope)
First class.....\$10.00
(effective July 1, 1978)
Foreign air mail...\$16.00
Mail address: THE HORN SPEAKER
Box 12
Kleberg TX 75145

The HORN SPEAKER.... 9820 Silver Meadow Drive, Dallas, Texas 75217

EDITOR...We appreciate the way NFWA handles their public relations.

Dear Jim:

I have found some more radios since I last wrote to you. They are listed as follows: Trinity 5 tube, home made set built from Adams Morgan parts with Paragon cabinet, another home made set built from Dayton parts, this set has 3 variometers and is in mint condition, also diamond shaped loop and last but not least 3 wall phones, 2 candle stick phones, one with dial, which I am now using. Also 1 tube Harkness.

Thats all for now,

Julius H. Pilger, K2KCB
123-09-18th Ave.
College Point NY 11356

P.S. I did not receive the March 1978 HORN SPEAKER, but I did receive the April. Will you please send me the March as it might have been lost in the mail. Thank you.

EDITOR.....If anyone misses an issue or we fail to place an ad, hang us on the wall.

Dear Jim:

I didn't receive my April issue of HORN SPEAKER, would you please forward me a copy.

Regards,
Lane Upton
526 11th Ave.
Salt Lake City
Utah 84103

P.S. Am getting good results from my ad!

EDITOR....Always glad to hear good news about the ads pulling so well.

MART

Classified ad rate: 6¢ per word.
Photo ads: \$2.00 extra.

Deadline: 20th of the preceding month.

MISC.

"RADIO AGE," a radio magazine devoted to wireless and early broadcast eras. Contains interesting articles written by collectors, articles published in early radio magazines, lots of reprints of famous radio ads, and a classified section for buying or selling radio and electronic items. Subscribe at \$7.50 per year for ten issues. Mail check or money order to Radio Age, 1220 Meigs St., Augusta, Georgia 30904.

FOR SALE OR TRADE

FOR SALE: Over 3000 radio magazines from 1913 to 1945, RADIO NEWS, RADIO, RADIO TOPICS, PACIFIC RADIO NEWS, POPULAR RADIO, WIRELESS AGE, RADIO WORLD, QST, ELECT EXPER., plus more. Radio service manuals: RCA, AK, RIDERS, SUPREME, plus more. Write for list R-4-78 75¢ plus SASE w/2 13¢ stamps. Krantz, 100 Osage Ave., Somerdale N.J. 08083.

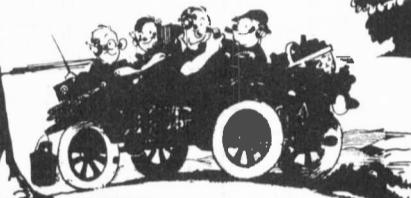
HAVE ANTIQUE RADIO & TV TUBES. Also some antique & old radios. Send 26¢ in stamps for list w/ prices. Harold's Radio, 3106 N. 3rd. St., Harrisburg PA 17110.

BLANK BAKELITE PANELS - Cut to size, 1/16" to 3/8" thick. Fabricating and engraving services available. SASE for pricing sheet. Persons, WB1BVO, 22 Forest St., Branford CT 06405.

NICKEL PLATED brass machine screws, Crosley thumb screws, AK & EE thumb nuts, old tube types and collectables, engraving filler stick, etc. SASE for list. Ray Harland, 2602 Mary Ln., Escondido CA 92025.

RADIO ADVENTURE!

FOLLOW THE ROAD TO OLD-TIME RADIO DAYS. ENJOY YESTERYEAR, AND DISCOVER THE NEW HOBBY OF RADIO COLLECTING.



A FLICK OF THE SWITCH, 1930-50: Fun picture reference of home, military, Ham, professional radio-TV, 312 pages. \$10.95 hard-cover, \$8.95 soft.

VINTAGE RADIO, 1887-1929: Pictorial story of pioneer days, 1,000 photos, 263 pages. \$10.95 hard-cover, \$8.95 soft.

RADIO COLLECTOR'S GUIDE, 1921-32: Data book with 50,000 facts on 9,000 models by 1,100 makers, 264 pages, \$6.95.

RADIO ENCYCLOPEDIA: Gernsback's 1927 classic beautifully re-created, 175 pages. \$14.95 hard-cover, \$10.95 soft.

FROM SEMAPHORE TO SATELLITE: A beautiful show-piece covering communications history. Printed in Europe. 343 pages, \$19.75.

CIRCUIT DIAGRAMS for any pre-1951 radio, just \$3.50. Send model number.

IDEAL GIFTS WE PAY POSTAGE

SEND TODAY to Vintage Radio, Dept. D Box 2045, Palos Verdes, Ca. 90274. We pay postage. Calif. residents add 6%.

_____\$_____
_____\$_____
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_____\$_____
_____\$_____
TOTAL \$_____

Name _____
Street _____
City _____ St. _____ Zip _____

\$62.55 5-BOOK SET - ONLY \$54.55

Special-Save \$ 8!

FOR SALE OR TRADE

FOR SALE OR TRADE: Tubes, just about any type from 1920 to date, new and used reasonable. Thousands of radio parts, transformers and AC set chassis parts, also. Excellent for early AC sets, 4 mfd at 600VDC metal sealed paper \$3.00 each. Repair and type set, E.H. Scott and classics our specialty. Send SASE with needs. Golden Age Radio Shop, 2222 S. Kinnickinnic Ave., Milwaukee, WI 53207. Phone: 414 744-8825.

FOR SALE: Tubes for older radios, brand new in original factory boxes. Very reasonable. Send us your list of requirements for a quotation. Daniel Gaidosz, 342 West River Rd., Orange CT 06477.

ATWATER KENT ELECTRICAL VALUES OF PARTS IN ALL RECEIVERS 1924-1932, 8 1/2 X 11, 24 pages. Will reprint if enough interest. Cost \$4 or \$5. Write if interested. Send NO money. Alvin Heckard, Route 1, Box 88, Lewistown PA 17044.

ANTIQUA RADIOS and collectables bought & sold. Antique Pavillion, 37 South Broadway, Nyack NY. Friday, Saturday and Sunday 11-5, or by appointment. 201 861-0914.

FOR SALE: Basement full of 20s and early 30s radios and parts. Moving out of state, can't take them. Too many to catalog. You'll have to come to me. Great bargains, a once in a lifetime opportunity. Peter Collinson, 1226 Andre, Mt. Pleasant MI 48858 Phone; 517 772-1378.

ATWATER KENT REPLICAS Bread Board switches - \$10.00, front plates for variometer, variocoupler, and T11 tuners - \$8.50. AK thumb nuts. SASE for sample. Replicas of any dial or knob. WD11 or UV99 adaptor - \$5.50, two for \$10.00pp. K. Parry, 17557 Horace, Granada Hills CA 91344.

FOR SALE: Murdock Neutrodyne receiver as pictured on front page of April issue of HORN SPEAKER, but without the horn, \$60.00. Also a Bonnell No. 4 D.D. Home medical apparatus as pictured on page 6 of April issue of HORN SPEAKER, \$25.00. Daniel S. Gaidosz, 342 West River Road, Orange CT 06477.

NOW AVAILABLE: New exact replacement tube bases to use 864, 30, 11E3 or 1H5GT in WD-11 socket. Send a long SASE for brochure. James Fred, Route 1, Cutler IN 46920.

FREE SALES LIST of early radios and related items, to be sent later. SASE please. Dennis R. Peterson, 5701-40 Ave. So., Mpls., MN 55417.

FOR SALE OR TRADE

SASE for list, Marconi, DeForest, Mignon etc. Glenn S. Streeter, 4133 Via Nivel Palos Verdes Estates CA 90274.

FOR SALE: Early battery and AC radios, speakers, phones & parts. Large stock of old and late type tubes. Dial hoods made for Radiolas. Write for information. SASE plus 15¢ stamp for lists. Franklin Haas, 207 W., 30th., Hutchinson KS 67501.

WANTED

WILL PAY \$100 plus postage for factory wired Atwater Kent "Breadboard" in restorable condition. Parsons, 22 Forest, Branford CT 06405.

WANTED: Columbia Vival Tonal Phonograph. Also need left door of Victor Credenza Phonograph, size is 14-1/2 inches wide by 33-3/4 inches high, any condition. Also want to correspond with anyone owning Victor Orthophonic Phonograph VE8-60E. Mechanical information needed. Bob Scott, Box 1694, Wayne New Jersey 07470. Tel: 201 696-1278.

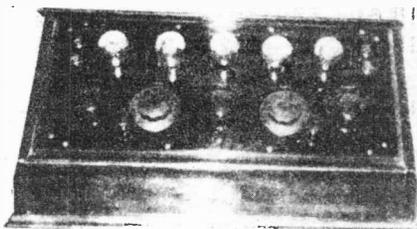
WANTED: RCA Radiola V, in good physical condition. I will buy outright, or trade my electronical know-how ability towards two of your prize radios. Joseph Woychowski, P.O. Box 254, East Lyme CT 06333.

WANTED: Atwater Kent speakers type-E, type-H, Baldwin 14" horn, three dials for Freshman Masterpiece. D'Arcy Brownrigg, Chelsea, Quebec JOX 1N0 Canada.

WANTED: AK Cathedral, preferably model 84. Also would like Philco Cathedrals 20B and 90B. Will buy or trade for. Charles Green, 3309-24th., Great Bend KS 67530.

WANTED: Kennedy, DeForest and Marconisets. Trade or buy. Steve Lange, Waldo WI 53093. (414) 541-4811.

WANTED: Scott Philharmonic, also Radiola VIII Super console. Mark Mathison, 103 S. Park, Medford, Wisc. 54451.



WANTED: KENNEDY XV in good to excellent complete condition. John Schellkopf, 1344 Goucher St., Pacific Palisades CA 90272.

WANTED: Always buying old car radios, literature and parts, please price and describe. Marv Roth, 14500 LaBelle, Oak Park, Michigan 48237.

WANTED

ZENITH ZEPHYR
(page 191 Vintage Radio)

End-Table Radio Receiver



Three-band super in end-table cabinet

Available in six and ten-tube super models, this modern end-table receiver is built for domestic broadcasts, short-wave and foreign reception. Placed alongside an arm chair, divan or day bed it is convenient to tune. A plate-glass panel protects the dial and slides out of sight when set is in operation. A hinged top covers a utility compartment in the rear which provides storage space for your log and magazines. Provision has been made for an all-wave doublet antenna connection and the set may be used with hard-of-hearing aid if desired.

please write condition & price:

J.W.F. Puett

ANTIQUARIAN COLLECTOR

P. O. BOX 28572 DALLAS, TEXAS 75228
PHONE FROM 9:00 A.M. TO 10:00 P.M. C.S.T.
(214) 321-0927 OR 327-8721

INTERESTED IN PURCHASING

ANTIQUA RADIOS, CAMERAS, WRIST
AND POCKET WATCHES, ELECTRIC AND
MECHANICAL CLOCKS, FOUNTAIN PENS

WANTED

WOOD HORNS WANTED: Large Bell ONLY (any condition). Phonograph Items Wanted: All parts, advertising items (needle boxes, signs, brochures, counter displays, etc.). Thank you, Jerry Madsen, 4624 W. Woodland Rd., Edina MN 55424.

WANTED: Aeriola's X, Jr. model RE, Senior & amplifier, Radiola's I, II, Senior type RF, Marconi 106. Please state condition and price. David Shanks, 115 Baldwin St., Bloomfield N.J. 07003, phone; 201 748-8820.

WANTED: RADIO NEWS 1920-23, RCA SERVICE NOTES 1923-28, AUDIO XFMRs FOR AK20c, AR-1300 for Radiola V. D. A. Swindal, 1112 San Jose Lane, Hanahan SC 29406 (744-0071).

WANTED: Scott Philharmonic, complete front panel for Scott Laureate & large Midwest radio. Robert Teska, 334 Willard, Toledo, Ohio 43605.

THE HORN SPEAKER



Dr. DeForest holding a gas-flame detector—a forerunner of the vacuum tube—and, in the other, one of the screen-grid tubes

Mr. Gary B. Schneider
6818 Commonwealth
Parma Heights, Ohio 44130

PUETT ELECTRONICS PUETT ELECTRONICS

PUETT ELECTRONICS

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

(send 13¢ stamp for newsletter sample)

List No. 17

HOW TO ORDER

- Make checks and money orders payable to PUETT ELECTRONICS.
- WE SHIP PARCEL POST. NO C.O.D. INCLUDE 15% FOR POSTAGE & HANDLING. POSTAL INSURANCE RATES ARE 60¢ FOR ORDERS UP TO FIFTY DOLLARS. MINIMUM ORDER \$3.00 - DOES NOT APPLY TO SCHEMATIC DIAGRAMS OR BOOKLETS. ORDERS WHICH EXCEED \$50.00 ARE SHIPPED POSTPAID. TEXAS RESIDENTS ADD 5% STATE SALES TAX.

POLICY

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. The tubes listed herein are either new, military pull-outs, factory over-purchasers, or used. If only one tube in original cartons are acceptable, add 10% to the total cost of your tube order. REFUNDS are mailed with your invoice for out-of-stock merchandise. CHECKER BEFORE SHIPMENT. ALL TUBES MUST MEET NEW TUBE STANDARDS WHEN CHECKED. All prices are subject to change without notice. All tube prices listed herein supersede prices in previous lists and ads. We offer free technical advice for a 13¢ stamp or you may call J. W. F. Puett. NO LATER THAN 10:00 PM CENTRAL STANDARD TIME - PLEASE.

WE CAN FURNISH SCHEMATICS ON ANY RADIO (1920 to 1954) - \$1.50 postpaid. IF YOU CAN NOT FURNISH THE NAME OF THE MANUFACTURER AND THE MODEL NUMBER, SEND THE TYPES AND QUANTITY OF TUBES AND WE WILL RESEARCH OUR FILES FOR A SIMILAR SET WHICH USES THE SAME TUBES - RESEARCH \$3.00 postpaid.

NEW ACQUISITIONS LIST
01A, 99, WD-11, etc. when in stock, ANTIQUE RADIO SETS AND TEST GEAR, ANTIQUE RADIO BOOKS, AND OTHER "one at a time" items... list sent by first class mail four to six times a year by subscription --- \$2.00 per year.

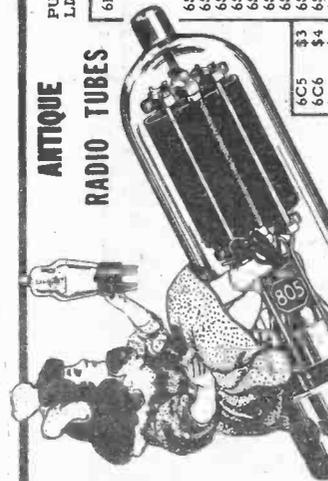
BALANCE TUBES send for catalog.

THE PUETT ELECTRONICS SUPER ANTENNA - GROUND SYSTEM plans \$2.

PUETT ELECTRONICS BOOKS & BOOKLETS (postpaid)

- THE ACQUISITION OF ANTIQUE RADIOS by J. W. F. Puett \$2.00
- THE COMPLETE RESTORATION OF BATTERY POWERED ANTIQUE RADIOS by J. W. F. Puett \$2.00
- THE COMPLETE RESTORATION OF AC POWERED ANTIQUE RADIOS by J. W. F. Puett \$2.00
- COMPLETE LIST OF ANTIQUE RADIO SERVICES \$2.00 (see list)
- WHEN WAS THAT OLD TUBE MADE? by James R. Watkins W.F. Puett - classic series by J.W.F. \$10.00
- MILITARY TUBE TYPE (VIT) TO COMMERCIAL TUBE TYPE CROSS-REFERENCE LIST \$1.00

ANTIQUA RADIO TUBES



687	\$4	785	\$3	12K7	\$7
688	\$4	786	\$4	12K8	\$4
689	\$4	787	\$4	12L6	\$3
690	\$4	788	\$4	12N7	\$4
691	\$4	789	\$4	12N8	\$4
692	\$4	790	\$4	12N9	\$4
693	\$4	791	\$4	12SA7	\$4
694	\$4	792	\$4	12SC7	\$4
695	\$4	793	\$4	12SE5	\$4
696	\$4	794	\$4	12SE7	\$4
697	\$4	795	\$4	12SG7	\$4
698	\$4	796	\$4	12SH7	\$4
699	\$4	797	\$4	12SK7	\$4
700	\$4	798	\$4	12SL7	\$4
701	\$4	799	\$4	12SN7	\$4
702	\$4	800	\$4	12SQ7	\$4
703	\$4	801	\$4	12SR7	\$4
704	\$4	802	\$4	12T6	\$4
705	\$4	803	\$4	12X4	\$4
706	\$4	804	\$4	12Z3	\$4
707	\$4	805	\$4	14A4	\$4
708	\$4	806	\$4	14A5	\$4
709	\$4	807	\$4	14A7	\$4
710	\$4	808	\$4	14B5	\$4
711	\$4	809	\$4	14B6	\$4
712	\$4	810	\$4	14B8	\$4
713	\$4	811	\$4	14C5	\$4
714	\$4	812	\$4	14C7	\$4
715	\$4	813	\$4	14E6	\$4
716	\$4	814	\$4	14E7	\$4
717	\$4	815	\$4	14F7	\$4
718	\$4	816	\$4	14F8	\$4
719	\$4	817	\$4	14H7	\$4
720	\$4	818	\$4	14J7	\$4
721	\$4	819	\$4	14K7	\$4
722	\$4	820	\$4	14Q7	\$4
723	\$4	821	\$4	14R7	\$4
724	\$4	822	\$4	14S7	\$4
725	\$4	823	\$4	14T7	\$4
726	\$4	824	\$4	14W7	\$4
727	\$4	825	\$4	14X7	\$4
728	\$4	826	\$4	14Y7	\$4
729	\$4	827	\$4	14Z7	\$4
730	\$4	828	\$4	15A7	\$4
731	\$4	829	\$4	15B7	\$4
732	\$4	830	\$4	15C7	\$4
733	\$4	831	\$4	15D7	\$4
734	\$4	832	\$4	15E7	\$4
735	\$4	833	\$4	15F7	\$4
736	\$4	834	\$4	15G7	\$4
737	\$4	835	\$4	15H7	\$4
738	\$4	836	\$4	15J7	\$4
739	\$4	837	\$4	15K7	\$4
740	\$4	838	\$4	15L7	\$4
741	\$4	839	\$4	15M7	\$4
742	\$4	840	\$4	15N7	\$4
743	\$4	841	\$4	15O7	\$4
744	\$4	842	\$4	15P7	\$4
745	\$4	843	\$4	15Q7	\$4
746	\$4	844	\$4	15R7	\$4
747	\$4	845	\$4	15S7	\$4
748	\$4	846	\$4	15T7	\$4
749	\$4	847	\$4	15U7	\$4
750	\$4	848	\$4	15V7	\$4
751	\$4	849	\$4	15W7	\$4
752	\$4	850	\$4	15X7	\$4
753	\$4	851	\$4	15Y7	\$4
754	\$4	852	\$4	15Z7	\$4
755	\$4	853	\$4	16A7	\$4
756	\$4	854	\$4	16B7	\$4
757	\$4	855	\$4	16C7	\$4
758	\$4	856	\$4	16D7	\$4
759	\$4	857	\$4	16E7	\$4
760	\$4	858	\$4	16F7	\$4
761	\$4	859	\$4	16G7	\$4
762	\$4	860	\$4	16H7	\$4
763	\$4	861	\$4	16J7	\$4
764	\$4	862	\$4	16K7	\$4
765	\$4	863	\$4	16L7	\$4
766	\$4	864	\$4	16M7	\$4
767	\$4	865	\$4	16N7	\$4
768	\$4	866	\$4	16O7	\$4
769	\$4	867	\$4	16P7	\$4
770	\$4	868	\$4	16Q7	\$4
771	\$4	869	\$4	16R7	\$4
772	\$4	870	\$4	16S7	\$4
773	\$4	871	\$4	16T7	\$4
774	\$4	872	\$4	16U7	\$4
775	\$4	873	\$4	16V7	\$4
776	\$4	874	\$4	16W7	\$4
777	\$4	875	\$4	16X7	\$4
778	\$4	876	\$4	16Y7	\$4
779	\$4	877	\$4	16Z7	\$4
780	\$4	878	\$4	17A7	\$4
781	\$4	879	\$4	17B7	\$4
782	\$4	880	\$4	17C7	\$4
783	\$4	881	\$4	17D7	\$4
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785	\$4	883	\$4	17F7	\$4
786	\$4	884	\$4	17G7	\$4
787	\$4	885	\$4	17H7	\$4
788	\$4	886	\$4	17J7	\$4
789	\$4	887	\$4	17K7	\$4
790	\$4	888	\$4	17L7	\$4
791	\$4	889	\$4	17M7	\$4
792	\$4	890	\$4	17N7	\$4
793	\$4	891	\$4	17O7	\$4
794	\$4	892	\$4	17P7	\$4
795	\$4	893	\$4	17Q7	\$4
796	\$4	894	\$4	17R7	\$4
797	\$4	895	\$4	17S7	\$4
798	\$4	896	\$4	17T7	\$4
799	\$4	897	\$4	17U7	\$4
800	\$4	898	\$4	17V7	\$4
801	\$4	899	\$4	17W7	\$4
802	\$4	900	\$4	17X7	\$4
803	\$4	901	\$4	17Y7	\$4
804	\$4	902	\$4	17Z7	\$4
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807	\$4	905	\$4	18C7	\$4
808	\$4	906	\$4	18D7	\$4
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812	\$4	910	\$4	18H7	\$4
813	\$4	911	\$4	18J7	\$4
814	\$4	912	\$4	18K7	\$4
815	\$4	913	\$4	18L7	\$4
816	\$4	914	\$4	18M7	\$4
817	\$4	915	\$4	18N7	\$4
818	\$4	916	\$4	18O7	\$4
819	\$4	917	\$4	18P7	\$4
820	\$4	918	\$4	18Q7	\$4
821	\$4	919	\$4	18R7	\$4
822	\$4	920	\$4	18S7	\$4
823	\$4	921	\$4	18T7	\$4
824	\$4	922	\$4	18U7	\$4
825	\$4	923	\$4	18V7	\$4
826	\$4	924	\$4	18W7	\$4
827	\$4	925	\$4	18X7	\$4
828	\$4	926	\$4	18Y7	\$4
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830	\$4	928	\$4	19A7	\$4
831	\$4	929	\$4	19B7	\$4
832	\$4	930	\$4	19C7	\$4
833	\$4	931	\$4	19D7	\$4
834	\$4	932	\$4	19E7	\$4
835	\$4	933	\$4	19F7	\$4
836	\$4	934	\$4	19G7	\$4
837	\$4	935	\$4	19H7	\$4
838	\$4	936	\$4	19J7	\$4
839	\$4	937	\$4	19K7	\$4
840	\$4	938	\$4	19L7	\$4
841	\$4	939	\$4	19M7	\$4
842	\$4	940	\$4	19N7	\$4
843	\$4	941	\$4	19O7	\$4
844	\$4	942	\$4	19P7	\$4
845	\$4	943	\$4	19Q7	\$4
846	\$4	944	\$4	19R7	\$4
847	\$4	945	\$4	19S7	\$4
848	\$4	946	\$4	19T7	\$4
849	\$4	947	\$4	19U7	\$4
850	\$4	948	\$4	19V7	\$4
851	\$4	949	\$4	19W7	\$4
852	\$4	950	\$4	19X7	\$4
853	\$4	951	\$4	19Y7	\$4
854	\$4	952	\$4	19Z7	\$4
855	\$4	953	\$4	20A7	\$4
856	\$4	954	\$4	20B7	\$4
857	\$4	955	\$4	20C7	\$4
858	\$4	956	\$4	20D7	\$4
859	\$4	957	\$4	20E7	\$4
860	\$4	958	\$4	20F7	\$4
861	\$4	959	\$4	20G7	\$4
862	\$4	960	\$4	20H7	\$4
863	\$4	961	\$4	20J7	\$4
864	\$4	962	\$4	20K7	\$4
865	\$4	963	\$4	20L7	\$4
866	\$4	964	\$4	20M7	\$4
867	\$4	965	\$4	20N7	\$4
868	\$4	966	\$4	20O7	\$4
869	\$4	967	\$4	20P7	\$4
870	\$4	968	\$4	20Q7	\$4
871	\$4	969	\$4	20R7	\$4
872	\$4	970	\$4	20S7	\$4
873	\$4	971	\$4	20T7	\$4
874	\$4	972	\$4	20U7	\$4
875	\$4	973	\$4	20V7	\$4
876	\$4	974	\$4	20W7	\$4
877	\$4	975	\$4	20X7	\$4
878	\$4	976	\$4	20Y7	\$4
879	\$4	977	\$4	20Z7	\$4
880	\$4	978	\$4	21A7	\$4
881	\$4	979	\$4	21B7	\$4
882	\$4	980	\$4	21C7	\$4
883	\$4	981	\$4	21D7	\$4
884	\$4	982	\$4	21E7	\$4
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886	\$4	984	\$4	21G7	\$4
887	\$4	985	\$4	21H7	\$4
888	\$4	986	\$4	21J7	\$4
889	\$4	987	\$4	21K7	\$4
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891	\$4	989	\$4	21M7	\$4
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903	\$4	1001	\$4	21Y7	\$4
904	\$4	1002	\$4	21Z7	\$4
905	\$4	1003	\$4	22A7	\$4
906	\$4	1004	\$4	22B7	\$4
907	\$4	1005	\$4	22C7	\$4
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910	\$4	1008	\$4	22F7	\$4