

THE NEWSPAPER FOR
THE HOBBYIST OF VINTAGE
ELECTRONICS AND SOUND

THE HORN SPEAKER

A Merry Christmas
and Good Wishes

HIGH-FIDELITY REPRODUCTION FROM RECORDS

A resume of interesting facts regarding the manufacture and reproduction of lateral and hill-and-dale records.

M. HARVEY GERNSBACK

ELECTRICAL reproduction of present-day phonograph records is considered by many to be well-nigh perfect. Actually such a state of affairs is far from the truth. Even by employing the best of pickups, amplifiers, and reproducers it would be impossible to achieve "high-fidelity" reproduction as dictated by the R.M.A. standard (Frequency response flat within 10 db., from 50-7,500 cycles.), which is a very limited one for high fidelity. From a sound engineer's standpoint, the definition of high fidelity would probably be more like this: "A flat response within 2 db., from 20 to 13,000 cycles."

Returning to the phonograph record again, the maximum range possible with present-day equipment is about 50 to 5,000 cycles with less than 10 db. variation. Using ordinary equipment in use in the average home, the response is naturally much less. It is probably safe to say that the range of the "electric" machine in the average home is only about 120-3,500 cycles. That's quite a distance from our "high-fidelity" definition!

In this article we must assume, for our purposes, that the experimenter possesses an amplifier and loudspeaker system which is capable of high-fidelity reproduction since we are going to confine ourselves to discussions of records and pickup devices.

Today there are crystal-type pickups available which have a response characteristic substantially flat from 30-10,000 cycles with less than 5 db. variation. By simple methods, it is possible to tilt this curve so that an increase in response of the frequencies below 1000 cycles takes place (to compensate for the fact that the average record is deficient in frequencies below 1000 and particularly below 250 cycles). There are also available improved magnetic pickups with a response such that when used to reproduce standard records, a fairly flat response is secured from about 50-5,000 cycles. So much for the pickups.

The commercial record of today seldom contains any "material" higher than 5,000 cycles. In fact, it is only within the last year that record-makers have succeeded in recording satisfactorily frequencies this high. No matter how well designed our pickups may be, they will be of little help if the higher frequencies are not recorded.

All operators of electric phonographs are familiar with the problem of needle scratch. This problem is a stumbling block to the perfection of high-fidelity recordings. The very high frequencies, even if recorded, are lost in the unpleasant noise of needle scratch. Needle scratch filters eliminate scratch, certainly, but they also eliminate frequencies above about 3,000 cycles! The causes of needle scratch are intimately associated with the type of material used in the records, the weight of the pickup on the record surface, etc. As far as high-fidelity reproduction is concerned, it would seem that it is impossible of achievement at present.

"HILL-AND-DALE" RECORDINGS

Probably a great many readers are familiar with the old Edison acoustic-type phonograph which was so popular years ago. The records used in this machine could not be played on the ordinary phonograph as the grooves were in a vertical rather than horizontal plane (as is the case with the ordinary record). (In the ordinary pickup, the needle vibrates from side to side when a record is being played; with the hill-and-dale type of record and pick-up, the needle vibrates up and down when a record is being played.)

The Western Electric Co. experimented with various recording systems several years ago, and as result of its experiments, brought forth a modernized "hill-and-dale" recording system, using electrical recording and reproducing methods. New methods of processing the finished master records were devised and a new type of record material was developed.

The results with this system of recording are remarkable. In the first place, it is possible to record and reproduce a frequency range of about 30-10,000 cycles with a variation of less than 5 db.! Due to improvements in record material, the use of a permanent diamond point as a needle, and also the fact that it is possible with this system to reduce the needle pressure on the record to about 2 per cent (or 40 milligrams!) of that employed on the standard type of record, needle scratch has been practically reduced to inaudibility. It is now possible to reproduce frequencies as high as 10,000 cycles.

(Continued on page 2)



Fig. A
The application of the cathode-ray oscilloscope to waveform analysis in recording.

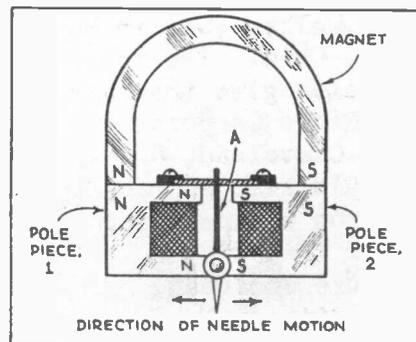


Fig. 1
The mechanical make-up of the magnetic pickup used for the common lateral-cut records.

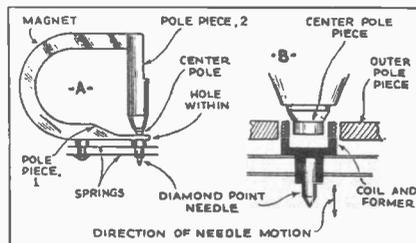


Fig. 2
Details of the W.E. dynamic hill-and-dale pickup which uses a permanent diamond needle.

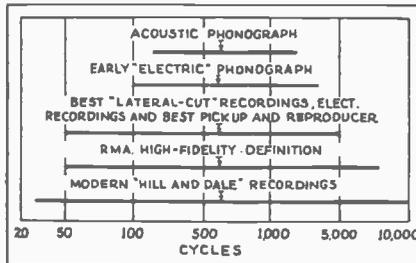


Fig. 3
A picture of the progress of phonograph recording and reproduction up to date.

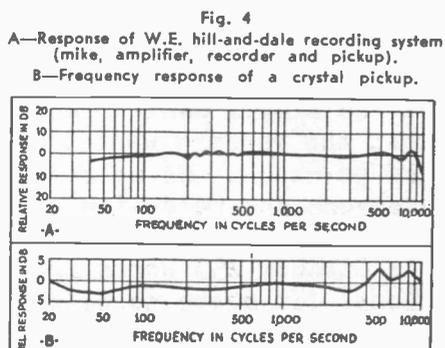
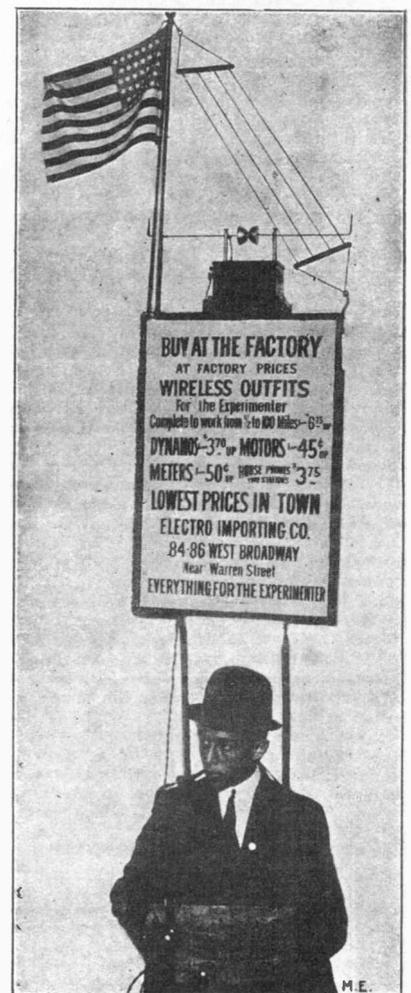


Fig. 4
A—Response of W.E. hill-and-dale recording system (mike, amplifier, recorder and pickup).
B—Frequency response of a crystal pickup.



WALKING WIRELESS STATION.

Our illustration shows what is very likely the first walking wireless station in existence. It was used during the holidays by an enterprising New York firm who manufacture wireless apparatus and outfits, catering especially to experimenters.

To make an impression on the holiday buyers, the man carrying the combined sign and wireless station, walked in the busiest streets, operating all the while the small half-inch spark coil, by means of a button carried in the pocket. Four dry cells were used to energize the coil, while the cells themselves were carried in an oblong box, hung from the side of the carrier in manner of a knapsack.

Zinc spark balls, sending condenser, and four wire aerial three feet tall, were used, and it was surprising that the noise produced by the spark was so strong and piercing that it could be heard very plainly for two blocks on Broadway during the busiest hours, notwithstanding trolley cars, automobiles, and heavy wagons,

MODERN ELECTRICS, January 1909

LETTERS

EDITOR'S MAILBAG

COMMENT ON THIS 1925 HIGH FIDELITY ARTICLE

In addition to the 1935 historical content of this article the reader who is familiar with the Nineteenth century controversy of hill-and-dale versus lateral cut will enhance Edison's original ideas about recordings.

The history of the recording industry has a long life of interesting history.

HIGH-FIDELITY REPRODUCTION FROM RECORDS

(Continued)

000 cycles without the annoyance of needle scratch.

Long-playing records, making use of slower turntable speeds and closer spacing of the grooves on the records, have been available in the old type records for several years. They have never been successful due to several factors.

First of all, the lower frequencies were severely attenuated on them due to the close spacing of grooves. The high frequencies were also attenuated due to the slower speed of playing. The general volume level of these records was lower, too. (It is necessary to turn up the volume of the reproducing equipment to get the same sound level as with the shorter playing records.)

The net result of this is the introduction of a higher needle scratch level. With so many objections, it is no wonder that these records never met with great favor.

Hill-and-dale recordings due to certain fundamental differences suffer from none of these disadvantages. It is possible to make a slow-speed, closely-grooved record without impairing the high or low frequencies. The volume level of the record can be just as high as with the short-playing record and there will be no more record wear than with ordinary records. With the old style short-playing lateral cut record there are about 98 grooves per inch. With the hill-and-dale system it is possible to increase this figure to somewhere between 125 and 150 grooves per inch, and at the same time record at a higher level than was used on the short-playing lateral-cut record!

By recording at the same level as used on the lateral-cut record it is possible to record 200 grooves per inch with no loss in fidelity of response. This means that a 10-inch record played at 33 r.p.m. will play for 10 to 12 minutes on each side. A 12-inch record will play for 15-20 minutes per side.

Due to the fact that it is feasible to record at higher levels with the hill-and-dale system it follows that a much greater volume range can be handled. It is not so necessary to monitor musical performances to an even level of sound when recording. As a result recordings can be made in which the contrasts between loud passages and soft are more lifelike than is the case with lateral-cut records.

A further advantage of these records due to the light weight of the pickup and the fact that a permanent needle is used is that they can be played thousands of times with no appreciable wear on the records. The recording material generally employed is cellulose acetate.

The pickup employed is of the "magneto-dynamic" type; the same principle is utilized in this pickup as in the common dynamic speaker for this pickup has a voice coil in place of the usual balanced armature arrangement found in the ordinary lateral-type pickup, and a permanent magnet supplies the field flux. (See Fig. 2.)

It is unfortunate that so little commercial use has been made of this vastly superior recording and reproducing system. It exceeds the R.M.A. high-fidelity standard and does not miss by very much the real high-fidelity standard (mentioned in the first paragraph of this article), and even exceeds the range (30 to 8,000 cycles) encompassed by modern so-called "high-fidelity" film recordings.

So far, the only commercial use being made of it is in the field of electrical transcriptions for broadcast purposes. The World Broadcasting System, a producer of these transcriptions is the only concern employing this system.

In closing, comment is made concerning the "telegraphone" (as it is generally called) system of recording sound on a moving metal strip susceptible to magnetic influences. In the past, radio programs from England utilizing the "Blattnerphone" represented the finest that could be offered in "magnetic wire" recordings—yet, fidelity was low and noise-level high; recently, the writer has noted B.B.C. magnetic-wire programs of greatly improved character.

Dear Jim,
Thought you might like to see some of my goodies.
Really enjoy The Horn Speaker.
Keep it up. 73's

Larry V. Flegle
1004 E. Powhattan
Tampa, Florida 33604

WARE MODEL
L WITH TOWER
SPEAKER



PHILCO A-B
ELIMINATOR

Dear Sir:

Mr. Kottmann of RCA suggested I write you regarding the appraisal on a crystal (cat whiskers) set made by George W. Walker (Walker Multi-Unit) Cleveland, Ohio. The instructions on the back also give the name of the Workrite Radio Corporation, 1812 E. 30th St., Cleveland, Ohio.

I would also appreciate any information on anyone interested in purchasing the set.

Picture enclosed.

Sincerely,

Mrs. David A. (Eileen) Perry
2712 Nels Ave.
Orlando, Florida 32809

Editor: Anyone interested?

Jim,

I want more technical "how to's!" Get some circuit "tricks" and lists of parts sources. I could write an article on parts sources alone if you'd like. Trouble is, I'm only 18 and I don't know enough to help much. Alan Douglas has helped me immensely with his typed informative letters. He even has sent several photo-copied pages of his manuals, before I got my set of Riders. I have about 25 radios, mostly junk, but I try.

P. S. Where can I get:

- A: Atwater-Kent F6 or F6-A SPKR.
 - B: A-K type "N" SPKR (for A-K 75, 74, 76, etc.)
 - C: Single grid to plate (Vice Versa) 3½ to 1 interstage transformers.
- Will a Stancor A53 work?
Mark Oppat
31800 Balmoral Dr.
Livonia, Mich. 48154

Editor: We always want to know about what the readers want to plan our articles to match. We welcome articles from everyone and we'd like an article from you.

The Stancor A53 works in most applications. It shows to be the equivalent to the Triad A-31-X, which has a 3 to 1 ratio.

RECEIVING DON'TS

From Radio Amateur's Handbook
of 1933

A. Frederick Collins

Don't expect to get as good results with a crystal detector as with a vacuum tube detector.

Don't be discouraged if you fail to hit the sensitive spot of a crystal detector the first time...or several times thereafter.

Don't use a wire larger than No. 30 for the wire electrode of a crystal detector.

Don't try to use a loud speaker with a crystal detector receiving set.

Don't expect a loop aerial to give worthwhile results with a crystal detector.

Don't handle crystals with your fingers as this destroys their sensitivity. Use tweezers or a cloth.

Don't imbed the crystal in solder as the heat destroys its sensitivity. Use Wood's metal, or some other alloy which melts at or near the temperature of boiling water.

Don't forget that strong static and strong signals sometimes destroy the sensitivity of crystals.

Don't heat the filament of a vacuum tube to greater brilliancy than is necessary to secure the sensitiveness required.

Don't use a plate voltage that is less or more than it is rated for.

Don't connect the filament to a lighting circuit.

Don't use dry cells for heating the filament except in a pinch.

Don't use a constant current to heat the filament, use a constant voltage.

Don't use a vacuum tube in a horizontal position unless it is made to be so used.

Don't fail to insulate properly the grid and plate leads.

Don't use more than 1/3 of the rated voltage on the filament and on the plate when trying it out for the first time.

Don't fail to use a voltmeter to find the proper temperature of the filament.

Don't expect to get results with a loud speaker when using a single vacuum tube.

Don't fail to protect your vacuum tubes from mechanical shocks and vibration.

Don't fail to cut off the A battery entirely from the filament when you are through receiving.

Don't expect to get the best results with a gas-content detector tube without using a potentiometer.

Don't connect a potentiometer across the B battery or it will speedily run down.

Don't expect to get as good results with a single coil tuner as you would with a loose coupler.

Don't expect to get as good results with a two-coil tuner as with one having a third, or tickler, coil.

Don't think you have to use a regenerative circuit, that is one with a tickler coil, to receive with a vacuum tube detector.

Don't let your regenerative detector oscillate or howl when you are tuning the set. Those howls are being broadcast and your neighbors do not like to have their programs ruined.

Continued on page 6

August 9, 1919 ADVERTISEMENT

October 2, 1920 ADVERTISEMENT

Aug. 9, 1919



Hear
"the singing throat"
of the
STARR
Phonograph



UNTIL YOU HEAR
the Starr's wonderful tones—their richness; their mellowness; their clearness—you cannot realize how individual is "the singing throat" of the Starr. Voice or instrument—the Starr betters both.
Six styles, prices \$70 to \$235.
Ask to have the Starr played for you, at the nearest Starr dealer's.
Hear it!
THE STARR PIANO CO.
Richmond, Indiana
Los Angeles New York
Birmingham, Ala.
London, Can.

STYLE X
Price, \$235

VITANOLA

The Phonograph of Marvelous Tone




The VitanoLa Tone Arm instantly adjusts to play any disc record.

**VITANO LA
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Buy Any Disc Record You Prefer

No need for VITANO LA owners to confine their purchases to any one make or style of record. They may buy the record which gives the most favored interpretation of any desired selection, for on the VITANO LA any disc record—irrespective of make—can be played without attachments. No tedious adjusting of the tone arm when changing from one style record to another—a simple turn of the wrist is all that is required.

And no matter what record is played, VITANO LA music is always true to life—clear, sweet and pure.

VITANO LAS can be had in every style of cabinet—every kind of wood and finish. You can quickly find a VITANO LA which will harmonize perfectly with your home.

Illustrated Booklet Upon Request

Send your name and address and we will mail illustrated booklet and suggestions that will prove of real value in helping you to make an intelligent and satisfactory phonograph selection.

The VITANO LA is Distributed by Good Dealers Everywhere

VITANO LA TALKING MACHINE COMPANY
Executive Offices: Cicero, Ill., U. S. A. (Chicago Suburb)

S.E.P.
June 2, 1923

Good Music Anywhere, Anytime!

At home, while traveling, or on your vacation, indoors or outdoors, the New CAROLA portable phonograph offers a sure road to music satisfaction. Light and sturdily built of acoustic metal, it is just the thing for—

<i>Small apartments</i>	<i>Office or shop</i>	<i>Camping trips</i>
<i>Summer cottages</i>	<i>The gymnasium</i>	<i>Auto trips</i>
<i>Front porches</i>	<i>Bathing beaches</i>	<i>Motor boats</i>
<i>Your bedroom</i>	<i>Summer parks</i>	<i>Canoe or skiff</i>

or wherever good music is wanted at low cost, quickly and without bother.

The New CAROLA has a fine motor of special design and plays all standard cut records. Among the many extra features is a record storage case within the machine.

We guarantee that you will be fully satisfied with
The New Portable

CAROLA

"The Nightingale of Phonographs"
Ask your dealer for a demonstration
If he cannot supply you, we will ship direct to you, postpaid, upon receipt of price

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New York Office 118 East 28th Street
410 Lakeside Ave., N.W. Cleveland, Ohio
Chicago Office 30 No. Michigan Blvd.



\$20
Price, East of the Rockies

CAROLA
The Nightingale of Phonographs

Weight, 15 pounds
Size, 11 x 13 x 9
Finish, jet black with nickel trim

June 2, 1923 ADVERTISEMENT

FIRST
RECORDING
ARTIST



Photo: Brown Bros.

JOSEF HOFMANN

1888 RECORDING OF HOFMANN

Who was the first entertainer of importance to record some cylinder records? According to Roland Gelatt in The Fabulous Phonograph in 1888 the 12-year-old Josef Hofmann was the first recognized artist to engrave some cylinder records.

Hofmann started his public career at the age of six and only nine-years old when he began a successful concert tour of Europe. Soon he visited America, and in two and a half months young Josef appeared in fifty-two concerts. He was breaking down under the stress of so many appearances that he aroused the indignation of the Society for the Prevention of Cruelty to Children. He later became classed with a group of pianists who "concern themselves with the orchestral development of piano tone."

It took about a decade after Edison invented the phonograph for him to practice using the phonograph for serious entertainment. He had faith in his wax developments.

on the Air

CLUB NEWS

The Whippany Vintage Radio Club, Bell Laboratories has recently been formed. Frank Scaglione, K2RIG, 217 Ridgedale Ave., Florham Park, N. J. 07932 is the chairman.

Another newly organized club is the Mid-America Antique Radio Club. News of the club came from Bob Lane, 230 Indep., Ave., K. C., MO 64124.

The Buckeye Antique Radio and Phonograph Collectors Club will meet January 19, 1975. Location is unknown right now. A name and address for the club is David A. Lieberth, 120 Beck Ave., Akron, Ohio 44302. Greg Gfell won a contest with a 1922 Polly Portable disc machine. Maurice Stahl won a contest with a 1924 BC114 Field Radio Transmitter and BC115 receiver.

Another newly organized group is the Southwest Vintage Radio and Phonograph Society. Next meeting is 7 P. M. January 18, 1975 at Electronic Center, 2929 N. Haskell in Dallas, Texas.

FINDS OF THE MONTH

I have been interested in collecting old radios, phonos, telephones and associated gear for many years (I still have my first receiver, an AK12 Atwater Kent breadboard, purchased in 1933 for \$4.50). Over the years I have acquired hundreds of pieces which occupy most of my spare time.

So it's no wonder that I became excited when told by my son, that someone had some "oldies" in their attic that were available. I lost no time making arrangements to be there the very next evening. Upon arriving at the house I was invited to climb a step ladder, so with extension light in hand up through the attic hatchway I went.

One quick look was all that was necessary to make me realize that I did indeed have something to be excited about. The attic area was about twenty by thirty-five feet and almost completely covered with radios, speakers, power supplies, boxes of parts, old books and schematic etc. (totaling a little short of 600 collectable pieces).

Looking around, I first noticed a Western Electric 10A loudspeaker. Then a Western Electric 548 loudspeaker with two Western Electric 7A amplifiers and a Western Electric 25B amplifier. I looked into a box and saw about 100 cans containing crystals (doubles & triples) and twenty sealed boxes of Foote wireless detectors plus others by Philmore, Foote, Kelvin White Wireless Specialty etc. Then a pair of (1919) Western Electric EELA Buzzer-phones, variometers, several new packaged carbon microphones, resistors and variable condensers by Murdock, Chelsea and General radio.

As for radios, well I quickly noticed a Clapp Eastham, two step amp. (H2) with its companion receiver (HR), Collin B. Kennedy amp. (type 525) with its companion receiver (220). Then a Radiola SR. (type RF), Radiola II and IIIs, a Radiola regenoflex and a Michigan radio (MRC2), Westinghouse RA-DA plus several one and two tubers with WD11's and Western Electric VTI's, one that particularly caught my attention was a 1917 (300M to 2500M) made for Bureau of Steam Engineering by National Electrical Supply Co. (CN113A) of Washington D. C. I saw Atwater Kents, Kelloggs and cases of DeForest and DeForest type honeycomb, duo-lateral coils and the list goes on and on.

While looking over this seemingly endless attic, for some unknown reason I was becoming aware that this was more than a very exciting, once in a life time discovery. Then as I gazed at the

battery cable of a Freed Eisemann NR7, like an explosion I realized that this receiver had belonged to me years ago (1936-37) with this in mind a closer look around the attic enabled me to identify several more. Then I realized that I had swapped the sets with my electrical school teacher for some test equipment to start my first radio repair shop.

A little investigating showed that the house, radios, etc. had indeed belonged to my electrical teacher of many years ago. Incidentally, not only was he my school teacher, but I worked for him as an electrician and for a short time lived with him and have been trying to locate him off and on without success since World War II.

Needless to say, I acquired the entire lot (using two trucks to haul it away) and am looking forward to many months of enjoyment with my new find. I also have a lead on the present whereabouts of my school teacher and expect to pay him a visit shortly.

C. W. Harriman, Jr.
1 Clover Lane
Bradford, Mass. 01830

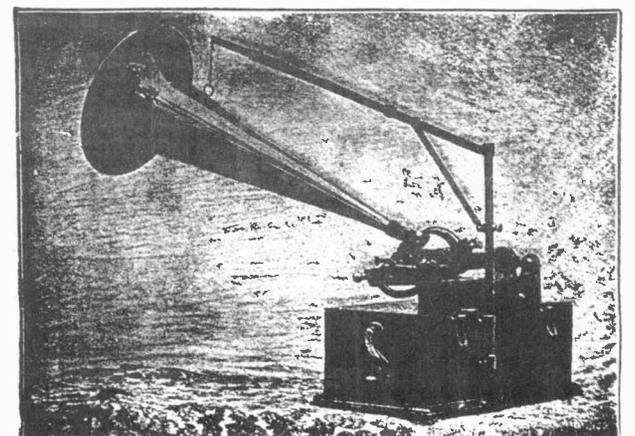
Just as a note...for the find of the month...at least for me. A pair of good working Atwater Kent Breadboards model 10Cs...4700 series...both for \$50. and the prior owner was worried I'd turn him down at that price. He bought them at an auction where everyone literally laughed at him saying he bought incomplete sets...just chassis and so he held them back for over two months before contacting me. Afraid he would be laughed at by me. Said he made a good profit even at \$25. each. I guess I should have been at the auction.

Rick and Chris Ammon
P. O. Box 104
Mt. Carmel, Ill. 62863

Brian Cook of Shawnee, Kansas, 18 years old, was given a Grebe CR-1 with brass base tube-mint-free by widow of a radio ham friend of theirs.

Brian has a Crosley Pup, Ak Breadboard, and about 40 other good radios. He has collected for about 4 years now and belongs to newly organized "Mid-America Antique Radio Club."

Robert Lane
2301 Indep. Ave.
Kansas City, MO 64124



Telescopic Horn Crane

RADIO-CRAFT for AUGUST, 1932

A SCREEN-GRID DETECTOR FOR THE A.K. 37

By George Stoneham

VOLUME and sensitivity were increased approximately three times, selectivity was improved and tone quality was unimpaired by making a few slight changes in an A.K. model 37 receiver. The changes made in this radio set may be made in any receiver where the type '27 detector operates with comparatively low plate voltage and R.F. input.

The original circuit of connections is shown in Fig. 5A; B, the completed diagram, incorporates a type '24 tube as the detector.

after being revamped in accordance with the above procedure.

Since the filter system is now connected to ground through condenser C6 the resulting effective capacities of the condensers in the can will be a function of the capacity of C6; in other words, we are bringing into use the law of condensers in series.

Therefore, to raise the effective capacity of C2, the condenser C7 connected to the outside of the can is added in parallel to C2 and C6.

Although the effective capacity of C3 is lowered, it is not possible to notice any difference in operation of the set. However, if desired, its capacity, too, may be increased by connecting an external condenser from the can to the detector positive terminal on the terminal board. Condenser C5 is added to aid in the filtering.

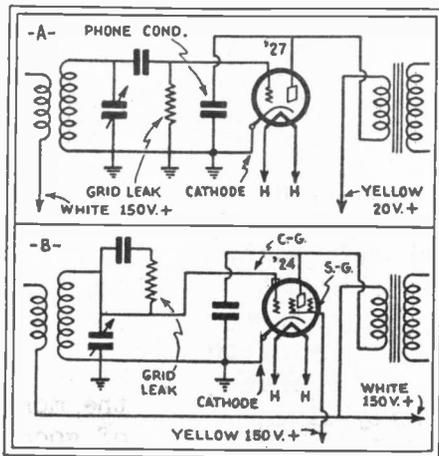


Fig. 5 Changing for the screen-grid detector.

THE SERVICE MAN'S FRIEND

By Wilbert L. Misner

IN the life of every Service Man there comes a time when he will accidentally mar the surface of a radio receiver cabinet. The writer takes care of such contingencies by always carrying along a small bottle containing clear varnish and capped by a rubber stopper. The procedure is illustrated in Figure 6.

The rubber stopper moistened with a little varnish is rubbed over the scratch until the varnish flakes have been dissolved and mixed with the fresh varnish and presto, the scratch will have disappeared!

Where the scratch has gone through the surface of the varnish and reached the wood, use a soft-lead pencil to darken the surface and then follow the procedure previously described.

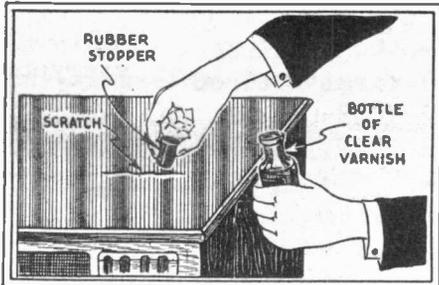


Fig. 6 At last, a scratch eliminator!

REPAIRING A.K. POWER PACKS

By Herbert W. Jones

WE all know what a messy and tough job it is to repair A.K. Power Packs in which one of the condensers is "shot." However, there is one method which, in so far as the writer is aware, has never before been proposed to the main body of Service Men. This is a simple and effective method of repairing such A.K. models as the 37 and 38—and without tearing the can to pieces or melting out the sealing compound; the principle is applicable to other makes of receivers having similar power pack design.

If either the detector bypass or the filter condensers are shot, remove the cover and loosen the clamp which holds down the two cans, raise the filter system can and then place under it a piece of insulating material. Then, cut the bare lead that connects from the filter can to the center hold-down, bolt and solder a piece of insulating wire to this bare wire from the can. Replace the can, place another piece of insulating material under the hold-down clamp (that is, over the filter can) and tighten. The filter can should now be entirely insulated from the chassis.

The original connections of the filter system of an A.K. model 37 or 38 receiver pack are shown in Figure 7A; in 7B, the connections of the filter system are shown

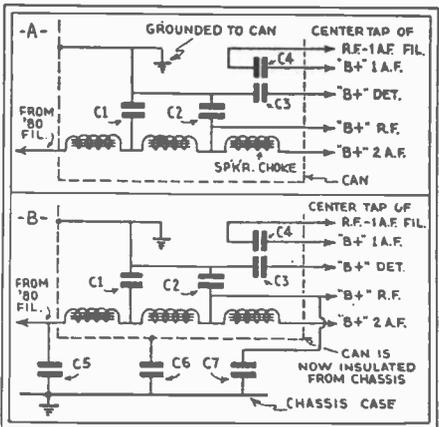
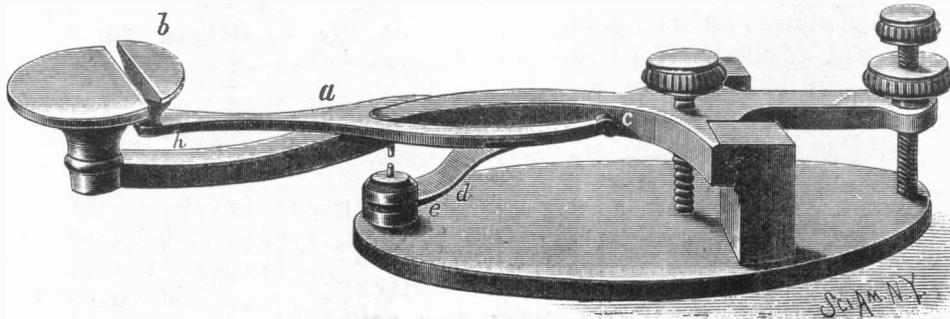


Fig. 7 And for repairing that A.K. power pack—

AN IMPROVED TELEGRAPH KEY.

The accompanying illustration represents, in perspective view, a telegraph key provided with means for automatically closing the circuit as the operator releases the key, and for opening the circuit when the key is grasped by the thumb and finger. The cut shows the attachment as applied to a "Victor" key. It is a patented invention of Mr. John B. Van Deusen, of Saratoga Springs, N. Y. The key is of the ordinary construction, with base plate and standards in which the key lever is pivoted, while a leg, *e*, passing through the base plate and insulated therefrom, is provided with an anvil contact for opposing the contact of the key lever.

Under the head of the leg is a flat spring, *d*, curved rearwardly and upwardly, and slit at the ends to form arms at opposite sides of the key lever, a central arm contacting with the under surface of the key lever. A short distance in front of the trunnions of the key lever at *c* is pivoted a forwardly extending forked lever, *a*. The key knob is divided, its forward portion being attached directly to the end of the key lever in the usual way, and the rear portion, *b*, attached to



VAN DEUSEN'S TELEGRAPH KEY.

the forward end of the forked lever, each arm of which has a strip of insulating material resting on the side arms of the springs on each side of the key lever. The key is operated in the same way as an ordinary key, the circuit being opened and closed at the anvil contact points, but when the operator releases the key the forked lever is automatically lifted by the spring, *a* as shown in the illustration, and the circuit is closed, a matter which the operator, through neglect or otherwise, often fails to attend to.

SCIENTIFIC AMERICAN September 9, 1890

1974 AD

50 YEAR OLD FLAME PROOF KEY TYPE J-7-A

Gov't. Order No. 141082 Dated: 1921

\$12.95 PPD

In 1966 the U.S. Navy closed the hugh Brooklyn Navy Yard and the City of New York purchased the property. The J7A Keys were discovered in a warehouse where they had been stored for the past 50 years. Corrosion has been corrected, however, there is some slight paint peel. New boxes have been provided.

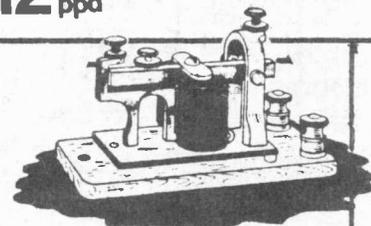
Both keys are of heavy duty construction with a large Navy type knob. The keying arm and dome are brass... the contacts are 1/4 inch coin silver. The J7A is 2 1/2 x 5 1/2 inches and the J5A is 2 1/2 x 3 1/4 inches in size. The BULB, or Lamp is NOT supplied with the J7A.

A RARE FIND! ORDER TODAY!

\$12.95 ppd

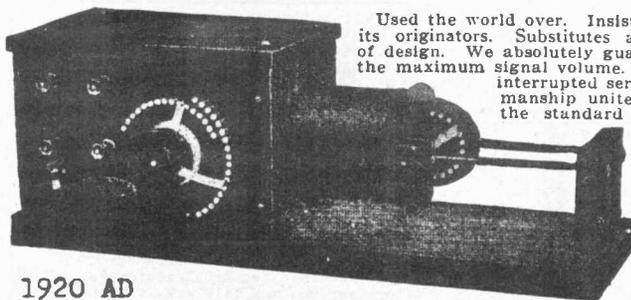
The J5A was made for the Signal Corps in 1941, and is the same type of Key except for the dome housing the neon bulb. A real memento of WWII. Supply is somewhat limited... buy today!

\$11.95 ppd



Sounders \$25.00 ppd

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Used the world over. Insist on the genuine, built by its originators. Substitutes are expensive, irrespective of design. We absolutely guarantee our tuners to give the maximum signal volume. Delicate refinement, uninterrupted service and high class workmanship unite to make TRACO tuners the standard whereby all others are judged. If your Dealer does not handle them, order direct from us.

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1920 AD

The Famous 5A and 5C Models

THE RADIO APPARATUS CO.,

Pottstown, Penna., U. S. A.

WALTS EMPORIUM

P O BOX 19406

DALLAS, TEXAS 75219 EVENINGS 214-262-7855

SAVE FOR COMPLETE LIST

The Classic

Radio

by J. W. F. Puett

The Scott Transformer Company produced eight different sets from 1924 to 1929.

They included three battery sets, the World's Record Super 8 (1924 - 25), the W.R. S. 9 (1926) and the W.-R.S. 10 (1927). The first AC powered Scott, the World Record Screen Grid 9, was introduced in 1928, followed in the same year by the W.R.S.G. 9B. These sets were all produced in kit form. In 1929, three models were offered, the World Record AC 9, the W.R. AC 10 and the relatively small TRF AC Symphony which used only five tubes. The W.R. AC 9 was offered as a kit, while the W.R. AC 10 and the Symphony were assembled by "professional set-builders" throughout the U.S.A. and in certain foreign countries. Herewith, a list of early Scott receivers and the quantity and type numbers of the tubes employed:

MODEL	TUBES QTY./TYPE
WRS 8	6/01A, 1/112A, 1/00A (originally used type 99 tubes)
WRS 9	7/01A, 1/112A, 1/00A.
WRS 10	9/01A, 1/10.
WRS G 9	3/01A, 1/112A, 1/40 1/50, 2/81, 3/22.
WRS G 9B	3/01A, 1/112A, 1/40, 1/171A, 1/80, 3/22.
WR AC 9	5/27, 3/24, 1/71A, 1/80.
WR AC 10 Symphony	5/27, 3/24, 2/45, 2/80. 2/27, 1/22, 1/71A, 1/80.

The author extends thanks to George C. Harris for this data.

- Don't think you are the only amateur who is troubled with static.
- Don't lay out or assemble your set on a panel first. Connect it up on a board and find out if everything is right.
- Don't try to connect up your set without a wiring diagram in front of you.
- Don't fail to shield radio-frequency amplifiers.
- Don't set the axes of the cores of radio-frequency transformers in a line. Set them at right angles to each other.
- Don't use wire smaller than No. 14 for connecting up the various parts.

Don't fail to adjust the B battery after putting in a fresh vacuum tube, as its sensitivity depends largely on the voltage.

- Don't fail to space properly the parts where you use variometers.
- Don't fail to put a copper shield between the variometer and the variocoupler.
- Don't fail to keep the leads to the vacuum tube as short as possible.
- Don't throw your receiving set out of the window if it howls. Try placing the audio-frequency transformers farther apart and the cores of them at right angles to each other.
- Don't expect as good results with a loop aerial, or when using the bed springs, as an outdoor aerial will give you.
- Don't use an amplifier having a plate potential of less than 100 volts for the last step where a loud speaker is to be used.

- Don't try to assemble a set if you don't know the difference between a binding post and a blue print. Buy a set ready to use.
- Don't expect to get Arlington time signals and the big stations if your receiver is made for short wavelengths.
- Don't take your headphones apart. You are just as apt to spoil them as you would a watch.
- Don't expect to get results with a Bell telephone receiver.
- Don't forget that there are other operators using the ether besides yourself.
- Don't let your B battery get damp and don't let it freeze.
- Don't try to recharge your B battery unless it is constructed for the purpose.

1974 AD

PUETT ELECTRONICS

MAILING ADDRESS:
3008 Abston Drive Mesquite, Texas 75149

LIST NUMBER 10

HOW TO ORDER:

- ALL CHECKS OR MONEY ORDERS MUST BE MADE PAYABLE TO J.W.F. PUETT.
- 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.
- 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

ALL TUBES ARE THOROUGHLY TESTED on a mutual conductance tube checker before shipment. **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.

IN TABLE 3, THE SYMBOL n INDICATES THAT A TUBE IS AVAILABLE NEW AND THE SYMBOL u INDICATES THAT THE TUBE IS AVAILABLE USED.

IN TABLE 4, THE SYMBOL n INDICATES THAT A TUBE IS AVAILABLE NEW AND THE SYMBOL u INDICATES THAT THE TUBE IS AVAILABLE USED.

TABLE 1. OLD STYLE GLASS ENVELOPE TUBES
all are used, thoroughly tested

RADIOTRON	CUNNINGHAM	SYLVANIA	MAJESTIC
10	C32L	SY224	G-27
UX210	CX326	SX227	G27S
UY224	C327	SY551	G35S
UY227	CX332	SX280	A.P.
UX226	CX345		
35	80	PERRYMAN	PHILCO
37	CX380	R-281	2L
UX240		PA224	26
UX245			27
71A			36
UX240			37
866			71A
			80

KEN RAD	UNKNOWN	TUNG SOL
UX245	2L	
56	27	
	D227	
	245	

SPEED	WIZARD	SILVERTONE
27	226	227

TABLE 3. OLDER TYPE-NUMBER TUBES - prices listed for new tubes used tubes are half new price

0	u	523	nu	62Y5	nu	14C5	nu	55	n
1A3	u	524	nu	74A	nu	14C7	nu	56	n
1A4	u	6A3	nu	745	nu	14F7	nu	57	n
1A5	u	6A4	nu	746	nu	14F8	nu	58	n
1A6	u	6A5	nu	747	nu	14H7	nu	59	n
1A7	u	6A6	nu	748	nu	14J7	nu	70A7	n
1B4	u	6A7	nu	7A7	nu	14N7	nu	70L7	n
1B5	u	6A8	nu	7A7	nu	14Q7	nu	75	n
1C5	u	6B4	nu	7A7	nu	14W7	nu	76	n
1C6	u	6B5	nu	7B4	nu	14X7	nu	77	n
1C7	u	6B6	nu	7B5	nu	15	u	78	n
1D5	u	6B7	nu	7B6	nu	19	u	79	n
1D8	u	6B8	nu	7B7	nu	24A	nu	80	n
1E5	u	6C5	nu	7B8	nu	25A6	nu	81	u
1E7	u	6C6	nu	7C5	nu	25A7	nu	82	u
1F4	u	6C7	nu	7C6	nu	25B6	u	83V	n
1G4	u	6C8	nu	7C7	nu	25C6	u	84	n
1G5	u	6D6	nu	7E6	nu	25L6	u	85	n
1G6	u	6D7	nu	7E7	nu	25S	u	89	n
1H4	u	6E6	nu	7E7	nu	25T5	nu	117-	n
1H5	u	6E7	nu	7F8	nu	2526	nu	L7	u
1H6	u	6F5	nu	7G7	u	26	nu	117-	n
1LA4	u	6F6	nu	7H7	u	26A6	nu	26	n
1LA6	u	6F7	nu	7J7	u	26A7	nu	9002	n
1LB4	u	6F8	nu	7K7	u	27	nu	9003	n
1LC5	u	6G6	nu	7L7	u	28D7	nu	VT52	n
1LD6	u	6H6	nu	7M7	u	30	nu	XXB	n
1LE5	u	6J5	nu	7Q7	u	31	nu	XXPM	n
1LE3	u	6J7	nu	7R7	u	32	u	XXL	n
1LF3	u	6J8	u	7R7	u	32L6	u		n
1LG5	u	6K5	nu	7V7	u	32L7	n		n
1LH4	u	6K6	nu	7X6	u	33	n		n
1LN5	u	6K7	nu	7X7	u	34	u		n
1M5	u	6K8	nu	7Y4	u	35	u		n
1P5	u	6L5	nu	7Z4	u	35A4	u		n
1Q5	u	6L6	nu	12A7	u	35Z3	u		n
1V	u	6L7	nu	12A8	u	36	u		n
2A3	u	6N5	u	12B7	u	37	u		n
2A4	u	6N6	u	12B8	u	38	u		n
2A5	u	6N7	u	12C5	u	39	u		n
2A6	u	6P5	u	12C8	u	41	u		n
2B7	u	6Q7	u	12F5	u	42	u		n
3C6	u	6R7	u	12J5	u	43	u		n
3FL4	u	6S7	u	12J7	u	44	u		n
3Q5	u	6S8	u	12K7	u	45	u		n
5R4	u	6T7	u	12K8	u	46	u		n
5T4	u	6T8	u	12Q7	u	47	u		n
5U4	u	6U6	u	12Z3	u	48	u		n
5V4	u	6U7	u	14A4	u	49	u		n
5W4	u	6V6	u	14A7	u	50A5	u		n
5X4	u	6V7	u	14B5	u	50C6	u		n
5Y3	u	6V6	u	14B6	u	50X6	u		n
5Y4	u	6Z4	u	14B8	u	51	u		n

TABLE 4. MORE RECENT TUBE TYPES - prices listed for new tubes used tubes are half new price

0A2	n	6AT6	nu	12A5	nu	35Z5	nu	1629	u
0A3	u	6AU6	nu	12A6	nu	35Z6	nu	1633	u
0B3	u	6AV6	nu	12AT6	nu	40Z5	u	1634	u
0C3	nu	6BA6	nu	12AT7	u	45Z3	n	1635	u
0D3	nu	6BE6	nu	12AU6	nu	45Z5	u	2050	nu
0T4	n	6BJ6	nu	12AU7	nu	50B5	nu	2051	nu
0Z4	n	6C4	nu	12AV6	nu	50C5	nu	5686	n
1L4	u	6C6	nu	12BA6	nu	50L6	nu	5691	n
1L6	u	6S4	u	12BB6	nu	50Y6	nu	CK-	n
1R5	nu	6SA7	nu	12L6	nu	50Y7	nu	5703	u
1R4	n	6SB7	nu	12SA7	nu	117-	u	5749	u
1R5	nu	6SC7	nu	12SC7	n	23	nu	5751	u
1T4	u	6SD7	nu	12SF5	n	117-	u	5814	u
1T5	u	6SF5	u	12SF7	n	24	u	5879	u
1U5	u	6SF7	u	12SG7	nu	807	u	5881	u
2C26	u	6SG7	nu	12SH7	u	879	n	5992	u
2E2	u	6SH7	nu	12SJ7	nu	884	u	6080	u
3A4	u	6SJ7	nu	12SK7	nu	930	u	6842	n
3A5	u	6SK7	nu	12SL7	nu	950	u	6973	n
3A8	u	6SL7	nu	12SN7	nu	955	u	7193	u
3Q4	u	6SN7	nu	12SQ7	nu	958	u	VR90	u
3R4	u	6SQ7	nu	12SR7	nu	CK-	u	VR-	u
3V4	u	6SR7	nu	12V6	nu	1005	u	105	u
6AB4	u	6SR7	nu	12W6	nu	1158	u	VR-	u
6AB7	u	6S7	u	12X4	nu	1201	u	150	u
6AC5	u	6SV7	u	19T8	u	1203	u		u
6AG7	u	6W6	nu	35A5	nu	1232	u		u
6AK5	u	6L	nu	35C5	nu	1273	u		u
6AL5	u	6L5	u	35L6	nu	1612	u		u
6AL7	u	6T5	u	35W4	u	1625	u		u
6AQ5	u	6T7	u	35Z4	nu	1626	u		u

TABLE 5. BALLAST TUBES - \$3.00 each - all are new

JFD Type A,B & C; K36A; K49B; K80C; K92B; KX49B; L55B; 2B14; 3H7; 4P45; 7H11; 40A1; 100-77; 100-79; 165R; 165R4; 185R4; 250R; 6092A. AMPERITE 3TP7; VICTOREEN 1300-8

WE HAVE MANY MORE-RECENT-TYPE-NUMBER TUBES AND EARLY TV TUBES AT \$2.00 new and \$1.00 used. Send a self-addressed stamped envelope with your requests.

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111-120	6.60	11.55	16.50	61.00
121-130	7.20	12.55	17.85	66.20
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141-150	8.25	14.45	20.65	76.30

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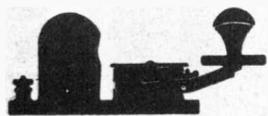
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WILL REPAIR, restore, refinish, re-new or rebuild your old radio. Buy, sell or trade tubes, parts and radios. Bob Lucas, 9014 Mahoning, Houston TX 77036.

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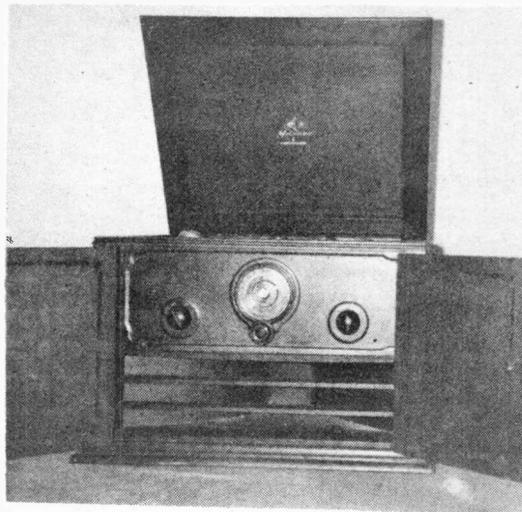
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ANTIQUA-Add extra class to your collection with a 50 year old J7A Telegraph key! Dated 1923, it has a brass dome and keying arm, and a large Navy type knob-Flame Proof type. New, but not perfect because of years of storage in the Brooklyn Navy Yard. \$12.95ppd. Also, W. U. Tele Co. Main line sounders, good, used type 17A and 15B, \$25.00ppd., each. Buy-Trade-Sell Telegraph, Radios, Books--what have you? Walt's Emporium, P. O. Box 19406, Dallas, Texas, 75219.

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FOR SALE: Large collection of early Radio and Wireless material, Literature, letters, booklets, catalogues, some magazines, parts, phones, few tubes, and some unusual items. Send large SASE for list. Willis Otto, 2009 West 10th St., Davenport, Iowa 52804.

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1921-1931 schematics and service data where available \$2.00. Cecil Bounds, Pine Springs Rte., Carlsbad, N. M. 88220.

FOR SALE OR TRADE 7

FOR SALE: Aretino Phonograph with green flower shaped horn, \$400., plays 1/2" and 1/4" records. AK model 20 large box, no tubes, \$75. Steve Insalaco, 26 Ridge Crt. W. 3B, West Haven CT 06516. Phone 203 932-5345.

WD11 Adaptors, use UX199, 120, VT24. No Wiring changes, Radiola III's battery hook up included \$5.25 pp., 2 for \$9.25. Keith Perry, 17557 Horace St., Granada Hills CA 91344.

WANTED

WANTED: Early horn type phonographs, disc or cylinder. Complete or incomplete parts, reproducers, horns etc. "What Have You?" Will buy or trade quality battery radios, early elect's, horn speakers, early battery tubes. Wilford Wilkes, Box 43, Brisbin PA 16620.

WANTED: RCA Horn Speaker, Model UZ-1320 in good condition, "Radio News" and "Popular Radio" for the 1920's and 1930's with covers. J. Albert Warren, Box 279 - Church St., Waverly PA 18471.

WANTED: Books, memorabilia about disc recording and pre-1937 television. Will buy or trade wireless telegraphy books. H. Layer, AV-SFSU, 1600 Holloway, San Francisco CA 94132.

WANTED: Old radio books, catalogs, Gernsback manuals, Early test equipment. Give price in first letter. William Hemrick, Route 1, Terra Alta, West Virginia 26764.

WANTED: First stage audio transformer for Grebe Synchrophase MU1. Trade Farnsworth Portable AT30 with 4 tubes (Fair). Hurst, Box 81, Rt.1, Milford, Ohio 45150. ✓

HAVE AIRLINE 26 radio, WANT Compatible speaker same era, not necessarily Airline. Also CX 201 tubes. Bill Guertin, 1050 Oak Place, Fairfax VA 22030. ✓

WANTED: Any information on The Aloe Co. of St Louis, marbled paneled electro-medical machine with two spark gaps no. 2080, Circa 1919. John Green, 5540 Hickoryst, Omaha, Neb. 68106. ✓

WANTED: Old light bulbs & tubes from early experimental to 1930. B. Harbeck, P. O. Box 1172, Sioux City, Iowa 51102. ✓

WANTED: AK 20 lid name plate; AK 30 lid name plate; AK 33 lid name plate; Grebe CR9 lid name plate; Schematic for Murad MA15. Bill Pugh, 2126 E. Myrtle, Phoenix, Arizona 85020.

WANTED: Freed-Eisemann speaker as shown pp. 87 McMahon book, rectangular shape with Gothic Arches over grill. Jim Melvin, 5445 Netherlands Ave., Apt. F-41, Bronx, N. Y. 10471. ✓

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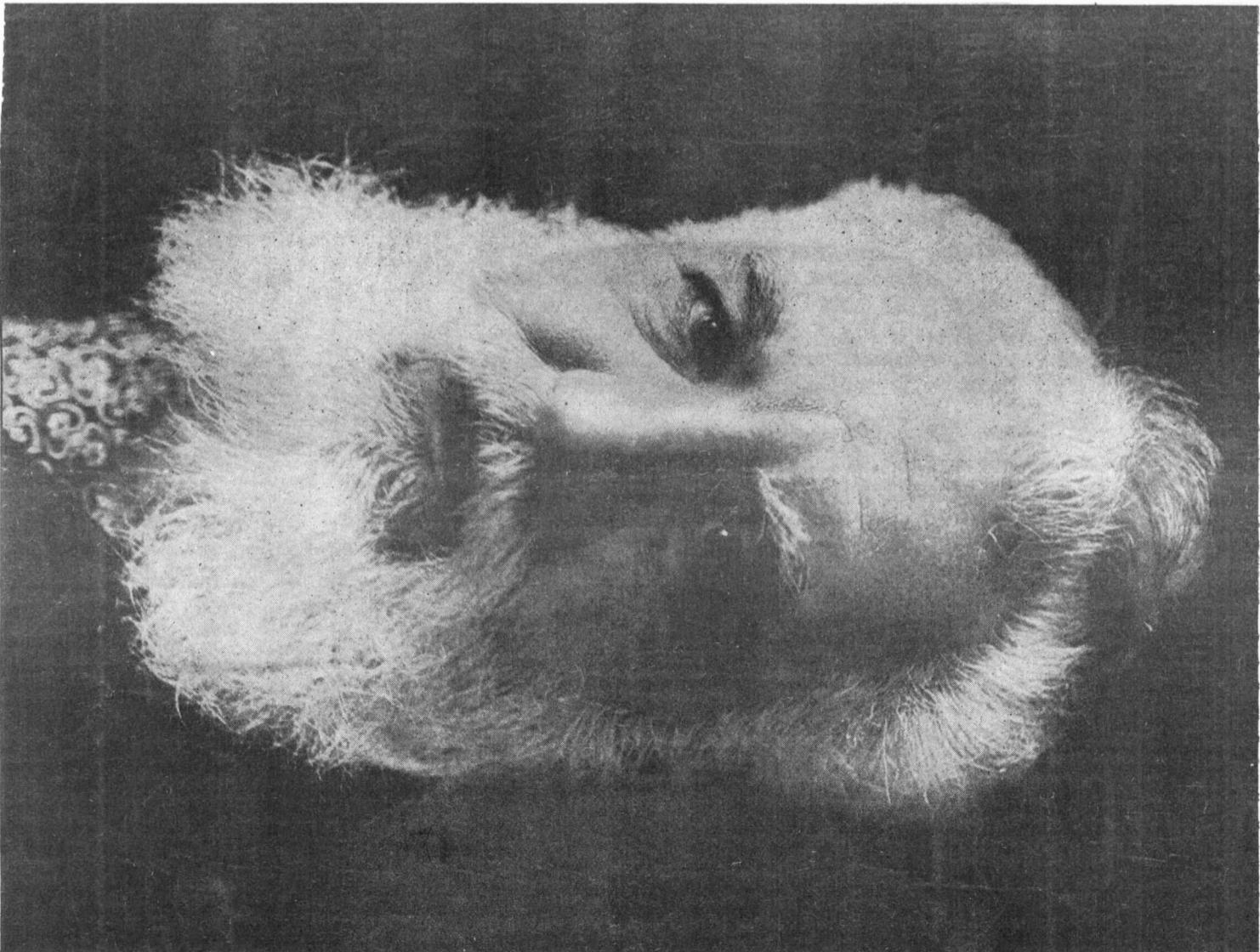
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