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1924

RADIO WORLD

Title-Reg. U. S. Pat. Off.

VOL. 5, No. 8

195-112

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RADIO WORLD

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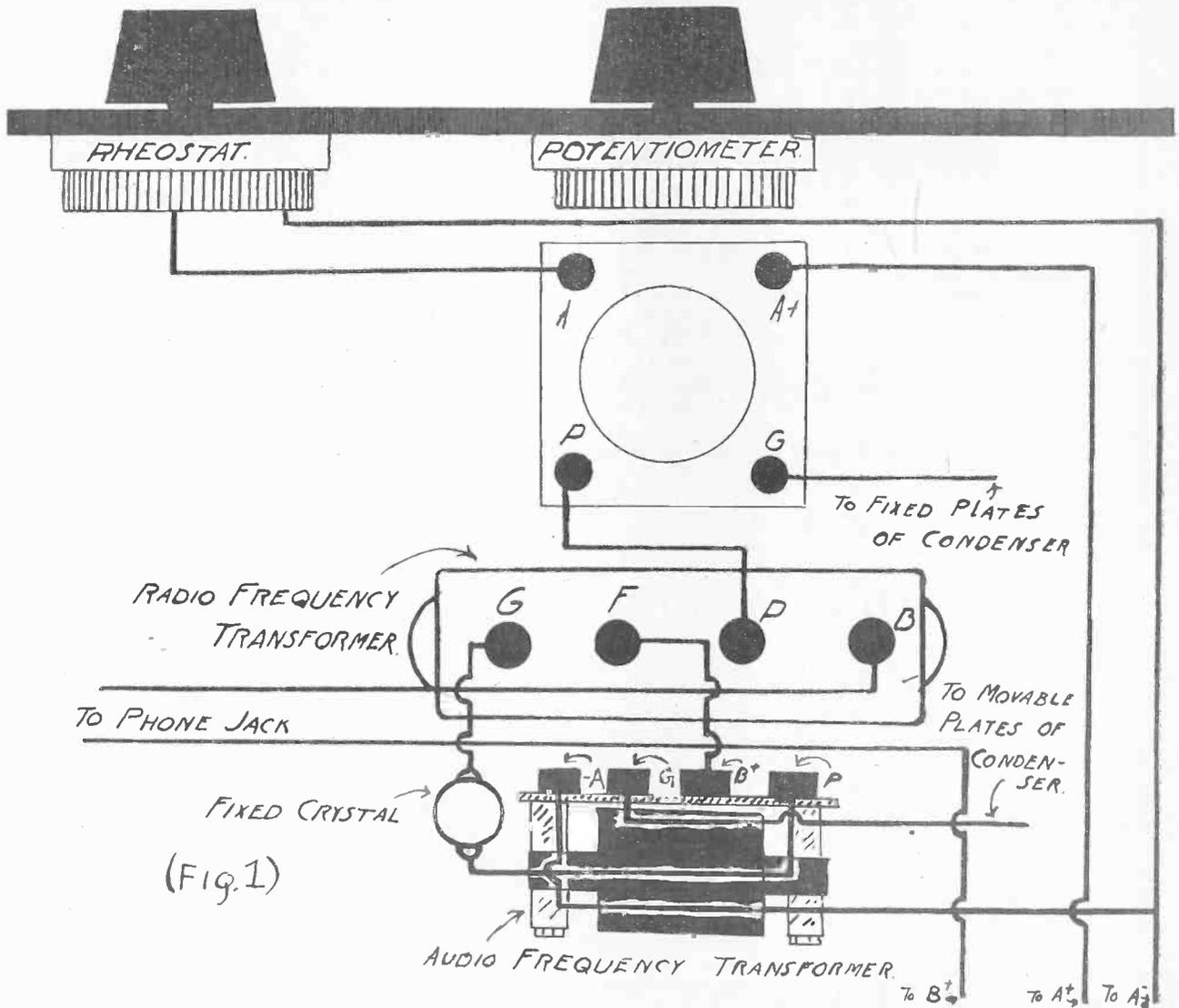
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2,000 Miles on Only One Tube



2,000 MILES ON ONE TUBE is what Byrt C. Caldwell obtained from the set he built, following his original diagram, published above in schematic form (Fig. 1). This result was achieved on earphones. The potentiometer figures in a succeeding article.

[In RADIO WORLD, issue of April 19, 1924, an article by Byrt C. Caldwell was published, describing a one-tube set that does not radiate. The following article carries that hook-up one stage further. Two subsequent articles will develop a super-power receiver to its peak.]

By Byrt C. Caldwell

THIS week we will change our receiver into a one-tube reflex. The receiver will now be powerful enough to operate a loud speaker with moderate volume on the local stations, and on the stations up to fifty or a hundred miles. With the earphones we may expect to receive over distances of 2,000 miles or

more. It will now incorporate one stage of radio frequency amplification, detector, and one stage of AF.

The apparatus required in addition to that previously described is one good audio frequency transformer and a .00025 mfd., and a .002 mfd, fixed condenser. These two condensers are not absolute requisites, but better results will generally be had with their use.

The audio-frequency transformer is placed close in back of the radio frequency transformer, as shown. The wiring from the variocoupler and condenser, that from the tube socket, the connection to the P of the RF transformer, and the connections to all but the B

(Concluded on next page)

U. S. Renews Tests for Wave Lengths

THE Bureau of Standards is transmitting special signals of standard frequency about twice a month. The last previously announced schedule was published in the March, 1924, issue of the Radio Service Bulletin. The next schedule is announced below. The signals can be heard and utilized in general east of the Mississippi River.

These special signals of standard frequency are of use to testing laboratories, transmitting stations operators, and others in standardizing wave meters and adjusting transmitting and receiving apparatus. The transmissions to be made on June 5 will be of special interest to ship operators, those on July 7 to amateurs, and those on June 20 to broadcasting station operators. The accuracy of these signals is better than three-tenths of one per cent. Information on how to use them was given in the February, 1923, issue of the Radio Service Bulletin. More detailed information is given in Bureau of Standards Letter Circular No. 92, which may be obtained, on application from the Bureau of Standards, Washington, D. C.

All transmissions are by unmodulated continuous-wave telegraphy. A complete frequency transmission includes a "general call," a "standard frequency signal," and "announcements." The "general call" is given at the beginning of the eight-minute period and continues for about two minutes. This includes a statement of the frequency. The "standard frequency signal" is a series of very long dashes with the call letters WWV intervening. This signal continues for about four minutes. The "announcements" are on the same frequency as the "standard frequency signal" just transmitted, and contain a statement of the measured frequency. An announcement of the next frequency to be transmitted is then given. There is then a four-

minute interval while the transmitting set is adjusted for the next frequency.

The schedule of standard frequency signals from the Bureau of Standards is as follows:

Schedule of Frequencies in Kilocycles (Approximate wave lengths in meters in parentheses)			
Eastern Standard Time	June 5	June 20	July 7
11:00 to 11:08 P. M.	300 (1000)	550 (545)	1363 (200)
11:12 to 11:20 P. M.	315 (952)	650 (461)	1430 (210)
11:24 to 11:32 P. M.	345 (869)	750 (400)	1500 (200)
11:36 to 11:44 P. M.	375 (800)	833 (360)	1600 (187)
11:48 to 11:56 P. M.	425 (705)	940 (316)	1700 (176)
12:00 to 12:08 A. M.	500 (600)	1050 (285)	1800 (167)
12:12 to 12:20 A. M.	600 (500)	1150 (261)	1900 (158)
12:24 to 12:32 A. M.	667 (450)	1250 (240)	2000 (150)

Ship Will Broadcast to Own Passengers

MICROPHONIC apparatus and loud speakers are to be installed in the social rooms of the S. S. Paris and S. S. France so that second and third class passengers can hear concerts staged in the first-class salons.

The ships' concerts are often given by opera and concert singers and musicians journeying to and from Europe. The ship's orchestra will also broadcast dance music throughout the vessel.

The S. S. France is now being converted to an oil burner and when she returns to service in May the new radio apparatus will be installed.

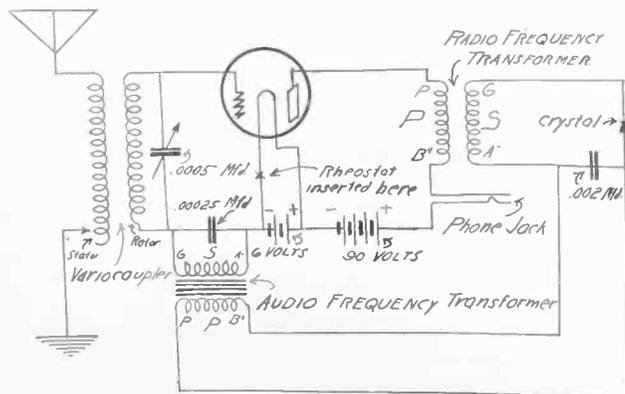
A 2,000-Mile Reflex

(Concluded from preceding page)

positive of the battery binding posts, is left as it now is. All other wiring should be carefully removed.

Now, proceeding as before with bus wire and soldering iron, make the following connections, following both diagrams carefully. First make the connection by following the picture diagram (Fig. 1), and then check up with the regular hook-up diagram.

Connect the B of the radio frequency transformer to the phone jack. Connect the other side of the phone jack to the positive B-battery binding post. Now con-



THE ONE TUBE reflex, using a crystal as detector, is shown in the above diagram (Fig. 2).

nect the F (or the A) of the radio frequency transformer to the B of the audio transformer. Then connect the G of the RF transformer to the crystal detector and the other side of the crystal detector to the P of the audio frequency transformer. Next connect the G of the AF transformer to the movable plates binding post of the tuning condenser, and the A of the same transformer, to the negative lead of the A battery. The wiring for this receiver is now finished, except for the condensers, which are connected at the positions shown in the diagram.

You should now receive all of the stations which you before heard, but with greatly increased volume. Indeed, with the local stations, the volume will have become too great to be comfortable with the headphones, and the tube will have to be turned down, or a loud speaker will have to be used.

THE complete list of parts needed to construct the one-tube reflex described by Mr. Caldwell is published herewith. It includes the parts mentioned in the previous article.

7 x 24-inch panel, Radion or bakelite.
 7½ x 23 x ½ inch baseboard.
 Two 3-inch dials.
 Switch outfit.
 Four 1½-inch bezels.
 One single circuit jack.
 Six binding posts.
 One rheostat
 One socket.
 Variocoupler.

23-plate condenser.
 Grid leak.
 Crystal detector.
 AF and RF transformers.
 Two .00025 fixed condensers.
 .002 fixed condenser.
 Screws, bus wire, copper terminals, variocoupler switch point connectors, and soldering outfit.
 Tube, phones, and batteries.

How to Get Greater Signal Strength

By Vincent Victory

MANY builders of sets are only partly satisfied with the results of their receivers and are ever looking for hints at to their improvement.

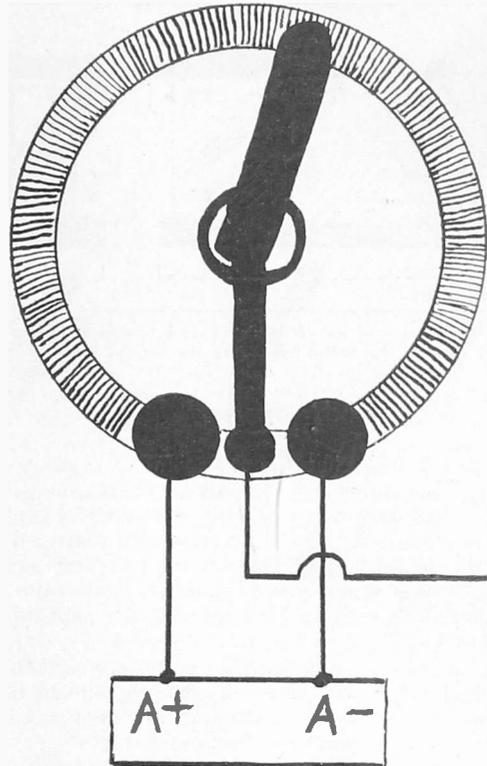
A potentiometer included in the filament grid circuit of most of the single-circuit radio frequency amplifiers, and even triple circuits, will give control of the regeneration and volume of sound to such an extent that the builder will actually be surprised. It is easy to install a potentiometer in the circuit and wherever it is possible it should be used, especially with the UV199 and the other dry cell tubes.

Another improvement easily made where audio frequency amplification is used is the addition of a C battery in the grid circuit of the amplifier tubes. This battery should consist of one of the flat type dry batteries such as are used by flashlight manufacturers. The long flap (negatively) should be connected towards the grid, so as to place a negative impulse on the grid of the tube, thereby giving distortionless amplification.

Vernier controls wherever possible should be used. This may seem an unnecessary evil, but the man who is well versed in searching for DX stations knows with what delicate adjustments the set must be tuned. The couplers, condensers and rheostat of the detector tube should be vernier control. If you do not care to instal new apparatus, the little button fitting alongside of the edge of the dial will function very nicely and surprise you in its ability to allow distant stations to be tuned in with precision.

Shellac should never be used as a binding agent when winding coils. This causes greatly distributed capacity in the coils and detracts from the sharpness of the set. If it is not possible to wind the coils tightly enough by hand, it is better to use collodion.

Probably the greatest mistake that novices make is the addition of unnecessary parts, not specified in the circuit diagrams.

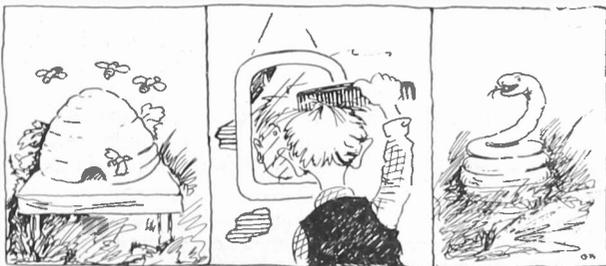


HOW CONNECTIONS ARE MADE TO A POTENTIOMETER—The two posts that correspond to those of a rheostat are connected from the potentiometer to the A plus and A minus, just as in the case of a rheostat. The midpoint of the potentiometer goes to the end of the secondary of your inductance coil, the lead shown at extreme right.

You Know

what this picture represents

Let the Rebus Editor Know that You Know
and He Will Let the World Know



REBUS NO. 1.

RADIO fans are known for their cleverness. RADIO WORLD knows how clever they are. The ingenious devices and adaptation contained in the mail sent to the editor by readers of RADIO WORLD leave no doubt about it.

Knowing that its readers like to indulge their cleverness, RADIO WORLD herewith begins publishing a series

of rebus drawings. If you can read a diagram you should be able to read the rebus. Study the picture carefully and see if you cannot tell what piece of radio apparatus it represents.

After you have decided, send your answer to Rebus Editor, RADIO WORLD, 1493 Broadway, New York City. Mention Rebus No. 1. Be sure to give your full name and address. The names of all those sending in the correct answer will be published in RADIO WORLD.

Disguising Mistake in Panel Drilling

SOMETIMES when drilling a panel, the constructor will drill a hole that is not needed, or it will be so far off register that it is simply an extra hole. This of course spoils the panel to some extent. However, it can be disguised so that no one not knowing the hole was there would believe it.

Get some black sealing wax and a small piece of smooth glass. Lay the panel face down on some smooth surface, with the piece of glass directly under the hole. Then melt the sealing wax into the hole, letting it dry thoroughly before removing it. Upon turning it over, it will be found that the sealing wax has neatly filled the hole.

Making a Variable Grid Condenser

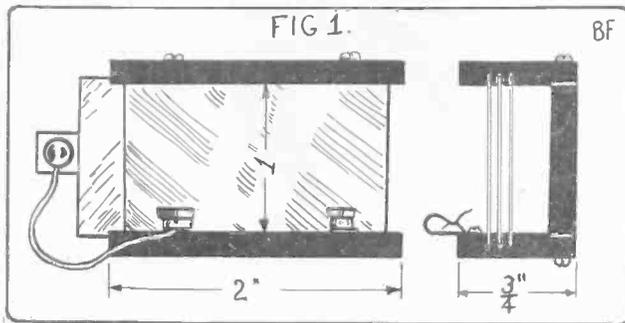


FIG. 1—Dimensions of an air-insulated grid condenser having very low capacity. It may be varied by sliding the central plate in its grooves.

By Brainard Foote

WHY is it that the .00025 mfd. capacity has always been considered correct for the grid condenser? Is this capacity accepted because it's best in results or merely as a matter of habit? I cannot say, but do know that many receiving circuits may be greatly improved upon in both tone quality and selectiveness by a reduction in the capacity of the grid condenser.

Anyone who has purchased a one or two plate vernier condenser and used it as a grid condenser has been surprised to find a most pleasing improvement in clearness and in sharpness of tuning when its capacity was made very low. As a matter of fact, the user of such a grid condenser has discovered that it is possible to set the instrument at practically zero capacity and still obtain very good results—thus demonstrating that so large a capacity as .00025 mfd. is not at all necessary.

Apparently, a reduction in the capacity of the grid condenser reduces the capacitive coupling between the tuning circuit and the grid of the tube, in that way minimizing the actuation of that grid by signals on a wave length different from that to which the tuning circuit is adjusted. In other words, a smaller grid condenser gives greater selectivity, and without the slightest cut in volume. But improvement is not to be looked for in the matter of capacity alone.

Type of Dielectric

Air, as is well known, is the most perfect insulating medium. Tests by the Bureau of Standards have shown many times that variable condensers using a minimum of insulation for supporting the plates are most efficient and result in loudest signals. In addition to that requirement, the Bureau stipulates for best sensitivity in any receiving circuit a condenser insulation which has a low dielectric constant. This brings the insulation as near as possible to the insulating conditions of air.

Perhaps "dielectric constant" may require a word of explanation. If we have two flat sheets separated by a certain distance by air alone, a condenser will be formed having a certain capacity. Now if we slide between those plates a sheet of mica equal in thickness to the separation between the plates, the capacity of the condenser will immediately become about five times its original value. The dielectric constant of that mica is then said to be "5," because it makes the condenser's capacity 5 times what it would be with air instead of the mica. Sometimes this increase in capacity is a desirable thing, but in circuits where high

efficiency is necessary losses known as "dielectric absorption" take place, and the radio frequency currents passing through that condenser are not passed with their original form retained. In other words, a condenser in which too much dielectric absorption is present does distort the passing current to some extent. In the case of a small condenser used as a series or grid condenser, this loss is scarcely noticeable, and yet some believe it worth while to do away with such loss if possible.

To secure a more efficient condenser, then, we must use as much air dielectric as possible, and for purposes of improvement on the grid condenser, we desire a lower capacity. We do not wish to employ much dielectric and what dielectric we do have to use, let it be hard rubber, as this is recommended by the U. S. Bureau of Standards as being next to air for condenser insulation.

A Variable Condenser

For the experimentally inclined, I have the following type of construction to suggest. See Fig. 1, and also the left hand condenser of Fig. 2. The fixed plates are cut from a sheet of aluminum with scissors or tinsmith's snips about $1\frac{3}{4}$ by $1\frac{3}{4}$ inches. The rotor plate is made the same length, but only about $1\frac{1}{8}$ inches in width. The supporting plates are of hard rubber, regular panel thickness— $\frac{1}{4}$ inch—and all three cut 2 inches long. The side piece is 1 inch wide, while the two brackets are $\frac{3}{4}$ inch. Fig. 1 shows an end view, pointing out the method by which the plates are held in position.

There are three narrow grooves cut with a thin hacksaw in the brackets—the slots or grooves being about $\frac{1}{16}$ inch apart. The grooves should be about $\frac{1}{8}$ inch deep. Small round head wood screws may be successfully used to hold the brackets to the side piece—holes slightly smaller in diameter than the screws being first drilled into the side piece. The hole which passes the screw through the bracket should be slightly larger than the screw, however.

When the screws are tightened, the fixed plates are gripped securely between the brackets, while the movable plate is loose and will slide in the groove. If necessary, its groove should be made a little wider than the other two to permit free movement in and out. A small binding post knob fastened to an extending lug on the movable plate serves as a handle. Two small Fahnestock clips provide quick connection—one making contact to the movable plate through a length of flexible cord and the other joined to a length of small copper wire "squeezed" underneath the two fixed plates as the fastening screws are tightened down.

What capacity will such a condenser have when it is completed? A little simple algebra serves to determine this, and our calculations are to be made in the metric system, not in inches. The formula for condenser capacities having air as the dielectric is as follows:

$$C = \frac{A}{d}$$

$$4 \times 3.1416 \times 9 \times 100000 \times d$$

where C is the capacity in microfarads

A is the plate area in square centimeters

d is the separation between plates in centimeters

Our plate area is $1\frac{3}{4}$ by $1\frac{3}{4}$ inches, or 2.19 sq. in. This is equal to 14.13 sq. cm. The plate separation is $\frac{1}{16}$ inch, or .0625 inch. This is equal to .1587 cm.

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Tone Quality of Reception Increased

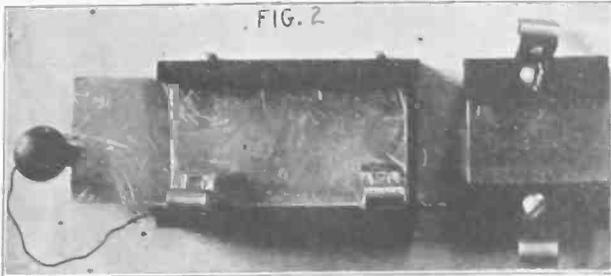


FIG. 2—Photo of fixed and variable grid condensers with air as the main dielectric. Spring clips make connections to the condensers easy. Sheet aluminum is used, together with hard rubber supports.

(Concluded from preceding page)

Substituting these values in the formula above, we find the capacity

$$C = .00000787 \text{ mfd.}$$

This, however, is only the capacity between two such plates. Since we have double that, we multiply the above by 2 to find the actual capacity of our condenser at full value. This becomes .00001574 mfd. This is certainly a good deal less than the customary .00025 size—just about one-fifteenth as large, and yet in practically every case it means a surprising improvement in reception. By variations of the above formula, the radio fan may build himself a grid condenser of any desired capacity, bearing in mind that it holds only where there is practically no other dielectric than air between the plates. The figure obtained in the case of other dielectrics must be multiplied by the dielectric constant. Of course, the working capacity may be less than .0000157 in case the moving plate is pulled out part way. If it is half way out, for example, its capacity will then be just half, or .00000787 mfd.

A Fixed Form

The actual capacity of the grid condenser doesn't play so big a part so long as it is very small. Hence for all around purposes, a fixed capacity will do quite satisfactorily. At the right of Fig. 2, is illustrated a fixed form of condenser, having a capacity of approximately .000018 mfd., which is exceedingly simple of construction.

Fig. 3 depicts the method of assembly and shows how the Fahnstock clips are employed to make connections to both plates. The plates are 1 inch square, with a cut-away section at one end of each to allow room for the holding screw to pass and touch only one plate at each end. The hard rubber strips holding the condenser together are cut about 1 inch long and 1/4 inch wide, regular panel thickness rubber being used. The separating strips are also 1/4 inch wide and rubber 1/32 inch thick is employed here. Most any sort of good insulation can be used if such thin sheet rubber cannot be obtained, but as a rule a little search through stores carrying panel material will reveal 32nd inch stock. It can be cut with shears very easily.

The clips may be taken from an old "B" battery and a hole drilled with a No. 27 twist drill to pass the 1/2-inch 6-32 machine screw that is used to fasten the parts together. The clips are mounted between the holding strips and right against the plate to which they make contact. A corner of the plate may be allowed to extend and used as a mounting lug if this practice appeals to some. In any case, a highly efficient grid condenser will result, whether fixed or variable, with air as the main dielectric in both cases.

I would suggest that the grid leak be of the fixed

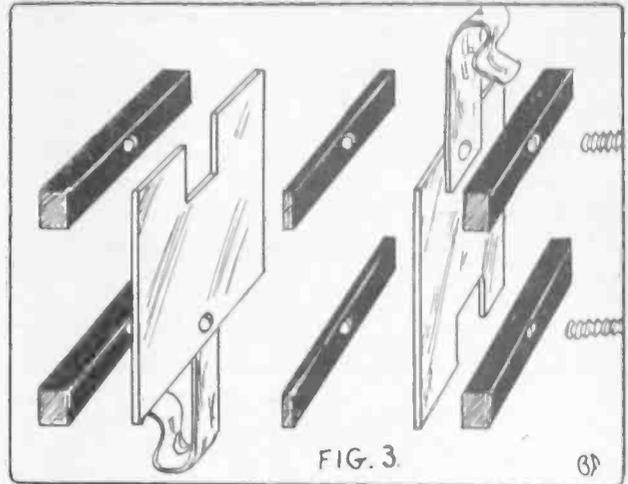


FIG. 3—How the fixed grid condenser is put together. A 32nd inch thick strip of hard rubber keeps the plates apart.

variety—keeping several sizes such as 1, 1 1/2, 2, 2 1/2 and 3 megohms to try with each detector tube. Connect the leak between the grid of the tube and the positive side of the filament, bearing in mind that all wires from the grid to the grid condenser and to the grid leak must be as short as possible to reduce chances of capacitative coupling direct to the grid from the body or any other source.

A revelation in tonal quality is in store for anyone sufficiently interested in clear detection to try a lower capacity condenser and a condenser of high efficiency. Any listener who is anxious to test both kinds may easily rig up an anti-capacity double pole double throw cam switch and connect first one and then the other in circuit as the grid condenser. A little retuning will be necessary when the condensers are changed, as well as a readjustment of the feed-back for regeneration. A good grid condenser repays in reception for the slight labor of its construction.

Hoover's Reduced Funds are Restored

APPROPRIATIONS for the administration of radio under the Department of Commerce, reduced by \$21,500 by the House of Representatives, have been re-established by the Senate Appropriations Committee at \$180,278.

Following the reductions made by the House, Secretary Hoover before the Senate Committee voiced his opinion that the Departmental radio section absolutely needed the full amount allowed by the budget. It is now believed that the amount approved by the Senate will finally be passed and that the Senate and House conferees will agree.

CYL on the DX List

STATION CYL, at Mexico City, has been heard in many sections of the United States. The station has been on the air every night since December. It is rated with a power of 500 watts. All broadcasting is done on a wave length of 500 meters, and the programs consist of news bulletins and music.

Complete List of Broadcast Stations

HEREWITH is published a complete list of all the broadcasting stations in the United States. This list contains 565 stations, the number holding licenses on May 9, the date to which the list was compiled.

In next week's issue the stations in Canada will be listed, as well as those in Cuba, Porto Rico, Mexico and Great Britain.

The call letters are given, the name of the station owner, the location of the station and the wave length in both meters (M) and kilocycles (K).

Call	Owner	Location	M	K
KDKA	W't'ghouse Co.	E Pittsb'gh, Pa.	326	920
KDFW	West'ghouse Co.	Cleveland, O.	270	1110
KDPT	South'n Elec Co.	San Diego, Cal.	244	1230
KDYL	Tel'g'm Co.	Salt Lake City, U.	360	830
KDYM	Savoy Theatre	San Diego, Cal.	280	1070
KDYO	Ore. Inst. Tech.	Portland, Ore.	360	620
KDYY	Star Bulletin	Honolulu, Hawaii	360	620
KDZB	F. E. Siefert	Bakersfield, Cal.	240	1250
KDZE	Rhodes Co.	Seattle, Wash.	270	1110
KDZI	Elec. Sup. Co.	Wenatchee, Wash.	360	830
KDZR	Nichols A. of M.	Denver, Col.	360	830
KDZR	Bel'gham Co.	Bel'gham, Wash.	261	1150
KFAD	M'Arthur Bros. Merc. Co.	Phoenix, Ariz.	360	830
KFAE	State College	Pullman, Wash.	330	910
KFAF	West. Radio Corp.	Denver, Colo.	360	830
KFAJ	Univ. of Colorado	Boulder, Colo.	360	830
KFAN	Elec. Shop	Moscow, Idaho.	360	830
KFAR	Studio Light Co.	Hollywood, Cal.	280	1070
KFAU	Daily Sun	Boise, Idaho.	270	1110
KFAW	Radio Den	Santa Ana, Cal.	280	1070
KFAY	W. T. Virgin Co.	Medford, Ore.	283	1060
KFBB	F. A. Buttrey Co.	Havre, Mont.	360	830
KFBC	W. K. Azbill	San Diego, Cal.	278	1080
KFBE	R. Horn	San Luis Obispo, Cal.	360	830
KFBG	1st Pres. Church	Tacoma, Wash.	360	830
KFBK	K'ball-Upson Co.	Sac'r'm'to, Cal.	283	1060
KFBL	Leise Bros.	Everett, Wash.	224	1340
KFBS	Trinidad G-E Co.	Trinidad, Col.	360	830
KFBT	The Cathedral	Laramie, Wyo.	283	1060
KFCB	Nielson Radio Co.	Phoenix, Ariz.	238	1260
KFCF	F. A. Moore	Walla Walla, Wash.	360	830
KFCG	Elec. Ser. Sta.	Billings, Mont.	360	830
KFCP	R. W. Figgare	Ogden, Utah	360	830
KFCV	F. Mahaffey	Houston, Texas	360	830
KFCY	West. Union Co.	Le Mars, Ia.	360	830
KFCZ	Omaha Cen. H. S.	Omaha, Neb.	258	1160
KFDA	Adlers Music Store	Baker, Ore.	360	830
KFDD	St. Michael's Cath.	Boise, Ida.	252	1190
KFDE	Univ. of Ariz.	Tucson, Ariz.	360	830
KFDF	Oregon Agri. Col.	Corvallis, Ore.	360	830
KFDO	H. E. Cutting	Bozeman, Mont.	248	1210
KFDR	Bullock's Store	York, Neb.	360	830
KFDV	Gilbrech & Stinson	Fayetteville, Ark.	360	830
KFDX	1st Baptist Ch.	Shreveport, La.	360	830
KFDY	S. D. State College of Ag.	Brookings, S. D.	360	830
KFDZ	H. O. Iverson	Min'polis, Minn.	231	1300
KFEC	Meier & Frank Co.	Portl'd, Ore.	360	830
KFEL	Winner Radio Corp.	Denver, Col.	360	830
KFEQ	J. L. Scroggin	Oak, Neb.	270	1110
KFER	Auto E. S. Co.	Ft. Dodge, Ia.	231	1300
KFEV	Radio Elec. Shop	Douglas, Wyo.	263	1140
KFEY	Augsburg Sem.	Min'polis, Minn.	261	1150
KFEY	Bunker Hill & Sull. Mng. Co.	Kellogg, Idaho	360	830
KFEZ	Am. So. of Mech. Eng.	St. Louis	360	830
KFFB	Jenkins Furn. Co.	Boise, Idaho	273	1100
KFFE	East. Ore. R. Co.	Pendleton, Ore.	360	830
KFFO	Dr. E. H. Smith	Hillsboro, Ore.	229	1310
KFFP	1st Baptist Ch.	Moberly, Mo.	266	1130
KFFO	Marksheffel M. C.	Col. Spgs, Col.	360	830
KFFR	Jim Kirk	Sparks, Nev.	226	1330
KFFV	Graceland Col.	Lamoni, Iowa	360	830
KFFX	McGraw Co.	Omaha, Neb.	278	1080
KFFY	Pincus & Murphy	Alex'ndria, La.	275	1090
KFFZ	A. G. Barnes & Co.	Dallas, Tex.	226	1330
KFGC	La. State Univ.	Baton Rouge, La.	254	1180
KFGD	Chickasha Radio & Elec. Co.	Chickasha, Okla.	248	1210
KFGH	Leland Stanford University	Stanford Univ., Cal.	226	1330
KFGL	Arlington Garage	Arlington, Ore.	234	1250
KFGV	Crary H'dw'r Co.	Boone, Iowa	226	1330
KFGW	Heidbreder R. S. Co.	Utica, Neb.	224	1340
KFGX	1st Pres. Church	Orange, Tex.	250	1200
KFGY	Gjelhaug's R. S.	Baudette, Minn.	224	1340
KFGZ	Emmanuel Missionary College	Berrien Springs, Mich.	268	1120
KFHA	Col. State Normal School	Gunnison, Col.	252	1190
KFHB	Rialto Theatre	Hood River, Ore.	280	1070
KFHD	Utz Elec. Shop Co.	St. Joe, Mo.	226	1330
KFHE	Con. Chrst. Ch.	Shreveport, La.	266	1130
KFHH	A. J. McCue	Neah Bay, Wash.	261	1150
KFHI	Fallo' & Co.	Santa Barbara, Cal.	360	830
KFHR	Star Elec. & Radio Co.	Seattle, Wash.	270	1110
KFHX	R. W. Nelson	Hutchinson, Kan.	229	1310
KFI	E. C. Anthony, Inc.	Los Angeles	469	640
KFID	Arbuckle's Garage	Iola, Kan.	246	1220
KFIF	Benson Insti.	Portland, Ore.	360	830
KFIL	Windisch Co.	Louisburg, Kan.	234	1280
KFIO	N. Cen. H. S.	Spokane, Wash.	252	1190
KFIQ	Yakima Valley Radio Broad-	casting Asso., Yakima, Wash.	224	1340
KFIU	Alaska Elec. Co.	Juneau, Alaska	226	1330
KFIX	Church of Latter Day Saints	Independence, Mo.	240	1250
KIFZ	Daily Commonwealth	Fond du Lac, Wis.	273	1100

Call	Owner	Location	M	K
KFJI	Liberty Theatre	Astoria, Ore.	252	1190
KFJK	Delano Radio & Elec. Co.	Bristow, Okla.	233	1290
KFJL	Hardack Co.	Ottumwa, Iowa.	242	1240
KFJM	Univ. of N. D.	Grand Forks, N. D.	229	1310
KFJQ	Valley Radio Co.	Grand Forks, N. D.	280	1070
KFJR	Dixon & Son	Stevensville, Mont.	258	1160
KFJV	I. H. Warren	Dexter, Iowa.	224	1340
KFJX	State Teacher's College	Cedar Falls, Iowa	229	1310
KFJY	Trenwall Radio Co.	Fort Dodge, Iowa	246	1220
KFJZ	Texas Nat'l. Gd. (12th Cav.)	Fort Worth, Texas	254	1180
KFKA	Tunwell Radio Co.	Fort Dodge, Iowa	246	1220
KFKB	Brinkley-Jones Hosp.	Milford, Kan.	286	1050
KFKQ	Conway Radio Lab.	Conway, Ark.	224	1340
KFKV	F. Gray	Butte, Mont.	283	1060
KFKX	Westinghouse E. & M. Co.	Hastings, Neb.	286	1050
KFKZ	Nassour Bros.	Colorado Springs, Colo.	234	1280
KFLA	A. R. Willson	Butte, Mont.	248	1210
KFLB	Signal Mfg. Co.	Menominee, Mich.	248	1210
KFLD	P. E. Greenlaw	Franklinton, La.	234	1280
KFLE	Nat'l Educational Serv.	Denver, 268	1120	
KFLH	Errickson Radio Co.	Salt Lake City	261	1150
KFLP	E. N. Foster	Cedar Rapids, Ia.	240	1250
KFLQ	Bizzell Radio Co.	Little Rock, Ark.	261	1150
KFLR	Univ. of N. M.	Albuquerque, N. M.	254	1180
KFLU	Rio Grande Radio Co.	San Benito, Texas	236	1270
KFLV	Rev. A. T. Frykman	Rockford, Ill.	229	1310
KFLW	Missoula Elec. Sup. Co.	Missoula, Mont.	234	1280
KFLX	Geo. R. Clough	Galveston, Texas	240	1250
KFLY	Fargo Radio Co.	Fargo, N. D.	231	1300
KFLZ	Atlantic Auto Co.	Atlantic, Iowa	273	1100
KFMQ	Univ. of Ark.	Fayetteville, Ark.	263	1140
KFMR	Morningside Col.	St. Louis City, Ia.	261	1150
KFMS	Freimuth Dept. Store	Duluth, Minn.	275	1090
KFMT	Dr. G. W. Young	Minneapolis, 231	1300	
KFMT	Stevens Bros.	San Marcos, Tex.	240	1250
KFMW	M. G. Sateren	Houghton, Mich.	266	1130
KFMX	Carlson Col.	Northfield, Minn.	283	1060
KFMY	Boy Scouts of Am.	Long Beach, Cal.	229	1310
KFMZ	Roswell Broadcasting Club	Roswell, N. M.	250	1200
KFNC	Alonzo Monk, Jr.	Corsicana, Tex.	234	1280
KFNF	H. Field Seed Co.	Shenandoah, Iowa	266	1130
KFNG	Wooten's Radio Shop	Coldwater, Miss.	254	1180
KFNH	State Teachers' Col.	Springfield, Mo.	236	1270
KFNJ	Warensburg Elec. Shop	Warensburg, Mo.	234	1280
KFNY	Montana Phono. Co.	Helena, Mont.	261	1150
KFNX	Peabody Radio Soc.	Peabody, Kan.	240	1250
KFOC	First Christian Church	Whittier, Calif.	236	1270
KFOD	Vern Peters	Wallace, Idaho	224	1340
KFOF	Rohrer Electric Co.	Marshfield, Ore.	240	1250
KFOH	Radio Bungalow	Portland, Ore.	283	1060
KFOJ	Moberly H. S. Radio Club	Moberly, Mo.	246	1220
KFOL	L. M. Schafbusch	Marengo, Ia.	234	1280
KFON	Echophone Radio Shop	Long Beach, Calif.	234	1280
KFOO	Latter Day Saints Univ.	Salt Lake City, Utah	261	1150
KFOP	Wilson Constr. Co.	Dallas, Texas	268	1120
KFOQ	Ora W. Chancellor	Galveston, Texas	240	1250
KFOR	David City Tire & Elec. Co.	David City, Neb.	226	1330
KFOT	College Hill Radio Club	Wichita, Kan.	231	1300
KFOU	Hommell Mfg. Co.	Richmond, Calif.	254	1180
KFOV	Davis Elec. Corp.	Sioux City, Ia.	234	1280
KFOX	Bd. of Ed. Tech. H. S.	Omaha, Neb.	248	1210
KFOY	Beacon Radio Soc.	St. Paul, Minn.	226	1330
KFOZ	Hudson Real Est. Co.	Fort Smith, Ark.	233	1290
KFPB	E. J. Brown	Seattle, Wash.	224	1340
KFPD	Garrettson & Dennis	Los Angeles	254	1180
KFPH	H. C. Mailander	Salt Lake City	242	1240
KFPL	C. C. Baxter	Dublin, Texas.	242	1240
KFPM	New Furn. Co.	Greenville, Tex.	242	1240
KFPN	Missouri Nat'l Guard	Jefferson City, Mo.	242	1240
KFPP	G. & C. Radio & Elec. Shop	Olympia, Wash.	236	1270
KFPO	C. M. Esler	Dennison, Tex.	231	1300
KFPR	Forestry Dept.	Los Angeles, Cal.	231	1300
KFPS	C. A. Ross	Casper, Wyo.	242	1240
KFPV	Heintz & Kohlmoos	San Francisco, Cal.	236	1270
KFPW	M. E. Church	S. Cartersville, Mo.	268	1120

Call	Owner	Location	M	K
KGG	Hallock & Watson	Portland, Ore.	360	830
KGK	N'western Rad. Mfg. Co.	Portland, Ore.	360	830
KGO	Gen. Elec. Co.	Oakland, Cal.	312	960
KGU	M. A. Mulrony	Honolulu, Hawaii	360	830
KGW	Oregonian	Portland, Ore.	492	610
KGY	St. Martin's College	Lacey, Wash.	258	1160
KHJ	Times	Los Angeles	395	760
KHQ	Wasmuser	Seattle, Wash.	360	830
KJQ	C. O. Gould	Stockton, Cal.	360	830
KJR	Northwest Rad. Ser.	Seattle, Wash.	283	1060
KJS	Bible Inst. of L. A.	Los Angeles	360	830
KLS	Warner Bros. Rad. Co.	Oakland, Cal.	360	830
KLX	Tribune Pub. Co.	Oakland, Cal.	509	590
KLZ	Reynolds Rad. Co.	Denver, Colo.	360	830
KMJ	San Joaquin Lt. & Pr. Corp.	Fresno, Cal.	273	1100
KMO	Times	Tacoma, Wash.	360	830
KNT	Gray's Harbor Rad. Co.	Aberdeen, Wash.	263	1140
KNX	Elec. Light. Sup. Co.	Los Angeles	360	830
KOB	N. M. Col. of Ag. & Mec. Arts	State College, N. M.	360	620
KOP	Detroit Police Dept.	Detroit, Mich.	286	1050
KPO	Hale Bros.	San Francisco	423	710
KQP	Apple City Rad. Club	Hood River, Ore.	360	830
KQV	Douglas-Hill	Pittsburgh, Pa.	360	830
KQW	C. D. Herrold	San Jose, Cal.	360	830
KRE	Gazette	Berkeley, Cal.	278	1080
KSD	Post Dispatch	St. Louis	546	550
KTW	1st Presb. Church	Seattle, Wash.	360	830
KUO	Examiner Ptg. Co.	San Francisco	360	830
KUY	Coast Radio Co.	El Monte, Cal.	256	1170
KWG	Portable Wireless Tel.	Stockton, Cal.	360	830
KWH	Examiner	Los Angeles	360	830
KYW	Westinghouse Co.	Chicago	536	560
KYQ	Electric Shop	Honolulu	360	830
KZM	D. Allen	Oakland, Cal.	360	830
KZN	Cope & Johnson	Salt Lake City	268	1120
KZV	Wenatchee Bat. Co.	Wenatchee, Wash.	360	620
WAAB	Jensen	New Orleans	268	1120
WAAC	Tulane Univ.	New Orleans	463	650
WAAD	Ohio Mech. Inst.	Cincinnati	360	830
WAAG	Drovers Journal	Chicago	286	1050
WAAC	Gimbel Bros.	Milwaukee, Wis.	280	1170
WAAM	J. R. Nelson Co.	Newark, N. J.	263	1040
WAAN	Univ. of Mo.	Columbia, Mo.	254	1180
WAAP	Omaha Grain Ex.	Omaha, Neb.	360	830
WAAB	Har. Sptg. Gds. Co.	Harrisburg, Pa.	266	1130
WABD	Parker High School	Dayton, O.	283	1060
WABE	Y. M. C. A.	Washington, D. C.	283	1060
WABG	Arnold Edwards Piano Co.	Jacksonville, Fla.	243	1210
WABH	Lake Shore Tire Co.	Sandusky, Ohio	240	1250
WABI	Bangor Rail. & Elec. Co.	Bangor, Me.	240	1250
WABL	Conn. Agr. College	Storrs, Conn.	283	

Call	Owner	Location	M	K	Call	Owner	Location	M	K	Call	Owner	Location	M	K
WBR	Penna. State Police	Butler, Pa.	286	1050	WHAM	Univ. of Rochester	Rochester, N. Y.	283	1060	WOAT	B. M. Hamp	Wilmington, Del.	360	830
WBS	D. W. May, Inc.	Newark, N. J.	360	830	WHAP	Otta & Kuhns	Decatur, Ill.	360	830	WOAW	Penn. Nat. Guard	Erie, Pa.	242	1240
WBT	Southern Radio	Charlotte, N. C.	360	830	WHAR	Par. R. & E. Co.	Atlantic City	231	1300	WOAW	W'dmen of World	Omaha, Neb.	526	570
WBZ	Westinghouse	Springfield, Mass.	337	890	WHAS	Courier-Journal Times	Louisville, Ky.	400	750	WOAX	F. J. Wolff	Trenton, N. J.	240	1250
WCAC	J. Finke Jewelry	Ft. Smith, Ark.	360	830	WHAU	Wilmington Elec. Spec. Co.	Wilmington, Del.	360	830	WOC	Palmer Sch. of Chiro.	Davenport, Iowa	484	620
WCAD	St. Lawrence Univ.	Canton, N. Y.	360	830	WHAZ	Rensselaer Pol. Inst.	Troy, N. Y.	380	760	WOI	Iowa State Col.	Ames, Iowa	360	830
WCAE	Kaufman & Baer	Pittsburgh	462	650	WHB	Sweeney Sch. Co.	Kan. City, Mo.	411	730	WOO	John Wanamaker	Philadelphia	509	590
WCAH	C. R. Randall	New Orleans	268	1120	WHK	Radio Box Co.	Cleveland, Ohio	283	1060	WOQ	West. Radio Co.	Kansas City, Mo.	360	830
WCAJ	Entrekin Elec. Co.	Columbus, O.	286	1050	WHN	Loew's State Theatre	N. Y. C.	360	830	WOR	Bamberger & Co.	Newark, N. J.	405	740
WCAJ	Neb. Wesleyan Univ.	University Place, Neb.	360	830	WHO	Bankers Life Co.	Des Moines, Ia.	526	570	WOS	Mo. State Market Bureau	Jefferson City, Mo.	441	680
WCAK	A. P. Daniel	Houston, Texas	263	1140	WHT	Mich. L. & C. Co.	Rogers, Mich.	300	1000	WPAB	Penn. State Col.	State Col. Pa.	283	1060
WCAL	St. Olaf Col.	Northfield, Minn.	360	830	WIB	Joslyn Tribune	Rockford, Ill.	252	1190	WPAC	Donaldson Radio	Okmulgee, Okla.	360	830
WCAM	Villanova Col.	Villanova, Pa.	360	830	WIAD	Galston Tribune	Galveston, Tex.	360	830	WPAH	Wis. D. of M.	Waupaca, Wis.	360	830
WCAO	Sanders & Stayman Co.	Baltimore, Md.	360	830	WIAD	H. R. Miller	Philadelphia, Pa.	254	1180	WPAJ	Doolittle Radio Corp.	New Haven, Conn.	268	1120
WCAP	Chesapeake & Potomac Tel. Co.	Washington, D. C.	469	640	WIAD	H. R. Miller	Philadelphia, Pa.	254	1180	WPAK	N. Dak. Agri. College	Agricultural College, N. D.	360	620
WCAR	Alamo Co.	San Antonio, Tex.	360	830	WIAJ	Fox Riv. Val. Radio Sup. Co.	Neehan, Wis.	224	1340	WPAL	Superior Rad. Tel. & Equip. Co.	Columbus, Ohio	286	1050
WCAS	W. H. Dunwoody Inst.	Minneapolis	246	1220	WIAK	Jour'l Stock'n Co.	Omaha, Neb.	278	1080	WPAM	Auerb' & Guettel	Topeka, Kan.	360	830
WCAT	South Dakota School of Mines	Rapid City, S. D.	240	1250	WIAO	School of Eng. of Milwaukee	Milwaukee, Wis.	360	830	WPAP	T. D. Phillips	Winchester, Ky.	360	830
WCAU	Durham & Co.	Philadelphia, Pa.	286	1050	WIAQ	Chronicle Pub. Co.	Marion, Ind.	226	1330	WPAQ	Gen. Sales & Eng. Co.	Frostburg, Md.	360	830
WCAV	Diec Elec. Co.	Little Rock, Ark.	360	830	WIAS	Home Elec. Co.	Burlington, Ia.	360	830	WPAR	West Bat. Co.	Beloit, Kan.	236	1270
WCB	C. W. Heimbach	Allentown, Pa.	280	1070	WIAU	Am. T. & S. Bank	Le Mars, Ia.	360	830	WPAT	St. Pat. Cathed.	El Paso, Tex.	360	830
WCB	Univ. of Mich.	Ann Arbor, Mich.	280	1070	WIAY	Woodward & Lathrop	Washington, D. C.	273	1100	WPAU	Concordia Col.	Moorhead, Minn.	360	620
WCB	W. G. Voliva	Zion, Ill.	345	770	WIK	K. & L. Elec. Sup. Co.	McKeesport, Pa.	360	830	WQAA	H. A. Beale	Parkesburg, Pa.	360	830
WCBF	Paul J. Miller	Pittsburgh	236	1270	WIP	Gimbel Bros.	Philadelphia, Pa.	509	590	WQAC	E. B. Gish	Amarillo, Texas	360	830
WCBG	H. S. Williams	Pacagoula, Miss.	236	1270	WJAD	Jackson's R. E. L.	Waco, Tex.	360	830	WQAD	Whithall Elec. Co.	Waterbury, Conn.	242	1240
WCB	Nicoll, Duncan & Rush	Bemis, Tenn.	226	1330	WJAL	Continental Elec. Sup. Co.	Washington, D. C.	360	830	WQAE	Moore Radio	Springfield, Vt.	275	1090
WCBJ	J. C. Mans	Jennings, La.	244	1230	WJAJ	Norfolk D'No News	Norfolk, Neb.	283	1060	WQAF	Sandusky Register	Sandusky, O.	240	1250
WCBK	E. R. Hall	St. Petersburg, Fla.	266	1130	WJAK	C. L. White	Norfolk, Neb.	360	830	WQAL	Coles Co. Tel. & Tel. Co.	Mattoon Ill.	258	1160
WCB	N. Radio Mfg. Co.	Houlton, Me.	280	1070	WJAM	D. M. Perham	Greentown, Ind.	254	1180	WQAM	Elect. Equip. Co.	Miami, Fla.	283	1060
WCB	Charles Swarz	Baltimore, Md.	229	1310	WJAN	Peoria Star	Peoria, Ill.	280	1070	WQAN	Scranton Times	Scranton, Pa.	280	1070
WCB	J. Boland	Ft. Ben. Harrison, Ind.	266	1130	WJAO	Capper Pub.	Cedar Rapids, Ia.	268	1120	WQAO	Calvary Baptist Chr.	N. Y. C.	360	830
WCB	Radio Shop, Inc.	Memphis, Tenn.	250	1200	WJAP	Outlet Co.	Providence, R. I.	360	830	WQAW	W. Tex. Rad. Co.	Abilene, Tex.	285	1050
WCBQ	Ist Baptist Ch.	Nashville, Tenn.	236	1270	WJAS	Pittsburgh Radio Sup. House	Pittsburgh, Pa.	250	1200	WQAS	Prince-Walter Co.	Lowell, Mass.	265	1130
WCB	Univ. of Miss.	Oxford, Miss.	242	1240	WJAT	Kelly-Vawter Jewelry Co.	Marshall, Mo.	360	830	WQAW	Catholic Univ.	Washington, D. C.	236	1270
WCBT	Clark Univ.	Worcester, Mass.	238	1260	WJAX	Union Trust Co.	Cleveland, O.	390	760	WQAX	Rad. Equip. Co.	Peoria, Ill.	360	830
WCB	Arnold Wire Co.	Arnold, Pa.	254	1180	WJAZ	Chicago Rad. Lab.	Chicago	448	670	WQAW	W. M. Rice Inst.	Houston, Tex.	360	830
WCBV	Tullaha R. Co.	Tullahoma, Tenn.	252	1190	WJD	Dennison Univ.	Granville, O.	229	1310	WQAW	Rad. Equip. Co.	Peoria, Ill.	360	830
WCBW	G. P. Rankin, Jr.	Macon, Ga.	226	1330	WJX	De Forest R. T. & T. Co.	N. Y. C.	360	830	WQAW	N. Reed	Providence, R. I.	231	1340
WCBY	Forbes Elec. Shop	Buck Hill Falls, Pa.	268	1120	WJY	Radio Corp. of Am.	N. Y. C.	405	740	WRAL	Nor. S. P. Co.	St. Croix Falls, Wis.	248	1210
WCBZ	Copetelli Bros.	Chgo. Hts. Ill.	248	1210	WJZ	Radio Corp. of Am.	N. Y. C.	455	660	WRAN	Black Hawk Elec. Co.	Waterloo, Iowa	236	1270
WCK	Stix-Baer & Co. & Fuller Co.	St. Louis, Mo.	360	830	WKAA	H. F. Paar	Cedar Rapids, Ia.	360	830	WRAP	J. C. Thomas	David City, Neb.	226	1330
WCM	Univ. of Texas	Austin, Tex.	360	830	WKAD	Chas. Loeff	E. Providence, R. I.	240	1250	WRAP	Antioch Col.	Yellow Sprgs, O.	242	1240
WCM	Detroit Free Press	Detroit	517	880	WKAF	U. S. Radio Sup. Co.	Wichita Falls, Texas	360	830	WRAX	Flaxon's Garage	Gloucester City, N. J.	268	1120
WDAE	Tampa D'ly Times	Tampa, Fla.	360	830	WKAN	Un. Bat. Co.	Montgomery, Ala.	226	1330	WRAY	Radio Sales Corp.	Scranton, Pa.	280	1070
WDAF	Kan. City Star	Kan. City, Mo.	411	740	WKAP	D. W. Flint	Cranston, R. I.	360	830	WRAY	Radio Shop, Newark, N. J.	233	1290	
WDAG	J. L. Martin	Amarillo, Texas	263	1130	WKAQ	Radio Corp. of P. R.	San Juan, Puerto Rico	360	830	WRK	Dorson Bros. E. Co.	Hamilton, O.	360	830
WDAH	Trinity Meth. Church (So.)	El Paso, Texas	268	1120	WKAR	Mich. Agr. Col.	Lansing, Mich.	280	1070	WRL	Union Col.	Schenectady, N. Y.	360	830
WDAJ	A & W P RR Co.	Col. Park, Ga.	360	830	WKAV	Laconia R. C.	Laconia, N. H.	254	1180	WRM	Univ. of Ill.	Urbana, Ill.	360	830
WDAK	The Courant	Hartford, Conn.	261	1150	WKY	WKY Radio Shop	Oklahoma City, Okla.	360	620	WRR	City of Dallas	Dallas, Tex.	360	620
WDAO	Auto. Elec. Co.	Dallas, Texas	360	830	WLAG	Cutting & Walsh Radio Corp.	Minneapolis, Minn.	417	720	WRW	Tarrytown Radio Res.	Tarrytown, N. Y.	273	1100
WDAP	Board of Trade	Chicago	360	830	WLAH	S. Woodworth	Syracuse, N. Y.	234	1250	WSAB	S. E. Mo. State Teachers Col.	Cape Girardeau, Mo.	360	830
WDAR	Lit Bros.	Philadelphia	395	760	WLAJ	Waco Elec. Sup. Co.	Waco, Tex.	360	830	WSAD	J. A. Foster Co.	Providence, R. I.	261	1150
WDAS	S. A. Waite	Worcester, Mass.	360	830	WLAK	Vt. Farm Mach. Corp.	Bellows Falls, Vt.	360	830	WSAG	City, St. Petersburg, Fla.	244	1230	
WDAU	Slocum & Kilburn	New Bedford, Mass.	360	830	WLAL	Naylor Elec. Co.	Tulsa Okla.	360	830	WSAI	U. S. Play. Card Co.	Cincinnati	309	970
WDAY	Fargo Radio Co.	Fargo, N. D.	244	1280	WLAP	W. V. Jordan	Louisville, Ky.	360	830	WSAJ	Grove City Col.	Grove City, Pa.	360	830
WDBA	Fred Ray	Columbus, Ga.	236	1270	WLAQ	A. E. Schilling	Kalamazoo, Mich.	283	1060	WSAN	Allentown R. C.	Allentown, Pa.	229	1310
WDBB	A. H. White Co.	Taunton, Mass.	229	1310	WLAV	Elect. Shop	Pensacola, Fla.	254	1180	WSAP	7th Day Ad. Chr.	N. Y. C.	263	1140
WDBC	Kirk, Johnson & Co.	Lancaster, Pa.	258	1160	WLAW	Police Dept.	N. Y. C.	360	830	WSAR	Doughty & Welch Elec. Co.	Fall River, Mass.	254	1180
WDBD	H. E. Buns	Martinsburg, W. Va.	268	1120	WLAX	Putnam E. Co.	Greencastle, Ind.	231	1300	WSAT	Donohoe-Ware Co.	Plainview, Tex.	268	1120
WDBF	R. G. Philips	Youngstown, O.	246	1220	WLBY	Univ. of Minn.	Minneapolis, Minn.	360	830	WSAU	C. Marienfeld	Chesham, N. H.	229	1310
WDBI	E. B. Peddicord	New Orleans	242	1240	WLBS	Sears Roebuck Co.	Chicago, Ill.	345	870	WSAW	J. Long	Canandaigua, N. Y.	275	1090
WDM	Ch. of Covenant	Washington, D. C.	234	1240	WLW	Crosley Mfg. Co.	Cincinnati, O.	309	970	WSAX	Chicago R. Lab.	Chicago	268	1120
WDZ	J. L. Bush	Tuscola, Ill.	248	1210	WMA	Round Hills Radio Corp.	Dartmouth, Mass.	360	830	WSAY	Irv. Austin	Portchester, N. Y.	230	1300
WEAA	Fallain & Lathrop	Flint, Mich.	280	1070	WMAH	Gen. Sup.	Kan. City, Mo.	275	1180	WSAZ	Chase Radio Co.	Pomeroy, O.	258	1160
WEAF	W. E. Co. (A. T. & T.)	N. Y. C.	492	610	WMAJ	Drovers Tel. Co.	Kan. City, Mo.	275	1180	WSB	Atlanta Journal	Atlanta, Ga.	429	700
WEAH	Wichita B. T. & W.	Wichita, Kan.	244	1230	WMAK	Norton Lab.	Lockport, N. Y.	360	830	WSL	J. & M. Elec. Co.	Utica, N. Y.	273	1100
WEAI	Cornell Univ.	Ithaca, N. Y.	286	1050	WMAL	Trenton Hw. Co.	Trenton, N. J.	256	1170	WSY	Ala. Pow. Co.	Birmingham, Ala.	360	830
WEAJ	Univ. of S. D.	Vermillion, S. D.	280	1070	WMAN	Broad St. Bap. Ch.	Columbia, O.	286	1050	WTAB	Fall River Daily Herald	Fall River, Mass.	248	1210
WEAM	Borough, North Plainfield, N. J.	252	1190	WMAP	Utility Bat. Ser.	Easton, Pa.	246	1220	WTAC	Penn. Traf. Co.	Johnstown, Pa.	360	830	
WEAN	Shepard Co.	Providence, R. I.	273	1100	WMAQ	Chicago Daily News	Chicago	448	670	WTAF	L. J. Gallo	New Orleans, La.	268	1120
WEAO	State Univ.	Columbus, O.	360	830	WMAV	Ala. Poly. Inst.	Auburn, Ala.	250	1200	WTAG	Kern Mus. Co.	Providence, R. I.	258	1160
WEAP	Mobile Radio Co.	Mobile, Ala.	360	620	WMAW	Kingshighway Pres. Church	St. Louis, Mo.	280	1070	WTAJ	Carmen Ferro	Belvidere, Ill.	236	1270
WEAU	Davidson Bros. Co.	Sloux City, Iowa	360	830	WMC	Com. Appeal	Memphis, Tenn.	500	600	WTAK	Radio Shop	Portland, Me.	236	1270
WEAY	W. Horowitz	Houston, Texas	360	830	WMU	Doubleday-Hill Elec. Co.	Washington, D. C.	261	1150	WTAL	Swan-Bower Co.	Steuensville, O.	266	1130
WEB	Benwood Co.	St. Louis, Mo.	360	830	WNAC	Shepard Stores	Boston, Mass.	278	1080	WTAM	Willard Stge. Bat. Co.	Cleveland	252	1190
WEV	Hurlbert-Still	St. Louis	360	830	WNAD	Univ. of Okla.	Norman, Okla.	360	830	WTAP	Cambridge Rad. Elec. Co.	Cambridge, Ill.	242	1240
WEW	St. Louis Univ.	Houston	360	830	WNAL	R. J. Rockwell	Omaha, Neb.	242	1240	WTAQ	S. Van Gorden	Oso, Wis.	226	1330
WF	Dallas News & Trib.	Dallas, Tex.	261	1150	WNAN	Peo. T. & T. Co.	Knoxville, Tenn.	236	1270	WTAR	Reliance Rad. & Elec. Co.	Norfolk, Va.	280	1070
WFA	C. F. Woese	Syracuse, N. Y.	234	1280	WNAW	Pen. R. C.	Pt. Monroe, Va.	360	830	WTAS	G. D. Carpenter	Elgin, Ill.	275	1090
WFAH	H. C. Spratley	Radio Co., Poughkeepsie, N. Y.	360	830	WNAZ	Dakota Radio Ap. Co.	Yankton, S. Dak.	244	1280	WTAU	Ruegg Bat. & Elec. Co.	Teumseh, Neb.	360	830
WFAJ	Hi-Grade Wireless Inst.													

The Radio Woman . . . *Her Activities at Work and at Play*

Broadcast Recipes Are Making Hit in the Household

Pen Women Will Broadcast



(Fotograms)

HER RADIO A COOK BOOK, Miss Lucille White, 3006 Eastwood Ave., Chicago, takes down recipes broadcast from New York City.

THE growing importance of radio in home economy is proved by the avidity with which the housewife seizes upon the advantage of broadcast cooking recipes.

Time was when the good old cook book used to hang right next to Napoleon's Dream Book, at the kitchen range, and catch fire once in a while. Now the radio is making the cook book passe, because stations broadcast up-to-the-minute recipes for making the finest cakes and pies, and turning out the most delectable roasts that any Lucullus ever sampled.

The housewife nowadays sits with notebook in hand and takes down

the recipes. She also gets an expert's intimate exposition of "constructional data." In other words, just as the home-set builder looks at his diagram, so the housewife listens intently to the oral diagram for baking a cake. Also, just as the home-set maker wants all the intimate details that come under the heading of constructional data, so does the housewife want the author's story of her own experience in baking the cake.

The effect of these broadcast cooking recipes is that storekeepers in the neighborhood find that they might as well shut shop during the half-hour that the recipes are on the air. The housewives are so greatly

THE League of American Pen Women has officially chosen WGN, Chicago broadcasting station, for weekly programs of their own talent, under the direction of the Illinois chapter, of which Mrs. Martha P. Ridge, of Evanston, is president. Mrs. Ridge has appointed Mrs. Vera Brady Shipman, a writer of national prominence on radio and other subjects, as radio chairman and she will have charge of the programs, which will be given each Tuesday evening, starting May 13.

The League of American Pen Women is a national organization of woman writers and composers, with chapters in almost every state in the Union. Its national president, Mrs. Louis Geldert of Washington, has appointed state presidents, which in turn have been developing radio affiliations whenever possible. In New York City and Washington, radio broadcasting is being done regularly, and in Kansas City and several other cities radio chairmen are appointed, but as yet the work has not been constructively regular.

fascinated by the recipes, and most of them have had such great success in following them, that they positively refuse to venture out of the house at the terrific sacrifice of missing this delightful feature.

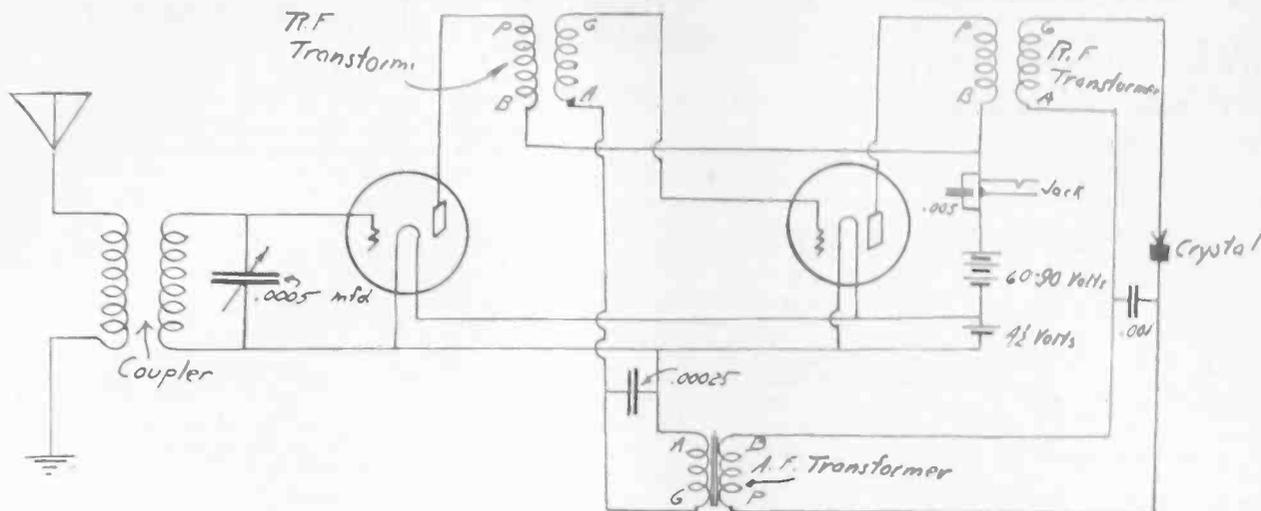
One of the distinct advantages of the broadcast recipes is that elderly women who desire to employ their spare time to the distinct advantage of their householders, and who cannot see well enough to read the small type in which most cook books are printed, can listen in and get the latest recipe of reigning favor at the Ritz-Carlton or the Waldorf-Astoria.

The story is told of a bride who was in the habit of making the night's dinner from the directions given over the radio. One evening the young husband came home from the office, hungrier than usual, but found his bride in tears.

"What's the matter, honey?" he cried, taking her in his arms.

"We—we've got nothing to eat tonight," she sobbed. "The storage battery ran down right in the middle of today's recipe."

A Knockabout Set for Summer



NEAL FITZALAN'S DIAGRAM of his two-tube Knockabout set he describes in the accompanying article. The set will stand hard knocks.

By Neal Fitzalan

FOR the person who wishes to carry his receiver with him, this set is described.

The cabinet and carrying case combined is made according to the dimensions shown in the diagram. The dimensions given are outside measurements, and the wood which is used is one-half inch thick. The top and front of the cabinet are made with hinges attached, so that they may be opened. A small lock or catch should be attached where these two hinged sides come together, and a handle fastened to the top.

The base is 8½ by 14 inches, and when the 8-inch by 14-inch panel is put in place, it will bring the panel 2 inches from the front of the case.

The diagram of the front of the panel is drawn exactly to scale, and shows the layout of the holes which are to be drilled.

Fasten the base to the panel and assemble the receiver before placing it in the case. The variocoupler is placed at the extreme left of the panel, and the variable condenser, which should be of the low loss type, is placed to the right of this. The switch and taps are placed between and below these. But three taps are used. The rheostat is placed below and between the two bezels, and the push pull filament switch is to the left of this. The tubes are placed close to the panel behind their respective bezels. The first radio-frequency transformer is placed between the two tubes, and the audio-frequency transformer is placed between this and the second radio-frequency transformer (directly behind the second tube), which is between the second tube and the jack.

The wiring diagram should be followed closely. Use bus wire, and be sure to solder every connection. Soldering is especially important in this case, as a portable set must be extra rugged, and the jars which it is likely to receive will loosen any poorly made joint. If the wire is soldered to lugs which are placed under the binding posts, carefully put a small drop of shellac against the two parts of the binding post after it is tightened up. When this has hardened, it will prevent them from becoming loose.

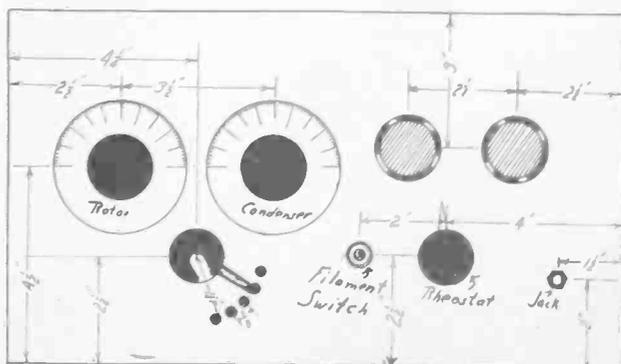
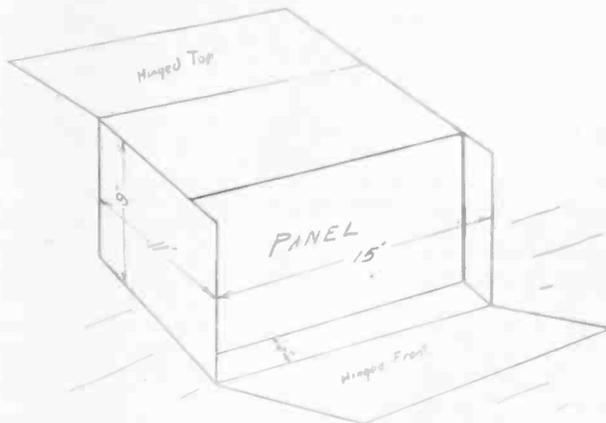
The tuning of this receiver is very simple. Have the coupling of the inductance fairly close, and tune with the switch and condenser. When a station is heard, loosen the coupling until the station can just be heard, and tune again with the condenser; this time the station will come in much louder.

For a portable receiver, the crystal should be of the fixed

type, but if it is of the catwhisker type, it should be adjusted until the music comes in loudest and clearest.

As described above, all the instruments are to be placed close to the panel. There will then be enough room to place all of the batteries in the rear of the case. UV199 tubes should be used, and for these, three dry cells, or two flashlight batteries (4½ volts each, connected in parallel) should be used. Two 4½-volt C batteries connected in parallel will suffice. Use three or four small 22½-volt block B batteries for the high voltage.

The antenna and ground binding posts are in the front of the receiver. The antenna (about thirty or forty feet of insulated wire) may be coiled upon the space in front of the case. Instead of a ground, a counterpoise is used.



CABINET (top) and panel layout (below.)

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MAY 17, 1924

Mutual Benefit from Conventions

THE fact that the Democratic Presidential Convention will be held in Madison Square Garden, New York City, in June, and that the Republican Convention will meet in Cleveland during the same month, already is having an effect on the radio enthusiasts.

The fans who have sets are discussing the fun they will have while listening in on these important sessions. Those who have no sets are bestirring themselves so that they will be within the fold when the first keynote speech is broadcast. The radio trade, its thoughts simultaneous with those of the prospective purchasers, is laying plans for a big selling drive.

Recently dealers have been receiving more than the usual number of inquiries concerning long-distance sets. This is particularly true in the Middle West and on the Pacific Coast. It is not a far cry from convention hall to the homes of those making the inquiries.

While material benefit will be derived from the tie-up of the conventions with the radio, a bigger and broader aspect of the situation lies in the possibility of converting the indifferent into enthusiastic fans.

What Type of a Receiver Shall I Buy?

By Brewster Steele

THIS is one of the most important questions of the present in radio. Almost daily I receive letters and phone calls from radio fans asking what type of receiver is best suited to their particular needs. This request not only comes from novices who have yet to learn the full pleasures of radio broadcast reception, but also from experienced broadcast listeners who have tried radio out on a small receiver and are now fully satisfied that it is practical. They want a receiver that will be an ornament to the home and in full harmony with the surroundings in a well furnished room.

The radio market is full of receivers in harmony with the best room furnishings, but, of course, some are better technically than others. I believe that the coming radio set is that receiver that is fairly compact, economical to operate, requiring little supervision, and, capable of operating on either a small indoor aerial or loop. The last requirement is steadily gaining, since many radio users are growing daily tired of looking over a cumbersome outdoor aerial, especially in bad weather.

Then again, a loop receiver is remarkably free from the radiation evils of a set that operates on a large outdoor antenna. It is safe to say that the coming receiver will not be the single circuit regenerative receiver in its present form. It will most likely consist of radio-frequency and regeneration, or, just plain radio-frequency amplification, reflexed or unreflexed. The reflex idea seems to be gaining ground. In fact, the objections raised against it are rapidly being lowered with the general improvement of apparatus used in such circuits.

Radio is a science. Science is a logical collection of facts and knowledge. The development of a science after the fundamental laws and theories have been established consists in the general improvement of apparatus or instruments that have been made to materialize the theory.

Today, the telephone is backed by the same basic theory of transmission of voice currents as in the early days of Dr. Bell's first model line. It is very true that we can do many thousands times more things with the present telephone than with the first crude laboratory model. But that is because we have learnt how to make telephone instruments and apparatus that approach closer the

ideal conditions set forth in the theory.

The same is true in electrical generating apparatus. The big dynamos we now see in our modern power stations run on the same theory that was expounded when the original dynamo was built by Edison. The only new things have been the improvements in efficiency and construction.

The same analogy is true of radio as a science. The improvements in radio lie in the betterment of the present-day receiving and transmitting, not in the finding of "hocus pocus" circuits. In truth, many of the circuits that have been called new are not in reality new circuits but an improvement in efficiency in one of the older circuits.

Buy your radio set now. The improvements to come will not consist in revolutionizing theory. You can bet your bank-roll that radio in its essentials will not change.

Now comes the question of whether to make your own receiver or purchase one already assembled, either in a factory or by radio experts. If radio receivers are going to be ushered into well-appointed parlors and living rooms, as it is plainly the coming style, then the receivers must be so cased as to present a harmonizing appearance. This means that a home-made receiver will most likely look out of place unless the workmanship be excellent. Every one must agree, however, that the trying out of new apparatus presents more fun for some radio enthusiasts than actually listening to a program.

Now in reference to the range of a receiver. Is it better to buy a 3,000-mile receiver than a 1,500-mile receiver? It all depends, but it is well worth bearing in mind that the essential of any receiver is quality, not quantity. "Can you receive your local stations clear and loud?" is the paramount question. It is all right to have range and sensitivity, so that you can get distance if you desire, but you must have quality at all cost. Remember that there is a limit on the sensitivity of any receiver. Theoretically we can get any desired degree of sensitivity, but practically we are limited by our surroundings. If we have plenty of electric motors around, an extremely sensitive receiver will pick up noises from these motors. All in all, the modern DX receivers are as sensitive as normal conditions will allow.

White Bill Wins in Committee as Trust Is Barred

THE House Committee on Merchant Marine reported favorably on the White bill to prevent monopoly of the air and regulate transmission.

The bill represents a two years' study by the committee with a view to evolving a comprehensive code for the control of radio communication and the correction of evils that have grown up as the science has progressed.

The bill creates a Bureau of Radio in the Department of Commerce, which would be assisted in enforcing the law by an advisory committee. This advisory committee would be composed of one member each representing the Secretary of State, the Secretary of the Treasury, the Secretary of War, the Secretary of the Navy, the Secretary of Agriculture, the Postmaster-General, the Secretary of Commerce, the United States Shipping Board, and seven additional members of "recognized attainment in radio communication" from civilian life.

The anti-monopolistic provision of the bill reads as follows:

"The Secretary of Commerce is hereby directed to refuse a station license to any person, company or corporation or any subsidiary thereof which, in his judgment, is unlawfully monopolizing or seeking to unlawfully monopolize radio communication, directly or indirectly, through the control of the manufacture or sale of radio apparatus, through exclusive traffic arrangements or by any other means. In addition, the general anti-trust laws are made applicable to the manufacture, sale and distribution of radio devices and equipment."

The bill virtually makes the Secretary of Commerce and the board acting under his direction censors of intelligence broadcast by radio. It directs the Secretary to "prescribe the nature of the service to be rendered and the priorities as to subject matter to be observed" by licensed stations. It also prohibits the transmission of any "false or fraudulent radio communication or signal of distress or false or fraudulent radio communication or signal of any kind."

The license fees collectible under the bill from stations and operators range from \$300 to 50 cents, a dozen or so classes of stations and operators being designated. Violations of the orders of the Secretary of Commerce would be punished by heavy fines.

Coming Events

MAY 27—Inter-American Electrical Communication conference, Mexico City.

MAY 26-31—National Outdoor Sports Exposition, Grand Central Palace, New York City. One feature will be a radio division.

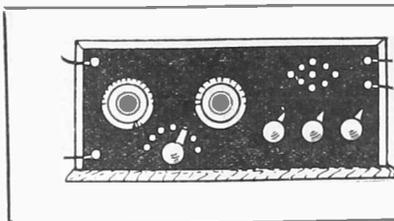
AUG. 16-21—Radio Exposition, San Francisco, conducted by Pacific Radio Trade Assn.

SEPT. 22-28—First Annual International Radio Show, Madison Square Garden, New York City.

EXPERIMENTAL STATION FOR WGY SCHENECTADY, N. Y.

THE General Electric Company plans to erect in this vicinity during the coming summer a \$150,000 radio experimental station. The present station, WGY, in operation for two years, will continue entertainments and educational programs, while the new station, not yet licensed, will be given over entirely to experimental work.

Tentative plans for the experimental station call for its erection on a site isolated from the works proper, with a power plant capable of delivering higher power at various frequencies and antenna towers adaptable to a wide range of wave lengths, to permit systematic investigation of radio problems.



What a Condenser Is and Does

TO the newcomer in radio the various technical expressions are a puzzle, therefore, it is fitting that from time to time the different pieces of apparatus that go to make up a radio receiving set be discussed in the Primer Department. In this issue we will take up the variable condenser.

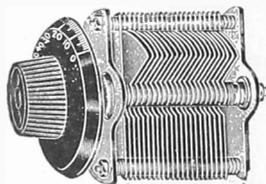
First of all, the word condenser, in the radio language, means an instrument which concentrates electricity by the inductive action from two plates which are separated by a non-conductor.

An example of a condenser is two sheets of metal separated by a sheet of glass. The metal plates when connected to a source of current will hold electricity up to their capacity, that is, so many volts for each square inch of conductive surface.

A peculiar function of the condenser is that it will pass alternating currents of high frequency, while direct current cannot get by them. This is what is meant when the expression "by-pass condenser" is used—they let the high frequencies continue on, while blocking the low ones.

Fixed condensers are made up of a series of copper or lead foil plates, separated by thin sheets of mica. The more sheets that are used, the higher the capacity of the condenser. Sometimes in condensers of larger capacity sheets of paraffined paper are used for the dielectric.

Variable condensers are very little under-



VARIABLE air condenser

stood by the novice, and for that matter by some radio fans who have been in the game a little while. A variable condenser should have the following properties: very low resistance loss, low minimum capacity, accurately machined plates and bushings, positive contact on the shaft, highest possible dielectric in the insulating material. It is always well to use a vernier condenser rather than the straight kind, where fine tuning is necessary.

By vernier we mean some sort of arrangement whereby very little capacity can be easily tuned in or out of the circuit on the condenser. There are many methods by which this may be done.

A small friction knob attached to the panel and touching the outer rim of the condenser dial will afford fine tuning. When this small knob is turned, the friction of it turns the large dial very slowly so that distant stations that could not otherwise be heard may be tuned in between the degree marks on the dial. On some condensers there is a large and small gear arrangement whereby fine tuning may be obtained in the same way as with the friction knob. Some makes utilize three separate plates, in effect an added condenser of small capacity, which are fastened on

The RADIO PRIMER

Information and Instruction
for the Beginner

at the rear of the condenser proper and controlled by a shaft and knob which comes out through the center of the large dial.

Literature Wanted

J. E. Hutchuson, 213 Church street, Fayetteville, Ark.

Smith's Radio and Battery Service, 219 18th street, N. W., Washington, D. C.

M. J. Tschida, Jr., Glen Ullin, North Dakota; opening radio store; wants good line of sets, condensers, cabinets, panels, sockets, accessories.

Geo. F. Roche, Jr., 15 Prospect street, Amesbury, Mass.

Frank Stam, Taylor Springs, Ill., parts and material for building and rebuilding batteries.

U. S. Radio Supply Co., 2658 Romeo street, Los Angeles, Cal.

Those who sent in the correct answer to Wrong Diagram No. 1, published in RADIO WORLD, issue of May 10, included:

H. B. Watkins, 274 Franklin street, Springfield, Mass.

A. Karp, 105 East 104th street, N. Y. City.

Wm. Filler, 1741 Washington avenue, N. Y. City.

Alfred E. Ritter, 250 Crocus avenue, Floral Park, N. Y.

Leon Beckerman, 456 Crescent street, Brooklyn, N. Y.

A. T. Hayes, 652 Centre street, Trenton, N. J.

Fred Hoffman, Jr., 1963 61st street, Brooklyn, N. Y.

C. Struppman, 1 Shippen street, Weehawken, N. J.

B. Herman, 109 St. Joseph Blvd., W., Montreal, Can.

Chas. Simpson, 12 Bowditch St., Peabody, Mass.

8-Gang Socket for Super-Heterodyne

THE newest Victory product turned out by the United Radio Mfg. Co., 191 Greenwich St., New York City, makers of the Victory single and triple gang socket, is a Super-Heterodyne 8-tube socket, especially designed for successful building of the Super-Heterodyne. It combines the eight sockets on a bakelite panel with space for sub-bases, binding posts, drilled and engraved, all in one handy unit. The socket is mechanically sound with phosphor bronze contact points, panel or base mounting. This firm also makes special sockets to specification. They will shortly bring out a new three-on-one socket, which takes the place of a baseboard. It is suitable especially for portable sets.

Coils for the Superdyne Specially Made

THE Wallace Radio Company, 135 Liberty St., New York City, has placed on the market a set of coils for the Superdyne circuit, scientifically made. The company is assembling the set to order, using only high-grade tested standard parts. The circuit differs slightly from the hookup published in RADIO WORLD December 15, 22 and 29, 1924, but for selectivity, clarity and volume is excellent.

This concern also can furnish kits to build the Superdyne circuit, all assembled on engraved panel and base panel, with bus wire, so even the novice can wire the set. Diagram and plans furnished.

ROTHAFEL AIDS VETERANS

THROUGH the efforts of S. L. Rothafel, aided by his company of broadcasting artists of the Capitol Theatre, the military hospitals in Washington are now being equipped with radio apparatus so that the wounded veterans may keep in touch with events in the outside world. With the proceeds of benefit performances given by the Capitol artists as a nucleus, within a month \$23,000 has been raised.

MORE SPECHT BROADCASTING

THE Paul Specht office has just completed arrangements to have its two Lido Venice Club Orchestras broadcast over WJZ. The bands are the string ensemble under the direction of Arthur Blyth and the dance orchestra under Earl Smith's leadership.

Use a Wave Trap to Cut Through Locals

By C. W. Horn

Superintendent, Radio Operations, Westinghouse Electric & Mfg. Co.

WHEN broadcasting was inaugurated, one wave length was assigned; that was three hundred and sixty meters. There soon developed an overcrowding of this wave and many complaints were made by the public. The majority of those complaints contented themselves with the suggestion that there be "silent nights" and many other proposals more or less impractical.

The Department of Commerce assigned an additional wave, four hundred meters, which relieved this crowding somewhat. However, the same condition soon developed and the Department, after a conference by technical radio committee adopted the present plan of wave bands which has demonstrated its worth.

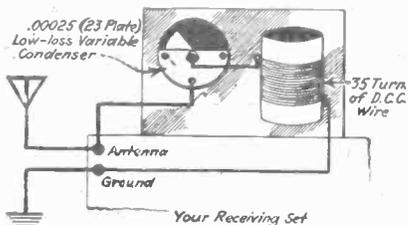
The present plan, when first put into effect, was also severely criticized and many objections raised, but it soon became apparent that by making use of the developments that were being constantly brought out in the radio science, very good results could be obtained.

Therefore, why should not the problem of tuning out local stations also be solved in a similar way, which may be called constructive rather than destructive.

A similar condition to the one which developed at Chicago came up in New York City when one of the stations increased its power, which, remember, was done to better serve the public, even though a few individuals nearby were temporarily made to suffer. But by proper education the public overcame this difficulty, and there is very little complaint at the present time.

All of these things tend to show that radio development is taking care of all such conditions which arise and that the listener should keep himself acquainted with the progress being made in radio, by reading radio publications and other mediums through which these improvements are being made public.

Probably the most simple method of elim-



HOW to Construct a Wave-Trap.

inating interference from a local station is to use a wave trap. Such devices are on the market and for the one who cannot or does not find time to construct such a device, he is urged to obtain one of these devices manufactured by some reliable, recognized firm.

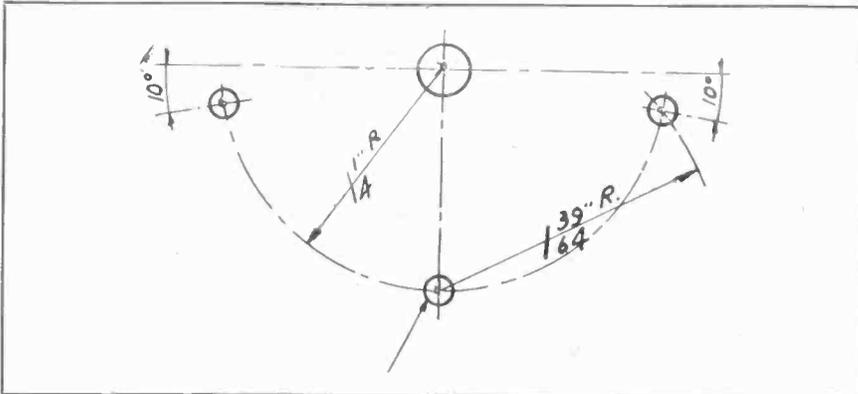
For the man who desires to construct his own wave trap, I will describe a very simple one.

Connect an inductance coil of about thirty-five turns in series with a low-loss variable condenser, and connect this entire circuit across the antenna to ground terminal of the receiving set. Be careful to keep this at least a foot or so from the receiver so as not to couple it too closely.

The condenser can be of about 23-plate. The efficiency of this circuit depends entirely on the condenser's low losses.

To operate this trap, set the tuner dial a little off from the local station and adjust the trap circuit until the local station's sig-

Templates Needed to Mount Parts Safely



ACTUAL SIZE OF A TEMPLATE, which correctly guides you in panel drilling. This diagram is for a particular make of instrument.

DID you ever go to a radio store and buy a complete set of parts to build a fine receiver? Of course you have.

Like many others, you probably took your treasured packages home and commenced to lay them out as explained in your new hook-up.

Everything went along smoothly in the artistic arrangement until the marking of the holes for panel-mounting the parts became necessary. Here is where you stopped. You asked yourself:

"How am I going to find out where to drill the holes to mount the condenser, the coupler, the variometer, the rheostat, the potentiometer and other essentials?"

The answer is furnished when you get a template with the apparatus you buy. A template is a diagram which guides you in

drilling holes for accurate mounting of the instrument. The accompanying illustration shows a template for mounting a variable air condenser. Different makes of condensers require different templates, so do not use this illustration as your guide.

If the instrument is not mounted accurately it may be stiff in its movement and become useless.

A template is pasted on the panel. The drill holes are made according to the marks and dimensions. Then the template is washed off.

The Federal Telephone and Telegraph Company of Buffalo, N. Y., furnishes templates with all its parts requiring them.

Mr. Manufacturer, do you? If so, address Template Club Editor, RADIO WORLD, 1493 Broadway, New York City.

Let Common Law Decide Radio Disputes, Advises Hoover Aide

WASHINGTON.

LEGAL questions arising out of interference between users of radio could probably be settled by common law, according to Stephen B. Davis, Solicitor of the Department of Commerce, who discussed the subject at a meeting of the Federal Club of the Bureau of Standards.

Mr. Davis stated that while common law was based almost wholly on precedent, it often was modified by court decisions to meet new conditions, such as have been created by radio and aircraft. He pointed

out that in the case of aircraft the old rule that the land owner owned all the air above him has been modified by a recent court decision.

The case cited was that of an airplane that had crashed on private property and done some damage. It was held that it made a difference whether the plane was trespassing or doing something lawful before it fell. The judge ruled that the landowner owned the air above him only in so far as he was able to make use of it.

Secretary Hoover is considering it.

nal is at a minimum. Then tune in the distant station desired, and again carefully adjust the trap circuit.

If the materials used in the construction of this device are efficiently made up, you should have a very selective receiving set.

If the reader winds the coil himself, he should be careful to use either silk or cotton covered wire, not enameled wire, and be careful to wind it on a thin hard rubber or mica tube.

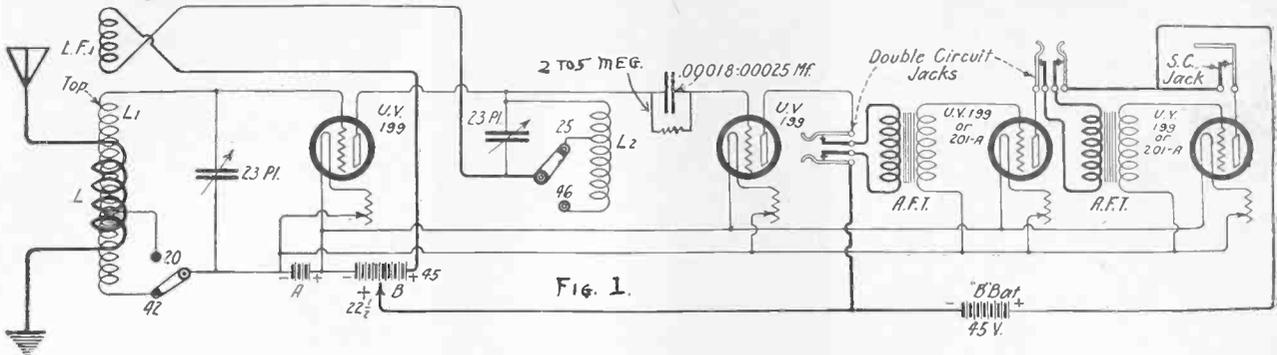
A honeycomb coil can be used for this purpose. There are many other types of traps. However, the device described above is simple to construct and will probably eliminate most of the trouble.

A feature so often overlooked and which has so very much to do with the sharpness

of tuning is the antenna itself. A very long, high antenna is bound to make sharp tuning difficult. I recommend that a single wire of approximately fifty to seventy-five feet, measuring from the apparatus to the far end, be used. This wire should run free and clear of all obstructions and should not run parallel to any wires, metal roofs, water spouts, telephone or telegraph wires, as these will all have a tendency to broaden the tuning.

Make sure that your ground connection, and all connections are soldered, as any resistance in the antenna circuit will broaden the tuning and reduce the efficiency in general. Make sure that the antenna is well insulated, as any losses from this cause will be detrimental.

Superdyne a Clear-Toned DX Getter



CIRCUIT DIAGRAM OF THE SUPERDYNE—The coils are wound as follows: L1, Secondary coil, 42 turns of No. 22DSC wire, on 4 inch tube, tapped at 20th turn. L—6 turns of No. 22DSC wire wound directly over secondary. L2—46 turns of 22DSC wire wound on 4-inch tube, tapped at 25th turn. LFI (Tickler coil), consists of 36 turns of No. 22DSC wire, 18 turns on each side of 3% inch rotor. The grid leak is optional, and the grid condenser may be of the variable type as less than .00025 mfd. may work better.

By N. N. Bernstein

PART I

AMONG the many circuits which have sprung up during the last few years employing radio-frequency amplification with two or more tubes, and modifications of the Armstrong regeneration principle, the one that seems best to hold the attention of novice and expert alike, is the Superdyne four-tube receiver, originally described in RADIO WORLD, December 15, 22 and 29.

The usual straight radio-frequency circuit using a transformer is at a disadvantage as to real accurate tuning because it tunes sharply over only a narrow band of frequencies. This does not permit a great choice of stations.

In the Superdyne, the construction of the coils and method of tapping them provides facilities for covering the entire broadcasting range.

To get clear signals from stations at great distances, it is necessary that some form of tuned radio-frequency amplification be used. This principle, embodied in two stages of neutralized tuned radio-frequency, is the one upon which the Neutrodyne set functions. One great difficulty with the Neutrodyne circuit is that the moment all tubes are tuned to exact resonance, a condition necessary to receive distance, the circuit starts to oscillate, unless the set is accurately neutralized.

In the Superdyne, this neutralizing is not necessary because the regeneration is controlled by the reverse feed-back principle, which enables the radio-frequency tube and the detector to be tuned to absolute resonance without allowing the circuit to "spill over."

To obtain this stability a tuned impedance is used in the plate circuit of the first or radio-frequency tube. This consists of a coil of wire, 46 turns of No. 22 double silk covered wire wound on a four inch tube, tapped at the 25th turn, as shown in the diagram (Fig. 1). This impedance is tuned by the 23-plate variable condenser, and when the wave length switch is set at 25 on L2 and on 20 on L1, the set will tune from approximately 200 to 360 meters. When on taps 46 and 42, (L2 and L1 respectively) are switched on, the range will be about 360 to 600 meters.

Preferably, type UV199 tubes should be used for the radio-frequency amplifier and also for detection. Either UV199s or UV201As can be used in the audio-frequency section, which is the standard AF hook-up. UV199 tubes function best as radio-frequency amplifiers on account

of their extremely low capacity. This low capacity is entirely due to the construction of the tube. The plate and grid leads in the UV199 are brought out on opposite sides of the base, thus placing them the farthest possible distance from each other. In addition, the nibs or contact shafts are very small, and the regulation UV199 socket, which should be used, has very little internal capacity. All this makes for a minimum capacity and prevents the tube from going into oscillation before the circuit is tuned. An adapter for standard sockets should not be used with the UV199, because the added metal in the adapter creates a capacity which entirely counteracts all the good done by the low capacity leads.

The wave length switch, although shown separate in the diagram for convenience, is a double-pole, double-throw anti-capacity switch. The type used in this particular set has a push-pull arrangement, but any anti-capacity switch may be used.

The path of the signal is followed in this manner. The incoming signal passes through the untuned primary winding and is passed to L1 inductively. From the secondary the signal passes to the grid and across to the plate of the radio-frequency tube. The energy is now fed back to the resonant grid circuit, but in the reverse or negative manner. When the grid circuit is tuned to resonance, the plate circuit is given just enough negative feed-back to counteract any positive

capacity feed-back which may be present within the tube. This prevents any chance of oscillation of the tube or the grid and plate circuits. This, coupled with the fact that the impedance in the plate circuit is at its maximum, will produce the highest plate voltage impulse. It is due to this phenomenon that when tuned to maximum resonance very little tube noise is present, which also accounts for the extraordinary clearness of distant signals.

The list of parts:

- 1 7 x 24 inch radian panel.
 - 1 baseboard (to match panel).
 - 2 23-plate low-loss vernier condensers.
 - 1 anti-capacity switch.
 - 1 4-gang socket mounting (or 4 sockets arranged for panel mounting).
 - 4 25 or 30-ohm rheostats.
 - 2 double circuit jacks.
 - 1 single circuit jack.
 - 1 battery cut-off switch.
 - 2 audio-frequency transformers (5 to 1 and 3 to 1 ratio).
 - 150 feet, No. 22 double silk covered wire.
 - 1 rotor ball and shaft 3% in diameter.
 - 2 5-inch radion tubings (4 inch outside diameter).
 - 1 grid leak and condenser .00025 mfd.
 - 8 binding posts (marked).
 - 3 dials for front of panel.
 - 3 bezels for panel.
 - 10 feet bus bar wire and spaghetti.
- (Part II will be published next week.)

Interference with Broadcast Sermon Violates State Law, Church Charges

TOPEKA, KAN.

DOES interference with radio waves carrying a sermon constitute a violation of the Kansas law prohibiting interference with religious worship.

That is the question that has been submitted to Attorney General Griffith by the congregation of a little church at Norway in Republic County. This church is without a pastor at present, but the trustees of the church determined to continue the regular services every Sunday, so they installed a radio receiving set and have been getting the services from Omaha.

When the Omaha congregation sings, so do the folks in the little church at Norway. When the pastor at Omaha announces the offering, the plate is passed

at Norway. And the Norway folks hear the sermon of the Omaha pastor over the radio and the loud speaker.

But it seems that there is a small broadcasting station not far from Norway, and that the operator keeps interfering with the reception of the Omaha church service.

The Attorney General advised the Norway congregation that if the interference was done purposely or maliciously it could be stopped and the perpetrator prosecuted. He held that it would be purely a case of interference with religious worship and subject to the same penalties as if it were actual interference with the services if conducted within the church at Norway. It is said that this is the first protest of its kind.

BROADCAST PROGRAMS FROM FAR AND NEAR

KEY

Abbreviations: G. M. T., Greenwich Meridian Time; E. S. T., Eastern Standard Time; C. S. T., Central Standard Time; M. T., Mountain Time; P. T., Pacific Time; m., meters; k., kilocycles.

How to tune in a desired distant station at just the right time—Choose your station from the big list published herewith. See what time division the station is under (E. S. T., C. S. T., etc.); then consult the table below. Add to or subtract, as directed, from the time as given on the PROGRAM. The result will be the time BY YOUR CLOCK that you should tune in. The table:

If you are in	And want a station in	Subtract	Add
E. S. T.	C. S. T.		1 hr.
E. S. T.	M. T.		2 hrs.
E. S. T.	P. T.		3 hrs.
C. S. T.	E. S. T.	1 hr.	
C. S. T.	M. T.		1 hr.
C. S. T.	P. T.		2 hrs.
M. T.	E. S. T.	2 hrs.	
M. T.	C. S. T.	1 hr.	
M. T.	P. T.		1 hr.
P. T.	E. S. T.	3 hrs.	
P. T.	C. S. T.	2 hrs.	
P. T.	M. T.	1 hr.	

If you are under Daylight Saving Time, and the station you want is under that time, too, or if both are under Standard Time, the above table will hold.

If you are under Daylight Saving Time, and the station operates under Standard Time, add one hour to the table result.

If the station uses Daylight Saving Time, and you are under Standard Time, subtract one hour from the table result.

Stations under Daylight Saving Time: KDKA, KOV, KYW, WAAM, WBZ, WCAE, WDAF, WDAW, WDAF, WFI, WGI, WGN, WHN, WIP, WJY, WJZ, WLW, WMAQ, WOO, WOR, WSAI.

Wednesday, May 14

WAAM, Newark, N. J., 263m (1140k), E. S. T.—9:15 P. M., K. I. K. entertainers in song review. 9:30 P. M., Judith Roth and Al Wilson, songs. 9:45 P. M., Herbert Spencer, composer-pianist. 10:15 P. M., Fred A. Henze, tenor; Viola C. Henze, soprano, popular ballads. Grace Castleton, piano. 10:30 P. M., Clarence Williams, Lawrence Lomax and Eva Taylor, Okeh artists, singing. 10:45 P. M., Jimmy Doyle and George Roberts, vaudeville team. 11 P. M., Leo Friedman's weekly "Grab-bag of Celebrities." 11:15 P. M., "How Songs and Song-writers Become Famous," by Leo Friedman.

WOR, Newark, N. J., 405m (740k), E. S. T.—6:15 P. M., "Music While You Dine," Ernie Krickett's Paramount record orchestra. 6:55 P. M., resume of the day's sports. 8 P. M., Sigmund Spaeth, music critic, and Philip Gordon, eminent American pianist. 9:15 P. M., Christopher Meehan, lyric tenor. 9:30 P. M., orchestra of S. S. Pres. Roosevelt. 9:50 P. M., Close-up of Claire Windsor, movie star. 10:15 P. M., program by Newark Lodge No. 21 B. O. E.; charity benefit chorus and glee club.

WJZ, New York, 455m (660k), E. S. T.—4:30 P. M., Hotel Commodore tea music. 5:30 P. M., lecture by Dr. Herman H. Horne. 7 P. M., Story for Boys and Girls. 7:20 P. M., Wall Street Journal. 7:30 P. M., Selzer's Cafe Boulevard Orchestra. 8:50 P. M., Folk Songs by Elizabeth Howry. 9:10 P. M., Temple Four Male Quartet. 10:15 P. M., Martin Blumenthal, cellist. 10:30 P. M., Emil Coleman's Trocadero Orchestra.

WWJ, Detroit, 517m (580k), E. S. T.—8 A. M., setting-up exercises. 9:30 A. M., "To-night's Dinner," by Woman's editor. 9:45 A. M., Public Health Service bulletins. 10:25 A. M., weather forecast. 11:55 A. M., Arlington time. 3 P. M., Detroit News Orchestra. 3:30 P. M., weather forecast. 3:35 P. M., market reports and baseball scores. 5 P. M., baseball scores. 7 P. M., Detroit News Orchestra; Joseph Mounsey, baritone.

WOO, Philadelphia, 509m (590k), E. S. T.—11 A. M., grand organ. 11:30 A. M., weather forecast. 12 noon, luncheon music by Tea Room Orchestra. 12:55 P. M., time signals. 4:45 P. M., grand organ and trumpets. 7:30 P. M., sports results, police reports; dinner music by Havana Casino Orchestra. 8:15 P. M., dramatic reading, "Hawath's Wooing," by Joseph A. Culbert. 8:45 P. M., "Camping for Boys and Girls," Major Fish. 9 P. M., WOO Orchestra.

KHJ, Los Angeles, 395m (760k), P. T.—12:30 P. M., "The Highlanders"; Edmund D. Nixon, baritone. 2:30 P. M., matinee musicale, courtesy Barker Brothers. 6 P. M., Art Hickman's Concert Orchestra. 6:30 P. M., Music Memory Contest, courtesy Fitzgerald Music Co. 7 P. M., children's program. Mary B. DeWitt, story teller; Dick Winslow, juvenile reporter; Catherine Craig, reader; Elizabeth Carroll Swan, soprano. 8 P. M., Leslie Brigham, bass. 9 P. M., Studebaker Radio Orchestra, courtesy Glenn Thomas Co. Dr. Mars Balmgardt, lecturer. 10 P. M., Art Hickman's Orchestra.

CKAC, Montreal, 430m (700k), E. S. T.—1:45 P. M., Mount Royal Hotel luncheon program. 4 P. M., weather, news, stocks. 4:30 P. M., Mount Royal Hotel dance program.

KFAE, Pullman, Wash., 330m (910k), P. T.—8:30 P. M., "Practical Talk on Copper and Lead." Hugh M. Henton. Readings, Bernice Witt. Concert, Mu Phi Epsilon Women's Musical Honor Society. "Diet for the Rural Home," Miss Leila



THIS IS J. M. WITTEN, chief announcer at Station WOS, Jefferson City, Mo. His pleasing voice has charmed thousands.

Hunt. "Home Conveniences and Sanitation." A. B. Crane.

WGI, Medford, Mass., 360 m. (830k), E. S. T.—12:40 P. M., weather forecast. 12:45 P. M., Farmers Produce Market report. 6:30 P. M., closing market survey; live stock reports; world market survey; Boston police reports. 6:45 P. M., code practice. 7 P. M., Amrad Big Brother Club. 7:30 P. M., evening program.

WFAA, Dallas, Tex., 476m. (620k), C. S. T.—12:30 P. M., musical program presenting Red-Head Girl of Dallas Journal.

KPO, San Francisco, 423m. (710k), P. T.—12 noon, time signals; reading of the Scripture. 1 P. M., Rudy Seiger's Fairmont Hotel Orchestra. 2:30 P. M., organ recital by Theodore J. Irwin. 4:30 P. M., Rudy Seiger's Fairmont Hotel Orchestra. 5:30 P. M., children's hour stories by "Big Brother." 7 P. M., Rudy Seiger's Fairmont Hotel Orchestra. 8 P. M., E. Max Bradford's Versatile Band.

WGY, Schenectady, N. Y., 380m. (790k), E. S. T.—11:30 A. M., stock market report. 11:40 A. M., produce market report. 11:45 A. M., weather report. 11:55 A. M., time signals. 5 P. M., produce and stock market quotations; news bulletins; baseball results. 5:30 P. M., "Adventure Story."

KGW, Portland, Ore., 492m. (610k), P. T.—11:15 A. M., window shopping. 11:30 A. M., weather forecast. 12:30 P. M., concert by Darby's Orchestra. 3:30 P. M., children's program. 7:30 P. M., baseball scores, weather forecast and market reports. 8 P. M., concert by Orpheus Male Chorus. 9 P. M., business talk by James Albert. 10 P. M., dance music by George Olsen's Metropolitan Orchestra. Selections by Sorenis Quartet.

WDAF, Kansas City, Mo., 411m. (730k), C. S. T.—3:30, 4, 4:30, 5 and 6 P. M., baseball scores. 3:30 P. M., Geary's Missourians. 6 P. M., Marketgram, weather forecast, time signal and road report. Weekly health talk. Tell-Me-a-Story Lady. Fritz Hanlein's Trianon Ensemble. 8 P. M., program by Mrs. T. A. Tibbetts. 11:45 P. M. (Nighthawk Frolic), the "Merry Old Chief" and the Coon-Sanders Orchestra.

WLW, Cincinnati, O., 399m. (970k), E. S. T.—10:30 A. M., weather forecast and business reports. 12:45 P. M., language lesson. 1:30 P. M., business reports. 3 P. M., market reports. 4 P. M., concert for "Shut Ins." 8 P. M., program of 7th annual convention National Coal Association.

WBAP, Fort Worth, Texas, 476m (620k) C. S. T.—7:30 P. M., concert by Fort Worth Camp Fire Girls. 9:30 P. M., concert by Dick Gaines and orchestra.

WNAC, Boston, 278m (1080k), E. S. T.—10:30 A. M., Women's Club talks, 1 P. M., Shepard Colonial orchestra; Myrtle Laffee Watson, pianist composer. 4 P. M., Shepard Colonial orchestra; incidental music from Loew's State Theatre. 6 P. M., children's half-hour. 6:30 P. M., WNAC dinner dance, Checker Inn orchestra. 7:35 P. M., E. L. Greene, Boston Better Business Commission. 8 P. M., concert program announced.

WHAS, Louisville, Ky., 409m (750k), C. S. T.—4 P. M., selections by Alamo Theatre orchestra; police bulletins; weather forecast for Kentucky,

Indiana and Tennessee; selections by Walnut Theatre orchestra; selections by Ballard Memorial School chorus; late news. 4:50 P. M., local livestock, produce and grain reports. 4:55 P. M., baseball scores. 5 P. M., official time announced. 7:30 P. M., agricultural talk; concert auspices Mrs. John E. Harmon, Jr.; late news; official time announced at 9 o'clock.

KFMF, Shenandoah, Ia., 266m (1130k), C. S. T.—7:30 P. M., musical program by Watson, Mo., direction of H. B. Shandy.

WDAR, Philadelphia, 395m (760k), E. S. T.—11:45 A. M., daily almanac. 12:02 P. M., organ recital from Stanley Theatre; features from the studio; Arcadia Concert orchestra. 2 P. M., Arcadia concert orchestra; Mrs. Louis Love, "Care of Children." 4:30 P. M., recital by Ingrid Slettengrer, violinist. 5:15 P. M., program dance music. 7:30 P. M., Dream Daddy.

WOC, Davenport, Ia., 484m (820k), C. S. T.—9 A. M., opening market quotations. 10 A. M., garden and household hints. 10:55 A. M., time signals. 11 A. M., weather and river forecast. 11:05 A. M., market quotations. 12 noon, chimes concert. 1 P. M., closing stocks and markets. 3:30 P. M., educational program. 6:30 P. M., Sandman's visit. 6:50 P. M., sport news and weather forecast. 7 P. M., educational talk. 8 P. M., organ recital; male quartet.

WRC, Washington, 469m (640k), E. S. T.—3 P. M., fashion developments, by Women's Wear. 3:10 P. M., song recital announced. 3:25 P. M., report of National Conference Board. 3:30 P. M., song recital. 3:45 P. M., piano recital by Eleanor Glynn. 3:50 P. M., current topics by editor of Outlook. 4 P. M., song recital announced. 5:15 P. M., instruction in international code. 6 P. M., stories for children by Peggy Albion. 6:15 P. M., talk, auspices Smithsonian Institute.

KSD, St. Louis, 546m (550k), C. S. T.—8 P. M., program by Music Department of St. Louis Public Schools, orchestra of 400.

WOS, Jefferson City, Mo., 441m (680k), C. S. T.—8 P. M., proceedings of "Annual Journalism Week" at Columbia, Missouri, auspices School of Journalism, Missouri University.

WEAF, New York, 492m (610k), E. S. T.—11 A. M., mother's program; health talk by health speakers service bureau; musical program by Eleanor Marum, soprano; chapel services from Columbia Univ.; address and musical program; market and weather reports. 4 P. M., Sophia Robinson, dramatic soprano; Frieda Weber, pianist; L. Violet Allen, soprano, accompanied by Mrs. H. H. McKinley; Robert L. Farrer, bass, accompanied by Frederick Ollenspack. 7 P. M., Synagogue service, auspices United Synagogue of America; United Cigar Stores sport talk, Thornton Fisher; talk, auspices American Agriculturist; "Introductions to Psychology," by Gardner Murphy, auspices Columbia Univ.; talk, auspices, National Surety Co., Augusta Juck Hickok, mezzo soprano; the Chiclet orchestra; Russian musical program, auspices National Carbon Co.

WIP, Philadelphia, 509m (590k), E. S. T.—1 P. M., luncheon music Gimbel Tea Room orchestra. 1:30 P. M., weather forecast. 3 P. M., Dagnar Johnson, soprano; Mrs. Horatio Batezell, contralto; Emilie Loeben, accompanist. 6 P. M., weather forecast; final baseball scores. 6:05 P. M., dinner dance music, St. James Hotel dance orchestra. 6:45 P. M., livestock and produce market reports. 7 P. M., Uncle Wip's bedtime stories and rcl call for children.

KFI, Los Angeles, 469m (640k), P. T.—4:45 P. M., Evening Herald and Examiner news bulletins. 6:45 P. M., Nick Harris detective stories and concert. 8 P. M., Evening Herald's concert. 9 P. M., Examiner concert. 10 P. M., Hollywood community orchestra. 11 P. M., Ambassador Max Fisher's Cocoonat Grove orchestra.

KGO, Oakland, Cal., 312m (960k), P. T.—1:30 P. M., N. Y. Stock Exchange; weather reports. 3 P. M., musical program; address by Cora L. Williams Institute. 4 P. M., concert orchestra, St. Francis Hotel. 6:45 P. M., stock exchange; weather reports; news items.

WBZ, Springfield, Mass., 337m (890k), E. S. T.—11:55 A. M., time signals; weather reports; Boston and Springfield market reports. 5:00 P. M., results of games in Eastern, American and National leagues; "Colonial Broadcasting and Your Attic," by Guy A. Jackson. 6:30 P. M., bedtime story. 6:40 P. M., concert by Worcester Academy Glee Club. 7:40 P. M., program from General Conference of Methodist Episcopal Church. 9:55 P. M., time signals.

KYW, Chicago, 536m (560k), C. S. T.—5 P. M., Spanish lessons by Prof. A. A. Brasch. 5:33 P. M., news, financial and final markets. 5:45 P. M., bedtime story. 6 P. M., dinner concert. 7:00 P. M., musical program. 8:05 P. M., "Good Roads"; talk by Chicago Motor Club. 8:15 P. M., talk auspices Union Trust Company. 9 P. M., to 1:30 A. M., Midnight Revue.

KDKA, Pittsburgh, 326m (920k), E. S. T.—11:55 A. M., time signals. 12 M., weather forecast; market reports. 2:15 P. M., scores, inning by inning, of the baseball games. 5 P. M., baseball scores. 5:30 P. M., dinner concert by Pittsburgh Athletic Asso. Orchestra. 6 P. M., baseball scores. 6:30 P. M., Little Fontelroy here in America. 6:45 P. M., news bulletins. 7 P. M., baseball scores; "Your Garden, this Summer," Radio Garden Editor. 7:15 P. M., program by League of American Pen Women. 7:40 P. M., National Stockman and Farmer market reports. 8 P. M., concert by Blanche Sanders Walker. 9:55 P. M., time signals; weather forecast; baseball scores.

Thursday, May 15

WJZ, New York, 455 m. (660k), E. S. T.—4:05 P. M., daily menu. 4:10 P. M., Middle Atlantic Fisheries, "Health from the Sea." 4:35 P. M., "Progress of the World." 4:45 P. M., Harper's Bazar Fashion Talk, by Lucy Park. 5 P. M., Coley Colson, tenor. 5:15 P. M., Jack Nelson, popular songs. 5:30 P. M., State and Federal agricultural reports; farm and home reports; closing quotations of the New York Stock Exchange; foreign exchange quotations; Evening Post news. 7 P. M., Uncle Dave Cory's Jack Rabbit Stories. 7:20 P. M., Wall Street Journal. 7:30 P. M., Specht's Lido Venice String Ensemble. 8 P. M., "Problems of Crime," by Dr. Henry P. Fairchild, of New York University. 8:30 P. M., Wanamaker organ recital direct from the Wanamaker auditorium. 10:30 P. M., Hotel Majestic Dance Orchestra.

WWJ, Detroit, 517m. (580k), E. S. T.—8 A. M., setting-up exercises. 9:30 A. M., "To-night's Dinner," by Woman's Editor. 9:45 A. M., Public Health Service bulletins and talks of general interest. 10:25 A. M., weather forecast. 11:55 A. M., Arlington time. 3 P. M., Detroit News Orchestra. 3:30 P. M., weather forecast. 3:35 P. M., market reports and baseball scores. 5 P. M., baseball scores. 7 P. M., Detroit News Orchestra; Cyril Wezemacl, baritone; Leo Robitaille, tenor.

WOO, Philadelphia, 509m. (590k), E. S. T.—11 A. M., grand organ. 11:30 A. M., weather forecast. 12 noon, luncheon music by Tea Room Orchestra. 12:55 P. M., time signals. 4:45 P. M., grand organ and trumpets. 7:30 P. M., sports results; police reports. 10:55 P. M., time signals and weather.

KHJ, Los Angeles, 395m. (760k), P. T.—12:30 P. M., Floryane Thompson, soprano, and Claire Forbes Crane, concert pianist. 2:30 P. M., matinee musicale, courtesy Barker Brothers. 6 P. M., Art Hickman's Concert Orchestra. 6:30 to 6:45 P. M., Music Memory Contest, courtesy Fitzgerald Music Co.; Raymond Harmon, tenor. 6:45 to 7 P. M., Prof. Walter Sylvester Hertzog, American history. 7 P. M., children's program. Bedtime stories by "Uncle John." 8 P. M., program courtesy Fitzgerald Music Co. 10 P. M., Art Hickman's Dance Orchestra.

CKAC, Montreal, 430m. (700k), E. S. T.—4 P. M., weather, news, stocks, music. 8:30 P. M., Canadian Natl. Railway Artists, talk by railway official.

WGI, Medford, Mass., 360m. (830k), E. S. T.—12:40 P. M., weather forecast. 12:45 P. M., Farmers' Produce Market report. 6:30 P. M., stock market reports. Live stock reports. Agriograms. Boston police reports. 7 P. M., meeting Amrad Big Brother Club. 7:30 P. M., evening program. 7:45 P. M., popular song hits, "Bernie and his Bunch." Weather report and standard time.

WFAA, Dallas, Tex., 476m. (620k), C. S. T.—12:30 P. M., address. Epps G. Knight, on "Matured Minds in the Young Man's Era." 8:30 P. M., program by talent from Glen Rose, Texas; Judge William E. Muse, talk; fiddlers and singers, pianist and reader. 11 P. M., Miss Jessie McKee's Orchestra, favorite music program.

KPO, San Francisco, 423m. (710k), P. T.—12 noon, time signals; reading of Scripture. 1 P. M., Rudy Seiger's Fairmont Hotel Orchestra. 2:30 P. M., matinee program, management of Mrs. May Clarke Burns. 5:30 P. M., children's hour stories by "Big Brother." 7 P. M., Rudy Seiger's Fairmont Hotel Orchestra. 8 P. M., program under direction of P. E. Ward. 10 P. M., E. Max Bradford's Yersatile Band.

WGY, Schenectady, N. Y., 380m. (790k), E. S. T.—11:30 A. M., stock market report. 11:40 A. M., produce market report. 11:45 A. M., weather report. 11:55 A. M., time signals. 1 P. M., music and humorous reading. 5 P. M., produce and stock market quotations; news bulletins; baseball results. 5:30 A. M., dinner music. Romano's Orchestra. 7:40 P. M., baseball results. 7:45 P. M., musical program.

KGW, Portland, Ore., 492m. (610k), P. T.—11:15 A. M., window shopping. 11:30 P. M., weather forecast. 12:30 P. M., concert by Seiberling Lucas Music House. 3:30 P. M., woman's story program. 7:30 P. M., baseball scores, weather forecast and market reports. 8:15 P. M., program dance music, George Olsen's Metropolitan Orchestra. 10 P. M., George Olsen's Metropolitan Orchestra; Lillian J. Swanson, soprano.

WDAF, Kansas City, Mo., 411m. (730k), C. S. T.—3:30, 4, 4:30, 5 and 6 P. M., baseball scores. 3:30 P. M., D. A. Haley's Dance and Concert Orchestra. 6 P. M., Marketgram, weather forecast, time signal and road report. Miss Cecile Burton, works of local and Missouri writers. Tell-Me-a-Story Lady. Fritz Haulein's Trianon Ensemble. 11:45 P. M. (Nighthawk Frolic), "Merry Old Chief" and Coon-Sanders Orchestra.

WLW, Cincinnati, Ore. 309m. (970k), E. S. T.—10:30 A. M., weather forecast and business reports. 12:45 P. M., language lesson. 1:30 P. M., business reports. 3 P. M., market reports. 4 P. M., piano solos by Miss Adelaide Apfel. 10 P. M., Times-Star Radio Club. 10:10 P. M., program by Conservatory of Music.

WBAP, Fort Worth, Texas, 476m (620k), C. S. T.—7:30 P. M., concert, Mabel Helmcamp Neely. 9:30 P. M., concert by Hemphill Heights Masonic Lodge orchestra.

WNAC, Boston, 278m (1080k), E. S. T.—10:30 A. M., WNAC Women's Club talks. 1 P. M., Shepard Colonial orchestra. 4 P. M., Hawaiian Guitar duo. 6:30 P. M., WNAC dinner dance, from Hotel Westminster. 8:15 P. M., "Dream Girl," broadcast from the Shubert Wilbur Theatre.

WHAS, Louisville, Ky., 400m (750k), E. S. T.—4 P. M., selections by Walnut Theatre orchestra; police bulletins; weather forecast for Kentucky, Indiana and Tennessee; selections by Alamo Theatre orchestra; concert, auspices Kentucky State Board of Health; late news. 4:50 P. M.,

local livestock, produce and grain market reports. 4:55 P. M., baseball scores. 5 P. M., official time announced. 7:30 P. M., concert by Keith Kannard and Kentucky Rambler radio Boy Scout talk; late important news bulletins; official time announced at 9 o'clock.

KFNH, Shenandoah, Ia., 266m (1130k), C. S. T.—7:30 P. M., music by Red Oak "Ragpickers" and associated artists, direction the Millens.

WJAR, Philadelphia, 395m (760k), E. S. T.—11:45 A. M., daily almanac. 12:02 P. M., organ recital from Stanley Theatre; features from the studio; Arcadia concert orchestra. 2 P. M., Arcadia concert orchestra; artist recital from studio. 4:30 P. M., Women's Club hour. 5:30 P. M., Pierce School; 7:30 P. M., Dream Daddy.

WOC, Davenport, Ia., 484m (620k), C. S. T.—9 A. M., opening market quotations. 10 A. M., garden and household hints. 10:55 A. M., time signals; 11 A. M., weather and river forecast. 11:05 A. M., market quotations and agriograms. 12 noon, chimes concert. 1 P. M., closing stocks and markets. 3:30 P. M., educational program. 5:45 P. M., chimes concert. 6:30 P. M., Sandman's visit. 6:50 P. M., sport news and weather forecast. 9 P. M., orchestra program.

WRC, Washington, 469m (640k), E. S. T.—5:15 P. M., instruction in international code. 6 P. M., children's hour by Peggy Albion. 7:45 P. M., "The Question Box." 8 P. M., dance program by Better 'Ole orchestra. 8:45 P. M., talk on motoring, auspices American Automobile Association. 9 P. M., announced. 9:15 P. M., concert by In-Com-Co band, Interstate Commerce Commission. 9:55 P. M., time signals and weather forecasts.

KSD, St. Louis, 546m (550k), C. S. T.—8 P. M., program by Music Department of St. Louis Public Schools, chorus of 700 voices.

WOAW, Omaha, Neb., 526m (570k), E. S. T.—6 P. M., every child's story hour, by Grace Sorenson. 6:30 P. M., dinner program by Yost's orchestra. 9 P. M., piano recital, artist pupils of Jean P. Duffield.

WOS, Jefferson City, Mo., 441m (680k), C. S. T.—8 P. M., proceedings of "Annual Journalism Week" at Columbia, Missouri, auspices Missouri University.

WEAF, New York, 492m (610k), E. S. T.—11 A. M.—Anna Farer, pianist; market and weather reports. 4 P. M., Louis Spielman, pianist; Regina Szegeti Spielman, zymbalist; Solomon Spielman, violinist; children's hour program, stories and songs. 7 P. M., mid-week services, auspices Greater N. Y. Federation of Churches; United Cigar Stores daily sports talk by Thornton Fisher; May Breen and Her Girl Syncopators; Adolph Kachko, baritone, accompanied by Paul Jelenek; talk by the Bank of America; concert direct from Hunter College; Sarah Edwards, contralto; Creighton Allen, pianist.

WIP, Philadelphia, 509m (590k), E. S. T.—1 P. M., luncheon music, Gimbel tea room orchestra. 1 P. M., weather forecast. 3 P. M., recital from Henri Scott Vocal Studios. 6 P. M., weather forecast; final baseball scores. 6:05 P. M., dinner dance music by Harold Leonard and his Red Jackets. 6:45 P. M., Agriculture livestock and produce market reports. 7 P. M., Uncle Wip's bedtime stories and roll call. 8 P. M., "Timely Talks to Motorists," Gene Hogle. 8:15 P. M., Philadelphia Police Band. 9 P. M., Haverford Township Choral Society. 10:30 P. M., organ recital by Karl Bonawitz. 11:15 P. M., dance music by Ted Weems and Victor Recording orchestra.

KFI, Los Angeles, 469m (640k), P. T.—4:45 P. M., Evening Herald and Examiner news bulletins. 6:45 P. M., Y. M. C. A. concert. 8 P. M., Ambassador Hotel concert. 9 P. M., Examiner concert. 10 P. M., concert by Harry Porter, baritone.

KGO, Oakland, Cal., 312m (960k), P. T.—1:30 P. M., N. Y. Stock Exchange; weather reports. 4 P. M., concert orchestra of St. Francis Hotel. 6:45 P. M., stock exchange; weather reports, and news items. 8 P. M., address, "Enlarging Life's Territory," by Rev. George W. Phillips; musical program.

WBZ, Springfield, Mass, 337m (890k), E. S. T.—6 P. M., results of games in American, National and Eastern leagues. 6:05 P. M., "Management in the Home," lecture on Live Stock. 6:30 P. M., bedtime story. 6:40 P. M., musical program by orchestra Boston Stock Co. 7:30 P. M., recital of violin and various voices. 8:30 P. M., recital by Elise Biron, violinist, and Beth Charlton, pianist. 9 P. M., results of games in American, National and Eastern leagues. 9:55 P. M., time signals.

KYW, Chicago, 536 m (560k), C. S. T.—5:45 P. M., bedtime story. 6 P. M., dinner concert. 6:35 P. M., talk on "Sports," by Leo Fisher of Chicago Evening American. 7 P. M., "Twenty Minutes of Good Reading," by Rev. C. J. Permin. 7:20 P. M., musical program.

KDKA, Pittsburgh, 326 m (920k), E. S. T.—5:30 P. M., dinner concert by KDKA Little Symphony Orchestra. 6 P. M., baseball scores. 6:30 P. M., The Farmer in the Dell. 6:45 P. M., news bulletins. 7 P. M., baseball scores. 7:15 P. M., farm program, including the market reports. 8 P. M., concert by KDKA Little Symphony Orchestra; Mrs. Elma Sulzner, contralto; Mr. James Croft, bass; Mr. Elmer Stephan, tenor; Mr. Wilbur Casey, violin. 9:55 P. M., time signals; weather forecast; baseball scores. 10:30 P. M., special late evening concert.

WAAM, Newark, N. J., 263m (1140k), E. S. T.—8:45 P. M., "Weekly Sport Talk," by Sam Taub, sport writer. 9 P. M., program by orchestra of Dixon High School, Jersey City. 9:15 P. M., The Rev. Dr. A. W. Brooks, scientific astrologist, lecture on "The Turn of the Wheel of Events"; radio horoscopes. 9:30 P. M., E. M. Shoemaker, radio doctor, talk on "Superheterodyne Construction." 9:45 P. M., Victor Wilbur, baritone. 10

P. M., C. J. Saunders' Sterling dance orchestra. 11 P. M., Arthur W. Hanle, tenor. 11:15 P. M., Thomas Barton, baritone.

WOR, Newark, N. J., 405m (740k), E. S. T.—3 P. M., Milton Wallace, comedian of "Abie's Irish Rose." 3:30 P. M., tenor solos by Charles Kindeberger. 3:45 P. M., Mme. Hallie De Luca, mezzo-soprano. 6:15 P. M., Albert E. Sonn, technical expert. 6:30 P. M., concert by Clef Club of N. Y. 7:20 P. M., resume of the day's sports.

Friday, May 16

WAAM, Newark, N. J., 263m. (1140k), E. S. T.—11 A. M., program instrumental and vocal numbers. 12 noon, luncheon concert. 1 to 2 P. M., agricultural and health notices, stock market reports, hints to housewives.

WOR, Newark, N. J., 405m. (740k), E. S. T.—3:45 P. M., Nancy Ripley Cobb, whistler. 6:15 P. M., Agnes Leonard's songs for children. 6:30 P. M., "Man in the Moon" stories for children. 7 P. M., Harry Jentes in novelty piano solos. 7:20 P. M., resume of the day's sports.

WJZ, New York, 455m. (660k), E. S. T.—5:45 P. M., State and Federal agricultural reports; Farm and Home reports; closing quotations of N. Y. Stock Exchange; foreign exchange quotations; Evening Post news. 7 P. M., "Jack Rabbit Stories. 7:10 P. M., "Motor Campers' Kitchen." 7:20 P. M., "Financial Development of the Day." 7:30 P. M., weekly French lesson. 8:15 P. M., Frank De Witt, baritone. 9 P. M., Vincent Coppola, pianist; Anthony Fazella, violinist. 9:45 P. M., safety talk. 10 P. M., Dettmorn and Howard, Hawaiian guitars. 10:30 P. M., Specht's Almanac Orchestra.

WJY, New York, 406m. (740k), E. S. T.—7:30 P. M., "The Passing of the Wilderness," by Frank Winch. 7:45 P. M., Norwegian program. 8 P. M., Louisleaf Current Topics. 8:30 P. M., "Income Taxes" Frank Shevit. 8:45 P. M., Angelo Boschetti, mezzo tenor, accompanied by Keith McLeod. 9 P. M., Harmonica Band and contest winners. 9:45 P. M., "The Way to Prevent Motor Vehicle Accidents." 10 P. M., popular program.

CKAC, Montreal, 430m. (700k), E. S. T.—1:45 P. M., Mount Royal Hotel luncheon program. 4 P. M., weather, news, stocks. 4:30 P. M., Mount Royal Hotel dansant program.

KFAE, Pullman, Wash., 330m. (910k), P. T.—8:30 P. M., readings, Mrs. H. H. Langdon. "Bee Frolic Time," B. A. Sloucum Campus Orchestra program. Vocal selections. The New Books, Miss Alice Webb, instrumental selections.

WGI, Medford, Mass., 360m. (830k), E. S. T.—12:40 P. M., weather forecast. 12:45 P. M., farmers' produce market report. 6:30 P. M., closing market reports; code practice; Boston police reports. 7 P. M., meeting Amrad Big Brother Club. 7:30 P. M., evening program. 7:40 P. M., late Ampico releases. 7:50 P. M., Red Cross health talk. 8 P. M., musicale. 9 P. M., popular song hits, Orpheum Music Co. Weather report and standard time.

WFAA, Dallas, Tex., 476m. (620k), C. S. T.—12:30 P. M., address, Dr. Robert Stewart Hyer, Southern Methodist Univ.; Sunday school lesson. 8:30 P. M., musical recital by Mrs. Juanita Blair Fric, singing, and Miss Martha Morna Whitaker, pianist.

KPO, San Francisco, 423m. (710k), P. T.—12 noon, time signals; reading of Scripture. 1 P. M., Rudy Seiger's Fairmont Hotel Orchestra. 2:30 P. M., matinee of American music, direction John Manning.

WGY, Schenectady, N. Y., 380m. (790k), E. S. T.—11:30 A. M., stock market report. 11:40 A. M., produce market report. 11:45 A. M., weather forecast. 11:55 A. M., time signals. 1 P. M., music and one-act play, "The Rising of the Moon," by Lady Gregory. 5 P. M., produce and stock market quotations; news bulletins; baseball results. 5:30 P. M., children's program. 5:45 P. M., children's story in French by Frederic Duclert. 7:35 P. M., health talk, N. Y. State Department of Health. 7:40 P. M., baseball results. 7:45 P. M., Evening of Minstrelsy.

KGW, Portland, Ore., 492m. (610k), P. T.—11:15 A. M., market basket. 11:30 A. M., weather forecast. 12:30 P. M., Peck Holton's Orchestra. 3:30 P. M., talk for women. 7:30 P. M., baseball scores, weather forecast and market reports. 8 P. M., Oregon High School Debating League. 10:30 P. M., Hoot Owls.

WDAF, Kansas City, Mo., 411m. (730k), C. S. T.—3:30, 4, 4:30, 5 and 6 P. M., baseball scores. 3:30 P. M., regular "request" program by Leo R. Davis' "Radio" Orchestra. Time signal and road report. weather forecast, time signal and road report. Tell-Me-a-Story Lady. Fritz Haulein's Trianon Ensemble. 8 P. M., "Radio Review," popular program by favorite entertainers. 11:45 P. M. (Nighthawk Frolic), "Merry Old Chief," Con-Sanders Orchestra.

WLW, Cincinnati, Ore., 309m. (970k), E. S. T.—10:30 A. M., weather forecast and business reports. 12:45 P. M., language lesson. 1:30 P. M., market reports. 3 P. M., stock quotations. 4 P. M., special program.

WWJ, Detroit, 517m (580k), E. S. T.—8 A. M., setting-up exercise. 9:30 A. M., "To-night's dinner," by Woman's Editor. 9:45 A. M., Public Health Service bulletins; talks of general interest. 10:25 A. M., 3 P. M., Detroit News Orchestra. 3:30 P. M., weather forecast. 3:35 P. M., market reports and baseball scores. 5 P. M., baseball scores. 7 P. M., the Detroit News orchestra; Anne Campbell, poet; Grace M. Moss and Freda Sprachman, pianists; Mrs. Chrissie Johnson, contralto; Mrs. George McDonald, soprano.

WOO, Philadelphia, 509m (590k), E. S. T.—7:30 P. M., sports results; police reports; dinner music by Hotel Adelphia concert orchestra. 8:30 P. M., Caroline Wagner Green, soprano; Margaret Hughes Holmes, pianist; Harriette G. Rid-

(Continued on page 20)

New De Forest Idea



(Gilliams)

DR LEE DE FOREST is shown with his newest invention, a radio transmitter with which he talks to aviators flying in the air while he remains on the ground. This is a transmitting and receiving set combined.



(Photograms-Milner)

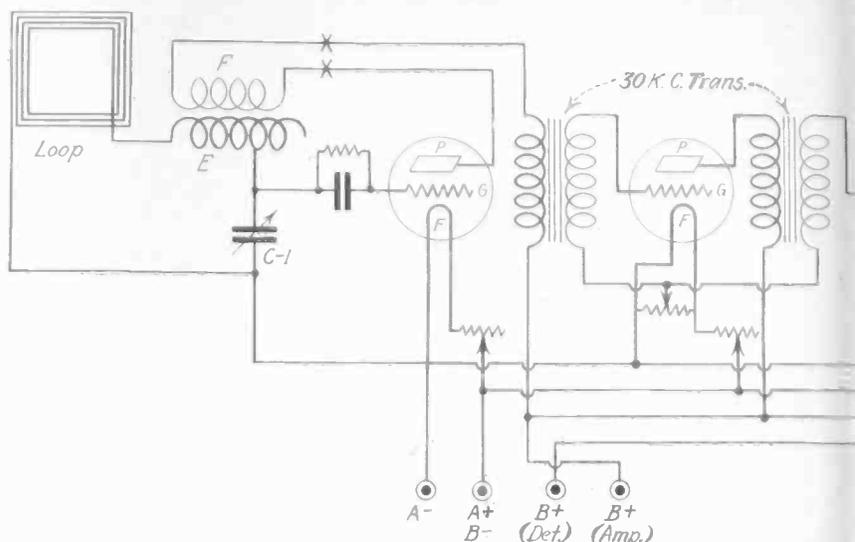
BROADCASTING the names of prize winners of the Eighth Annual Bird House contest of Pittsburgh in which 12,000 contestants competed. The young contestants are shown after their arrival in Washington, where they were received by Senators and Representatives and where the broadcasting took place. Richard Lunn, Capitol Architect, is "announcing."



(International Newsreel)

THE MOST MODERN scientific inventions are used in the endeavor to probe the dark ages of the past. In the Mongolian Desert, the Third Asiatic Expedition from the American Museum of Natural History, is keeping in communication with the outside world while traveling over what is perhaps the very ground of man's origin. The photo shows Bayard Colgate trying to get Peking by wireless, to obtain the right time.

Simplified Super-Heterodyne W



USING A LOOP, this simplified Super-Heterodyne possesses great sensitivity for Summer use. The long-wave RF transformers are the

By Charles H. M. White

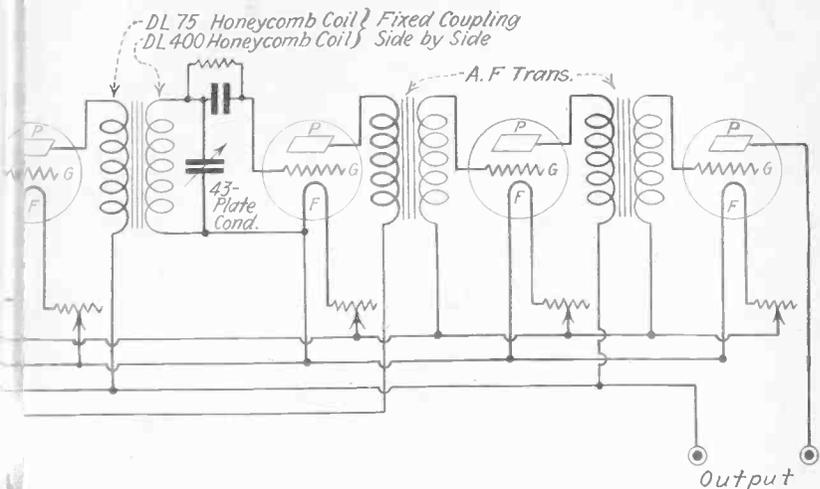
THE principle of the Super-Heterodyne is just as simple as that of the single circuit regenerative receiver. Many radio fans are inclined to believe it difficult because it employs a larger number of tubes. Fundamentally, a Super-Heterodyne is a transformation device that changes short waves of high frequency into longer waves of lower frequency. These longer waves, capable of more efficient radio-frequency amplification, are then passed through a low frequency amplifier and finally detected and passed through the regular audio-frequency amplifier. It is quite obvious that a Super-Heterodyne is nothing more than a long wave radio-frequency receiver with a frequency transformation instrument placed before the long wave apparatus. Thus it is easily possible to design both simple and elaborate receivers.

In respect to the radio-frequency receiver, most Heterodyne receivers are essentially the same, but the transformation device can vary quite a bit in design. In the standard type of Super-Heterodyne two vacuum tubes and a short wave tuning device are used. The tuning device consists of a loop and a tuning condenser. Either one or two tubes can be used for the frequency transformation. If two tubes are used, one tube is called the oscillator and the other tube the first detector. The oscillator is made to oscillate at a frequency slightly higher or lower than the signal frequency. This produces a beat note of a frequency which is the difference between the signal frequency and the frequency of the local oscillator. Since the original signal frequency is modulated with voice waves, then the new "beat note" frequency will be proportionately modulated.

The first detector acts solely to exclude the higher frequencies and pass the new lower frequencies. These lower frequency waves are then passed on to a long wave radio-frequency receiver. In some simplified Super-Heterodyne receivers the oscillator and first detector functions are performed by one tube. In such cases the principle is really autodyne, in that this one tube must oscillate at a frequency slightly different from that of the incoming signal and act as the first radio-frequency detector. The one sound objection to this is that when the first tube is tuned to oscillate at a slightly different frequency, the incoming signal is likewise detuned and weakened thereby. One of the best ways of overcoming this objection is to make use of what is known as the second harmonic. A second harmonic is pro-

Works on the Autodyne Principle

Wins Coveted Prize



(Gilliams)
PRIVATE LLOYD T. GOLDSMITH, who won this receiving set for making the best record in the instruction class of the Citizens' Military Training Camp at Camp Vail, N. J.

and selectivity. It is adapted for portable sets, too, and is excellent special parts needed. Six tubes are used in this circuit.

iced when the autodyne reception is used, therefore making it possible to tune closer to signal frequency than with the fundamental.

The construction of this Super-Heterodyne which works on the autodyne second harmonic principle is easy. There are no special parts, outside the long wave radio-frequency transformers. The unit E-F is nothing more than the standard 180-degree coupler and the loop is the standard short wave loop. An 11 or 13-plate variable condenser with the same sort of vernier adjustment is used for the unit C-1.

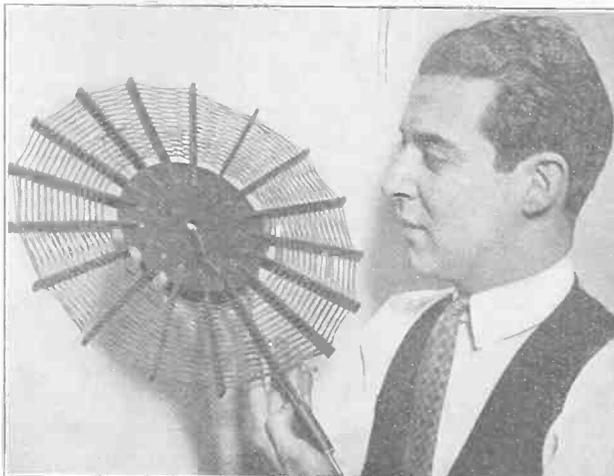
If the autodyne tube (at extreme left) fails to operate or oscillate, just reverse the terminal connections to the rotor terminal F at the points marked with crosses, shown in the diagram at the right of the loop.

It is not necessary to bring the taps for switchpoints to the outside of the panel, because it will be discovered that after a preliminary tryout the oscillator will be found to work best on one particular tap. This eliminates one variable control, thus making the condenser C-1 the main tuning condenser.

As the final long wave tuner, two honeycomb coils are used. One coil is a 100-turn coil and the other is 350 or 500-turn coil shunted with a 43-plate variable condenser. These two honeycomb coils need not be mounted on a standard variable coupling mount, but can be tried together side by side so as to form a tight coupling. After all preliminary adjustments have been made there are only two main tuning controls—the condenser C-1 and the 43-plate long wave tuning condenser.

The receiver can be logged for stations in the same manner as the Neutrodyne. An efficient transformer for the short wave 30 K. C. transformer is the Acme 30 K. C. unit built especially for this type of service. A rheostat is used for each separate tube because the writer firmly believes that in a circuit of this type much better results can be obtained with independent tube control. The grid leak condenser and the grid leak units should be of a size recommended for the style of tubes used.

If the high plate voltages are used, then a C battery will be found useful in keeping down B battery consumption. As a general rule, about 1.5 volts of C battery for every 45 volts of B battery will give the best results. The C battery also improves the general tone reproduction and clarifies the received signal to a marked extent, especially when the volume is large. This simplified Super-Heterodyne, if UV199 tubes be used, is readily portable and thus adapted to summer use. It possesses great sensitivity and selectivity.



(Kadel & Herbert)
THIS PECULIAR loop antenna is built like a spider web coil, and due to its low distributed capacity and efficient design makes long distance reception possible.



(Kadel & Herbert)
ROGER WOLFE KAHN, son of Otto H. Kahn, the noted financier, uses nothing less than an eight-tube Super-Heterodyne outfit. He is intensely interested in radio and does considerable experimental work in his laboratory when not blowing on his saxophone.

Programs

Friday, May 16 (continued from page 17)

ley, accompanist. 9 P. M., "The Port of Philadelphia," George F. Sproule. 9:15 P. M., organ recital. Mary E. Vogt. 10 P. M., dance program from Hotel Adelphia. 10:55 P. M., time signals. 11:02, weather forecast.

WBAP, Fort Worth, Tex., 476m (620k), C. S. T.—7:30 P. M., concert by Aeolian Trio. 9:30 P. M., monthly concert by Texas Christian University. **WNAC, Boston, 278m (1080k), E. S. T.—**10:30 A. M., WNAC Women's Club talks. 1 P. M., Shepard Colonial orchestra. 4 P. M., Shepard Colonial orchestra. 6 P. M., children's half-hour. 6:30 P. M., WNAC dinner dance. Shepard Colonial orchestra. 8:15 P. M., New England Conservatory orchestra.

WHAS, Louisville, Ky., 400m (750k), C. S. T.—4 P. M., selections by Alamo Theatre orchestra; police bulletins; weather forecast for Kentucky, Indiana and Tennessee; selections by Walnut Theatre orchestra; late news. 5:50 P. M., local livestock produce and grain market reports. 4:55 P. M., baseball scores. 5 P. M., official time announced. 7:30 P. M., concert by Kentucky and Indiana Terminal orchestra; tenor solos, Charles H. Barnes; late news; official time announced at 9 o'clock.

KFNH, Shenandoah, Ia., 266m (1130k), C. S. T.—7:30 P. M., old time music by East River Township.

WDAR, Philadelphia, 395m (760k), E. S. T.—11:45 A. M., daily almanac; 12:02 P. M., organ recital from Stanley Theatre; features from studio; Arcadia concert orchestra. 2-3 P. M., Arcadia concert orchestra; recital from studio. 4:30 P. M., program dance music; baseball scores. 7:30 P. M., Dream Daddy. 7:50 P. M., book review. 8 P. M., author's and poet's corner; Arcadia concert orchestra; playlet, Morning Glories, WDAR Players.

WOC, Davenport, Ia., 484m (620k), C. S. T.—9 A. M., opening market quotations. 10 A. M., garden and household hints. 10:55 A. M., time signals. 11 A. M., weather and river forecast. 11:05 A. M., market quotations. 12 noon, chimes concert. 1 P. M., closing stocks and markets. 3:30 P. M., educational program. 5:45 P. M., chimes concert. 6:30 P. M., Sandman's visit. 6:50 P. M., sport news and weather forecast. 7 P. M., educational lecture. 8 P. M., musical program.

WRC, Washington, 469m (640k), E. S. T.—3 P. M., fashion developments, by Women's Wear. 3:10 P. M., song recital by Arthur McCormick, baritone. 3:20 P. M., "Beauty and Personality," by Elsie Pierce. 3:25 P. M., current topics by editor, Review of Reviews. 3:35 P. M., piano recital by Ethel Grant. 3:50 P. M., Magazine of Wall Street. 4 P. M., song recital announced. 5:15 P. M., time signals and weather forecasts. 6 P. M., stories and songs for children, Peggy Albion and Mary Frances Glenn.

WKAQ, San Juan, P. R., 360m (830k), E. S. T.—7 to 9 P. M., WKAQ orchestra, Romantique Rigoletto, Spanish popular waltz; talk in Spanish, Dr. Q. Balz; piano solos, Miss Revero; late news; orchestra continued.

KSD, St. Louis, 546m (550k), C. S. T.—8 P. M., program by Music Department of St. Louis Public Schools, chorus of 750 voices, orchestra of 50.

WOS, Jefferson City, Mo., 441m (680k), C. S. T.—3 P. M., proceedings of "Annual Journalism Week" at Columbia, Mo., auspices Missouri Univ.

KHJ, Los Angeles, 395m (760k), P. T.—12:30 P. M., program of music; news items; weather report. 2:30 P. M., matinee program. 6 P. M., Art Hickman's concert orchestra. 6:30 P. M., music memory contest, courtesy, Fitzgerald Music Co.; Raymond Harmon, tenor. 6:45 P. M., Prof. Walter Sylvester Hertzog American history. 7 P. M., children program; bedtime story by "Uncle John." 8 P. M., Norwegian program, courtesy, Mr. Belland. 10 P. M., Art Hickman's dance orchestra.

WEAF, New York, 492m (610k), E. S. T.—11 A. M., Helen Clark, soprano; talk by Major Bradley Martin; talk by Leonard Barron, auspices Garden Magazine; market and weather reports. 4 P. M., Michael Speciales Hotel Carlton Terrace orchestra; talks for women's clubs; Ruth Bigelow, soprano. 7 P. M., John Steele, tenor; United Cigar Stores daily sport talk by Thornton Fisher; Lyric Ladies vocal trio; the Happiness Boys, Billy Jones and Ernest Hare; C. Carroll Clark, baritone; B. Fischer and Company's Astor Coffee orchestra; "Romance of Radio," by H. de A. Donistrophe, Roseland orchestra.

WIP, Philadelphia, 509m (590k), E. S. T.—1 P. M., luncheon music. Gimbel Tea Room orchestra. 1:30 P. M., weather forecast. 3 P. M., artist students from Clarence K. Bowden Studios. 4 P. M., lesson in Mah Jong by Mr. and Mrs. Wei Lum Wong. 6 P. M., weather forecast; final baseball scores. 6:05 P. M., dinner dance music by the Jordan-Lewis dance orchestra. 6:45 P. M., Agriculture livestock and produce market reports. 7 P. M., Uncle Wip's bedtime stories and roll call.

KFI, Los Angeles, 469m (640k), P. T.—4:45 P. M., Evening Herald and Examiner news bulletins. 6:45 P. M., Glenda Boston and Her Seal Beach orchestra. 8 P. M., Evening Herald concert. 9 P. M., Examiner concert. 10 P. M., Maud Reeves Barnard and pupils. 11 P. M., Ambassador-Max Fisher's Coconut Grove orchestra.

KGO, Oakland, Cal., 312m (960k), P. T.—1:30 P. M., N. Y. Stock Exchange; weather reports.

3 P. M., musical program; book reviews. 4 P. M., concert orchestra of St. Francis Hotel. 6:45 P. M., stock exchange; weather reports; news items.

WBZ, Springfield, Mass., 337m (890k), E. S. T.—5:05 P. M., dinner concert by WBZ Orchestra. 6 P. M., results of games in Eastern, American and National leagues. 6:05 P. M., "The Dover Road," a dramatized story. 6:30 P. M., bedtime story. 9 P. M., results of games in American, National and Eastern leagues. 9:05 P. M., concert by Mozart Ladies' Quartet. 9:55 P. M., time signals. 10 P. M., summary of day's events at General Conference Methodist Episcopal Church. **KYW, Chicago, 536m (560k), C. S. T.—**5 P. M., Spanish lesson by Prof. A. A. Braschi. 5:33 P. M., Dun's Review; Bradstreet's Review. 5:45 P. M., bedtime story. 6 P. M., dinner concert broadcast from Congress Hotel. 7:20 P. M., talks under auspices American Farm Bureau Federation. 9 P. M. to 1:30 A. M., midnight revue.

KDKA, Pittsburgh, 326m (920k), E. S. T.—11:55 A. M., time signals. 12 M., weather forecast; market reports. 2:15 P. M., baseball scores. 5 P. M., baseball scores. 5:30 P. M., organ recital by Paul Flegler. 6 P. M., baseball scores; dinner concert. 6:15 P. M., "Isaiah and the Assyrian Crisis," Sunday School Lesson. 6:30 P. M., The House in the Woods. 6:45 P. M., news bulletins. 7 P. M., baseball scores; Radio Boy Scout meeting. 7:40 P. M., National Stockman and Farmer market reports. 8 P. M., popular concert by the KDKA Serenaders and KDKA Male Quartet. 9:55 P. M., time signals; weather forecast; baseball scores.

Saturday, May 17

WAAM, Newark, N. J., 263m (1140k), E. S. T.—9:15 P. M., Fred Burton's Ambergal Serenaders. 9:45 P. M., Jean Herbert's "Radio Reel." 10 P. M., continuation Fred Burton's Ambergal Serenaders. 10:30 P. M., Jean Herbert, singing. 10:45 P. M., Homer Hayden, pianist.

WOR, Newark, N. J., 405m (740k), E. S. T.—6:15 P. M., "Music While You Dine," Cinderella Georgia Melodians. 7:20 P. M., resume of the day's sports. 8 P. M., Gene Ingraham's Bell Record Orchestra. 8:55 P. M., "Resuscitation," talk by A. J. Van Brunt. 9:10 P. M., J. H. Klein, Jr., Naval Air Station Lakehurst, N. J. 9:40 P. M., two-piano recital by Adelman Twins. 9:55 P. M., Phyllis Kraeuter, cellist of N. Y.; Margaret W. Perkins, accompanist. 10:10 P. M., Fullman Porter's Quartet of Atlanta.

WJZ, New York, 455m (660k), E. S. T.—3 P. M., Ruth Handros, pianist. 3:15 P. M., Helen Ryan, violinist, accompanied by Keith McLeod. 3:30 P. M., Chet Frost's Bostonians. 5 P. M., Hotel Belmont Stringed Ensemble; Landau and Harbor Inn Serenaders. 5:30 P. M., State and Federal agricultural reports; Farm and Home reports; closing quotations of N. Y. Stock Exchange; foreign exchange quotations; Evening Post news. 7 P. M., Howard Garis' Uncle Wiggley Stories. 7:15 P. M., Waldorf-Astoria Grill Orchestra. 8:15 P. M., "Famous Caves of the World," by Wirt W. Barnitz. 8:30 P. M., Harry Schyde, bass, accompanied by Keith McLeod. 9 P. M., "Golf," by Innis Brown. 9:15 P. M., Reid's Instrumental Sextet. 9:45 P. M., dinner of Reserve Officers' Association of U. S.

WWJ, Detroit, 517m (580k), E. S. T.—8 A. M., setting-up exercises. 9:30 A. M., "To-night's Dinner," by Woman's editor. 9:45 A. M.—Public Health Service bulletins; talks of general interest. 10:25 A. M., weather forecast. 11:55 A. M., Arlington time. 3 P. M., Detroit News Orchestra. 3:30 P. M., official weather forecasts. 3:35 P. M., market reports and baseball scores. 5 P. M., baseball scores. 7 P. M., the Detroit News Orchestra.

WGO, Philadelphia, 509m (590k), E. S. T.—11 A. M., grand organ. 11:30 A. M., weather forecast. 12 noon, luncheon music by Tea Room Orchestra. 12:55 P. M., time signals. 4:45 P. M., grand organ and trumpets. 7:30 P. M., sports results, police reports. 10:55 P. M., time signals. 11:02 P. M., weather forecasts.

WBAP, Fort Worth, Tex., 476m (620k), C. S. T.—7 P. M., review of interdenominational Sunday school lesson and radio Bible class by Mrs. W. F. Barnum.

WNAC, Boston, 278m (1080k), E. S. T.—10:30 A. M., WNAC Women's Club talks. 1 P. M., Shepard Colonial orchestra. 2 P. M., Girl's Scout program; address by Channing Cox, governor of Massachusetts. 4 P. M., tea dance from Copley Plaza Hotel. 6:30 P. M., WNAC dinner dance. 8 P. M., dance music, Checker Inn orchestra. 9 P. M., dance music, State Ballroom orchestra. 10 P. M., dance music, Copley Plaza orchestra; popular songs between dance sets.

WHAS, Louisville, Ky., 400m (750k), C. S. T.—4 P. M., selections by Walnut Theatre orchestra; police bulletins; weather forecast for Kentucky, Indiana and Tennessee; selections by Alamo Theatre orchestra; late news. 4:50 P. M., local livestock, produce and grain market reports. 4:55 P. M., baseball scores. 5 P. M., official time announced. 7:30 P. M., Wayne R. Euchner's orchestra; Walter Davison's Orchestra; Harry S. Currie's Orchestra; late news; official time announced at 9 o'clock.

KFNH, Shenandoah, Ia., 266m (1130k), C. S. T.—7:30 P. M., program by artists from Howe, Nebr.

WDAR, Philadelphia, 395m (760k), E. S. T.—11:45 A. M., daily almanac. 12:02 P. M., organ recital from Stanley Theatre; features from studio; Arcadia concert orchestra. 2-3 P. M., Arcadia concert orchestra. 4:30 P. M., Bobbie Lee and his Cotton Pickers. 7:30 P. M., Dream Daddy.

WOC, Davenport, Ia., 484m (620k), C. S. T.—9 A. M., opening market quotations. 10 A. M., garden and household hints. 10:55 A. M., time signals. 11 A. M., weather and river forecast. 11:05 A. M., government bulletins. 11:15 A. M., closing market quotations. 12 noon, chimes concert. 3:30 P. M., educational program. 5:45 P. M., chimes concert. 6:30 P. M., Sandman's visit. 6:50 P. M., sport news and weather forecast.

WRC, Washington, 469m (640k), E. S. T.—5:15 P. M., instruction in international code. 6 P. M., children's hour by Peggy Albion. 7:45 P. M., Bible talk, Rep. John C. Ketcham, Michigan. 8 P. M., "Tony the Barber" by Ed. Callow. 8:15 P. M., violin recital by Sol Minster. 8:30 P. M., talk on radio, Maj. J. W. Howe, Wireless Age. 8:45 P. M., announced. 9 P. M., song recital by Jack Nesbit. 9:20 P. M., concert by Irving Boernstein's Cafe Madrilion Trio. 9:55 P. M., time signals and weather forecasts.

KSD, St. Louis, 546m (560k), C. S. T.—8 P. M., Missouri Theatre Orchestra concert specialties direct from theatre.

KHJ, Los Angeles, 395m (760k), P. T.—12:30 P. M., Neal Wood, slide whistle, and Charles Bradshaw, banjo. 2:30 P. M., matinee musicale. 6 P. M., Art Hickman's orchestra. 6:30 P. M., music memory contest, courtesy Fitzgerald Music Co., Raymond Harmon, tenor. 6:45 P. M., Prof. Walter Sylvester Hertzog, American history. 7 P. M., children's program. 8 P. M., program, courtesy "Bonnie" Helen Mackintosh, Scottish prima donna. 10 P. M., Art Hickman's dance orchestra.

CKAC, Montreal, 430m (700k), E. S. T.—7 P. M., Kiddies' Stories in French and English. 7:30 P. M., Rex Battle and Mount Royal Hotel Concert Orchestra. 8:30 P. M., La Presse special concert. 10:30 P. M., Joseph C. Smith and his Merry-makers.

WGI, Medford, Mass., 360m (830k), E. S. T.—6:30 P. M., code practice; weather forecast; New England crop notes. 7 P. M., meeting Amrad Big Brother Club. 7:30 P. M., Current Events, by David M. Cheney. 8 P. M., talk on New England business industry by Arthur R. Curnick; concert by Quincy High School Glee Club; weather report and standard time.

WFAA, Dallas, Tex., 476m (620k), C. S. T.—12:30 P. M., address, William M. Kelly, editor Craftsman, "Labor and Patriotism." 8:30 P. M., Dr. Richard Mandell, Denton, Texas, with entertainers, song and instrumental renditions. 11 P. M., Adolphus Hotel Orchestra.

KPO, San Francisco, 423m (710k), P. T.—12 noon, time signals; reading of Scripture. 1 P. M., Rudy Seiger's Fairmont Hotel Orchestra. 2:30 P. M., Nannie Marks' Orchestra. 3:30 P. M., tea dansant, E. Max Bradfield's Versatile Band. 8 P. M., dance music by Art Weidner and popular artists.

WGY, Schenectady, N. Y., 380m (790k), E. S. T.—11:30 A. M., stock market report. 11:40 A. M., produce market report. 11:55 A. M., U. S. Naval Observatory time signals. 9:30 P. M., dance music by Romano's Orchestra.

KGW, Portland, Ore., 492m (610k), P. T.—11:30 A. M., weather forecast. 3 P. M., children's program; music and story by Aunt Nell. 10 P. M., baseball scores, weather forecast; George Olsen's Metropolitan Orchestra (2 hours).

WDAF, Kansas City, Mo., 411m (730k), C. S. T.—3:30, 4, 4:30, 5 and 6 P. M., baseball scores. 3:30 P. M., Riley-Ehrhart Orchestra. 6 P. M., Market-gram, weather forecast, time signal and road report. Tell Me a Story. Lacy; Fritz Hanlein's Trianon Ensemble. 11:45 P. M., (Nighthawk Frolic), "Merry Old Chief" and Coon-Sanders Orchestra.

WLW, Cincinnati, O., 309m (970k), E. S. T.—10:30 A. M., weather forecast and business reports. 1:30 P. M., market reports.

WEAF, New York, 492m (610k), E. S. T.—4 P. M., Mount Royal orchestra; the Royal vocal trio. 7:30 P. M., bedtime story. Grosskopf trio; solos and duets by Florence Petsch, contralto, and Charles Schuyler, tenor; Louis Girard, pianist; talk, auspices American Olympic Committee; Jeanne Alfred, soprano; Sol Roselle, baritone.

WIP, Philadelphia, 509m (590k), E. S. T.—1 P. M., organ recital, Karl Bonawitz, from Germantown Theatre. 1:30 P. M., weather forecast. 3 P. M., program by Arlon quartet. 6 P. M., weather forecast. 6:05 P. M., dinner dance music by Harold Leonard and his Red Jackets. 6:45 P. M., Agriculture livestock and produce market reports. 7 P. M., Uncle Wip's bedtime stories and roll call. 8 P. M., "Helium and other Rare Gases," Prof. E. J. Hughes. 8:15 P. M., Westminster double quartet. 9:15 P. M., Schumann trio. 10:15 P. M., dance music by Harold Leonard and his Red Jackets.

KFI, Los Angeles, 469m (640k), P. T.—4:45 P. M., Evening Herald and Examiner news bulletins. 6:45 P. M., vocal concert. 8 P. M., Celeste Rhyas. 9 P. M., Examiner concert. 10 P. M., popular concert. 11 P. M., Ambassador-Max Fisher's Coconut Grove orchestra.

KGO, Oakland, Cal., 312m (960k), P. T.—12:30 P. M., N. Y. Stock Exchange; weather reports. 4 P. M., concert orchestra of St. Francis Hotel. 8 P. M., KGO Little Symphony orchestra; Mu Zeta Rho Musical Sorority. 10 P. M. to 1 A. M., St. Francis Hotel dance orchestra.

WBZ, Springfield, Mass., 337m (890k), E. S. T.—5:30 P. M., dinner concert by Leo Reisman and orchestra. 6 P. M., results of American, National and Eastern league games. 6:30 P. M., bedtime story. 6:40 P. M., concert by Hotel Kimball Trio. 7:15 P. M., recital by Mrs. Ethel Ringer Cuzner, soprano, Mrs. Hettie Sawyer Roberts, contralto, Mr. George R. Smith, accompanist. 8 P. M., concert by Worcester Polytech Institute Combined Musical clubs. 9 P. M., results of American, National and Eastern league games. 9:55 P. M., time signals.

KYW, Chicago, 536m (560k), C. S. T.—5 P. M., news, financial and final markets. 5:18 P. M., talk; speaker announced by radiophone. 5:45 P. M., bedtime story. 6 P. M., dinner concert. 7 P. M., musical program. 8 P. M., talk by Vivette Gorman, Home Economics. 8:15 P. M., Youth's Companion stories, articles and humorous sketches. 9:15 P. M. to 12:30 A. M., late show. **KDKA, Pittsburgh, 326m (920k), E. S. T.—**5:30 P. M., dinner concert by Westinghouse Band.

(Concluded on page 21)

Fine Reception Is in Store for Fans in Summer

By N. N. Bernstein

THE outlook for radio reception this summer even surpasses the brilliant winter season just passed, and promises to exceed any previous season in the short history of radio broadcasting.

Let us look back a few years to the time when the American public was first introduced, a little cautiously it is true, to the possibility of receiving in the home entertainment broadcast by a wireless station twenty-five miles away.

Amateur radio operators in those days used their sets solely for communicating with each other by means of the telegraph code. At that time, also, the American amateur was experimenting with radio telephony with success, so that voice reception over the air was no novelty to them.

Then came the pioneer broadcasting station of the world, KDKA, East Pittsburgh, Pa. It really was rather romantic that the great industry that radio is today had its inception in a lowly barn 'way out in the country.

Radio amateurs all over the country picked up the impromptu programs sent out from KDKA and told their friends about it. This information got to the newspaper headlines and the public wondered and was thrilled.

But did the public for a moment think that they, as well as the young amateurs, could have a radio receiving set and get all this free entertainment without a deep knowledge of electricity and the theory of wireless? No, they were very skeptical and wanted to be shown. They didn't know a thing about radio. It was all too vague and impossible. "Get music 500 miles away without wires? No, I don't buy any stock on that proposition. There's a catch in it somewhere!"

That was the general attitude of the public. That was only a few short years ago. Since then radio with each succeeding year has made great strides. The public has been educated to radio, until now about all you hear on the street is the discussion of tubes, B batteries, loop-antennas, DX, the Super-Heterodyne, ad infinitum. People in all walks of life, young and old, male and female, have or want a radio set. The discussions only increase with the approach of summer. Summer in the past has sometimes been greeted by the radio dealer with a sense of gloom. Then receiving sets were not good enough, or were too inconvenient to lug about on vacations. That's all dead history. The receiving set today can be easily taken to the country, on motor trips, anywhere,—and all the news and entertainment broadcast by the 560-odd radio stations in the United States will follow you around, no matter where you go.

In addition, we have before us a summer of stupendous interest. Both the Democratic and Republican Presidential Conventions will be broadcast. All the athletic and sporting results will be broadcast daily, even while the events are happening. "Coolidge renominated for President. Sarazen leads the field in the Kentucky Derby. Dempsey scores a knockdown over Wills in the second round. Babe Ruth slams out a homer with two men on base!"

You have to catch your breath when you think of all the good things you are going to hear this summer.

The old bugaboo "static" goes by the board with the rest of the obsolete ideas, for there is practically no static in the daytime all the year 'round. Present receiving sets can do as good work in daytime as those in vogue a few years ago could do at night. And as sets are more selective, cross-talk easily can be eliminated.

Programs Saturday, May 17 (concluded from page 20)

6 P. M., baseball scores. 6:30 P. M., Georgie Porgie Pudding and Pie. 6:45 P. M., "Last Minute Helps to Teachers," Carman Carver Johnson. 7 P. M., baseball scores. "Sport Review," by James J. Long. 7:15 P. M., play, Dramatic League of Pittsburgh. 8 P. M., concert by Westinghouse Band. 9:55 P. M., time signals; weather forecast; baseball scores.

Sunday, May 18

KYW, Chicago, 536m. (560k), C. S. T.—10 A. M., Central Church service from Orchestra Hall; musical program direction Daniel Protheroe. 1:30 P. M., studio chapel service, direction of Chicago Church Federation. 6 P. M., preliminary service of Chicago Sunday Evening Club. 7 P. M., regular meeting Chicago Sunday Evening Club.

WOO, Philadelphia, 509m. (590k), E. S. T.—2:25 P. M., musical exercises; Sunday afternoon session. Bethany Sunday School; School Orchestra. 3:45 P. M., sacred recital on Wanamaker organ. 7:30 P. M., evening services from Bethany Presbyterian Church; organ recital 7:30 to 7:45; Chorus Choir, direction Prof. Jerry March; Leman String Quartette; sermon by Rev. Dr. A. Gordon MacLennan.

WBAP, Fort Worth, Tex., 476m. (620k), C. S. T.—11 A. M., services of First Methodist Church. 4 P. M., organ concert from Rialto Theatre, Miss Marguerite Agnew White, organist. 5 P. M., concert by Cleburne, Texas artist. 7 P. M., sport review. 11 P. M., popular program by Crockett's Texans Orchestra.

KFNF, Shenandoah, Ia., 266m. (1130k), C. S. T.—3 P. M., religious services by Men's Gospel Team. 6:30 P. M., regular sacred song service.

WOS, Jefferson City, Mo., 441m. (680k), C. S. T.—7:30 P. M., religious services First Christian Church, Jefferson City, Rev. Robert M. Talbert, pastor; Prof. Siebert Price, organist; Mrs. Fred Reagle, violinist, and robed choir 20 voices.

CKAC, Montreal, 430m. (700k), E. S. T.—4:30 P. M., vocal and instrumental concert.

WGI, Medford, Mass., 360m. (830k), E. S. T.—4 P. M., twilight program; "Adventure Hour," by Youth's Companion; address by Rev. John McGaw Foster, assisted by choir of Church of Messiah. 8:30 P. M., evening program; talk, auspices Greater Boston Federation of Churches; musicale.

WFAA, Dallas, Tex., 476m. (620k), C. S. T.—6 P. M., Radio Bible Class, Dr. William M. Anderson, pastor; Bible study and Gospel song. 9 P. M., Miss Ruth Fabian in song recital. 9:30 P. M., Jack Gardner's Orchestra, popular music recital.

KPO, San Francisco, 423m. (710k), P. T.—11 A. M., undenominational and non-sectarian. Speaker, Rev. Frederick H. Menzel, San Francisco Lutheran Church; soloist, Miss Fanny E. Regan, contralto. 8:30 P. M., concert by Rudy Seiger's Fairmont Hotel orchestra.

WDAF, Kansas City, Mo., 411m. (730k), C. S. T.—3:30, 4, 4:30 and 5 P. M., baseball scores. 4 P. M., program by Northeast High School Orchestra; solos by artist members.

WIP, Philadelphia, 509m (590k), E. S. T.—11 A. M., morning service from Holy Trinity Church, Rev. Floyd W. Tompkins, D. D., rector. 4:30 P. M., services by Dr. W. B. Wilkinson from Germantown Theatre.

KFI, Los Angeles, 469m (640k), P. T.—10 A. M., L. A. Church Federation service. 4 P. M., Sol Cohen matinee musicale. 6:45 P. M., Silver Gate trio. 8 P. M., Ambassador Hotel concert. 9 P. M., Examiner concert. 10 P. M., Cinderella ballroom orchestra.

KGO, Oakland, Cal., 312m (960k), P. T.—3:30 P. M., concert by KGO Little Symphony Orchestra and soloists.

Monday, May 19

WHAZ, Troy, N. Y., 380 m. (790k), E. S. T.—9 P. M., concert by Emma Willard. 9:30 P. M., "Rearing Fish for Sportsmen," Dr. Emmeline

Moore. 10:30 P. M., program popular dance music by Art Thompson's Orchestra.

WOO, Philadelphia, 509m. (590k), E. S. T.—12 noon, luncheon music by Tea Room Orchestra. 12:55 P. M., time signals. 4:45 P. M., grand organ and trumpets. 7:30 P. M., sports results, police reports; dinner music by Hotel Adelpia Concert Orchestra. 8:30 P. M., "Relation of Sanitation to Public Health," G. H. Shaw. 8:45 P. M., Henri May, baritone; Margaret Ryder Beane, pianist; Harriette G. Ridley, accompanist. 9:10 P. M., Fox Theatre Grand Orchestra. 10 P. M., organ recital, Mary E. Vogt. 10:30 P. M., dance programme by Havana Casino Orchestra.

WBAP, Fort Worth, Tex., 476m. (620k), C. S. T.—7:30 P. M., concert by Municipal Band, Jaytown, Texas. 9:30 P. M., concert by Men's and Girls' Glee Clubs of Tarleton College, Stephenville, Texas.

WOS, Jefferson City, Mo., 441m. (680k), C. S. T.—8:00 P. M., program by Missouri State Prison Orchestra.

CKAC, Montreal, 430m. (700k), E. S. T.—1:45 P. M., Mount Royal Hotel luncheon concert. 4 P. M., weather, news, stocks. 4:30 P. M., Mount Royal Hotel dansant.

KPO, San Francisco, 423m. (710k), P. T.—12 noon, time signals; reading of Scripture. 1 P. M., Rudy Seiger's Fairmont Hotel orchestra. 2:30 P. M., matinee program, management Constance Duncan. 4:30 P. M., Rudy Seiger's Fairmont Hotel Orchestra. 5:30 P. M., children's hour stories. Songs for children by Erwin Holton, tenor. 7 P. M., Rudy Seiger's Fairmont Hotel Orchestra. 8 P. M., organ recital by Theodore J. Orwin. 9 P. M., program, direction Chester Harold. 10 P. M., E. Max Bradfield's Versatile Band.

WDAF, Kansas City, Mo., 411m. (730k), C. S. T.—3:30, 4, 4:30, 5 and 6 P. M., baseball scores. 3:30 P. M., Milo Finley's Dance and Concert Orchestra. 6 P. M., marketgram, weather forecast, time signal and road report; Tell-Me-a-Story Lady; Fritz Hanlein's Trianon Ensemble. 8 P. M., Fritz Hanlein's Trianon Ensemble; vocal and instrumental solos. 11:45 P. M. (Night-hawk Frolic), "Merry Old Chief" and Coonsanders Orchestra.

KFI, Los Angeles, 469m (640k), P. T.—4:45 to 5:15 P. M., Evening Herald and Examiner news bulletins. 8 P. M., Evening Herald concert. 9 P. M., Examiner concert. 10 P. M., Ambassador-Max Fisher's Cocoonat Grove Orchestra.

KGO, Oakland, Cal., 312m (960k), P. T.—1:30 P. M., N. Y. Stock Exchange; weather reports. 3 P. M., musical program; address on "The Health of the Child," 4 P. M., Hotel St. Francis dance orchestra. 6:45 P. M., stock exchange; weather reports, and news items. 8 P. M., educational program, with musical numbers; courses in agriculture, Spanish, music, economics and literature.

Tuesday, May 20

WOO, Philadelphia, 509m. (590k), E. S. T.—11 A. M., grand organ. 11:30 A. M., weather forecast. 12 noon, luncheon music by Tea Room Orchestra. 12:55 P. M., time signals. 4:45 P. M., grand organ and trumpets. 7:30 P. M., sports results, police reports. 10:55 P. M., time signals. 11:02 P. M., weather forecast.

WBAP, Fort Worth, Tex., 476m. (620k), C. S. T.—7:30 P. M., concert by Walter Colling's Band of Cleburne, Texas. 9:30 P. M., concert by artists, Fort Worth Harmony Club.

KFNF, Shenandoah, Ia., 266m (1130k), C. S. T.—7:30 P. M., program by Jubilee Singers of Clarinda, Iowa.

CKAC, Montreal, 430m. (700k), E. S. T.—4 P. M., weather, news, stocks, music. 7 P. M., kiddies' stories in French and English. 7:30 P. M., Mount Royal Hotel dinner concert. 8:30 P. M., English program by White Star Dominion Steamship "Regina." 10:30 P. M., Mount Royal Hotel Dance Orchestra.

KPO, San Francisco, 423m. (710k), P. T.—12 noon, time signals; reading of Scripture. 1 P. M., Rudy Seiger's Fairmont Hotel Orchestra. 2:30 P. M., organ recital by Theodore J. Irwin. 4:30 P. M., Rudy Seiger's Fairmont Hotel Orchestra. 4:30 P. M., children's hour stories. 6:30 P. M., program by "Cleveland Six." 6 P. M., Rudy Seiger's Fairmont Hotel Orchestra. 8 P. M., program by Richard Jose and the Islam Joseans. 10 P. M., E. Max Bradfield's Band.

A New List Showing Total Vote Cast Will Be Published in an Early Issue

Who Is America's Most Popular Radio Entertainer?

Everybody is interested in this query: Who is America's most popular radio entertainer? You have your favorite. Who is she or he? Let us know your choice, whether a comedian, an opera singer, a jazz band, or a story-teller.

RADIO WORLD wants to be able to tell the world the name of the entertainer who stands highest in the regard of listeners-in.

Use the accompanying blank and mail to Broadcasting Manager, RADIO WORLD.

Cut off. FIE out. Mail today.

BROADCASTING MANAGER, RADIO WORLD,
1493 Broadway, New York City.

Dear Sir:

My favorite entertainer is.....Station.....

Name.....

Street Address.....

City and State.....

The Radio University

A Question and Answer Department conducted by RADIO WORLD for its Subscribers by its Staff of Experts.

Address Letters to Radio University Department
RADIO WORLD, 1493 Broadway, New York City

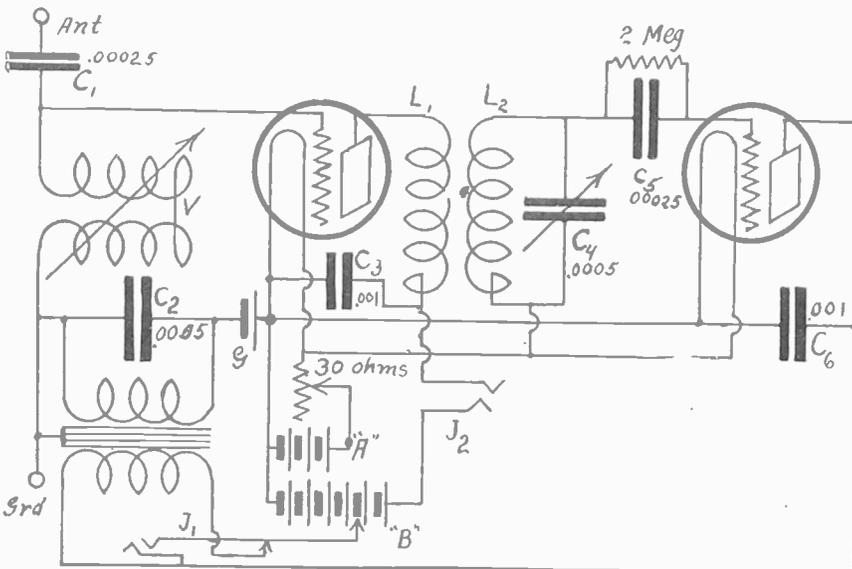
1—Which circuit would you advise me to use for distance and volume, a 4-tube Neutrodyne with push-pull audio-amplification, the 3-tube reflex, or the 3-tube super-regenerative circuit which appeared in RADIO WORLD for Dec. 1, 1923? 2—In the 3-tube super-regenerative are the coils marked DL 300-1500-1250 honeycomb coils, or must they be wound by the experimenter himself? 3—Is the stator winding in that set divided and the rotor placed between the two windings? 4—Where can the 12,000-ohm resistance units be purchased?—Glenn Neely, Dolgeville, N. Y.

All the circuits you mention have brought good results, and it is only a matter of taste which one you would personally prefer. Some of course cost a little more than others, due to more parts being used in their construction. They are all good circuits. 2—The coils are duo-lateral or honeycomb coils and can be purchased at almost any radio supply store. 3—The stator winding on the coupler is separated about 3/4 of an inch, to allow the shaft of the rotor to come through. 4—Look in the advertising columns of RADIO WORLD for the address of firms selling resistance units and take your choice.

There are doubtless many radio fans throughout the country who still have regenerative sets and who do not like to part with them. I am one of these, and I have the Ambassador set. I would like an article on how to construct a step of radio-frequency amplification to be used with my present set, without disturbing it in the least.—C. Struppman, Jr., 1 Shippen St., Weehawken, N. J.

Just the article you want appeared in RADIO WORLD for May 3, 1924. In that article, Walt E. Thompson described in detail how to construct and operate his Neutrad Unit, which can be used with an regenerative set without changing its wiring.

Please publish a diagram for a portable two-tube set suitable for use with dry-cell batteries.—Joe Zisner



CIRCUIT DIAGRAM of a portable two-tube receiver asked for by Joe Zisner, which may be installed in a small square hand bag and space arranged for the dry-cell A and B batteries. The antenna and ground wires may be coiled up and stowed in the bag also. For a ground, some bare wire dropped into a river, lake or well will give results (Fig. 13).

Zisner, 2571 Madison St., Ridgewood (Queens), N. Y.

The accompanying diagram, Fig. 13, is a very efficient portable set and can be built into a small handbag. For the antenna and ground 2 small coils of flexible insulated wire may be carried rolled up in the bag. UV199 tubes are recommended for use with this outfit. Two 4 1/2-volt batteries of the C type can be used to heat the filaments, and two small blocks of 22 1/2-volt B batteries used for the high voltage.

Kindly inform me which of the sets below mentioned you recommend: Ultradyne, 5-tube Neutrodyne, Super-Regenedyne, Superdyne, and Super-Heterodyne. My object is to get good, clear reception at a range approximating 2,500 miles, that is, to get broadcasting stations from all

parts of the United States, and a set that is easy to manipulate.—L. Gomez, P. O. Box 264, Havana, Cuba.

All the sets you mention have done excellent work in bringing in distant stations clearly. It is not the policy of this publication to recommend apparatus sold in the competitive field. As before stated, all these sets will do the work, the more expensive naturally better serving the purpose. An outfit manufactured by a good reputable concern as always dependable, and you should be guided by this fact.

1—On page 9 of RADIO WORLD of December 29 you give a diagram of the autoplex circuit. Can

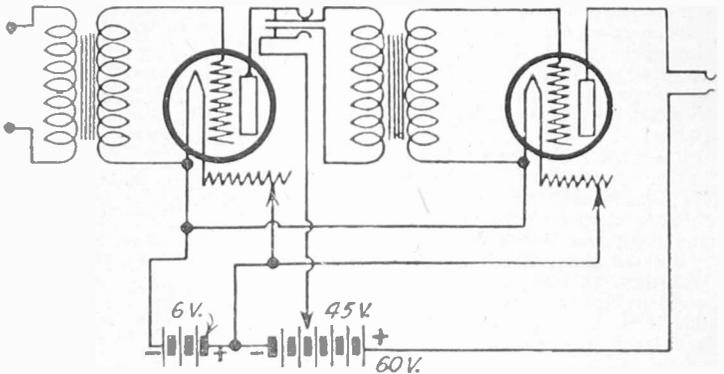


FIG. 12 is the wiring diagram of 2-stage AF amplifier asked for by Ralph B. Hamer.

I add one or two stages of audio-frequency amplification for bringing in distance stations, and if so can you give me a circuit diagram for wiring

it in? 2—Would also like to know whether there is any method by which I may regulate the current delivered from a rectifier which has no rheostats so that I may charge a storage B battery?—Ralph B. Hamer, Roff, Okla.

Fig. 12 shows the wiring diagram for adding two stages of audio-frequency amplification. The primary of the first transformer is connected to the output of the detector circuit. Jacks are also provided for. 2—Would suggest that you write to the manufacturer of your storage B battery for charging information, as different makes are charged differently.

In RADIO WORLD for August 25, 1923, there was a diagram of a radio set that is being used by the Government lighthouses. I have made this and it has proven very satisfactory. Now I wish to add one or two stages of amplification to this set and would appreciate a diagram for same.—Samuel Ehrenworth, care Wm. A. Burckhard Co., Norfolk, Va.

See the diagram in answer to Ralph B. Hamer. This same amplifying circuit can be used on any set.

I would like to know if a selectoformer would work in place of primary and secondary coils, using variometer for feedback?—Louis Jacobs, Box 209, Whitinsville, Mass.

Yes, the selectoformer can be used successfully in place of a variocoupler or primary and secondary coils.

I have built a Superdyne receiver from the plans in RADIO WORLD. Due to a bad case of arc light interference, which seems to be impos-

sible to get rid of, I find that I get better results with my old-time coupler-variometer set. This set almost eliminates the trouble. I have had the coupler-variometer set for almost two years, and it is all home made, even the coils being wound by hand. I would like to change the home-made variometers for Dayton variometers, which I can procure. I will also use a Michigan 180-degree coupler. Do you think the set will work as well?—Robert A. Harvey, Paris, Texas.

In regard to the arc light interference, you might try changing the antenna about to run in a different direction, which may materially decrease the annoyance. The reason that the Superdyne picks up more of the interference is probably because it is more sensitive when brought to the point of resonance. The parts you want to substitute for your home-made apparatus should work better than those you are using. If a set of this type is correctly wired and operated, very excellent results will be obtained.

1—Can I use an Amco compensating condenser instead of the potentiometer in the 3-tube tuned and untuned radio-frequency circuit by Mr. White on page 3 of RADIO WORLD for March 22? 2—Could I make this a 4-tube circuit by adding another untuned stage of radio-frequency in the proper manner?—E. N. Cash, Norwich, Conn.

1—No, a condenser is not a resistance, therefore it could not be used as a potentiometer. The purpose of the potentiometer is to provide the proper negative grid bias to the first tube, which could not be done with a condenser. 2—Yes, you can add another step of untuned radio-frequency amplification, in which case the transformer is to be constructed the same as the one before the third tube.

Please publish a diagram of the R. C. A. Regenoflex circuit, giving winding and general construction data.—E. L. Storck, 15750 Alden Ave., Detroit, Mich.

Suggest that you communicate with the Radio Corporation of America, 233 Broadway, New York City.

Join RADIO WORLD'S University Club

And Get Full Question and Answer Service for the Coming 52 Weeks.

RADIO WORLD, 1493 Broadway, New York City:

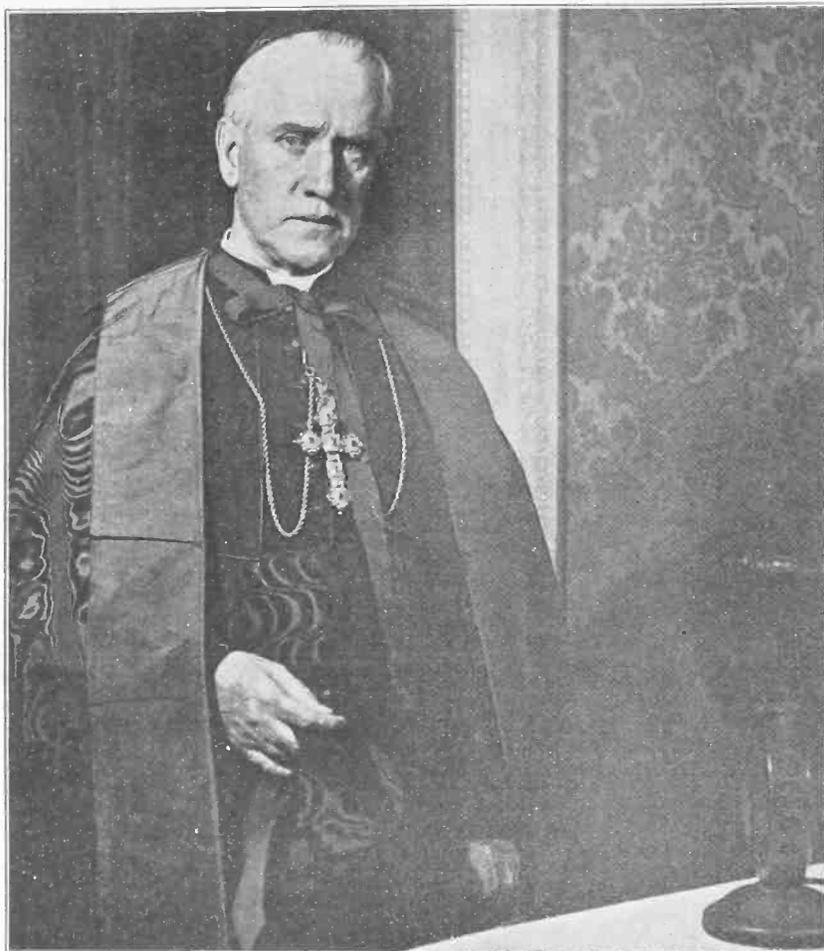
Enclosed find \$6.00 for RADIO WORLD for one year (52 Nos.) and also consider this as an application to join RADIO WORLD'S University Club, which gives me free information in your Radio University Department for the coming year.

Name

Street

City and State

Cardinal Hayes Broadcasts



(Foto Topics.)

NEWLY APPOINTED, Cardinal Hayes, just back from Rome, broadcast from WEAJ. The Cardinal, given a triumphant welcome in New York, was born in a modest tenement house in that city.

His Spider-Web Neutrodyne Gets Wonderful Results

I HAVE completed the Spider-Web Neutrodyne described in RADIO WORLD for April 12, and I believe the readers of RADIO WORLD will be interested to know the results. I did not follow the specifications exactly, because I could not get 60 turns of No. 24 wire on the forms I had. I wound the forms with No. 28 DCC wire, 60 turns on the secondary, and 8 on the primary. These were mounted on 23-plate condensers, the coils being placed at right angles to each other. A tap was taken from the 50th turn, but I did not use neutralizing condensers. To my surprise, there was not a single squeal over the whole range. So far I have logged 22 stations on the loud speaker. My opinion of the outfit as I have it is that it's a mighty inexpensive circuit to build and maintain, as I am using dry-cell batteries for the filaments of the UV199 tubes. The only fixed condenser I used was the .00025 mfd. grid condenser. In wiring the set I left the ends of the windings on the coils rather long and carried them directly to their proper connections without breaking or soldering to them, only soldering the ends of the wire. I built the set as an experiment, but it is so good and inexpensive to operate that I shall put it in a cabinet and use it until I find something better. It tunes very sharp,

Radio Tax Deemed Dead After Senate Rejection

WASHINGTON.

THE action of the Senate, sitting as a committee of the whole, in rejecting the tax on radio sets, 40 to 13, is regarded here as meaning the end of the attempt to thrust a tax on the radio industry.

The radio tax provision never was in the tax bill as it came from the House, but originated in the Senate Finance Committee. Recently that committee, when only 20 Senators were present at a Senate meeting, jammed through an approval of the tax, without a roll call. But when the matter was brought up again—this time at the insistence of opponents of the tax—the 40-to-13 victory for the radio public was achieved.

and I can easily separate any station within 5 or 10 meters.

HARRY E. DAVIS,
12 Court St., Binghamton, N. Y.

MAGNAVOX

Radio Products



New model

R3—\$35.00

Current consumption in the new Magnavox Reproducer R3 is so low that it is an unimportant factor.

This feature, combined with the new Volume Control, makes the new R3 indispensable for use with every radio receiving set.

Magnavox Reproducers

R2 with 18-inch curvex horn \$50.00
R3 with 14-inch curvex horn \$35.00
M1 with 14-in. curvex horn. Requires no battery for the field \$35.00

Magnavox Combination Sets

A1-R consisting of electro-dynamic Reproducer with 14-inch curvex horn and 1 stage of amplification \$59.00
A2-R consisting of electro-dynamic Reproducer with 14-inch curvex horn and 2 stages of amplification \$85.00

Magnavox Power Amplifiers

A1—new 1-stage Power Amplifier \$27.50
AC-2-C—2-stage Power Amplifier \$50.00
AC-3-C—3-stage Power Amplifier \$60.00

Magnavox products can be had at Registered Magnavox Dealers everywhere. Write for new 32-page catalogue.

The Magnavox Company
Oakland, California

New York Office: 350 West 31st Street

Canadian Distributors

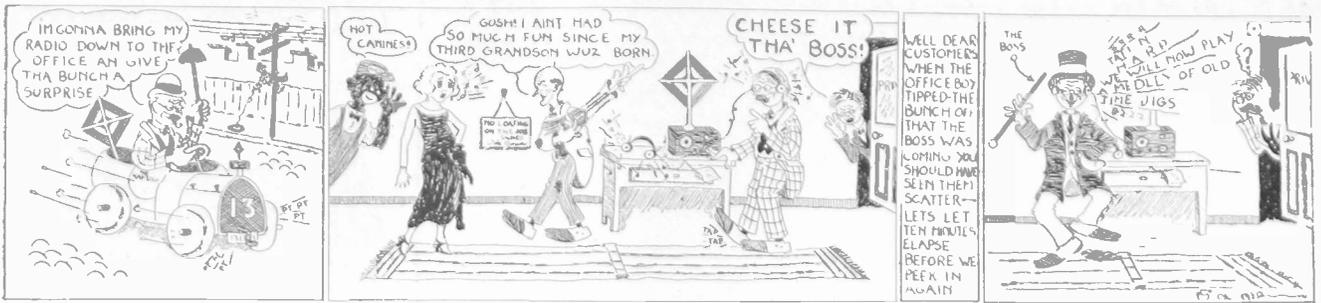
Perkins Electric Limited

Toronto Montreal Winnipeg

MR. D. X. HOUND

Radio World's Own Artist Creates An
Enjoyable Character

By HAL SINCLAIR



The Radio Trade

Big New Enterprise to Finance Dealers

THROUGH the co-operation of a group of bankers, a wholesale radio outfit is undertaking the financing of radio dealers throughout the country in a manner that will enable the dealers to sell radio sets and accessories on the installment plan. The dealer will be in position, under this plan, to carry a complete stock without being held to the output of any one manufacturer. This plan—unique in the radio field—brings to the industry the financial arrangements prevalent in the sale of automobiles. The firm that has brought about the innovation is United States Radio-Kraft Corporation, 132 Nassau Street, N. Y. City.



A. S. RAND

Anthony S. Rand, of this organization, said: "Our company came to the conclusion a few months ago that we could be of help to radio dealers if we could not only distribute radio sets and apparatus but also finance the dealers' sales. A few manufacturers were doing so but many dealers did not care to devote their business to any particular radio set. Buyers of radio sets, like buyers of other advertised products, wish to purchase that which appeals to their taste and purse. If a man wants a certain type of radio receiving set, he wants that set and none other. Many men are unable to pay out in cash the amount necessary today to buy a high grade receiving set. We found in our retail installment business that if the buyer was given an opportunity to buy and pay for his purchase gradually, he bought the best only, particularly in those items which were nationally advertised."

Mr. Rand put into practice the idea of radio on the installment plan in New York City.

Gadget Makes Its Bow

GADGET No. 1 has been put on the market by Gibson & Glamzo, 50 Park Place, New York City. Gadgets are a series of useful radio devices which this concern plans to bring out from time to time.

Gadget No. 1, a pair of brass connecting dices, takes the place of plug and jack combined by

allowing the use of between one and six phones at one time. Loud speaker tips can be plugged in at the same time that phones are connected and any combination of speakers and phones is possible. One or both can be disconnected instantly with no trouble or loss of time.

Gadgets can be used as ground, aerial or battery switch by breaking the circuit and attaching the cord tips to end of wire, and using gadgets as connecting medium.

If attached to the head of one's bed, they make possible the listening in on some special program with ease and comfort. This use will appeal to the DX fan who wants to listen in at 2 A. M. By attaching to the battery circuit, it is possible to disconnect one's set without getting out of bed.

Tradiograms

VICTOR HERBERT and John Philip Sousa, members of the American Society of Authors and Composers, before the House Committee on Patents, during a hearing on the Newton bill (complement of the Dill bill), opposed relieving broadcasters of paying royalties on musical compositions.

THE American Society of Authors, Composers and Publishers has instituted, under the name of its member, Witmark & Sons, an action in Los Angeles for a restraining order and \$250 damages against the Earle C. Anthony, Inc., radio station, KFI, for alleged violation of the copyright law. It is alleged the station has broadcast "Gypsy Love," Witmark copyright number, without permission or license.

New Corporations

Pierce Radio Sales Corp., N. Y. City, stock brokers, \$100,000; J. E. Peterson, M. H. Cousins. (Attorney, L. Hess, 1540 Broadway.)

J. Ridges Co., N. Y. City, electric novelties, \$50,000; J. Ridges, G. Feinman, B. Rosenblatt. (Attorneys, Phillips, Jaffe & Jaffe, 1170 Broadway.)

Associated Electric Products Corp., N. Y. City, \$10,000; I. and E. Magidoff, S. Kraft. (Attorneys, E. Kraft & Co., 677 Peck St.)

Cineradio Corp., N. Y. City, radio and motion pictures, 1,000 shares preferred stock, \$10 each; 100 common, no par value; G. Middleman, R. Frankel. (Attorneys, H. O. Falk, 1457 Broadway.)

Port A Radio Corp., N. Y. City, 500 shares common stock, no par value; B. Salter, Z. Greenstone R. Rosenberg. (Attorney, W. Klein, 152 West 42d St.)

De Forest Wins Tube Patent Suit

WASHINGTON.

LEE DE FOREST of New York, was declared by the District of Columbia Court of Appeals to be entitled to priority as the inventor of the audion as a means of producing sustained electrical oscillation in transmission by radio or otherwise. The opinion reversed the finding of the Commissioner of Patents, who had awarded priority to Edwin H. Armstrong. Claims also had been made by Alexander Meissner and Irving Langmuir.

The decision of a New York court in a suit brought by Armstrong against the De Forest Radio Telephone and Telegraph Company, which was decided in favor of Armstrong, had no bearing, the court found, because it involved an infringement and not the question of priority.

Business Opportunities Radio and Electrical

Rates: 40c a line; Minimum 3 lines.

MANUFACTURERS—We have a large shop and are well equipped to handle the assembling or finishing of small mechanical articles in large quantities. Room 801, 103 East 125th Street, New York City. Phone Harlem 3961.

YOUNG MAN—GENERAL MANAGER ELECTRICAL and radio manufacturing concern five years past, desires connection in New York or vicinity; not necessarily same lines; investment if required. Box X, Radio World.

RADIO CABINET SHOP—WELL EQUIPPED, wants connection with firm to manufacture their product. Box 12-B, 577 East 163rd Street, New York City.

RADIO SHOP IN NEWARK, CENTRALLY located, averaging \$6,500 monthly, with good profit; must sacrifice due to other business; good proposition to cash buyer. Box XX, Radio World.

HALF INTEREST IN VALUABLE RADIO patent; corporation established, doing business; non-competitive article; wonderful opportunity; reason for selling; principal only. Box XXX, Radio World.

RADIO ESTABLISHED BUSINESS, RECEIPTS \$1,000 to \$1,500 weekly; great thoroughfare; stock and fixtures cost \$8,000, sacrifice \$6,500. Investigation invited. Crowe, Times Building, New York City.

Now in Preparation, Third Annual Vacation Number of Radio World

There are three million more radio fans this year than there were last year—which means just that many more potential buyers of radio goods for the summer.

RADIO WORLD for June 7 will be a special Vacation Number and will contain so many special summer feature and service articles that it will serve as a great urge for buyers of sets and parts.

Cover and preferred position will close May 27. Last page of last black form will close May 29.

Regular advertising rates in force: \$150 per page, \$75 half page, \$37.50 quarter page, \$5 per inch, 40c per.agate line.

ADVERTISING DEPT., RADIO WORLD, 1493 BROADWAY, NEW YORK CITY

Join the A. B. C. NOW

Membership Is Free and All Fans Are Asked to Enroll—
List of Members Will Be Published Soon

THE American Broadcast Club, formed under the auspices of RADIO WORLD, has for its object the promotion of the welfare of the broadcast listeners of the United States and Canada.



Membership is open to all interested in radio in any way, either as broadcast listener, dealer, manufacturer, wholesaler or jobber. A novel feature of the A.

B. C. is that membership entails no duties or obligations whatever. There are no dues. All you have to do is enroll. That will signify your interest in radio and make you one of the thousands unselfishly united in a common interest.

All you have to do to join is to send in your name and address on a postcard or in a letter.

Address, A. B. C. Editor, RADIO WORLD, 1493 Broadway, New York City.

A FEW OF THE MEMBERS

- W. N. Thomas, 1603 Minnesota avenue, N. E., Washington, D. C.
 - W. L. Wray, Box 361, Great Kills, S. I., N. Y.
 - Jack Hoebel, 715 West Pleasant street, Freeport, Ill.
 - C. E. Williams, Box 343, Chickasha, Okla.
 - Lewis S. Hays, 418 South Maple avenue, Greensburg, Pa.
 - Edw. M. Feeney, 173 Beach 105th street, Rockaway Beach, N. Y.
 - Ray Weston, 770 N. Main street, Marion, O.
 - E. W. Simmons, 141 Central avenue, San Francisco, Cal.
 - Kenneth B. Walton, 2503 East 55th street, Cleveland, O.
 - Charles B. Hatfield, 599061, Littleton, W. Va.
 - Carl Brown, Inter State Signal Co., Columbus, O.
 - John A. Rhea, 112 Trinity Place, N. Y. City.
 - Wm. R. Charlton, 536 E. 89th St., N. Y. City.
- To be continued.

POWER

From Your Lamp Socket

Send for particulars.

SIDBENEL RADIO CO.

29 Mount Eden Ave., New York, N. Y.

BRISTOL AUDIOPHONE

MORE THAN A LOUD SPEAKER

- Bristol Audiophone, Sr., 15-in. Horn...\$30.00
- Bristol Audiophone, Jr., 11-in. Horn...\$22.50
- Bristol Single Stage Power Amplifier...\$26.00

Write for Bulletin 3006-W

The Bristol Company

Waterbury, Conn.

HOOK-UPS FOR EVERYBODY—Henley's 222 Radio Circuit Designs, \$1.00, postpaid. The Columbia Print, 1493 Broadway, N. Y. C.

Build a BETTER ULTRADYNE

from
"L-RA-CO"
Parts



OR

The IMPROVED
SUPER-
HETERODYNE

Kit
Only \$25.00

COMPLETE PARTS FOR 8 TUBE ULTRADYNE

- | | |
|--|---|
| <ul style="list-style-type: none"> 1 L-RA-CO special parts kit consisting of: 1 LC1 Tuning Inductance 1 LC2 Oscillator Coupler 1 LC3 R. F. Filter Coupler 3 LC5 Intermediate R. F. Transformers 1 7" x 30" x 3/16" Formica Panel, drilled and engraved 1 Baseboard 1 .001 43 Plate Condenser 1 .0005 23 Plate Condenser 2 4" Vernier Dials 1 7 ohm General Radio Rheostat 1 20 ohm General Radio Rheostat 1 400 ohm General Radio Potentiometer | <ul style="list-style-type: none"> 1 Cutler Hammer Battery Switch 3 Double Closed Bakelite Jacks 1 Single Open Bakelite Jack 8 General Radio Sockets 2 General Radio Audio Transformers 3 .001 Dubilier Mica Condensers 2 .006 Dubilier Mica Condensers 1 .00025 Dubilier Condenser with 4 Meg Leak 5 Extra Heavy Bakelite Eby Binding Posts 35 Ft. Heavy Square Bus Wire 1 Frost Radio Plug Necessary screws Blue prints of wiring diagrams, panel layout and baseboard layout. |
|--|---|

\$82.22

THE ONLY SUMMER SET—ORDER NOW

1614 Tenth St.—LEWIS RADIO CO.—Wichita Falls, Texas

Supremacy Proven by Every Test

FILKO-STAT

THE SCIENTIFICALLY CORRECT
RADIO RHEOSTAT

Sleeper

MONOTROL

Reg. U. S. Pat. Off.

Licensed under the Grimes Inverse Duplex Inventions. No aerial—no ground. Just dial to turn.

Perfect selectivity—no interference. The Monotrol will bring in more stations with better reception than any other set you have ever heard.

Booklet "W" on request.

SLEEPER RADIO CORPORATION
88 Park Place New York



FOR DISTANCE OUR THREE SUNBEAM LEADERS

- The Air-King, 3 Circuit Tuner.....\$16.50
 - The Wonderful Ambassador, 1 tube....\$16.50
 - The Famous Journal, 1 Knob Set.....\$12.50
- All three assembled and wired in handsome Cabinet. Each of these sets has brought in WOC from New York City.

SUNBEAM ELECTRIC CO.

71 Third Avenue New York City

M. B. SLEEPER RADIO DESIGN & CONSTRUCTION FOR EXPERIMENTERS, REFLEX & RADIO FREQUENCY—Mailed on receipt of \$1.00 The Columbia Print, 1493 Broadway, New

S-U-P-E-R-D-Y-N-E

The Circuit Featured by RADIO WORLD

The most satisfactory radio circuit yet developed. Any locality, all conditions. Equal in all respects to five tube Neutrodyne, but more simple to tune and no critical adjustments.

Local and Long Distance With or Without Ground
With or Without Aerial Maximum Volume
Perfect Reproduction

- Our engineers have developed the coils for this circuit to its highest perfection. Coils for Superdyne (complete with diagram)..... \$6.50
- Kits consisting of two Flewelling Condensers and complete set of coils (with diagram)..... \$19.50
- Complete parts assembled on engraved Radion Panel, and base panel with necessary bus bar ready to wire (diagram and plan furnished) at \$65.00

Contrary to usual practice, all parts included in this kit are the very best quality on the market, and workmanship first class.

RESULTS GUARANTEED

Flewelling Condensers in stock. Mail orders solicited.

WALLACE RADIO COMPANY, Inc.

135 LIBERTY STREET,

NEW YORK

YOUR "NEUT" WON'T "NEUT"?

If you used good parts, do like scores of others—use same panel, same layout, change around a little wire, take out a few parts, add some—and have a Kladag Coast-to-Coast on Loud Speaker set.

We'll send, prepaid, everything you need—extra part, 22 feet real gold sheathed wire, blue print and four pages of "dope" for \$3.00. If you want further details send 10c. for data sheet.

KLADAG RADIO LABORATORIES
KLINE BLDG., KENT, OHIO

RADECO SAFETY FUSES

Complete Tube Protection
Slips on the Filament Terminal
"A fuse that doesn't go on the terminal doesn't protect the set."

50 CENTS EACH

Write for Booklet
RADIO EQUIPMENT COMPANY
20 STUART ST. BOSTON, MASS.



ULTRADYNE

the Improved Super-Heterodyne.
Send 50c for book giving complete details of drilling, assembling, wiring and tuning 8 and 8 tube ULTRADYNE Receivers.

Phenix Radio Corp., 5-9 Beekman St., N. Y. C.

CAUGHT

with worn-out dry cell "B" batteries? Purchase the economy way. Build a rechargeable "Hawley" knockdown "B" storage battery consisting of large-size Edison elements, special molded extra heavy flat bottom glass vials, (not ordinary thin test tubes), special nickel wire, 200 hole hard rubber perforated separators, rubber stoppers, chemical electrolyte; in fact, everything for the actual making of battery, including, free, an 8-page illustrated folder showing the simple putting together, making of a charger, and charging. 4 volt, \$6.25; 90 volt, \$9.90; 100 volt, \$10.50; 150 volt, \$14.25; 200 volt, \$17.00. Unconditional guarantee or money refunded. 30 day trial. Pioneer dealer. B. W. Smith, 31 Washington Ave., Danbury, Ct.

**SAVE
25%**

**WHOLESALE
TO THE
PUBLIC**

**ALLOW US TO
QUOTE ON ANY
PARTS OR
STANDARD SETS**

Mail Order Department

BROOKLYN RADIO SERVICE CO.

577 Myrtle Avenue
BROOKLYN, N. Y.

Send 5c. in Stamps for
Catalogue

Funoflex Circuit

FUNOFLEX EDITOR:

WILL you publish a diagram of the Funoflex Circuit?

SEER E. US.

Certainly. Send it in.

* * *

AFRIEND built the Super-Heterodyne that J. E. Anderson will describe in the next issue of RADIO WORLD. The fan says the set is so selective that if some one is singing well and the accompanist is a poor one, he tunes out the pianist and just listens to the singer.

* * *

FUNOFLEX EDITOR:

IBUILT a set as diagrammed in Circuit "Wrong Diagram No. 1," that appeared in RADIO WORLD, issue of May 10. I only get local stations on the set. What should I do to bring in distance?

JIM.

Use still more imagination.

Municipal Station for Salt Lake City

SALT LAKE CITY will have a municipal broadcasting station, according to an announcement made by the Chamber of Commerce of that city. The new station, which will be installed by the Western Electric Company, is a gift of Nathaniel Baldwin.

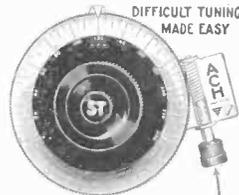
The station will be established on the roof of the Hotel Utah. Mr. Baldwin will furnish the power and provide operators.

The Chamber of Commerce will supply programs for two years under direction of a committee composed of educators, musicians, newspaper men, business men and agricultural experts.

America Hears Britain on Loud Speaker

SEVERAL radio listeners have reported reception from 2AC, Manchester, England, with loudspeaker volume and others have heard the waves from across the sea on a one-tube set. The English programs were picked up and rebroadcast by Station IXAL, Mattapoisett, Mass., and that is why American auditors heard the English signals with such volume.

ACH SHARP TUNER



Mail Orders Prepaid Why the ACH is different
3 in. DIAL \$2.50 (156-10-1)
4 in. DIAL \$5.00 (218-10-1)
\$16 REG. 1/4" 3/16" BUSHINGS \$5 EACH

Send for Circular D

A. C. Hayden Radio & Research Co.
Brockton, Mass., U. S. A.

**"GET HASTINGS, NEB."
We Will Mail Free the Hook-up of
"Killoch Kilo Koupler"**

Most Wonderful Coil

A CIRCUIT WELL WORTH WHILE!
Build a two-tube set, one stage of R. F., using neodyne principle, and detector. Full details in Radio World, issue April 12. Send 15 cents.

David Killoch Company

Dodge Building, 45 West Broadway
Corner Park Place, New York City

USE

**EVEREADY
Radio Batteries**
-they last longer

TUBES REPAIRED \$2.50

GUARANTEED

ALL STANDARD TYPES 24 hour service
WD-11-WD-12 Mail Orders
UV-199-UV-200-UV-201A Sent Parcel
Post C.O.D.

RADIO TUBE SERVICE CO.

239 Centre Street, near Grand New York City

PANEL ENGRAVING

PANELS DRILLED AND ENGRAVED TO PERFECTION
Special Price on Production
ALL WORK GUARANTEED

W. W. ACKERMAN

38 PARK PLACE N. Y. CITY
37 BARCLAY ST.

**Ackerman
LOUD SPEAKER, \$9.50**

Complete—Ready for Immediate Use
Delivered anywhere in the U. S. A. A marvelous Speaker for the price of a headset.

Dealers and Jobbers Write for Discounts
ACKERMAN BROS. CO., Inc.
301 W. 4th St. (Dept. "RW") New York, N. Y.



For best reception you need

The Goodman

The niftiest short wave tuner on the market. Great for present broadcasts, local and DX. Used in all parts of the world. Certificates of merit from testing laboratories. Pamphlet on request.

L. W. GOODMAN, Mfr., Drexel Hill, Pa.

PERPETUAL RADIO FUSE!

\$100.00 Reward

If you can blow your bulbs, with Stanley's Perpetual Radio Fuse in your receiving set. A NEW INVENTION. Practical and perfect. No second cost, it lasts a lifetime. No changing of set, installed in two minutes. Orders coming in by the thousand. Your order received and delivered in rotation. Factory working night and day. THE PRICE IS \$2.50 and it lasts forever.

THE STANLEY RADIO COMPANY
2947 Lorain Avenue Cleveland, Ohio



WORLD BATTERY
Saves You 50%

Famous Guaranteed Quality and Service—Backed by Years of Successful Manufacture and Thousands of Satisfied Users

Prices That Save and Satisfy

Auto Batteries	Radio Batteries
6-Volt 11 Plate, \$12.25	6-Volt 60 Amps, \$ 8.50
6-Volt 13 Plate, 14.25	6-Volt 80 Amps, 10.00
12-Volt 7 Plate, 17.00	6-Volt 100 Amps, 12.50
	6-Volt 120 Amps, 14.50
	6-Volt 140 Amps, 16.00

Special 2-Volt Storage Battery for W.D.11 and 12 tubes. Will run 200 hours on one charge. Rechargeable \$5.00.
Special 4-Volt Storage Battery for U.V.199 tubes. Same features as 2 Volt. \$6.00.
Shipment express C.O.D. subject to examination. 5% Discount for cash in full with order.

2-Yr. Guarantee Bond in Writing With Each World Storage Battery
proves satisfactory World performance. Mail this ad with your name and address and we will ship battery day order is received; and give you a 45-Volt "B" Battery and Hydrometer Free with each battery purchased. Write today.

World Battery Company
Dept. 17, 1219 S. Wabash Ave.
CHICAGO, ILL.

FREE
45 V. B-BATTERY
and
HYDROMETER

SOMETHING NEW
Green Radio Applause Cards
Bound In Book Form

With stubs on which records of Radio Artist are kept after card is detached and sent, a Log Book and Card combined, all for 1c. 25 CARDS, 25c. Sent by mail postpaid. No stamps. Address: **PLATTSBURGH RADIO SUPPLY CO.** PLATTSBURGH, N. Y.
DEALERS: Write for sample and terms.



No. 1001
6 1/2 Ohm Rheostat... \$1.10
25 Ohm Rheostat... \$1.10
40 Ohm Rheostat... \$1.10
Patd. 870,842



No. 1003
200 Ohm Potentiometer... \$1.50
400 Ohm Potentiometer... \$2.00
Patd. 870,042



No. 1004
Multi Terminal Receiver Plug
In simultaneous connection for as many as six pairs of standard receiver plugs.
Patd. Aug. 28, 1923



No. 1002
6 1/2 Ohm MI-erometer Rheostat... \$1.50
25 Ohm MI-erometer Rheostat... \$1.50
40 Ohm MI-erometer Rheostat... \$1.50
Patd. July 10, 1923

HOWARD

Ask the man at the counter to show you the Howard line of quality Radio Merchandise. Every piece is sold with the guarantee of satisfactory performance.

JOBBERS WRITE FOR DISCOUNTS

Send 2c. Stamp for wiring diagram and folder to Dept. J.



4248 NORTH WESTERN AVENUE

Jester's Dictionary
By L. H. Montagne

"A" BATTERY—The part of a radio set that takes your money and makes light of it.

AERIAL—That which is used to catch messages; and our chins when cutting across lots late at night.

AMATEUR—One far advanced with the disease "radiomaniatis." Sometimes called interference and other pet names.

ARC—A method of transmission invented by Noah.

"B" BATTERY—That which supplies the necessary high-voltage kick to a radio set.

BROADCASTING—The gentle art of saying or doing what you want, out of reach of your audience.

CAGE AERIAL—A place for the parrot hams, and other vegetables.

CAT-WHISKER—Another slam on Felix. Compare Cat-gut.

COPPER—A good conductor, but collects no fares.

CRYSTAL SET—A piece of glass in platinum.

JACK—That substance used to buy and run a radio set.

LOUD SPEAKER—Any apparatus that speaks out loudly. Also loud squawker. Commonly referred to as an abomination by the neighbors.

MUSIC—That which is supposed to emanate from a broadcasting station.

PEOPLE—The abomination of the harassed radio dealer, and often makes him wish that he had been on the ark... with an augur.

RADIOMANIATIS—A disease fatal to pocketbook and time. Symptoms: The first indications are the desire to visit all radio stores and ask endless questions. Also a strong desire to gather up all homeless wire, insulators, etc., accompanied by a wish to put them into a "set." In the advanced stage, the victim is usually sleepy, and tired. Has a confirmed desire to talk nothing else but radio.

— RADIO (San Francisco.)

That Special Size
RADION PANEL
Mahogany and Black
For Your Victoria, Portables or "Super"
All Slock Sizes
N. Y. Hard Rubber Turning Co.
212R Centre St. New York City

FOR RELIABLE UP-TO-DATE
RADIO MAILING LISTS

Use Our Card Catalog Directory
In Use Now with Over 200
Radio Manufacturers and Jobbers
Your ENVELOPES ADDRESSED
At \$2.50 per 1,000

Write for Particulars
Sydell's Radio Trade Directory
410 W. 31st St., New York. Chickering 9840

378 DX STATIONS

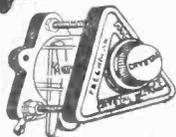
DX fans, if you have not logged 300 stations in past six months you need a Kennedy Three Circuit Tuner. The Kennedy Tuner logged 378 stations from September 15th to March 15th, including 210 London; 5WA Cardiff, Wales; 6FCM Calgary, Alberta, Canada; KGW Portland, Oregon; KFI and KHJ Los Angeles, California; KPO San Francisco, California; KGO and KLX Oakland, California.

KENNEDY TUNER TAKES THE PLACE OF
3 Honeycomb Coils at \$1.40..... \$4.20
1 Honeycomb Coil Mounting..... 5.00
1 23-plate Vernier Condenser..... 5.00
\$14.20

Kennedy Tuner, including
Globe Trotter Diagram **\$5.00**

T. J. KENNEDY
RADIO GLOBE TROTTER
470 W. 159TH STREET, NEW YORK, N. Y.
GUARANTEE: If not satisfied after 30 days will cheerfully return your money.

The Reflex Problem is Solved!



FRESHMAN
DOUBLE ADJUSTABLE
CRYSTAL DETECTOR
The World's Best
for crystal or reflex sets

FRESHMAN
Double Adjustable Crystal Detector for panel or bench use, complete with crystal

\$1.50

Freshman Super - Crystal With Non-Mounting Housing 50c
Ask for Circular D-S

Chas. Freshman Co. Inc.
Radio Condenser Products
106 Seventh Ave., N. Y. C.

ARROW BATTERY
SLASHES Prices TO

Prices Smashed!
Quality Not Sacrificed

Here is real battery quality, guaranteed to you, at prices that will astound the entire battery-buying public. Order direct from factory. Put the Dealer's Profit in your own pocket. You actually save much more than half, and so that you can be convinced of true quality and performance, we give a **Written Two-Year Guarantee**

Here is your protection! No need to take a chance. Our battery is right—and the price is the lowest ever made. Convince yourself. Read the prices!
Special 2-Volt Radio Storage Battery, \$3.75
Special 4-Volt Radio Storage Battery, 6.00
6-Volt, 60 Amp. Radio Storage Battery, 7.00
6-Volt, 80 Amp. Radio Storage Battery, 8.00
6-Volt, 100 Amp. Radio Storage Battery, 9.50
6-Volt, 120 Amp. Radio Storage Battery, 11.50
6-Volt, 140 Amp. Radio Storage Battery, 13.00

We ask for no deposit. Simply send name and address and style wanted. Battery will be shipped the day we receive your order Express C. O. D., subject to your examination on arrival. Our guarantee accompanies each battery. We allow 5% discount for cash in full with order. You cannot lose! Act quick. Send your order today—NOW.

Arrow Battery Co.
1421 South Wabash Ave.
Dept. 8 Chicago, Ill.



Reg. U. S. Patent Office

THE IDEAL AUDIO FOR
NEUTRODYNES



Every Neutrodyne Receiver requires audio transformers which are especially built for this circuit. Build right by selecting **SUPERTRANS** first! Greatest volume. Least distortion.

Works equally well with all types of modern tubes.

Price \$6.00

At your dealers or by mail postpaid on receipt of purchase price. Write for our free literature.

Ford Mica Co., Inc.
33 East Eighth Street, New York
Western and Southern Distributors
Beckley-Ralston Company

YOU DON'T NEED TUBES to hear programs from stations 400 to 1000 Miles Away. I can show you how to get them on YOUR CRYSTAL SET. Changes often cost Less Than One Dollar. Send self-addressed envelope for picture of my set.
LEON LAMBERT
 562 So. Volusia, Wichita, Kansas

SUPERDYNE
THE WONDER CIRCUIT
 Tremendous Volume!

D. X. Without an Aerial
Original Globe Coils
 With Complete Wiring Instructions and Diagram.
\$6.25 Postpaid **\$6.25**
 Globe Radio Equipment Co.
 217 WEST 125th STREET NEW YORK



ROLLS ROYCE RADIO TUBES

Like their name, significant of quality. Durable and powerful. Bring in distance with a maximum of volume and clearness.
 Type 200—5 volts, 1 ampere Detector Tube
 Type 201A—5 volts, .25 amperes Amplifier and Detector
 Type 199—3-4 volts, .06 amperes Amplifier and Detector
 Type 199—3-4 volts, .06 amperes With Standard Base—Amplifier and Detector
 Type 12—1 1/2 volts, .25 amperes Platinum Filament—Amplifier and Detector

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 ALL TYPES
EVERY TUBE GUARANTEED

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This receiver is rapidly becoming the "Old Reliable." A five-tube tuned radio-frequency set that any inexperienced fan can operate.

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RADIO WORLD, 1493 Broadway, N. Y. C.

CRAM'S RADIO MAP—Printed in color. The best map on the market. Mailed on receipt of 35c. The Columbia Print, 1493 Broadway, New York City.

Doctor Demonstrates Bloodless Operation with "Radio Knife"

CHICAGO—A "radio knife," which may render virtually bloodless operations for cancerous growths, was demonstrated here by Dr. L. E. Schmidt, who performed two operations with it.

A low-power radio transmitter is used to generate current. The "knife," resembling a knitting needle, forms one terminal. A sheet of tinfoil on which the patient lies forms the other terminal. The human tissue, offering resistance to the current when the knife is applied, causes the generation of heat. The knife burns itself through skin and muscle quickly and without pressure.

In the operations performed, Dr. Schmidt said, the tissue was seared for a depth of a thirty-second of an inch, the searing making the operation virtually bloodless. Very delicate operations are possible with the instrument, he added.

New Patents

1,489,287—Albert H. Taylor, Washington, D. D.—Relates to the reception of a multiplicity of high frequency electrical signals employing the same collector or antenna. The particular object is the multiple reception of such signals without disturbing reactions between the several receivers connected to the one collector.

1,465,108—E. F. W. Alexanderson, Schenectady, N. Y., assignor to General Electric Co., N. Y.—Relates to radio signaling systems and more particularly to a radio receiving system. One of the objects is to provide a receiving system which will permit of the reception of signals of any desired wave length at a receiving station to the exclusion of other signals having the same wave length coming from directions other than that from which the desired signals come.

1,485,524—Hugo H. Pickson, Rock Island, Ill.—Relates to a crystal detector for radio instruments, and aims to increase the efficiency of such devices, by improving the character of the engagement between the contact member and the mineral.

1,485,485—Henry G. Condes, Bremerton, Wash.—Relates to a signal sifter in the receiving antenna circuit of a radio signal receiving system. The object of my invention is to prevent or reduce the effect in a receiving system of undesirable signals of comparatively short duration and great intensity such as are produced by certain electrical atmospheric disturbances or static while the effect of desirable signals is only slightly reduced.

PRE-AMPLIFIER

A Radio Frequency Amplifier of TREMENDOUS POWER. Gets distance, volume, less static. Attachable to any receiving set. Price complete with tube, \$25.00. Send for Circular

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use the well known Como Duplex Transformers

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WITH the new Shamrock Kit you can build a set that pulls in stations 3000 miles away. These revolutionary kits contain two of our new balancing condensers—and three Shamrock air core transformers mounted and properly balanced on U. S. Tool condensers, made expressly for Shamrock.

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RADIO'S GREATEST LITTLE ACCESSORY
No Set Complete without Them

Attach direct to binding posts. Allow use of from 1 to 6 head sets or loud speaker and head sets—any combination desired. Eliminates jack and plug. Attach to plug and make possible instantaneous shifting from phones to speaker. Make extension to bed and listen in while in bed. Make extensions anywhere.

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Distances at Sea Measured In a New Way

A NEW method of determining distances at sea was described by George Lewis, assistant to Powel Crossley, Jr., in a talk before the Ohio Academy of Science at Columbus. Mr. Lewis was a lieutenant in the United States Navy and holds the first license issued to radio operators. For several years he had charge of experimental work for the navy.

"A specially designed radio transmitter sends out a series of dots, one second apart, which, used in connection with the sound of a bell through the water, enables the observers on a ship automatically to determine their distance from a given object, such as a ship or shore," Mr. Lewis said. "A half mile through the water is covered in one second by the submarine bell signal.

"The radio signal, used in connection with the submarine signal, is almost instantaneous in its travel. The combination of the submarine and radio signals enables the ship officers to determine accurately the position of the vessel for example, with regard to a lighthouse. A pair of earphones is used by the radio operator on the ship, one phone connected to the radio transmitter and the other to the submarine signal receiving set, so that it is possible for the operator to listen for the signals sent from the lighthouse and thus determine the position.

"Each radio dot heard by the operator means a half mile between the ship and the lighthouse and it is only necessary to count the number of dots he hears before the arrival of the submarine signal, then the distance is known."

SENATE BROADCASTING NEAR

THE Senate passed a bill to investigate the resources of army and naval radio engineers for broadcasting the sessions of the Senate.

Use — Price 75¢

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 Variable Grid Leak

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 Durham & Co., 1936 Market St., Phila.


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\$8.50	Workrite 180° Silk Wound.....	\$2.95
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\$4.00	R. C. 23 plate.....	\$2.25
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\$18.00	DR. SEIBT IMPORTED "SUPER HEADSET".....	\$5.90
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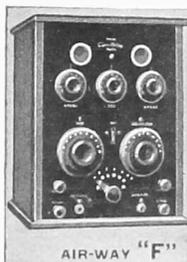
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This pioneer institution in the radio field originally conceived this far-sighted method of dealer cooperation, in order to enable small and medium-sized dealers to increase their sales by selling nationally advertised radio apparatus.

Its endorsement by leading manufacturers and its acceptance by dealers everywhere emphasizes not only its salability, but its NECESSITY to merchants with limited capital.

This form of radio buying has progressed with all the facility and encouragement that has so highly predominated in automobile buying—and enables the purchase of the best radio apparatus.

Our method takes under its own responsibility the burden of outstanding cash.



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Marko Storage Battery

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 Then you will know where to set the Dials, Switches and Rheostats to bring them back. This book is endorsed by thousands of professional Radio Fans in all parts of the country because it covers everything on the panel. (Copyrighted.) Can be used with any set. Contains up-to-date list of 1,100 Broadcasting Stations, Time of Principal Cities and instructions How to Record Stations. 24 Pages, Valuable Information. No set complete without one. 50c per Copy, Postpaid. For your convenience send a one dollar bill for two copies, otherwise send Money Order for one or more. No checks nor stamps.
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U. S. to Send Delegates to Radio Parley

TWELVE of the twenty-one American Republics expected to take part in the Inter-American Electrical Communication Conference in Mexico City on May 27 have indicated their intention to send delegates, and six have appointed their representatives, according to the Pan-American Union. The six are Brazil, Guatamala, Paraguay, Uruguay, Peru, and Salvador.
 The United States has not named its delegates but it is understood that three representatives, the maximum permitted, will be selected as soon as the joint resolution passed by the Senate and House is signed by President Coolidge. It is thought that the President will appoint either Assistant Secretary of State Leland Harrison or Assistant Secretary J. Butler Wright as chairman of the delegation.

For five months the United States Departmental Committee on Communications has been working on agenda including a definite radio policy, and preparing an exhaustive report for submission to the conference in Mexico City. The problem is said to be that of establishing an all-American policy for radio, telegraph cable, and possible telephone communications along progressive lines. The resultant Inter-American policy will undoubtedly be carried abroad to the International Conference when that meeting is called.
 It has been suggested to the State Department that the U. S. Commissioners include representatives of the State and Commerce Departments, and an "outsider," that is, a spokesman for the public and commercial interests.

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RADIO RECORD
 Keep a permanently bound record of all stations you have received and how you received them. Radio Record 5 1/2" x 14"—600 lines. All broadcasting stations listed, and indexed with space for new stations—\$1.00 Postpaid.
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 Applause Cards 60 for \$1.00 Postpaid.

NEUTRODYNE
FADA, complete \$69.45
 BUILT FOR YOU FREE
FADA Sealed Kit, 5-tube ... \$54.75
PERFECTION RADIO CORP.
 119 W. 23rd Street 59 Cortlandt Street
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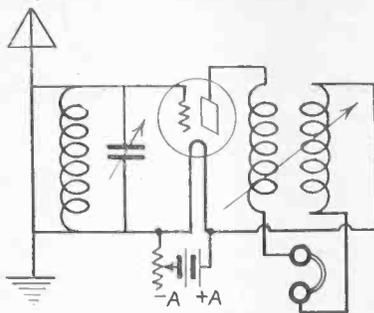
\$15 Set Gets 2,000 Miles
 The Essex Radio Special, the receiving set with a conscience, gets you more distant stations clearer and sweeter than sets costing ten times its price.
\$15 SET COMPLETE WITH CABINET, WITHOUT TUBE OR BATTERIES
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 Detailed information on request.

AT LAST!
THE MOST PERFECT ONE-TUBE REFLEX
 ever built
CLARITY—VOLUME DISTANCE
Inductance or Capacity Tuning or Both
NO Howling, Hissing, Squealing, Distortion, Rheostat, Potentiometer, Storage Battery (optional), Taps, Switches, or dead-end-losses.
 Uses standard parts. A few cents changes your old reflex into this new one. Complete hook-up and all information.
PRICE ONE DOLLAR
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COAST TO COAST
 Every Turn **STAR** No
 A Tap **COIL** Soldering
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STAR RADIO PRODUCTS CO.
 711 S. DEARBORN ST. CHICAGO, ILL.

WHAT'S WRONG HERE?

EVERY radio amateur and fan is clever. But how clever? That's what we are going to find out. The wiring in the ac-



Wrong Diagram No. 2

companying diagram is wrong. If you have built a set yourself, you will find the mistake if you follow the diagram closely, taking note of all the connections. If you find what you think is the error, write us about it. Refer to Wrong Diagram Number 2. Send your answers to Wrong Diagram Editor, RADIO WORLD, 1493 Broadway, New York City. The names of those sending in the right answer will be published in RADIO WORLD.



NOISE KILLER

Kills Noise in Radio Sets!
 Can also be operated to put expression in musical numbers, to modulate tones of human voices and to secure natural tonal quality without distortion.
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Does it howl? Is it hard to control? Do you wish to eliminate neutralizing condensers and double the efficiency of your receiver? **TECHNIFORMERS** are so extremely efficient that the sensitiveness of a receiver incorporating them is unsurpassed. There is no inductive coupling between them, and as a result, neutralizing condensers and potentiometers are not required to stop oscillation. Try them out. We assure you of satisfaction. Price. Set of 3. For substitution in your neutrodyne. \$8.00. **TECHNIFORMER KIT. 3 Techniformers with variable condensers. \$18.00.**
 Dealers: Write for our prices.

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 On RADEX Log Cards to Match Your Set

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100 Cards, Mahogany Finish or Oak Cabinet, and Index Dividers, Complete, \$3.00. A Useful Accessory to Any Set. Give Name of Your Set or Sketch of Dial Arrangement. Sent Postpaid on Receipt of Cash or Money Order.
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Nath. Baldwin Phones with

SHELTONE LOUD SPEAKER

Complete Regular Value \$15. **\$8**
 Postpaid. Use your headset for two purposes—exceptional combination value—every pair of phones tested.
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Important, if True

STATION POZ, Nauen, Germany, now transmits time signals on a wave length of 18,000 meters in place of 13,000 meters. The sending time is not changed, but is as formerly, 1,200 G. M. T. and 2,400 G. M. T.

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OUR \$200,000.00 COMPANY STANDS SQUARELY BACK OF EVERY HEADSET

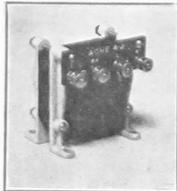
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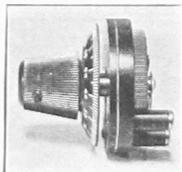
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ACME
Audio Frequency Transformer
Type A-2 — For loud, clear
broadcasting. Ratio 4.25 to 1.
Undisputed leader in the field.
List Price.....\$5.00
OUR PRICE..... 3.65



U S L
Vernier Condenser—23 Plate
"Genuine Bakelite," "Precision
Made." Mechanically perfect,
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Improved type of original
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High Quality & Low Prices*

Where you find one, you usually miss the other. Well known, both of them, at HEITMANEK, as they make their home there.

HEITMANEK specializes in trade-marked radio supplies of the well known kind, at prices lower than Anybody's, Anywhere, Any time.

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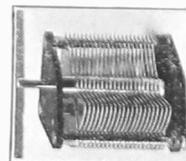
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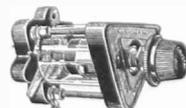
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Frequency Amplifying
Transformers
Best for distance broadcast re-
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form, is coming into general
use because, with a loop, may
be used to reduce static and
other forms of interference.
Styles R-2, R 3, R-4
List Price.....\$5.00
OUR PRICE..... 3.65



U S L
Plain Condenser—23 Plate
"Genuine Bakelite," "Precision
Made." Mechanically perfect,
highly polished, and nickel-
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App. Cap. .001
List Price.....\$2.40
OUR PRICE..... 1.85



CHAS. FRESHMAN
New Double Adjustable Detector
for panel or base use
Highly recommended by un-
biased authority as world's
most efficient crystal—meeting
every requirement of the
"Reflex" circuit.
List Price (complete with
crystal).....\$1.50
OUR PRICE..... 1.15

**Aerial Falls, Breaks Windows, None Hurt
Poorly Erected Aerial Unsafe**

During a recent storm here a poorly erected aerial gave way and plunged thru a skylight of a court building below. The damage was confined to the breaking of the glass skylight and a large amount of noise.

This should serve as a warning to radio fans to erect only the best and safest class of aerials, for in doing so they protect themselves and others.

*This Should Not Happen and
Will Not Happen with*

FREIDAG Aerial Mast Pipe Fixtures

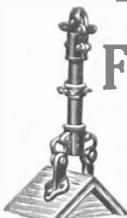
Wood poles and poorly erected endanger property and unsightly. Freidag Fixtures are designed for safety and sightliness. Made in 2 styles for 1/2 and 1 inch standard pipe. Complete with guy wire collars and ready to put up. These fixtures can be put securely in place in 15 to 30 minutes.



No. 60
\$3.50 Per Set

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Price \$1.00
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Notice, Radio Fans—Special Offer

If your dealers do not handle Freidag Equipment and you wish to order direct, send your order with the names of 2 or more dealers in your city and reduce the amount of your order 10%. See, you can save money by helping us.

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Good quality cards—High grade printing. You will be DELIGHTED. Send order with check or money order today—NOW

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He Gets 43 Stations

From G. H. Mitchell, Jr., 310 West 79th Street, New York City.

During this month and last I have received the following 43 stations on a regenerative receiver with 1 step of audio amplification, my aerial being on the roof of a 12-story apartment house.

WFI, WIP, WJZ, WFAF, WOR, WHN, KDKA, WAAM, WJAR, WCBW, WLW, WTAS, KFKX, WHAZ, WSB, WJY, WDAF, WJAZ, WTAM, WCAD, WOS, WBS, WSAI, WGY, WDAF, KGO, WOO, CHYC, KOP, WRC, WGR, WCAP, KYW, WMC, KHJ, WLAG, WCAL, WQAO, WNAC, KSD, WBBR, WCAE, and a station in New Brunswick, N. J., who had no license but was testing. I have gotten a verification from KGO and KHJ.

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7x18x7...\$4.00 POST-PAID on receipt of
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CUT OUT STATIC and interference

Don't put your set away for the summer on account of that troublesome, interfering static that comes busting in every time you get some favorite station.

You will be surprised at the ease with which you can

Eliminate Static and Interference

Costs less than a dollar to equip any type of set, crystal, regenerative, reflex, neutrodyne, and with practically any size of antenna. We are getting coast to coast stations any night on loud speaker without interference.

You can get the same results.

Send stamped addressed envelope for further information. WRITE TODAY.

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THE United States Civil Service Commission announces the following open competitive examination:

Radio Inspector

The examination will be held throughout the country on May 21. It is to fill a vacancy in the Signal Service at large, at an entrance salary of \$2,400 a year, and vacancies in positions requiring similar qualifications.

Applicants must have been graduated from an accredited high-school, and, in addition, have had at least two years of experience in special radio work such as the manufacture, installation, adjustment, inspection or operation of commercial radio apparatus. Each completed year of a scientific course in a college of recognized standing, majoring in radio, electrical engineering, or physics, will be accepted as equivalent to six months of the required experience; and for each year lacking of the completion of the high-school course, applicants may substitute an additional six months of the required experience.

The duties of this position in the Signal Corps are to superintend the transmission and reception of dispatch traffic by telegraph, radio, or telephone, over controlled radio nets, such as the War Department, Army, Corps Area, and Air Service radio nets; to economically route such traffic and coordinate the available means for its transmission and reception; to lay out, install and maintain modern radio equipment, especially of the high powered vacuum tube types; to make studies of and provide remedies for interference problems in radio communication, and other related work.

Full information and application blanks may be obtained from the United States Civil Service Commission, Washington, D. C., or the secretary of the board of U. S. civil service examiners at the post office or custom house in any city.

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ACT QUICK!—\$235 Kennedy type 220 Receiver and 525 Two-Stage, \$100; Magnavox, like new, \$24.50; Magnavox 2-stage power amplifier, less cabinet, \$28; Acme 4-Tube Reflex, mahogany cabinet, \$35; Haynes Super-Hetrodyne, 7-tube set, assembled, but not wired, \$40; Tuska \$20 Superdyne parts, \$13.50; 5-Tube Neutrodyne, licensed parts, mahogany finish cabinet, \$69. Write for free list small parts. Terms, one-third cash or money order, balance C.O.D. D. V. DAWSON, Elwood, Indiana.

Newspapers as Broadcasters Drop from 100 to 45

RADIO was prominent in the discussions of the American Newspaper Publishers Association recently at the Hotel Waldorf-Astoria, New York City. That the number of newspapers oper-

ating their own radio broadcasting stations has decreased from 100 in October, 1922, to 45 at the present time, was disclosed in the report of the Committee on Radio, of which Walter A. Strong of the Chicago News is chairman.

Most of the stations operating in 1922, the report said, were small stations not exceeding 20 to 30 watts and serving local communities only. The 45 stations now operating include one with 750 watts, 17 with 500, three with 250, two with 200, one with 150, nine with 100 and twelve with 50 or less. The report goes on:

"Reports from seven of the newspapers operating 500 watt stations show that their average original cost was approximately \$22,000 and their operating cost varies from \$12,000 to \$50,000 per year. In every one of these cases the newspapers maintain radio broadcasting as a department of their newspaper enterprise. None of these stations is doing any advertising. The stations are being operated on the average of thirty hours per week.

"There is no positive evidence in the experience of the last year whether or not broadcasting stations can be used commercially for the dissemination of news to the public which would in any way affect the publication of newspapers and the demand for them. At present the radio broadcasting stations of large newspapers engaged in this experiment can still be regarded as an expensive publicity feature producing an intangible but undoubtedly a valuable good will."

The report said that Stuart Rogers of the American Radio Association had announced that he would seek the aid of the American Newspapers Publishers' Association to protect the public against advertising disguised as entertainment, and that the committee believed that a policy should be established based on the interests and preferences of the listening public.

Radio broadcasting by newspapers and other stations was discussed at length. Among those who talked on this subject were Louis Hanooh of the Newark Sunday Call, S. M. Williams of the New York World, and C. P. J. Mooney of the Memphis (Tenn.) Commercial Appeal.

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A New Zealand amateur got Alabama (10,000) miles on one Myers Tube—heard the signals and message perfectly. Certified by Radio News.

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add to the efficiency of any set by cutting out noise, tube hiss and interference.

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Insist on the New Improved Myers Tubes—at reliable dealers—otherwise send purchase price and be supplied postpaid.

\$5 EACH, complete with clips ready to mount on your set; no sockets or other equipment necessary.

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Radio Vacuum Tubes

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For Your Victrola, Portable or "Super"
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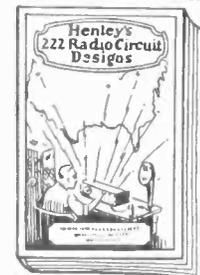
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GRAM'S RADIO MAP—Printed in colors. Best map on the market, 35c. The Columbia Print, 1493 Broadway, N. Y. C.

Eleven Stations in Canada Added in 5 Months

NEW interest in radio in Canada is revealed in figures issued by the Dominion Department of Marine at Ottawa. Since December last eleven licenses for broadcasting stations have been issued by the department, making a total of forty-five broadcasting stations in

Canada. The new stations are, by provinces: Ontario, 5; Nova Scotia, 1; Quebec, 1; British Columbia, 2, and Alberta, 2.

Montreal leads in the number of receiving licenses issued to amateurs with

6,600, while in Toronto 3,400 have paid, and the work of collecting the license fees is not nearly completed. Approximately 29,039 radio licenses have been issued to amateurs in Canada up to Jan. 31, according to the records.

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"Popular Wherever Radio Is Used"

14 Sizes in Beautiful Display Case.

Dealers write for big money-making proposition.

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VACUUM TUBES REPAIRED

WD-11, WD-12, UV-201A, UV-199 \$2.50 and others for

Quick service. All tubes repaired by us guaranteed to work as good as new. Send your dead tubes. All you pay is \$2.50 plus postage to postman.

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The "Goode" Two-o-One A Tube amplifies or detects. It is a quarter ampere, six volts, standard base silvered tube.

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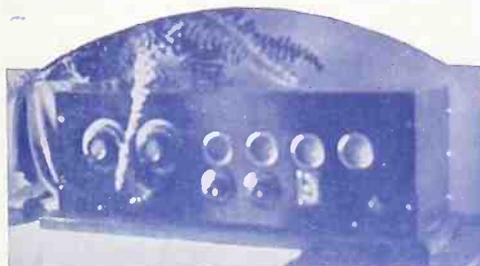
Three thousand miles on the loud speaker, without outdoor antenna, or even a loop! This is what the BILTMORE REFLEX RECEIVER is capable of. But a ground, and a few feet of concealed wire are all that is required. It is undoubtedly the most sensitive receiver made. Actually, the results usually surpass those obtained on the eight tube super-heterodyne.

The quality of the tone is pure, clear and full. Reproduction is perfect, due in large measure to the Erla fixed rectifier which is employed.

In appearance, the receiver is unsurpassed—beautiful Radion Mahogany panel, heavy hand rubbed mahogany cabinet, heavily nickel-plated metal parts. All connections are made to the rear of cabinet.

The most efficient circuit is used—four tubes, yet equivalent to eight.

The apparatus employed is of the very best—Radion Mahogany panel, bakelite reflex variocoupler, moulded bakelite sockets and dials, Frost jacks, Erla rectifier, Dubilier Micadons, Acme Radio Frequency Transformers, and Acme Audio Frequency transformers. We



can obtain no better apparatus.

Extremely selective, it is, nevertheless, easy to tune. You have but to snap the switch to listen to the world. A child can operate it without previous experience.

It is but slightly affected by static. Ideal for summer reception.

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And—the price. But \$100. Anyone can afford this wonderful receiver. Should you operate it, see it, and hear it, you would have no other.

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DEALERS! You should handle this most popular receiver. Write us.



BILTMORE RADIO COMPANY

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HOW MANY STATIONS DO YOU GET?

and do you hear them
“LOUD and CLEAR”

WHEN the fellow from next door comes in and wants to tell you about his set, and shows you a list of stations that look like a Chinese newspaper, what have you got to show? Can you sit down and tune them in so that they sound as if they were in the next room? That's what thousands of radio owners can do who have learned how to get loud and clear messages from the far away stations by the Acme method.

The importance of amplification

In order to hear clearly and distinctly, you must be sure that you are using amplifying transformers that amplify the sound without distorting it. Amplification is the key to radio—it increases the tiny sound waves that reach your set and makes them loud enough for you to hear and enjoy.

But it is not enough to amplify the sound, you must be sure that in amplifying it you do not blur it and make muffled, unintelligible sounds out of messages that should be clear and distinct. That is the danger of distortion.

ACME APPARATUS COMPANY

How to get amplification without distortion

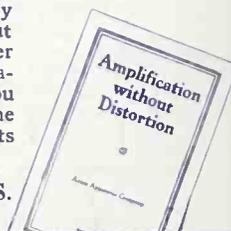
The Acme engineers have perfected two instruments that give you maximum amplification without distortion. The Acme R-2 (also R-3 and R-4) Radio Frequency Transformer builds up the radio energy before it reaches your detector. This increases your range. The Acme A-2 Audio Amplifying Transformer gives you greater volume of sound. It builds up the audio energy that leaves your detector and gives it to you “loud and clear.” If you want to get the most out of your set, be sure to use Acme Transformers.



THE Acme A-2 Transformer (shown above) and Acme R-2, R-3 and R-4 Radio Frequency Transformers sell for \$5 each at radio and electrical stores. Your dealer will be glad to help you.

How to get the best results

In order to get the best results, send for “Amplification Without Distortion”—an instructive and helpful book which not only explains exactly how to get the best results by proper amplification, but also contains a number of reliable wiring diagrams. It will help you build a set. Send the coupon with 10 cents for your copy.



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