Citizen's

RADIO CALL BOOK

N. S. E.

REG. U. S. PAT. OFFICE

50¢

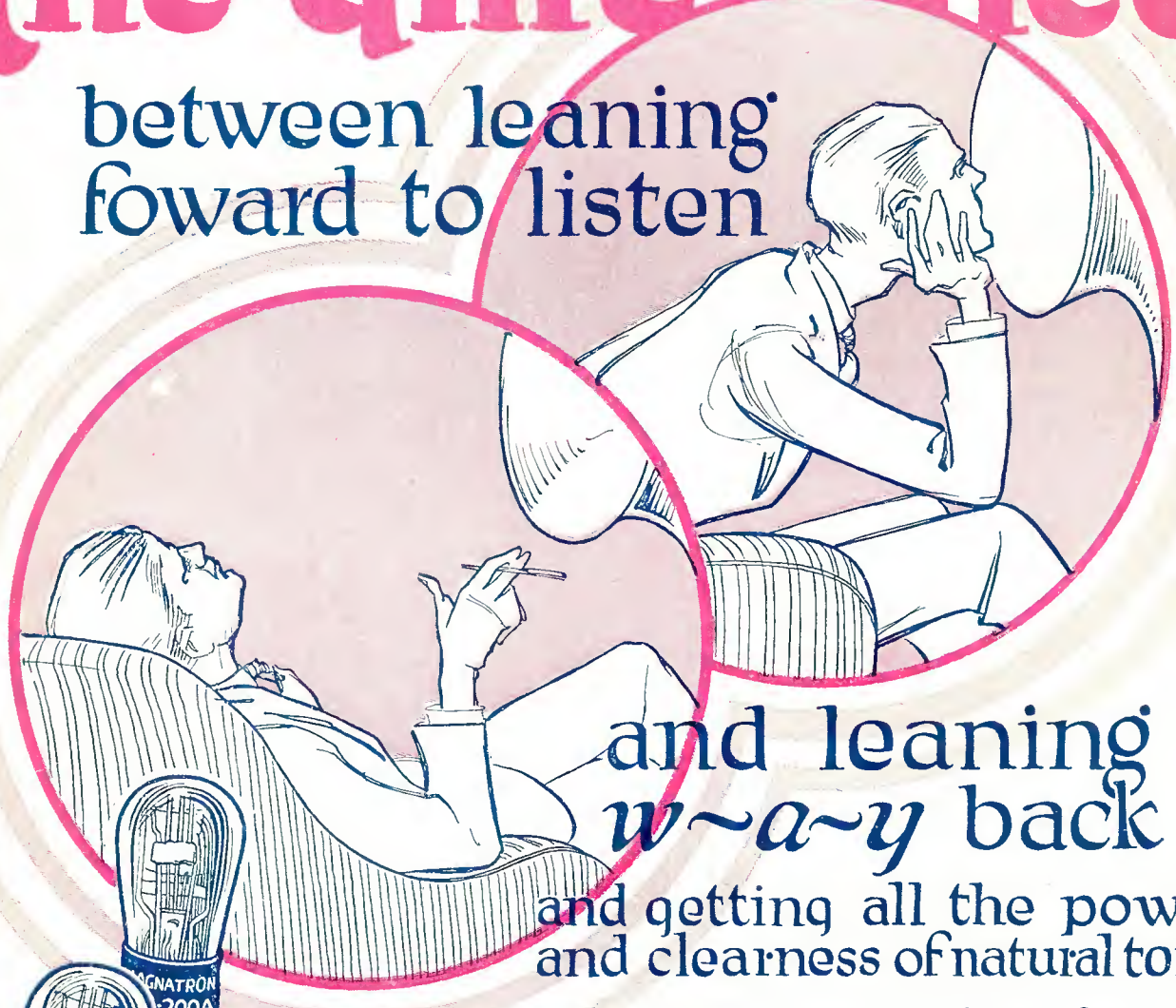
FOREIGN 65 CENTS

A COMPLETE RADIO CYCLOPEDIA

"Used the World Over"

the difference

between leaning foward to listen



and leaning *w~a~y* back

and getting all the power and clearness of natural tone

$4.00

$4.50

$4.50

To Bring Your Radio Up to Date

Use the new bigbly sensitive detector DC-200A, and eitber the DC-112 power tube with platinum filament or the DC-171 power tube with low impedance, here illustrated. Either power tube may be had witb the patented handy adapted base at no extra cost.

RADIO tubes are NOT all the same! One set of tubes will give you the kind of reception that just about trickles through—all right if you have good ears! Another set will give you a hurricane of sound, but very little music—satisfactory if you HAVEN'T good ears.

But Magnatrons are made for normal people who want normal volume and a smooth even flow of natural, undistorted tone. Quantity of quality—clear, natural—delightful.

These wonderful radio tubes are made by an organization of experts who have specialized in nothing but the production of tubes since the beginning of broadcasting. Just one Magnatron will give you a new conception of radio reception. A complete set will practically give you a new receiver!

CONNEWEY ELECTRIC LABORATORIES

Magnatron Bldg. **Hoboken, N. J.**

MAGNATRONS

Citizens Radio Call Book, December, 1926. Published 4 times yearly. Volume VIII, No. 1. Published at Chicago, Illinois. Subscription price, $1.75 yearly. Entry as second-class matter applied for at the Post Office at Chicago, Illinois, under the Act of March 3, 1879. Citizens Radio Service Bureau, Inc., Chicago, Illinois.

CITIZENS RADIO CALL BOOK

C. O. STIMPSON, President
J. R. MAC FARLAND, Vice-President
D. H. BELL, Secretary-Treasurer
E. M. GIBSON, Advertising Manager

Established 1921
Executive Offices:
508 So. Dearborn St., Chicago, Ill.

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Member Audit Bureau of Circulations

DECEMBER, 1926 Vol. 7, No. 3

CONTENTS THIS ISSUE

With the Editor

WE wish to announce that Mr. W. W. Harper, Consulting Engineer, has joined the engineering staff in the capacity of Chief Engineer of this Department.

We consider Mr. Harper amply able and well qualified to give our readers many valuable articles of a high class nature, and original in design—watch for them in succeeding issues.

HAVING made application for second class postoffice mailing privileges, we are now able to mail your copy direct from the printing plant. This will reach you several days in advance of those placed on sale through newsstands. Subscription coupon on page 199 for your convenience.

WE are especially anxious to have you mail us back the Questionnaire on page 221, this issue.

It will enable us to more intelligently carry out the wishes of our readers. Even though you do not enter the $100 Letter Contest—won't you be so kind as to mail this page back to us. We thank you in advance for so doing.

OWING to popular demand we are publishing the CITIZENS RADIO CALL BOOK four times yearly—instead of three times. They will be on sale at all newsstands, book, news and department stores and most all good radio stores, September 1, November 1, January 1, and March 1.—EDITOR.

Citizens Radio Call Book is published four times a year and is on sale approximately the first of December, March, September and November. Subscription price $1.75 per year in U. S. A. Canada and Foreign $2.00 per year, payable in advance. Single copies 50 cents. Remit by check, draft or P. O. order. No foreign stamps or coins accepted. Mail subscriptions to 508 So. Dearborn Street, Chicago. We will not be responsible for cash sent for subscriptions unless registered.

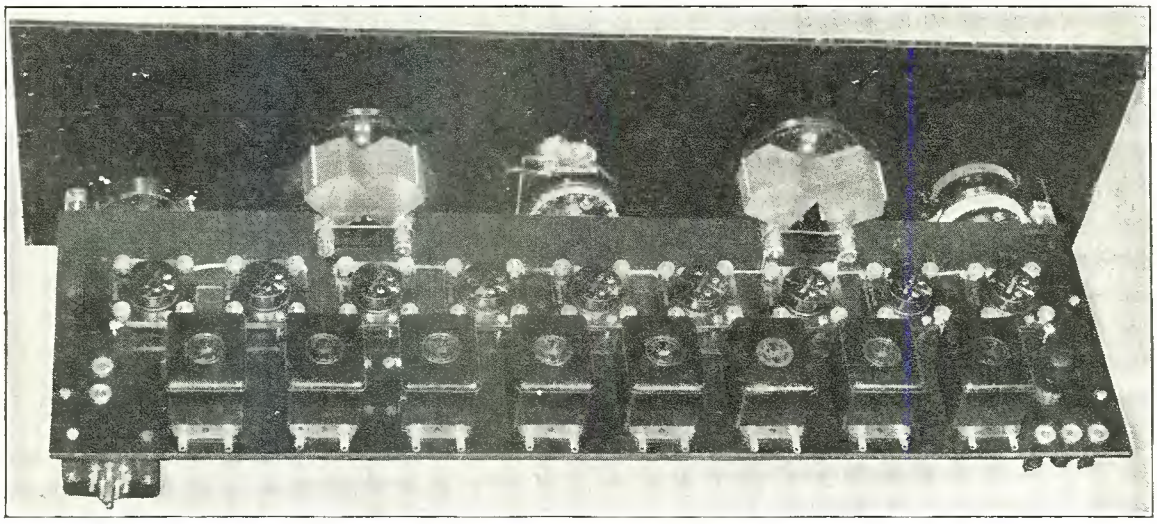
Citizens Radio Call Book is for sale on all newsstands in the United States and Canada; also Department Stores and Book Stores; also can be purchased in most radio stores. Paris, France, Brentanos, Ave de L'Opera. England, R. A. Rothermel, Ltd., 24-26 Maddox St., Regent St., London.

Entry as second class matter applied for at the Postoffice at Chicago, Illinois, under the Act of March 3, 1879.

We also publish Citizens Radio Amateur Call Book, semi-annual, 75c per copy, listing all amateur transmitting stations in the world. Subscription price, $2.00 yearly. Starting Sept., 1927, will be published 3 times a year—September, January and March.

Advertising Representatives:

Chicago—A. B. Mills, 508 So. Dearborn St. Wabash 1901.
New York—(Branch Office) 1674 Broadway. Circle 4887. Cor. 52nd St.
Philadelphia—C. S. Palmer, 731 Victory Bldg. Walnut 6568.
Boston—E. H. Jaudon, 99 Channcey St. Hancock 6974.
Baltimore—H. Boyd, 1202 Maryland Ave. Vernon 0771.



Nine In Line the Wonder Circuit—

The Nine in Line circuit has more than made good the claims made for it earlier in the season. For selectivity, volume and tone quality, we believe it unequalled. We recommend and offer the list as shown in the Call Book. The complete kit includes drilled and engraved panel and sub-base, also miscellaneous screws, wire, lugs, etc. Write for complete catalog CBR and prices.

We Handle the Following Lines:

Allen Bradley	Jewell
Amsco	Jones
Belden	Kurz-Kasch
Benjamin	Majestic
Burgess	NaAld
Carter	Radiodyne
Centralab	Raytheon
Crosley	Remler
Cunningham	Sangamo
Cutler-Hammer	Sterling
Daven	Thordarson
Dubilier	Thorola
Eby	Timmons
Electrad	Trimm
Formica	Tungar
Frost	Utah
General Radio	Weston
	Yaxley

— Dealers —

find greater profit and protection by securing nationally advertised lines at our liberal discounts, backed by the TELMACO guarantee. Our broad guarantee protects you and our low net prices produce extra profits. Our late net catalog No. CBW sent gratis to dealers. Write TODAY.

Distributors of Quality Radio Exclusively

TELEPHONE MAINTENANCE COMPANY

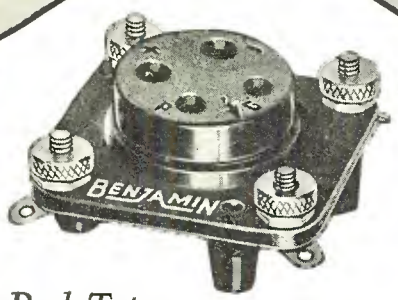
20 South Wells St., Chicago, Illinois

Established TELMACO *in 1918*

Buy by the Name

Success in Set Building Begins at the Dealer's Counter

ALL BENJAMIN RADIO PRODUCTS ARE OF THE SAME HIGH STANDARD AS THE FAR-FAMED CLE-RA-TONE SOCKETS

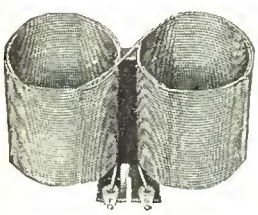


Push Type Cle-Ra-Tone Spring-Supported Shock-Absorbing Sockets

Stop tube noises. Greatest aid to non-noisy operation. Contacts always clean.

75 cents each

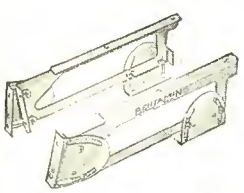
When you buy your radio parts, buy them right. Everything else being equal, when a name has stood for a quarter of a century's striving toward technical perfection it is practically as safe as a formula as a guide to right buying. When your dealer sells you Benjamin radio products for your set you have already leaped a big hurdle on the way to success.



"Lekeless" Transformers

Uniform high inductance, low distributed capacity and low resistance. The external field is so slight that it permits placing coils close together without appreciable interaction.

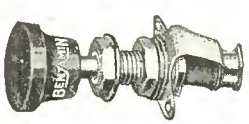
Single Transformers $2.50



Brackets

An aid to simplification in set construction. Supports sub-panel, with room underneath for accessories and wiring. Plain and adjustable.

Plain, 70c per pair
Adjustable, $1.25 per pair



Battery Switch

Quick, positive, clean-cut make and break. When it's "in" it's "off," eliminating danger of wasteful use of battery.

30 cents each

Improved Tuned Radio Frequency Transformers

Proved through exhaustive and comparative tests to be the most efficient coil for modern radio sets. Better in all important features and characteristics. Space wound. Basket weave. Cylindrical. Highest practical air dielectric. Gives wonderful sharpness in tuning, better volume and purer tone quality.

2¼" Diameter Transformer

Compact. Especially desirable for crowded assembly. Eliminates interfering "pickup."

Set of three, $5.75
Single Transformer, $2.10

3" Diameter Transformer

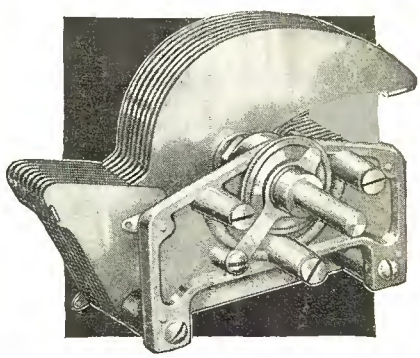
Capacity coupling reduced to lowest degree. For use with .00035 Mfd. Condensers.

Set of three, $6.00
Single Transformer, $2.25

Straight Line Frequency Condensers

No crowding of stations. The broadcast range is spread evenly over the dial. Stations come in without interference, and tuning is much easier. Adjustable turning tension. Low loss characteristics give a definite and distinct radio reception. Beautiful in appearance —a credit to the looks and efficiency of any set. Finished in dull silver. Made in 3 sizes.

.00025 Mfd., $5.00; .00035 Mfd., $5.25; .0005 Mfd., $5.50



If your dealer cannot furnish you with Benjamin Radio Products, send amount direct to our nearest sales office with his name and we will see that you are promptly supplied.

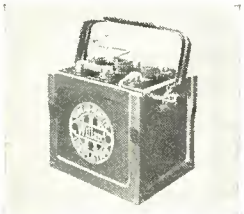
Benjamin Electric Mfg. Co.

120-128 South Sangamon Street

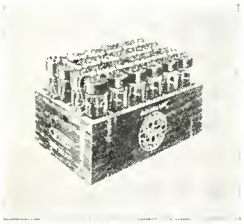
New York: 247 W. 17th St. Chicago San Francisco: 448 Bryant St.

Manufactured in Canada by the Benjamin Electric Mfg. Co. of Canada, Ltd., Toronto, Ontario

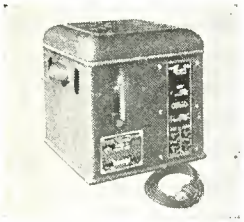
Anything you need for radio power



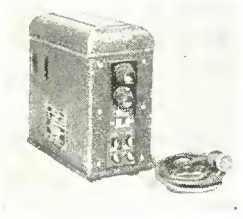
Willard "A" Battery. Thread-Rubber Insulation. CHARGED Bone-dry. Correctly rated, like all Willard Batteries. Made in 75, 100, and 120-ampere hour capacities.



Willard "B" Battery. Thread-Rubber Insulation. CHARGED Bone-dry. Same battery the broadcasting stations use for voice amplification. Made in 48 and 80-volt sizes.



Willard "A" Power Unit. Selective charging, a distinctive Willard feature, insures a constant supply of "A" power at all times. This unit also charges "B" batteries.



Willard "B" Power Unit. Also operates from house-lighting circuit. Can be depended upon to supply steady power in all types of radio sets—including those with power tubes.

WILLARD RADIO BATTERIES *and* POWER UNITS

There are genuine Willards for every radio need—full-powered, rechargeable radio batteries which give the utmost in fine reception, and last for years; Willard Power Units, also, for the listener-in who prefers the convenience of operating his radio set direct from the lighting circuit in his home.

For sale by

The Willard Battery men

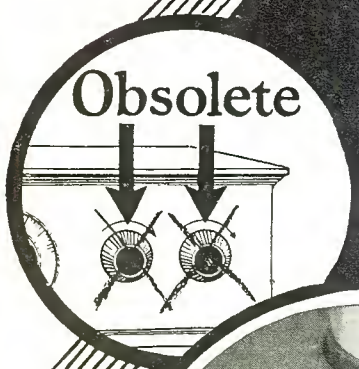
and authorized radio dealers

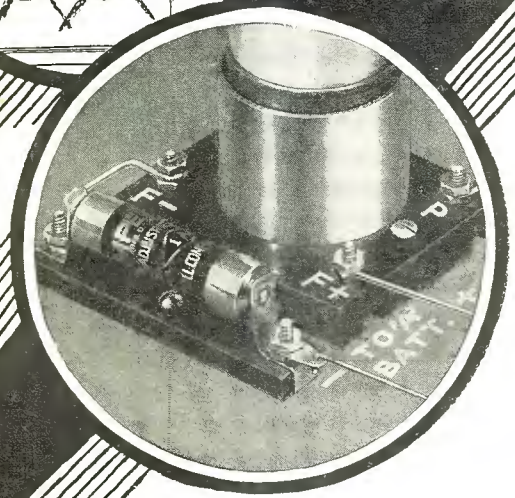
Why your set needs AMPERITE

Because quality of reception without distortion, also long tube life necessitate that delicate and self-adjustable filament control which only AMPERITE can give you.

AMPERITE eliminates hand rheostats, simplifies set-wiring and abolishes all tube troubles.

Uniformly successful performance for more than 5 years in every type of circuit has proven AMPERITE to be *the only perfect filament control.*





Universally accepted as the best filament control by leading radio engineers, AMPERITE is recommended by them as standard equipment in every popular construction set. For instance:—

HAMMARLUND-ROBERTS "Hi-Q"	L-C 27
Popular Science Monthly's	HENRY-LYFORD RECEIVER
POWERFUL 5 TUBE SET	VICTOREEN SUPER
KING EQUAMATIC	BROWNING-DRAKE
INFRADYNE	BEST'S SUPER
DIAMOND OF THE AIR	INTERFLEX

and many others

FREE Write for "The Radiall Book", containing 24 pages of the latest popular hook-ups and valuable information for the set-builder. Sent free on request to Dept. R.C.B.-5

$1.10 complete with mounting
[In U. S. A.]

Radiall Company
50 Franklin Street New York City

AMPERITE

REG. U.S. PAT. OFF.

The "SELF-ADJUSTING" Rheostat

Radio Plug

The smooth and instantaneous action of this Radio Plug, the positive grip, the beauty of design and finish mark it as a typical Weston product. More than a million in use.

Model 301 Filament Voltmeter

A filament voltmeter is recognized as an essential of every good radio set, because close regulation of filament voltage improves reception and materially lengthens the life of the tubes.

Model 425 Thermo-Galvanometer

A sensitive thermo-milliammeter of low resistance, designed especially for use in a wave meter circuit for the measurement of wave length and decrement; and for the measurement of high frequency resistances by the resistance and reactance variation methods.

Model 506 Panel Instruments

Two inch Radio Panel Voltmeters, Ammeters, and Milliammeters. Voltmeters have an exceptionally high internal resistance (125 ohms per volt)—an outstanding advantage for dry-cell battery operated sets. Small and compact in design, but retaining all of the famous Weston quality. These small instruments are made in a comprehensive list of ranges.

Model 489 Radio Table Voltmeter

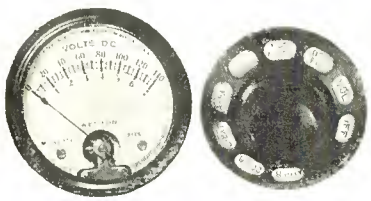
A high resistance instrument, beautifully made with a strong Bakelite case. Its portable form, accuracy, dependability and range combination (150/7.5 volts) make it an ideal all-purpose voltmeter around the radio set, for checking filament and grid voltages, locating troubles such as loose or broken connections, testing new hookups, for improving reception and for materially increasing the useful life of the tubes.

Model 425 Antennae Ammeter

This Weston thermocouple type ammeter solves perfectly the problem of measuring high frequency currents such as are imparted to the antennae. It also measures accurately and with equal facility, alternating currents of low frequency.

Quality Radio Instruments

¶The most recent addition to the Weston Radio line is Model 506 Convertible"Pin-jack" Voltmeter. It is perhaps the most versatile and practical electrical measuring device for radio use so far developed. ¶The instrument itself is a "Pin-Jack" Voltmeter and mounts on the panel of Radiola, Victor and Brunswick-Balke Superheterodynes by plugging it into the pin-jacks provided by the manufacturer. Here you have an instrument that measures filament voltages. Remove it and plug it into the High Range Stand and you have another instrument that will measure battery voltages. This unique combination is unusually pleasing in appearance and places the average operator of a radio set in a position where he may operate at the exact proper filament voltages, save tubes, save batteries and get vastly improved reception over results without its use. ¶For other makes of sets a pair of pin-jacks is supplied with each instrument for mounting on and permanently connecting the filament circuit to the panel. The group of Weston Quality instruments, some of which are here pictured, meets every need of the expert and enthusiast. ¶For full, clear-cut information write us today for free booklet entitled "Weston Radio Instruments."

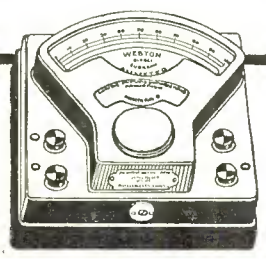


2-Inch Model 506 Voltmeter and Weston Universal Bi-Polar Switch

A new and remarkable combination having universal application to all types of radio sets. It consists of a Weston 2-Inch Voltmeter with double scale (140/7 volts) and a nine-point bi-polar switch. The resistance for the high range of the instrument is contained in the housing of the switch. This Weston combination makes a complete electrical check of your set—by simply turning a switch. Can be readily installed by any radio enthusiast.

WESTON ELECTRICAL INSTRUMENT CORPORATION

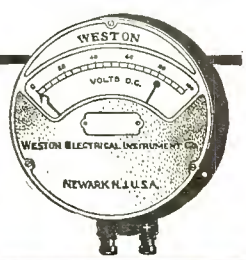
1 Weston Avenue, Newark, N. J.



STANDARD THE WORLD OVER

WESTON

Pioneers since 1888



American Broadcasting Stations

Five dollars reward is offered to the person sending the greatest number of corrections to the following list before March first. The correction will be verified by the broadcasting station and placed to your credit. Employees of broadcasting stations are not eligible.

This list has been very carefully compiled from official Government sources and questionnaires sent to the broadcasting stations. If we have made any mistakes we want to know it. Address your corrections to the Citizens Radio Call Book, Caxton Building, Chicago, Ill., U. S. A.

KDKA Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa. 309 meters, 970 kilocycles, 10,000 watts. Monday, 6:15-9:45 pm. Time calls, 11 am, 12 n, 2:30 pm; baseball scores, 3:20 pm; stock weather reports, 5:30; dinner program, 6:15; baseball scores, 7:40 pm; stock report, 8-9:55 pm; evening program, 9:55 pm. Time signals, late program, Tues & Thurs, 10:35 am; Sun, 10 am-12 m, church; 6:15 pm, baseball scores; 7:45-9 pm, church

KDLR Radio Elec. Co., Devils Lake, N. Dak. 231 meters, 1300 kilocycles, 5 watts. Daily ex Sun, 12:10 pm, weather; 6:15 pm, markets. Mon, 9:30 pm, studio progam; Sun, 11 am, church; 4:30 pm, studio program. Central standard time. Slogan: "North Dakota's Own Station."

KDYL Intermountain Broadcasting Corp., 1009-10-11 Ezra Thompson, Salt Lake City, Utah. 246 meters, 1220 kilocycles, 250 watts. Daily, including Sun. 3-5 pm, matinee program. Mon, 8-10 pm, dance orchestra. Tues, 8-9 pm, classical. Wed, 7-8 pm, Courtesy Program. Daily ex Sun, 9-10 pm, 10-11 pm, 11-12 pm, dance orchestra. Mountain time. Slogan: "The Little Station with the Big Voice."

KFAB Nebraska Buick Auto Co., 13th and Ive sts., Lincoln, Nebr. 340.7 meters, 880 kilocycles, 1000 watts. Sun, 9-10 pm. Mon, Tues, Wed, 9:30-9:55 am, 10:30-11 am, 2:15-1:30 pm, 3-3:30 pm, 5:30-6:30 pm, 8:10-10:30 pm. Thurs, 3-4 pm. Fri same as Mon, Tues & Wed. Sat, 9:30-9:55 am, 3-3:30 pm, 5:30-6:30 pm, 8:30-10:30 pm. Slogan: "Home Service—Home Station."

KFAD McArthur Bros. Co., 134 So. Central st., Phoenix, Ariz. 273 meters, 1100 kilocycles, 100 watts. Daily ex Sun. Mon, 6-7 pm. 8-9 pm daily ex Sun. Wed, 6-7 pm; 9-11 pm, concerts, news, stock. Mountain standard time. Slogan: "The Voice of the Atwater-Kent Radio."

KFAF Alfred E. Fowler, 31st & San Antonio sts., San Jose, Calif. 217-3 meters, 1380 kilocycles, 50 watts. Pacific standard time.

KFAU High School, Boise, Idaho. 280.2 meters, 1070 kilocycles, 750 watts, Sun, 7:30 to 8:30 or 9 pm, church services. Mon, Wed & Fri, 12:30 pm to 1 pm, market, weather, news; Tuesday, 12:30 to 1 pm, market, weather, news; 7:30-8 pm, 8 pm-10 pm Thursday; 12:30 pm to 1 pm, 8 pm, 10 pm entertainment; children's hour Saturday. No market or weather; 7:30 pm-8:30 pm, farm news by State Dept. of Agriculture.

KFBC Radio Station KFBC, on Roof of Balboa Theater Bldg, San Diego, Calif. 380 meters, 780 kilocycles, 100 watts. Sun, 7-7:30 pm, religious lecture. Daily ex Sat & Sun, 7:10 pm, studio program. Sat, 7-12 pm, frolic. Pacific standard time.

KFBB F. A. Buttrey Co., Havre, Mont. 275 meters, 1090 kilocycles, 50 watts, Daily ex Sun, 12:45 am-1:30 pm. Mountain standard time.

KFBK Kimball Upson Co., 610 Calif st., Sacramento, Calif. 535 meters, 560.4 kilocycles, 100 watts. Mon, Thurs & Sat, 6-10 pm. Standard time.

KFBL Leese Bros., 2814 Rucker av., Everett, Wash. 224 meters, 1340 kilocycles, 100 watts. Daily, 7:30-8:30 pm. Pacific time.

KFBS School District No. 1, Trinidad, Colo. 238 meters, 1260 kilocycles, 15 watts.

KFBU Broadcasting Station KFBU, Laramie, Wyoming. 374.8 meters, 800 kilocycles, 1000 watts. Sun, 7:30-9 pm, church services. Mon, Wed, Fri, Sat, 12:30-8:30 pm, weather & news. Tues, Thurs, 7:30-9:00 pm, studio program. Mountain standard time. Slogan: "The Top of the World."

KFCB Nielsen Radio Supply Co., 311 N. Central Ave., Phoenix, Ariz. 238 meters, 1260 kilocycles, 100 watts. Sun, 9:30 to 10:30 am, Radio Community Bible Class. Mon, 7:30 to 8:30 pm, children's hour. Wed, 8 to 9 pm, musical. Sat, 7-8 pm, educational program 12 to 2 am. Mountain standard time. Slogan: "Kind Friends Come Back."

KFDD St. Michael's Cathedral. Boise, Idaho. 275.1 meters, 1090 kilocycles, 50 watts. Sun, 11:15 am-12:30 pm, 7:30-9:15 pm, church services. Mountain standard time. Slogan: "The Voice of the Saint and of Paul."

KFDM Magnolia Petroleum Co., Box 798, Beaumont, Tex. 315.6 meters, 950 kilocycles, 500 watts. Sun, 11-12 n, 8-9 pm. church services. Tues & Fri, 12:30 n, band concert; 8 pm, band concert. Central standard time. Slogan: "Kall for Dependable Magnolene."

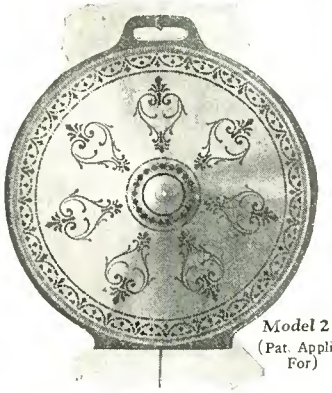
KFDX First Baptist Church, Shreveport, La. 236.1 meters, 1270 kilocycles, 500 watts. Sun, 10:50 am, 7:45 pm. Wed, 9-10 pm. Central standard time.

KFDY South Dakota State College, Brookings, So. Dak. 306 meters, 980 kilocycles, 500 watts. Daily ex Sun, 12:15-12:45 pm, markets & agriculture. Thurs, 7:30-8:30 pm, entertainment. Central standard time.

KFDZ Harry O. Iverson, 2510 Thomas av., South Minneapolis, Minn. 231 meters, 1300 kilocycles, 10 watts. Central standard time.

KFEC Meyer & Frank Co., Portland, Ore. 248 meters, 1210 kilocycles, 50 watts, Daily ex Sun, 12 n, weather reports; 4-5 pm, music; 6:30 pm, weather, crop, markets, reports. Sat, 11 am-12 n, children's hour. Pacific time.

Winsdor Wall or Table Type Cone Speaker Amazes Radio World



Model 210
(Pat. Applied For)

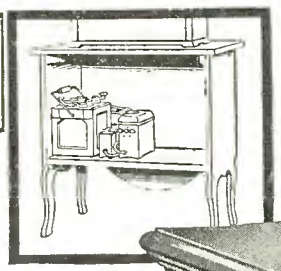
The latest model Windsor Cone Loudspeaker has astonished the world of radio. In convenience, quality of reception, and extremely low price, it far surpasses anything yet offered. The cone is 22 inches in diameter and is mounted on a sounding board which, in turn, is supported by an easel back. It can be hung up on the wall, as in the picture above, or stood upon any flat surface as shown in the picture below. It contains the famous Windsor loudspeaker unit noted for the extreme clarity and fidelity of reproduction.

Model 210
22-inch Cone Loudspeaker with sounding board and easel back.
$15.00
(*West of Rockies $18*)
(Pat. Applied For)

Model 302 (Shown below)
With Moulded Composition Horn Loudspeaker and 18-inch Cone Loudspeaker.

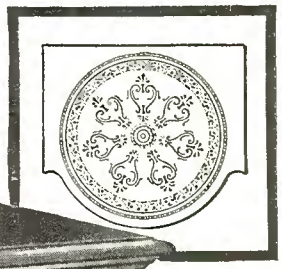
(Pat. Applied For)

In this Windsor Console is combined both the Windsor Moulded Composition Horn Loudspeaker and the 18-in. Windsor Cone Loudspeaker. The top is 30 in. x 17 in. and stands 29 in. high. Plenty of battery and equipment space is provided by large shelf in rear. Price, finished in Mahogany or Walnut **$48.00**
(*West of Rockies, $55*)



Rear view at left shows large compartment with ample space for batteries, battery charger, or battery eliminator, which are entirely concealed from view. Back is open for ventilation of batteries.

At right is shown the Cone Loudspeaker, with its sounding board, which is quickly and easily removable, allowing instant access to all batteries, battery charger, battery eliminator or other equipment and wiring.



(Pat. Applied For)

Model 200—*with 22-inch Cone Loudspeaker*
This Windsor Cone Loudspeaker Console is equipped with a 22-inch Windsor Cone Loudspeaker. Its top is 30" x 17" and is 29" high. The battery shelf provides ample space for batteries, charger, battery eliminator and other equipment. Beautifully finished in either Mahogany or Walnut.

Model 200
$29
Console with Cone Loudspeaker Ready for Set and Batteries
(*West of Rockies, $35*)

This is the Fastest Selling Line of *Loudspeakers and Loudspeaker Consoles* in the Radio World Today

The quality of radio reception made possible by Windsor Cone and Horn Loudspeakers and Loudspeaker Consoles so far surpasses anything heard heretofore that it amazes and delights every radio enthusiast. The Windsor Line is so complete that everyone can find in it a loudspeaker, loudspeaker table, or loudspeaker console exactly to fit their particular needs.

Model 100
with Moulded Composition Horn Loudspeaker or 16-inch Cone Loudspeaker
(Pat. Nov. 18, 1924)

Above is shown a beautiful Windsor Loudspeaker Console, finished in either Walnut or Mahogany, which provides ample space on top for any radio set. The battery shelf beneath will accommodate all necessary equipment. Equipped with either Moulded Composition Horn or 16-inch Cone Loudspeaker. Size: 38 in. x 18 in., and 29 in. high. Price **$40.00**
(*West of Rockies, $42.50*)

To the right is shown the newest Windsor Loudspeaker Console. It is equipped with a 22-inch Cone Loudspeaker and cabinet suitable for 7-inch radio panels up to 26 inches in length. Battery shelf provides ample space for all equipment. Beautifully finished in either Walnut or Mahogany. Price (without receiving set) . . **$44.00**
(*West of Rockies, $52.00*)

Note to Dealers: Write or wire today for details of the highly profitable Windsor line.

(Pat. Applied For)
Model 1000
with 22-inch Cone Loudspeaker

Electrical Department

WINDSOR FURNITURE COMPANY

1498 Carroll Avenue • CHICAGO, ILLINOIS
Los Angeles Branch—917 Maple Avenue

Tell 'Em You Saw It in the Citizens Radio Call Book

KFEL Eugene P. O'Fallon, Inc., Argonaut Hotel, Denver, Colo. 254 meters, 1180 kilocycles, 250 watts. Sun, 9-10 am, church services. Mon, Tues, Wed, Thurs, Fri, Sat, 11-12 am, 2-3 pm, 4-5 pm, 5-6 pm, station programs. Tues, 9-10 pm, special programs. Thurs, 10-12 pm, Sleepwreckers' Program. Mountain standard time. Slogan: "The Argonaut Station."

KFEQ J. L. Scroggin, Oak, Nebr. 267.7 meters, 1120 kilocycles, 500 watts. Sun, 4:30-6 pm, 8:30-10 pm. Mon, Tues, Wed, Thurs, Fri, Sat, 2-3 pm, 8:30-10 pm. Central standard time.

KFEY Bunker Hill & Sullivan Industrial Y. M. C. A. & Union High School, Kellogg, Idaho. 233 meters, 1290 kilocycles, 10 watts. Sun, 11 am-7:30 pm, church services. Wed, 7:30-8:30 pm, musical. Thurs, 7:30, health talks. Sat, 9-10 pm, dance, music. Pacific standard time. Slogan: "The Voice of the Coeur D. Alenes."

KFFP First Baptist Church, 6th & Rollins, Moberly, Mo. 241.8 meters, 1240 kilocycles, 50 watts. Sun, 9:45-10:45 am, 7:30 pm, church services. Thurs, 8 pm, musical program. Central standard time. Slogan: "The Gospel Messenger of the Air."

KFGQ The Crary Hardware Co., Boone, Iowa. 226 meters, 1330 kilocycles, 10 watts. Sun, 3-4 pm. Wed, 8-9. Slogan: "The Daniel Boone Station." Central standard time.

KFH Hotel Lassen (Rigby-Gray Hotel Co.), Wichita, Kan. 268 meters, 1120 kilocycles, 500 watts. Sun, 7-10 pm, church services, studio program. Daily ex Sun, 7-2 pm, every hour, markets; 7 pm, studio program. Central standard time. Slogan: "Kansas' Finest Hotel—In the Very Heart of God's Country."

KFHA Western States College of Colorado, Gunnison, Colo. 252 meters, 1190 kilocycles, 50 watts. Sun, 3 pm, organ program. Tues, Fri, 7 pm, kiddies' hour; 7:30 pm, musical. Mountain time. Slogan: "Where the Sun Shines Every Day."

KFHL Penn College, Oskaloosa, Iowa. 240 meters, 1250 kilocycles, 10 watts, Central standard time.

KFI Earle C. Anthony, Inc., 1000 S. Hope St., Los Angeles, Calif. 467 meters, 642 kilocycles, 5000 watts. Sun, 10 am, church; 4 pm, vespers; 6:30 pm, nightly doings; 6:45 pm, music chat; 7-11 pm, musical program. Mon, Wed, Fri, 10:20-11 am, household talk. Daily ex Sat, Sun, 5:30-11 pm, musical program. Sat, 2:30 pm, football games; 5:30 pm-2 am, musical program. Pacific standard time. Slogan: "National Institution, Where Great Programs Come From."

KFIF Benson Polytechnic Institute, Portland, Ore. 248 meters, 1210 kilocycles, 100 watts. Pacific standard time.

KFIO North Central High School, Spokane, Wash. 272.6 meters, 1100 kilocycles, 100 watts. Fri, 8-9:30 pm. Pacific standard time.

KFIQ First Methodist Church, 332 Miller Bldg., Yakima, Wash. 256 meters, 1170 kilocycles, 100 watts. Wed, Sat, 7:30 pm, musical programs. Sun, 11 am, 7:30 pm, church services. Pacific standard time.

KFIU Alaska Elec. Light & Power Co., Juneau, Alaska. 226 meters, 1330 kilocycles, 10 watts. Mon, Wed & Fri, 6-7 pm, daily news items, steamer sailings, music, vocal and instrumental. Alaska time. (Note: 6 am, Seattle time, is 5 am Alaska time.) Slogan: "A Voice from the Far North."

KFIZ Fond du Lac Commonwealth Reporter, Fond du Lac, Wis. 273 meters, 1100 kilocycles, 100 watts. Daily, 5 to 5:30 pm, markets, weather & news. Occasional evening programs of music. Sun, 6-7 pm, dinner hour concert. Central standard time.

KFJB Marshall Elec. Co., 1603 W. Main st., Marshalltown, Iowa. 248 meters, 1210 kilocycles, 10 watts. Daily ex Sun, 10 am, market reports. Tues & Fri, 7:30-11 pm, musical programs. Sun, 10 am-12 pm; vespers, 3-6 pm. Central standard time. Slogan: "Marshalltown, the Heart of Iowa."

KFJC R. B. Fegan (auspices of the Episcopal Church), 410 N. Jefferson st., Junction City, Kans. 218.8 meters, 1370 kilocycles, 10 watts. Central standard time.

KFJF Oklahoma City, City of Opportunity, 406 N. Hudson St., Oklahoma City, Okla. 261.7 meters, 1150 kilocycles, 500 watts. Daily ex Sun, 9 am, market service; 9:15 am, musical program; 10 am, market service; 12:30 pm, market service; 6:15 pm, market service; 6:30 pm, dinner musical; 7 pm, news bulletins; 9 pm, musical program. Sun, 10 am, 11 am; 7:30 pm, 9:30 pm, church services. Central standard time. Slogan: "City of Opportunity."

KFJI Liberty Theatre and E. E. Marsh, Astoria, Ore. 246 meters, 1220 kilocycles, 10 watts. Wed, 9-10 pm, organ music. Sun, 12:30-1:30 pm. Sat, 10:30-11 pm. Pacific standard time.

KFJM University of North Dakota, Grand Forks, N. Dak. 278 meters, 1080 kilocycles, 100 watts. Limited coml. Sun, 6-7 pm, orchestra. Daily ex Sun, 12 n-1 pm, music records; 6-7 pm, orchestra. Central standard time. Slogan: "The Educational Center of the State."

KFJR Ashley Dixon & Son, care Ralph Schneeloch Co., 95 Fifth st., Portland, Ore. 263 meters, 1140 kilocycles, 120 watts, Mon, 7:30-8:15 pm, story; 8:15-8:45, Listeners Service. Tues, 7:30-8:15, junior program; 9:15-10:45, "Music of the Masters." Wed, 7:30-8:30 (1st & 3rd) Y. M. C. A. program (2nd & 4th). Thurs, 7:30-8:15 pm; 8:15-8:30 B. C. L. service; 9-10 pm, music. Fri, 12:30 (midnight), test program. Sat, 1:30-3 pm, music. Pacific standard time.

KFJY Tunwall Radio, 1004 Central Ave., Ft. Dodge, Iowa. 245.8 meters, 1220 kilocycles, 50 watts. Sun, 11 am, church services. Daily ex Sun, 5:30 pm, market & weather reports. Thurs, 7:30 pm, musical program. Central standard time.

KFJZ W. E. Branch, 400 W. 7th St., Fort Worth, Tex. 254.1 meters, 1180 kilocycles, 50 watts. Sun, 7-10 pm, 11-12:30 mornings. Daily ex Sun & Wed, 8:30-9:30 pm, 9 am to 6 pm. Central standard time.

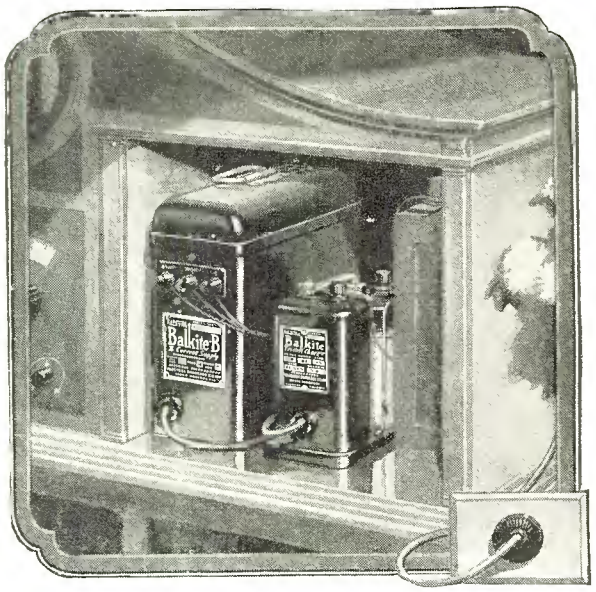
KFKA Colorado State Teachers' College, Greeley, Colo. 273 meters, 1100 kilocycles, 50 watts. Wed, 10 am, chapel exercises. (Schedules to be announced.) Mountain time.

KFKU University of Kansas, Lawrence, Kan. 275 meters, 1090 kilocycles, 500 watts. Mon & Thurs, 6:55-8 pm. (Also special broadcasting.) Central standard time. Slogan: "Up at Lawrence on the Kaw."

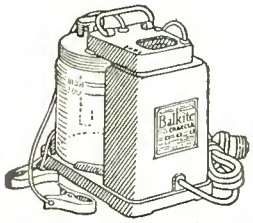
KFKX Westinghouse Elec. & Mfg. Co., Hastings, Nebr. 288.3 meters, 1040 kilocycles, 5000 watts. Daily ex Sun & Sat, 9:30 & 10:30 am, 12:15-2 & 7 pm; musical program at 12:40 & 9 pm. Sat, 9:30 & 10:30 am, markets, also 12:15 pm. Slogans: "Empress of the Air" and "Pioneer Radio Repeating Station of the World."

KFKZ F. M. Henry, 107 E. Harrison St., Kirksville, Mo. 226 meters, 1330 kilocycles, 100 watts. Sun, 3:30 to 4:30 pm. Mon, 8-9 pm, dance music; 9 pm, radio plays. Slogan: "Kirksville, the Home of Osteopathy."

KFLR Korber Wireless Station, the State University of New Mexico, Albuquerque, N. Mex. 254 meters, 1180 kilocycles, 100 watts. Fri, 8:10 pm. Mountain standard time. Slogan: "Sunshine Center of America."

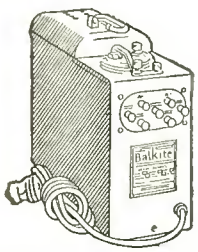


The new Balkite "B" at $27.50 and the Balkite Trickle Charger furnish all radio power from the light socket



The New Balkite Charger

MODEL J. Has a low trickle charge rate and a high rate for rapid charging and heavy duty use. Can thus be used either as a trickle or as a high rate charger and combines their advantages. Noiseless. Large water capacity. Visible electrolyte level. Rates: with 6-volt battery, 2.5 and .5 amperes; with 4-volt battery, .8 and .2 amperes. Special model for 25-40 cycles with 1.5 amperes high rate. Price $19.50. West of Rockies $20. (In Canada $27.50.)



Balkite Combination

When connected to the "A" battery this new Balkite Combination Radio Power Unit supplies automatic power to both "A" and "B" circuits. Controlled by the filament switch already on your set. Entirely automatic in operation. Can be put either near the set or in a remote location. Will serve any set now using either 4 or 6-volt "A" batteries and requiring not more than 30 milliamperes at 135 volts of "B" current—practically all sets of up to 8 tubes. Price $59.50. (In Canada $83.)

All Balkite Radio Power Units operate from 110-120 volts AC current with models for both 60 and 50 cycles. The new Balkite Charger is also made in a special model for 25-40 cycles.

The light socket is your most convenient source of radio power. Use it by adding the new Balkite "B" and the Balkite Trickle Charger to your radio set.

Balkite "B"—the unique "B" power supply—eliminates "B" batteries entirely and supplies "B" current from the light socket. The new Balkite "B"-W at $27.50 serves sets of 5 tubes or less requiring 67 to 90 volts, Balkite "B"-X sets of up to 135 volts and 8 tubes and Balkite "B"-Y any standard set.

The Balkite Trickle Charger at $10 is probably the most popular of all chargers. Over 200,000 were purchased during one season and are now in service. Instead of operating intermittently at a high rate, it operates continuously at a low rate, thus automatically keeping the battery at full charge. In effect it converts your "A" battery into a light socket "A" power supply. With 4-volt batteries it can be used as an intermittent charger, or as a trickle charger if a resistance is added.

Both Balkite "B" and the Balkite Trickle Charger are noiseless in operation. Both are permanent pieces of equipment, with nothing to renew or replace. Other than a slight consumption of household current, their first cost is the last. Both are built to conform with the standards of the Underwriters' Laboratories.

Over 700,000 radio sets are already Balkite equipped. Make yours a light socket receiver too by adding these Balkite Units. Enjoy the pleasure of owning a radio set always ready to operate at its best.

[Balkite "B"-W $27.50; "B"-X $42; "B"-Y $69; Trickle Charger $10; West of Rockies $10.50. In Canada, "B"-W $39; "B"-X $59.50; "B"-Y $96; Trickle Charger $15.]

Fansteel Products Co., Inc., North Chicago, Ill.

The Balkite
Radio Symphony Concerts
with WALTER DAMROSCH
and the New York Symphony

These concerts are broadcast every other Saturday Evening. On intervening Saturdays, Mr. Damrosch gives one of his famous piano recitals on Wagner's great Music Dramas. At 9 P.M. Eastern Standard Time, over a group of 13 stations: WEAF, WEEI, WGR, WFI, WCAE, WSAI, WTAM, WWJ, WGN, WCCO, KSD, WDAF, WOC.

FANSTEEL

Balkite Radio Power Units

KFLU San Benito Radio Club, San Benito, Tex. 236 meters. 1270 kilocycles, 10 watts. Wed & Sat, 8-9 pm. Central standard time.

KFLV Swedish Evang. Miss. Church, Rockford, Ill. 229 meters, 1310 kilocycles, 100 watts. Fri, 8:30 pm. Sun, 12:30 pm (Swedish), 9:30 pm (English). Central standard time.

KFLX Geo. R. Clough, 1214 40th St., Galveston, Tex. 240 meters, 1250 kilocycles, 10 watts. Central standard time.

KFMR Morningside College, Sioux City, Iowa. 260.7 meters, 1150 kilocycles. 100 watts. Commercial. Mon, Wed, Fri, 11:40 am, chapel exercises (20 minutes). Central standard time.

KFMX Carleton College, Northfield, Minn. 336.9 meters, 890 kilocycles, 50 watts. Sun, 7 pm, college vesper service. Tues, 9:30 pm, lecture. Wed, 9 pm, concert. Fri, 10 pm, organ recital. Central standard time.

KFNF Henry Field Seed Co., Shenandoah, Iowa. 461 meters, 650 kilocycles, 1000 watts. Sun, 10:45 am-12:15 pm, services; 2:30-4:30 pm, 6:30-9:00 pm, services. Mon, 7-8 am. Tues, 10-11 am. Wed, 12-2 pm. Thurs, 3-5 pm. Fri, 7-9 pm. Sat, 11-12 pm. Slogan: "Known for Neighborly Folks." Central standard time.

KFOA Rhodes Dept. Store, 1321 2nd Ave., Seattle, Wash. 454.3 meters, 660 kilocycles, 1000 watts. Mon & Tues, 9:30-10:30 am, 12:30-1:30 pm, 2:30-5 pm, 6:25-10 pm. Wed, 9:30-10:30 am, 2:30-5 pm, 6:25-10 pm. Thurs, 9:30-10:30 am, 2:30-5 pm, 6:25-6:45 pm. Fri, 9:30-10:30 am, 12:30-1:30 pm, 2:30-5 pm, 6:25-12:10 pm. Sat, 2:30-5 pm, 6:25-10 pm.

KFOB KFOB, Inc., Burlingame, Calif. 226 meters, 1330 kilocycles, 50 watts. Tues & Thurs, 10-11:30 am, 1-2:30 pm, 5:30-7 pm, 8-11 pm. Sat, 1-3 pm, 5:30-7 pm, 9 pm-1 am. Pacific standard time.

KFON Nichols & Warinner, Inc., 212 Jergins Trust Bldg., Long Beach, Calif. 233 meters, 1280 kilocycles, 500 watts. Sun, 2:30-11 pm, bands, concerts, studio orchestra, etc. Daily ex Sun, 11:30-12 n, news bulletins; 4-7 pm, concerts, organ recitals, news bulletins, etc.; 8-11 pm, studio programs. Pacific standard time. Slogan: "Where Your Ship Comes In."

KFOO Latter Day Saints University, Salt Lake City, Utah. 236.1 meters, 1270 kilocycles, 250 watts.

KFOR David City Tire & Elec. Co., David City, Nebr. 226 meters, 1330 kilocycles, 100 watts. Mon & Tues, 8-9 pm. Central standard time. Slogan: "The Voice of David City."

KFOT College Hill Radio Club, 1st and Erie Sts., Wichita, Kan. 231 meters, 1300 kilocycles, 50 watts. Sun, 11-12:30 pm, 7:30-9 pm, church services. Mon, 9-10 pm, music. Central standard time. Slogan: "Radiocasting Church."

KFOX Technical High School, Omaha, Nebr. 248 meters, 1210 kilocycles, 100 watts. No regular schedule. Central standard time.

KFOY Beacon Radio Service, 373 Robert St., St. Paul, Minn. 252 meters, 1190 kilocycles, 50 watts. Sun, 2:30 pm, musical. Central standard time.

KFPL C. C. Baxter, Dublin, Tex. 252 meters, 1190 kilocycles, 15 watts. Central standard time. Sun, 7 am. Mon, Thurs, 7-8 pm. Slogan: "Baxter's Place."

KFPG Oliver S. Garretson, 5118 Maywood Ave., Los Angeles, Calif. 238 meters, 1260 kilocycles, 10 watts. Pacific time.

KFPM The New Furniture Co., Box 628, Greenville, Tex. 242 meters, 1240 kilocycles, 10 watts. Sun, 11 am, services. Mon, Tues, Fri & Sat, 9 pm, music; 7:15 pm, sports in season; 1 pm, musical program. Wed & Thurs, 8 pm, music; 7:15 pm, sports in season; 1 pm, musical program. Central standard time. Slogan: "Biggest Little Ten Watts on the Air."

KFPR Los Angeles Co. Forestry, Los Angeles, Calif. 231 meters, 1300 kilocycles, 500 watts. Irregular schedule. Pacific standard time.

KFPW St. John's M. E. Church, Box 424, Carterville, Mo. 258 meters, 1160 kilocycles, 20 watts. Sun, 1-2 pm, chapel service. Fri, 8-10 pm, popular and classical. Central standard time. Slogan: "Keeping Pace with Christ Means Progress."

KFPY Symons Investment Co., Symons Block, Spokane, Wash. 273 meters, 250 watts, 1098 kilocycles. Sun, 9 am-10 pm. Daily ex Sun, Tues, 7-8 pm. Mon, 9-10 pm. Wed, 9 pm-12 midnight. Thurs, 10-11 pm. Sat, 11 pm-midnight. Pacific standard time.

KFQA The Principia, 5539 Page Ave., St. Louis, Mo. 261 meters, 1150 kilocycles, 100 watts. Sun & Thurs, 8-9 pm, church services and lectures. Central standard time.

KFQB Lone Star Broadcasting Co., Ft. Worth, Tex. 508.2 meters, 590 kilocycles, 1000 watts. Daily ex Sun & Wed, 8-12 midnight, musical. Sun, 10 am-12 pm, 3-10 pm, church services. Central standard time. Slogan: "Keep Folks Quoting the Bible—KFQB."

KFQO Meier Radio Shop, Russell, Kan. 261 meters, 1150 kilocycles, 10 watts. Central standard time.

KFQP George S. Carson, Jr., 906 College St., Iowa City, Iowa. 223.7 meters, 1340 kilocycles, 10 watts. Central standard time. Irregular schedules as announced.

KFQU Holy City Broadcasting Station, Holy City (Alma P.O.), Calif. 230.6 meters, 1300 kilocycles, 100 watts. Daily ex Sun & Mon, 9-10 pm. Sun, 11 am-12 noon, 9-10 pm. Pacific standard time.

KFQW KFQW, Inc., Continental Hotel, Seattle, Wash. 215.7 meters, 1390 kilocycles, 50 watts. Daily ex Sun, 4:30-7:30 pm, music, 8-12 pm, dance music. Pacific time. Slogan: "At the Western Entrance of Snoqualmie Pass."

KFQZ Taft Products Co., 5653 De Longpre Ave., Hollywood, Calif. 226 meters, 1330 kilocycles, 50 watts. Tues, Fri, 9-11 pm, musical program. Pacific standard time.

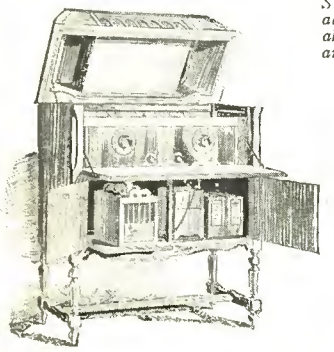
KFRB Hall Bros. (Rialto Theatre), Beeville, Tex. 248 meters, 1210 kilocycles, 250 watts. Central standard time.

A Fine Piece of Furniture to Contain Your New Radio Set— or Your Old One

The Excello Radio Console embodies years of experience in fine cabinet making.

Console, Style No. R-23, with Bench to match

THIS Console is designed in three compartments, the tone chamber, the receiver compartment and the battery space. The tone chamber is of wood with metal throat for perfect tone production. The receiving set compartment has adjustable filler pieces to accommodate any panel not exceeding 10½" x 32". The battery space measures 14" x 32" and the A battery sets on a leaf which pulls forward for easier filling or testing. Matched wood door panels of Butt Walnut, two-tone effect. Ask to see the Excello at your dealers or write for catalog showing full line of consoles and tables.



Sketch showing accessibility of all parts of set and equipment

Distributors and dealers —attractive territory still open. Write for interesting proposition.

EXCELLO

Radio Consoles & Cabinets

EXCELLO PRODUCTS CORPORATION

4820-28 West 16th Street, Cicero, Illinois, (Suburb of Chicago)

KFRC Don Lee-Caddillac Station, San Francisco, Calif. 268 meters, 1120 kilocycles, 50 watts. Daily ex Sun & Mon, 6:30-8 am, exercises. Daily ex Sun, 5:30-6:30 pm, children's hour, 6:30-10 pm, Mon & Thurs. Tues & Fri, 6:30-11 pm, concert. Wed, 6:30-12 pm. Sat, 6:30 pm-1 am, dance music. Sun, 6:30-10 pm, 10-12 pm. Pacific standard time.

KFRO Curtis Sales Co., 1109 8th Ave., Fort Worth, Tex. 246 meters, 1220 kilocycles, 50 watts. Central standard time.

KFRU Stephen's College, a Junior College for Women, Columbia, Mo., "The Athens of the West." 499.5 meters, 600 kilocycles, 500 watts. Sun, 7:30 am, sunrise service; 9:20 am, Burrall class; 7:30 pm, church services. Daily ex Sun & Sat, 8:30 am, public school convocation; 4:30 pm, popular program; 6 pm, dinner hour. Wed, 9 pm, musical program. Thurs, 10 pm, musical program. Sat, 4:30 pm, popular program; 6:15 pm, weather, news. Central standard time. Slogan: "Where Friendliness is Broadcast Daily."

KFRW United Church, Olympia, Wash. 218.8 meters, 1370 kilocycles, 50 watts. Sun, 11 am-12:15 pm, 7:30-9 pm. Pacific time. Slogan: "Make the World a Brotherhood."

KFRX J. G. Klemgard, R. R. 2, Pullman, Wash. 217 meters, 1380 kilocycles, 10 watts. Pacific time.

KFSD Airfan Radio Corporation, U. S. Grant Hotel, San Diego, Calif. 245.8 meters, 1220 kilocycles, 1000 watts. Sun, 3-4 pm, musical program; 6:15-10 pm, musical program. Daily ex Sun, 6:15-11 pm, musical program. Pacific time.

KFSG Angelus Temple, 1100 Glendale Blvd., Los Angeles, Calif. 275 meters, 1091 kilocycles, 500 watts. Sun, 10:30 am-12:30 pm, 2:30 pm-4:30 pm, 6:40-11 pm, church services. Tues, Wed, 10:30 am-12:30 pm, 2:30-4:30 pm, 6:30-9 pm, church services. Thurs & Fri, 10:30 am-12:30 pm, 2:30-4:30 pm, 6:30-11 pm, church services. Sat, 10:30 am-12:30 pm, 3:30-4:30 pm, 6:30-9:30 pm. Slogan: "The Church of the Air."

KFUL Thos. Goggan & Bro. Music Co., Galveston, Tex. 258 meters, 1160 kilocycles, 50 watts. Daily, 10:30 am. Fri, 8 pm. Central standard time. Slogan: "Kan't Fool Us Longhorns."

KFUM Corley Mountain Highway, Colorado Springs, Colorado. 239.9 meters, 1250 kilocycles, 100 watts. Sun, 8:15-8:35 am. Mon, Fri, 7:30-9 pm. Thurs, 8-9:30 pm. Sat, 7:15 pm, sport news. Mountain standard time.

KFUO Concordia Seminary (Lutheran), St. Louis, Mo. 545.1 meters, 550 kilocycles, 500 watts. Daily ex Sun, 3:30-4 pm, 9:15 pm. Mon, 8 pm. Tues, 6:30 pm. Wed, 9:30 pm. Fri, Sat, 7:15 pm. Central standard time. Slogan: "The Gospel Voice."

KFUP Fitzsimmons General Hospital, Denver, Colo. 234 meters, 1280 kilocycles, 50 watts. Mountain time.

KFUR Peery's Egyptian Theatre (H. W. Peery, Mgr.), Ogden, Utah. 224 meters, 1340 kilocycles, 50 watts. Tues, Thurs, Sat, 9:50-11:50 pm, dance music. Mountain time.

KFUS Gospel Radio, 529 28th St., Oakland, Calif. 259 meters, 1170 kilocycles, 50 watts. Tues, 2:30-3:30 pm, Educational; 8-9 pm, 6:30-7:30 pm, sacred studio program. Wed & Fri, 8-9 pm, sacred program. Thurs, 4:30-5 pm, educational; 5-5:30 pm, children's program. Sun, 9-9:30 am, S.S. lesson; 3:30-4:30 pm, sacred program. Pacific standard time.

KFUT University of Utah, Salt Lake City, Utah. 261 meters, 1150 kilocycles, 100 watts. Off air until October or later.

KFUU Mathewson Motor Co., Inc., and Oakland Times, Oakland, Calif. 220 meters, 1363 kilocycles, 150 watts. Mon, Wed, Fri, 6:30-7:30 pm, 8-10 pm. Tues & Thurs, 8-10 pm. Sat, 6:30-7:30, 8-11 pm.

KFVD Venice Ball Room, Venice, Calif. 205 meters, 1460 kilocycles, 250 watts. Sun, 10-12 pm, Ball Room orchestra. Daily ex Sun, 8-10 pm, musical; 10-12 pm, Ballroom Orchestra. Sat, 12 pm, Midnight Frolic from Ship Cafe. Pacific time.

KFVE Romaine Fielding, Film Corp. of America, 6800 Delmar Blvd., University City, Mo. 240 meters, 1250 kilocycles, 5000 watts. Daily ex Sun & Thurs, 9:15 pm, National amusement review, studio entertainers, & orchestra music. Central standard time.

KFVG First Methodist Episcopal Church, 204 S. Penn. Ave., Independence, Kan. 236 meters, 1270 kilocycles, 15 watts. Sun, 10:55 am-12:30 pm & 7:30-9:15 pm, church services. Central standard time. Slogan: "Kansas Folks Very Good."

KFVI Headquarters Troop, 56th Cavalry Brigade, 305 Sabine St., Houston, Tex. 240 meters, 1210 kilocycles, 10 watts. Central standard time.

KFVN Carl E. Bagley, Welcome, Minn. 227 meters, 1320 kilocycles, 50 watts. Mon, Tues, Wed, 9-10:30 pm, musical programs. Fri, 8:30-8:50 pm, children's religious hour; 9-10:30 pm, musical program. Sun, 2:30-3:30 pm, Sunday School. Central standard time.

KFVR Moonlight Ranch Broadcasting Station (Eugene Rossi), Route No. 6, Denver, Colo. 244 meters, 1230 kilocycles, 50 watts. Mon, Fri, 10 pm-12 midnight. Tues, Sat, 8-9 pm. Wed, Thurs, 12-1 am. Mountain time.

KFVS Hirsch Battery & Radio Co., 312 S. Frederick St., Cape Girardeau, Mo. 224 meters, 1340 kilocycles, 50 watts. Daily ex Sun, 12:15 noon, news & markets. Mon, 6:30-10:30 pm, musical. Wed, 7:30-10:30 pm, musical. Thurs, Fri, 7:30-9:30 pm, musical. Central standard time. Slogan: "The City of Opportunity."

KFVY Radio Supply Co., 407 W. Central Ave., Albuquerque, N. Mex. 259.9 meters, 1200 kilocycles, 10 watts. Daily ex Sun, 5:30-6:30 pm, news items & music. Tues & Fri, 8-9:30 pm, dance music. Mountain standard time.

KFVZ Glad Tidings Tabernacle, Inc., 1536 Ellis St., San Francisco, Calif. 234 meters, 1280 kilocycles, 50 watts. Pacific time.

KFWB Warner Bros. Motion Picture Studios, Inc., 5806 Sunset Blvd., Hollywood, Calif. 252 meters, 1190 kilocycles, 500 watts. Mon, Tues & Wed, 5-6 pm, Big Brother hour; 6-11 pm, musical. Thurs, Fri & Sat, 6-11 pm, musical. Sun, 9-11 pm, musical. Pacific standard time. Slogan: "Movieland."

KFWC L. E. Wall, Upland, Calif. 291.1 meters, 1030 kilocycles, 5 watts, Sun, 9-12 am, church services; 9-12 pm, musical. Mon, 9 am-1 pm, 4-12 pm. Tues, 11:30 am-12:30 pm, 3-5 pm, 9-12 pm. Wed, 11:30 am-12:30 pm, 4-6 pm, 9-12 pm. Thurs, 12-1 pm, 4-6 pm, 9-12 pm. Fri, 11:30 am-12:30 pm, 3-5 pm, 9-3 pm. Pacific standard time. Slogan: "The Voice of the Orange Empire."

KFWF St. Louis Truth Center, 4030 Lindell St., St. Louis, Mo. 214.2 meters, 1400 kilocycles, 250 watts, non-commercial. Sun, 10:45 am, 7:45 pm, 9 pm, organ & chimes. Thurs, 10:45 am, sunshine hour; 7:45 pm, sermon; 9 pm, music. Central standard time. Slogan: "The Voice of Truth."

KFWH F. Wellington Morse, Jr., Chico, Calif. 254 meters, 1180 kilocycles, 100 watts. Daily ex Sun, 6:15-6:30 pm, news & music. Daily, 6:30-7:15 pm, dinner concert. Mon, Wed, Fri, 8-10 pm. Pacific time. Slogan: "Kind Friends, We're Here."

KFWI Radio Entertainments, Inc., Chevrolet Bldg., San Francisco, Calif. 250 meters, 1200 kilocycles, 500 watts. Sun, 1-2 pm, 8-9 pm, 9-10 pm, 10-12 pm. Mon, 1-2 pm, 6:30-7 pm, 7-7:30 pm, 8-9 pm, 9-10 pm, 10-12 pm. Tues, 8-8:30 pm, 8:30-9 pm, 9-10 pm 10-11 pm. Wed, 1-2 pm, 6:30-7:30 pm, 8-9 pm, 9:30-11 pm, 11 pm-1 am. Thurs, 10-12 pm. Fri, 1-2 pm, 6:30-7:30 pm, 8-10 pm, 10-12 pm. Sat, 10-12 pm, 12:30-3 am.

KFWM Oakland Educational Society, 1520 8th Ave., Oakland, Calif. 315.6 meters, 920 kilocycles, 250 watts. Sun, 9:30-11 am, 1-2 pm, 8:30-9:30 pm. Mon, Thurs & Sat, 8-10 pm. Tues, Wed & Fri, 2-3 pm. Pacific standard time. Slogan: "Voice of Oakland."

KFWO Major Lawrence Mott, 346 Claressa Ave., Avalon, Catalina Island, Calif. 211.1 meters, 1420 kilocycles, 250 watts. Daily including Sun, 12:30-1:30 pm, 5-6 pm, 6-7:30 pm; 7:30-9 pm, band. Pacific standard time. Slogan: "Catalina for Wonderful Outings."

KFWU Louisiana College, Pineville, La. 238 meters, 1260 kilocycles, 100 watts. Central standard time.

KFWV Wilbur Jerman, 385 58th St., South Portland, Ore. 212-5 meters, 1410 kilocycles. 100 watts. Sun, 12-1:30 pm, organ; 6-7 pm, Benson Hotel dinner music. Mon, Fri & Sat, 10-11 am, housewife hour; 6-7 pm, Benson; 7-8 pm, organ; 8-9 pm, dinner music. Tues, 10-11 am, housewife hour; 6-7 pm, Benson; 7-9 pm, organ. Wed, 10-11 am, housewife hour; 6-7 pm, 7-8 pm, organ; 8-9 pm, 11-11:30 pm, music. Thurs, 10-11 am, housewife music hour; 6-7 pm, Benson; 7-8 pm, organ; 8-9, 11-12.

KFXB Rim of the World Station, Big Bear Lake, Pine Knot, Calif. 202.6 meters, 1480 kilocycles, 500 watts. Daily ex Sun, 5-5:30 pm, news, road bulletins, lectures, music. Pacific standard time. Slogan: "The Rim of the World Station."

KFXD L. H. Strong, East Center St., Logan, Utah. 205.4 meters, 1460 kilocycles, 10 watts. Mountain time.

KFXF Pikes Peak Broadcasting Co., Inc., Colorado Springs Nat'l Bank Bldg., Colorado Springs, Colo. 250 meters, 1200 kilocycles, 500 watts. Mon, Tues, Sat, 8:30-10:30 pm, musical program. Thurs, 9:15-10:45 pm, dance program. Sun, 11 am-12:30 pm, 7:30-9 pm, church services. Mountain time. Slogan: "The Pike's Peak Station."

KFXH Bledsoe Radio Co., 2857 Montana St., El Paso, Tex. 242 meters, 1240 kilocycles, 50 watts. Mon, Wed, Fri, 8-10 pm, musical. Sat, 11-12 pm, frolic. Central standard time. Slogan: "The Voice of the Rio Grande."

KFXJ Mountain States Radio Distributors, Inc., 917 14th St., Denver, Colo. (Portable.) 215.7 meters, 1390 kilocycles, 15 watts. Mountain time.

KFXR Classen Film Finishing Co., Oklahoma City, Okla. 214.2 meters, 1400 kilocycles, 15 watts.

KFXY Mary M. Costigan, Flagstaff, Ariz. 205.4 meters, 1460 kilocycles, 50 watts. Mountain time.

KFYD N. Baker, 2nd St., Muscatine, Iowa. 256 meters, 1170 kilocycles, 250 watts. Central standard time.

KFYF Carl's Radio Den (Carl Newcomb), Oxnard, Calif. 214.2 meters, 1400 kilocycles, 10 watts. Mon, Tues, Wed, 5-6 pm, crop reports, news, music; 8-11 pm, music. Fri & Sat, 5-6 pm, crop reports, news, music. Slogan: "The Baby Super Station."

KFYJ Houston Chronicle Pub. Co. (Portable Station), Houston, Tex. 238 meters, 1260 kilocycles, 10 watts. Central standard time.

KFYO Buchanan-Vaughan Co., Texarkana, Tex. 351 meters, 1430 kilocycles, 10 watts. Sun, 11 am, church services. Daily ex Sun & Sat, 12 n-1 pm, musical program; 6-7 pm, dinner hour musical program. Sat, noon day program. Central standard time. Slogan: "Where Arkansas Ends and Texas Begins."

KFYR Hoskins-Meyer, Inc., 200 4th St., Bismarck, N. Dak. 247.9 meters, 1210 kilocycles, 10 watts. Sun, 10:30 am-12 noon, church; 3-5 pm, music. Daily ex Sun, 6:30-7:30 pm, music, baseball scores, weather forecast, etc. Central standard time.

KGH Marion A. Mulrony, King St., Honolulu, Hawaii. 270 meters, 1110 kilocycles, 500 watts. Sun, 11 am, 6-9 pm, church services. Mon, Tues, Thurs, Sat, 7:30-9 pm, musical, dance music. Slogan: "The Future Playground of America."

KGAR The Tucson Citizen, Tucson, Ariz. 243.8 meters. 1230 kilocycles, 100 watts. Sun, 9-11 am, church services. Mon, Tues, 7-8 pm. Wed, 8-9 pm. Thurs, 7-10 pm. Fri, 7-9 pm. Mountain standard time.

KGBS Arthur C. Daily, 844 East 58th St., Seattle, Wash. 227 meters, 1321 kilocycles, 100 watts. Sun, 1:30-2:45 pm, 5-6 pm. Mon, 8:30-9:30 pm. Wed, Fri, 7-8 pm. Wed, 9-10 pm. Sat, 9-10 pm. Pacific time.

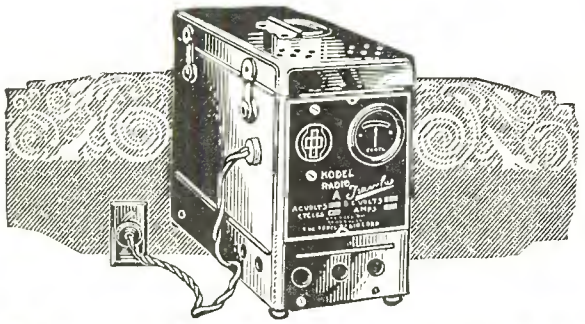
KGBY A. C. Dunning, Shelby, Nebr. 202.6 meters, 1480 kilocycles, 50 watts. Sun, 3-5 pm, religious program. Tues, 8-10:30 pm, popular program. Fri, 6-7 pm, dinner program. 8-10:30 pm, popular program. Central standard time. Slogan: "The Voice of Shelby, in the Heart of the Corn Belt."

KGBZ Federal Live Stock Remedy Co., Swine & Poultry Station, York, Nebr. 333.1 meters, 900 kilocycles, 100 watts. Sun, 9 am, church services; 3:30 pm, orchestra. Daily ex Sun, Tues, 12:30 pm, market, livestock; 3 pm, musical. Thurs, Sat, 9 pm, dance music. Central standard time. Slogan: "The Swine and Poultry Station."

KGCA Chas. W. Greenley, Decorah, Iowa. 280.2 meters, 1070 kilocycles, 15 watts. Sun, 9:30-10:30 am, 2:30-3:30 pm. Daily, 12:15-12:45 pm, 5:30-6:30 pm. Varied musical from Luther College and Educational. Central standard time.

KGCG Moore Motor Company, Newark, Ark. 234.2 meters, 1280 kilocycles, 100 watts. Sun, 2:30-3:30 pm, concert. Wed, 9-10 pm, popular concert. Sat, 10-11 pm, frolic. Central standard time.

A-B & C Radio Power from your light socket



Kodel Transifiers

Operate any radio receiver direct from the light socket. Eliminate all A, B and C batteries. Absolutely no hum or noise—gives increased volume, a purer, richer tone—will improve the reception from any receiver. No moving parts to wear out. Will last indefinitely. Can be used on any make or type of set, any kind of tubes. See Kodel Transifiers at your nearest radio dealer or write direct for full information.

Five Efficient Models to Serve Any Set!

You may purchase exactly the Transifier to fit your needs. Models for all sets and all currents

Model 15 "A & B"—4 or 6 volts "A" current, 22½ to 150 volts "B" current..... **$65.00**

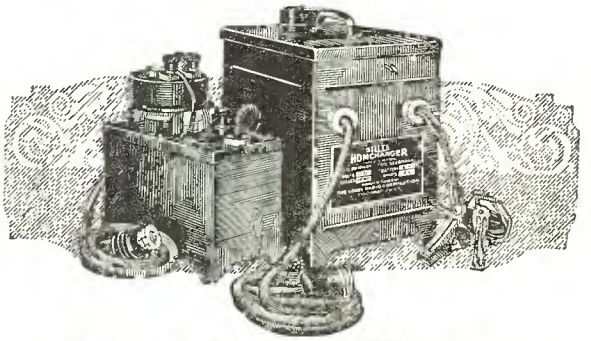
Model 10 "A"—4 or 6 volts "A" current for sets up to 8 tubes..... **42.50**

Model 61 "B"—Radio's most popular eliminator for 5 and 6 tube sets..... **28.50**

Model 10 "B"—22½ to 180 volts "B" current; 4 to 12 volts "C" current—for any size set..... **42.50**

Model 63 "B"—for use on 110 or 220 volt direct current circuits—for any size set..... **25.00**

Prices Do Not Include Tubes



SILITE TRICKLE CHARGERS

You can make an efficient light socket "A" power unit of your present radio battery. Merely connect either of the Silite Trickle Chargers to your battery and plug it into the light socket. That's all there is to it. Left permanently on charge, your battery remains always at peak power, ready to deliver a full charge of live powerful current to the set. Silite is being used in more than 40 makes of power units now on the market. You may obtain either of the two models from your nearest radio dealer, or write direct for full information.

Silite Trickle Charger, gives .6 ampere charging rate. For any average size set. Absolutely noiseless. Complete..... **$10.00**

Silite Homcharger. In addition to .6 ampere rate, gives booster charge of 2½-3 amperes. For very large sets. Absolutely noiseless. Price complete..... **19.50**

[***"Behind the Scenes in a Broadcasting Station," an interesting 24-page booklet, together with literature describing Kodel Transifiers, Silite Chargers, and all Kodel radio devices, will be mailed free on request.***]

THE KODEL RADIO CORP., 510 E. Pearl St., CINCINNATI, O.

The World's Largest Manufacturers **KODEL** *of Radio Power Devices*

POWER SPECIALISTS SINCE 1912

KGCH Wayne Hospital, Wayne, Nebr. 434 meters, 690 kilocycles, 500 watts. Sun, 6 pm, sacred service. Daily ex Sun. 10:10 am, weather, stock reports. Daily ex Sat, Sun, Mon, 6:30 pm, musical recitals, orchestra, story hour, etc. Central standard time. Slogan: "Remember Us When U R Ill, & We Come to U in Health, You Come to Us in Sickness."

KGCM Robert B. Bridge, Radio Service Shop, 2412 Main Ave., San Antonio, Tex. 263 meters, 1140 kilocycles, 10 watts. Sun, 4-6 pm, varied musical program. Daily ex Sun, 10:15-11:30 am, weather bulletins, music; 12:30-2 pm, road bulletins, music; 6:30-7:30 pm, music. Central standard time.

KGCN A. E. Smith, Concordia, Kan. 210 meters, 1428 kilocycles, 50 watts. Daily ex Sat, 7:30-8:30 pm. Central standard time.

KGL North Pacific Sea Products Co., Port Hobron, Alaska.

KGO General Electric Co., Oakland, Calif. 361.2 meters, 830 kilocycles, 5000 watts. Sun, 11 am, 7:30 pm. church services. Daily ex Sun, 11:30 am, luncheon program; 1:30 pm. stock reports; 6 pm, dinner concert; 6:55 pm, evening reports. Mon, 5:30 pm. Kiddies' Club. Wed, 5:30 pm, Columnist. Thurs, 5 pm, Boys' hour. Fri, 5:30 pm, Girls' half hour. Mon, Thurs, 8 pm. studio program. Wed, 8 pm, farm program. Sat. 8:45 pm, sport review. 9 pm, dance program. Pacific standard time. Slogan: "Pacific Coast Station."

KGU Marion A. Mulrony, 236 King St., Honolulu, Hawaii. 270 meters, 1110 kilocycles, 500 watts. 2½ hours later than Pacific time. Daily ex Sun, 12-1 pm, weather, stocks, musical. Mon, Tues, Thurs, Fri, 7:30-9 pm, musical. Tues, 9-10 pm. Sun, 11 am-12 pm; 7:30-9 pm, church services.

KGW The Morning Oregonian, Portland, Ore. 491.5 meters, 1000 watts, 610 kilocycles, Sun, 10 am-12 noon, church; 7:30-9 pm, church; 9-10, symphony. Mon, 10-11:30 am, Town Crier; 12:30-1:30 pm, concert; 6-7, concert; 7-12, musical entertainment. Tues, 10-11:30 am, Town Crier; 12:30-1:30 pm, concert, 2-3:30, women's matinee; 6-12, music and educational program. Wed, 10-11:30 am, Town Crier; 12:30-1:30 pm, 6-7, concerts; 7:30-10, diversified entertainment. Thurs. 10-11:30 am, Town Crier; 12:30-1:30 pm, entertainment and dance music. Fri, 10-11:30 am, 6-7, concerts; 7:30-12, utility service, vaudeville Town Crier; 12:30-1:30 pm, concert; 2-3:30 pm, women's matinee; 6-7, concert; 7:30-9, utility and musical entertainment; 10:30-12, Hoot Owl frolic. Sat, 10-11:30 am, Town Crier; 12:30-1:30 pm, 6-7, concerts; 10-12 pm, dance music. Pacific standard time. Slogan: "Keep Growing Wiser."

KGTT Glad Tidings Temple, 1471 Ellis St., San Francisco, Calif. 207 meters, 1450 kilocycles, 50 watts. Sun, 2:30-5 pm, 8:10 pm. Mon, Tues, Thurs & Sat, 12:10-12:30, sacred. Wed, 12:10-12:30 pm, 2:30-3:33 pm, sacred. Fri, 12:10-12:30 pm, 3-4 pm, 8-10 pm, sacred. Pacific standard time. Slogan: "Knights of Glad Tidings."

KGY St. Martins College, Lacey, Wash. 277.6 meters, 1080 kilocycles, 50 watts. Tues, Thurs, Sun, 8:30-9:30, PST concert. Pacific standard time. Slogan: "Out Where the Cedars Meet the Sea."

KHJ Los Angeles Times, Los Angeles, Calif. 405.2 meters, 740 kilocycles, 500 watts. Daily ex Sun, Mon, 12:30-1:30 pm, 6:30-11. Mon, 12:30-1:30 pm. Sun, 10-12:30 pm, 6-7:30, 8-11 pm. Pacific time. Slogan: "Kindness, Happiness, Joy."

KHQ Louis Wasmer, Inc., care of Davenport Hotel, Spokane, Wash. 394.5 meters, 760 kilocycles. 1000 watts. Sun. 11-12:30, 6-7:30, 7:30-10 pm, church services. Mon, Tues, Thurs, Fri, Sat, 2:30-4:30 pm, matinee; 5-6 pm, service hour. Thurs, Fri, Sat, 6-7 pm, concert. Mon, Tues, 7:30-12 pm, varied. Wed, 7-8 pm, rebroadcast from KFOA; 8-9 concert; 9-10 pm, dance music. Thurs, Fri, 8-10 pm, popular; 10:30-12 pm, KGW. Pacific time. Slogan: "Tells the World."

KJBS Julius Brunton & Sons Co., 1380 Bush St., San Francisco, Calif. 220 meters, 1360 kilocycles, 5 watts. Sun, (summer schedule—silent). Mon & Wed, 9-11:30 am, 2-4 pm. Tues, Thurs & Sat. 9-11:30 am, 2-4 pm. Slogan: "San Francisco's Baby Station."

KJR Northwest Radio Service Co., 641 Terminal Sales Bldg., Seattle, Wash. 384.4 meters, 780 kilocycles, 1000 watts. Sun, 11 am, church services; 7:30 pm. church services; 9-10 pm, concert. Mon, 11:30 am-12 noon, markets; 5:40-6 pm. 8:30-10 pm, studio. Daily ex Sun & Mon, 11:30 am-12 noon, markets. Pacific standard time.

KLDS Reorganized Church of Jesus Christ of Latter Day Saints, Independence, Mo. 440.9 meters, 680 kilocycles, 1000 watts. Sun, 11 am, 3 pm, 6 pm, 9:15 pm. Mon, silent. Thurs, 8 pm, studio program. Fri, 6:30 am, morning devotional program. Sat, 8 pm, studio program. Slogan: "The Station Dedicated to Knowledge, Liberty, Divinity and Service."

KLS Warner Bros. Radio Supplies Co., 2201 Telegraph Ave., Oakland, Calif. 250 meters, 1200 kilocycles, 250 watts. Sun, 10-11 am, church services. Pacific standard time. Slogan: "The City of Golden Opportunity."

KLX The Oakland Tribune, Oakland, Calif. 508.2 meters, 590 kilocycles, 500 watts, Mon, 7-7:30 pm, news; 8:10 pm, studio program. Tues & Thurs, 3-5 pm, 7-7:30 pm, baseball, news broadcast. Wed, 3-5 pm, baseball; 6:30-7, orchestra; 7-7:30 pm, news; 8-10 pm, studio. Fri, 3-5 baseball; 7-7:30 pm, news; 8-10:30, studio. Sat, 2:5-30 pm, football broadcasting during season. Pacific standard time. Slogan: "Where Rail and Water Meet."

KLZ Reynolds Radio Company, Inc., Shirley Savoy Hotel, Denver, Colo. 266 meters, 1130 kilocycles, 500 watts. Sun, 7:45-10 pm, services from Sunshine Rescue Mission. Mon, 7:50-8 pm, weather reports and announcements; 8-11 pm, studio program. Tues, 7:50-8 pm, weather reports and announcements; 8-11 pm, studio program. Wed, 7:50-8 pm, weather reports and announcements; 8-11 pm, studio program. Thurs, 7:50-8 pm, weather reports and announcements; silent night. Fri, 6:30-7 pm, Movie Club; 7-8 pm, announcements and weather reports. Sat, 7:50-8 pm, weather reports and announcements; 8-12 pm, studio program.

KMA Earl E. May Seed & Nursery Co., Shenandoah, Iowa. 461 meters, 660 kilocycles, 500 watts. Sun, 8:30-9:30 am, sacred; 12:15-1:30 pm, talk and music; 4:30-6:30, talk and music. Mon, 5:30-7 am, 9-10 am, 11:30-12:30 pm, 6-7 pm, 9-11 pm. Wed, 5:30-7 am, 11:30-12:30, 6-7 pm. 9-11 pm. Thurs, 9-10 am, 11:30-12:30, 6-7 pm. Fri, 5:30-7 am, 9 am, 11:30-12:30, 6-7, 9-11 pm. Sat, 5:30-7 am, 9 am, 11:30-12:30, 2-3 pm, 6-7 pm, 9-11 pm. Central standard time. Slogan: "Keeps Millions Advised."

KMJ Fresno Bee, Fresno, Calif. 234 meters, 1280 kilocycles, 50 watts. Mon, Wed, Fri, 7:15-9 pm. Pacific time.

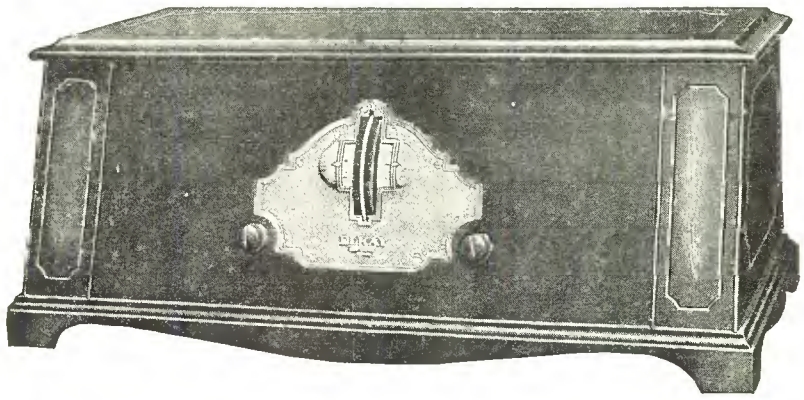
KMMJ The Old Trusty Station. Clay Center, Neb. 229 meters, 1310 kilocycles, 1000 watts. Sun, 9:15 pm. Mon, Tues. 10 am, 1:30 pm, 8 pm. Thurs, Fri, Sat, 10 am, 1:30 pm, 8 pm. Slogan: "The Old Trusty Station."

KMO Association Station (Love Electric Co.), Tacoma, Wash. 250 meters, 1199 kilocycles, 100 watts. Pacific time.

KMOX KMOC, St. Louis, Mo. 280.2 meters, 1070 kilocycles, 1500 watts. 9 pm, Skouras Brothers Sunday night club; 6:30 pm, Jacquinot Jules, organist; 7 pm, Kmox Radio orchestra; 8 pm, Kmox Radio orchestra; 9 pm, "By the Banks of Bonny Doon," Kmox Radio orchestra; 10 pm, Kmox Radio orchestra.

KMTR Echophone Mfg. Co., Los Angeles, Calif. 238 meters, 1260 kilocycles, 500 watts. Sun, 6:30-7 pm, 7-9:30 pm, church services. Daily ex Sun, 9:30 am, 12 midnight, programs vary. Pacific time. Slogan: "Echoes of Hollywood."

KNRC Kierulff & Ravenscroft Co., Radio Equipment, 17th & Los Angeles St., Los Angeles, Cal. 208 meters, 1440 kilocycles, 500 watts. Sun, silent. Mon, 1-3 pm, music; 8-10 pm, varied program. Tues, 7-10 pm, novelty program; Wed, 7-10 pm, popular program. Thurs, 2-3 pm, music; 8-10 pm, minstrel program. Fri, 8-10 pm, novelty program. Sat, 8-11 pm, concert and weekly meeting of the K.R.B.'s. Pacific standard time. Slogan: "Keep Novelties Radiating Constantly."



(Licensed Under Patents Granted and Pending)
SixTubes—$125 List

THE NEW ELKAY RECEIVER

TRADE MARK REG.

A "Truphonic" [TRUE TONE] Reproducer

The new Elkay embodies the Donle Truphonic System of audio amplification, and the Elkay Synauto Radio Frequency principle . . . two momentous improvements in radio.

Truphonic means true tone amplification. The Donle System unit comprises three balanced stages of audio, entirely free from interstage coupling or distortion within the stages. A pure note entering this amplifier comes out a pure note—from the first point of audibility evenly up to the greatest volume it is possible for the tubes to supply. If good music is on the air, the Elkay will get it!

The Synauto principle, an Elkay patent, pours oil on the troubled waters of tuning! You may have noticed in your experience that if you set your dial for good volume on the low waves, you had to readjust the rheostats when switching to the higher waves to get volume. And if later you turned back into the lower waves without tuning down the filaments you were greeted with squeals.

The Elkay Synauto principle smooths out the entire dial from 200 to 580 meters. Switch where you will, the clarity and volume will be even.

Besides these outstanding advantages, the new Elkay has the following:

—neat, centralized Uni-Control . . . the flexibility of three dials, all under your thumb.

—the Elkay Tube Equalizor System of interchangeable, automatic rheostats; any combination of tubes can be used. In addition to the splendid new tubes now to be had, before this radio season is over there will be special R. F., Detector, Audio and Output tubes on the market. Elkay owners will be able to use these tubes without alteration of hook-up.

—both the R. F. stages and the Detector are entirely shielded against "strays."

—"floating" sockets mounted on Bakelite subpanel; all important insulated and wearing parts genuine Bakelite.

—all connections from a common cable, plainly tabbed.

—in a beautiful sloping-front cabinet of brown, antique Duco finished natural grain mahogany, $125. If your dealer can't supply you, send us his name and we will take care of you. Also, write for descriptive folder.

Elkay Equalizors and Suppressors

Elkay Tube Equalizors are sold independently of Elkay Receivers. They are in handy cartridge form, just the thing for experimenters' and fans' use in trying out new circuits. There is a value for every tube made. List price, 50c; mounted, 75c.

Elkay Suppressors, also of cartridge design, for the grid circuit, suppress regeneration and facilitate tuning. 100 to 1800 ohm values. List price, 75c; mounted, $1.00. Quantity prices to manufacturers on Suppressors and Equalizors.

THE LANGBEIN-KAUFMAN RADIO CO., Dept. C, 62 Franklin St., New Haven, Connecticut

KNX The Los Angeles Evening Express Broadcasting Station, 6116 Hollywood Blvd., Los Angeles, Calif. 337 meters, 890 kilocycles, 1000 watts. Sun, 10 am-10:30 pm, classical program. Mon, 7:30 am-12 midnight, semi and classical. Tues, 7:30 am-1 am, semi and classical. Wed. 7:30 am-12 midnight, semi and classical. Thurs, 7:30 am-12 midnight, semi and classical. Fri, 7:30 am-12 midnight, semi and popular. Sat, 7:30 am-2 am, semi, popular and classical. Slogan: "The Voice of Hollywood."

KOA Rocky Mountain Broadcasting Station, General Electric Co., 1370 Krameria St., Denver, Colo. 322.4 meters, 930 kilocycles, 5000 watts. Sun, 10:30 am, 4:30 pm, 7:30 pm, church services. Daily ex Sun, 11:45 am, weather, news; 12 noon, time signals; 12:45 pm, organ recital. Tues, Thurs, Fri, 3:30 pm, matinee; 4 pm, culinary hints; 4:15 pm, fashion review. Daily ex Sat & Sun, 6 pm, stocks, markets, news bulletins, etc.; 6:30 pm, dinner concert. Mon, Wed, Fri, 8 pm, instrumental program; 8:15 pm, studio program. Tues, 8:30 pm, wit & humor. Mountain standard time.

KOAC Oregon Agricultural College, Corwallis, Ore. 280.2 meters, 1070 kilocycles, 500 watts. Mon, agriculture night service talks and information lecture. Wed, Information lectures & music. Fri, Information lectures & music. Pacific standard time. Slogan: "Science for Service."

KOB New Mexico College of Agriculture & Merchants Arts, State College, N. M. 348.6 meters, 860 kilocycles, 1500 watts. Mon, 11:55 am-12 pm, time signals; 9:55-10 pm, time signals; 12-12:02 n, weather reports; 12:02-12:10 pm, New Mexico road reports; 12:10-12:30 pm, news briefs. Wed, 9:55-10 pm, standard mountain time signals; 10-10:02 pm, U. S. W. B. reports; 10:02-10:10 pm, New Mexico road reports. Mountain standard time. Slogan; "The Sunshine State of America."

KOCH Central High School, Omaha, Neb. 258 meters, 1160 kilocycles, 250 watts. Sun, 3-5 pm, classical. Mon, Tues, Thurs, & Sat, 8:30-10 pm, musical. Central standard time. Slogan: "The Voice of 2000 Students."

KOCW Oklahoma College for Women, Chickasaw, Okla. 252 meters, 1190 kilocycles, 200 watts. Mon, Tues, Thurs & Fri, 12-1 pm, educational talk and music. Tues, Fri & Sat, 8-9 pm, musical program. Wed, 10-10:40 am, chapel services; 12-1 pm, musical. Sun, 11 am-12 n, church services; 2:30-3:30 pm, musical. Central standard time.

KOIL Mona Motor Oil Radio Station, 1124 6th St., Council Bluffs, Iowa. 305.9 meters, 980 kilocycles, 500 watts. Sun, 11 am-12 noon, church services; 7-9 pm; 11-midnight. Daily ex Sun, Mon, & Wed, 12 n-1:15 pm; 6-9 pm; 11-12 midnight. Mon, 12 n-1:15 pm; 6-midnight. Slogan: "Station of Service."

KOIN The Portland News, Heathman Hotel, Salmon & Park Sts., Portland, Ore. 319 meters, 940 kilocycles, 1000 watts. Daily ex Sun, 3-4 pm, news bulletin and musical program from The Portland News. Nightly ex Sat & Sun, studio diversified musical program from 8-10 pm. Sat night silent. Sun, 6-7 pm, 7:50-9 pm, broadcast of church services from First Church of Christ Scientist, Portland, Ore. Slogan: "The Station of the Hour."

KOMO Seattle, Wash. 305.9 meters, 980 kilocycles, 1000 watts. Tues, 7-8 pm, 8-9. Wed, 8-9:30, 9-10. Fri, 7-8 pm, 9-10, 10:15-12. Sun, 1-2 pm, 9:10-10:10, church service. Pacific time.

KOWW Blue Mountain Radio Association, 711 Baker Bldg., Walla Walla, Wash. 285 meters, 1052 kilocycles, 500 watts. Daily ex Tues & Sun, 7-7:30 pm, news, markets & weather; 8-12 pm, studio & orchestra. Tues, 7-7:30 pm, news, markets & weather.

KPJM Journal Miner Radiofone, Prescott, Ariz. 215 meters, —— kilocycles, 15 watts. Indefinite schedule, broadcasting only sports & feature news. Mountain time.

KPPC Pasadena Presbyterian Church, Colorado & Madison Sts., Pasadena, Calif. 228.9 meters, 1310 kilocycles, 50 watts. Wed, 7:15-9 pm, mid-week service. Sun, 10:30 am-12:30 pm, 6:45-9 pm, religious services. Pacific standard time.

KPO Hale Brothers & The Chronicle, San Francisco, Calif. 428.3 meters, 700 kilocycles, 1000 watts. Daily ex Sun, 7-8:15 am, health drill; 8-11 pm, music. Daily ex Fri & Sun, 2:30-3:30 pm, matinee. Daily ex Sat & Sun, 5:15-6:15 pm, "Big Brother." Daily, 10:30 am & 6:30 pm, weather forecast & "Ye Towne Crier," etc. Sun, 9:45-10:45 am, church service; 5-10 pm, musical. Pacific standard time. Slogan: "The City by the Golden Gate."

KPRC Houston Post-Dispatch, Houston, Texas. 296.9 meters, 1010 kilocycles, 500 watts. Sun am & pm, church services. Mon, Tues, Wed, Thurs, Fri, Sat, 11 am-12 noon; 5:30 pm, 7:30-10 pm. Wed, Sat, 11-12 midnight. Central standard time. Slogan: "Kotton Port Rail Center."

KPSN The Pasadena Star-News, 525 E. Colorado St., Pasadena, Calif. 315.6 meters, 950 kilocycles, 1000 watts. Tues, Thurs, Sat, 8-9:30 pm, studio concert. Sat, 9:30-10:30 pm, dance orchestra. Sun, 9:30-10:30 am & 6-7 pm, church services; 8:45-9:45 pm, hotel concert. Pacific standard time. Slogan: "Pasadena, California, Station KPSN."

KQW California Farm Bureau Station, First Baptist Church, San Jose, Calif. 333.1 meters, 900 kilocycles, 500 watts. Sun, 9:40-12:30 am, 7:30-9:30 pm, church services. Daily ex Sun, 9:30-10:30 am, shopping guide. Daily ex Sat, Sun, 6:15-8 pm, farm program. Sat, 6:30-7:30 pm, farm program with Humpty Dumpty. Wed, 8-9:30 pm, mid-week prayer service. Pacific standard time. Slogan: "The Voice of the California Farmer."

KQV Doubleday Hill Elec. Co., 719 Liberty Ave., Pittsburgh, Pa. 275 meters, 1090 kilocycles, 500 watts. Daily ex Sat & Sun, 10:30-11 am, music; 3-5 pm, music and baseball scores. Eastern standard time. Slogan: "The Smoky City Station."

KRE Berkeley Daily Gazette, Berkeley, Calif. 256 meters, 1170 kilocycles, 100 watts. Daily ex Sun, 7:30 am, Good Thought service; 11:15 am, physical exercise for women; 7 pm, current news. Mon, 8-10 pm. Tues, 9-11 pm, musical. Wed, 5-6 pm, children's hour; 9-12 pm, musical. Thurs, 8-11 pm. Fri, 9-12 pm. Sat, 8 pm-1 am, dance programs. Sun, 10-11 am, church; 6:30-7:30 pm, concert; 8:15-10 pm, sacred music concert. Pacific standard time. Slogan: "Looking Thru the Golden Gate."

KSAC Kansas State Agricultural College, Manhattan, Kan. 340.7 meters, 880 kilocycles, 500 watts. Daily ex Sat & Sun, 9-9:25 am, 9:55-10:25 am, 12:35-1:05 pm, 4:30-5 pm, 6:30-7:30 pm. Sat, 12:35-1:05 pm. Central standard time.

KSBA Shreveport Broadcasting Association, Shreveport, La. 316.6 meters, 959 kilocycles, 1000 watts. Sun, 11-12 am, church services; 5-6 pm, musical; 7:30-9 pm, church services. Mon, 8-9 pm. musical. Tues, 9-11, hotel dance. Thurs, Fri, 8-9 pm, musical. Sat, 9-11, hotel dance. Central standard time. Slogan: "Shreveport on the Air—Shreveport Everywhere."

KSD St. Louis Post-Dispatch, 12th & Olive Sts., St. Louis, Mo. 545.1 meters, 550 kilocycles, 500 watts. Sun, 6:20 pm. Mon, 9 pm, opera. Tues, 7 pm. Wed, Thurs, Fri, Sat, 8 pm, entertainment. Central standard time.

KSEI KSEI Broadcasting Association, Pocatello, Idaho. 260.7 meters, 1150 kilocycles, 500 watts. Sun, 8-10 pm. Mon, Fri, 9-11 pm. Western time. Slogan: "The Only Community-Owned Broadcasting Station in the United States."

KSL Utah Radio Service Corp., Salt Lake City, Utah. 300 meters, 1000 kilocycles, 1000 watts. Daily ex Sun, 7:30-11 am, 4-11:30 pm. Sun, 10:50 am-12 noon, 4-11:30 pm, classical & religious program. Fri, 6-11:30 pm. Mountain standard time. Slogan: "The Inter-Mountain Empire."

Is *actual* reproduction possible?

ALTHOUGH it is common to hear such claims as "Perfect Reproduction," "Absolute Perfection," "The Living Artist Brought Right into Your Home"—in spite of these claims scientists have never boasted absolute *perfection* in radio reproduction.

Let us look at the facts.

At the broadcasting station the music of the violin, for instance, is changed into a radio wave, and is broadcast. It is then detected in your radio set and changed once more into an electric wave carrying the impulses of the music. This electric wave emerges from the detector tube not altogether perfect. However, it is so nearly perfect that radio science has turned its attention from the *broadcasting* and *detecting* phases of reproduction to *the audio* amplifying of the detector tube output.

Reproduction by good amplification has become the most important consideration in the art of radio. The amplifying transformers that were used in radio sets last year are definitely a thing of the past. Almost every set manufacturer has improved upon them. Some have adopted resistance coupling, others large size transformers, and some electric light socket power amplification.

Although these methods of amplification are an improvement, they do not and cannot give *perfect* reproduction, nor do they come as close to perfection as has now been made possible by the recently announced new principle of audio amplification.

The New Amplification

An entirely new system of amplification known as *Truphonic* has been developed. This system more nearly approaches actuality than any other yet devised. Scientific laboratory tests and tests before both the musically trained and the musically untrained ear establish this fact beyond question.

Unfortunately the Truphonic system was not developed in time to be generally used in this fall's production of radio sets—with the exception of a number of the makers of the more expensive sets, who have a smaller production and who were able to incorporate Truphonic amplification into their instruments.

But for radio listeners and lovers of fine music who want this most nearly actual of all reproduction *now* and immediately, the Truphonic Power Amplifier is provided in the simple, compact form shown below—*for instant attachment, without tools, and with no change whatever in your present radio set.*

Whether you bought or made your set this year, last year or five years ago, the Truphonic will give you finer reproduction than you can get in any other way—regardless of how much you can afford to spend.

The Truphonic Power Amplifier operates directly from the detector output. No transformers now in the set are utilized. This pure detector music in every note, tone, and shade, and in considerably greater volume, is so beautifully and faithfully reproduced that you will find it as difficult to describe as it is for us to attempt to describe it to you.

The Truphonic with Power Tubes

Besides the fundamentally great improvement in reproduction that the Truphonic brings to radio in such a conveniently applied form, there is the added advantage that for those who want extreme volume without overloading the last stage tube, the necessary extra B and C battery connections for the use of power tubes are provided for in the attachment cord.

We have tried in this space to give you some idea of what you may expect from this new principle of audio reproduction that has come to radio. We realize that we have made some strong claims for Truphonic amplification, but we have made no claim that you will not find more than backed up when you have tried the Truphonic yourself.

We urge you to get the Truphonic *now*—so that you may begin immediately to have an altogether different kind of enjoyment of the splendid programmes that are coming to you over the air.

Your dealer has the Truphonic, or will get it for you.

ALDEN MANUFACTURING COMPANY
Dept. F-5, Springfield, Mass.

TRUPHONIC
Power Amplifier

Not Resistance Coupled

$20

KSMR Santa Maria Valley R. R., Santa Maria, Calif. 209.8 meters, 1430 kilocycles, 100 watts. Daily ex Sun, 6:30-10 pm, music, children's hour, home & farm, music. Sat, 7:30-8:15 pm, markets, reports, etc. Pacific time. Slogan: "Santa Maria, Calif., The Valley of Gardens."

KSO Berry Seed Co., Clarinda, Iowa. 242 meters, 1240 kilocycles, 500 watts. Sun, 11 am, church services. Mon, Tues, Wed, Thurs, Fri, 12 noon, 7 pm, musical. Sat, 12 noon, Sunday school. Sat. silent night. Central standard time. Slogan: "Keep Serving Others."

KTAB The Associated Broadcasters, Inc., 1410 10th Ave., Oakland, Calif. 302.8 meters, 990 kilocycles, 1000 watts. Sun, 9:45-12:30 pm, 7:45-9:30 pm. church services. Daily ex Sun, 8:45-10 am, 5-6 pm, 7-7:30 pm. Daily ex Sat, Sun, 8-10 pm. Pacific standard time. Slogan: "Knowledge, Truth and Beauty."

KTBI Bible Institute of Los Angeles, 536 S. Hope St., Los Angeles, Calif. 294 meters, 1020 kilocycles, 750 watts. Mon, Tues, Wed, Thurs, 8 pm, musical studio program. Fri, 7 pm, Sunday school lesson. Sun, 10:45 am, 7:15 pm, church services; 6 pm, vespers. Pacific standard time.

KTBR Brown's Radio Shop, 39½ Yamhill St., Portland, Ore. 263 meters, 1140 kilocycles, 50 watts. Mon & Wed, 11 am-12 noon, 1:30-2:30 pm, 6-7:30 pm, 8:30-9:30 pm. Tues, 11 am-12 noon, 1:30-2:30 pm, 7-7:30 pm. Thurs, 11 am-12 noon, 1:30-2:30 pm, 6-7:30 pm. Fri, 11 am-12 noon, 1:30-2:30 pm, 6-9 pm. Sat, 11 am-12 noon, 3-4 pm, 7-9:30 pm.

KTHS New Arlington Hotel, Hot Springs, Ark. 374.8 meters, 800 kilocycles, 500 watts. Sun, 11 am-12:15 pm, 9-12 pm, music. Daily ex Sun, 12:30-1:30 pm, markets; 9 pm-12 midnight, music. Central standard time. Slogan: "Kum to Hot Springs."

KTNT Calliphone Co., Muscatine, Iowa. 333.1 meters, 900 kilocycles, 1000 watts. Daily ex Sat & Sun, 6:30-8 pm; home folk's program, 12-12:30 pm. Sun, 6:30-7:30 pm. Central standard time. Slogan: "Calliphone Studio KYNT First New Tone in 40 Years."

KTUE Uhalt Electric Co., 614 Fannin St., New Orleans, La. 263 meters, —— kilocycles, 5 watts. Daily, 5:30-6:30 pm. Central standard time.

KTW First Presbyterian Church, 7th Ave. and Spring St., Seattle, Wash. 454 meters, 660 kilocycles, 1000 watts. Sun, 11 am & 1 pm, 3-4 pm, 7:30-9:30 pm. Pacific time.

KUO San Francisco Examiner, San Francisco, Calif. 434.8 meters, 690 kilocycles, 100 watts. Daily ex Sun, 9 am, 10 am, 12:30 pm, 2 pm, 4 pm, 6:30 pm. Sun, 9 am, 4 pm. Pacific standard time.

KUOA University of Arkansas, Fayetteville, Ark. 299.8 meters, 1000 kilocycles, 750 watts. Sunday services occasionally. Mon, 7:30 pm, farmers' program; Tues, 8 pm, musical program; Thurs, 8 pm, University Extension lectures.

KUOM State University of Montana, Missoula, Mont. 244 meters, 1230 kilocycles, 500 watts. Mon & Thurs, 8 pm, music & popular educational talks. Sun, 9:15 pm, sacred concert & sermon. Mountain standard time.

KUSD University of South Dakota, Vermillion, S. Dak. 278 meters, 1080 kilocycles, 100 watts. Wed, 8-9 pm. Central standard time.

KUT University of Texas, Austin, Tex. 230.6 meters, 1300 kilocycles, 500 watts. Sun, 11 am, St. David's Episcopal Church. Mon & Wed, 8 pm, studio program. Slogan: "Come to University of Texas."

KVOO Voice of Oklahoma, Bristow, Okla. 374.8 meters, 800 kilocycles, 500 watts. 12:30-7 pm, continuous program, with pipe organ, Rev. Luper and his 20-piece string band, the Laughton family, etc.; 7:30-9 pm, worship hour; 6-9 pm, Jimmie Wilson & his catfish string hand. Central standard time.

KWCR H. F. Paar, 1444 Second Ave. E., Cedar Rapids, Iowa. 278 meters, 1080 kilocycles, 500 watts. Sun, 11 am, church service; 5:15 pm, special service. Mon, Wed, Fri, 4:15-9 pm. Wed, 4:15-9 pm. Sat, 12 midnight. Central standard time. Slogan: "Voice of Cedar Rapids."

KWG Portable Wireless Telephone Co., 530 E. Market St., Stockton, Calif. 247.8 meters, 1210 kilocycles, 50 watts. Daily ex Sun, Tues, Fri, 4-5 pm. Tues, Fri, 4-5 pm, 8-9 pm. Pacific time. Slogan: "The Voice of the San Joaquin Valley."

KWKC Wilson Duncan Studios, 39th and Main Sts., Kansas City, Mo. 236 meters, 1270 kilocycles, 100 watts. Tues, Wed, Thurs, Fri, 7-9:15 pm. Central standard time. Slogan: "Keep Watching Kansas City."

KWSC The State College of Washington, Pullman, Wash. 348.6 meters, 860 kilocycles, 500 watts. Mon, Wed, Fri, 7:15-9 pm. Pacific standard time. Slogan: "The Voice of the Cougars."

KWUC Western Union College, Le Mars, Iowa. 252 meters, 1190 kilocycles, 50 watts. Sun, 3 pm, vesper service. Fri, 7 pm, musical entertainment. Wed, 8 pm. Central standard time. Slogan: "The Best 50-Watt Station on Air."

KWWG Brownsville Chamber of Commerce, Brownsville, Texas. 278 meters, 1080 kilocycles, 500 watts. Sun, church services at 11 am. Mon, weather and river reports, music 12-12:30; music, 6-6:30, 8:30-9:45, 12 midnight-1 am. Tues, weather & river reports, 12-12:30 pm; music, 6-6:30. Wed, Thurs, Fri, Sat, same as Tues. Slogan: "Kum to the World's Winter Garden."

KYW Westinghouse Elec. & Mfg. Co., Congress Hotel, 500 S. Michigan Ave., Chicago, Ill. 535.4 meters, 560 kilocycles, 3500 watts. Sun, 11 am, church services; 4 pm, musical; 7 pm, Sun Evening club; 9 pm, symphony. Daily ex Sun, 11:35 am, table talks; 12 noon, concert; 6 pm, bed time stories; 7 pm-12 midnight, musical program. Central standard time. Slogan: "KYW, Pioneer Radio Station of West."

KZM Preston D. Allen, 13th and Harrison Sts., Hotel Oakland, Oakland, Calif. 240 meters, 1250 kilocycles, 100 watts. Daily ex Sun, 6:30-8 pm, Hotel Oakland dinner orchestra. Pacific standard time.

NAA Naval Radio Station, Arlington, Va. 434.5 meters, 690 kilocycles, 1000 watts. Daily 10:05 am, 3:45 pm, 10:05 pm. Tues, 7:30 pm. Eastern standard time. Slogan: "Where the Time Signals Originate."

WAAD Ohio Mechanics Institute, Cincinnati, Ohio. 258 meters, 1160 kilocycles, 25 watts. Central standard time.

WAAF Chicago Daily Drovers Journal, 836 Exchange Ave., Chicago, Ill. 278 meters, 1080 kilocycles, 250 watts. Daily ex Sun & Holidays, 8:45 am, markets; 10:30 am, weather; 10:50 am, markets; 11 am, estimated receipts of following day; 12:30 pm, weather; 12:50 pm, markets; 3 pm, markets; 4:30 pm, eastern meat trade conditions. Sat, 12:30 pm, final weather and market reports. Central standard time.

WAAM I. R. Nelson Co., Bond St., Newark, N. J. 263 meters, 1140 kilocycles, 500 watts. Daily ex Sat, Sun, 11 am-12 pm, religious. Daily ex Thurs & Sun, 6-11 pm. Thurs, 6-7:30 pm. Eastern standard time. Slogan: "Sunshine Station."

WAAW Omaha Grain Exchange, 19th & Harney Sts., Omaha, Neb. 384.4 meters, 780 kilocycles, 500 watts. Daily ex Sun, Wed, 8 pm. classical, orchestra, etc. Central standard time. Slogan: "Pioneer Market Station of the West."

WABB Harrisburg Sporting Goods Co., Harrisburg, Pa. 204 meters, 1470 kilocycles, 10 watts.

WABC Asheville Battery Co., Inc., 19 Haywood St., Asheville, N. C. 254 meters, 1180 kilocycles, 20 watts. Sun, 11 am-12:30 pm, 7:30-9 pm. Central standard time.

WABI First Universalist Church, Park St., Bangor, Me. 240 meters, 1280 kilocycles, 100 watts. Sun, 10:30 am-12 pm, morning services; 7:30-9 pm, evening services. Eastern standard time. Slogan: "The Pinetree Wave."

WABO Lake Ave. Baptist Church, Rochester, N. Y. 278 meters, 1080 kilocycles, 100 watts. Sun, 10:25 am-12 noon, 7:15-9 pm, church services. Eastern standard time.

WABQ Haverford College, Dept. of Engineering, Haverford, Pa. 261 meters, 1150 kilocycles, 1000 watts. Mon, Fri, regularly 8 pm-12:30 am, organ recital. Alt. Mons. 8-8:30 pm, lectures. Fri, 8 pm, varied musical programs; 10:15-12 pm, every third Sun, musical programs. Eastern standard time. Slogan: "Designed, Built, and Operated by Engineering Students at Haverford College."

WABR Scott High School, Toledo, Ohio. 263 meters, 1140 kilocycles, 50 watts. No regular schedule. Eastern standard time.

WABW College of Wooster, Wooster, Ohio. 206.8 meters, 1450 kilocycles, 50 watts. No regular schedule. Eastern standard time.

WABX Henry B. Joy, Near Mt. Clemens, Mich. 246 meters, 1220 kilocycles, 500 watts. Central standard time.

WABY John Magaldi, Jr., 815 Kimball St., Philadelphia, Pa. 242 meters, 1240 kilocycles, 50 watts. Eastern standard time.

WABZ Coliseum Place Baptist Church, 1376 Camp St., New Orleans, La. 275 meters, 1090 kilocycles, 50 watts. Sun, 11 am-12 pm, 7:30-9 pm. Central standard time.

WADC Allen T. Simmons (Allen Theater), Portage Hotel, E. Market St., Akron, Ohio. 258 meters, 1160 kilocycles, 500 watts. Daily ex Sun, 11 am-12 noon, 11 am-11 pm. Tues & Fri, 7:50-11 pm. Thurs, 9-11 pm. Sun, 12:30-1:30 pm, 6:30-7:30 pm. Eastern standard time. Slogan: "Watch Akron Develop Commercially."

WAFD Albert B. Pariet Co., 1432 Military St., Port Huron, Mich. 275 meters, 1090 kilocycles, 500 watts. Mon, 8-10 pm. Tues, 10 am-11 am. Wed, 8-11 pm. Sat, 12 pm-2 am. Sun, 10:30-11:30 am. Central standard time. Slogan: "Gateway to the Great Lakes."

WAGM Radio Dept. of the A. G. Miller Furniture Store, Royal Oak, Mich. 275 meters, 1330 kilocycles, 50 watts. Sun, 9-10 pm, Bible study. Mon, 8-12 midnight, popular program. Wed, 8-10:30 pm, semi-classical program. Fri, 8-10:30 pm, popular studio program. Central standard time. Slogan: "The Home of Prompt Radio Service."

WAHG A. H. Grebe & Co., Inc., 70 Van Wyck Blvd., Richmond Hill, N. Y. 315.6 meters, 950 kilocycles, 5000 watts. Daily ex Sun. 11:55 am-1:30 pm, time signals, weather reports, musical. Mon. 7:30 pm-midnight, musical. Tues & Sat, 12 midnight-2 am, musical novelty program. Eastern standard time. Slogan: "Wait & Hear Grebe."

WAIT A. H. Waite & Co., Inc., 32 Weir St., Taunton, Mass. 229 meters, 1326 kilocycles, 10 watts, class A. No regular schedule. Eastern standard time.

WAIU American Insurance Union, Columbus, Ohio. 293.9 meters, 1020 kilocycles, 500 watts. Sun, 2-4 pm, vesper; 6-7, dinner. Daily ex Sun, 10-11 am, 11:55-1 pm, 2-4 pm, 6-7 pm. Tues, Sat, 9:15-11:30 pm. Fri, 6-11:30 pm. Eastern standard time.

WAMD Hotel Radisson, Minneapolis, Minn. 243.8 meters, 1230 kilocycles, 500 watts. Daily ex Sun, 10:15 am, organ recital; 10:30 am. housewives' bargain broadcast; 11 am, housekeepers' chats, 6:58 pm, time signals; 7:01 pm, news bulletins; 7:05 pm, special agricultural features. Mon, Wed, 7:30 pm, musical program. Mon, 11 pm, theatrical frolic. Wed, Thurs, Fri, 10 pm, popular program. Sun, 10:30 am, 9:15 pm, church services. Central standard time.

WAPI Alabama Polytechnic Institute, Auburn, Ala. 461.3 meters, 650 kilocycles, 1000 watts. Daily ex Sun, 12:30-1 pm, 8-9 pm. All programs include musical numbers and educational lectures. Central standard time.

WARC American Radio & Research Corp., 1 Radio Ave., Medford Hillside, Mass. 261 meters, 1150 kilocycles, 100 watts, class A. Eastern standard time.

WASH The Baxter Laundry Co., 747 Fountain St., N. E., Grand Rapids, Mich. 256.4 meters, 1170 kilocycles, 500 watts. Central standard time. Sun, 11 am-12:15 pm. Daily ex Sun, 12:30-1:30, 5:30-6, 7-8 pm. Sat, 2:15 pm (football season only). Central standard time.

WATT Edison Elec. Illuminating Co., Boston, Mass. 243.8 meters, 1230 kilocycles, 100 watts.

WBAA Purdue University, West Lafayette, Ind. 273 meters, 1100 kilocycles, 250 watts. Mon, Fri, 9:50 am, markets and WX; 7:15 pm, lecture, entertainment. Tues, Wed, Thurs, 9:50 am, markets & WX. Sat, 9:50 am, markets & WX; 11 pm, entertainment. Central standard time. Slogan: "Boilermaker Station."

WBAK Pennsylvania State Police, 18th & Herr Sts., Harrisburg, Pa. 275 meters. 1090 kilocycles, 500 watts. Daily ex Sun, 2 pm, weather, police information, etc.; 3 pm, agriculture bulletins. Eastern standard time.

WBAL Baltimore, Md. 246 meters, 1220 kilocycles, 5000 watts. Sun, 6:30-7:30 pm, concert orchestra. Daily ex Sun, Wed, Sat, 3:30-12 pm, all musical ex 3:45-4 pm, when talk is on air. Eastern standard time. Slogan: "The Station of Good Music."

WBAO James Milliken University, Decatur, Ill. 270 meters, 1100 kilocycles, 100 watts, class A. Irregular schedule. Central standard time.

WBAP The Star-Telegram and Record-Telegram Station, Fort Worth, Tex. 475.9 meters, 630 kilocycles. 1500 watts. Sun, 11 am, church; 12:30 pm, kiddies' hour; 5 pm, sacred music; 9:30 pm, orchestra. Daily ex Sun, Wed, 7:30-8:30 pm, 9:30-11 pm, 11 pm-midnight, music. Central standard time. Slogan: "Daytime on the Hour, Nighttime on the Half."

WBAW Waldrum Drug Co. & Braid Electric Co., Nashville, Tenn. 236.1 meters, 1270 kilocycles, 100 watts, class A.

WBAX John H. Stenger, Jr., Box 104, Wilkes-Barre, Pa. 256 meters, 1170 kilocycles, 100 watts. Sun, 3-4 pm, symphony concert; 4-5 pm. religious; 5-6 pm, symphony concert. Tues, 10-11 pm, 9-10 pm, classical. Thurs, 8-9 pm, recital; 10-11 pm, dance. Sat, 10-12 pm, dance. Slogan: "In Wyoming Valley, Home of the Anthracite." Eastern standard time.

WBBC Brooklyn Broadcasting Co., 2123 Troy Ave., Brooklyn, N. Y. 249.9 meters, 1200 kilocycles, 500 watts. Tues, Thurs, Sat, 8-12 pm, musical. Eastern time.

WBBL Grace Covenant Presbyterian Church, Richmond, Va. 229 meters, 1310 kilocycles, 100 watts. Sun, 11 am-7:45 pm. Tues, 8 pm. Eastern standard time. Slogn: "Richmond, the Gateway North and South."

WBBM Atlas Investment Co., 1554 Howard Ave., Chicago, Ill. 225.4 meters, 1330 kilocycles, 1500 watts. Mon, 4-7 pm. Tues, Wed, Thurs, Fri, 4-6 pm, 7-12 pm. Sat, 4-6 pm, 8 pm-2 am. Sun, 12:30-2 pm. Central standard time. Slogan: "World's Best Broadcast Medium." The Stewart-Warner Air Theater, Chicago.

WBBP Petoskey High School, Petoskey, Mich. 238 meters, 1260 kilocycles, 200 watts. Program irregular. Central standard time. Slogan: "There's Only One Petoskey."

WBBR Station WBBR, "The Watchtower," 124 Columbia Heights, Brooklyn, N. Y. 416.4 meters, 720 kilocycles, 500 watts. Sun, 10-12 am, orchestra, lectures, lessons; 2-4:30 pm. concert; 7-9 pm, Bible questions, music. Tues, Thurs, Fri, 7:30-9:30 pm, organ recital, health items, vocal & violin, Bible lecture. Eastern standard time. Slogan: "Watchtower."

WBBW Ruffner Junior High School, Norfolk, Va. 222 meters, 1350 kilocycles, 50 watts. Programs vary. Eastern standard time.

WBBY Washington Light Infantry, 240 King St., Charleston, S. C. 268 meters, 1120 kilocycles, 10 watts, class A. Irregular through week. Sat, 7-12 pm, orchestra, vocal, instrumental and talks. Eastern time. Slogan: "The Seaport of the Southeast."

WBBZ C. L. Carrell, 36 So. State St., Chicago, Ill. (Portable.) 215.7 meters, 1390 kilocycles, 50 watts. Central standard time.

WBCN Southtown Economist Station, Foster & McDonnell, 730 W. 65th St., Chicago, Ill. 266 meters, 1130 kilocycles, 500 watts. Sun, 10:30 am, 9:15 pm, church services. Daily ex Sun, 9:45-11 am, home service program; 3-5:30 pm, Tea Time matinee; 5:30-6 pm, police bulletins; 7-8 pm, classical program; 10-12 pm, popular program. Central standard time. Slogan: "World's Best Community Newspaper."

WBES Bliss Electrical School, Takoma Park, Washington, D. C. 222.1 meters, 1350 kilocycles, 100 watts, class A. Eastern standard time.

WBNY Shirley Katz, 145 West 45 Tilmar Bldg., New York, N. Y. 322.4 meters, 930 kilocycles, 500 watts. Daily ex Sun, 7-11 pm. Sun, 2:30-6 pm. Eastern standard time. Slogan: "The Voice of the Heart of New York."

WBOQ A. H. Grebe & Co., Inc., 70 Van Wyck Blvd., Richmond Hill, L. I., N. Y., 236 meters, 1270 kilocycles, 100 watts. Tues, Thurs, Sat, 9:55 pm, time signals and weather reports. Eastern standard time.

WBRC Bell Radio Corp., 1913 5th Ave. N., Birmingham, Ala. 248 meters, 1210 kilocycles, 50 watts. Sun, 11 am-12:30 pm, 7:30-9 pm, church services. Mon, Wed, Thurs, Fri, 8-10 pm, musical. Tues, 7:30-8 pm, musical. Central standard time. Slogan: "The Biggest Little Station in the World."

WBRE Baltimore Radio Exchange, 17 W. Washington St., Wilkes-Barre, Pa. 231 meters, 1300 kilocycles, 100 watts. Sun, 9-12 pm. Wed, 6-7 pm, dinner music. Fri, 8:30-10:30 pm. Eastern standard time.

WBRL Booth Radio Laboratories, Tilton, N. H. 410 meters, 731.3 kilocycles, 500 watts. Sun, 10:30-11:30 am, 7-8 pm, church services. Tues, Fri, 10-11:30 pm, dance program. Mon, Wed, Thurs, Sat, program varied. Eastern time. Slogan: "The Voice of the Granite State."

WBS D. W. May, Inc., 325 Central Ave., Newark, N. J. 252 meters, 1190 kilocycles, 100 watts. Eastern standard time.

WBT C. C. Coddington, Realty Bldg., Charlotte, N. C. 275 meters, 1090 kilocycles, 250 watts. Sun, 11 am & 8 pm. church services. Tues & Thurs, 9 pm, organ recital. Daily, 7:30 pm, organ recital. Eastern standard time. Slogan: "The Queen City of the South."

WBZ Westinghouse Elec. & Mfg. Co., 625 Page Blvd., East Springfield, Mass. 333.1 meters, 900 kilocycles, 5000 watts. Daily ex Sun, 6:30-10:30 pm. Sun, 10:50 am, 7 pm, 8 pm. Eastern standard time. Slogan: "The Broadcasting Station of New England."

WBZA Westinghouse Electric & Mfg. Co., Hotel Brunswick, Boston, Mass. 333.1 meters, 900 kilocycles, 250 watts. Eastern standard time.

WCAC Connecticut Agricultural College, Storrs, Conn. 275 meters, 1090 kilocycles, 500 watts. Mon, Wed, Fri, 7:30-9 pm, farm lectures & music. Eastern standard time. Slogan: "Voice from the Nutmeg State."

WCAD St. Lawrence University, Canton, N. Y. 263 meters, 1140 kilocycles, 250 watts. Daily ex Sun, 11-11:15 am. Wed, 8-10 pm. Thurs, 11-11:15 am. Eastern standard time. Slogan: "The Voice of the North Country."

WCAE The Pittsburgh Press & the Kaufman & Baer Co., Pittsburgh, Pa. 461.3 meters, 650 kilocycles, 500 watts. Mon, Wed, Fri, 10:45 am. 3 pm, 4:30 pm, 6:30-10:30 pm. Mon, 12:45 pm, news. Tues, 8 to 11 pm. Thurs, Sat, 12:30 pm, 3 pm, 4:30 pm, 6:30-11 pm. Sun, 10:45 am, 3:45 pm, 7:20 pm & 9:15 pm. Eastern standard time. Slogan: "Where Prosperity Begins."

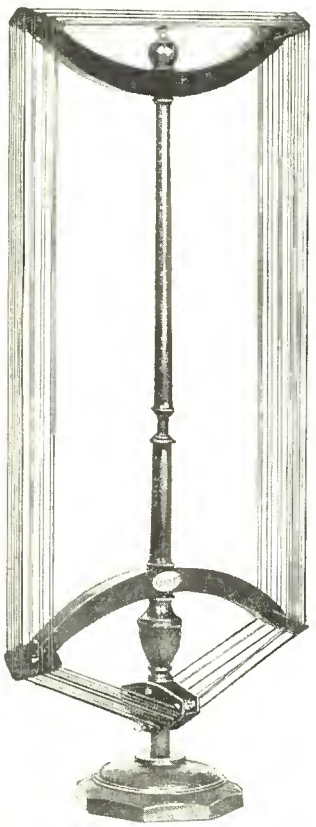
WCAJ Nebraska Wesleyan University, University Place, Nebr. 254 meters, 1180 kilocycles, 500 watts. Mon, Tues & Thurs, 5:30 pm, radio forecasts, weather & news. Wed, 5:30 pm, news, weather; 8 pm, music, lectures. Fri, 5:30 pm, news, weather; 7 pm, Bible study hour. Central standard time.

WCAL St. Olaf College, Northfield, Minn. 336.9 meters, 890 kilocycles, 500 watts. Daily ex Sun & Thurs, 9:45 am, chapel service. Mon, Fri, Sat, 8:30 pm, music, lecture, book talk. Thurs, 9 pm, music, lecture. Sun, 8:30 am, Norwegian Church service; 9 pm, sacred music, sermon. Central standard time. Slogan: "The College on the Hill."

Loop Antenna in Supreme Favor

REPORTS SHOW that fully 85% of the radio public regard the Loop as the ideal antenna. Ultimately there will be no other kind used.

The loop antenna has everything in its favor. It makes a radio set a complete unit in itself. It offers less interference from static and similar disturbances. It is more convenient. Can be directly and easily adjusted. Is portable. Lastly, the loop antenna can be made a thing of beauty, adding a real artistic touch to the entire radio set.



Fiat Console Loop

30" high—14" wide. Tuned with .0005 M.F. Condenser

The Fiat Console Loop Antenna meets completely these requirements of the ideal loop antenna.

First of all the Fiat Loop possesses a high degree of sensitiveness and directional efficiency.

The Bank Winding by our exclusive patented method secures a high ratio of inductance to distributed capacity insuring an unusual degree of sensitivity. The long perpendicular side effects gain in directional efficiency.

Our patented method of Bank Winding also makes the attractive small size of the Fiat possible.

Its rectangular shape with less than 7 inch turning radius makes it convenient for standing close to adjoining walls or furniture.

It has great beauty of design and finish, the graceful lines of its simple Colonial design giving it a touch of refinement that is very pleasing.

The frame is solid American Walnut with hand-rubbed lacquer finish. The metal parts and name plate are rose gold. The end pieces, through which the high frequency cable is wound, are of polished Bakelite.

The Fiat Loop is adjusted by simply turning the center pole. It is easily assembled and taken down. Can be packed conveniently in small compass.

The usual Guarantee of perfect workmanship and condition goes with each Fiat Loop.

The Fiat Loop is recommended for use with Madison-Moore, St. James, Victoreen, Cotton, Nine-in-Line, Mello-Heald, and many other super-heterodynes. Also Browning-Drake and all other circuits designed for loop antenna.

Reliable Dealers almost everywhere have Fiat Loops for sale. If yours has not, orders direct will be promptly filled, sent post paid on receipt of list price.

Prices	Each	$12.50
	West of Rockies	13.50
	Canadian	15.50
	Foreign	17.00

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JOBBERS—Good territory still open to recognized jobbers and distributors.

"Remarkable Efficiency Combined with Unusual Beauty"

WCAM Municipal Broadcasting Station, Camden, N. J. 336.9 meters, 890 kilocycles, 1 watt. Mon, Wed, Fri, 8-12 pm, mixed program. Eastern time.

WCAO Metropolitan Club, 842 N. Howard St., Baltimore, Md. 275 meters, 1090 kilocycles, 100 watts. Mon, Wed & Fri, 8-11, varied. Sun, 11-12 am, church. Eastern standard time. Slogan: "Swartwout."

WCAR Southern Radio Corp. of Texas, 101 West Pecan St., San Antonio, Texas. 263 meters, 1140 kilocycles, 500 watts. Daily ex Sun, 11 am, stock reports; 3 pm, late stock reports & news item; 8-10 pm, musical program. Central standard time. Slogan: "Down in Sunny Antonio."

WCAT South Dakota State School of Mines, Rapid City, S. Dak. 240 meters, 1250 kilocycles, 50 watts. Daily ex Sun, 9:30-9:45 am, weather; 12:30-1 pm, weather & agrigrams. Mountain time. Slogan: "WCAT, Station of the South Dakota State School of Mines at Rapid City."

WCAU Universal Broadcasting Co., Hotel Pennsylvania, 39th & Chestnut Sts., Philadelphia, Pa. 277.6 meters, 1080 kilocycles, 500 watts. Sun, 11 am-5 pm, 6:45-11 pm. Mon, 7:30-12 pm, musical. Tues, 7:30-12 pm, musical. Wed, 7:30-12 pm. Thurs, 6:30-12 pm. Fri, 7:30-12 pm. Eastern standard time. Slogan: "Where Cheer Awaits U."

WCAX University of Vermont, Burlington, Vt. 250 meters, 1200 kilocycles, 100 watts. Fri, 7:30-8:30 pm, educational & entertainment. Eastern standard time. Slogan: "The Voice of the Green Mountains."

WCBA Queen City Radiophone Station WCBA, 1015 Allen St., Allentown, Penna. 254 meters, 1180 kilocycles, 15 watts. Wed & Fri, 8:15-11 pm, musical programs. Sat, 9:30-11 pm, dance program. Sun, 10 am, 5:30 pm, 7 pm, church services. Eastern standard time.

WCBD Wilbur Glenn Voliva, Shiloh Park, Zion, Ill. 344.6 meters, 870 kilocycles, 5000 watts. Tues, Thurs, 8-10:30 pm, concerts. Wed, 12:30-1 pm, organ concerts. Thurs, 2:30-3:45 pm, sacred music and address. Sun, 9-10:45 am, Bible school; 2:30-6 pm, service. Central standard time. Slogan: "Where God Rules Man Prospers."

WCBE Uhalt Bros. Radio Co., New Orleans, La. 263 meters, 1140 kilocycles, 5 watts. Daily ex Sun, 11:30-12:30 pm. Sun, 12:30-2:30 pm, 7:30-8:30 pm. Central standard time. Slogan: "Second Post, U. S. A."

WCBH University of Mississippi, University P. O., Miss. 242 meters, 1240 kilocycles, 50 watts. Tues, 7 pm. On air irregular times, broadcasting athletic events. Central standard time. Slogan: "The Voice of Ole Miss."

WCBM Hotel Chateau, Baltimore, Md. 229 meters. 1310 kilocycles, 50 watts. Sun, vocal & instrumental, 9:45-11 pm. Wed & Sat, 10-12 midnight, dance orchestra. Eastern standard time. Slogan: "The Chateau Roof, Where a Man Can Bring His Wife."

WCBR C. H. Messter (Portable), 42 Doyle Ave., Providence, R. I. 210 meters, 1430 kilocycles, 100 watts. Daily ex Sun, 6:30 pm, 7:30 pm, 9-10 pm. Eastern time.

WCCO Gold Medal Station, St. Paul & Minneapolis, Minn. 416.4 meters, 720 kilocycles, 5000 watts. Daily ex Fri & Sun, 9:30 am, 9:35 am. 9:45 am, 10:30 am, 11:30 am, 12 noon, 1:30 pm & 2 pm, news, markets, weather, noon concert & woman's hour. Mon, 2:30-10 pm. Tues, 3-10 pm. Wed, 2:30-11:30 pm. Thurs, 3-10:05 pm. Fri & Sat, 6:15-10:05 pm. Sat, 2:30 pm. Sun, 10:50 am, 1:45-9:15 pm. Central standard time.

WCFL Chicago Federation of Labor, 166 West Washington St., Chicago, Ill. 491.5 meters, 610 kilocycles, 1000 watts. Daily ex Sun & Mon, Fed. talks, Brevoort concert trio, and entertainment. Sun, 4-7:45 pm, church services. Slogan: "The Voice of Labor."

WCLO C. E. Whitmore, Camp Lake, Wis. 231 meters, 1300 kilocycles, 50 watts. Sun, 11 am, church services; 3 pm, musical. Mon, 9-12 pm, concerts. Other week days, irregular programs. Central standard time. Slogan: "The Playground of the Lake Region."

WCLS Boston Store, 301 Jefferson St., Joliet, Ill. 214 meters, 1400 kilocycles, 150 watts. Central standard time.

WCMA Culver Military Academy, Culver, Ind. 258.5 meters, 1160 kilocycles, 500 watts.

WCOA Municipal Broadcasting Station, City Hall, Pensacola, Fla. 222.1 meters, 1350 kilocycles, 500 watts. Sun, 12:30 pm, weather forecasts. Daily ex Sun, 10:30 am-12:30 pm, weather forecasts; 7-10 pm, studio concerts. Eastern standard time. Slogan: "Wonderful City of Advantages."

WCSH Henry P. Rines, Congress Square Hotel, Portland, Maine. 500 meters, 600 kilocycles, 500 watts. Sun, 10:30-12 noon, 1:30-2:30 pm, 7:30 to 10:15 pm. Mon, 10 to 11 am, 12-2 pm, 3-4 pm, 6-11 pm. Daily ex Sun same as Mon. Slogan: "The Voice from Sunrise Land."

WCSO Wittenberg College, Springfield, Ohio. 248 meters, 1210 kilocycles, 100 watts. Irregular schedule. Central standard time.

WCWK Keen Service System, Fort Wayne, Ind. 234.2 meters, 1280 kilocycles, 250 watts. Sun, 10:30 am, 6:30-7:30 pm, church services. Mon, Tues, Wed, Thurs, Fri, Sat, 11 am-12 noon, musical program. Mon, 4-5:30 pm, children's hour. Tues, Fri, 8-11 pm, musical program. Central standard time. Slogan: "The Hoosier Station."

WCX & WJR. Detroit Free Press & Jewett Radio & Phone Co. 516.9 meters, 580 kilocycles, 5000 watts. Sun, 7:15 pm, church services Central Methodist Episcopal. Mon, Wed, Thurs & Fri, 4 pm, news bulletin; 6 pm, dinner concert, 8 pm, studio program. Friday also, 10 pm, dance music. Tues, 4 pm, news bulletin; 6 pm, dinner concert; 10 pm, Red Apple Club. Sat, 4 pm, news bulletin; 6 pm, dinner concert.

WDAD Dad's Auto Accessories & Radio Store, 160-164 8th Ave. North, Nashville, Tenn. 226 meters, 1336 kilocycles, 150 watts. Daily ex Sat, 3:30-5 pm, musical (Sun, sacred program). Daily ex Sun, 8-10 pm, musical. Central standard time. Slogan: "Where Dollars Are Doubled."

WDAE Central Florida Broadcasting Station, Inc., care of Tampa Times, Tampa, Fla. 273 meters, 1100 kilocycles, 250 watts. On air every afternoon and evening. Eastern standard time. Slogan: "The Land of Wonderful Days and Evenings."

WDAF The Kansas City Star, Kansas City, Mo. 365.6 meters, 820 kilocycles, 1000 watts. Sun, 3-4:45 pm, church concert and services. Mon, Tues, Wed, Thurs, Fri, Sat, 10:45 am-1:15 pm, housewife chats; 3:30-4:30 pm, musical matinee; 6-7 pm, school of the air; 8-10 pm, evening program; 11:45 pm-1 am, Nighthawk Frolic. Central standard time. Slogan: "Enemies of Sleep."

WDAG J. L. Martis, 605 E. 4th St., Amarillo, Texas. 263 meters, 1140 kilocycles, 100 watts. Daily ex Sun, various programs. Sat, all musical and entertainment. Mon, Wed, Fri, Sat, 12:45 pm, markets, weather, etc. Tues, Thurs, 12:45 pm, markets; 9-10 pm, entertainment. Central standard time. Slogan: "Where Dollars Always Grow."

WDAH Trinity Methodist Church, El Paso, Tex. 267.7 meters, 1120 kilocycles, 50 watts. Sun, 10:45 am, 7:30 pm, church services. Wed, 7:30-9 pm, musical program. Central standard time.

WDAY Radio Equipment Corporation, 119 Broadway, Fargo, N. Dak. 261 meters, 1150 kilocycles, 50 watts. Sun, 10:30 am, church services; 3 pm, musical; 7:30 pm, church services. Daily ex Sun, 10 am, markets, news, weather; 10:15 am, chapel; 11 am, market; 12 n, farm school; 12:30 pm, musical; 2 pm, market report; 5 pm, musical program; 5:30 pm, children's hour; 5:50 pm, afternoon news. Mon, Thurs, 6 pm, musical. Tues, Thurs, Sat, 7:30 pm, musical program. Central standard time. Slogan: "The Biggest Little City in the World."

WDBE Silham Schoen Elec. Co., 35 Cone St., Atlanta, Ga. 270 meters, 1100 kilocycles, 100 watts. Tues, 7-8 pm, 9C. S. T. Central standard time.

WDBJ Richardson Wayland Elec. Corp., 106 Church St., S. W., Roanoke, Va. 229 meters, 1310 kilocycles, 50 watts. Sun, 7:30-8:30 pm, church services. Daily ex Sun, 12 noon-1 pm, 5:30-6 pm, 8-9 pm, musical. Wed, 9-11 pm. Fri, Sat, 9-10 pm, dance, sports, music. Eastern standard time. Slogan: "The Magic City."

WDBK M. F. Broz Furniture, Hardware & Radio Store, 13918 Union & Kinsman Sts., Cleveland, Ohio. 227 meters, 1320 kilocycles, 100 watts. Tues & Fri, 8:30-11:30 pm. Eastern standard time. Slogan: "Brozcasting from Cleveland."

WDBO Winter Park, Orlando, Florida, 239.9 meters, 1250 kilocycles, 500 watts. Sun, 11-12 am, 4-5 pm, 7:30-8:30 pm, church services. Daily ex Sun, 6:15 pm, announcements, markets; 6:30 pm, dinner music; 7:30 pm, talks; 8 pm-1:30 am, entertainment. Sat night silent. Eastern standard time. Slogan: "The Voice of Central Florida, Way Down By Orlando."

WDBZ Kingston Radio Club, Kingston, N. Y. 232.4 meters, 1290 kilocycles, 10 watts.

WDEL Wilmington Electric Specialty Co., 405 Delaware Ave., Wilmington, Del. 266 meters, 1130 kilocycles, 100 watts. No regular schedules at present. Slogan: "The Gateway to the Delmarvia Peninsula."

WDGY Twin City Broadcasting Station, Minneapolis, Minn. 263 meters, 1140 kilocycles, 500 watts. Mon, 6-8 pm, 9-11. Tues, 7-8 pm. Wed, 6-10 pm. Fri, 7-11 pm. Central standard time.

WDOD Chattanooga Radio Co., Inc., 615 Market St., Chattanooga, Tenn. 256 meters, 1170 kilocycles, 500 watts. Mon, Wed, Fri, 6:30-10 pm. Alternate. Sun, 11 am-7:30-9:15 pm, church services. Sat. 8:30-10:30 pm, popular progam. Central standard time. Slogan: "Wonderful Dynamo Of Dixie."

WDRC Doolittle Radio Corp., 115 Crown St., New Haven, Conn. 268 meters, 1119 kilocycles, 500 watts. Sun, 11 am-12 pm. Thurs, 8-9 pm. Summer schedule. Eastern standard time.

WDWF Dutee Wilcox Flint, Inc., Cranston, R. I. 440.9 meters, 680 kilocycles, 500 watts. Eastern standard time.

WDZ Jas. L. Bush Grain Office and Tuscola Radio Supply Station, Tuscola, Ill. 277.6 meters, 1080 kilocycles, 100 watts. Daily ex Sat & Sun, grain markets, 9 am-2:15 pm, each half hour. Sat, 9 am-1:15 pm, each half hour. Slogan: "The Buckle of the Corn Belt."

WEAF Broadcasting Company of America, Inc., Rm. 412, 195 Broadway, New York City. 491.5 meters, 610 kilocycles, 5000 watts. Sun, 2-10:15 pm. Daily ex Sun, 6:45-8 am, 4-6 pm, 6-12 midnight. Daily ex Sun, Sat, 11 am-1:15 pm. Sat, 12:45-1:45 pm. Eastern time.

WEAI School of Electric Engineering, Cornell University, Ithaca, N. Y. 254 meters, 1180 kilocycles, 500 watts. Eastern standard time.

WEAM Borough of North Plainfield, North Plainfield, N. J. 261 meters, 1150 kilocycles, 250 watts. Eastern standard time.

WEAN The Shepard Stores, Westminster St., Providence, R. I. 367 meters, 817 kilocycles, 500 watts. Daily ex Sun. 12-1 am, 4-5 pm, musical program; 6:30 pm, dinner dance; 8 pm, concert. Tues & Thurs, 10 am, home service talk. Wed, 9:30, dance program. Sun, 10:30 am or 11 am, church service; 1:30 pm & 4 pm, concert program. Eastern standard time. Slogan: "We Entertain a Nation."

WEAO Ohio State University, Columbus, Ohio. 293.9 meters, 1020 kilocycles, 750 watts. Daily ex Sun & holidays. 9:45 am, weather, market reports, agricultural bulletin; 11 am. market reports and music; 1 pm, market, music; 4 pm, markets. Tues, 7 to 9 pm, lectures, music. Wed, 8 to 10 pm, lectures, music. Thurs, 8 to 10 pm, lectures, music. Eastern standard time.

WEAR The Goodyear Tire & Rubber Co., 2026 Union Trust Bldg., Cleveland, Ohio. 389.4 meters, 770 kilocycles, 750 watts. Daily ex Sun, 11 am-12:15 pm, weather, markets. Daily ex Sat & Sun, 3:30-4 pm, weather, markets. Mon, Wed & Sat, 7-8 pm, musical. Tues, Thurs & Fri, 7-11 pm, musical. Sun, 3:30-5 pm, musical; 7-10 pm, musical. Eastern standard time. Slogan: "Goodyear Tires—WEAR."

WEAU Davidson Bros. Co., Sioux City, Iowa. 275 meters, 1090 kilocycles, 100 watts. Daily ex Mon, 8:35-9:35, 10:35-11:35 am, 12 noon-12:35 pm, 3:30-5 pm. Tues also, 6:30 pm. Sun, 2-4 pm, musical program. Central standard time.

WEBC Walter C. Bridges, 1011 N. 21st St., Superior, Wis. 242 meters, 1240 kilocycles, 100 watts. Central standard time.

WEBH Edgewater Beach Hotel, Chicago Evening Post, 5300 Sheridan Road, Chicago, Ill. 370.2 meters, 810 kilocycles, 2000 watts, Daily ex Sun, Mon, 7-8 pm, 9-10 pm, 11 pm-1 am (Sat, 11 pm-2 am). Sun, 10:40 am-12 noon, church service; 5-6 pm, 7-9 pm, musical program. Central standard time. Slogan: "Where Everybody's Happy."

WEBJ Third Avenue Railway System, 130th St. & Third Ave., New York, N. Y. 272.6 meters, 1100 kilocycles, 500 watts, Tues & Fri, 7 to 9 pm, popular & educational. Wed, 8 to 10 pm, popular & educational. Eastern standard time.

WEBL Radio Corp. of America, Woolworth Bldg., New York, N. Y. (portable). 226 meters, 1330 kilocycles, 100 watts. Eastern standard time.

WEBQ Tatc Radio Co., Harrisburg, Ill. 226 meters, 1330 kilocycles, 10 watts, Daily ex Sun, 7:15-7:30 pm, local news, markets. Wed, 8:15-9:15 pm. Sun, 7-8:30, church services. Central standard time. Slogan: "Blue Bird Station."

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EVERYBODY, including experienced radio engineers said — it cannot be done. But we did it—produced a high grade, long distance single dial control radio to operate a loud speaker to retail for $25.00—and yet allow liberal discount to agents.

This marvelous instrument is the result of five years hard work by an organization of trained radio engineers. It is no experiment —thousands are in use—the results speak for themselves.

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Thousands have been waiting for just such a radio —a real long distance, powerful instrument but—at a price they can afford.

It is here, and live wide awake salesmen will recognize their opportunity immediately—they won't lose a single minute writing for full information.

Just as there are 100 Fords to one high priced car, just so will there be 100 Vikings to every $75.00 and $100.00 radio—think what this means to men who get in on the ground floor right now.

A $25 Radio Which Will Equal a $75 Radio

Put a Model 599 Viking which retails for $25.00 alongside any radio retailing for $75.00 and even more. Compare them for ease of tuning—only one dial to tune on the Viking—distance received, volume and tone. The results will make any man say, "I'll save that $50.00."

Radio is today the biggest and quickest selling line—thousands are being sold—salesmen have made unheard of profits. But here is a far greater, a far more interesting radio proposition than anyone ever dreamed of.

You Should Make $100.00 a Week Easily

You can't help it—many will make more. Some will control a county—others will control many counties. We have the livliest radio selling plan of today—instruments of all prices—a radio price to fit every pocketbook.

Any man who will follow our teaching cannot help but add big money to his present income and start to do it immediately. If you want more money here is your chance but you'll have to act quick—others will jump at this chance.

Agents Wanted Make $100.00 a Week

Sell Radio in Your Spare Time—Evenings

You don't even have to give up your present position. The only time radio can be sold is in the evening—by demonstration. So here is a chance to add to your present income. During the past five years we have trained 4364 men in this very profitable business.

You'll be the first one with a real low priced long distance radio—your price will startle everybody—the results will be even far more startling. Once you demonstrate you're sure of a sale. No one can think of investing $75.00 to $100.00 in a radio when this instrument will get the same results and your retail price is only $25.00. Just think of the advantage you have. Sell a radio for only $25.00, and yet make a handsome commission.

A Regular Radio at a Price Unheard Of

Uses five No. 199 tubes, operates on three ordinary dry cells. Only one dial to tune—a feature generally only found in the highest priced instruments. Any child can tune the Model 599 VIKING—simply turn the dial. Cabinet is extremely attractive, 12 inches long, 8 inches high and 6 inches deep. The wood is covered with Keratol, embossed in a very attractive design. On the front are two very odd gold colored, colonial designs inserted in two panels. The base and ends are finished in a rough gold and black colored finish which together with the rich seal brown Keratol of the balance makes a cabinet that would be an ornament in any home.

The tuning is arranged so that it is accomplished by the use of one special low loss condenser and a basket weave coil. Sockets, rheostat, potentiometer and base board are all of bakelite. Three transformers give an abundance of volume for loud speaker. Parts will equal the average $75.00 or $100.00 radio instrument—only enormous production could possibly bring about this low price.

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WEBR Hotel Worth, Buffalo, N. Y. 244 meters. 1230 kilocycles, 100 watts. Mon, Wed, Fri, 8:30-11 pm. Sun, church services. Slogan: "We Extend Buffalo's Regards."

WEBW Beloit College, Beloit, Wis. 267.7 meters, 1120 kilocycles, 500 watts. Sun, 4:25-5:30 pm, vesper services. Mon, 8-9 pm, concert. Central standard time.

WEBZ Savannah Radio Corp., Savannah, Ga. 263 meters, 1140 kilocycles. 50 watts. Mon, Wed, Fri, 8:30 pm. Eastern standard time.

WEEI The Edison Electric Illuminating Co. of Boston, 39 Boylston St., Boston, Mass. 348.6 meters, 860 kilocycles, 500 watts. Sun, 10:50 am-12 noon. Daily ex Sat, Sun, 6:45-10:45 am, 2-5 pm, 5:45-11 pm. Sat, 2-5 pm, 8-10:30 pm. Eastern time. Slogan: "The Friendly Voice."

WEHS Oliver G. Fordham, Evanston, Ill. 202.6 meters, 1480 kilocycles, 10 watts.

WEMC Emmanuel Missionary College, Berrien Springs, Mich. 316 meters, 950 kilocycles, 4000 watts. Sun, 11 am-8:15 pm, chapel services. Daily ex Sun, 8:05 am, Beacon Light Sacred Hour. Mon, Wed, 8:15 pm, miscellaneous, orchestra, etc. Fri, 9 pm, old-time songs, sacred songs, etc. Central standard time. Slogan: "The Radio Lighthouse."

WENR All-American Radio Corp., 4201 W. Belmont Ave., Chicago, Ills. 266 meters, 1130 kilocycles, 1000 watts. Sun, 2-3 pm, 3-4 pm, popular programs. Daily ex Sun & Mon, 1-3 pm, All-American popular program; 6-7 pm, dinner concert; 8-10 pm, popular program; 12-2 am, Midnight Frolic. Central standard time. Slogon: "W-E-N-R, Builders of Radio for the Years to Come."

WEW St. Louis University, University Station, St. Louis, Mo. 360 meters, 833 kilocycles, 1000 watts. Daily ex Sun, 9-10 am, 2-5 pm, government report. Tues, 7 pm, literary reading. Thurs, 7 pm, music, lectures. Sun, 2 pm, difficulties in religion answered; 7:15 pm, lecture. Central standard time.

WFAA Dallas News & Journal, Dallas, Tex. 475.9 meters, 630 kilocycles, 500 watts. Sun, 2:30-3:30, 6-8:30, 11-12 pm. Daily ex Sun, each half hour from 6:30 am-6 pm, 6:30-7:30 pm, 8:30-9:30 pm. Sun, Tues, Sat, 11-12 pm. Central standard time. Slogan: "Working For All Alike."

WFAM St. Cloud Daily Times, St. Cloud, Minn. 273 meters, 1100 kilocycles, 10 watts. No definite days to broadcast, but most programs are broadcasted on Mon, 8-10 pm. Central standard time. Slogan: "The Granite City of the World."

WFAV Dept. of Elec. Engineering, University of Nebraska, Lincoln, Nebr. 275 meters, 1090 kilocycles, 500 watts. Central standard time.

WFBC First Baptist Church, Knoxville, Tenn. 250 meters, 1200 kilocycles, 50 watts. Sun, 10:30 am, 7:30 pm, church services; 4 pm, concert sacred music. Central standard time.

WFBE Vande Walle Music & Radio Co., 208 W. 2nd St., Seymour, Ind. 226 meters, 1330 kilocycles, 10 watts. Mon, Wed & Fri, 7 to 9 pm. Central standard time.

WFBG Wm. F. Gable Co., Altoona, Pa. 277.8 meters, 1080 kilocycles, 100 watts. Sun, 10:45 am, church; 7:30 pm, church; 10:15 & 11:15 pm. Tues, 12:15 pm, organ; 3-6:30-8:30 pm. Wed, 12:15-3-6-8:30 pm. Fri, 12 noon, 3-6:30-8:30-11:15-9:30. Sat, 3-6:30-7:30-8:30-9:30. Eastern standard time. Slogan: "The Voice of the Alleghenies."

WFBH Concourse Radio Corp., Hotel Majestic, 72nd St. & Central Park West. New York City, N. Y. 272.6 meters, 1100 kilocycles, 500 watts. Daily, 11:30 pm. Mon, Tues & Fri, 2-7 pm; Wed, Thurs & Sats, 2-8 pm; Sun, 5-8 pm. Eastern standard time. Slogan: "Voice of Central Park."

WFBJ St. Johns University, Collegeville, Minn. 236 meters, 1270 kilocycles, 100 watts. Sun, 7-7:30 pm. Central standard time. Slogan: "In the Heart of the Landscape Paradise."

WFBL The Onandaga Hotel, Syracuse, N. Y. 252 meters, 1190 kilocycles, 750 watts. Mon, Wed, Fri, 3-4 pm, 6-10 pm. Tues, 6-11:30 pm. Thurs, 6 pm through 12:30 am. Sat, 2-5 pm, 6-9 pm, 10:30-12 midnight. Eastern standard time. Slogan: "When Feeling Blue, Listen."

WFBM Merchants Heat & Light Co., 515 Guaranty Bldg., Indianapolis, Ind. 268 meters, 1120 kilocycles, 250 watts. Sun, 9:30-10:45, 2 pm, 4:45 pm, 7:30 pm, church services. Daily ex Sat, Sun, 5:30 pm, sports, stock market reports; 10 pm, orchestra. Fri, 11 pm, request organ program. Cental standard time. Slogan: "The Crossroads of America."

WFBR Fifth Infantry Maryland National Guards, Hoffman & Bolton St., Baltimore, Md. 254 meters, 1180 kilocycles, 100 watts, Daily ex Sun, 12 noon, dance music; 7-10 pm, sporting results and news. Tues, Thurs & Sat, 12 noon, 10 pm, 7 pm, general programs. Sun, 11 am. Central standard time. Slogan: "Home of the Star-Spangled Banner."

WFDF Frank D. Tallain, 321 1st Ave., Flint, Mich., Station at Police Bldg. 234 meters, 1280 kilocycles, 100 watts. Mon, Wed & Fri, 8 to 10:30 pm (also special broadcasts). Central standard time. Slogan: "Flint, the Motor City."

WFI Strawbridge & Clothier, Philadelphia, Pa. 394.5 meters, 760 kilocycles, 500 watts. Mon, Wed & Fri, 10:15 am-1 pm, markets and reports, recital and Betty Crocker; 3 pm, S & C tea room ensemble, market reports & recital; 6:40 pm, concert programs. Tues, Thurs & Sat, 10:15 am, market reports; 1-3 pm, S & C Tea Room ensemble, markets, reports & studio recital; 6:40 to 8 pm, concert and dance orchestra. Eastern standard time.

WFKB Francis K. Bridgman, 4536 Woodlawn Ave., Chicago, Ill. 217.3 meters, 1380 kilocycles, 500 watts. Daily ex Sun, Mon, 7-10 pm, classical and semi-classical music. Wed & Sat, children's stories. Central standard time. Slogan: "Station of Vesta Battery Corporation."

WFRL Flatbush Radio Laboratories, 1421 East 10th St., Brooklyn, N. Y. 205.4 meters, 1460 kilocycles, 100 watts. Eastern standard time.

WGAL Lancaster Elec. Sup. & Const. Co., Lancaster, Pa. 248 meters, 1210 kilocycles, 10 watts. On Wed, Fri, 5:45-6:15 pm, dinner concert. Wed, 11:15-1 am, organ concert. Eastern standard time. Slogan: World's Gardens At Lancaster."

WGBB Harry H. Carman, 217 Bedell St., Freeport, N. Y. 244 meters, 1230 kilocycles, 100 watts. Mon, Wed, Fri, 7:30-12 pm, musical program. Sun, 10:40 am to 12 noon. Church services, Freeport M. E. Church. Eastern standard time. Slogan: "The Voice of Long Island."

WGBC First Baptist Church, Memphis, Tenn. 278 meters, 1080 kilocycles, 10 watts. Sun, 9:55 am & 7:30 pm, church service. Central standard time.

WGBF The Finke Furniture Co., 307 Upper Seventh St., Evansville, Ind. 236.1 meters, 1270 kilocycles, 500 watts. Daily ex Sun, 7:15 am, morning worship service; 12:10 pm, news, markets, weather, etc.; 8-11 pm, music. Tues & Fri, 7-11 pm, musical program. Sun, irregular schedule. Central standard time. Slogan: "Gateway to the South."

WGBR Geo. S. Ives, 731 W. 5th St., Marshfield, Wis. 229 meters, 1310 kilocycles, 10 watts. Sun, 2-4 pm, musical. Central standard time. Slogan: "Wisconsin's Greatest and Best Radios."

WGBS Gimbel Brothers, Inc., 33rd St. & Broadway, New York, N. Y. 315.6 meters, 950 kilocycles, 500 watts. Daily ex Sun. 10-11 am, 1:30-2:30 pm, 3-4 pm. Mon, Wed, Fri, 6-7:30 pm. Tues, Thurs, Sat, 6-11:30 pm. Sun, 3:30-4:30 pm, 9:30-11:30 pm. Eastern standard time.

WGBU Chamber of Commerce, Ful-ford-by-the-Sea, Fla. 270 meters, 1080 kilocycles, 500 watts. Mon, Tues, Thurs, Fri, 12-1 pm, 6:30-7:30 pm, 11 pm-2 am. Wed & Sat, 12-1 pm, 6:30-7:30 pm, 10 pm-1 am. Sun, 9:30-11 pm. Eastern standard time.

WGBX University of Maine, Orono, Maine. 234.2 meters, 1280 kilocycles, 500 watts. Sun, 2 pm, musical. Wed, 7:30 pm, musical & educational. Eastern standard time.

WGCP Grand Central Palace & Clover Gardens, Lexington Ave. at 46th St., New York City. D. W. May—outlet, Newark, N. J. 252 meters, 1190 kilocycles, 500 watts. Daily ex Sun, 3-5:30 pm. Mon, Thurs & Sat, 6-12 pm. Tues, Wed, Fri, 7-8:30 pm. Sun, 7-9:30 pm. Eastern standard time. Slogan: "The Four Leaf Clover Station."

WGES Coyne Electrical School, Inc., 1300 W. Harrison St., Chicago, Ill. 315.6 meters, 950 kilocycles, 500 watts. Mon, 5-7 pm, pipe organ, musical. Tues, Wed, Thurs, Fri & Sat, 5-7 pm, semi-classical; 8-9 pm, 11-1 am, musical. Sun, 10:15-12 am, 5-7:40 pm, 11-12 pm, religious pipe organ music. Central standard time. Slogan: "World's Greatest Electrical School."

WGHB The George H. Bowles Developments, Clearwater, Fla. 266 meters, 1130 kilocycles, 500 watts. Mon, Wed, & Fri, 8:30-10 pm, musical programs. Tues & Thurs, 7-8 pm, orchestra. Eastern standard time. Slogan: "WGHB Inviting the World to the Springtime City."

WGHP George Harrison Phelps, Inc., Radio Division, 110 Rowena St., Detroit, Mich. 270 meters, 1110 kilocycles, 1500 watts. Mon, Tues, Wed, 6-10 pm, dinner concert, market report, children's chat, news, classical, etc. Thurs, Fri, 6-8 same as above, 6-10 pm, 10-11 pm, frolic; 11-12 pm, dance program. Eastern standard time.

WGMU A. H. Grebe & Co., Inc., Richmond Hill, L. I., N. Y. (Portable). 236 meters, 1270 kilocycles, 100 watts, class A. Unlimited schedule. Eastern standard time.

WGM Verne & Elton Spencer, 501 Cowan Ave., Jeannette, Pa. 372 meters, 806 kilocycles, 150 watts. Sun, 1:30-3 pm, music. Daily ex Sun, Wed, Sat, 7:30-9 pm, dance music. Popular program. Eastern time. Slogan: "Voice from the Glass City. Voice from the Hilltop."

WGN The Chicago Tribune, Drake Hotel, 140 East Walton Place, Chicago, Ill. 302.8 meters, 990 kilocycles, 1000 watts, class B. Daily ex Sun, 11:57 am, 12:40-3:30 pm, 5:30-5:57 pm, 6-7:30 pm, 8:30-11:30 pm. Tues & Thurs, 12:30 pm. farm talks. Sun, 12-1 pm, 1-5 pm, 9-10 pm. Central standard time.

WGR Federal Radio Corp., Hotel Statler, Buffalo, N. Y. 319 meters, 940 kilocycles, 750 watts. Sun, 10:45 am, church; 7:45 pm, church; 9:15 pm, concert. Mon, 12 noon, reports; 2:30 pm, program; 6:30, music; 7:30, reports; 8 pm-1 am, program. Tues, 12 noon, reports; 2:30 pm, program; 6:30 music; 7:30, reports; 8-11 pm, program. Wed, 12 noon, reports; 6:30 pm, music; 7:30, reports; 8-11 pm, program. Thurs, 12 noon, reports; 2:30 pm, program; 6:30 pm, music; 7:30 pm, reports; 8-11 pm, program. Fri, 12 noon, reports; 8 pm. Eastern standard time. Slogan: "Key City of Industry."

WGST Georgia School of Technology, Atlanta, Ga. 270 meters, 1110 kilocycles, 500 watts. Mon, 9-10 pm, "Tech Nite" program. Thurs, 7-8 pm, "Artist Series" program. Central standard time. Slogan: "The Southern School with the National Reputation."

WGY General Electric Co., 1 River Road, Schenectady, N. Y. 379.5 meters, 790 kilocycles, 5000 watts. Daily ex Sun, 11:55 am, 12:30 pm, 12:45 pm, 6 pm, 6:10 pm. Mon, Tues, Thurs, Fri, 2 pm. Tues & Thurs, 2:30 pm. Mon, Tues, Thurs, 6:30-7 pm. Thurs, 11:30 pm. Fri, 7 pm. Wed, 6:30 pm. Fri. 6:30 pm, 10:30 pm. Mon, 7:15 pm. Wed, Fri, 7 pm. Sat, 9:30 pm. Sun, 10:30-12 am, 5 pm, 7 pm, 7:30-8:45 pm, 8:15 pm. Eastern standard time.

WHA University of Wisconsin, Madison, Wis. 535.4 meters, 560 kilocycles, 750 watts, Mon, 8-9 pm, musical program. Wed & Fri, 8 am-8 pm. Sat, athletic events. Central standard time.

WHAD Marquette University - Milwaukee Journal Bldg., 4th & State Sts., Milwaukee, Wis. 275 meters, 1090 kilocycles, 500 watts. Sun, 3:15 pm, symphony concert. Mon, Tues. Wed, Thurs, Fri, Sat, 12 noon, news, musical program; 4 pm, studio program; 4:55 pm, stock quotations; 6 pm, market & financial news; 6:15 pm, dinner ochestra; 8:30 pm, popular program. Wed, 11:30 pm, midnight recital. Central standard time. Slogan: "The Voice of Wisconsin."

WHAM Eastman School of Music, Rochester, N. Y. 278 meters, 1080 kilocycles, 100 watts, class A. Daily ex Sun, 3:30-4 pm, 5-5:45 pm, 7-7:40 pm. Sun, 3:15 pm, chapel services. Eastern time.

WHAP Wm. H. Taylor Finance Corp., 393 Seventh Ave., New York, N. Y. 431 meters, 695.6 kilocycles, 1000 watts, class A. Daily ex Sat & Sun, 6:30-11 pm. Sun, 2:30-4:15 pm. Eastern standard time. Slogan: "The Station for Public Service."

WHAR Pioneer Broadcasting Station of Atlantic City, the Hotel Seaside, Atlantic City, N. J. 275 meters, 1090 kilocycles, 500 watts. Sun, 10:45-1 pm, 2:15-3:10 pm, 7:45-10 pm. Daily ex Sun & Wed, 2-3 pm, 7:45-9 pm. Eastern standard time. Slogan: "Pioneer Broadcasting Station of Atlantic City."

WHAS The Courier Journal Co. & The Louisville Times Co., Louisville, Ken. 399.8 meters, 750 kilocycles, 500 watts. Sun, 9:57-10:40 am, church services; 4:30-5:30 pm, evening choral service. Mon, Tues, Wed, Thurs, Fri, Sat, 1-2 pm, orchestra; 3:15-5 pm, markets, music, sports, weather, etc. Tues, Wed, Thurs, Fri, Sat, 7:30-9 pm, concert. Central standard time. Slogan: "Old Kentucky Home."

WHAZ Radio Broadcasting Station, Rensselaer Polytechnic Institute, Troy, N. Y. 379.5 meters, 790 kilocycles, 1000 watts. Mon, 9 pm. Eastern standard time. Slogan: "Transcontinental and International Radiophone Broadcasting from the Oldest College of Engineering and Science in America. Rensselaer Polytechnic Institute, Troy, N. Y."

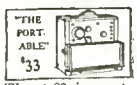
WHB Sweeney Automotive & Electrical School, Kansas City, Mo. 365.6 meters, 820 kilocycles, 500 watts. Mon, Wed, Fri, 2-3 pm, music; 7-8 pm, educational. Tues, Thurs, 7-7:45 pm & 8-10 pm, musical. Sun, 9:40-10:45 am, 11 am-12:15 pm, 8-9:15 pm, services; 11:15-1 am, organ concert. Central standard time. Slogan: "The Heart of America."

WHBA Shaffer Music House, Oil City, Pa. 250 meters, 1200 kilocycles, 10 watts, class A, limited commercial broadcast. Mon, 8 pm until 11 pm, musical. Fri, 9 pm until 12 pm, musical. Eastern standard time.

CROSLEY RADIO
All prices slightly higher west of Rocky Mts.

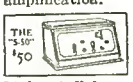
This little double-circuit 1-tube set has made long distance records.

4 tubes. Amazing efficiency, Crescendon equipped!

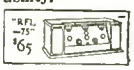


The 4-29 in portable form.

Five tubes, tuned radio frequency. Two stages non-oscillating radio frequency amplification, Crescendon, two stages audio frequency amplification.



5 tubes, 1-dial control acuminators, Crescendon, power tube adaptability.

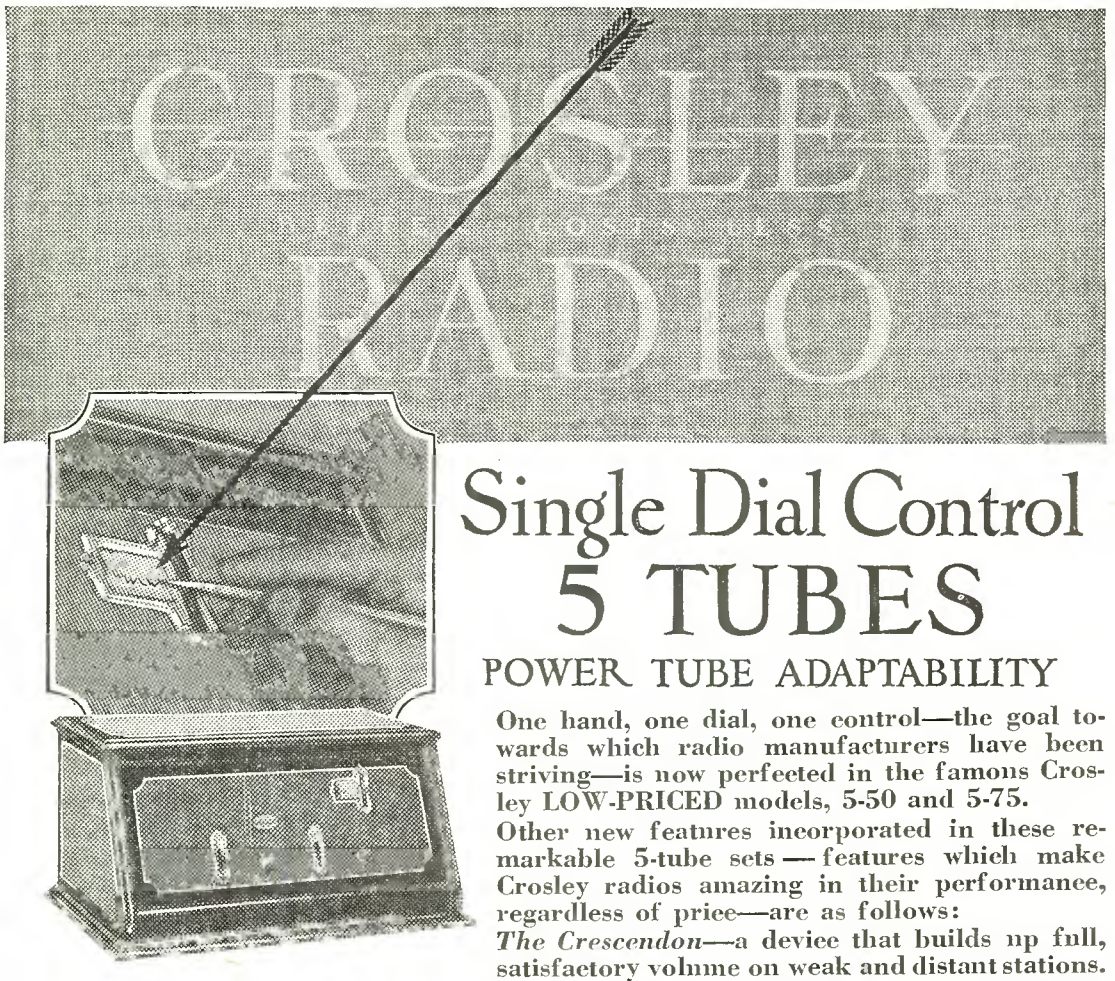


6 tubes. True-cascade amplification; non-oscillating and non-radiating.

In a mahogany console. 5-tube 5-50 receiver, Crosley Musicone speaker, ample compartment for batteries.

Double drum station selector! Musicone and room for batteries and accessories.

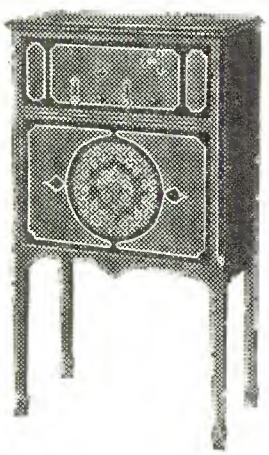
12-inch size, $12.50. Super Musicone, $14.75. Musicone Deluxe, $23.50. Also beautiful Musiconsole with room for batteries and accessories, as below.



Single Dial Control
5 TUBES
POWER TUBE ADAPTABILITY

TABLE MODEL 5-tube 5-50 Single dial control with graphic drum station selector. A mahogany cabinet of two-tone finish, beautifully trimmed with rose metal fittings. Incorporating 6 amazing features,—two of which (Acuminators and Crescendon) are exclusively Crosley's. Price slightly higher west of Rocky Mountains.

$50



$75

CONSOLE MODEL 5 tube 5-75 Single dial control with graphic drum station selector. A mahogany cabinet, two-tone finish, into which is built the famous Crosley Musicone, cleverly concealed behind a silk screen. Cabinet will hold batteries and accessories. Stands 40 inches high. Rose gold trimmings. Price slightly higher west of Rocky Mountains.

One hand, one dial, one control—the goal towards which radio manufacturers have been striving—is now perfected in the famous Crosley LOW-PRICED models, 5-50 and 5-75.

Other new features incorporated in these remarkable 5-tube sets — features which make Crosley radios amazing in their performance, regardless of price—are as follows:

***The Crescendon*—a device that builds up full, satisfactory volume on weak and distant stations.**

***The Acuminators*—these auxiliary tuners enable you to receive with great volume, because of sharp tuning, distant stations passed by and entirely missed on ordinary single dial control sets. With the use of the drum selector alone enough stations will parade by to satisfy everyone—but with the acuminators, even wider and better broadcast is opened to you.**

***The All-Metal Chassis*—a type of construction which shields the various units and prevents interstage as well as external coupling. The result is a great saving in production costs and a greater efficiency in reception.**

***Rich Mahogany Cabinets*—beautifully finished and artistically decorated. The use of such high grade material for cabinet work is possible only because of the tremendous production program for 1927.**

The Crosley 5-50 and 5-75 are being welcomed by thousands of persons who have hesitated to replace their out-of-date equipment with sets containing the latest features because the cost was prohibitive. Now they can have the very latest developments in radio at a price that is easily within their reach—thanks to the genius of Crosley in reducing costs by mass production.

Go to your dealer—and learn what exquisite tone, wonderful selectivity and satisfactory volume are built into these two incomparable radios.

THE CROSLEY RADIO CORPORATION, CINCINNATI—POWEL CROSLEY, Jr., President

For Catalogue write Dept. 41

Crosley manufactures radio receiving sets, which are licensed under Armstrong U. S. Patent No. 1,113,149 or under patent applications of Radio Frequency Laboratories, Inc., and other patents issued and pending. Owning and operating station WLW, first remote control super-power station in America. All prices without accessories.

Crosley Features

"CRESCENDON"

When, on ordinary radios, ears must strain to catch a station miles away, a turn of the Crescendon on Crosley radios instantly swells reception to room-filling volume. An exclusive Crosley feature.

ALL-METAL SHIELDED CHASSIS

This truly great radio achievement, found in several Crosley sets, furnishes a substantial frame for mounting elements, produces excellent alignment of condensers, shields the units from each other, prevents interstage, improves the stability of the circuit, increases selectivity and saves costs by standardizing this phase of manufacture.

THE SINGLE-DIAL STATION SELECTOR

Nothing in radio equals the joy or the convenience of single dial control. Crosley single drum control enables you to find the stations sought, without log book or "tuning"

"THE ACUMINATORS"

Crosley Acuminators permit tuning in—loud and clear—weak stations passed over and entirely missed by ordinary single dial radios. In tuning high powered and local stations they are not used.

USE OF POWER TUBE

Power tube adaptability marks the Crosley "5-50" "5-75" and "RFL" sets. This feature typifies Crosley provision for best radio reception at moderate cost. This feature is in keeping with all that is most progressive.

HEAD PHONES
$3.00

QUALITY AND BEAUTY IN CABINETS AND CONSOLES

WHBC Rev. E. P. Graham, 627 McKinley Ave., Canton, Ohio. 254 meters, 1810 kilocycles, 10 watts. Mon, 8-8:30 pm, lecture, sermon. Eastern time. Slogan: "Dispel Ignorance."

WHBD Chamber of Commerce, Chas. W. Howard, 110 Chillicothe St., Bellefontaine, Ohio, 222.1 meters, 1350 kilocycles, 20 watts. Sun, 10:45 am, 7:30 pm. Daily ex Sun & Sat, 7:30-9 pm. Eastern standard time. Slogan: "Ohio's Highest Point."

WHBF Beardsley Spec. Co., Inc., 217 18th St., Rock Island, Ill. 222 meters, 1350 kilocycles, 100 watts. Mon, Wed, Sat, 9-11 pm. Sat, 2-4, 7-9 pm. Central standard time. Slogan: "Where Historic Blackhawk Fought."

WHBG John S. Skane, 1810 N. 4th St., Harrisburg, Pa. 230.6 meters, 1300 kilocycles, 20 watts, class A. Tues, 9:30-11:30 pm; Thurs, 9:30-12 pm; Sun, 9:15-10:30 pm.. religious program. Eastern standard time. Slogan: "Where Harrisburg Broadcasts Gladness."

WHBL James H. Slusser, 1214 Erie Ave., Logansport, Ind. 215.7 meters, 1390 kilocycles, 50 watts, class A. Central standard time.

WHBM O. L. Carrell (Portable), 1506 No. American Bldg., 36 So. State St., Chicago, Ill. 215.7 meters, 390 kilocycles, 20 watts, class A. Central standard time.

WHBN First Ave. Methodist Church, 1st Ave. & 5th St., Petersburg, Fla. 238 meters, 1260 kilocycles, 10 watts, class A. Eastern standard time.

WHBP The Johnstown Automobile Co., 101 Main St., Johnstown, Pa. 256 meters, 1170 kilocycles, 100 watts, class A. Weds, 9 pm; Sat, 10 pm. Eastern standard time. Slogan: "The Voice of the Friendly City."

WHBQ Men's Fellowship Class of St. John's M. E. Church, South Bellevue and Peabody Aves., Memphis, Tenn. 233 meters, 1290 kilocycles, 50 watts, class A. Limited commercial. Wed, 8-9:30 pm, musical program. Sun, 9:45-10:45 am, services, Men's Fellowship class; 11 am, church service; 7:30 pm, church service. Central standard time. Slogan: "We have Best Quartet."

WHBU Riviera Theater & Bing's Clothing, 1002 Meridian St., Anderson, Ind. 218.8 meters, 1370 kilocycles, 10 watts, class A. Daily ex Sun, 9-9:30 am; 12-12:30 pm. Wed, Fri, Sun, 7-9 pm. Central standard time. Slogan: "The Home of Chief Anderson."

WHBW D. R. Kienzle, 4916 Chestnut St., Philadelphia, Pa. 215 meters, 1390 kilocycles, 100 watts, class A. Weds, pm. Eastern standard time.

WHBY St. Norbert's College, West De Pere, Wis. Green Bay-De Pere Broadcasting Station. 249.9 meters, 1200 kilocycles, 50 watts. Mon, 8-10 pm, orchestra, dance music. Wed, 5-6 pm, organ recital. Fri, 5-6 pm, musical, Peppy Collegians. Daily ex Sun, 5 pm, weather forecast. Daily, 5:45-6 pm, market reports & stock quotations. Central standard time.

WHDI Dunwoody Industrial Institute, 818 Superior Blvd., Minneapolis, Minn. 277.6 meters, 1080 kilocycles, 500 watts. Mon, Tues, Wed, Thurs, Fri, Sat, 7-8:35 am, time service program. Mon, 8-9 pm, popular hour. Wed, 9-10 pm, Big Hat prize drawing, music. Fri, 9-10 pm, popular hour. Central standard time.

WHEC Hickson Elec. Co., Inc., 36 South Ave., Rochester, N. Y. 258 meters, 1160 kilocycles, 100 watts. Sun, 10:45 am, church services; 5-6 pm, organ recital; 6-6:30 pm, symphony. Daily ex Sun, 12 noon, time flashes; 6:30 pm, dinner program; 7-9 pm, musical program. Sat, 10:30 pm-12 midnight, dance music. Eastern standard time. Slogan: "This Is Rochester—The City of Varied Industries."

WHK The Radio Air Service Corporation, Inc., Carnegie Hall, Cleveland, Ohio. 272.6 meters, 1100 kilocycles, 1000 watts. Sun, 10 am-10:30 pm, church & studio programs. Daily ex Sun, 12-12:45, popular noon program; 12:45-1 pm, farm flashes; 3:30-4 pm, housekeepers' chat; 6-8, dinner music & studio program; 8-9, specialties, concerts, studio programs, etc.; 9-10 pm, orchestra. Sat, 10-12 pm, WHK happy hours. Eastern standard time. Slogan: "Cleveland, the Convention City."

WHN George Schubel, 1540 Broadway, New York, N. Y. 361.1 meters, 830 kilocycles, 1000 watts. Sun, 11 am-12 midnight. Daily ex Sun, 2:15-12 midnight. Eastern standard time. Slogan: "Station of the Great White Way."

WHO Bankers Life Co., 1110 Liberty Bldg., Des Moines, Iowa. 526 meters, 570 kilocycles, 5000 watts. Daily ex Sun, 9:45-12 noon & 2 pm, markets; 7:30 to 9 pm, musical; 11 to 12 pm, musical reports, talks. Sun, 11 to 12:30 pm, 11 pm-midnight, musical programs. Central standard time. Slogan "WHO (WHO) Bankers Company, Des Moines, Iowa."

WHT Radiophone Broadcasting Corp., Wrigley Bldg., 410 N. Michigan Blvd., Chicago, Ill. 238 meters, 1260 kilocycles, 3500 watts. Sun, 12 noon-3:45 pm, 5:30-11:30 pm. Daily ex Sun, 10 am-2 pm, 6-7:30 pm. Daily ex Sun & Mon, 7:45 pm-1 am. Central standard time. Slogan: "Write Home Tonight."

WIAD Howard R. Miller, 6318 N. Park Ave., Philadelphia, Pa. 250 meters, 1199 Kilocycles, 100 watts, class A. Tue, Fri, 9 pm. Eastern standard time.

WIAS Home Elec. Co., Burlington, Iowa. 254 meters, 1180 kilocycles, 100 watts, class A. Tues, 8-9 pm. Thurs, 7-8 pm. Sat, 10:30-11 pm. Sun, 10:30 am, church. Central standard time. Slogan: "Burlington on the Mississippi."

WIBA The Capital Times and The Studio Station, 511 State St., Madison, Wis. 236 meters, 1270 kilocycles, 100 watts, class A. Mon & Wed, 8:30 to 10 pm. Sat, 12 midnight, Cuckoo Club Music. Central standard time. Slogan: "The Four Lakes City."

WIBG St. Paul s Protestant Episcopal Church, Elkins Park, Philadelphia, Pa. 222 meters, 1350 kilocycles, 50 watts, class A. Sun, 10:45 am, 3:45 pm. Eastern standard time.

WIBH Elite Radio Stores (Moriarty), 55 Hillman St., New Bedford, Mass. 210 meters, 1430 kilocycles, 30 watts, class A. Daily ex Sun, 12-1:30 pm. Eastern standard time. Slogan: "The Voice of New Bedford."

WIBI Frederick B. Zittrell, Jr., 369 Amity St., Flushing, L. I., N. Y. 218.8 meters, 1370 kilocycles, 5 watts, class A. Eastern standard time.

WIBJ O. L. Carrell, 1506 N. American Bldg., Chicago, Ill. (Portable). 215.7 meters, 1390 kilocycles, 50 watts, class A. Central standard time.

WIBM Billy Maine (Portable), 36 W. Randolph St., Chicago, Ill. 215.7 meters, 1390 kilocycles, 10 watts, class A. Daily ex Sun, 8:45-9:45 pm. Central standard time. Slogan: "The Gypsy Station."

WIBO Nelson Brothers Bond & Mortgage Co., 6310 Broadway, Chicago, Ill. 226 meters, 1330 kilocycles, 1000 watts, class A. Daily, 2-4 pm. Daily ex Mon, 6-8 pm, music. Wed, 10 pm-12 midnight. Fri, 10 pm-2 am. Tues & Thurs, 12 pm-2 am, Midnight Jamboree. Sun, 10-12 pm, musical. Central standard time. Slogan: "Chicago's Uptown Radio Station."

WIBR Tri-State Radio Co., Thurman A. Owings, Mgr., Weirton, W. Va. 246 meters, 1220 kilocycles, 50 watts, class B. Fri, 8-11 pm. Eastern standard time.

WIBS New Jersey National Guard, 57th Infantry Brigade, 921 Edgewood Road, Elizabeth, N. J. (Portable). 202.6 meters, 1480 kilocycles, 10 watts, class A. Eastern standard time.

WIBT Orlando Edgar Miller, New York, N. Y. (Portable). 211.1 meters, 1420 kilocycles, 100 watts, class A. Eastern time.

WIBU The Electric Farm, R. F. D. No. 3, Poynette, Wis. 222 meters, 1350 kilocycles, 20 watts, class A. Central standard time.

WIBW Dr. L. L. Dill, Rosclawn Addition, Logansport, Ind. 220 meters, 1360 kilocycles, 100 watts, class A. Daily ex Sun, 4:15 pm, markets. Tues & Sat, 6-7 pm, organ recital. Thurs, 9-10 pm, religious concert. Fri, 7-10 pm, high school basketball. Sun, 10:45 am-12 pm, 7-9 pm. Central standard time. Slogan: "WIBW On the Banks of the Wabash."

WIBX WIBX, Inc., Hotel Utica, Utica, N. Y. 234.2 meters, 1280 kilocycles, 150 watts. Sun, 10:30 am, 7:30 pm, church services; 4 pm, studio program. Mon, 8-10 pm, musical program. Tues, Thurs, 6:30-9 pm, musical program; 11 pm, Avon Theater program. Sat, 6:30-7:30 pm, dinner dance; 11 pm, WIBX Funfest. Eastern standard time. Slogan: "Utica, N. Y.—The Hub of the Empire State."

WIBZ A. D. Trum, 217 Catamo St., Montgomery, Ala. 230.6 meters, 1300 kilocycles, 10 watts. Fri, 9-10 pm. Sun, 12-1 pm. Central standard time. Slogan: "We Interest Business Zeal."

WICC-WCWS The Bridgeport Broadcasting Station, 1188 Main St., Bridgeport, Conn. 285 meters, 1060 kilocycles, 500 watts. Sun, 10:50 am-2 pm, church services. Tues, Fri, 11 am, home management; 8 pm, studio program. Mon, 7-9 pm, studio program. Wed, 5:45-10:30 pm, concert, musical, theater presentations, etc. Thurs, 8 pm, studio program. Fri, 6:30-8:30 pm, orchestra, studio program. Eastern standard time. Slogan: "The Industrial Capital of Connecticut."

WIL St. Louis Star and Benson Radio Co., St. Louis, Mo. 258 meters, 116.2 kilocycles, 250 watts, class A. Tues, Thurs & Sat, 4-5 pm. Thurs, 8-12 pm. Sat, 10-12 pm. Central standard time. Slogan: "Watch It Lead."

WIOD Carl G. Fisher, Miami Beach, Fla. 247.8 meters, 1210 kilocycles, 1000 watts. Slogan: "Wonderful Isle of Dreams."

WIP Gimbel Bros., Philadelphia, Pa. 508.2 meters, 590 kilocycles, 500 watts. Daily ex Sun, Mon & Fri, 6:45-7:30 am, 10-11 am, 1-2 pm, 3-4 pm, 6-7:30 pm. Tues, Thurs & Sat, 8 pm-12 midnight. Mon, Wed & Fri, 6:45-8 am, 10 to 11 am, 1-2 pm, 3-4:30 pm, 6-7:30 pm. Sun, 10:30 am to 12:30 pm, 4-6 pm, 7-9:15 pm, 9:15 pm to 12 midnight. Eastern standard time. Slogan: "Watch Its Progress."

WJAD Frank P. Jackson, Hotel Raleigh, 801 Austin Ave., Waco, Tex. 352 meters, 850 kilocycles, 500 watts. Mon, Tues, Thurs, Fri, 8:30-10:30 pm, musical. Wed, 8:30-9:30 pm, musical. Central standard time. Slogan: "Waco, Texas, All Around It."

WJAF J. A. Fenberg Radio Co., 113 State St., Detroit, Mich. 400 meters, 749.6 kilocycles, 50 watts. Sat, Sun, 9-11 pm, popular music. Mon, 8-11 pm, varied. Wed, 8-11 pm, popular orchestra. Fri, 8:30-12 pm, popular orchestra. Eastern standard time.

WJAG Norfolk Daily News, Norfolk, Neb. 270 meters, 1110 kilocycles, 200 watts. Daily, 12:15 pm, features, sports, word pictures, ball games, and athletic events. Central standard time. Slogan: "Home of Printers' Devil."

WJAK The Kokomo Tribune, Kokomo, Ind. 254.1 meters, 1180 kilocycles, 50 watts. Mon, 11:45 am, weather, markets, etc.; 7:30 pm, hour of music. Daily ex Sun, 11:45 am, 5 pm. Central standard time. Slogan: "One of Indiana's Most Beautiful Little Cities and the Home of the First Automobile."

WJAM D. M. Perham, 322 3rd Ave. W., Cedar Rapids, Iowa. 268 meters, 1120 kilocycles, 100 watts, class A. Tues, Thurs & Sat, 7-10 pm. Sun, 4 pm, vesper service. Central standard time.

WJAR The Outlet Company, 174 Weybosset St., Providence, R. I. 305.9 meters, 980 kilocycles, 500 watts, class B. Daily ex Sun, 1:05 pm, musical; 1:30, weather reports. Mon, 8 pm, 9 pm & 10 pm, musical programs & grand opera. Wed, 7:30 pm, music. Tues, 7:30, 8:30 & 9 pm, musical. Thurs, 8, 9 & 10 pm, music & entertainment. Fri, 7:30, 7:45, 8:20, 8:30, 9 & 11 pms, music & entertainment. Sun, 7:20 pm & 9:15 pm. Eastern standard time. Slogan: "The Southern Gateway of New England."

WJAS Pittsburgh Radio Supply House, 963 Liberty Ave., Pittsburgh, Pa. 275 meters, 1090 kilocycles, 500 watts. Sun, 11 am, church services, St. Patrick's Church; 2 pm, studio services. Daily ex Sun, 12 noon, church services, St. Patrick's Church; 7:30 pm, dance; 8 pm, studio concert; 10:30 dance program. Eastern standard time. Slogan: "World's Jolliest Aerial Station."

WJAX Municipal Radio Broadcasting Station, Jacksonville, Fla. 336.9 meters, 890 kilocycles, 1000 watts. Eastern standard time. Slogan: "Wonderful Jacksonville—In the Land of Sunshine."

WJAZ Care of The American Radio Broadcasting Corp., Chez Pierre Club, 247 E. Ontario St., Chicago, Ill. 329.8 meters, 910 kilocycles, 1500 watts. Sun, 4:30-6 pm, 7:30-9 pm. Tues, Wed, Thurs, 6:30-12 midnight. Fri, 6:30-1 am. Sat, 6:30-2 am. Central standard time.

WJBA D. H. Lentz, Jr., 301 Whitley Ave., Joliet, Ill. 206.8 meters, 1450 kilocycles, 50 watts, class A. Tues, 8-11 pm. Central standard time.

WJBB The Financial Journal, Inc., 126 13th St. N., St. Petersburg, Fla. 254 meters, 1180 kilocycles, 10 watts, class A. Eastern standard time. Slogan: "Land of Perpetual Sunshine."

WJBC Hummer Furniture Co., La Salle, Ill. 234.2 meters, 1280 kilocycles, 500 watts. Sun, 10-11 am, Catholic church services; 7:30-9:30 pm, Baptist church services. Mon, 8-10 pm, studio program. Tues, Thurs, Sat, 12:30-1 pm, organ concert. Sat, 1-2 pm, children's program. Central standard time. Slogan: "Better Homes Station."

WJBI Robert S. Johnson, 631 Broad St., Red Bank, N. J. 218.8 meters, 1370 kilocycles, 250 watts. Wed, 8 pm-12 midnight, entertainment. Eastern standard time.

WJBK Ernest F. Goodwin, Ypsilanti, Mich. 233 meters, 1290 kilocycles, 10 watts, class A. Central standard time.

WJBL Wm. Gushard Dry Goods Co., 301 N. Water St., Decatur, Ill. 270 meters, 1110 kilocycles, 500 watts, class A. Mon, Wed & Sat, 9:30-11 pm. Central standard time.

WJBO Valdemar Jensen, New Orleans, La. 268 meters, 1120 kilocycles, 100 watts.

WJBR Gensch and Stearns, Omro, Wis. 227.1 meters, 1320 kilocycles, 50 watts.

WJBU Bucknell University, Lewisburg, Pa. 211.1 meters, 1420 kilocycles, 100 watts. Slogan: "In the Heart of the Keystone State."

WJBV George J. Cook, 9024 78th St., Woodhaven, N. Y. 288.3 meters, 1040 kilocycles, 100 watts. Sun, 1-5 pm, popular program. Tues, Thurs, 8-10 pm, popular program. Eastern standard time.

WJBW Serve-U-Radio Co., 2743 Dumaine St., New Orleans, La. 270 meters, 1110 kilocycles, 20 watts. Tues, Fri, 10-11 pm. Central standard time. Slogan: "The Serve-U-Radio Co."

WJR Jewett Radio & Phonograph Co. and Detroit Free Press, Detroit, Mich. 516.9 meters, 580 kilocycles, 5000 watts, class B. Daily ex Sun, 7-8 pm, 9-10 pm. Mon, Wed, Sat, 11:30 pm-1 am. Thurs, Sat, 10-11 pm. Eastern standard time. Slogan: "Where Joy Reigns."

WJJD Loyal Order of Moose, Mooseheart, Ill. Chicago programs from the Palmer House, Chicago, in co-operation with the Chicago Evening Post. 370.2 meters, 810 kilocycles, 1000 watts. Sun, 7:45 am, Catholic services; 9:40 am, Protestant; 1 pm. organ; 2 pm, Bible & song services; 4 pm, symphony orchestra. Daily ex Sun, 1 pm, orchestra; 2 pm, organ; 4 pm, Mooseheart program; 5:45 pm, dinner program. Daily ex Sun, Mon, 8 pm, studio; 10 pm, studio; 12 pm, studio. Central standard time. Slogan: "Every Child Is Entitled to a High School Education and a Trade."

WJUG Uda B. Ross, 30 Park Place, New York City, N. Y. 516.9 meters, 580 kilocycles, 250 watts. Daily on air. Unlimited time. Eastern standard time. Slogan: "The Jug."

WJY Radio Corporation of America, 33 W. 42nd St., New York, N. Y. 405.2 meters, 740 kilocycles, 1000 watts, class B. Tues, Thurs, Fri, 7:30-11:30 pm. Sun, 8:15-10:30 pm. Eastern standard time.

WJZ Radio Corporation of America, 33 W. 42nd St., New York, N. Y. 454.3 meters, 660 kilocycles, 5000 watts, class, none. Sun, 6 to 10:30 pm. Daily ex Sun, 1-2 pm, 4-6 pm, 7-11:30 pm, miscellaneous program. Eastern standard time.

WKAF Radio Service Corporation, Hotel Antlers, Milwaukee, Wis. 261 meters, 1150 kilocycles, 500 watts. Sun, 4-6 pm, studio program. Mon, Fri, 10-11 pm, studio program. Wed, Fri, 7-8, 9-10 pm, popular studio program. Thurs, 2:30-3:30 pm, popular program. Slogan: "Wisconsin's Keenest Aerial Feature."

WKAQ Radio Corp. of Porto Rico, San Juan, Porto Rico. 340.7 meters, 880 kilocycles, 500 watts. Mon, 8-9 pm, Rialto Theater; 9-10:30 pm, studio program. Wed, 8-10 pm, musical band of San Juan. Fri, 9-10:30 pm. Local time (one hour earlier than E. S. T.) Slogan: "The Island of Enchantment."

WKAR The Michigan State College, East Lansing, Mich. 285.7 meters, 1050 kilocycles, 1000 watts. Sun, 6-8, church services. Daily ex Sun, 12-12:30, markets, weather, educational program. Tues, Thurs, 7-8 pm, educational program. Wed, 8-9:15 pm, musical program. Fri, 7-9:15 pm, state department program. Sat, football games, basketball games, afternoon & evening. Central standard time.

WKAV Laconia Radio Club, 480 Main St., Laconia, N. H. 224 meters, 1340 kilocycles, 50 watts. Fri, pm. Sun, 10:30 am, 6:30 pm. Eastern standard time. Slogan: "The Voice of the Winnepesaukee Lake Region."

WKBB Sanders Bros., 607 Jefferson St., Joliet, Ill. 282.2 meters, 1060 kilocycles, 150 watts, class A. Wed, 6-8:30 pm, dinner program. Thurs, 8:30-12 pm, good time program. Sun, 3-5 pm, classical; 8:30-12 pm, frolics. Central standard time.

WKBC H. L. Ansley, 1428 North 12th Ave., Birmingham, Ala. 225 meters, 1330 kilocycles, 10 watts. Tues, Thurs, Sat, 7:30-8 pm. Music. Sat, Sunday school talks on lessons for Sun. Central standard time.

WKBE K. & B. Electric Co., 59 Emerald Ave., Webster, Mass. 270.1 meters, 1110 kilocycles, 100 watts, class A. Mon, 8-11:30 pm. Eastern standard time.

WKBM WKBM Radio Broadcasting Co., 130 Broadway, Newburgh, N. Y. 215.7 meters, 1390 kilocycles, 100 watts. Sun evening, church services. Mon, dinner musical program. Tues, Thurs, 6-12 pm, studio program. Fri, 7-11 pm, studio program. Sat, 10:30 am, morning program; 9 pm, dance music. Eastern time.

WKBQ Starlight Amusement Park, 1100 E. 177th St., New York City, N. Y. 285 meters, 1152 kilocycles, 50 watts. Daily ex Sun. Irregular hours. Eastern standard time.

WKJC Kirk Johnson & Co., 16-18 W. King St., Lancaster, Pa. 258 meters, 50 watts, 1160 kilocycles. Sun, 9-10:30 pm. Mon, Wed, Fri, 8-10 pm.

WKRC The Kodel Radio Corp., Cincinnati, Ohio. 422.3 meters, 710 kilocycles, 1000 watts. Sun, 6:45-7 pm, 10-12 pm, 12-2 am. Mon, Wed, 6:15-7 pm, 8-10 pm, 12-2 am. Tues, 10-12 pm. Thurs, 8-10 pm. Sat, 10-12 pm. Central standard time. Slogan: "WKRC—K, Kodel—R, Radio—C, Corporation."

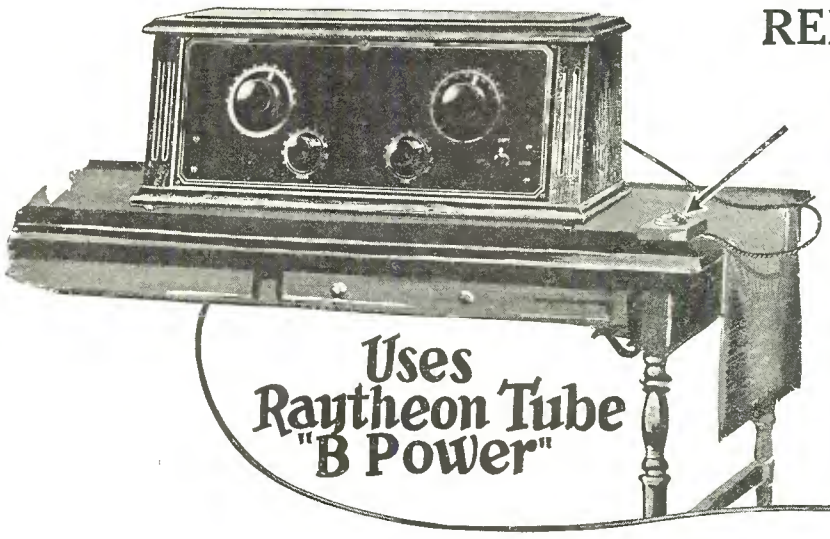
WKY E. C. Hull, H. S. Richards, Oklahoma City, Okla. 275.1 meters, 1090 kilocycles, 100 watts. Daily ex Sun, 9 am, 2:30 pm, markets, weather; 7-8:30, music. Sun, 11 am, 7:30 pm, services. Central time.

WLAL First Christian Church, 9th & Boulder Sts., Tulsa, Okla. 250 meters, 1200 kilocycles, 100 watts, class A. Wed, 9:30 pm. Sat, 7:30 pm. Sun, 7:30 pm, church. Central standard time.

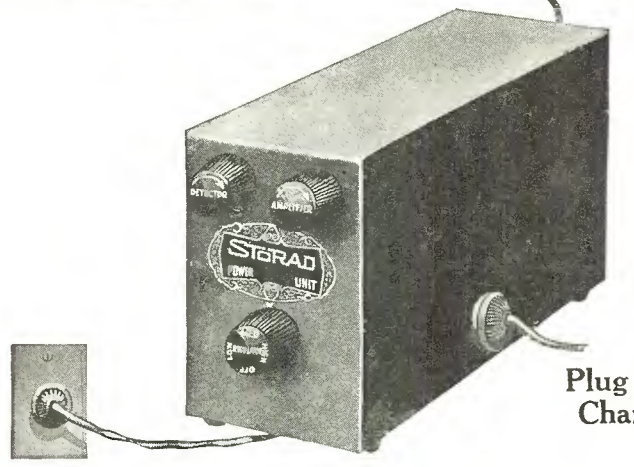
WLAP W. V. Jordon, 306 W. Breckenridge St., Louisville, Ky. 275 meters, 1090 kilocycles, 20 watts, class A. Thurs, Fri, 9:20-10 pm. Central standard time.

Marvelous New STORAD

REMOTE CONTROL POWER SUPPLY *with* *Set Control Button*

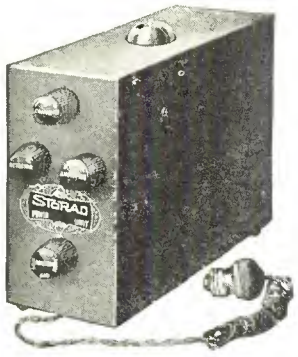


Uses Raytheon Tube "B Power"

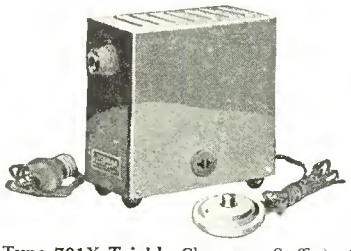


Plug in Trickle Charger Here

Type 101X—"B Power" Supply, Raytheon Tube Type Unit operating on house lighting circuit. Three variable controls from 180 volts down. Has REMOTE CONTROL feature.



Type 201AX—"B Power" Supply and Trickle Charger. Combination unit illustrated here, combines Raytheon type "B" Eliminator with Storad Trickle Charger. Operates with REMOTE CONTROL.



Type 701X Trickle Charger. Sufficient capacity for "A" Batteries used with larger sets. Variable Control regulates charging current from ½ to 1 amp. Has REMOTE CONTROL feature.

Unique, Practical and an Exclusive Storad Feature!

Here is the kind of Power Supply you have been waiting for—REMOTE CONTROL—the kind that is controlled with one button placed where you want it. Place your eliminator, charger and batteries where you wish—cellar, clothes press, or cabinet—you do not have to touch them to turn them on or off. The control button turns off the set and eliminator and turns on the Trickle Charger at the same time.

Interchangeable With Other Units

You do not have to use all Storad Units to enjoy this REMOTE CONTROL feature. A Storad Trickle Charger will work with any make of eliminator and operate it by REMOTE CONTROL, or you can use a Storad 101X "B Power" with another make Trickle Charger and enjoy the same advantages.

Raytheon "B Power"

Storad "B" Power Units having the REMOTE CONTROL feature are Raytheon Tube Type.
Storad Exclusive Circuit (Patent Pending).
Tobe Deutschmann Heavy Duty Condensers are used throughout.

100% Over Capacity

That's why Storad Power Supply will work on any set without hum. Storad Heavy Duty Units have ample power for UX171 Power Tubes even when used on the largest sets.

No More Power Worries

Put a Storad on your circuit and your power worries are over. You will have current—lots of it—when you want it.
Storad Power Supply is the result of three years of research work and one year of actual test.

Insist on Storads from your dealer or write us direct

The Storad Manufacturing Company
2411 Detroit Avenue, Cleveland, Ohio

WLB University of Minnesota, Minneapolis, Minn. 277.6 meters, 1080 kilocycles, 500 watts.

WLBL Wisconsin Department of Markets, Stevens Point, Wis. 277.6 meters, 1080 kilocycles, 500 watts. Mon, Tues, Wed, Thurs, Fri, Sat, 8-9-10-11 am, 12 noon, 1 pm, markets. Mon, 8 pm, musical program. 1st, 3rd, 5th Sat of month, 8 pm, musical program. 2nd, 4th Sat of month, 10 pm, musical program. Central standard time. Slogan: "Wisconsin, Land of Beautiful Lakes."

WLIB Liberty Magazine, Chicago, Ill. 302.8 meters, 990 kilocycles, 4000 watts. Daily ex Sun & Mon, 7-8 pm, 9-10 pm & 11-12 pm. Sun, 4-5 pm. Central standard time. Slogan: "Liberty—A Weekly for Everybody."

WLIT Lit Bros., Philadelphia, Pa. 395 meters, 760 kilocycles, 500 watts, class B. Daily ex Sun, 12-1 pm, 2-3 pm, 4:30-5 pm. Mon, 12 noon to 11 pm. Tues, 11 am to 8 pm. Wed, 12 noon to 11 pm. Thurs & Sat, 12 noon to 8 pm. Fri, 12 noon to 12 midnight. Eastern standard time. Slogan: "The Quaker City Siren."

WLS Sears Roebuck Agricultural Foundation, Chicago, Ills. 345 meters, 870 kilocycles, 5000 watts. Sun, 10:45-12, U. of C.; 12-1 pm, organ; 7-9 pm, Little Brown Church. Mon, 6:30, 7-7:30, 7:45, markets; 9-9:30-10-10:30-11-11:30-11:45-1-1:25-2. Tues, Thurs same as Mon, also, 2:30, Home Makers' Hour; 6:9, musical program. Wed, Fri, same as Tues evening programs, 6-12 pm. Sat same as Wed, with exception of Homemakers' hour. Central standard time. Slogan: "World's Largest Store. Work Better, Live Better, Sell Better."

WLSL Lincoln Studios, Inc., Providence, R. I. 440.9 meters, 680 kilocycles, 500 watts.

WLTS Lane Technical High School, 1225 Sedgwick St., Chicago, Ill. 258 meters, 1160 kilocycles, 100 watts. Fri, 1-2 pm. Tues, 1-2:30 pm, educational & musical. Central standard time.

WLW The Crosley Radio Corp., 3401 Colerain Ave., Cincinnati, Ohio. 422.3 meters, 709 kilocycles, 5000 watts. Sun, 9:30 am-8:50 pm, church services. Mon, Tues & Sat, 8 am-9 pm, concerts, orchestra, etc. Wed, 8 am-11 pm. Thurs, 8 am-12:15 am, novelties, etc. Fri, 8 am-4 pm, weather, etc. Central standard time. Slogan: "What Listeners Want."

WLWL Missionary Society of St. Paul the Apostle, 425 W. 59th St., New York, N. Y. 384.4 meters, 780 kilocycles, 5000 watts. Sun, 8-9:15 pm, church services. Mon, 8-11 pm, musical program, vocal numbers, etc. Tues, Wed, Thurs, 9-11 pm, musicals, lectures, popular talks, etc. Eastern standard time.

WMAC Clive B. Meredith, Cazenovia, N. Y. 275 meters, 1090 kilocycles, 500 watts. Sun, 3:30 pm, choral singing; 9:30 pm, popular program. Mon, 8:30, semi-classical program; 7:30, Weekly Letter to Dad. Daily ex Sun & Mon, 7:30 pm. Tues, Autobiography of Infamous Bugs. Wed, Chats with Weatherman; 8:30, popular program. Thursday, Primer for Town Farmers. Fri, 7:30 pm, Agricultural Interview; 8:30 pm, classical program. Sat, Farm News Digest. Eastern time. Slogan: "Voice of Central New York."

WMAF Round Hills Radio Corp., South Dartmouth, Mass. 440.9 meters, 680 kilocycles, 1000 watts, class B. Eastern standard time.

WMAK Lafayette Broadcasting Studios, Inc., Hotel Lafayette, Buffalo, N. Y. 365 meters, 1130 kilocycles, 500 watts. Sun, 10:25 am-7:50 pm, church services. Daily ex Sun, 12 noon, farm flashes; 6:15 pm, dinner program; 7:15 pm, daily news items; 7:30 pm, weather, health, etc.; 8 pm, studio program, concerts, recitals, etc. Tues, Wed, Thurs, 10:30 pm, musical program. Thurs, 11:30 pm, organ recital. Eastern time.

WMAL M. A. Leese Optical Co., 712 11th St., Washington, D. C. 212.6 meters, 1410 kilocycles, 100 watts, class A. Tues, Thurs & Sat, 7 pm, varied. Eastern Standard time.

WMAN First Baptist Church, Columbus, Ohio. 278 meters, 1080 kilocycles, 50 watts, class A. Sun, 10:30-12 noon; 7:30-9 pm, church services. Eastern standard time.

WMAQ The Chicago Daily News, 15 N. Wells St., Hotel LaSalle, Chicago, Ill. 447.5 meters, 670 kilocycles, 1000 watts. Daily ex Sun & Mon, 10 to 11 am, 12 noon to 1:45 pm, 2:45 to 7 pm, 8 to 10 pm. Mon, 10 am to 11 am, 12 noon to 1:45 pm, 2:45 to 7 pm. Central standard time.

WMAY Kingshighway Presbyterian Church, St. Louis, Mo. 248 meters, 1210 kilocycles, 100 watts, class A. Sun, 11 am-12 pm, 8-9 pm, church services. Central standard time.

WMAZ Mercer University, Macon, Ga. 261 meters, 1150 kilocycles, 500 watts, class A. Mon, Thurs, 10-11 pm, musical. Tues & Fri, 8-9 pm, sacred music. Wed, 11-12 pm, musical program. Fri, 9-11 pm, musical. Central standard time. Slogan: "Watch Mercer Attain Zenith."

WMBB American Bond & Mortgage Co., 6201 Cottage Grove Ave., Chicago, Ill. 250 meters, 1200 kilocycles, 500 watts. Sun, 3-6 pm, popular concert program; 7:40-9 pm, Christian Science services; 9-11 pm, popular program. Daily ex Sun, Mon, 7-8:30 pm, semi-classical program; 9-11 pm, popular program. Central standard time. Slogan: "World's Most Beautiful Ballroom."

WMBC Michigan Broadcasting Co. (F. G. Siegel), Hotel Addison, Detroit, Mich. 256 meters, 1170 kilocycles, 100 watts. Sun, 6:30-10 pm, dinner hour, studio program. Daily ex Sun, 6:30-8:30 pm, dinner hour. Mon, Tues, Wed, 10-12 pm, studio; 12-1 am, midnight frolic. Thurs, Fri, Sat, 8-10 pm, studio; 12-1 am, midnight frolic. Eastern standard time. Slogan: "The Singing Announcer."

WMBF Fleetwood Hotel, Miami Beach, Fla. 384.4 meters, 780 kilocycles, 500 watts. Daily, 7:30 pm-12:30 am, orlhestra. Tues, silent night. Eastern time. Slogan: "Wonderful Miami Beach Fleetwood."

WMBI The Moody Bible Institute of Chicago, 153 Institute Place, Chicago, Ill. 288.3 meters, 1040 kilocycles, 500 watts. Sun, 3:30-5:30 pm, 7-9 pm, Bible classes. Daily ex Sun, 7-7:30 am, morning worship; 10:30-11:30 am, missionary hour, Bible study; evening, 8:30-9:30, Bible study. Central standard time. Slogan: "The West Point of Christian Service."

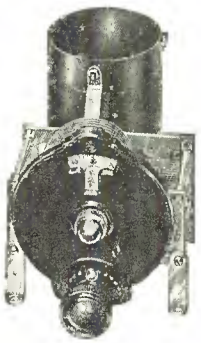
WMC Commercial Publishing Co., The Commercial Appeal, 30 N. 2nd St., Memphis, Tenn. 499.7 meters, 600 kilocycles, 1000 watts. Sun, 11 am, church services. Daily ex Sun, 9:45 am, markets. Mon, Wed, Fri, 12 noon, music. Tues, Thurs. 12 noon, markets. Mon, 8 pm, farm talks. Tues, 7:45 pm, bridge game. Thurs, 8 pm, music. Mon, Tues, Fri, Sat, 8:30-11 pm, music, frolic. Central standard time. Slogan: "WMC, Memphis, Down in Dixie."

WMCA Hotel McAlpin, New York, N. Y. 340.7 meters, 880 kilocycles, 500 watts. Sun, 10:30 am-midnight. Mon, Wed, Fri, Sat, 10:30 am-midnight. Tues, Thurs, 10:30 am-2 am. Eastern standard time. Slogan: "Where the Great White Way Begins."

WMRJ Peter J. Prinz, 10-12 New York Ave., Jamaica, N. Y. 227.1 meters, 1320 kilocycles, 5 watts. Sun, 9:30 pm-12 midnight, dance music & popular program. Tues, 8:30 pm-11:30 pm, dance music, popular program. Thurs, 8:30 pm-11:30, semi-classical, popular program. Eastern time. Slogan: "The Gateway to the Sunrise Trail."

WMSG Madison Square Garden, New York, N. Y. 302.8 meters, 900 kilocycles, 500 watts.

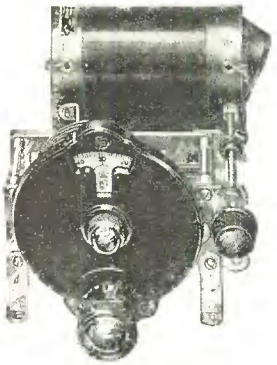
To Build Good Radio Sets



BD-1B WITH "B" DIAL

NATIONAL TUNING UNIT BD-1B consists of a BROWNING-DRAKE **spacewound** inductance coil, mounted on a .0005 NATIONAL "EQUICYCLE" (SLF) Condenser and covering the broadcast range. The inductance has the lowest R. F. resistance recorded for a coil of this type. The condenser uses three-quarters instead of one-half turn, thus still further spacing out the stations. A NATIONAL VELVET-VERNIER 4-inch dial is included.

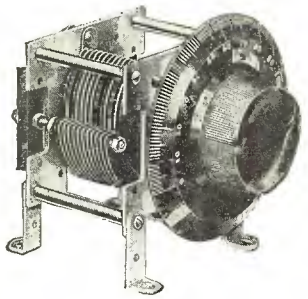
Price **$10.25**
With ILLUMINATED Type C Dial..... **10.75**
Also furnished with NATIONAL EQUIMETER (SLW) Condenser at $1.00 less than above list.



BD-2B WITH "B" DIAL

The BD-2B NATIONAL Tuning Unit combines a BROWNING-DRAKE spacewound Transformer with a .00025 NATIONAL "EQUICYCLE" Condenser. The primary of the BROWNING-DRAKE Transformer is SLOT wound,—a unique B-D feature, and one of the essential reasons why these units perform so well. THE NATIONAL VELVET-VERNIER Dial is known from coast to coast for its perfection and constancy of action. It is now also made as Type C with an ILLUMINATED Dial.

Price—BD-2B, with Type B Dial as shown..**$13.75**
With Type C ILLUMINATED Dial..... **14.25**
Also furnished with NATIONAL EQUIMETER (SLW) Condenser at $1.00 less than above list.



EM-500 WITH "A" DIAL

The NATIONAL "EQUIMETER" Condensers (straight-line wavelength) are as popular as ever among broadcast listeners and Radio amateurs. Made in all capacities from 50 to 1,000 MMF.

Type A NATIONAL VELVET-VERNIER Dials,—the original and matchless dials for operation of variable condensers,—are supplied with these condensers.

Price— 50 MMF..... **$5.00**
250 MMF..... **6.00**
500 MMF..... **6.50**

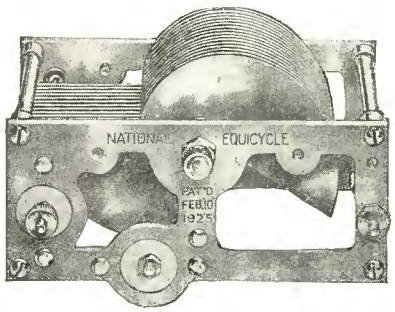
THE ILLUMINATED DIAL (Type C)

To meet the demand for a dial to make logging of stations easy in any part of a room at night, without respect to the room lights, the NATIONAL COMPANY, INC., has brought out the ILLUMINATED Dial Type C,—a VELVET-VERNIER product. This has the same variable ratio of from 6-1 to 20-1, the same perfection of construction and operation, beauty of appearance and ease of attachment, as the Type B VELVET-VERNIER Dial.

It has **in addition** a tiny invisible 6-volt lamp, which brilliantly lights the scale. It is usually connected with the filaments so that one switch lights the tubes and dials together. Extra 6-volt lamps, **$0.20**. 4 ½-volt lamps, **$0.35** each.

Made in either clockwise or counter-clockwise and with 360° divisions (0-200) or in Dual Range—180° (0-100-0).

Price—In nickel finish..... **$3.00**
In gold finish..... **3.50**



THE NATIONAL "EQUICYCLE" CONDENSERS

These Variable Condensers are unlike any others because their SLF plates revolve three-quarters instead of one-half turn, to cover the tuning range, resulting in a greater spacing of crowded stations than is possible with a 180° movement. Shape of plates developed by Prof. Field of Harvard University and Carl A. Hellmann of Washington, D. C. Plates and frame are made of aluminum with brass working parts and hard rubber insulation. The prices include either Type A or Type B NATIONAL VELVET-VERNIER Dial. The ILLUMINATED Type C Dial is furnished for $0.50 additional.

Price—250 MMF..... **$7.00**
350 MMF..... **7.25**
500 MMF..... **7.50**

NATIONAL IMPEDAFORMERS

No matter how sensitive or selective a Radio set may be, it gives little real satisfaction if the quality of its audio amplification falls below modern standards.

The NATIONAL IMPEDAFORMERS have been designed for quality audio amplification. Each of the three units contains a .1 Mfd. TOBE Condenser and a LYNCH Resistor. The first unit has also an R.F. Choke, which is a real necessity for perfection of reproduction. Three impedaformers, three tube sockets and a rheostat are all that is necessary for an audio amplifier which is the last word in power and faithfulness of reproduction.

Price—NATIONAL IMPEDAFORMERS,

Type B, each..... **$5.50**

[The NATIONAL RADIO SET ESSENTIALS listed above, may be easily built by you into a modern receiving set,—capable of distance, able to separate stations sharply, of fine appearance,—easy to operate and easy to listen to. Send for Bulletin 116-C-B.

National Company, Inc., now also makes Power Transformers, Filter Chokes, Filter Condenser Blocks, using TOBE Condensers, and Tone Filters for B-Eliminator and Power Amplifier construction,—both for Raytheon and other rectifying tubes. Send for special literature, mentioning CITIZENS RADIO CALL BOOK.]

BE SURE YOU GET THE GENUINE

NATIONAL

RADIO PRODUCTS

NATIONAL CO., INC., *Engineers & Manufacturers;* W. A. READY, Pres., 110 Brookline St., Cambridge, Mass.

WNAB The Shepard Stores, Winter St., Boston, Mass. 280.2 meters, 1070 kilocycles, 100 watts, class A. Daily ex Sun, 3 to 4 pm, daily Phonophone record hour. Eastern standard time.

WNAC The Shepard Store, Winter St., Boston, Mass. 430.1 meters, 697 kilocycles, 500 watts. Sun. 10:45 am, church services; 1-2 pm, musical concert; 7:05-7:15 pm, church services. Daily ex Sun, 10:30-11:30 am, women's club; 12:15-1 pm, church services; 1-2 pm, luncheon concert; 4-5 pm, music; 6-6:30 pm, children's club; 6:30-7:30, dinner dance; 7:30-8 pm, news and talks; 8-10 pm, concert. Sat, 10:05 pm, dance program. Eastern time.

WNAD University of Oklahoma, Norman, Okla. 254 meters, 1180 kilocycles, 500 watts, class A. Mon, Tues, Wed, Thurs, 12:30-1 pm, music; 3:30-4:30 pm, jazz orchestra; 7:15-8 pm, talks; 10:30-12 pm, music. Sun, 9:15-10:30 pm. Central standard time. Slogan: "The Voice of Soonerland."

WNAL R. J. Rockwell, 5019 Capitol Ave., Omaha, Nebr. 258.5 meters, 1160 kilocycles, 500 watts, class A. Tues, Fri, 7:30-9 pm. Central standard time. Slogan: "Pioneer Station of Omaha."

WNAP Wittenberg College, Springfield, Ohio. 248 meters, 1210 kilocycles, 100 watts, class A. Central standard time.

WNAT Lensing Bros. Co., Spring Garden & Ninth St., Philadelphia, Pa. 250 meters, 1200 kilocycles, 100 watts, class C. Wed, 6:50 pm until midnight, musical. Sat, 8 pm until midnight. Eastern standard time. Slogan: "We Never Are Tired."

WNAX Dakota Radio Apparatus Co., Yankton, S. Dak. 244 meters, 1230 kilocycles, 100 watts, class A. Daily ex Sun, 11:30 am, markets and weather. Tues, Thurs, Sat, 5 pm, musical. Central standard time. Off air until first of September.

WNBH New Bedford Hotel, Pleasant St., New Bedford, Mass. 247.8 meters, 1210 kilocycles, 250 watts. Sun, 11 am-12:15 pm, church services. Mon, Fri, 6-11 pm, musical program. Tues, Wed, Thurs, Sat, 7-7:15 pm, news flashes. Wed, 6-7 pm, dinner concert. Eastern standard time.

WNJ Radio Shop of Newark, 89 Lehigh Ave., Newark, N. J. 252 meters, 1190 kilocycles, 500 watts, class A. Daily ex Mon & Thurs, 6-6:30 pm, 8:30-12 pm, dance music. Eastern standard time. Slogan: "The Voice of Newark."

WNOX Peoples Tel. & Tel. Co., 313 Commerce St., Knoxville, Tenn. 268 meters, 1120 kilocycles, 500 watts, class A. Mon, Wed, Fri, 8-10 pm. Central standard time. Slogan: "Smoky Mountain Station."

WNYC City of New York, New York City, N. Y. 526 meters, 570 kilocycles, 1000 watts, class B. Daily ex Sun, 6-11 pm. Mon, Wed, Fri, 11 am-12:30 pm. Sun, irregular. Eastern standard time. Slogan: "Municipal Broadcasting Station of the City of New York."

WOAI Southern Equip. Co., San Antonio, Texas. 394.5 meters, 760 kilocycles, 2000 watts. Sun, 11 am-7:45 pm, church services. Daily ex Sun, 10 am, weather, markets, etc.; 2:30-3 pm, music; 3-4:45 pm, news, music, children's story telling, etc. Daily ex Sat, Sun, Mon, 8:30-9:30 pm, varied program. Central standard time.

WOAN The Vaughan School of Music, Lawrenceburg, Tenn. 282.8 meters, 1060 kilocycles, 500 watts, class B. Daily ex Sun, 9-10 pm, musical. Central standard time. Slogan: "Watch Our Annual Normal."

WOAW The Voice of the Woodmen of the World Life Insurance Association, Headquarters Bldg., Omaha, Nebr. 526 meters, 570 kilocycles, 1000 watts. Sun, 9 to 10:45 am, 2 to 4 pm, 6 to 7 pm, religious services; 9 to 11 pm, religious. Mon, Tues, Thurs & Fri, 8 to 9 am, stock reports; 10-11:30 am, 12:30 to 2 pm, stock reports & musical; 4 to 6 pm, miscellaneous; 6-7:30 pm, dinner concert; 9 to 11, concert. Sat, regular programs till 7:30 pm. Additional programs under the Omaha Chamber of Commerce. Central standard time. Slogan: "The Fraternal Station at Omaha."

WOAX Franklin J. Wolff, the Monument Pottery Co., Trenton, N. J. 240 meters, 1250 kilocycles, 500 watts. Daily ex Sun, 10:05-12:45 pm, music, weather forecast, police reports, crop reports for New Jersey. Eastern standard time. Slogan: "The Voice from Trenton."

WOC The Palmer School of Chiropractic, Davenport, Iowa. 483.6 meters, 620 kilocycles, 5000 watts. Sun, 1-2 pm, orchestra; 6:30 pm, church; 8:15-9:15 pm, 10-11 pm, orchestra. Daily ex Sun, 1:57-6 pm, time signals, markets. Mon, 3-3:30 pm, home management; 5:45-6 pm, chimes & sports. Tues, 7-9:30, WEAF; 9:30 pm, musical or lecture. Wed, 4-4:45 pm, musical; 9-9:30 pm, WEAF; 9:30-10:30 pm, organ. Thurs, 7-7:30 pm, WEAF; 7:30-8, Quartette Plowboys; 8-10 pm, WEAF. Fri. 7-7:30 pm, Ivory Twins; 7:30-8:30 pm, Melody Mexicos; 8:30-9:30 pm, musical from WEAF. Sat, 8-9 pm, WEAF. Central standard time. Slogan: "Where the West Begins and in the State Where the Tall Corn Grows."

WOCB Orlando Broadcasting Co., P. O. Box 451, Orlando, Fla. 293.7 meters, 1021 kilocycles, 50 watts. Daily ex Sun, 3-4 pm, 7:30-8 pm. Sat, 6-7 pm. Eastern time. Slogan: "Orlando, City Beautiful."

WOCL Jamestown Furniture Assoc., Jamestown, N. Y. 275.2 meters, 1090 kilocycles, 15 watts, class A. Sun, 10:30 am & 7:30 pm, church service. Mon, 9 to 9:15 pm, 9:15 to 12 midnight, educational feature popular program. Eastern standard time.

WODA The O'Dea Temple of Music, 115 Ellison St., Paterson, N. J. 390.9 meters, 767 kilocycles, 250 watts. Sun, 10:30 am, 7:30 pm, church services. Daily ex Sun, 12-1 noon; 5-7 pm, studio; 8-11 pm, studio. Tues, 11:30-12:30 am, Nite Club. Thurs, 11-12 midnight, Nite Club. Fri, 10:30-11:30 pm, dance; 11:30-12:30 am, Nite Club. Eastern standard time. Slogan: "The Voice of the Silk City."

WOI Elec. Engineering Dept., Iowa State College, Ames, Iowa. 270 meters, 1110 kilocycles, 750 watts, class B. Daily ex Sun, 9:30 am, weather, markets; 10:15 am, weather & markets; 12:30 pm, chimes, weather, markets & educational talks; 9:30 pm, weather. Mon & Thurs, 7:30 pm, educational talks, program. Sun, 10:45 am, chimes; 11 am, college chapel. Central standard time.

WOK Neutrowound Radio Mfg. Co., Homewood, Ill. 217 meters, 1380 kilocycles, 5000 watts. Sun, 6-12 pm, organ concert, orchestra. Daily ex Sun & Mon, 6-7:45 pm, 8-9 pm, 9:20-12 pm. Central standard time.

WOKO Otto Baur, Dyckman Radio Shop, 138 Dyckman St., New York City. 233 meters, 1290 kilocycles, 50 watts, class A. Mon, Thurs, Sats, 7-12 pm. Tues & Fri, 7-12 pm, non-regular. Eastern standard time.

WOO John Wanamaker, Philadelphia, Pa. 508.2 meters, 590 kilocycles, 500 watts, Daily ex Sun, 11 am, music; 11:30, weather; 11:55 am, time signals; 12 noon, music; 4:40 pm, news reports; 4:45 pm, musical; 9:55 pm, time signals; 10:02 pm, weather report. Mon, Wed, Fri, 7:30-11 pm, concerts. Sun, 10:45 am, or 7:45 pm, 2:15 pm, Sunday School musical program; 6 pm, organ recital. Eastern standard time.

WOOD Hotel Rowe, Grand Rapids, Mich. 241.8 meters, 1240 kilocycles, 5000 watts. Daily ex Sat & Sun, 7:35-11 pm. U. S. farm school, musical program, presentation, air mail hour, nut club. Central standard time. Slogan: "The Furniture Capital of America."

MONEY BACK ~ *if Not Delighted*

"Marvelous!" "Unbelievable!" "What a Bargain!" Every day we receive scores of letters from users of the amazing new Roll-O "B" Battery Eliminator praising this invention to the skies. It does all that any higher priced "B" Eliminator can do—and more!

Read This Proof!

I have received the Roll-O "B" Battery Eliminator and I am greatly pleased with it. We did not know we had a good radio till we hooked up your Eliminator. To me it is a 100% perfect Eliminator.
Detroit, Mich.

I received the Eliminator and will say that its performance is all I could ask.
Waterman, Cal.

I have your "B" Eliminator and like it very much. So far it has given me very good service.
Perth Amboy, N. J.

Recently received a "B" Eliminator. Works fine.
Akron, Ohio

The eliminator is working perfectly.
Louisville, Ky.

Your "B" Eliminator received and worked satisfactory. Please send me another one at once. Do you give agencies for local counties? I can sell several of these here.
Zanesville, O.

Names on request.

Forget Battery Troubles Forever

All you do is hook up this Roll-O Eliminator to your set and sit back to the greatest radio pleasure of your life. No more batteries to worry about. Enjoy better reception, sharper tuning. Don't worry because "B" batteries run down and spoil the reception of your set.

Operates on All Sets

Works perfectly on any direct or alternating current, giving up to 90 volts and using full wave of the power supply. Hooks up in a moment to any set up to six tubes. Constant voltage assures more power.

Completely Equipped—No Extras to Buy

Five minutes after you receive this Eliminator you can be enjoying its advantages. Comes to you completely equipped, together with simple, easy instructions. Made to last years. Solidly built in beautifully finished metal case with genuine Bakelite top.

Order Today—10 Days Trial

Now, for no more than the cost of good "B" batteries you can own a Roll-O Eliminator that will make batteries unnecessary forever. Pin a dollar bill to coupon and mail today. Postman will deliver Eliminator to you. Deposit $6.95 (plus few cents postage) with him. Use Eliminator 10 days. If not delighted with results, return it within ten days and receive your money. Don't delay. Act quick to become one of the thousands of enthusiastic users.

Trickle Charger, $3.95

Charges "A" or "B" batteries using ordinary house current. Hooked to your "A" battery gives complete "A" power unit. Send $1.00 with order. Pay $2.95, plus few cents postage, to postman when he delivers your charger C. O. D.
Use for ten days. If not more than satisfied, return it and get your money back.

Send only $1 with this Coupon

The Roll-O Radio Co.,
Dept. Q-15,
3rd and Sycamore Sts.,
Cincinnati, Ohio.

Gentlemen: I attach $1.00. Please send Roll-O Eliminator to me C. O. D. for $6.95 (plus a few cents postage) on special 10-day Trial Guarantee.

Name.....

Address.....

Town.....State.....

THE ROLL-O RADIO CO.

Dept. Q-15, 3rd & Sycamore St., Cincinnati, Ohio

WOQ Unity School of Christianity, 917 Tracy Ave., Kansas City, Mo. 278 meters, 1080 kilocycles, 1000 watts, class B. Tues, 8-9:30 pm, devotional musical program. Thurs, 7-8 pm, educational; 8-10 pm, musical. Sat, 8-10 pm, classical music; 10-11 pm, special radio healing service. Sun, 11 am-12:30 pm, morning services; 7-9:30 pm, evening services. Central standard time.

WOR L. Bamberger & Co., 46 Bank St., Newark, N. J. 405.2 meters, 740 kilocycles, 500 watts, class B. Mon, 3:45 pm, 5:15-12 pm. Tues & Thurs, 5:15-7:30 pm. Wed, 5:15-11 pm. Fri, 5:15-6:30 pm. Sat, 3 pm, 6:30-12 pm. Eastern standard time.

WORD Peoples Pulpit Association, Webster Hotel, 2150 Lincoln Park West, Chicago, Ill. 275 meters, 1090 kilocycles, 5000 watts. Sun, 10-11 am, 2:30-4 pm, 7-8 pm, 9-11 pm. Mon, Tues, Wed, Thurs, Fri, Sat, 9:10-9:30 am, 12:10-12:30 noon, 7-8 pm, 9-10 pm, 11-12 pm. Central standard time. Slogan: "The Watch Tower, Radio WORD."

WOS Missouri State Marketing Bureau, Board of Agriculture, Jefferson City, Mo. 440.9 meters, 680 kilocycles, 500 watts, class B. Daily ex Sun, 9-10-11-12 am, 1-2-3-5 pm (Sat ams only). Mon, Wed & Fri, 8-11 pm. Sun, 9-10 am, 7:30-9:30 pm. Central standard time. Slogan: "Watch Our State."

WOWO The Main Auto Supply Co., 215 W. Main St., Fort Wayne, Ind. 227 meters, 1320 kilocycles, 500 watts. Sun, occasionally. Mon, Wed, Thurs, noon & night. Tues-Fri, Sat, noon. Central standard time. Slogan: "Wayne Offers Wonderful Opportunities."

WPAK North Dakota Agricultural College, Fargo, North Dakota. 275 meters, 1090 kilocycles, 50 watts. Mon, Wed & Fri, 7:30 pm, during school terms. Central standard time.

WPCC North Shore Congregational Church, Wilson Ave. & Sheridan Road, Chicago, Ill. 258 meters, 1160 kilocycles, 500 watts. Sun, 11 am, 3:30 pm, 7:45 pm, church services, and afternoon Gospel Studio Service. Wed, 7 pm, Gospel music and Bible hour. Fri, 7:30 pm, Gospel music and Bible hour. Slogan: "We Preach Christ Crucified."

WPDQ The Norwood Station, Hiram L. Turner, 121 Norwood Ave., Buffalo, N. Y. 205.4 meters, 1460 kilocycles, 250 watts, class A. Tues, Wed & Sat, 8-11 pm. Sat, 11:30 pm-1:30 am. Eastern standard time.

WPG Municipality of Atlantic City, Atlantic City, N. J. 299.8 meters, 1000 kilocycles, 5000 watts, class B. Sun, 3:15 pm until 12 midnight, summer scheduie. Mon, Tues, Thurs, Fri & Sat, 1:30 pm to midnight. Eastern standard time.

WPRC Wilson Printing & Radio Co., 1740 Fifth St., Harrisburg, Pa. 215.6 meters, 1390 kilocycles, 100 watts, class A. Mon, Wed & Fri, 9-11:30 pm. Eastern standard time. Slogan: "The Capital City of the Keystone State."

WPSC Pennsylvania State College Dept. of Elec. Engineering, State College, Pa. 261 meters, 1050 kilocycles, 500 watts, class A. Mon, Wed & Fri, 7-11 pm. Eastern standard time. Slogan: "The Voice of the Titany Lion."

WQAA Horace A. Beale, Jr., Parkersburg, Pa. 220 meters, 1360 kilocycles, 500 watts, class A. Eastern standard time.

WQAC Gish Radio Service, 108 E. 8th St., Amarillo, Texas. 234 meters, 1280 kilocycles, 100 watts, class A. Sun, 11:30 to 12:30 am; 3 to 4:30 pm; 7:30 to 9:30 pm. Central standard time. Slogan: "The Bible, the Whole Bible and Nothing But the Bible."

WQAE Moore Radio News Station, 41 Main St., Springfield, Vt. 246 meters, 1220 kilocycles, 50 watts, class A. Sun, 10:30 am, church services. Eastern standard time.

WQAM Electrical Equipment Co., 42 N. W. 4th St., Miami, Fla. 285.5 meters, 1050 kilocycles, 750 watts. Sun, 11 am-7:30 pm, church services. Daily ex Sun, 11:45-12:15 noon; evening programs vary. Eastern time. Slogan: "The Most Southern Broadcasting Station in the U. S."

WQAN Scranton Times, 222 Spruce St., Scranton, Pa. 250 meters, 1200 kilocycles, 100 watts, class A. Daily ex Sun, 12:30-1 pm; 4:30-5 pm. Tues & Fri, 8-10:30 pm. Sat, 10:30-12 pm. Eastern standard time. Slogan: "The Voice of the Anthracite."

WQAO Calvary Baptist Church, 123 W. 57th St., New York, N. Y. 361 meters, 833 kilocycles, 500 watts, class B. Wed, 8-9 pm, mid-week evening services. Sun, 11 am-12:30 pm, church services; 3-4:30 pm. Bible study class; 7:45-9:30 pm, evening services. Eastern standard time. Slogan: "The Bible, the Whole Bible, and Nothing but the Bible."

WQJ Calumet Baking Powder & Rainbo Gardens Station, Clark & Lawrence, Chicago, Ill. 447.5 meters, 670 kilocycles, 500 watts. Mon, 11 am-12 noon, 1:45-2:45 pm, home economics. Tues, Wed, Thurs, Fri & Sat, 11 am-12 noon, 1:45-2:45 pm, 7-8 pm, 10 pm-2 am. Central standard time. Slogan: "Chi-Caw-Go."

WRAF The Radio Club, Inc., 719 Michigan Ave., LaPorte, Ind. 223.8 meters, 1340 kilocycles, 100 watts. Sun, 10:15 am, church services; 8 pm, music. Mon & Thurs, 8:30 pm. Central standard time. Slogan: "The City of Maples."

WRAK Economy Light Co., 1105 Ludington St., Escanaba, Mich. 256 meters, 1170 kilocycles, 100 watts, class A. Sun, 6:30 to 8 pm, classical. Mon & Fri, 10:30 to 11 am, household hints and weather forecast; 6:30 to 7 pm, late news and weather forecast followed by musical program. Tues & Thurs, same as Mon & Fri. Wed, 10:30 to 11:30 am, household hints & weather forecast. Sat, 10:30 to 11 am, household hints & weather forecast; 6 to 6:30 pm, late news & weather forecast, followed with dance program. Eastern standard time. Slogan: "The Gateway to Cloverland."

WRAM Lombard College, Galesburg, Ill. 243.8 meters, 1230 kilocycles, 100 watts, class A. Mon, 7 pm, bedtime stories; 8 pm, educational; 9-11 pm, musical. Central standard time.

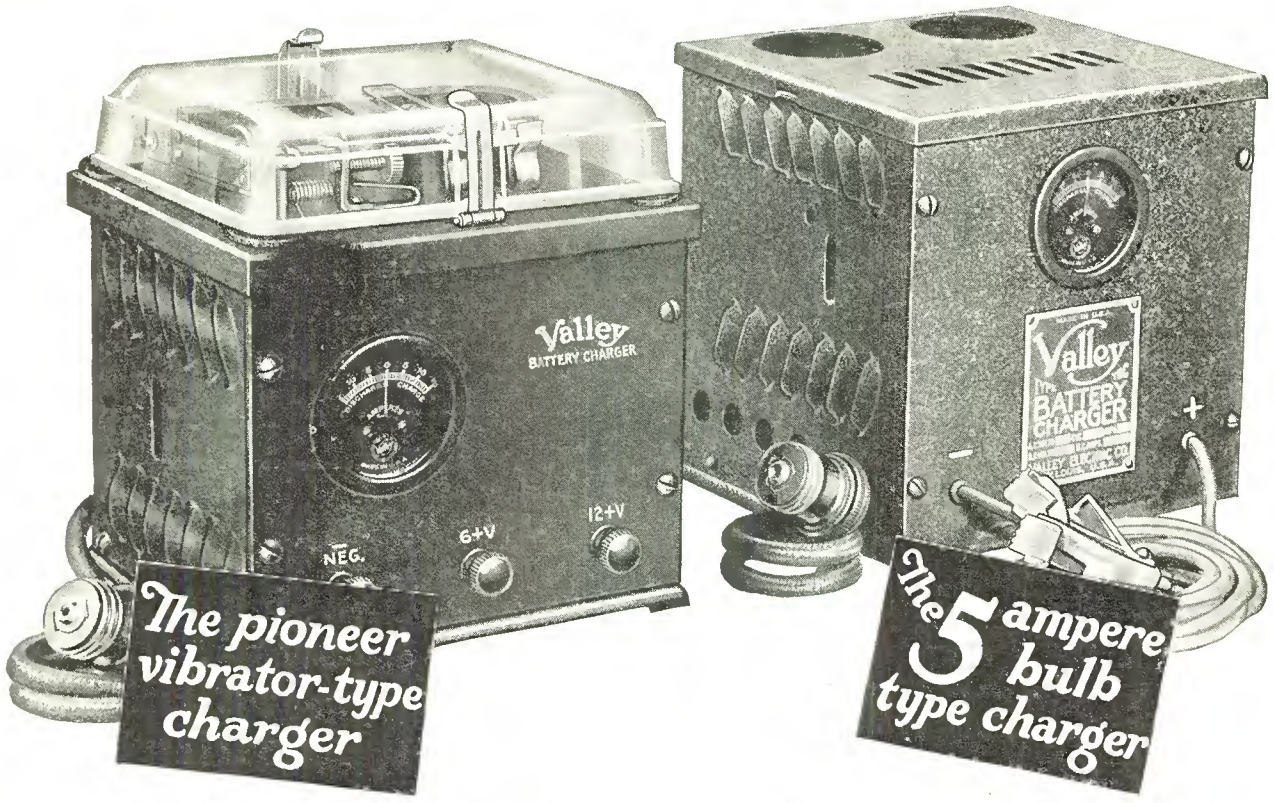
WRAV Antioch College, Yellow Springs, Ohio. 263 meters, 1140 kilocycles, 100 watts, class A. Wed, 8 pm, 9 pm, music & educational. Sun, 7 pm. Central standard time.

WRAW Avenue Radio & Electric Shop, 460 Schuyler Ave., Reading, Pa. 238 meters, 1260 kilocycles, 10 watts, class A. Tues, 9 pm, EST entertainment. Thurs, 10 pm. Eastern standard time. Slogan: "The Schuyler Valley Echo."

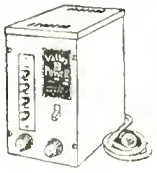
WRAX Flexon's Garage, Gloucester City, N. J. 268 meters, 1120 kilocycles, 500 watts, class A. Eastern standard time.

WRBC Immanuel Lutheran Church, Valparaiso, Ind. 277.6 meters, 1080 kilocycles, 500 watts, class A. Sun, 10:30-12 noon, 7:30-9 pm, church service. Mon, 7:30-9 pm, diversified program. Central standard time. Slogan: "World Redeemed by Christ."

WRC Radio Corporation of America, 14th & Park Road, N. W., Washington, D. C. 468.5 meters, 640 kilocycles, 1000 watts, class B. Sun, 11 am-12:30 pm, church services; 4-5:30 pm, church; 6:20-10:15, musical. Mon, Tues, Wed, Thurs, Fri & Sat, 6:45 am to 11 pm, varied. Eastern standard time. Slogan: "The Voice of the Capital."



Use either one for a dependable source of "A" battery current



Valley B Power Unit

Supplies plate voltage from the house lighting circuit. For sets of 12 tubes or less. Can be used with a power tube. Is equipped with famous Raytheon Tube—"for reliable reeeption."

Valleytone Radio Receiver

A 5-tube, tuned radio frequency receiver which affords the perfect combination of selectivity, tone, volume and range. Two-dial control. Antenna control. Wired so that use of power tube is optional.

You can get the famous Valley Battery Charger in both vibrator and bulb types. Use either one for a dependable source of A battery current.

The Vibrator Type: This is the pioneer of radio battery chargers. Nearly a quarter of a million of this type of Valley Charger has gone into service all over the world.

Charges 6-volt batteries at 6 amperes, 12-volt batteries at 3 amperes. Quiet, efficient. Cannot harm the battery.

Mounted in black case with bakelite panel and glass top. Pleasing in appearance and will harmonize with finest radio receiver. Complete with cord and plug, and leads and clips.

The Twin Bulb Type: The twin bulb design of this Valley Charger overcomes the only objection to the bulb type charger, i.e., the slow charging rate.

Using both bulbs, you have a 5-ampere charger. Using only one bulb, you have a 2½-ampere charger. Thus the charging rate and the purchase of one bulb or two are entirely optional.

Absolutely noiseless. Built in handsome black grained metal case. Complete with cord and plug, and leads and clips.

VALLEY ELECTRIC CO. ***(Radio Division)*** **ST. LOUIS, MO.**

District Offices: **Boston, Chicago, Cleveland, Indianapolis, Kansas City, Minneapolis, New York, Philadelphia, San Francisco**

Valley Electric

Tell 'Em You Saw It in the Citizens Radio Call Book

WRCO Wynne Radio Co., Raleigh, N. C. 252 meters, 1190 kilocycles, 100 watts, class A. Sun, 10:45 am. Irregular programs at present. Eastern standard time.

WREC Wooten's Radio & Elec. Co., Coldwater, Miss. 254 meters, 1180 kilocycles, 10 watts. Daily ex Sun, 6-8 pm. Sun, 4-5 pm. Central standard time. Slogan: "The Most Powerful 10-Watt Station in the World."

WREO The Reo Motor Car Co., Lansing, Mich. 285.5 meters, 1050 kilocycles, 500 watts, class B. Daily ex Sun, 6-7 pm, 10 pm. Tues, Thurs. 8:15-10 pm. Sat, 10-12 midnight. Sun, 10 am, chimes; 10:30 am & 7:30 pm, church. Eastern standard time. Slogan: "Watch Reo."

WRHF Washington Radio Hospital Fund, Washington, D. C. 256 meters, 1170 kilocycles, 50 watts. Eastern standard time.

WRHM Rosedale Hospital, Inc., Nicollet & 44th St., Minneapolis, Minn. 252 meters, 1190 kilocycles, 50 watts, class A. Thurs, 9-11 pm, music. Sun, 1:30-2:30 pm, children's hour; 2:30-4:30 pm, music; 9:15-10:30 pm. Central standard time.

WRK Doron Bros. Elec. Co., Hamilton, Ohio. 270 meters, 1110 kilocycles, 100 watts, class A. Fri, 8:15 pm, music, lectures. Sun, 10:15 am, 7:30 pm, church services. Central standard time. Slogan: "The Oldest Station in Existence."

WRM University of Illinois, Urbana, Ill. 273 meters, 1100 kilocycles, 1000 watts, class A. No definite schedule. Musical concert broadcasted once a week, no definite time selected. Central standard time.

WRMU A. H. Grebe & Co., Inc., Motor Yacht "Mu[,]" New York, N. Y. (Portable). 236 meters, 1270 kilocycles, 100 watts. Unlimited schedule. Eastern standard time.

WRNY The Roosevelt, New York City, N. Y. 373.8 meters, 802 kilocycles, 500 watts. Sun, 3-5:30 pm, 12-1 am. Daily ex Sun, 11-1 pm. Mon, Tues, Sat, 7-11 pm. Wed, Thurs, 6:45-10:30 pm. Fri, 7-12 midnight. Sat, 12-1 am. Eastern standard time. Slogan: "The Radio News Magazine Station."

WRR City of Dallas, Dallas, Tex. 245.8 meters, 1220 kilocycles, 500 watts. Daily ex Sun, Wed, 12-1 pm, 5-5:30, 6-7, 8-9. Mon, 11-12 midnight. Fri, 11-12 midnight. Wed, 5-5:30 pm. Thurs, 9:30-10:30 pm. Central time. Slogan: "City of Achievements."

WRST Radiotel Mfg. Co., Inc., 5 First Ave., Bay Shore, N. Y. 215.7 meters, 1390 kilocycles, 250 watts. Daily ex Sun, 12 noon-1 pm. Mon, Wed & Fri, 7-11:30 pm, concerts. Tues & Thurs, 8 to 11:30 pm. Sat, 7-11:30 pm. Sun, 11 am-12:45 pm, church services; 7-11 pm, musical concert. Eastern standard time. Slogan: "Bay Shore, Garden Spot of Long Island."

WRVA Larus & Brothers Co., Inc., Richmond, Va. 256 meters, 1170 kilocycles, 1000 watts. Mon, Thurs & Fri, 8:30-11 pm. Wed, 12:30 to 1:30 pm, 8:30 to 11 pm. Eastern standard time. Slogan: "Carry Me Back to Old Virginny."

WRW Tarrytown Radio Research Laboratory, Tarrytown, N. Y. 272.6 meters, 1100 kilocycles, 500 watts, class A. Mon, 7-8 pm, children's period; 9-11:30 pm, entertainment & orchestra. Tues, Thurs, Fri, Sat, 9-11:30 pm, entertainment, talk, orchestra. Wed, 10-11:30 pm, entertainment, orchestra. Sun, 8-9 pm, services; 10:30-11:30 pm, musical. Eastern standard time. Slogan: "Everything in Radio."

WSAI United States Playing Card Co., Cincinnati, Ohio. 325.9 meters, 920 kilocycles, 5000 watts. Sun, 11 am, church services; 4 pm. Dr. Cadman; 7:45 pm, chimes; 8 pm, sermon; 9:15 pm, Atwater-Kent Hour. Mon, 7-10 pm, musical, grand opera. Daily ex Sun, Mon, Fri, Sat, 7-10:30 pm. Sat, 7:45-12 midnight. Central standard time. Slogan: "The Gateway to Dixie."

WSAJ Grove City College, Grove City, Pa. 229 meters, 1310 kilocycles, 250 watts. Irregular schedule. Eastern standard time.

WSAN Allentown Call Publ. Co., Inc., Allentown, Pa. 229 meters, 1310 kilocycles, 100 watts, class A. Tues, Thurs & Sats, 8:15 pm, musical. Eastern standard time. Slogan: "We Serve Allentown Nationally."

WSAR Doughty & Welch Elec. Co., 46 No. Main St., Fall River, Mass. 254 meters, 1180 kilocycles, 100 watts, class A. Daily ex Sun, 12-1 pm. Sun, 10:30-12 m. Eastern standard time.

WSAX Zenith Radio Corp., 332 So. Michigan Ave., Chicago, Ill. 268 meters, 1120 kilocycles, 100 watts, class A. (Portable.) Central standard time.

WSAZ Chase Elec. Shop, Pomeroy, Ohio. 244 meters, 1230 kilocycles, 50 watts, class A. Sat, 2 pm. Sun, 10:30 am, 2:30 pm. Eastern standard time.

WSB The Atlanta Journal, care Biltmore Hotel, Atlanta, Ga. 428.3 meters, 700 kilocycles, 1000 watts. Sun, 9:30 am-5 pm, church services. Daily ex Sun, 10 am, homemakers' half hour. market reports, etc.; 10:30 am, public school program; 12 noon, organ recital, songs, etc.; 1 pm, Radio Farm Service; 2:30 pm, market reports, etc.; 6 pm, public school program; 6:20 pm, garden message. Mon, 8 pm, Sears-Roebuck Agricultural Foundation program; 10:45 pm, concert, organ, skylark, etc. Tues, 8 pm, church choir. Thurs, Fri, Sat, 8 pm, club, orchestra, etc. Central standard time. Slogan: "The Voice of the South."

WSBC The World Battery Company Station, 1219 S. Wabash Ave., broadcasting from New Southern Hotel, Chicago, Ill. 268.3 meters, 1040 kilocycles, 1000 watts. Sun, 5-7 pm, classical; 9-1 am, popular program. Mon, 5:30-7 pm, dinner concert. Daily ex Sun, Mon, 6:30-8:30 pm, dinner concert; 9:30-1 am, popular program. Central standard time.

WSBF Stix, Baer & Fuller, 6th & Washington Ave., St. Louis, Mo. 273 meters, 1100 kilocycles, 250 watts. Sun, 9 to 10 pm, theater; 11 pm to 1 am, Marigold Garden dance and revue. Mon, 1 pm, 3 to 4 pm, 7:30-8, 8-9, 9 pm, musical talks. Tues, 1 pm, 3 to 4 pm, popular. Wed & Fri, 12 noon-1 pm, 3-4 pm, 7:30-8 pm, 8-9 pm. music. Thurs, 12 noon to 1 pm, 3 to 4 pm, popular. Sat, 12 noon to 1 pm, 3 to 4 pm. Central standard time.

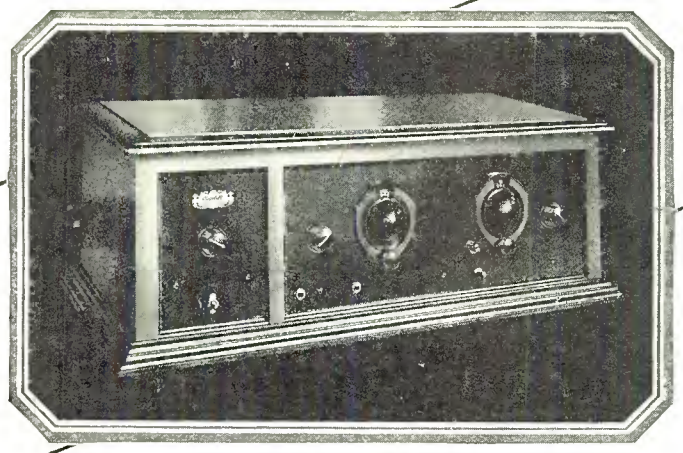
WSBT South Bend Tribune, South Bend, Ind. 315 meters, 951.8 kilocycles, 250 watts, class B. Mon, 7:15 to 10 pm, C. S. Wed, 7:15 to 9:15 pm, 12 midnight to 1 am. Fri, 7:15 pm to 9:30 pm. Slogan: "Voice of the Hoosier State."

WSDA The City Temple, New York City, N. Y. 263 meters, 1140 kilocycles, 250 watts, class A. Thurs, 7:45-9:30 pm. Sat, 10:45 am-1 pm. Sun, 7:30-9:30 pm. Eastern standard time.

WSKC World's Star Knitting Company, Bay City, Mich. 260.7 meters, 1150 kilocycles, 500 watts. Sun, 11 am. Daily ex Sun, 12-1 pm, dinner hour; 4 pm, news events, features. Mon, Wed, 9-11 pm, request program. Sat, 11 pm-2 am. Eastern standard time. Slogan: "Where the Summer Trails Begin."

WSM The National Life and Accident Ins. Co., Inc., Seventh Ave. N. & Union St., Nashville, Tenn. 282.8 meters, 1060 kilocycles, 1000 watts. Mon, Wed, Fri, & Sat, 6:30 pm, dinner music; 7 pm, bed time stories. Mon, 7:30 pm, community program. Mon, Wed, Sat, 10 pm, studio concert. Sun, 10:30 am, 7:30 pm, church services. Central standard time. Slogan: "We Shield Millions."

WSMB Saenger Amusement Co. & Maison Blanche Co., 1401 Tulane Ave., New Orleans, La. 319 meters, 940 kilocycles, 500 watts, class B. Daily ex Sun, 12:30-1:30 pm, 6:30-7:30 pm, 8:30-10:30 pm, entertainment. Central standard time. Slogan: "America's Most Interesting City."



$231

with 5 McCullough AC Tubes and Rectron 213
without Loud Speaker

Cleartone LEADS THE WAY

Here is the first successful low-priced set to eliminate "A" and "B" batteries

EVERYBODY was waiting for a set that would eliminate "A" and "B" Batteries without being high-priced. Here it is at last. The Cleartone Radio Electric Model 110, operating from the house current and using no fluids or acids. And the price, including 5 McCullough AC Tubes and Rectron 213 (without loud speaker), is only $231.00. What other set has such advantages at this figure?

The Cleartone Electric Model 110 abolishes the battery problem by using McCullough AC Tubes. They are undoubtedly the greatest achievement in radio today. The set has won the approval of such eminent authorities as Professor Wilcox, of the Armour Institute of Technology, of Chicago.

This set is the result of five years of exclusive radio receiving set manufacturing. You will marvel at its tone quality and volume. And the selectivity, which is attained by two vernier dial controls, is exceptionally acute. The high quality of workmanship insures a set which will give years of satisfactory service, fully guaranteed by a manufacturer of the highest standing in the radio industry.

THE CLEARTONE RADIO COMPANY
2434 Gilbert Avenue :: :: :: Cincinnati, Ohio

DEALERS

Let us tell you how this set will help you do away with losses due to heavy service costs. We have some interesting facts and figures for YOU.

CLEARTONE *Complete* RADIO SETS

Tell 'Em You Saw It in the Citizens Radio Call Book

WSMH The Shattuck Music House, 207 Washington St. N., Owosso, Mich. 240 meters, 1250 kilocycles, 20 watts, class A. Wed, 8 pm, vocal & instrumental music. Sat, 10 pm, popular music. Sun, 10 am, church service. Eastern standard time.

WSMK The S. M. K. Radio Corp., 812 Gibbons Hotel, Dayton, Ohio. 275.2 meters, 1090 Kilocycles, 500 watts, class A. Daily, 12 noon-1 pm, dinner music. Daily ex Sun, 4-4:30 pm, news reports. Daily ex Sun & Wed, 6-7 pm, dinner concert; 8-10:30 pm, studio concert. Sat, "Dum Dora Club" midnite frolic. Central standard time. Slogan: "The Home of Aviation."

WSOE School of Engineering of Milwaukee, 415 Marshall St., Milwaukee, Wis. 245.8 meters, 1220 kilocycles, 500 watts, class A. Daily ex Sat & Sun, 5:30-6:30 pm, Twilight Hour; 9-11 pm. Sat, 2 pm, markets & weather; 9-11 pm, review. Sun, 7:30-8:30 pm, services. Central standard time. Slogan: "In the Land of the Sky Blue Waters."

WSRO Radio Company (Harry W. Fahrlander), 409 High St., Hamilton, Ohio. 252 meters, 1190 kilocycles, 100 watts, class A. Tues & Fri, 8-10 pm. Sun, 2-4 pm. Central standard time. Slogan: "We Sell Radio Only."

WSSH Tremont Temple Baptist Church, Boston, Mass. 261 meters, 1150 kilocycles, 100 watts. Sun, 10:15 to 12 noon, 6:30 pm to 9 pm.

WSUI University of Iowa, Capitol & Washington Sts., Iowa City, Ia. 484 meters 620 kilocycles, 500 watts. Sun, 4 pm, vespers; 9:30 pm, hymns. Daily ex Sun, 10:30 am, news, music; 12:25 pm, news, music. Wed, 9 am, high school program; 10:30 am, music, news. Mon, 4 pm, Women's Club hour; 7:30 pm, radio correspondence courses; 9 pm, music; 11:15 pm, organ. Sat, 7:30 pm, athletic contests. Central standard time. Slogan: "A Voice from Old Cold."

WSVS Seneca Vocational School, Seneca & Hydraulic Sts., Buffalo, N. Y. 218.8 meters, 1370 kilocycles, 50 watts. Wed & Fri, 8 to 10:30 pm, musical program. Slogan: "Watch Seneca Vocational School." Eastern standard time.

WSWS Bligh-Whittington Co., Straus Bldg., 310 S. Michigan Ave., Chicago, Ill. 275.8 meters, 1090 kilocycles, 1000 watts. 6 to 7 pm, classical and semi-classical concert program; 8 to 9 pm, semi-classical and popular radio artists; 10 to 11 pm, dance music and feature entertainment; 12 mignight to 1 pm, radio round table entertainment. Mon, silent night. Central standard time.

WSY Alabama Polytechnic Institute, Auburn, Ala. 250 meters, 1200 kilocycles, 500 watts, class A. Central standard time.

WTAB Fall River Herald Pub. Co., 231 Pocasset St., Fall River, Mass. 266 meters, 1130 kilocycles, 100 watts, class A. Daily ex Sun, 6:15 pm, organ recital. Mon, Thurs, 10:45 am, home economics hour. Tues & Thurs, 7:30 pm, musical program. Eastern standard time.

WTAD Robert E. Compton, 412 Wabash Ave., Carthage, Ill. 236 meters, 1270 kilocycles, 50 watts, class A. Central standard time.

WTAG Worcester Telegram Publ. Co., 52 Front St., Worcester, Mass. 545.1 meters, 550 kilocycles, 500 watts. Daily ex Sun, 10:30 am-2 pm, 4-5 pm. Mon, Wed & Fri, 7:15 pm. Tues, Thurs & Sat, 5:14 pm, "The Twinkle-Twinkle Story Teller." Daily ex Sat, 8 pm. Eastern standard time. Slogan: "The Voice from the Heart of the Commonwealth."

WTAL Toledo Broadcasting Co., Waldorf Hotel, Toledo, Ohio. 252 meters, 1190 kilocycles, 10 watts. Sun, 7:30-9 pm. Mon, Wed, Fri, 8-10 pm. Tues, Thurs, Sat, 8-9 pm. Eastern standard time. Slogan: "The Gateway to the Sea."

WTAM Willard Storage Battery Co., 246 E. 13th St., Cleveland, Ohio. 389.4 meters, 770 kilocycles, 3500 watts. Sun, 11 am-10:15 pm. Mon, Tues, Wed, Thurs, Fri, Sat, 10:45-11 am, 12:30-1:30 pm, 2:30-3:30 pm, 6 pm-12 midnight. Eastern standard time. Slogan: "The Voice from the Storage Battery."

WTAQ S. H. Van Gordon & Son, Eau Claire, Wis. 254 meters, 1180 kilocycles, 100 watts, class A. Daily ex Sun, 10:30 am, 12:15 pm, 6:15 pm, weather, markets; 6:30 pm, code. Tues, 8 pm, Fri & Sun, 7:30 pm. Central standard time. Slogan: "The Voice of the Wilderness."

WTAR Reliance Elec. Co., Inc., 519 W. 21st Ave., Norfolk, Va. 261 meters, 1150 kilocycles, 100 watts, class A. Daily ex Sun, 6 pm, weather, markets & news. Eastern standard time. Slogan: "Down in Old Virginia."

WTAW Agricultural & Mechanical College of Texas, College Station, Texas. 270 meters, 1110 kilocycles, 500 watts, class A. Wed & Fri, 8-9 pm. Sun, 11 am. Central standard time.

WTAX Williams Hardware Co., 115 S. Vermillion St., Streator, Ill. 231 meters, 1300 kilocycles, 50 watts, class A. Tues, 8 to 10 pm. Thurs, 8 to 12 pm. Central standard time.

WTAZ Thomas J. McGuire, Lambertville, N. J. 261 meters, 1150 kilocycles, 15 watts, class A. Mon, 8-10 pm, musical. Eastern standard time.

WTIC The Travelers Insurance Co., 700 Main St., Hartford, Conn. 475.9 meters, 630 kilocycles, 500 watts. Mon, Fri, 12 noon-1 pm. Daily ex Sun, Mon, Fri, 12 noon-12:30 pm. Daily ex Sun, Wed, 6 pm-11 pm. Fri, Sat, 6 pm-12 midnight. Eastern time. Slogan: "The Insurance City."

WTRC 20th Assembly District Regular Republican Club, 62 Woodbine St., Brooklyn, N. Y. Sun, 2-6 pm, general entertainment. Mon, 8-11 pm, musical program, sports, news items. Tues, Wed, Fri, 7-11 pm, general program. Eastern time.

WWAE Electric Park (L. J. Crowley), Plainfield, Ill. 384.4 meters, 780 kilocycles, 10 watts, class A. Daily ex Sun, 12:30-1:30 pm, 9-12 midnight. Sun, 10:50-12:15 pm, church; 3:30-4:30 pm, musical. Central standard time.

WWJ Evening News Association, 615 Lafayette Blvd., W. Detroit, Mich. 352.7 meters, 850 kilocycles, 1000 watts. Sat, 9 pm, same as WEAF. Sun, 7:20 pm, same as WEAF. Daily ex Sat & Sun, 6 pm, dinner concert; 8 pm, entire program from WEAF. Eastern standard time.

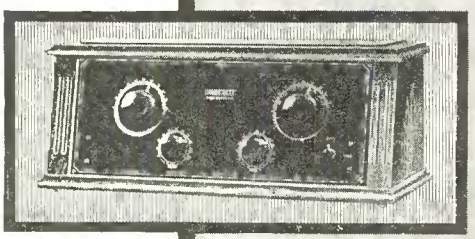
WWL Loyola University, New Orleans, La. 275 meters, 1090 kilocycles, 100 watts, class A. Sat, 7:30-8:30 pm. Central standard time.

WWRL Woodside Radio Laboratories, 4130 58th St., Woodside, L. I., New York. 258.5 meters, 1160 kilocycles, 100 watts. Sun, 2-7 pm. Mon, 10 pm-2 am, "At Home Party." Wed, Fri, 8-11 pm. Eastern standard time.

Just try a WORKRITE

The Sensation of the Season

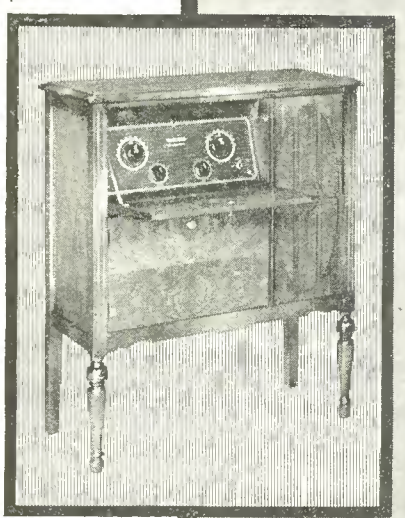
Licensed by Independent Radio Manufacturers, Inc. NEUTRODYNE Pat. March 27 1923 and April 1, 1924 Inventions Pats. Nos. 1,450,080 and 1,489,228 Other Patents Pending.



WorkRite Model 16

A 6-tube Neutrodyne Receiver. Two-dial control. Beautiful walnut cabinet with panel to match, gold trimmed.

Price $80.00



WorkRite Model 26

The same circuit and control as Model 16 mounted in a handsome walnut console cabinet. Three-way switch. Large built-in *cone speaker*. Wired for power units. Best value console on the market today.

Price $160.00

WorkRite Model 36
(See large illustration in center)

The supreme accomplishment of the season. Six-tube transformer and resistance coupled Neutrodyne circuit. TWO-IN-ONE dial operates all three condensers from one control. Has three-way switch. Large built-in *cone speaker* 24" wide. Beautiful walnut cabinet, is a pleasing piece of furniture.

Price $210.00

WORKRITE
Radios
WORKRITE

Practical Refinements

in Control and Circuits

together with more attractive cabinets and fittings make the new WorkRite Super Neutrodyne radios the sensation of the season. This is a big Neutrodyne year and WorkRite is one of the leading licensed Neutrodynes.

All WorkRite models are designed to operate with power units from lamp socket or with batteries.

All console models have built-in *cone speakers.*

A WorkRite Super Neutrodyne will satisfy your every radio desire. Visit a licensed WorkRite dealer today or write us for beautifully illustrated literature.

The WorkRite Manufacturing Co.
1827 E. 30th St. Cleveland, Ohio

U. S. Broadcasting Stations Listed by States

Alabama:

Auburn, WAPI, WSY
Birmingham, WBRC, WKBC
Montgomery, WIBZ

Alaska:

Hobron, KGL
Juneau, KFIU

Arizona:

Flagstaff, KFXY
Phoenix, KFAD, KFCB
Prescott, KPJM
Tucson, KGAR

Arkansas:

Fayetteville, KUOA
Hot Springs, KTHS
Newark, KGCG

California:

Berkeley, KRE
Burlingame, KFOB
Catalina Island, KFWO
Chico, KFWH
Fresno, KMJ
Hollywood, KFQZ, FKWB
Holy City, KFQU
Lake Pine Knot, KFXB
Long Beach, KFON
Los Angeles, KFI, KFPG, KFPR, KFSG, KHJ, KMTR, KNRC, KNX, KTBI
Oakland, KFUS, KFUU, KFWM, KGO, KLS, KLX, KTAB, KZM
Oxnard, KFYF
Pasadena, KPPC, KPSN
Sacramento, KFBK
San Diego, KFBC, KFSD
San Francisco, KFRC, KFVZ, KFWI, KGTT, KJBS, KPO, KUO
San Jose, KFAF, KQW
Santa Maria, KSMR
Stockton, KWG
Upland, KFWC
Venice, KFVD

Colorado:

Colorado Springs, KFUM, KFXF
Denver, KFEL, KFUP, KFVR, KFXJ, KLZ, KOA
Greeley, KFKA
Gunnison, KFHA
Trinidad, KFBS

Connecticut:

Hartford, WTIC
New Haven, WDRC
Storrs, WCAC

Delaware:

Wilmington, WDEL

District of Columbia:

Takoma Park, WBES
Washington, D. C., WCAP, WMAL, WRC, WRHF

Florida:

Clearwater, WGHB
Fulford-by-the-Sea, WGBU
Jacksonville, WJAX
Miami Beach, WIOD, WMBF, WQAM
Orlando, WDBO, WOCB
Pensacola, WCOA
St. Petersburg, WHBN, WJBB
Tampa, WDAE

Georgia:

Atlanta, WDBE, WGST, WSB
Macon, WMAZ
Savannah, WEBZ

Hawaii:

Honolulu, KGH, KGU

Idaho:

Boise, KFAU, KFDD
Kellogg, KFEY
Pocatello, KSEI

Illinois:

Carthage, WTAD
Chicago, KYW, WEBH, WENR, WFKB, WGES, WGN, WAAF, WBBM, WBBZ, WBCN, WCFL, WHBM, WHT, WIBJ, WIBM, WIBO, WJAZ, WLIB, WLS, WLTS, WMAQ, WMBB, WMBI, WORD, WPCC, WQJ, WSAN, WSBC, WSWS
Decatur, WBAC, WJBL
Evanston, WEHS
Galesburg, WRAM
Harrisburg, WEBQ
Homewood, WOK
Joliet, WCLS, WJBA, WKBB
La Salle, WJBC
Mooseheart, WJJD
Plainfield, WWAE
Rockford, KFLV
Rock Island, WHBF
Streator, WTAX
Tuscola, WDZ
Urbana, WRM
Zion, WCBD

Indiana:

Anderson, WHBU
Culver, WCMA
Evansville, WGBF
Ft. Wayne, WCWK, WOWO
Indianapolis, WFBM
Kokomo, WJAK
LaPorte, WRAF
Logansport, WHBL, WIBW
Seymour, WFBE
South Bend, WSBT
Valparaiso, WRBC
West Lafayette, WBAA

Iowa:

Ames, WOI
Boone, KFGQ
Burlington, WIAS
Cedar Rapids, KWCR, WJAM
Clarinda, KSO
Council Bluffs, KOIL
Davenport, WOC
Decorah, KGCA
Des Moines, WHO
Fort Dodge, KFJY
Iowa City, KFQP, WSUI
Le Mars, KWUC
Marshalltown, KFJB
Muscatine, KFYD, KTNT
Oskaloosa, KFHL
Shenandoah, KFNF, KMA
Sioux City, KFMR, WEAU

Kansas:

Concordia, KGCN
Independence, KFVG
Junction City, KFJC
Lawrence, KFKU
Manhattan, KSAC
Russell, KFQO
Wichita, KFH, KFOT

Kentucky:

Louisville, WHAS, WLAP

Louisiana:

New Orleans, KTUE, WABZ, WBBS, WCBE, WJBO, WJBW, WSMB, WWL
Pineville, KFWU
Shreveport, KFDX, KSBA

Maine:

Bangor, WABI
Orono, WGBX
Portland, WCSH

Maryland:

Baltimore, WFBR, WBAL, WCAO, WCBM

Massachusetts:

Boston, WEEI, WATT, WBZA, WNAB, WNAC, WSSH
Dartmouth, WMAF
East Springfield, WBZ
Fall River, WSAR, WTAB
Haunton, WAIT
Medford Hillside, WARC
New Bedford, WIBH, WNBH
Webster, WKBE
Worcester, WTAG

Michigan:

Bay City, WSKC
Berrien Springs, WEMC
Detroit, WGHP, WCX, WJR, WJAF, WJR, WKAR, WMBC, WWJ
Escanaba, WRAK
Flint, WFDF
Grand Rapids, WASH, WOOD
Lansing, WREO
Mt. Clemens, WABX
Owosso, WSMH
Petoskey, WBBP
Port Huron, WAFD
Royal Oak, WAGM
Ypsilanti, WJBK

Minnesota:

Collegeville, WFBJ
Minneapolis, WAMD, WCCO, WDGY, WHDI, WLB, WRHM
Northfield, KFMX, WCAL
St. Cloud, WFAM
St. Paul, KFOY
South Minneapolis, KFDZ
Welcome, KFVN

Mississippi:

Coldwater, WREC
University P. O., WCBH

Missouri:

Cape Girardeau, KFVS
Carterville, KFPW
Columbia, KFRU
Independence, KLDS
Jefferson City, WOS
Kansas City, KWKC, WDAF, WHB, WOQ
Kirksville, KFKZ
Moberly, KFFP
St. Louis, KFQA, KFUO, KFWF, KMOX, KSD, WEW, WIL, WMAY, WSBF
University City, KFVE

Montana:

Havre, KFBB
Missoula, KUOM

Nebraska:

Clay Center, KMMJ
David City, KFOR
Hastings, KFKX
Lincoln, KFAB, WFAV
Norfolk, WJAG
Oak, KFEQ
Omaha, KFOX, KOCH, WAAW, WNAL, WOAW
Shelby, KGBY
University Place, WCAJ
Wayne, KGCH

New Hampshire:

Laconia, WKAV
Tilton, WBRL

New Jersey:

Atlantic City, WHAR, WPG
Camden, WCAM
Elizabeth, WIBS
Gloucester, WRAX
Lambertville, WTAZ
Newark, WAAM, WBS, WNJ, WOR
North Plainfield, WEAM
Paterson, WODA
Red Bank, WJBI
Trenton, WOAX

New Mexico:

Albuquerque, KFLR, KFVY
State College, KOB

New York:

Bay Shore, WRST
Brooklyn, WFRL, WBBC, WBBR, WTRC
Buffalo, WGR, WMAK, WPDQ, WSVS
Canton, WCAD
Cazenovia, WMAC
Freeport, WGBB
Ithaca, WEAI
Jamaica, WMRJ
Jamestown, WOCL
Kingston, WDBZ
Long Island, WGMU, WBOQ, WIBI, WWRL
New York, WEBJ, WEBL, WEBR, WFBH, WHBS, WGCP, WBNY, WEAF, WHAP, WHN, WIBT, WJUG, WJY, WJZ, WKBQ, WLWL, WMCA, WMSG, WNYC, WOKO, WQAO, WRMU, WRNY, WSDA
Richmond Hill, WAHG
Rochester, WABO, WHAM, WHEC
Schenectady, WGY
Syracuse, WFBL
Tarrytown, WRW
Troy, WHAZ
Utica, WIBX
Woodhaven, WJBV

North Carolina:

Asheville, WABC
Charlotte, WBT, WJBC
Raleigh, WRCO

North Dakota:

Bismark, KFYR
Devils Lake, KDLR
Fargo, WDAY, WPAK
Grand Forks, KFJM

Ohio:

Akron, WADC
Bellefontaine, WHBD
Canton, WHBC
Cincinnati, WAAD, WKRC, WLW, WSAI
Cleveland, WEAR, WDBK, WHK, WTAM
Columbus, WEAO, WAIU, WMAN
Dayton, WSMK
Hamilton, WRK, WSRO
Pomeroy, WSAZ
Springfield, WCSO, WNAP
Toledo, WABR, WTAL
Wooster, WABW
Yellow Springs, WRAV

Oklahoma:

Bristow, KVOO
Chickasaw, KOCH
Norman, WNAD
Oklahoma City, KFJF, WKY, KFXR
Tulsa, WLAL

Oregon:

Astoria, KFJI
Corwallis, KOAC
Portland, KFEC, KFIF, KFJR, KFWV, KGW, KOIN, KTBR

Pennsylvania:

Allentown, WCBA, WSAN
Altoona, WFBG
East Pittsburgh, KDKA
Grove City, WSAJ
Harrisburg, WABB, WBAK, WHBG, WPRC
Haverford, WABQ
Jeannette, WGM
Johnstown, WHBP
Lancaster, WGAL, WKJC
Lewisburg, WJBU
Oil City, WHBA
Parkersburg, WQAA
Philadelphia, WFI, WABY, WCAU, WHBW, WIAD, WIBG, WIP, WLIT, WNAT, WOO
Pittsburgh, KQV, WCAE, WJAS
Reading, WRAW
Scranton, WQAN
State College, WPSC
Wilkes-Barre, WBAX, WBRE

Porto Rico:

San Juan, WKAQ

Rhode Island:

Cranston, WDWF
Providence, WEAN, WCBR, WJAR, WLSL

South Carolina:

Charleston, WBBY

South Dakota:

Brookings, KFDY
Rapid City, WCAT
Vermillon, KUSD
Yankton, WNAX

Tennessee:

Chattanooga, WDOD
Knoxville, WFBC, WNOX
Laurenceburg, WOAN
Memphis, WGBC, WHBQ, WMC
Nashville, WBAW, WDAD, WSM

Texas:

Amarillo, WDAG, WQAC
Austin, KUT
Beaumont, KFDM
Beeville, KFRB
Brownsville, KWWG
College Station, WTAW
Dallas, WFAA, WRR
Dublin, KFPL
El Paso, WDAH, KFXH
Fort Worth, KFJZ, KFQB, KFRO, WBAP
Galveston, KFLX, KFUL
Greenville, KFPM
Houston, KFVI, KFYJ, KFYO, KPRC
San Antonio, KGCM, WCAR, WOAI
San Benito, KFLU
Waco, WJAD

Utah:

Logan, KFXD
Ogden, KFUR
Salt Lake City, KDYL, KFOO, KFUT, KSL

Vermont:

Burlington, WCAX
Springfield, WQAE

Virginia:

Arlington, NAA
Norfolk, WBBW, WTAR
Richmond, WBBL, WRVA
Roanoke, WDBJ

Washington:

Everett, KFBL
Lacey, KGY
Olympia, KFRW
Pullman, KFRX, KWSC
Seattle, KFOA, KFQW, KGBS, KOMO, KJR, KTW
Spokane, KFIO, KFPY, KHQ
Tacoma, KMO
Walla Walla, KOWW
Yakima, KFIQ

West Virginia:

Weirton, WIBR

Wisconsin:

Beloit, WEBW
Camp Lake, WCLO
Eau Claire, WTAQ
Fond du Lac, KFIZ
Green Bay, WHBY
Madison, WHA, WIBA
Marshfield, WGBR
Milwaukee, WHAD, WKAF, WSOE
Omro, WJBR
Poynette, WIBU
Stevens Point, WLBL
Superior, WEBC

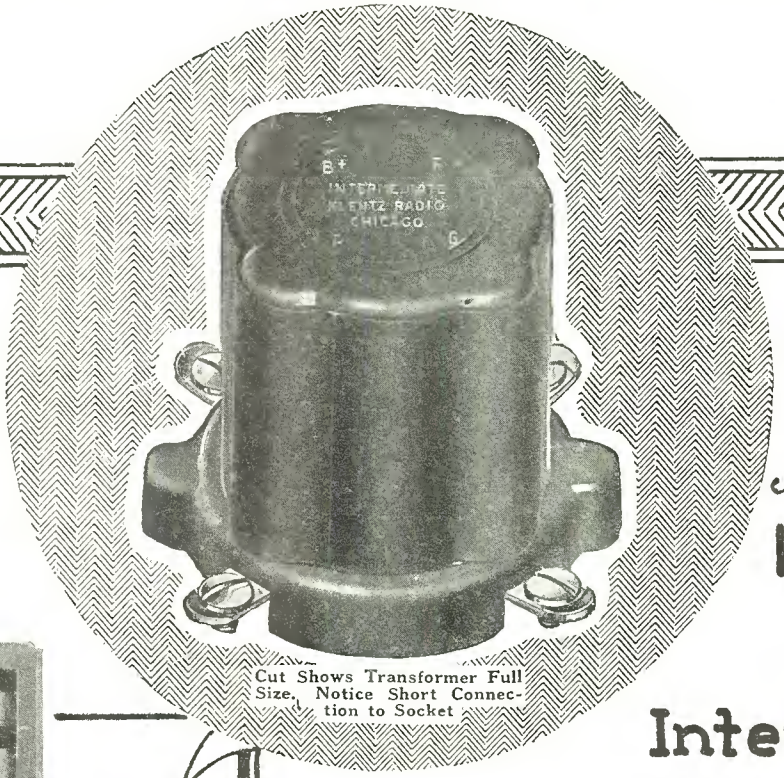
Wyoming:

Laramie, KFBU

U. S. Broadcasting Stations

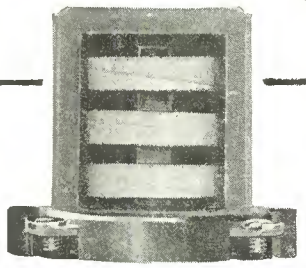
LISTED BY WAVELENGTHS

Meters	Call	Town
202.6	KFXB	Lake Pine Knot, Calif.
202.6	KGBY	Shelby, Neb.
202.6	WEHS	Evanston, Ill.
202.6	WIBS	Elizabeth, N. J.
204	WABB	Harrisburg, Pa.
205	KFVD	Venice, Calif.
205.4	KFXD	Logan, Utah
205.4	KFXY	Flagstaff, Ariz.
205.4	WFRL	Brooklyn, N. Y.
205.4	WPDQ	Buffalo, N. Y.
206.8	WABW	Wooster, Ohio
206.8	WJBA	Joliet, Ill.
207	KGTT	San Francisco, Calif.
208	KNRC	Los Angeles, Calif.
209.7	KFYO	Texarkana, Tex.
209.8	KSMR	Santa Maria, Calif.
210	KGCX	Concordia, Kan.
210	WCBR	Providence, R. I.
210	WIBH	Bedford, Mass.
211.1	KFWO	Avalon, Catalina Island, Calif.
211.1	WIBT	New York, N. Y.
211.1	WJBT	Lewisburg, Pa.
212.5	KFWV	South Portland, Ore.
212.6	WMAL	Washington, D. C.
214	WCLS	Joliet, Ill.
214.2	KFWF	St. Louis, Mo.
214.2	KFYF	Oxnard, Calif.
214.2	KFXR	Oakland City, Okla.
215	KPJM	Prescott, Ariz.
215	WHBW	Philadelphia, Pa.
215.6	WPRC	Harrisburg, Pa.
215.7	KFQW	Seattle, Wash.
215.7	KFXJ	Denver, Colo.
215.7	WBBZ	Chicago, Ill.
215.7	WIBL	Logansport, Ind.
215.7	WIBM	Chicago, Ill.
215.7	WIBJ	Chicago, Ill.
215.7	WIBM	Chicago, Ill.
215.7	WRST	Bay Shore, N. Y.
217	KFRX	Pullman, Wash.
217	WOK	Homewood, Ill.
217.3	KFAF	San Jose, Calif.
217.3	WFKB	Chicago, Ill.
218.8	KFJC	Junction City, Kan.
218.8	KFRW	Olympia, Wash.
218.8	WHBU	Anderson, Ind.
218.8	WIBI	Flushing, L.I., N.Y.
218.8	WJBI	Red Bank, N. J.
218.8	WSVS	Buffalo, N. Y.
220	KFUU	Oakland, Calif.
220	KJBS	San Francisco, Calif.
220	WIBW	Logansport, Ind.
220	WQAA	Parkersburg, Pa.
222	WBBW	Norfolk, Va.
222	WIBD	Bellefontaine, O.
222	WIBF	Rock Island, Ill.
222	WIBG	Philadelphia, Pa.
222	WIBU	Poynette, Wis.
222.1	WBES	Takoma Park, Wash.
222.1	WCOA	Pensacola, Fla.
223.7	KFQP	Iowa City, Ia.
223.8	WRAF	La Porte, Ind.
224	KFBL	Everett, Wash.
224	KFUR	Ogden, Utah
224	KFVS	Cape Girardeau, Mo.
224	WJBG	Charlotte, N. C.
224	WKAV	Laconia, N. H.
225	WKBC	Birmingham, Ala.
225.4	WBBM	Chicago, Ill.
226	KFGQ	Boone, Ia.
226	KFIC	Juneau, Alaska
226	KFKZ	Kirksville, Mo.
226	KFOB	Burlingame, Calif.
226	KFOR	David City, Neb.
226	KFQZ	Hollywood, Calif.
226	WEBL	New York, N. Y.
226	WEBQ	Harrisburg, Ill.
226	WFBE	Seymour, Ind.
226	WDAD	Nashville, Tenn.
226	WIBO	Chicago, Ill.
227	KFVN	Welcome, Minn.
227	KGBS	Seattle, Wash.
227	WDBK	Cleveland, O.
227	WOWO	Ft. Wayne, Ind.
227.1	WJBR	Omro, Wis.
227.1	WMRJ	Jamaica, N. Y.
228.9	KPPC	Pasadena, Calif.
229	KFLV	Rockford, Ill.
229	KMMJ	Clay Center, Neb.
229	WGBR	Marshfield, Wis.
229	WAIT	Haunton. Mass.
229	WPBL	Richmond, Va.
229	WCBM	Baltimore, Md.
229	WDBJ	Roanoke, Va.
229	WSAJ	Grove City, Pa.
229	WSAN	Allentown, Pa.
230.6	KFQU	Holy City, Alma P. O., Calif.
230.6	KUT	Austin, Tex.
230.6	WIBG	Harrisburg, Pa.
230.6	WIBZ	Montgomery, Ala.
238	WIL	St. Louis, Mo.
231	KDLR	Devils Lake, N.D.
231	KFDZ	South Minneapolis. Minn.
231	KFOT	Wichita, Kan.
231	KFPR	Los Angeles, Calif.
231	WBRE	Wilkes-Barre, Pa.
231	WCLO	Camp Lake, Wis.
231	WTAX	Streator, Ill.
232.4	WDBZ	Kingston, N. Y.
233	KFEY	Kellogg, Idaho
233	KJON	Long Beach, Calif.
233	WHBQ	Memphis, Tenn.
233	WJBK	Ypsilanti, Mich.
233	WOKO	New York, N. Y.
234	KFUP	Denver, Colo.
234	KFVZ	San Francisco, Calif.
234	KMJ	Fresno, Calif.
234	WFDF	Flint, Mich.
234	WQAC	Amarillo, Tex.
234.2	WIBX	Utica, N. Y.
234.2	KGCG	Newark, Ark.
234.2	WGBX	Orono, Me.
234.2	WCWK	Ft. Wayne, Ind.
234.2	WIBC	La Salle, Ill.
236	KFLU	San Benito, Tex.
236	KFVG	Independence, Kan.
236	KWKC	Kansas City, Mo.
236	WFBJ	Collegeville, Minn.
236	WGMT	Richmond Hill, L. I., N. Y.
236	WBOQ	Richmond Hill, L. I., N. Y.
236	WIBA	Madison, Wis.
236	WRMU	New York, N. Y.
236	WTAD	Carthage, Ill.
236.1	WGBF	Evansville, Ind.
236.1	KFDX	Shreveport, La.
236.1	KFOO	Salt Lake City, Utah.
236.1	WBAW	Nashville, Tenn.
238	KFCB	Phoenix, Ariz.
238	KFBS	Trinidad, Colo.
238	KFFG	Los Angeles, Calif.
238	KFWU	Pineville, La.
238	KFYJ	Houston, Tex.
238	KMTR	Los Angeles, Calif.
238	WBBP	Petoskey, Mich.
238	WHBN	Petersburg, Fla.
238	WHT	Chicago, Ill.
238	WRAW	Reading, Pa.
239.9	KFUM	Colorado Springs, Colo.
239.9	WDBO	Orlando, Fla.
240	WCAT	Rapid City, S. D.
240	KFHL	Oskaloosa, Ia.
240	KFLX	Galveston, Tex.
240	KFVE	University City, Mo.
240	KFVI	Houston, Tex.
240	KZMM	Oakland, Calif.
240	WABI	Bangor, Me.
240	WOAX	Trenton, N. J.
240	WSMH	Owosso, Mich.
241.8	KFFP	Moberly, Mo.
241.8	WOOD	Grand Rapids. Mich.
242	KFPM	Greenville, Tex.
242	KFXH	El Paso. Tex.
242	KSO	Clarinda, Ia.
242	WEBC	Superior, Wis.
242	WABY	Philadelphia, Pa.
242	WCBH	University P. O., Miss.
243.8	KGAR	Tucson, Ariz.
243.8	WAMD	Minneapolis. Minn.
243.8	WATT	Boston, Mass
243.8	WRAM	Galesburg, Ill.
244	KFVR	Denver, Colo.
244	KUOM	Missoula, Mont.
244	WEBR	Buffalo, N. Y.
244	WGBB	Freeport, N. Y.
244	WNAX	Yankton, S. D.
244	WSAZ	Pomeroy, O.
245.8	KFJY	Fort Dodge, Ia.
245.8	KFSD	San Diego, Calif.
245.8	WRR	Dallas, Tex.
245.8	WSOE	Milwaukee, Wis.
246	KDYL	Salt Lake City, Utah
246	KFJI	Astoria, Ore.
246	KFRO	Ft. Worth, Tex.
246	WABX	Mt. Clemens Mich.
246	WBAL	Baltimore, Md.
246	WIBR	Weirton, W. Va
246	WQAE	Springfield, Vt.
247.8	KWG	Stockton, Calif.
247.8	WIOD	Miami Beach. Fla
247.8	WNBH	New Bedford Mass.
247.9	KFYR	Bismarck, N. D
248	KFEC	Portland. Ore.
248	KFIK	Portland, Ore.
248	KFJB	Marshalltown, Ia.
248	KFOX	Omaha, Neb.
248	KFRB	Beeville, Tex.
248	WGAL	Lancaster, Pa.
248	WBRC	Birmingham, Ala.
248	WCSO	Springfield, O.
248	WMAY	St. Louis, Mo.
248	WNAP	Springfield, O.
249.9	WIBY	West De Pere, Wis.
249.9	WBBC	Brooklyn, N. Y.
250	KFWI	San Francisco, Calif.
250	KFXF	Colorado Springs, Colo.
250	KLS	Oakland, Calif.
250	KMO	Tacoma, Wash.
250	WFBC	Knoxville, Tenn.
250	WCAX	Burlington, Vt.
250	WHBA	Oil City, Pa.
250	WLAD	Philadelphia, Pa.
250	WLAL	Tulsa, Okla.
250	WMBB	Chicago, Ill.
250	WNAT	Philadelphia, Pa.
250	WQAN	Scranton, Pa.
250	WSY	Auburn, Ala.
252	KFHA	Gunnison, Colo.
252	KFOY	St. Paul, Minn.
252	KEPL	Dublin, Tex.
252	KFWB	Hollywood, Calif.
252	KOCW	Chickasaw, Okla.
252	WFBL	Syracuse, N. Y.
252	WGCP	New York, N. Y.
252	WBBS	New Orleans, La.
252	WBS	Newark, N. Y.
252	WNJ	Newark, N. J.
252	WRCO	Raleigh, N. C.
252	WRHM	Minneapolis, Minn.
252	WSRO	Hamilton, O.
252	WTAL	Toledo, O.
254	KFEL	Denver, Colo.
254	KFLR	Albuquerque, N. Mex.
254	KFWH	Chico, Calif.
254	WFBR	Baltimore, Md.
254	WABC	Asheville, N. C.
254	WCAJ	University Place, Neb.
254	WCBA	Allentown, Pa.
254	WEAI	Ithaca, N. Y.
254	WJBC	Canton, O.
254	WIAS	Burlington, Ia.
254	WJBB	St. Petersburg, Fla.
254	WNAD	Norman, Okla.
254	WREC	Coldwater, Miss.
254	WSAR	Fall River, Mass.
254	WTAQ	Eau Claire, Wis.
254.1	KFJZ	Fort Worth, Tex.
254.1	WJAK	Kokomo, Ind.
256	KFIQ	Yakima, Wash.
256	KFYD	Muscatine, Ia.
256	KRE	Berkeley, Calif.
256	WRAX	Wilkes-Barre, Pa.
256	WDOD	Chattanooga, Tenn.
256	WHBF	Johnstown, Pa.
256	WMBC	Detroit, Mich.
256	WRAK	Escabana, Mich.
256	WRHF	Washington, D.C.
256	WRVA	Richmond, Va.
256.4	WASH	Grand Rapids, Mich.
258	KFPW	Carterville, Mo.
258	KFUL	Galveston, Tex.
258	KOCH	Omaha, Neb.
258	WAAD	Cincinnati, O.
258	WADC	Akron, O.
258	WHEC	Rochester, N. Y.
258	WKJC	Lancaster, Pa.
258	WLTS	Chicago, Ill.
258	WPCC	Chicago, Ill.
258.5	WCMA	Culver, Ind.
258.5	WNAL	Omaha, Neb.
258.5	WWRL	Woodside, L. I., N. Y.
259	KFUS	Oakland, Calif.
259	KFVY	Albuquerqeu, N. Mex.
260.7	KFMR	Sioux City, Ia.
260.7	KSEI	Pocatello, Idaho
260.7	WSKC	Bay City, Mich.
261	KFQA	St. Louis, Mo.
261	KFQO	Russell, Kan.
261	KFUT	Salt Lake City, Utah
261	WABQ	Haverford, Pa.
261	WMAZ	Macon, Ga.
261	WPSC	State College, Pa.
261	WSSH	Boston, Mass.
261.7	KFJK	Oklahoma City. Okla.
261	WARC	Medford Hillside, Mass.
261	WDAY	Fargo, N. Dak.
261	WEAM	North Plainfield, N. J.
261	WKAF	Milwaukee, Wis.
261	WTAR	Norfolk, Va.
261	WTAZ	Lambertville, N. J.
263	KFJR	Portland, Ore.
263	KGCM	San Antonio, Tex.
263	KTBR	Portland, Ore.
263	KTUE	New Orleans, La.
252	KWUC	Le Mars, Ia.
263	WEBZ	Savannah, Ga.
263	WAAM	Newark, N. J.
263	WABR	Toledo, Ohio
263	WCAD	Canton, N. Y.
263	WCAR	San Antonio, Tex.
263	WCBE	New Orleans, La.
263	WDAG	Amarillo, Tex.
263	WDGY	Minneapolis, Minn.
263	WRAV	Yellow Springs, Ohio
263	WSBA	New York City
266	KLZ	Denver, Colo.
266	WENR	Chicago, Ill.
266	WGHB	Clearwater, Fla.
266	WBCN	Chicago, Ill.
266	WDEL	Wilmington, Del.
266	WTAB	Fall River, Mass.
267.7	KFEQ	Oak, Neb.
267.7	WEBW	Beloit, Wis.
267.7	WDAH	El Paso, Tex.
268	KFH	Wichita, Kan.
268	KFRC	San Francisco, Calif.
268	WFBM	Indianapolis, Ind.
268	WBBY	Charleston, S. C.
268	WDRC	New Haven, Conn.
268	WJAM	Cedar Rapids, Ia.
268	WJBO	New Orleans, La.
268	WNOX	Knoxville, Tenn.
268	WRAX	Gloucester, N. J.
268	WSAX	Chicago, Ill.
268.3	WSBC	Chicago, Ill.
270	KGH	Honolulu, Hawaii
270	KGU	Honolulu, Hawaii
270	WGBU	Ful-ford-by-the-Sea, Fla.
270	WGHP	Detroit, Mich.
270	WBAC	Decatur, Ill.
270	WDBE	Atlanta, Ga.
270	WGST	Atlanta, Ga.
270	WJAG	Norfolk, Neb.
270	WJBL	Decatur, Ill.
270	WJBW	New Orleans, La.
270	WOI	Ames, Ia.
270	WRK	Hamilton, Ohio
270	WTAW	College Station, Tex.
270.1	WKBE	Webster, Mass.
272.6	KFIO	Spokane, Wash.
272.6	WEBI	New York, N. Y.
272.6	WFBH	New York City
272.6	WHK	Cleveland, Ohio
272.6	WRW	Tarrytown, N. Y.
273	KFAD	Phoenix, Ariz.
273	KFIZ	Fond du Lac, Wis.
273	KFKA	Greeley, Colo.
273	KFPY	Spokane, Wash.
273	WFAM	St. Cloud, Minn.
273	WBAA	West Lafayette, Ind.
273	WDAE	Tampa. Fla.
273	WRM	Urbana, Ill.
273	WSBF	St. Louis, Mo.
275	KFBB	Havre, Mont.
275	KFKU	Lawrence, Kan.
275	KFSG	Los Angeles, Calif.
275	KQV	Pittsburgh, Pa.
275	WFAV	Lincoln, Neb.
275	WABZ	New Orleans, La.
275	WAFD	Port Huron, Mich.
275	WAGM	Royal Oak, Mich.
275	WBAK	Harrisburg, Pa.
275	WBT	Charlotte, N. C.
275	WCAC	Storrs, Conn.
275	WCAO	Baltimore, Md.
275	WHAD	Milwaukee, Wis.
275	WHAR	Atlantic City, N. J.
275	WJAS	Pittsburgh, Pa.
275	WLAP	Lonisville, Ky.
275	WMAC	Cazenovia, N. Y.
275	WORD	Chicago, Ill.
275	WPAK	Fargo, N. Dak.
275	WWL	New Orleans, La.
275.1	KFDD	Boise, Idaho
275.1	WKY	Oklahoma City, Okla.
275.2	WOCL	Jamestown, N. Y.
275.2	WSMK	Dayton, Ohio
275.8	WSWS	Chicago, Ill.
276	WEAU	Sioux City, Iowa
277.6	WHDI	Minneapolis, Minn.
277.6	KGY	Lacey, Wash.
277.6	WCAU	Philadelphia, Pa.
277.6	WDZ	Tuscola, Ill.
277.6	WLB	Minneapolis, Minn.
277.6	WLBL	Stevens Point, Wis.
277.6	WRBC	Valparaiso, Ind.
277.8	WFBG	Altoona, Pa.
278	KFJM	Grand Forks, N.D.
278	KUSD	Vermillion, S. D.
278	KWCR	Cedar Rapids, Ia.
278	KWWG	Brownsville, Tex.
278	WGBC	Memphis, Tenn.
278	WAAF	Chicago, Ill.
278	WAAW	Omaha, Neb.
278	WABO	Rochester, N. Y.
278	WHAM	Rochester, N. Y.
278	WMAN	Columbus, O.
278	WOQ	Kansas City, Mo.
280.2	KFAU	Boise, Idaho
280.2	KGCA	Decorah, Ia.
280.2	KMOX	St. Louis, Mo.
280.2	KOAC	Corwallis, Ore.
280.2	WNAB	Boston, Mass.
282.2	WKBB	Joliet, Ill.
282.8	WOAN	Lawrenceburg, Tenn.
282.8	WSM	Nashville, Tenn.
285	KOWW	Walla Walla, Wash.
285	WKBQ	New York, N. Y.
285 ½	WQAM	Miami, Fla.
285.5	WREO	Lansing, Mich.
285.7	WKAR	East Lansing, Mich.
288.3	KFKX	Hastings, Neb.
288.3	WJBV	Woodhaven, N. Y.
288.3	WMBI	Chicago, Ill.
291.1	KFWC	Upland, Calif.
293.7	WOCB	Orlando, Fla.
293.9	WAIU	Columbus, O.
293.9	KAIU	Columbus, O.
294	KTBI	Los Angeles, Calif.
296.9	KPRC	Honston, Tex.
299.8	KUOA	Fayetteville, Ark.
299.8	WPG	Atlantic City, N. J.
300	KSL	Salt Lake City, Utah
302.8	KTAB	Oakland, Calif.
302.8	WGN	Chicago, Ill.
302.8	WLIB	Chicago, Ill.
302.8	WMSG	New York, N. Y.
305.9	KOIL	Council Bluffs, Ia.
305.9	KOMO	Seattle, Wash.
305.9	WJAR	Providence, R. I.
306	KFDY	Brookings, S. D.
309	KDKA	East Pittsburgh, Pa.
315	WSBT	South Bend, Ind.
315.6	KFDM	Beanmont, Tex.
315.6	KFWM	Oakland, Calif.
315.6	KPSN	Pasadena, Calif.
315.6	WGBS	New York, N. Y.
315.6	WAHG	Richmond Hill, N. Y.
315.6	WGES	Chicago, Ill.
316	WEMC	Berrien Springs, Mich.
316.6	KSBA	Shreveport, La.
319	KOIN	Portland, Ore.
319	WGR	Buffalo, N. Y.
319	WSMB	New Orleans, La.
322.4	KOA	Denver, Colo.
322.4	WBNY	New York, N. Y.
325.9	WSAI	Cincinnati, O.
329.8	WJAZ	Chicago, Ill.
333.1	KQW	San Jose, Calif.
333.1	KTNT	Muscatine, Ia.
333.1	WBZ	East Springfield, Mass.
333.1	WBZA	Boston, Mass.
336.9	KFMX	Northfield, Minn.
336.9	WCAL	Northfield, Minn.
336.9	WCAM	Camden, N. J.
336.9	WJAX	Jacksonville, Fla.
337	KNX	Los Angeles, Calif.
340.7	KFAB	Lincoln, Neb.
340.7	KSAC	Manhattan, Kan.
340.7	WKAQ	San Juan, Porto Rico
340.7	WMCA	New York, N. Y.
344.6	WCBD	Zion, Ill.
345	WLS	Chicago, Ill.
348.6	KOB	State College, N. Mex.
348.6	KWSC	Pullman, Wash.
348.6	WEEI	Boston, Mass.
352	WJAD	Waco, Tex.
352.7	WWJ	Detroit, Mich.
360	WEW	St. Louis, Mo.
361	WQAO	New York, N. Y.
361.1	WHN	New York, N. Y.
361.2	KGO	Oakland, Calif.
365	WMAK	Buffalo, N. Y.
365.6	WDAF	Kansas City, Mo.
365.6	WHB	Kansas City, Mo.
367	WEAN	Providence, R. I.
370.2	WEBH	Chicago, Ill.
370.2	WJJD	Mooseheart, Ill.
372	WGM	Jeannette, Pa.
373.8	WRNY	New York, N. Y.
374.8	KFBU	Laramie, Wyo.
374.8	KTHS	Hot Springs, Ark.
374.8	KVOO	Bristow, Okla.
379.5	WGY	Schenectady, N. Y.
379.5	WHAZ	Troy, N. Y.
380	KFBC	San Diego. Calif.
384.4	KJR	Seattle, Wash.
384.4	WLWL	New York, N. Y.
384.4	WMBF	Miami Beach, Fla.
384.4	WWAE	Plainfield, Ill.
389.4	WEAR	Cleveland, O.
389.4	WTAM	Cleveland, O.
390.9	WODA	Paterson, N. J.
394.5	KHQ	Spokane, Wash.
394.5	WFI	Philadelphia, Pa.
394.5	WOAI	San Antonio, Tex.
395	WLIT	Philadelphia, Pa.
399.8	WHAS	Louisville, Ky.
400	WJAF	Detroit, Mich.
405.2	KHJ	Los Angeles. Calif.
405.2	WJY	New York, N. Y.
405.2	WOR	Newark, N. J.
410	WBRL	Tilton, N. H.
416.4	WBBR	Brooklyn, N. Y.
416.4	WCCO	St. Paul and Minneapolis, Minn.
422.3	WKRC	Cincinnati, O.
422.3	WLW	Cincinnati, O.
428.3	KPO	San Francisco, Calif.
428.3	WSB	Atlanta, Ga.
430.1	WNAC	Boston, Mass.
431	WHAP	New York, N. Y.
434	KGCH	Wayne, Neb.
434.5	NAA	Arlington, Va.
440.9	KLDS	Independence, Mo.
440.9	WJWF	Cranston, R. I.
440.9	WLSL	Providence, R. I.
440.9	WMAF	South Dartmouth, Mass.
440 9	WOS	Jefferson City, Mo.
447.5	WMAQ	Chicago, Ill.
447.5	WOJ	Chicago, Ill.
454	KTW	Seattle, Wash.
454.3	KFOA	Seattle, Wash.
454.3	WJZ	New York, N. Y.
461	KFNK	Shenandoah, Ia.
461	KMA	Shenandoah, Ia.
461.3	WAPI	Auburn, Ala.
461.3	WCAE	Pittsburgh, Pa.
461.3	WAPI	Auburn, Ala.
467	KFI	Los Angeles, Calif.
468.5	WRC	Washington, D. C.
469	WCAP	Washington, D. C.
475.9	WFAA	Dallas, Tex.
475.9	WBAP	Ft. Worth, Tex.
475.9	WTIC	Hartford, Conn.
483.6	WOC	Davenport. Ia.
484	WSUI	Iowa City, Ia.
491.5	KGW	Portland, Ore.
491.5	WCFL	Chicago, Ill.
491.5	WEAF	New York, N. Y.
499.7	WMC	Memphis, Tenn.
499.5	KFRU	Columbus, Mo.
500	WCSH	Portland, Me.
508.2	KFQB	Ft. Worth, Tex.
508.2	KLN	Oakland, Calif.
508.2	WIP	Philadelphia, Pa.
508.2	WQO	Philadelphia, Pa.
516.9	WCX	& WJR, Detroit, Mich.
516.9	WJR	Detroit, Mich.
516.9	WJUG	New York, N. Y.
526	WHO	Des Moines, Ia.
526	WNYC	New York, N. Y.
526	WOAW	Omaha, Neb.
525	KFBK	Sacramento, Calif.
535.4	KYW	Chicago, Ill.
535.4	WHA	Madison, Wis.
545.1	KFUO	St. Louis, Mo.
545.1	KSD	St. Louis, Mo.
545.1	WTAG	Worcester, Mass.
690	KUO	San Francisco, Calif.



Cut Shows Transformer Full Size. Notice Short Connection to Socket

A 100 kilocycle *Air Core* Intermediate Transformer



This "cut-away" view of the Klentz Transformer shows the Stagger windings which assure its perfect performance at all times.

Jobbing the following lines:

Jewell Electrical Instrument Co.
Thordarson Mfg. Co.
Yaxley Mfg. Co.
Amsco
Micamold Condenser
Precise Mfg. Co.
Spaulding Mfg. Co.
Belden Mfg. Co.
Potter Mfg. Co.
Pioneer Radio Corp.
Radio Appliance Lab.
Splitdorf Elect. Co.

.0001 Matched set of Four.....$1.50
.00015 Matched set of Four..... 1.50
All sizes of Matched Condensers in stock.

COUPON

Please send circular describing Transformers.

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The efficiency of your "Super" depends on the quality of the intermediate frequency transformers. Klentz air core transformers are designed to give maximum efficiency.

BLUE PRINTS

No. 1. This sheet shows full size panel layout giving dimensions and can be used as a template. Very handy when laying out apparatus that is mounted on front panel.

No. 2. Shows full baseboard layout so that you can lay out evenly apparatus to be mounted on baseboard. Gives exact dimensions of distance between each instrument.

No. 3. This shows a complete schematic diagram with all electrical connections plainly marked so that receiver will work when it is hooked up.

Complete set of three prints 50c postpaid

Salient Features. 100 K. C. 2-1 ratio air core perfect matching stagger winding. Bakelite construction throughout. Quality of tone, Selectivity, Amplification and Distance. Easily assembled on account of Bottom Connection. Moderately priced. One Filter. Three Intermediate Frequency Matched Transformers. One Oscillator, Four Matched Condensers. One set blue prints. Price $25.00.

Oscillator coupler is same style as intermediate transformer.

Klentz Radio Co.

2324 No. Sawyer Ave., Chicago, Ill.

KLENTZ TRANSFORMERS

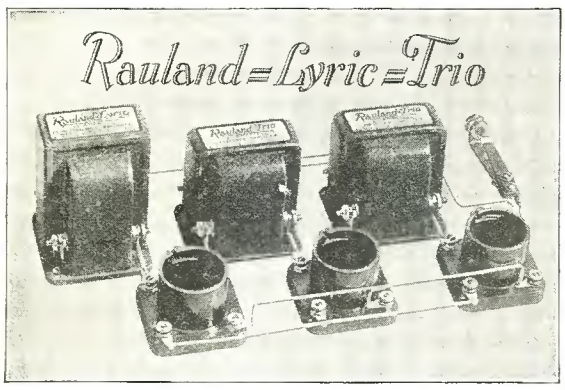
Still the undisputed leader

Rauland-Lyric
AUDIO TRANSFORMER

If you love music, and want your radio set to reproduce tones *faultlessly*, there is one audio transformer you can absolutely depend on—the famous Rauland-Lyric.

Voices and instruments alike are amplified with amazing realness by the Rauland-Lyric; with faithful amplification of those "overtones" essential to full, natural reproduction. The amplification curve of the Rauland-Lyric illustrates its outstanding superiority in tone purity.

The Rauland-Lyric is the undisputed leader in its field. It is invariably chosen by set builders who want the utmost in perfect tone quality.



Write for "Modern Audio Amplification", a free book, describing this fine unit.

A new high mark in three-stage audio amplifiers

Your receiver's tone quality depends in large measure on correct audio amplification. The famous Rauland-Lyric Transformer may now be combined with two Rauland-Trios (impedance units) to form the Rauland-Lyric-Trio —the highest known perfection in three-stage audio amplification. Rauland-Trio is a compact, well-made unit — containing in one shell — inductance, resistance, and capacity in correctly balanced relation.

New 1927 Radio Key Book

You'll enjoy reading it—48 pages of interesting, up-to-the-minute facts about radio, simply told. Also full construction details of all leading types of circuits. Send 10 cents (coin or stamps) to cover postage and mailing cost.

ALL-AMERICAN RADIO CORPORATION
4221 Belmont Avenue, Chicago, Illinois

OWNING AND OPERATING STATION WENR 266 METERS

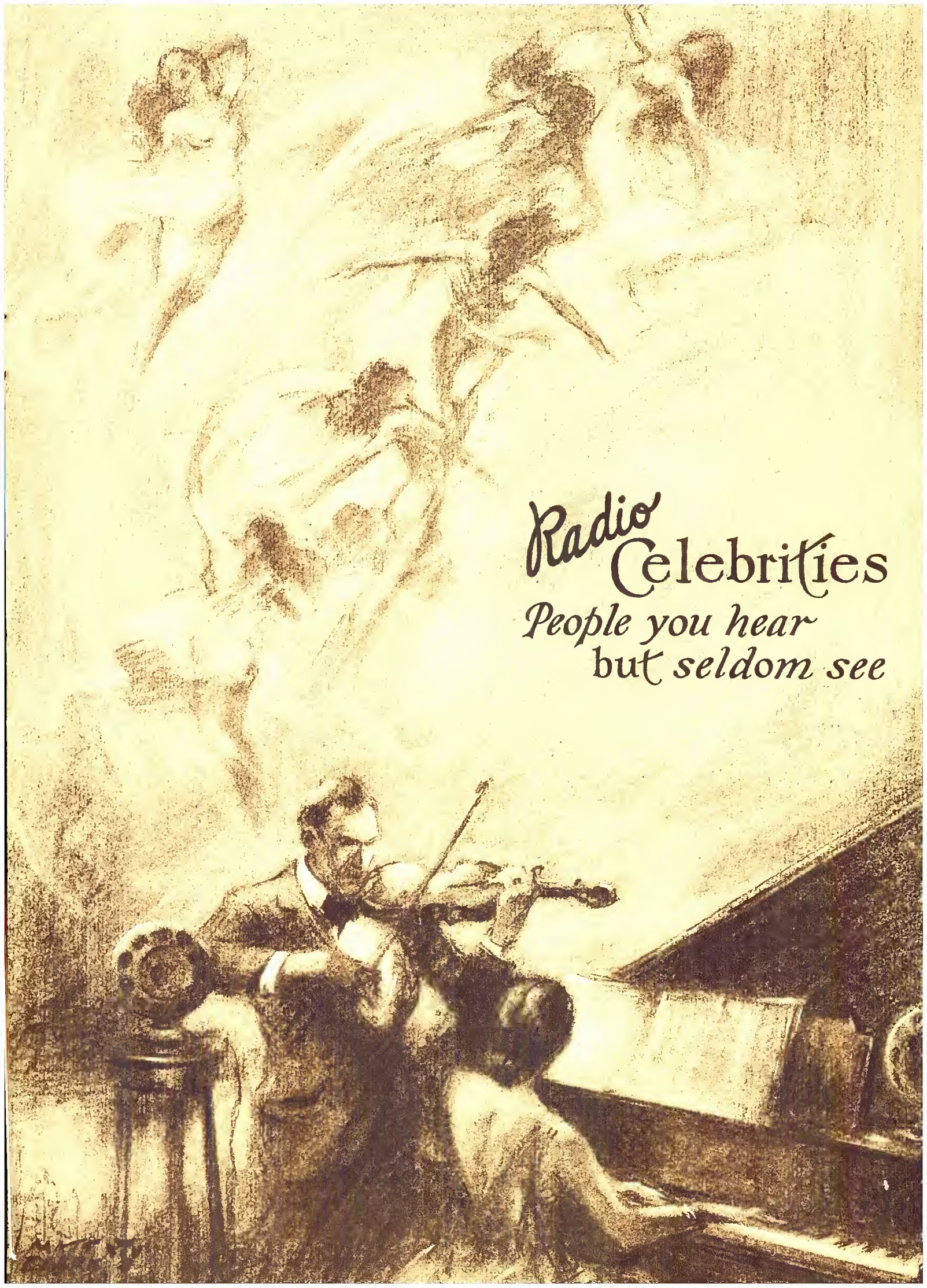
Foreign Radio Broadcasting Stations

	Call Letters	Wave-lengths, meters,	Power, watts
ALASKA			
Anchorage: Chovin Supply Co.	KFAD	280	100
Juneau: Alaska Electric Light & Power Co.	KFIU	226	10
ALGERIA			
Algiers: Colin & Fils	8DB	310	100
ARGENTINA			
Buenos Aires: No data. Received at Pernambuco and Valparaiso	LOO	250	1000
Argentine Association of Broadcasters	LOR	400	500
No data	LOT	272.7	1000
Francisco J. Brusa	LOV	352	1000
Grand Splendid Theatre	LOW	325	1000
Radio Cultura Magazine	LOX	375	500
Radio Nacional	LOY	313	100
University of La Plata		425	1000
AUSTRALIA			
New South Wales			
Bathurst	2MK	288	100
New Castle	2HD	288	100
Northbridge: Otto Sandel	2UW	263	500
Sydney: Burgin Electric Co.	2BE	326	100
Broadcasters Sydney Ltd.	2BL	353	5000
Farmer & Co. Ltd. Labor Party	2FC	11,100	10,000
Electrical Utilities Supply Co.	2UE	297	250
Victoria			
Brighton: Projected. No data	3PB	.....	.....
Melbourne: Associated Radio Co. of Australia Pty. Ltd.	3AR	484	1600
Broadcasting Co. of Australia Pty. Ltd.	3LO	371	5000
O. J. Nilson & Co.	3UZ	319	100
L. J. Hellier: Wangaratta Sports Depot	3WR	303	100
Mildura: R. J. Egge	3EO	286	100
Queensland			
Brisbane: Dr. V. McDowell. Under construction	4CM	278	250
Radio Manufacturers Ltd. Projected	3MB	337	260
Queensland Government	4QG	385	5000
Rockhampton: Queensland Govt. Projected	4RN	323	500
Toowoomba: Gold Radio Elec. Service	4GR	294	100
Tasmania			
Hobart: Association Radio Co. of Australia Ltd. to be replaced by a 3000-watt (Input) station to be operated by the Tasmanian Broadcasting Pty. Ltd.	7ZL	525	250
South Australia			
Adelaide: Central Broadcasting Co.	5CL	395	5000
E. J. Hume. Operated by 5DN Pty. Ltd.	5DN	313	500
Millswood Auto & Radio Co.	5MA	.....	.....
Marshall & Co.	5MC	273	500
Western Australia			
Perth: Westralian Farmers, Ltd.	6WF	1250	5000
AUSTRIA			
Vienna: Oesterreichischer Radioverkehrs A. G. broadcasts three 2-hour programs daily, including music (opera and popular), weather and market reports and news. Reception reported at Antwerp, Teheran Smyrna, Tunis	ORV	517.2	1500
Oesterreichischer Radioverkehrs A. G. Testing; to replace above station in the near future	ORV	488	10,000
Graz: Oesterreichischer Radioverkehrs A. G.		365.8	500
(Note: The Oesterrichischer Radioverkehrs A.G. has had stations projected for Bregenz, Innsbruck, Klagenfurt, Linz and Salzburg for some time, though reports do not show that any action toward construction has been taken.)			
BELGIUM			
Brussels: Radio Belgique station owned and operated by the Radio Belgique Co.	SBR	481	1500
Liege: Radio Wallonie station		205	.....
Radio Central station		294.1	.....
BRAZIL			
Bahia: Radio Sociedade do Bahia		250	500
Bello Horizante: National Telegraph Service		400	500
Fortaleza: Radio Club		.....	30
Pernamlnco: Radio Club. One hour daily and two hours three days each week		310	300
Port Alegre: Radio Society. Broadcasts one hour daily. To be replaced by 50-watt station		380	80
Radio de Janeiro: Radio Society. Daily programs by local artists		400	1000
National Telegraph Service. Praia Vermelha Station. Operated by Radio Club. Daily news and concerts		312	500
Rio de Janeiro: No data. Phonograph records broadcast 2 to 4 pm daily, concerts from 7 to 9 pm three or four days each week		.....	10
Santos: No data		.....	10
Sao Paulo: Dias Carneiro & Co., operated by the Radio Club of Sao Paulo		400	100
Radio Club of Sao Paulo Broadcasts Hotel Terminus orchestra and phonograph records daily		350	10
CANADA			
Nova Scotia			
Halifax: (Carlton Hotel station, Northern Electric Co., Ltd.)	CHNS	322	100
Prince Edward Island			
Summerside: R. T. Holman, Ltd.	CHLC	268	25
New Brunswick			
Moncton: Canadian National Railways	CNRA	322	500
Quebec			
Montreal: Northern Electric Co., Ltd.	CHYC	411	750
E. Fontaine	CHRC	341	5
La Presse Publishing Co.	CKAC	410.7	1200
Canadian Marconi Co.	CFCF	410.7	1650
Canadian National Railways. Uses equipment of other local stations	CNRA	.....	.....
Ontario			
Hamilton: Jack V. Elliott, Ltd.	CFCU	340.7	500
Wentworth Radio Supply Co.	CKOC	340.7	50
Brantford: Brant Radio Supply Co., Ltd.	CFGC	297	50
Huntsville: A. Staples	CHCO	248	25
Iroquois Falls: Abitibi Power & Paper Co.	CFCH	499.7	250
Kingston: Monarch Battery Co.	CYMC	267.7	20
Queens University	CFRC	267.7	500
Kitchener: O. Rumpel	CJCF	248	25
Burketon Junction: Canadian Broadcasting Corp. Projected		329.5	5000
London: London Free Press Printing Co., Ltd.	CJGC	330	500
Ottawa: J. R. Booth, Jr.	CHNC	434.5	250
Canadian National Railways	CNRO	434.5	500
Dr. G. M. Geldert. (For Ottawa Radio Assn.)	CKCO	435	100
Prescott: Radio Association of Prescott	CFLC	297	50
Preston: Wallace Russ	CKPC	248	7½
Scarboro Station: Universal Radio Co. of Canada	CJYC	291	500
Toronto: Star Publishing & Printing Co.	CFCA	356.9	500
Toronto Radio Research Society	CHNC	356.9	500
E. Eaton Co.	CJCD	356.9	50
Dominion Battery Co., Ltd.	CKCL	356.9	500
Canadian Broadcasting Corp. Projected	CKNG	329.5	5000
Northern Electric Co. Uses equipment of other local stations	CHIC		
Jarvis Street Baptist Church. Uses equipment of other stations	CJBC		
Evening Telegram. Uses equipment of local stations	CJSC		
Canadian National Railways. Uses equipment of CKY	CNRT		
Thorobold: D. J. Fendell. Suspended		247.8	75
Manitoba			
Winnipeg: Manitoba Telephone System	CKY	384.4	500
Canadian National Railways. Uses equipment of CKY	CNRW	.....	.....
Saskatchewan			
Regina: R. H. Williams & Sons, Ltd.	CHWC	297	15
Leader Publishing Co., Ltd.	CKCK	297	500
Manitoba Telephone System	CKY	384.4	500
Canadian National Railways. Uses Station CKCK equipment	CNRR	297	.....
Canadian National Railways. Uses equipment of CKY	CNRW	.....	.....
Saskatoon: The Electric Shop	CEQC	329.5	500
International Bible Students' Association	CHUC	329	500
Wheayon Electric Co.	CJWC	329.5	250
Canadian National Railways. Uses equipment of other local stations	CNRS	.....	.....
Unity: Horace N. Stovin	CHSC	356.9	250
Alberta			
Calgary: W. W. Grant Radio, Ltd.	CFCN	435	1800
Calgary Herald	CFAC	434.5	500
Canadian National Railways. Uses equipment of other local stations	CNRC	.....	.....
Edmonton			
Edmonton: International Bible Students' Assn.	CHCY	517	250
Radio Supply Co., Ltd.	CFCK	516.9	100
Edmonton Journal	CJCA	516.9	500
Canadian National Railways. Uses equipment of other local stations	CNRE	.....	.....
Lethbridge: J. E. Palmer	CJOC	268	50
British Columbia			
Burnaby: International Bible Students' Assn.	CFVC	411	500
Kamloops: N. S. Dagleish & Sons and Weller & Weller	CFJC	268	15
New Westminster: Westminster Trust Co.	CFXC	291.1	20
Vancouver: A. Holmstead & William Hanlon	CFDC	411	10
Radio Corporation of Vancouver	CFYC	410.7	10
Daily Province	CKCD	410.7	1000
First Congregational Church	CKFC	410.7	50
Canadian National Railways	CNRV	291.1	500
Sprott-Shaw Radio Co. Suspended	CFCQ	410.7	.....
Pyramid Temple Society. Uses equipment of other local stations	CUKC	.....	.....
CHILE			
Antofagasta: Senor J. Pedreny	CHAO	.....	200
Santiago: El Mercurio, newspaper		360	1200
Fratelli Castagneto		320	100
Chilean Broadcasting Society	CRC	385	350
Commercial Radio Co.		350	30
Tacna: Chilean Government	CRCT	550	1000
Valparaiso: Antonio Cornish	ACB	400	50

	Call Letters	Wave-lengths, meters,	Power, watts
CHINA			
Shanghai: Kellogg Switchboard & Supply Co. Operates four hours daily between 9:45 am and 11 pm		365	100
(Note: Stations have been reported in other Chinese cities, but the present operation is very doubtful. The above station is the only one mentioned in more recent reports.)			
CHOSEN			
Seoul: Under construction	JODK	.....	.....
COSTA RICA			
San Jose: Government. Under construction		.....	.....
CUBA			
Central Ekia: Elia Sugar Co.		300	500
Salvador Rionda	7SR	350	500
Cienfuegos: Jose Ganduxe	6BV	260	200
Hahana: Cuban Telephone Co.	PWX	400	500
Bernardo Barrie	2BB	250	15
Frederick W. Borton	2BY	260	100
El Pais	2EP	355	400
Credito y Construction Co.	2HP	295	100
Jose Lara	2LR	235	50
Manuel y Guillermo Salas	2MG	284	20
Mario Garcia Velez	2OK	360	100
Columbia Radio & Cycle Co.	2OL	225	100
Raoul Karman	2RK	315	20
Roberto E. Ramierz	2TW	270	20
Benito Vieta Ferro	2UF	265	10
Santiago: Alberto Ravelo	8BY	250	100
Tuinucu: Frank H. Jones	6JK	272	100
Frank H. Jones	6KW	340	100
CZECHOSLOVAKIA			
Bratislava		300	.....
Brunn: (Radio Journal station)		.....	.....
Radio Journal	OKB	441.2	500
Kazici		400	.....
Kbely		1150	.....
Prague: (Strasnice station)		.....	.....
Radio Journal	OKP	348.9	5000
CANARY ISLANDS			
La Laguna: Servando Ortoll Delmotte	EAJ5	280	50
Las Palmas: Canary Islands Radio Club		300	6
Club Radio Canarias		300	6
Teneriffe: Servando Ortoll Delmotte	EAR5	120	100
CEYLON			
Colombo: Ceylon American Wireless Association		800	2000
DENMARK			
Copenhagen: Copenhagen Radio Broadcasting station (Government owned)		337	500
Hjorring: Relay station (Government owned)		1250	500
Odense: Relay station (Government owned)		810	250
Ryvang		1150	.....
Soro: Ministry of War. Replaced station at Ryvang		1150-2400	1000
ESTHONIA			
Tallinn		350	.....
EGYPT			
Morocco			
Casablanca: Radio Club de Maroc	CNO	250	500
Senegal			
St. Louis Radio Club Senegalaise (Projected)		300	100
Tunisia			
Tunis: French Army	OCTU	50	500
Cairo: Amateur station: unknown		300	6
FINLAND			
Jyvaskyla: Nuoren Voiman Liiton Radioyhdistys		297	200
Bjorenborg: Under construction by the Nuoren Voiman Liiton Radioyhdistys		255.3	.....
Hango: Nuoren Voiman Liiton Radiohdistys		259.6	200
Helsingfors—Radio Bataljong		240	.....
Helsingfors: Finnish Civil Guard. Broadcasts concerts daily and special programs. Reception reported at Tallinn (Esthonia)		500	500
Military station at Skatudden, a suburb, supported by the public. Broadcasts concerts and other programs irregularly. Reception reported at Tallinn		318	750
Mikkeli: Nuoren Voiman Liiton Radioyhdistys		561	100
Pori: Nuoren Voiman Liiton Radioyhdistys		255.3	100
St. Michael: Nuoren Voiman Liiton Radioyhdistys, under construction		561	500
Tammerfors: Nuoren Voiman Liiton Radioyhdistys. Broadcasts concerts and other programs irregularly	3NB	368	250
Tampere		373	250
Uleaborg		233	100
FRANCE			
Angen: Department of Lot et Garonne	2BD	297	250
Angers: Ministry of Posts, Telegraphs and Telephones		275.2	500
Bezier		95	.....
Bordeaux: Ministry of Posts, Telegraphs and Telephones		238.1	500
Caen		277.8	.....
Greenoble: Ministry of Posts, Telegraphs and Telephones		380	150
Issy-les-Moulineaux: Ministry of War	QGA	1800	500
Lyon: Dubanchet & Trolliet, Station Radio Lyon		291.3	2000
Ministry of Posts, Telegraphs and Telephones, Station La Doua, named for suburb in which located	YN	476.2	500
Marseilles: Ministry of Posts, Telegraphs and Telephones		309.3	300
Mont de Marsen		400	300
Montpellier: Radio Montpellier station		220	200
Paris: Eiffel Tower station. Ministry of Posts, Telegraphs and Telephones	FL	2650	5000
Journal Petit Parisian	5NG	333	500
Petit Parisian. Reception reported at Rome			
Societ Francais Radioelectrique	FL	340.9	500
Societe Francais Radioelectrique	8AJ	1780	100
Cie. Francais de Radiophonie. Reception reported at Teneriffe, Jerusalem, Brussels, Rome, Teheran, Smyrna, Barcelona		1750	4000
Superior School of Ministry of Posts, Telegraphs and Telephones. Reception reported at Rome	FPTT	459.4	500
Paris: Radio Paris		1750	.....
Paris: Ecole Superieure		477.8	.....
Pic du Midi		350	.....
St. Étienne: Radio Club Forezien		220	50
Strasbourg: Radio Club	8GF	200	100
	8GH	200	100
Toulouse: La Radio. Reception reported at Rome, Barcelona		389.6	2000
Ministry of Posts, Telegraphs and Telephones, Aerodrome station	MRD	294.1	2000
(Note: The Ministry of Posts, Telegraphs and Telephones has had stations under construction at Angers, Bordeaux, Lille, Nice and Strasbourg for some time.)			
GERMANY			
Berlin: Postal Authorities. Konigswusterhausen station. Relays Vox Haus programs. Reception reported at Rome, Constantinople, Bergen, Algiers		1300	5000
Postal Authorities. Vox Haus station		507	2250
Magdeburger Platz		566	400
Konigswusterhausen station	AFT	1300	1600
Bremen: Nordische Rundfunk A. G. Relays Hamburg programs		400	700
Breslau: Schlessische Funkstudde. Received at Rome. To be replaced by station with 10,000 watts input		357.1	4000
Cassel		272.7	.....
Dortmund: Mitteldeutscher Rundfunk A. G. Relays Leipzig programs		283	300
Dresden: Mitteldeutscher Rundfunk A. G. Relays Leipzig programs		294.1	300
Elberfeld: Suspended		468.8	300
Frankfurt-on-the-Main: Sudwestdeutscher Rundfunkdeinst		394.7	300
Gleiwitz		250	1500
Hamburg: Norcischer Rundfunk A. G.		428.6	2000
Hanover: Nordischer Rundfunk A. G. Relays Hamburg programs		297	1500
Kassel: Sudwestdeutscher Rundfunkdienst		283	300
Kiel		254.2	300
Konigsberg: Ostmarken Rundfunk A. G.		241.9	300
Leipzig: Mitteldeutscher Rundfunk A. G.		322.6	300
Muenster: Westdeutscher Funkstunde A. G.		303	600
Munich: Deutsche Stunde in Bayern		535.7	300
Norddeich		1800	.....
Nuremberg		329.7	.....
Stettin		252.1	.....
Stuttgart		379.7	.....
Strasbourg		200	.....
GREAT BRITAIN			
Aberdeen	2BD	491.8	1500
Bradford		254.2	.....
Birmingham: Received at Antwerp, Brussels, Rome	5IT	491.8	1500
Bournemouth: Received at Antwerp, Teneriffe, Jerusalem	6BM	306.1	1500
Cardiff: Received at Antwerp and Rome	5WA	353	1500
Daventry: Received throughout Europe, northern Africa and Asia Minor	5XX	1600	16,000
Dundee	2DE	288.5	200
Edinburgh	2EH	288.5	200
Clasgow	5SC	405.4	1500
Hull	6KH	288.5	200
Leeds-Bradford	2LS	297	310
Liverpool	6LV	288.5	200
London: Received at Teneriffe, Strasbourg, Brussels, Rome, Barcelona, Tunis	2LO	361.4	.....
Manchester: Received at Rome	2ZY	384.6	1500
New Castle: Received at Brussels, Rome	5NO	312.5	1500
Nottingham	5NG	288.5	1500
Plymouth	5PY	288.5	200
Sheffield	6FL	288.5	200
Stoke on Trent	6ST	288.5	200
Swansea	5SX	288.5	200
HAWAII			
Honolulu: Marion A. Mulrony	KGU	270	500
HAITI			
Port au Prince: Government projected		.....	.....
HOLLAND			
Amsterdam	PCFF	2125	.....
Amsterdam		760	.....
Antwerp		508.5	.....
Bloemendall		566	.....
DeBilt		1100	.....
HUNGARY			
Budapest: Meugeyetemi Radio Magyar Tavirati Iroda. Broadcasts market reports and news		555.6	2000
ICELAND			
Reykjavik		333.3	.....
INDIA			
Bombay: Bombay Presidency Radio Club	2FV	387	220
Walter Rogers & Co.	2AX	226	.....
Calcutta: Radio Club of Bengal	2BZ	800	500
Owner not reported	5AF	425	.....
Karachi: Karachi Radio Club		425	40
Madras: Crampton		220	120
Rangoon: Radio Club of Burma and Wireless Club of Burma. Broadcasts musical programs every Sunday		450	40
NORTH IRELAND			
Belfast	2BE	326.1	1500
IRISH FREE STATE			
Dublin: Government	2RN	319.1	1500

	Call	Wave-length, meters	Power, watts
ITALY			
Rome: Unione Radiofonica Italiana. Broadcasts concerts and news, 8:30 to 11 o'clock pm daily. Receptions reported at Antwerp, Jerusalem, Lille, Smyrna, Damascus, Barcelona, Tunis and Alexandria. This is at present the station best received throughout the Levant. To be replaced by a station now under construction, of 2600 watts power	IRO	422.6	1200
Milan: Unione Radiofonica Italiana		315.8	1200
(Note: The Unione Radiofonica Italiana has stations at Florence, Naples and Palermo projected or under construction.)			
JUGO-SLAVIA			
Belgrade	HFF	1650	2000
Zagreb: Under construction		275.2	.....
LATVIA			
Riga		480	2000
MEXICO			
Chihuahua: Federal Government State Capital station	CZF	325	250
Guadalajara: Federal Military Command	FAM	490	1000
Radio Club		280	10
Mazatlan: Castulo Llamas	CYR	475	250
Mexico City: Elfrian R. Gomez	CYA	300	500
Jose J. Reynosa, operated by El Buen Tono, cigarette factory	CYB	275	500
Miguel S. Castro, operated by Le High Life, newspaper	CYH	375	100
Raoul Azcarraga, operated by Universal	CYL	400	500
Martinez y Zetina	CYO	425	100
El Excelsior—Parker	CYX	325	500
Department of Education	CZE	350	500
Monterey: Roberto Reyes	CYM	275	100
Constantino de Tarnava. Under construction	CYS	.....	.....
Oaxaca: Frederico Zenilla	CYF	265	100
Puebla: Augustin del P. Zaenz	CYU	312	100
Tampico: El Mundo. Suspended		.....	10
Cipriano Sagaon S en C	CYQ	322	100
Vera Cruz: Manuel Angel Fernandez. Recently inaugurated for broadcasting advertising of an American product	CYC	337	50
Yucatan: Partida Socialista del Sureste	CYY	548	100
JAPAN			
Nagoya: Nagoya Radio Broadcasting Co. Broadcasts daily 9 am to 9 pm; Sundays and holidays, 12m to 9 pm. Program consists of music, weather and market reports, etc.	JOCK	360	1500
Osaka: Osaka Radio Broadcasting Co. Programs in English and Japanese. 1500-watt station projected	JOBK	385	500
Osaka Broadcasting station (Proj.)	JIBK	385	1000
Tokyo: Tokyo Radio Broadcasting Co. Programs in English and Japanese. 155-watt	JOAK	375	1000
KWANTUNG			
Dairen: Government Bureau of Communications employs a commercial station. Daily programs broadcast, consisting of music, educational and entertainment numbers		400	.....
LUXEMBURG			
Luxemburg		217.4	250
MOROCCO			
Casablanca: Radio Club of Morocco: Omega Station	CNO	250	500
NETHERLANDS			
Hilverman: Netherlandsche Seintoellen Fabriek and Hilversum Dreadloze Omroep. Reception reported at Teheran		1050	1000
NEW ZEALAND			
Auckland: Newcome (Ltd.)	1YL	260	500
Auckland Radio Service	134	260	200
La Gloria Gramophone	1YB	260	50
Christchurch		.....	500
Dunedin: Otago University	4XO	140	.....
British Electrical & Engineering Co.	4YA	310-370	500
Radio Supply Co.	4YO	370	500
Gisborne: Gisborne Radio Co.	2YM	335	500
Wellington: Broadcastings (Ltd.)	2YB	275	15
Dominion Radio Co.	2YK	275	500
NORWAY			
Oslo: Broadcasting Company A. S.		370.4	1500
Bergen: Bergen Broadcasters		468.8	500
Bergen Broadcasters. Projected		468.8	1500
PERU			
Lima: Peruvian Broadcasting Co. (Ltd.)	OAX	360	1500
POLAND			
Warsaw		400	.....
PORTUGAL			
Lisbon: Grandes Armazens de Chiado. Suspended	PAA	320	500
PHILIPPINES			
Manila: I. Beck Department Store	KZIB	260	20
PORTO RICO			
San Juan: Radio Corporation of Porto Rico	WKAQ	340	500
RUSSIA			
Kiev		211.9	.....
Leningrad		940	.....
Leningrad		310	.....
Moscow: Central	RDW	1450	.....
Radio Paredatcha		420	.....
Popoff		79	.....
Popoff		25	.....
Popoff		1010	.....
Trades Union		450	.....
Nijni Novgorod		1400	.....
SALVADOR			
San Salvador: Division of Telephones and Telegraphs broadcasts concerts Monday & Friday nights at 8:15		.....	500
SENEGAL			
St. Louis: Senegal Radio Club projected		300	100

	Call	Wave-length, meters	Power, watts
SPAIN			
Barcelona: Radio Barcelona Station. Associated Nacional Radiofusion	EAJ1	280.4	200
Bilbao: Radio Carlton Station. Radio Club Vizcaya	EAJ9	434.8	200
Radio Vizcaya Station. Don Armando de Otera	EAJ11	418	400
Vizcaya Radio Broadcasting Station broadcasts music, provided by local talent, and considerable advertising from 10 to 12 pm daily		294.1	200
Cadiz: Don Francisco de la Liesca	EAJ3	400	550
Don Jan Iaborra	EAJ10	330	1000
Carthagena: Don Enrique de Orbe	EAJ16	297	150
Madrid: Don Antonio Castilla	EAJ4	275.2	1000
Radio Iberica Station	EAJ6	577	1000
Union Radio	EAJ7	372.4	1000
Don Vicente Coyonecho, projected	EAJ12	.....	200
Association of Radio	EAJ15	490	1000
Radio Espana		334	300
Malaga: Cia Iberica de Telecomunicacion	EAJ25	254.2	1000
Oviedo: Don Arburo Cima	EAJ19	201.3	1000
Salamanca	EAJ22	204.1	.....
Saragossa	EAJ23	325	.....
San Sebastian: Don Sabino Ucelayeta	EAJ8	272.7	500
Seville: Seville Radio Club	EAJ5	344.8	150
Don Manuel Garcia Ballesta	EAJ17	330	100
Don Jorge la Riva, projected	EAJ21	.....	1000
Valencia: Radio Corporation	EAJ14	400	500
Under construction	EAJ24	360	.....
STRAITS SETTLEMENTS			
Amateur Wireless Society of Malaya: 2-hour program broadcast each Sunday evening, and children's concert on Wednesdays. Received at Colombo, Ceylon		270	100
SWEDEN			
Drebo	SMTI	237	250
Boden: Radiojanst	SASE	454.5	1000
Eskilstuna: Radio Club. Relays Stockholm programs 4 days each week, broadcasts local programs other days	SMUC	275.2	150
Falun: Radio Club. Relays Stockholm programs 4 days each week, broadcasts local programs other days	SMZK	400	250
Gavle: Radio Club. Relays programs 4 days each week, broadcasts local programs other days	SMXF	204.1	250
Goteburg: Radiojanst	SASD	260.9	500
Helsinborg		235	250
Jonkopings: Jonkopings Runradiostation. Relays Stockholm programs 4 days each week, broadcasts local programs other days	SMZD	572	250
Kalmar		253	.....
Kalmas		253	250
Karlsborg: Radiojarst. Relays Stockholm programs 4 days each week, broadcasts local programs other days	SASF	1350	1000
Karlskrona: Relays Stockholm programs 4 days each week, broadcasts local programs other days		196	200
Karlstadt: Karlstadt Runradiostation. Relays Stockholm programs 4 days each week, broadcasts local programs other days	SMXG	500	80
Kristinehamn	SMTY	202.7	.....
Linkoping: Radio Club. Relays Stockholm programs 4 days each week, broadcasts local programs other days	SMUV	588.2	350
Malmo: Radiojanst	SASC	229	500
Norrkoping	SMVV	272.7	250
Orebro: Suspended	SMTI	566	.....
Ostersund		720	.....
Saffle		245	500
Stockholm: Radiojanst	SASA	416.7	100
Sundsvall: Radiojanst	SASD	545.6	500
Trollhattan: Trollhattans Runradiostation	SMXG	294.1	50
Varborg		340	100
Umea: Relays Stockholm programs 4 days each week, broadcasts local programs at other times, irregularly		252.1	180
SWITZERLAND			
Basle: Aerodrome. Projected		1000	300
Berne: Radio Berne Station. Radio Club of Berne		411	1500
General Post and Telegraph Office		302	1500
Geneva: Radio Broadcasting Society of Geneva. Broadcasts music and news		760	500
Lausanne: Champ de l'Air Station (Societe Romande de Radiotelephonie Lausanne)	HB2	850	600
Zurich: Hoengg Station. Radio Genossenschaft Zurich University. Reception reported at Antwerp, Brussels, Rome, Vienna	RGZ	500	500
TUNISIA			
Tunis: French Army. Two musical programs broacast each week	TUA-OCTU	1450	500
French Army. Two musical programs broadcast each week	OCTU	45	.....
TURKEY			
Stamboul. Station reported projected		.....	.....
URUGUAY			
Montevideo: Crandon Institute		.....	500
UNION OF SOUTH AFRICA			
Cape Town: Cape Publicity Association	WAMG	400	500
Durban: Town Council		350	500
Grahamstown		400	.....
Johannesburg: Assn. Scientific and Tech. Societies	JE	450	500
Cape Town: Cape Peninsula Broadcasting Assn., Broadcasts 54 hours per week, programs by paid orchestra and local talent		375	1200
VENEZUELA			
Caracas: Empress Venezolana de Radiotelefonia. Under construction		360	1000
Colombo: Ceylon Government. Replaced private station; new equipment, placed in use in January, 1926		365	100



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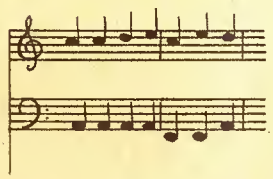

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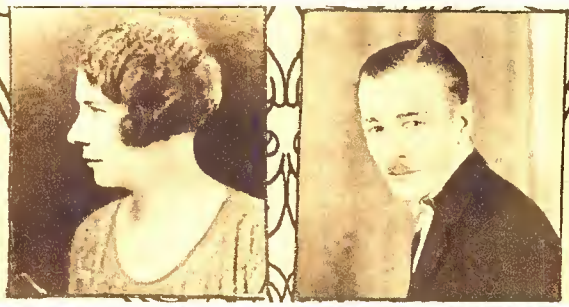
Mrs. Refuge Raye Loving, Lyric Soprano heard occasionally over KFDM, Beaumont, Texas

Variety Entertainers heard over KFPM, Greenville, Texas

Charles H. Gabriel, Jr., Chief Announcer and Program Director of KLX, Oakland, Calif. 34 and married. Native of San Francisco, Calif. Formerly newspaper man, college teacher, concert pianist and composer. Known as "Gabe"

Cloyd K. Young, Banjo Soloist of KFAB, Lincoln, Neb. Known as "Curley." Also member of the Buick Master Six Orchestra. 23 and married



At left: Hulda Helen Edwards, Soprano Soloist of KOA, Denver, Colo. Native of St. Louis, Mo. Formerly in the Insurance business. At right: G. Ralph Crowder, Announcer and player of pipe organ and piano over KOA. Native of Birmingham, Ala. Formerly heard over KYW, Chicago. 24 and married

Olive M. Fletcher Pianist of KFAB, Lincoln, Neb. Native of Orchard, Neb. Student at the U. of Neb.

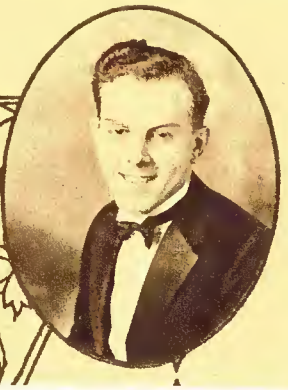
William N. Mahon, Announcer of KGW, Portland, Ore. Formerly newspaper man. Irish, but born in Manila, P. I. Filled in for a few minutes at Station KGW about three years ago and has been there ever since. 21 and single

Miss Mary E. Vogt, Organist of WOO, Philadelphia, Pa.

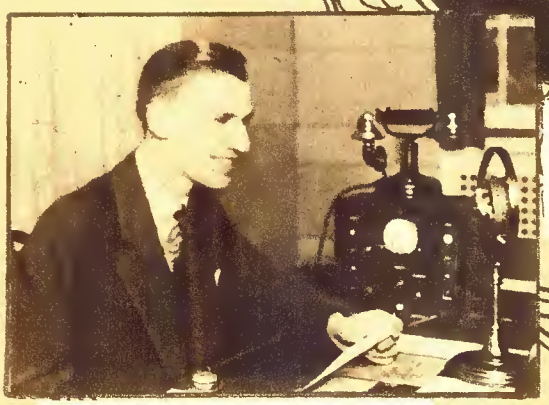
Above: Leslie Adams, Chief Announcer of KFI, Los Angeles, Calif. "Les" also whistles charmingly, plays the piano beautifully and is occasionally heard over the Aeolian Pipe Organ Recitals. At right: Virginia Flohri, Lyric Soprano heard over KFI. 28 and single. The daughter of the famous illustrator and portrait painter, Emil Flohri. Native of N. Y. C. Known as the "Radio Nightingale". Has also had considerable concert and opera experience

At left above: Mrs. Gertrude Davis Winroth, solo pianist and accompanist of KFKX, Hastings, Neb. Native of Highland Park, Ill. 27 and married. Formerly heard over WOR, KYW, WMAQ and WEAF. Teaches piano when not broadcasting. At right: Harry F. Russell, Announcer and Baritone heard over KFKX. Mr. Russell is a Hastings business man, Vice-Pres. of the Clarke-Buchanan Co., Vice-Pres. of the Hastings Chamber of Commerce and very active in civic affairs. Graduate of Hastings College a fluent speaker and a baritone singer of note 34 and married

Corrine Jordan, Accompanist and Assistant Studio Director of WBBM, Chicago. Half of the team of the "Two Jays"

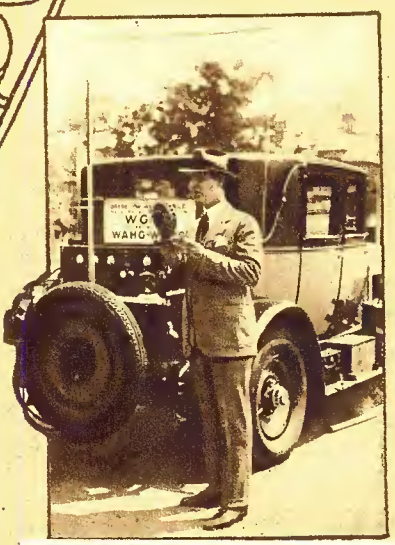


Fred Jeske, Assistant Announcer and the other half of the team of the "Two Jays" of WBBM, Chicago



Floyd Falch, Chief Announcer of WBBM

Charlie Garland, Announcer and Studio Director of WBBM. Native of McComb, Miss. Previous to broadcasting was organist and orchestra pianist. 30 and married



Thornton Fisher, Sports Announcer of WAHG at his relay broadcasting station WGMU which operates in conjunction with WAHG and WBOQ, the twin broadcasters of Richmond Hill, L. I.

Right: Wm. H. McDonnell, Announcer, Director and co-owner of WBCN, Chicago, Ill. Left: Merle "Big Boy" Yagle, Musical Director of WBCN. Previous to broadcasting had his own orchestra, produced amateur theatricals and made a little "Spare Money" playing baseball. 34 and married

Leo Fitzpatrick, Chief Announcer of WJR, Detroit, Mich.

Ralph Shugart, Announcer of WJJD, Mooseheart, Ill.

John D. Kuhns, Announcer of WBZ, Boston, Mass. Native of Dayton, Ohio. Formerly a teacher. Now studying architectural engineering at Mass. Inst. of Technology. Also announcer for Harvard Football Games

Dorothy Curtis, Pianist of WBZ, Boston, Mass. Also concert pianist, soloist and Formerly identified with WNAC and WEEI. Above: Edwin J. McEnelly and his Singing Orchestra of WBZ

Charles Darl Bethmann, Staff baritone and assistant announcer of WHAP, N. Y. C. Native of Easton, Pa. Formerly school teacher. 26 and single. Formerly heard over WEAF and WJZ

At left: Vincent H. Percy, Organist WEAR, Cleveland, Ohio. One of the original radio organists. Above: Hotel Cleveland Orchestra, heard over WEAR Ivan Francisci, cellist, is the director. Play classical and semi-classical music only

Mark A. Rigg, Jr., Managing Director and Announcer of WGR, Buffalo, N. Y. Native of Pittsburgh, Pa. Formerly a salesman

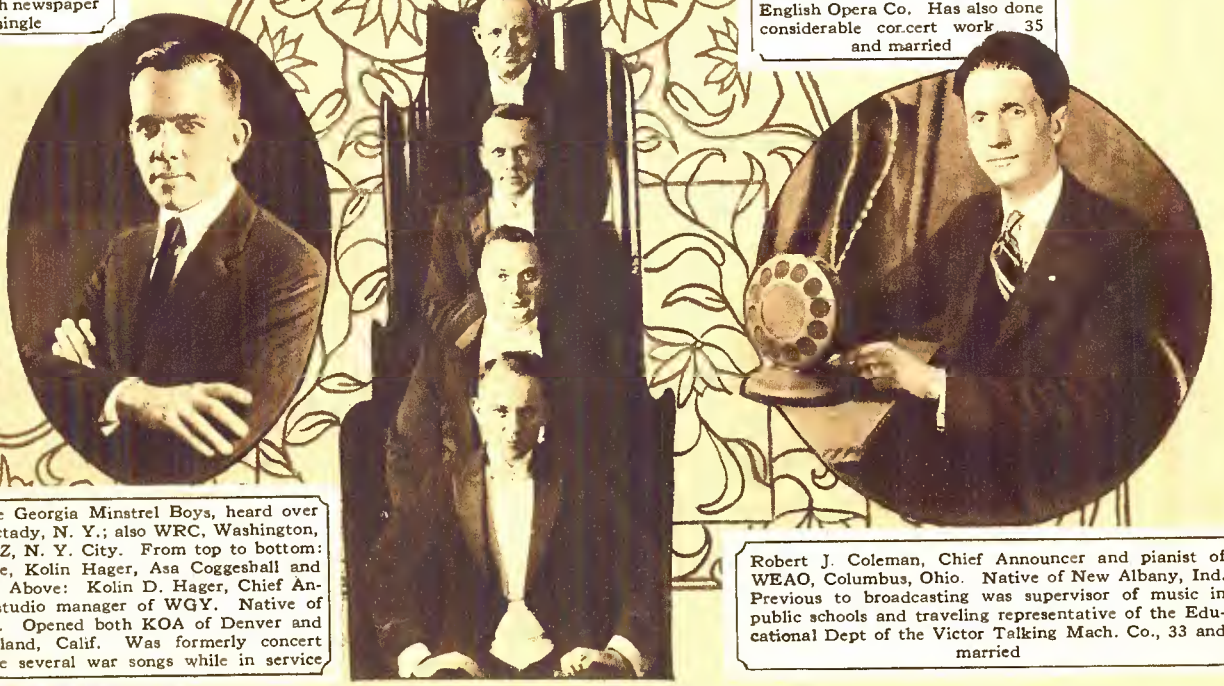
Dave Ward, chief announcer and studio director of KFQZ, Hollywood, Calif. 26 and Married. Native of Pine Bluff, Ark. Formerly known as the "Dean of the Banjo "uke" in Vaudeville

Kenneth Salisbury, Chief Announcer of WMAK, Buffalo, N. Y. Is also radio editor of the Buffalo Times

Quin A. Ryan, Announcer and Director of WGN and WLIB, Chicago. Has announced more spectacular events than any broadcaster in the Middle West. Has done the Kentucky Derby for two years from Louisville; the Indianapolis 500 mile auto race from Indianapolis; the Scopes evolution trial from Dayton, Tenn.; and football games from all over the country. In the Fall of 1925 he was chosen as one of the two official announcers of the World Series, with Graham McNamee of WEAF. Mr. Ryan is a native of Chicago. 27 and single. Was formerly connected with newspaper work and publishing

Donald H. Clark, Announcer and staff artist of WGBS, N. Y. C. Native of Pulaski, N. Y. Was formerly identified with newspaper work. 24 and single

T. Stanley Perry, Musical Director and Tenor of WGHP, Detroit, Mich. Native of Redditch, England. Formerly tenor and stage director of the Sheehan English Opera Co. Has also done considerable concert work. 35 and married



At right: The Georgia Minstrel Boys, heard over WGY, Schenectady, N. Y.; also WRC, Washington, D. C. and WJZ, N. Y. City. From top to bottom: Ellsworth Page, Kolin Hager, Asa Coggeshall and William Fay. Above: Kolin D. Hager, Chief Announcer and studio manager of WGY. Native of Albany, N Y. Opened both KOA of Denver and KGO of Oakland, Calif. Was formerly concert soloist. Wrote several war songs while in service

Robert J. Coleman, Chief Announcer and pianist of WEAO, Columbus, Ohio. Native of New Albany, Ind. Previous to broadcasting was supervisor of music in public schools and traveling representative of the Educational Dept of the Victor Talking Mach. Co., 33 and married

Above: John R. George, Chief Operator of WPG, Atlantic City, N. J. Right: Alice Warren Sachse, Program Director of WPG. Each Monday night conducts the feature "A Regular Little Journey to the Homes of Great Musicians". She is a piano soloist of national reputation

Ethel Rattay Fowler, Pianist and Hostess of WPG, Atlantic City, N. J. Formerly newspaper writer. Broadcasts the regular Tuesday feature "Resort Footlight and Fashion Flashes"

Ernest Rogers, Announcer and musician heard over WSB, Atlanta, Ga. with his African Harp. Founder of the Red Head Radio Club and composer of "Willie the Weeper"

Lambdin Kay, Director and Announcer of WSB, Atlanta, Ga. Native of Brooklyn, N. Y. Known as "The Little Colonel". 34 and single. Formerly reporter and department editor of Atlanta Journal

Paul A. Greene, Announcer and Manager of WSAI, Cincinnati, Ohio. Native of Rogers, Texas. 28 and single

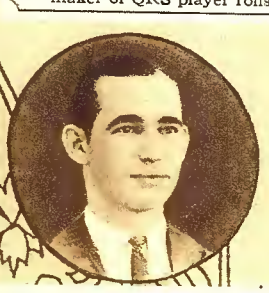
Jane Upperman, Colorature Soprano, heard over WSAI, Cincinnati, Ohio

James K. Dobbs, Assistant Announcer of WSB, Atlanta, Ga. Known as "Bishop." Also editor of the Atlanta Journal Radio Section

Maurice Wetzel, Announcer and Station Director of WOOD, Grand Rapids, Mich, 31 and married. Was formerly advertising salesman, copy-writer and maker of QRS player rolls

Guy W. Simon, Pastor of First Presbyterian Church, Lansing, Mich., who is heard over Station WREO. Native of McComb, Ohio. 52 and married

Quartette heard from WREO, Lansing, Mich. Left to right: Raymond Hamilton, James Lyon, Kenneth Buckingham and Raymond Lynn Bowers



Glenn J. Buell, Violinist and Director of "Glenn Buell and His Melody Men," heard over WREO, Lansing, Mich. 24 and married

Albert Carney, Organist of WHT, Chicago, Ill. Native of Dubuque, Iowa, 33 and single. Previous to broadcasting, was an organist in several of the large Chicago and Denver theaters. Also a composer

Eduard A. Davies, Director and Chief Announcer of WIP, Philadelphia, Pa. 35 and married. Was formerly concert and operatic baritone and for two years was President of the Philadelphia Operatic Society

Patrick Henry Barnes, Chief Announcer and Program Director of WHT, Chicago. Native of Sharon, Pa. Author of "A Buck on Leave" Written while he was in the Service. Formerly on the stage, also movie actor, author and salesman

Otis Vaughan, Assistant Announcer of WOAI, San Antonio, Tex.

Margery C. Bever, heard over WHN, N. Y. City

At left: J. Lewis Reid, Announcer of WJZ, N. Y. C. Native of Brooklyn, N. Y. Formerly musical comedy actor and stage manager and prior to that, news writer. 28 and married and the father of three year old Muriel Reid who sings on the air. At right: John B. Daniel, Announcer of WJZ, and WJY. Born in London, England, but educated in the U. S. Formerly in vaudeville, musical comedy and concert work; also newspaper music critic He is the son of Tom Daniel, the celebrated Basso

Major Lawrence Mott, owner and operator of KFWO, Avalon, Catalina Island, Calif. Native of N. Y. City. 41 years of age and single. Major Mott says; "Radio is my avocation; writing is my vocation; travel, big game shooting, cruising and fishing my occupations"

The Campus Serenaders of WHAZ, Troy, N. Y.

Left: Leslie Joy, Announcer of WEAF, N. Y. C. Graduate of Peekskill Military Academy of Peekskill, N. Y. and University of Pennsylvania. During the World War served as Lieut. in capacity of Artillery Balloon Observer. Has a bass-baritone voice of remarkable quality and has appeared in many concerts and oratorios. Has also played comedy roles with the Savoy Opera Co., presenting Gilbert & Sullivan operas. Right: Mathilde Harding, Accompanist and hostess of WEAF. Native of Washington, Pa. In her first appearance before the WEAF microphone she accompanied the mysterious "Silver Masked Tenor". 21 years of age and single

Arnold Morgan, Announcer of WEAF, N. Y. C. Born in Oklahoma but his early youth was spent in Portland, Ore. Formerly a teacher of voice and during the World War was connected with the Coast Artillery. Also is now the tenor soloist of Grace Episcopal Church of Brooklyn, N. Y.

Left: Ralph C. Wentworth, Announcer of WEAF. Native of Seattle, Wash. 34 and married. Possesses a very pleasing bass voice and has studied extensively in the U. S. and Europe. Has done considerable concert work. At right: Winifred T. Barr, accompanist of WEAF. Widely known as a musician of note. Following the armistice of the World War, she was twice enlisted for entertainment overseas with the A. E. F. and much of her time is still given to appearances as solo pianist or accompanist before ex-service men

Theodore J. Hahn, Announcer of Station WCAP, Washington, D.C. Native of Baltimore, Md. 29 and single. Formerly a lawyer. Is now Assistant Manager of the Business Office of C. & P. Tel. Co., known as "Ted"

Russell Pratt at the piano and Frederick Daw standing. "The Men of 1001 Songs," WMAQ Chicago

"Bernice," Pianist of WCX, Detroit, Mich. Native of Sault Ste. Marie, Mich. 20 and single. Conducts the Red Apple Club. Formerly identified with station WGHP

Hector R. Skifter, Announcer and Manager of WCAL, Northfield, Minn. Native of Northfield. Known as "Skif"

Arthur M. Harding, Station Director of KUOA, Fayetteville, Ark. 41 and married. Native of Pine Bluff, Ark. Formerly Director of General Extension, U. of Ark.

Richard F. Hire, violinist of WCBD, Zion, Ill. Native of Ligonier, Ind. Graduate of American Conservatory of Music, Chicago. 23 and married

Mrs. L. J. Hire, violinist and pianist of WCBD, Zion, Ill. Native of Fall River, Mass. Has appeared in concert work for many years. Is a member of the Hire Trio, consisting of L. J. Hire and her son Richard F. Hire

John A. Studebaker, Announcer and clarinet player of WCBD, Zion, Ill. Native of Park Rapid, Minn. Now studying at Northwestern University Dental College

Esmeralda Berry Mayes, Pianist and violinist of KSD, St. Louis, Mo.

Left: Rodmen Hendrickson, Chief Announcer of KTAB, Oakland, Calif. 38 and married. Also is in the wholesale lumber business. Right: Ray Martin Bitzer, Announcer and Chief Engineer of KTAB. 33 and married. Native of Muscatine, Iowa. Known as "Smiling Ray". Previously radio engineer in U. S. Navy

C. Marcus Wienand, Announcer and Educational Director of KTCL, Seattle, Wash. Native of Eau Claire, Wis. 30 and married

Uncle Ben, tells the bedtime stories over KSL, Salt Lake City, Utah

Edna Riesel Adams, the girl who whistles and sings over KPRC, Houston, Texas. 28 and single. Native of Galveston, Texas. Known as the "Sweetheart of the Air." She is also a church soloist and a member of the Houston Post-Dispatch staff

G. C. Arnoux, Announcer and Director of KTHS, Hot Springs, Ark. Native of N. Y. City. Formerly connected with WBAP, Ft. Worth, Texas

Above: Martha Estelle Hayes, who sings over KOB, State College, N. Mex. Native of Spartanburg, S. Car. Is usually accompanied on the banjo by her sister Minnie Bess Hayes who is also a student at the State College. Right: Minnie Bess Hayes, who plays the banjo and sings with her sister Martha Estelle Hayes over KOB

Alfred P. Daniel, Announcer and Program Director of KPRC, Houston, Texas. 37 and single. Formerly heard over WEV and WCAK. Originator of "Kotton Port Rail Center" slogan

Harold Fair, pianist of KOIL. 24 and single. Has played with several nationally known orchestras. Formerly heard over WQJ, WIBO, WHT, WEBH, all of Chicago and WWJ of Detroit

The Mona Motor Oil Twins, of KOIL, Council Bluffs, Iowa. Have broadcasted over 80 stations in the U. S and Canada

Donald R. Hill and his ukelele. Heard over KOIL. 20 and single. Plays his own accompinament to his songs, on the ukelele

J. Alban Becker, Announcer of WOWO, Ft. Wayne, Ind. Known as "Al." 28 and single

At left: Anne M. Spangle, Accompanist and Publicity Manager of WOWO, Ft. Wayne, Ind. 23 and single. Formerly Classified Adv. Manager on newspaper. At right: Dorothy Durbin, Pianist and Program Director of WOWO. Native of Calumet, Mich. 34 and married. Is also a teacher of piano

Carl H. Schwieters, Announcer WOWO Ft. Wayne, Ind.

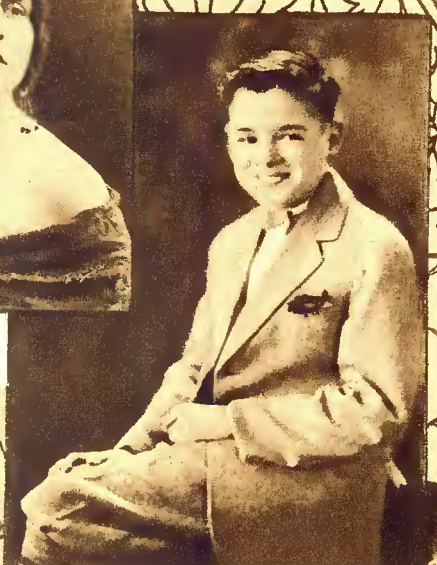
Pennsylvania Male Quartet, a regular feature of WLIT, Philadelphia, Pa. Left to right: John S. Hinkel, first tenor; Wm. H. Carmint, second tenor and director; Ernest Freas, baritone and Chas. D. Long, Bass

Peter MacArthur, Announcer and Scotch Baritone of WOC, Davenport, Iowa. Native of Greenock, Scotland. Known as "Pete, the Bobby Burns of the Air". Formerly on the stage with Sir Harry Lauder, Andreas Dippel and Schubento. 40 and married

Snedden Weir, Chief Announcer and Studio Manager of WMCA, N. Y. City. Native of Stirling, Scotland. 34 and married. Has a fine baritone voice and is frequently heard in song recitals

Paul J. Vipperman, Tenor of WOC, Davenport, Iowa. Native of Spartanburg, S. Car.

Harriet Lee, Contralto, heard over WOK



H. C. Hogencamp, Announcer of WODA, Paterson, N. J. Native of Paterson, N. J. Formerly connected with station WBAN

Above: Freddie Witmer, 12 year old pianist of WOK, Chicago. Freddie is now attending High School and when he graduates expects to go to College and study Law. He says, "I love music and would rather play than eat". Was formerly heard over WHT and WEBH. At right: Herman Sinaiko, Staff Violinist and Studio Director of WOK

Edward Prince, Announcer and Operator of WODA, Paterson, N. J.

Leona Brown Woodcock, Assistant Program Director and soprano of WTAM. Cleveland, O.

At left: John T. Vorpe, Announcer and Publicity Director of WTAM, Cleveland, O. Formerly identified with publicity and newspaper work. 27 and single. At right: Harold Gallagher, Announcer of WTAM. Formerly connected with stations WJAX and WEAR. 21 and single

Ralph B. Humphrey, Announcer of WTAM. Cleveland, O. 29 and single. Known as "Hump"

Dana S. Merriman, Musical Director of WTIC, Hartford, Conn. Native of Bristol, Conn. Known as "Merry." 34 and married. Previous to broadcasting was conductor, organist and music supervisor of public schools

Elmer G. Hoelzle, Director and Announcer of WRVA, Richmond, Va. The voice you hear singing "Carry Me Back to Old Virginny" each night at the close of WRVA Program. 40 and single. Formerly heard over WDAH, El Paso, Tex.

Trio from Detroit News Orchestra, WWJ, Detroit, Mich. Karl Chase, violinist, Valbert P. Coffey, pianist and Frederick Broeder, cellist. A very popular program feature of this station

At left: Selma Erickson, Norwegian Soprano heard over WCCO, Minneapolis, Minn. Through her radio work she was asked to sing at Gov. Christianson's Reception for Pres. and Mrs. Coolidge last year. Above: Elsie Nuessle Yoerg, Coloratura Soprano heard over WCCO. At right: Paul Johnson, Chief Announcer of WCCO. Native of Maple Valley, Wis. Student in College of Medicine and Dentistry, Univ. of Minn.

Germaine Bissonette, Accompanist and hostess of WWJ. Detroit, Mich. Native of Ottawa, Ont., Can. Known as "Gerry." For merly teacher of piano

Edgar Thompson Steel Works Quartet; heard over KDKA, Pittsburgh, Pa. Top row, left to right: Evan Floyd, Second Tenor, Louis Mason, Alto; bottom row: Chas. E. Price, First Tenor, Chas. Loomis, Bass, Clarence Drylie, baritone.

Louis L. Kaufman, Announcer KDKA, Pittsburgh, Pa. 23 and single. Also studying law and expects to be admitted to bar in 1927. Graduate of Penn State College

Reginald Baxter, Studio Director of WTAL, Toledo, Ohio

Right: Gertrude L. Brannon, Pianist of KTNT, Muscatine, Iowa. Also teaches pinao. Left: Marvin C. Lucke, Announcer of KTNT. 22 and single. Studied pipe organ at Ill. Wesleyan College, Bloomington, Ill. and piano at Troy Conservatory of Music, Troy, Mo.

Horace W. Feyle, Announcer of WWAD, Philadelphia, Pa. Known as the "Whistling Announcer." 33 years of age and married

Alfred Hall, Chief Announcer of WRNY, N. Y. City

Frank Westphal and his All-American Pioneers, exclusive artists of WENR, Chicago. Their specialty is dance music

Brian McDonald, Announcer and Manager of WJAS, Pittsburgh, Pa. Also tenor soloist. 28 and single

Tom Catton, Announcer and Managing Director of KFWI, San Francisco, Calif. Native of New Haven, Conn. Originator of the Cuckoo Club and Chief of the Tom Cat Club

Caroline Lee, "The Virginia Girl and her Spanish Guitar." Staff entertainer at WGHB, Clearwater, Fla. 24 and married. Native of Richmond, Va. Formerly connected with WSB of Atlanta

Mrs. Blanche G. Waters, Assistant Announcer and Bedtime Story Teller of WTAG, Worcester, Mass. Noted for her work on the air for children. Club known as "The Twilight Scouts." Age 29 and married

Billy Knight, Announcer and Director of WIL, St. Louis, Mo., known as "The Little Ole Professor." 29 and married. Native of Kansas City, Mo. Has been in theatrical work since five years of age

Phil Fischer's Novelty Californians who broadcast over KFWA, Ogden, Utah.

Mrs. Blanche J. Sharp, Program Director of WTAR, Norfolk, Va.

Herman H. Hohenstein, Announcer and Director of KFUO, St. Louis, Mo. Native of Peoria, Ill. Formerly a Lutheran Minister

Warren K. Howe, Musical Director of WJAZ, Chicago, Ill.

Right: Charlie Wellman, Announcer, Manager and vocalist of KFWB, Hollywood, Calif. 30 years of age and married. Formerly a vaudeville entertainer. Native of Masonville, Iowa. Known as "Don't Go Way Folks" Charlie. Above: Harry G. Keiper and his Movieland Orchestra, a delightful feature of KFWB

Mrs. Luetta Minick Armstrong, soloist of KFNF, Shenandoah, Iowa. Sings the old time melodies

At left: Ashley C. Dixon, Jr., Operator of KFJR, Portland, Ore. 18 years of age. Native of Chicago, Ill. At right: Ashley C. Dixon, Sr., Announcer and Director of KFJR. Known as "Dix". Native of Chicago, Ill. Formerly an Investment Banker

Miss Mern Reitler, staff violinist of KLZ, Denver, Colo. Native of Greeley, Colo. Previously an orchestra leader

John E. Fetzer, Announcer of WEMC, Berrien Springs, Mich. Native of Lafayette, Ind. During summer of 1925, visited all leading broadcast stations of Europe. Formerly radio engineer and operator

Above: The Etherical Quartette who entertain exclusively for KFRU, Columbia, Mo. Left to right: Fred L. Yates, tenor, Mrs. Zola Mascho, soprano, Paul Craker, pianist, Mrs. Gertrude Freeland, alto and W. Harry Clarke, bass. All residents of Bristow, Okla. Left: Gale H. Curtright, Chief Announcer and Manager of KFRU. Native of Paris, Mo. 22 years of age. Known as "Hatch"

Raymond C. Dettloff, Staff Pianist for WHAD, Milwaukee, Wis. Student at Marquette University. Has composed a number of piano compositions and intends to make concert work his profession

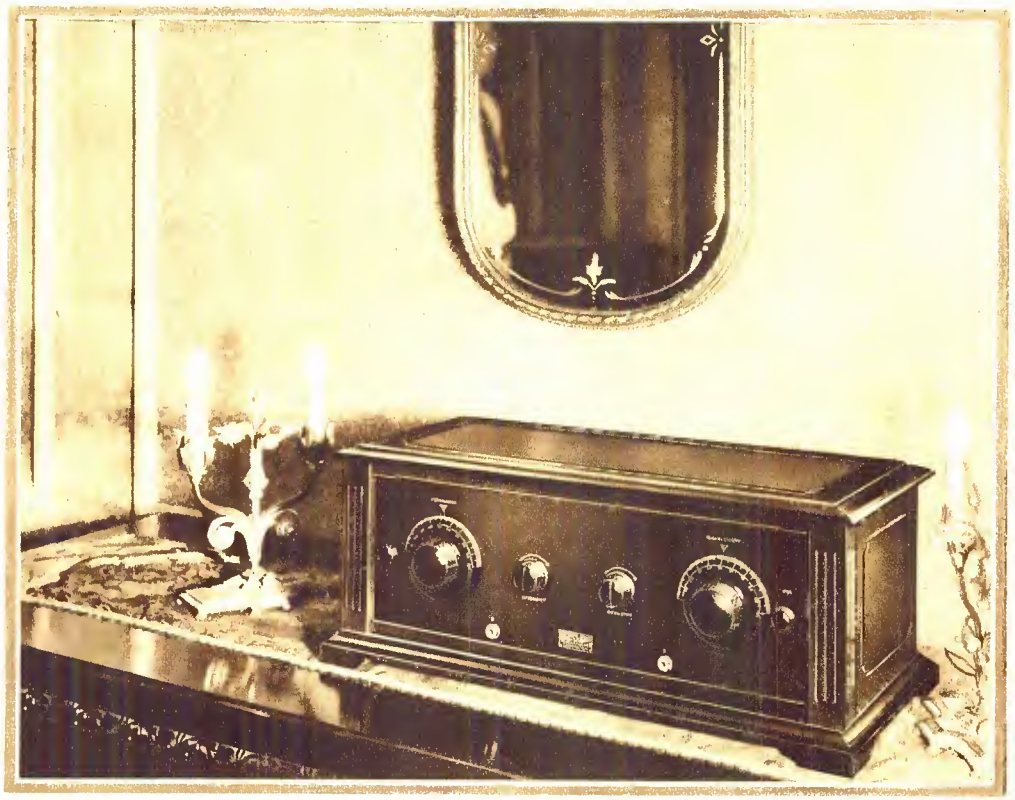
At left: Ford Rush, the "Ford" of Ford and Glenn, the Lullaby Boys of WLS, Chicago. Native of Columbia, Miss. Formerly salesman for music Publishing house. 36 and married. At right: Glenn Rowell, the "Glenn" of Ford and Glenn, the Lullaby Boys of WLS. Native of Pontiac, Ill. 27 and married

At the left above: William Charles Stoess, Announcer, Violinist and studio director of WLW, Cincinnati, O. 24 and married. Known as Bill and his hobby is pipes. At the right above: Louis John Johnen, Announcer of WLW. Interlocutor for the famous Burnt Cork Minstrels which he started as a novelty for the air audience. He says that he is single; in fact "the only eligible announcer in Cincinnati". At right: Irene Downing, organist and pianist heard over WLW. She is also a teacher of piano and plays the organ in theatres. 26 and single

At right: Mrs. Mary C. Puncke, of the Research Division of WLS, Chicago, Ill. Mrs. Puncke broadcasts to the farm women of the Nation. Native of Amsterdam, Holland. 39 and married and has three sons. Graduate of Amsterdam College. Came to U. S. in 1909 and went to homestead in Alberta, Can. in 1911. Returned to Chicago in 1924 and now doing research work and giving farm women the benefit of her experience. Above: Donald F. Malin, Chief Announcer of WLS. Native of Tama, Iowa. Formerly a newspaper man. Graduate of Iowa State College. 29 and married

Above: Vaughan Saxaphone Quartette, regularly appearing before the microphone of WOAN, Lawrenceburg, Tenn. Left to right: Adgar M. Pace, Ted Shaw, Elbert Barnett and William B. Walbert. At right: Luther E. Heatwole, Pianist and soloist of WOAN. Native of Baltimore, Md. Known as "Luke". 33 and single

BROWNING-DRAKE RADIO



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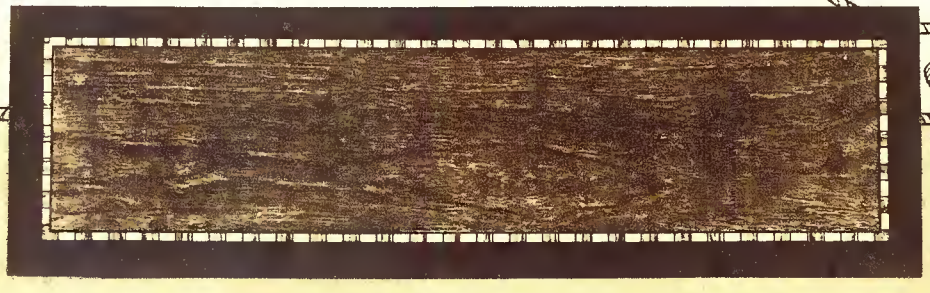

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Tell 'Em You Saw It in the Citizens Radio Call Book

The Six Tube Shielded Neutrodyne Receiver

Here Is a Receiver, the Result of Considerable Experimentation Which, When Properly Constructed, Will Perform in a Manner Equal to That of the Best of Factory Built Shielded Receivers

The Design of This Receiver Was Developed, and All Illustrations Made, in the Citizens Radio Laboratory*

THE neutrodyne receiver, which was introduced to the radio public in 1923, is considered by engineers to be one of the most outstanding and fundamental developments in the history of the art.

During the early period of broadcasting the radio public was forced to rely entirely upon the regenerative type of receiver. As the art of broadcasting increased in magnitude and great numbers of stations came on the air, the problem of selectivity grew to immense proportions. In the beginning, when only a few stations were broadcasting, selectivity was an unknown factor to the radio enthusiasts. At the present time, due to the broadcasting congestion, selectivity is one of the prime factors, and every non-technical user gives it first consideration. And this is not without justification, for tremendous amplification and sensitivity are useless when the ability of the receiver to break through local broadcasting interference is not present.

It also became apparent that if radio was to meet with great popular favor, the receiving system used in the home necessarily had to be greatly simplified.

The original regenerative receiver could not possibly fulfill these rigid requirements of selectivity and simplicity. Only one selector or tuning circuit was available, which was insufficient to give a high degree of selectivity. The use of additional circuits to bring about a selectivity increase resulted in a loss of sensitivity. Many attempts were made to associate vacuum tubes with these additional selector circuits, so that the loss of sensitivity previously mentioned could be overcome. This was the first attempt at radio frequency amplification. A serious trouble was encountered in these experiments, however, due to the inherent oscillating characteristic of the vacuum tube. The use of several tubes linked together through coupling circuits, resonant or partially resonant to the broadcasting frequency, gave rise to almost uncontrollable oscillation tendencies. When systems of this kind were adjusted so as to be non-oscillatory, an improvement over the simple regenerative system was noted in respect to selectivity, but because of the critical nature of the non-oscillatory state, the purpose was entirely defeated in respect to simplification of control.

However, with the introduction of the Neutrodyne circuit, a receiver was made available to the public which did not incorporate the objectionable qualities found in the regenerative type

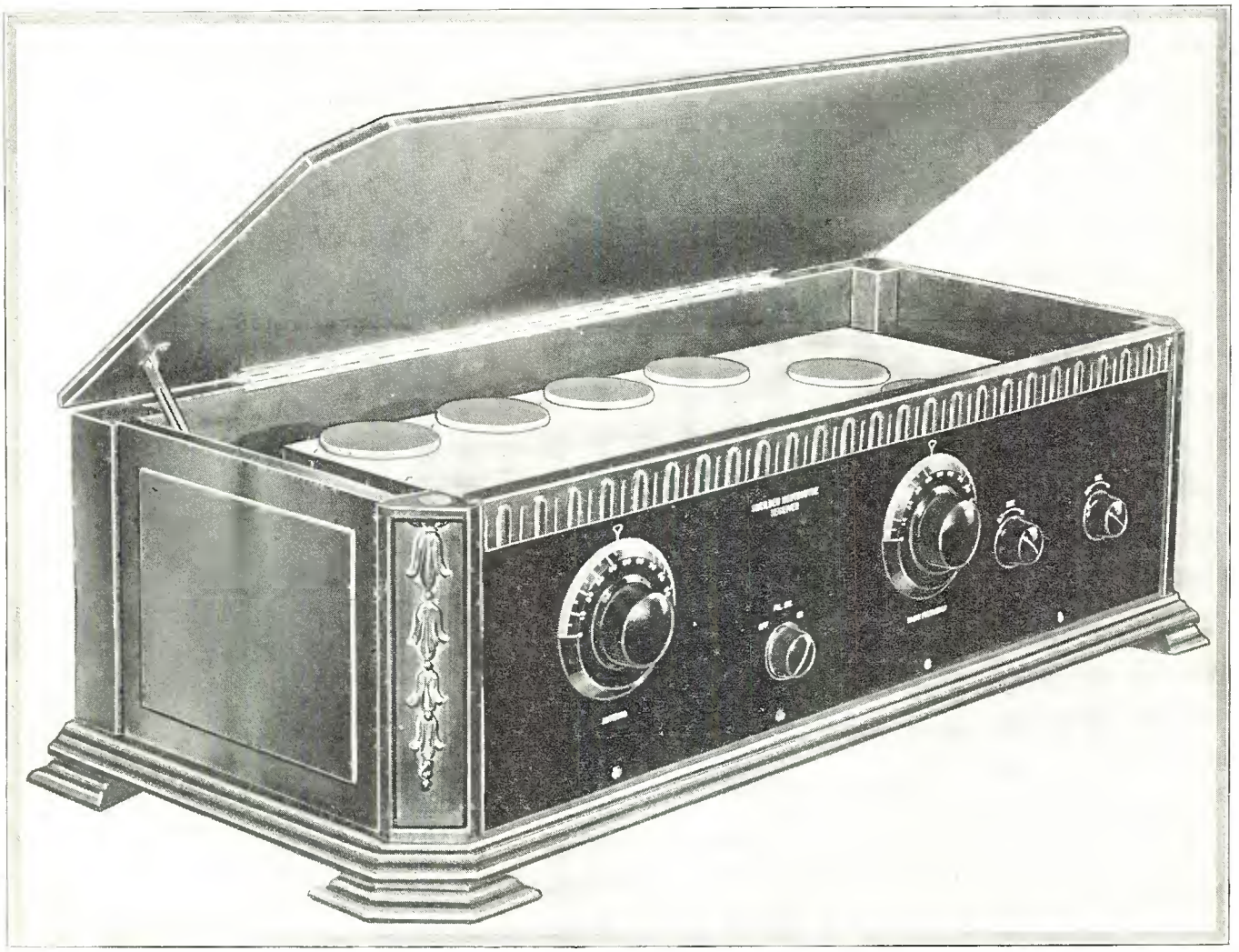


Photo A. The Shielded Neutrodyne installed in a cabinet

**A technical treatise on the Shielded Neutrodyne Receiver, more elaborate and complete than published herewith, has been prepared by our engineering staff. It will be sent upon the receipt of 25 cents in stamps or coin.*

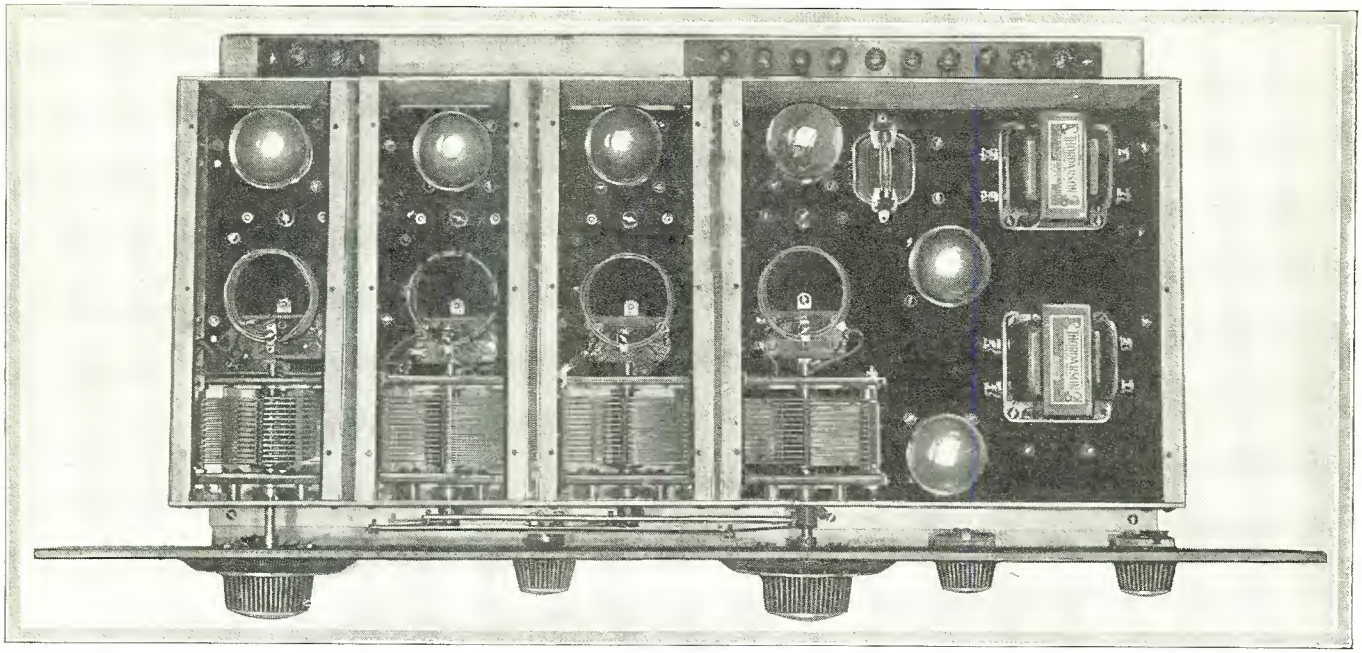


Photo B. Top view of receiver with cover removed. Note the entire absence of unsightly wires

of receiver. The novel feature of the receiver was in the method of neutralizing the capacity between the grid and plate elements of the tube in combination with the elimination, to a certain degree, of the electro-magnetic coupling between successive tuned stages. The innovation of this circuit had such a far-reaching influence that the aspect of radio broadcasting, with regard to receivers, was entirely changed. Few circuits have enjoyed the popularity which has been accorded the Neutrodyne. The fact that it is fundamentally sound is demonstrated by the large number of manufacturers who still use this type of circuit.

The introduction of high power in radio broadcasting has made it imperative that highly selective receivers be designed to combat the increase in interference. This has been largly accomplished by two methods. One has been the design of more efficient transformers; the other, the proper shielding of the various sections of the receiver so that electro-magnetic pick-up and interaction between stages were negligible. The latter is by far the more efficient, but owing to the tremendous expense incurred in the development of the design of a shield and the production methods necessary for the economical manufacture of it, receivers of this type have not been procurable except in a commercially made form.

Many home constructors have felt the urge to build a completely shielded set, but have not been able to do so because of their limited facilities for the proper assembly of such a receiver.

The Citizens Radio Laboratory, after extensive experimentation, have developed a completely shielded Neutrodyne receiver, easily built by the home constructor. This receiver, when properly constructed, and neutralized, will perform in a manner equal to that of the best of factory-built radio sets.

LIST OF PARTS

1—Echo Aluminum Shield (complete)
1—7x28x3/16-inch Drilled and Engraved Micarta Front Panel
1—8⅞x9⅞x3/16-inch Drilled Micarta Sub-panel
3—3⅝x6⅛x3/16-inch Drilled Micarta Sub-panels
3—¾x7¾x3/16-inch Drilled Micarta Terminal Strips
1—1x3x3/16-inch Drilled Micarta Terminal Strip
1—1x10x3/16-inch Drilled Micarta Terminal Strip
4—Benjamin Type 9035 Radio Frequency Transformers
6—Benjamin Type 9044 UX Cushion Sockets
1—Carter 6-ohm Midget Rheostat
1—Carter 25-ohm Midget Rheostat
1—Carter 2-ohm Fixed Resistance

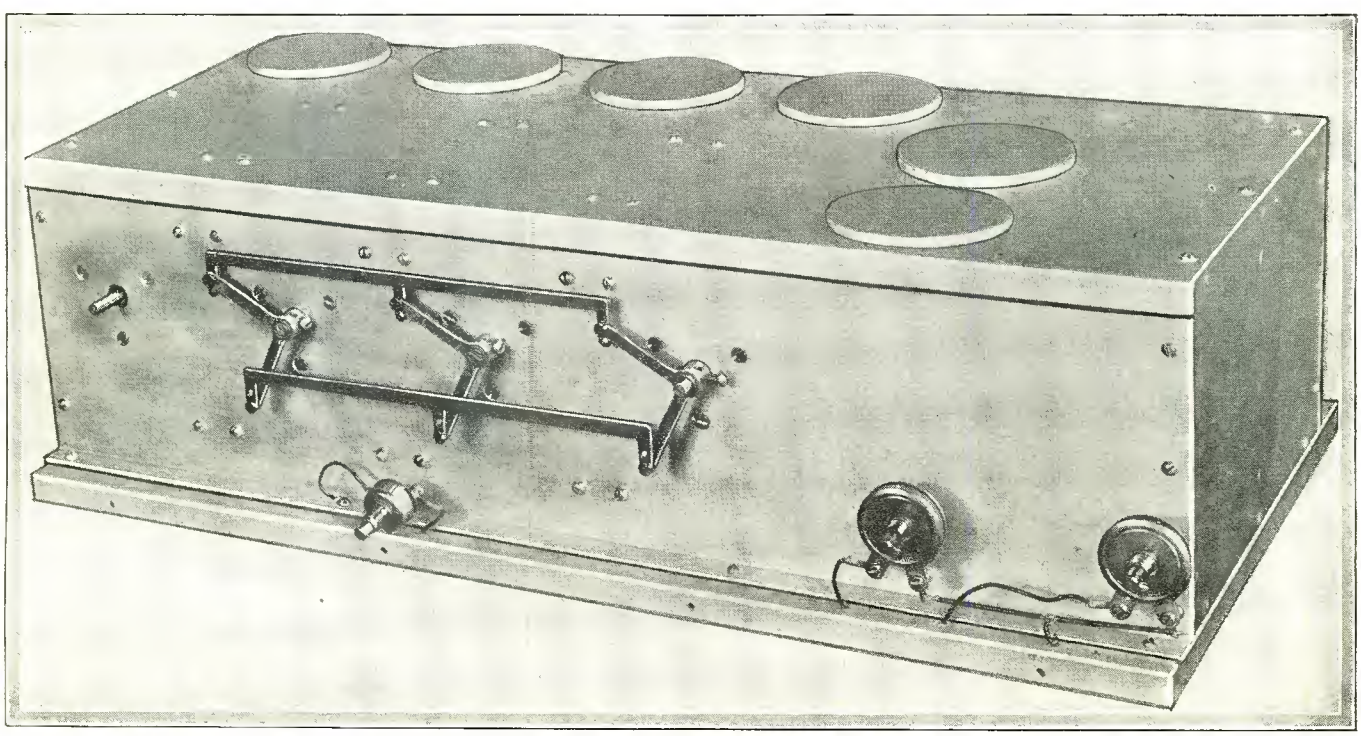


Photo C. Completed receiver ready for the front panel. The filament switch completes the circuit between the negative "A" battery and the shield

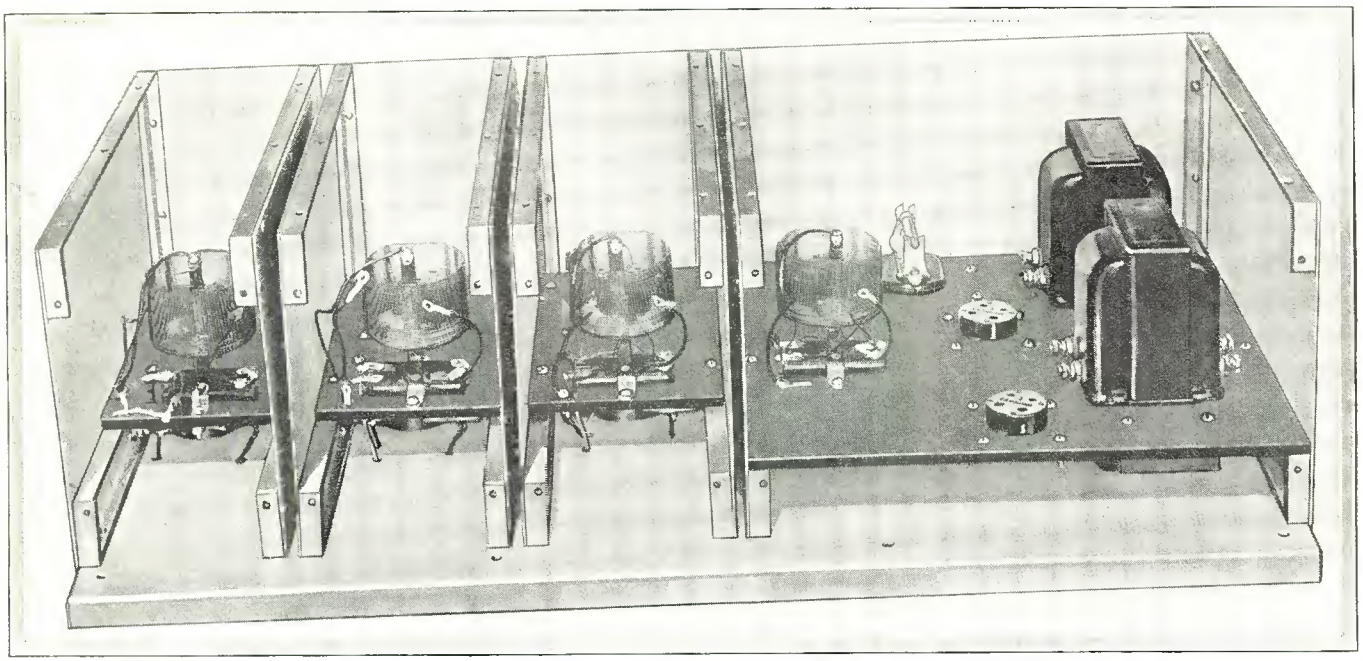


Photo D. Front view of receiver with top and front removed

1—Carter 4-ohm Fixed Resistance
1—Carter Midget Filament Switch
4—General Radio Type 247-F .0005 mfd. Variable Condensers
1—Silver Marshall No. 632 Link Motion
1—Sangamo 1 mfd. By-Pass Condenser
2—National 4-inch Type "A" Vernier Dials
3—Sangamo 0.5 mfd. By-Pass Condensers
1—Sangamo .00025 mfd. Fixed Condenser with Clips
1—Sangamo .002 mfd. Fixed Condenser
1—Sangamo .005 mfd. Fixed Condenser
12—Eby Engraved Binding Posts
3—Special Radio Frequency Choke Coils*
2—Thordarson R-200 Audio Transformers
3—XL Model "G-1" Neutralizing Condensers
1—XL Model "N" Neutralizing Condenser
1—Lynch 2-megohm Grid Leak
1 Roll of Celatsite Flexible Wire in each of the following colors: Black, Red, Green, Yellow, and Brown

**These coils can be obtained from our laboratory.*

The prospective constructor of the Shielded Neutrodyne Receiver may feel a certain apprehension as to the ease with which the receiver may be built. If a systematic method is followed, no difficulty will be experienced in correctly building the receiver. The construction is accomplished by a number of major operations, namely, the assembly of the shield; wiring of the individual radio frequency and audio frequency amplifiers; their insertion into the shield; the making of interstage connections; the assembly of the front aluminum panel on which the tuning condensers are mounted; the neutralizing of each stage; the mounting of the Micarta front panel, and the numerous minor details which are necessary to place the receiver in operation. Each of these particular operations will be described at length below.

The complete aluminum shield is supplied in "knock-down" form. It is carefully made and correct in mechanical design, each part thoroughly fabricated, with all holes drilled and the proper ones tapped. Machine screws for assembling the shield and holding it rigidly together are supplied with the shield. The base of the shield is first taken and the eight partitions mounted

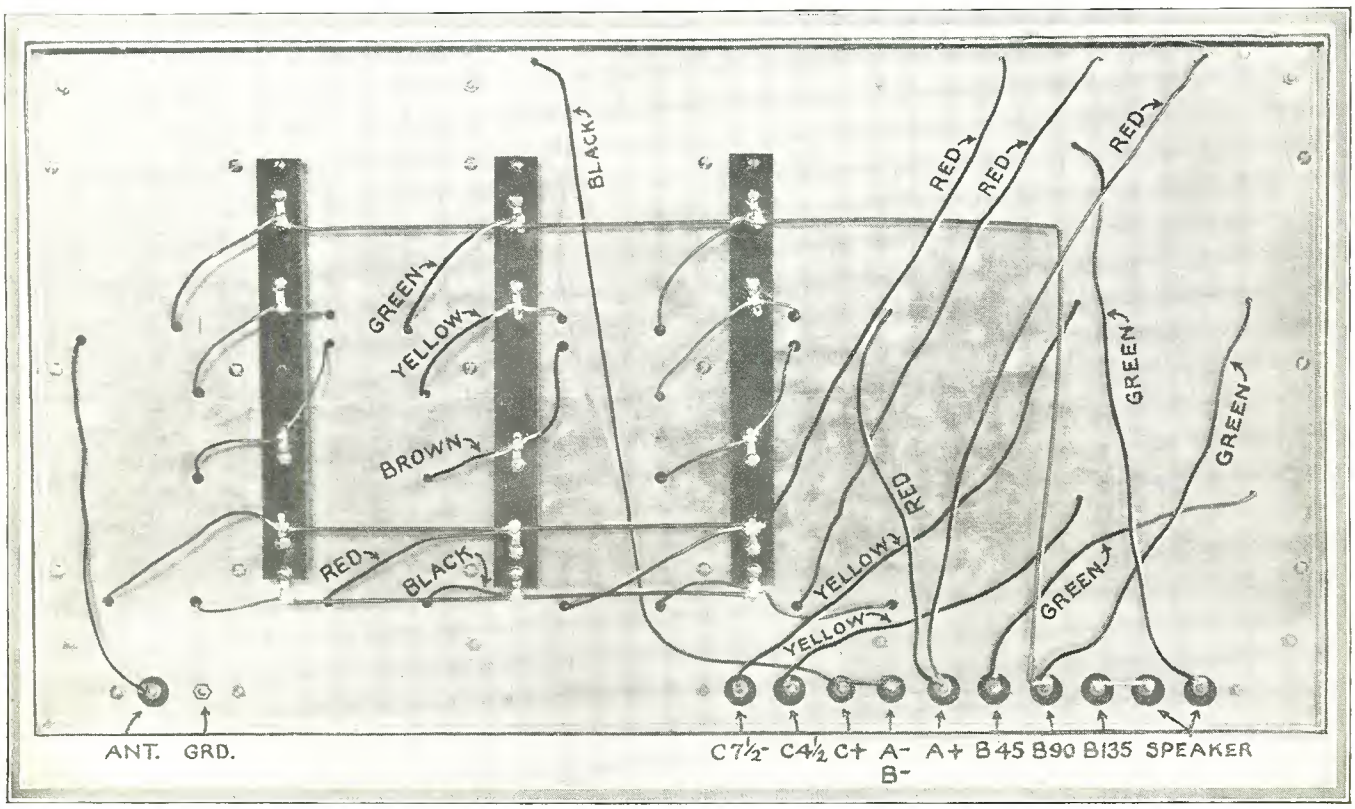


Photo E. Bottom view of receiver, showing the color of the different wires

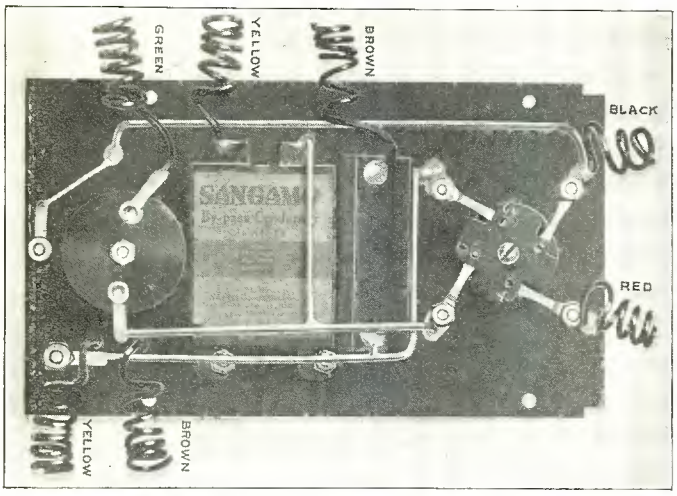


Photo F. Bottom view of radio frequency amplifier

upon it. There are two types of partitions—the left and the right. They are easily recognized by the location of the ⅜x⅜-inch aluminum rod upon which the stage assemblies are mounted. In four of the partitions the aluminum rod is at the left side with the opening in the cast frame to the front, and on the other four the aluminum rod is on the left side with the opening in the cast frame also at the front. In each case the height of the aluminum rod from the bottom of the partition is the same.

Fasten each partition securely to the base by means of screws, being sure that the screws are not absolutely tight. The three Micarta strips mounted on the under side of the aluminum base to establish a terminal point for connections between stages, are also mounted in their respective positions by the screws with which the partitions are fastened into place. The correct location of these strips are accurately shown on the photographic reproduction of the under side of the shield. Soldering terminals are placed at convenient intervals on the strips and are held in place by 6-32 screws ¼ inch long, fastened to the insulating material. Each of the terminals are insulated from the shield with the exception of the negative "A" terminal, which makes contact directly through one of the mounting screws holding the strip in position. A spacer, approximately ¼ inch thick, is placed under each end of the strip to raise it above the metal and prevent any short circuit between terminals.

Next, mount the rear panel by fastening it securely to the base with bolts and nuts, and to the partitions by means of screws. After the rear panel has been mounted, go over each screw in turn and carefully tighten it so that considerable pressure is applied between the partition and the part being clamped to it. This is very important, since an absolutely tight joint must prevail at the junction of any two parts.

Next, take the short terminal strip and mount it on the left end of the base at the rear, over the single 9/16-inch hole. The antenna and ground posts are mounted on this strip—antenna post to the left. A soldering lug is placed on the under side of

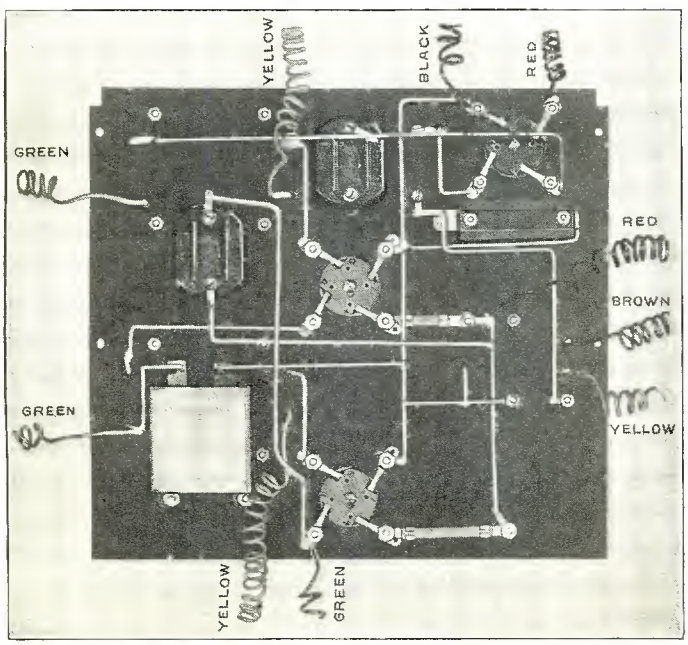


Photo J. Bottom view of detector-audio amplifier unit

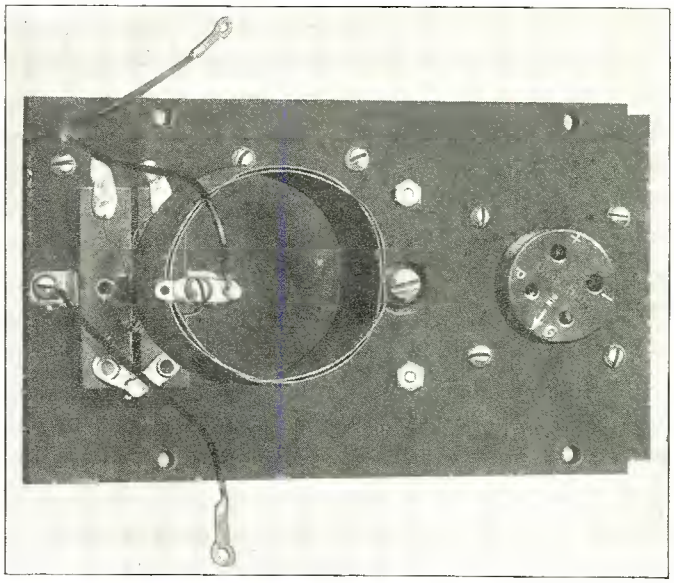


Photo H. Top view radio frequency amplifier. Note the two wires for connection to tuning condenser

the strip and securely clamped to it with the nut supplied with the binding post. The lug or screw should not make contact in any way with the aluminum. However, in the case of the ground terminal, the binding post is placed through the terminal strip and fastened against the aluminum by means of the nut furnished with the binding post. In this way the ground connection is automatically made to the shield, and if all clamping screws holding the shield together are securely tightened, a complete metallic connection is made throughout the shield. The hole at each end of the terminal strip is used for fastening it on the base. Inasmuch as no connections are made to these screws, there is no need of insulating them from the shield.

Next, repeat the assembly of the binding posts on the long strip placed over the series of 9/16-inch holes on the right end of the base toward the rear. These binding posts should be placed in the same order as they are shown on the large graphic illustration in Fig. 4. No connections whatsoever are made between the shield and any of the binding posts on this terminal strip. The same method is used in securely fastening this strip to the baseboard as is used in the other, namely, by means of the two mounting screws, one at each end of the strip.

The next step is the assembly of the three separate stages of radio frequency amplification. The panels may be secured already cut and completely drilled. This will obviate any difficulty in properly mounting the parts. However, if the constructor desires to drill and cut his own panels a complete template is shown in Fig. 1. Great care must be exercised, in drilling and cutting the panels, to carefully follow dimensions and properly countersink holes where necessary. If care is not taken, trouble will be experienced in parts not fitting accurately.

Begin the assembly of each amplifier by mounting the 0.5 mfd.

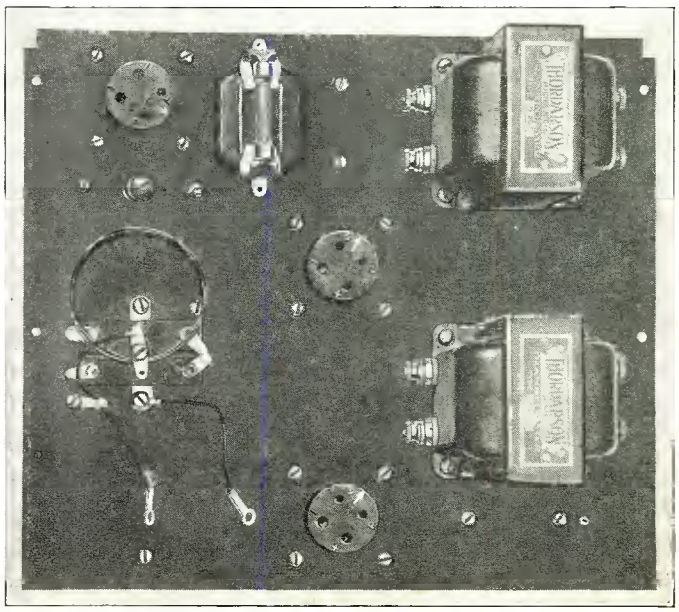


Photo G. Top view of detector-audio amplifier unit

Sangamo by-pass condenser, the radio frequency choke coil, the XL Model G-1 neutralizing condenser and the Benjamin socket, on the under side of the panel. Before mounting the neutralizing condenser, cut off the projecting bakelite mounting at each end. This is necessary, since it would prevent the insertion of the individual assemblies into the shield. The condenser then is mounted by means of two flat-head machine screws through the sub-panel fastened by two nuts on the upper side. When the amplifier is correctly assembled the adjusting screw of the neutralizing condenser will project through a hole in the top side of the panel, as will the upper part of the socket. Next, mount the Bejamin coil in position, taking great care not to change the form of the coil or injure it in any way. These coils are entirely self-supporting, and their construction, therefore, is more or less fragile. In making connections to the terminals of the coil use great care that the soldering iron does not come in close proximity to the coil itself or the mounting standard, since the material used in its construction is of an inflammable nature and will easily ignite. With ordinary care there is no danger of this happening, but a word of advice at this time will not be amiss. Next place a lug on each side of the sub-panel and fasten them securely against the panel by means of a screw through the hole in the lower left-hand corner of the panel, viewed from above. This hole is at the opposite end from the notched-out portion of the panel. These lugs are for the purpose of establishing connections between the transformer and tuning condenser. Then wire each unit completely, as shown on the schematic wiring diagram or graphic illustration, with 12-gauge bare tinner copper bus bar.

The difference between the antenna coupling stage and the radio frequency stages is only in one connection. The antenna coupling stage does not use the tap on the coil, while the radio frequency stages do.

Next, solder a length of the correctly colored Celatsite insulated flexible wire to each of the terminals shown in either the photographs or wiring diagrams. The length of these wires should be approximately 18 inches. Next, assemble the combination detector stage and two-stage audio amplifier by following a somewhat similar method as used in the radio frequency stages. Two Sangamo fixed mica by-pass condensers, one 1 mfd. Sangamo by-pass condenser, three Benjamin sockets, a Model "N" XL condenser, and two Carter fixed resistances—one four ohms, the other two ohms, are mounted on the under side of the detector and audio amplifier unit. Two Thordarson R-200 audio transformers, a .00025 mfd. Sangamo grid condenser, with a two megohm Lynch grid leak, and the last radio frequency transformer are mounted on the upper side of the panel. As in the case of the other panels, care should be exercised to properly locate holes and countersink them where required, if the constructor cuts and drills his own panel. The projecting metal terminal of the Model "N" condenser which is at the left end of the panel, nearest the partition, is cut off to prevent contact being made with the aluminum rod upon which the sub-panel rests. Bus bar is used in the wiring of the apparatus mounted on this unit. The Celatsite wiring is also used in this assembly for making connections outside of the unit.

Five colors of Celatsite flexible wire are used in the assembly

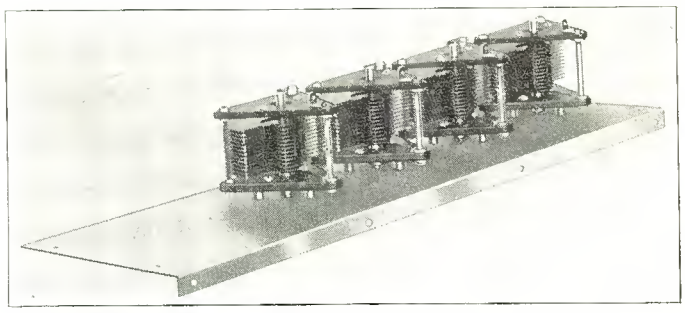


Photo K. Assembled front panel with condensers

of each of the units, as follows: The "A" battery positive leads are in red; the "A" battery negative leads are black; all "B" battery positive leads and the plate lead of the last audio tube are green; the neutralizing leads from the tap on the coils are in yellow, as are the 4½ and 7½ volt negative "C" battery leads; the lead between the neutralizing condenser and the succeeding stage is brown. The black wire is also used for the flexible leads from the radio frequency transformers to the variable condensers tuning them. These should be approximately 4 inches long, with a soldering lug at one end. The other end is soldered to the top lug of the pair mentioned above. This method makes it comparatively easy to fasten them to the respective terminals on the condensers. The two red flexible leads from the "F" positive terminals of the fixed resistances controlling the two audio tubes, and positive filament terminal of the detector tube should be made sufficiently long to extend to the 25-ohm detector tube rheostat, mounted on the front panel, and the "A" positive binding post at the rear of the shield, respectively.

After each of the units has been completely assembled and wired accurately, check each connection against either the schematic wiring diagram or large graphic illustration. This should be done very carefully, since any discrepancies in wiring which may occur will necessitate the complete disassembly of the receiver at some later time, if the discrepancy is to be corrected. After each unit has been carefully checked and the necessary corrections made, each unit should be inserted into its respective compartment of the shield, the flexible wires inserted through the holes of the base and pulled taut. Four screws are then inserted in the mounting holes of each unit and the unit securely fastened to the aluminum rods forming its support. Repeat this process on each of the units until all are securely fastened in place and all wires project underneath the base. Next, connect the interconnecting wires between stages to the proper terminals on the terminal strips located under the shield. By referring to the large graphic illustration, schematic wiring diagram or photographs, little difficulty will be experienced in hooking up the proper wires, since a red wire will be fastened to a red wire, green wire to a green, etc.

At this stage of the assembly, a completely wired receiver

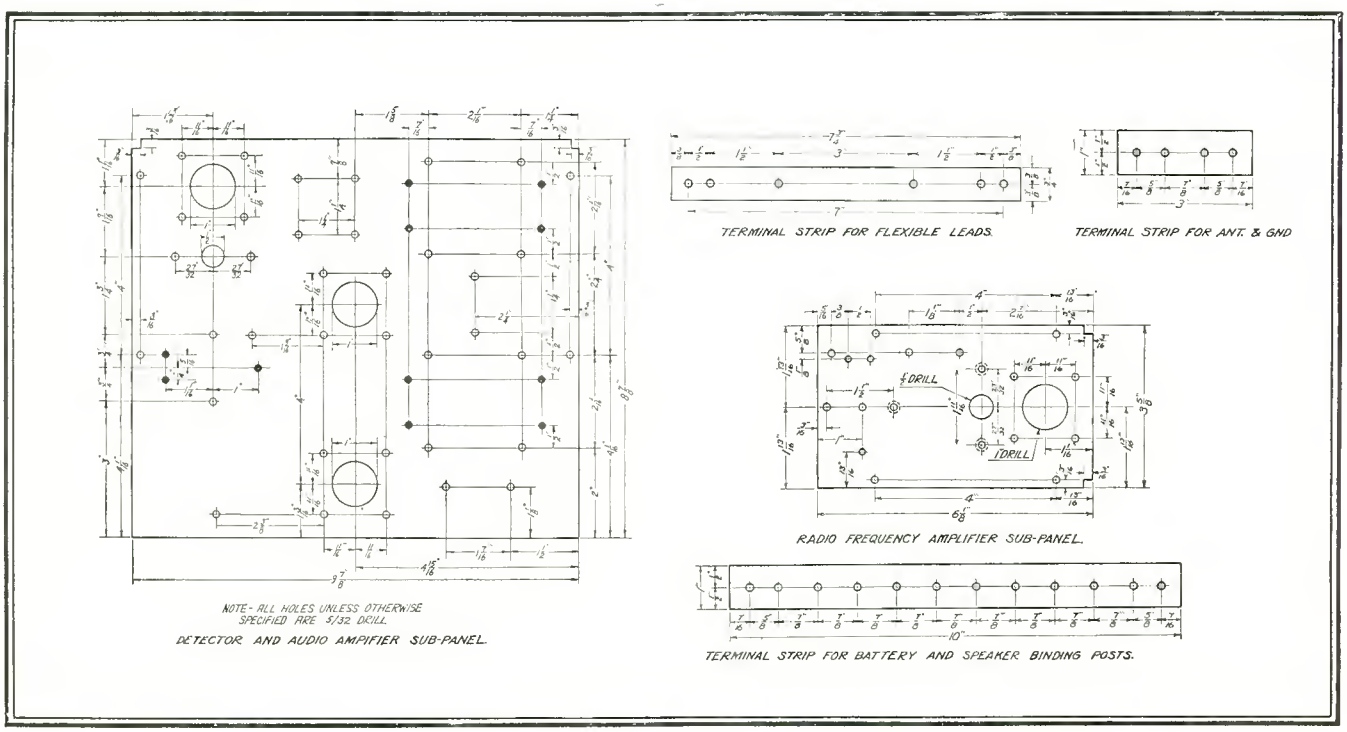


Fig. 1. Layout of sub-panels and terminal strips. Holes shown solid are for wires

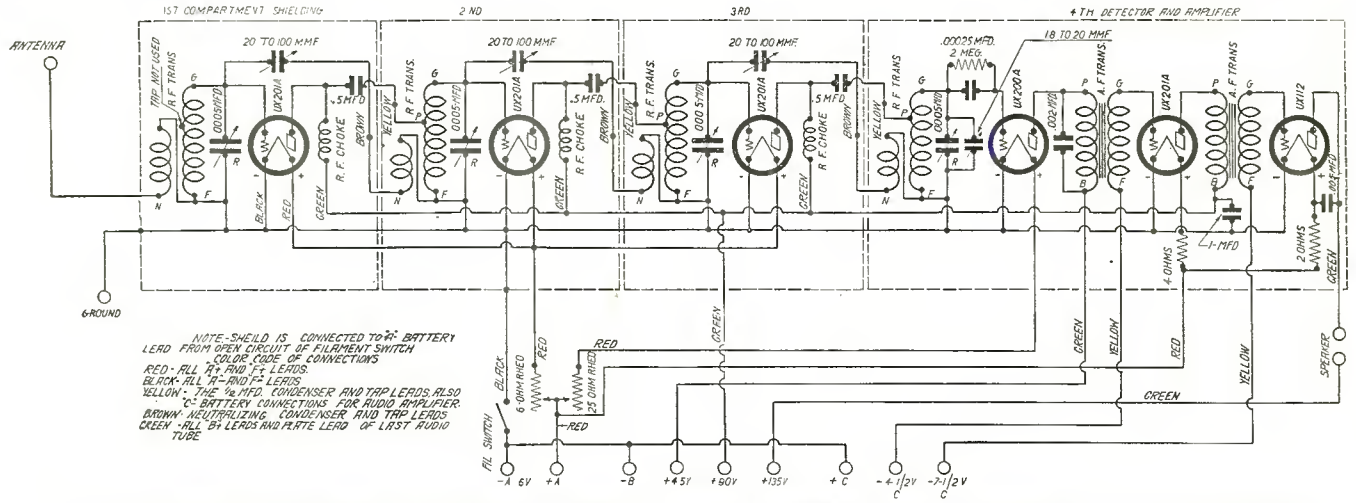


Fig. 3. Schematic wiring diagram of complete receiver. Note colors which are used for making the various connections

should be at hand, with the exception that the top and front portions of the shield are not in place. Mount each of the four tuning condensers upon the aluminum front panel in such a manner that the stator portion is at the top. With a hacksaw remove ¼ inch from the ends of each of the center condensers. The condenser assembly should then be mounted into place on the shield and connections made to the flexible leads which are present on each of the assemblies. Screw terminals are provided on each of the condensers by the manufacturer, thereby allowing connections to be made easily by placing a soldering lug under the screw. Then install the filament switch by soldering a wire between one of its terminals and one of the mounting screws holding the aluminum front panel into place. The other side of the switch has the wire connected to it, which is soldered to the negative "A" battery binding post. This completely isolates the shield from the "A" negative terminal except when the set is in operation. Next connect the two rheostats into the circuit. Place the formed top over the shield and securely fasten it to same by inserting and tightening the screws which clamp it to the partitions. Carefully examine the complete shield and note whether any screws are at all loose. As has been mentioned before, it is imperative that all screws be tight, since each part must make perfect contact with the part to which it is held.

Next place a UX 201-A tube in each of the sockets, with the exception of the detector and the last stage of audio frequency amplification, which require a UX 200-A and UX 112 tube respectively. Connect antenna, ground and "A" battery to the proper terminals at the rear of the receiver and observe whether each of the tubes lights properly and is controlled by the proper rheostat or resistance, and also whether the filament switch operates properly. Then touch one of the "A" battery wires to each of the remaining binding posts on the strip and observe whether any of the tubes light. If there is no indication that a tube lights except when the "A" battery is properly connected, it is safe to connect all "B" batteries, "C" batteries and speaker.

Place a cast aluminum cap over each of the holes, with the exception of the third compartment. Place a dial on each of the tuning condensers and tune in some local station whose signal is not too loud. Adjust the controls so that the signal is at maximum volume. Then remove the third radio frequency amplifier tube from its socket. Again adjust the dials until the signal is heard at loudest volume. Then remove the negative filament wire which is soldered to the third terminal strip on the base so that the third tube will not light. The signal will, however, still be heard, much weaker than when the tube was lit. With a long piece of wooden dowel, one end of which is sharpened like a screwdriver, adjust the neutralizing condenser in the compartment, holding the unlit tube until signals are inaudible or very faint. Removal of tube will cause signal strength to be increased very appreciably. Placing it again in its socket will reduce the signal to its former value. This indicates complete neutralization of that particular stage.

Solder the filament lead to its proper terminal again. Repeat the process on the second tube and first tube in turn, keeping the caps over the various stages which are not being neutralized. In order to be positive that proper neutralization is present, it is advisable that the neutralization process be repeated.

Next remove the dials which were used for tuning of receiver in the neutralizing process, and adjust the plates of each of the three condensers, which will be controlled by the link motion, so that they are fully enmeshed. These are the two condensers which have had their shafts shortened, and the one to their right. Then rotate the link motion on each of the condensers as far to the right as possible. At this point, the lever arrangement on each of the shafts will be in contact with it and prevent the link motion from turning any further. Fasten the link motion to each of the condensers by turning down the screw in the collar over the shaft. The outside edge of the gang control should be flush with the end of the shafts which have been shortened, and underflush to the extent of approximately ¼ inch on the condenser near the center of the panel.

Mount the two Velvet Vernier Dials on the Micarta front panel. Slipping the dials over the shaft of the condensers tuning the antenna stage and the detector stage, securely fasten the panel to the base by means of machine screws and nuts, at the same time mounting the filament switch and two rheostats which have been previously connected to the wires projecting through the base. The condensers should be entirely enmeshed and the dial indicating 100, when properly adjusted.

The receiver should not squeal or oscillate violently when tuned by the antenna and gang controls. If care is observed in attaching the link motion, selectivity will come as a matter of course, but in the event that the condensers have a slight discrepancy as to capacity, which is not probable, a balancing condenser across the detector input is provided by which the detector stage may be adjusted to allow full strength on weak signals. This balancing condenser is installed in a manner similar to the neutralizing condensers used in the radio frequency stages. If once adjusted properly, this balancing condenser need not again be touched.

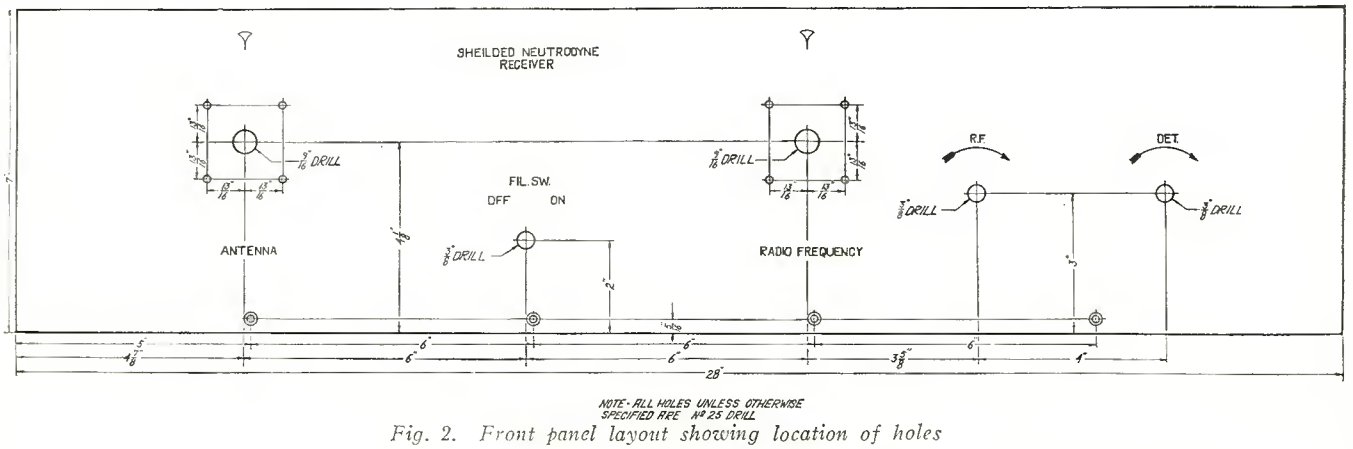


Fig. 2. Front panel layout showing location of holes

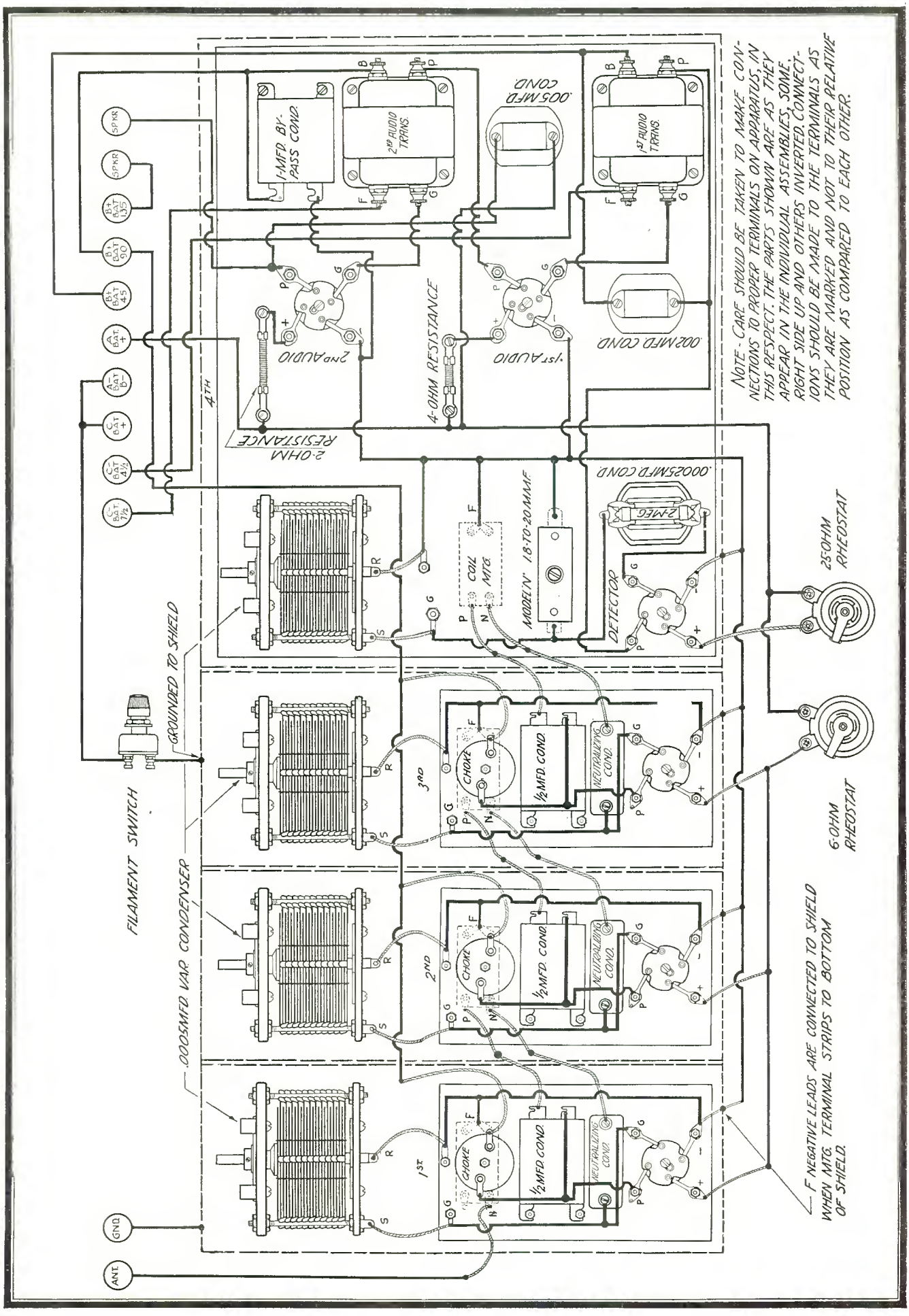
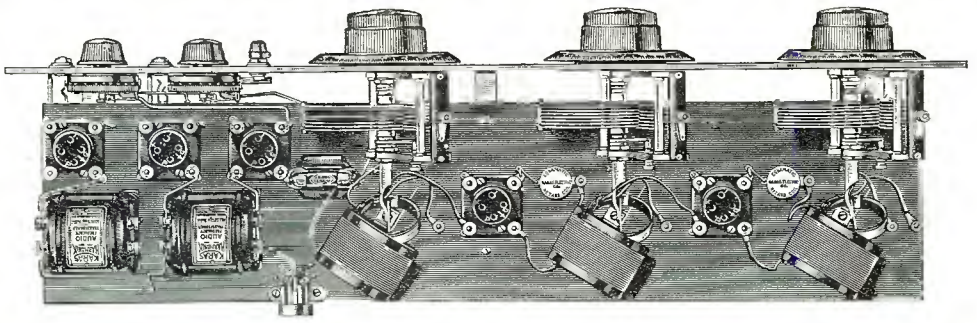


Fig. 4. Graphic illustration of complete receiver

Karas Equamatic

The Five Tube Wonder Circuit that has the Whole Country Talking—*Listening*—and BUILDING

HOW would you like to build a five tube radio frequency receiver that brings in every station WITH EQUAL VOLUME AND CLEARNESS from one end of the dial to the other?



How would you like to have a receiver that possesses an ALMOST UNBELIEVABLE SELECTIVITY—that enables you to CUT RIGHT THROUGH powerful local stations—to reach out after DX whenever you want to, WITHOUT THE SLIGHTEST POSSIBILITY OF LOCAL INTERFERENCE, and with an entire absence of scratchy, raspy, so-called static noises.

How would you like to own a receiver whose SWEET, CLEAR, PURE, MELLOW TONES were full-rounded, distinct and NATURAL—never fuzzy, blorry or distorted?

You can have such a set in the KARAS EQUAMATIC. You can easily and quickly build this receiver yourself in a remarkably short time. You can possess THE FINEST RADIO RECEIVER in your neighborhood—one which will out-perform any other set regardless of price or size.

The KARAS EQUAMATIC is something NEW in radio—something BETTER—something more PRECISELY ENGINEERED—something INFINITELY MORE EFFICIENT—than ANY OTHER RECEIVER ever before offered to all who really know radio and who want THE BEST.

It has been rightly called the KARAS EQUAMATIC FIVE TUBE WONDER CIRCUIT. It's a set the like of which radio fans have never before seen.

Engineers who have examined it—who have studied its principle of operation—who have exhaustively tested its performance under every conceivable condition—have been amazed at the manner in which it has SOLVED THE BIGGEST PROBLEM OF RADIO, in a simple, easily understood, AUTOMATIC manner—and solely through its application of absolutely correct engineering principles. Practically every prominent radio magazine in the country is now featuring this circuit.

Radio fans who have built the KARAS EQUAMATIC FIVE TUBE WONDER SET have also discovered that here at last is something entirely new in their whole radio experience—a new kind of TONE QUALITY—a new demonstration of VOLUME AND SELECTIVITY—plus a new principle of AUTOMATIC TUNING that makes all other systems obsolete because lacking in the very essentials that a radio set should possess to be in keeping with present day knowledge and scientific development.

Superb Tone Quality—An Equamatic Sensation

It was no small feat to design a radio receiver in which ALL OF THE MANY PERPLEXING PROBLEMS OF TUNING have been FINALLY and DEFINITELY solved through the invention of KARAS AUTOMATICALLY TUNED INDUCTANCE COILS and other KARAS parts—but it was a STILL GREATER ACHIEVEMENT to produce in the KARAS EQUAMATIC a TONE QUALITY that is ENTIRELY NEW in the field of radio frequency. THE KARAS EQUAMATIC has a marvelous golden tone that has been both the goal and the despair of radio set manufacturers ever since the era of broadcasting began.

You will find in the KARAS EQUAMATIC a quality of richness, fullness and of true tonal beauty. It's tone is never harsh—it is never coarse—just PURE, CLEAR, SWEET MELODY at every wavelength setting of the dials—for EVERY station.

The remarkable tone of the KARAS EQUAMATIC is due to peak efficiency at all wavelengths and to the scientifically correct mechanical and electrical characteristics of the circuit and to the use of KARAS HARMONIK AUDIO FREQUENCY AMPLIFYING TRANSFORMERS, which amplify all of the many vital harmonics and rich overtones that combine to form what we know as audible musical sounds.

Equamatic Selectivity Is Unsurpassed

Naturally you want a receiver that has the UTMOST SELECTIVITY. In the KARAS EQUAMATIC you will find a complete realization of all you ever have hoped for in this direction. The entire problem of selectivity has been solved by the EQUAMATIC principle, combined with the use of KARAS ORTHOMETRIC STRAIGHT FREQUENCY LINE VARIABLE CONDENSERS and KARAS MICROMETRIC VERNIER DIALS. Because of this remarkable selectivity there is NO OVERLAPPING OF STATIONS. Each station comes in clear and sharp and full tone at its proper place on the dial.

Equamatic System Licensed Under King Patents Pending

The selectivity of the circuit is accompanied by a remarkable volume, due to a big gain per each stage of radio frequency and to the employment of the powerful KARAS HARMONIK TRANSFORMERS for two audio stages.

Easy to Build This Wonder Set

Notice in the illustration of the EQUAMATIC RECEIVER how clean cut and easily wired this set actually is. EVEN THOUGH YOU MAY NEVER BEFORE HAVE BUILT A RADIO SET, you can build this one—build it easily and quickly—get from it far better results than you can obtain from the finest and most expensive manufactured set you can buy.

A 16-page manual of simple wiring diagrams and complete instructions for assembling this receiver is packed with each set of KARAS EQUAMATIC INDUCTANCE COILS. In this manual are minutely detailed instructions for the placing of every wire—the making of every connection—the correct positioning of every part. With the aid of this manual and the necessary KARAS parts you can have this wonderful receiver in operation in a remarkably short time. To build the EQUAMATIC RECEIVER you will need the KARAS parts listed on the accompanying coupon, plus other standard parts easily obtainable anywhere.

Order Today from Your Dealer or Direct from Us

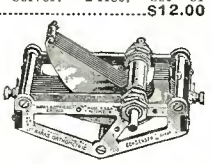
Thousands of dealers throughout the country can supply the necessary Karas parts for building this powerful, rich-toned and selective receiver. If your local dealer is not able to fill your order, you can secure your Karas parts direct from us by filling out and mailing the coupon. SEND NO MONEY. Just hand the postman the price of the parts plus a few cents postage.

Order your parts from your dealer or from us TODAY. Build one of these sensationally better five tube EQUAMATIC RECEIVERS right away, so that you can enjoy all of the pure, rich, full tone qualities—the remarkable selectivity—and the superb volume that it has to offer you in return for a few hours most pleasantly spent in building this totally satisfactory set.

KARAS ELECTRIC CO.
1009 Association Bldg.
Chicago, Ill.

Essential Parts of the Karas Equamatic Sensation

Karas Equamatic Inductance Coils are packed three in a carton, and come to you with complete manual of simple diagrams and instructions, all necessary nuts, screws and binding posts, ready for mounting in your receiver. Price, set of three coils **$12.00**



Karas Special 17 Plate Orthometric Condensers, three of which are used in the Equamatic Receiver, have special extended shafts upon which to mount the primary coils of the Inductances. Price, each **$7.00**

Karas Harmonik Audio Frequency Amplifying Transformers are essential to the tone quality success of the Equamatic Receiver. Two of these are used for the two stages of audio frequency amplification. Price, each..... **$7.00**

Karas Equamatic Retard Coils, two of which are used, were designed especially for the System. Price, each **$1.00**

Karas Equamatic Sub-Panel Brackets. To insure the necessary exact positions of primary and secondary coils these brackets are essential. Price, set of three..... **70c**

Karas Micrometric Dial. It has a 63 to 1 vernier and tunes to 1/1000 of an inch. Price..... **$3.50**

Karas Electric Co.,
1009 Association Building,
Chicago, Illinois.

Please send me set of 3 Equamatic Inductance Coils, $12.00; 3 special Orthometric Condensers with extended shafts, $7.00 each; 3 Micrometric Vernier Dials, $3.50 each; 2 Harmonik Audio Transformers, $7.00 each; 2 Equamatic Retard Coils, $1.00 each; and 3 sub-panel brackets, 70c, for which I will pay postman $60.20, plus postage, upon delivery. It is understood that I have the privilege of returning any of this apparatus for full refund any time within 30 days if it does not prove entirely satisfactory.

Name.....
Address.....
City..... State.....
(If cash accompanies order we will ship postpaid.)

The Equamatic Receiver

A Tuned Radio Frequency Receiver Using a New System of Radio Frequency Control

THE continual development of efficient tuned radio frequency circuits has brought forth few recent inventions which have aroused a greater interest than the Equamatic System of radio frequency control. It is one of the outstanding development of the year and bids fair to enjoy the popularity accorded the

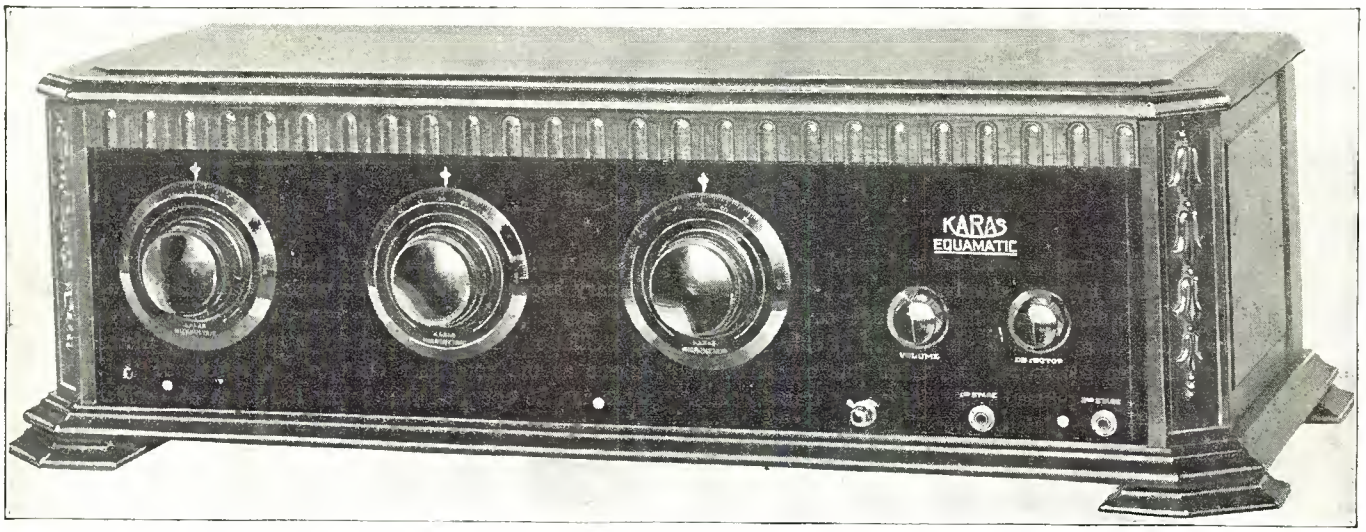


Photo A. Front view of receiver mounted in cabinet

various Neutrodyne circuits of two and three years ago. The fact that the radio public is interested has been manifested in many ways, notably by the many communications received from our readers requesting detailed information on the system itself and a practical application of it in a receiver. In response to these requests we are herewith giving a short description of the invention and a means of utilization in an easily constructed receiver.

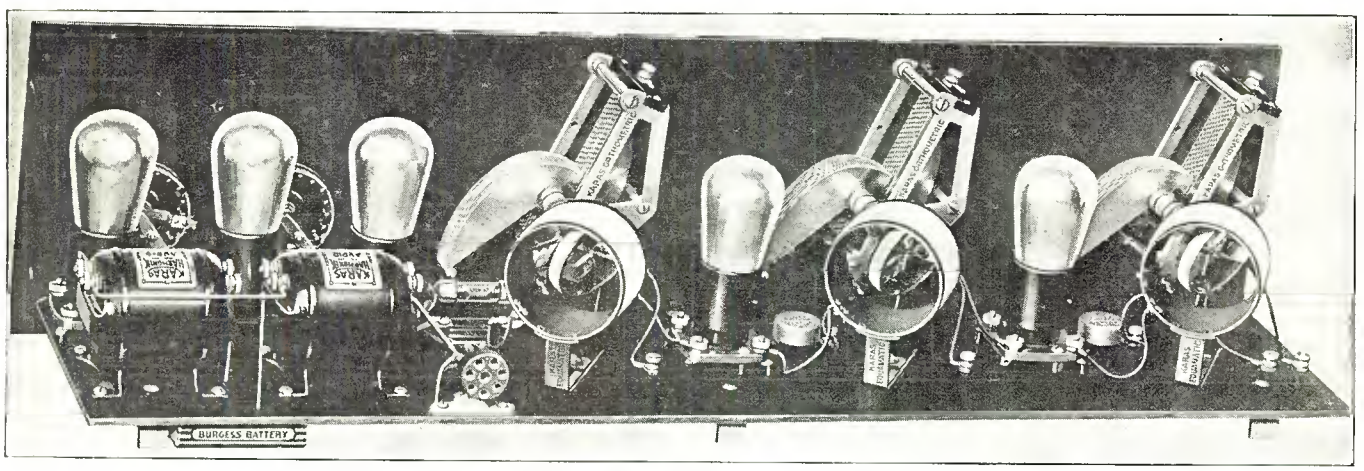


Photo B. Rear view of completed receiver

The object of the Equamatic System is to provide a composite variation of the radio frequency transformer coupling and the tuning element so that they shall automatically and simultaneously always reach their most efficient operating point at any frequency within the range of the receiver. An adjustable compensating coupler for controlling, in any required degree, the transfer of energy between

inductances at varying frequencies, is provided, so that the presence of any variation of conditions or apparatus employed in the circuit may be compensated for by adjusting the coupling to the proper value.

The tuned radio frequency receiver of today is so designed that a fixed relation is held at all times between the primary and secondary circuits, and the fact that a variation in coupling is necessary in order to obtain maximum energy transfer at any frequency, is practically ignored.

The inherent electrical characteristics of a tuned radio frequency transformer with fixed inductances and coupling, are such that the impedance, or resistance of an inductive coil to an alternating current varies approximately directly with the frequency. Inasmuch as the energy transfer between the primary and secondary is in direct proportion to the impedance, it is conceivable that a much greater inductance, to compensate for a decrease in impedance, is required in a primary coil to tune to 600 meters than is required to tune to 200 meters. It is also compatible that in order to obtain an optimum transfer of energy at every wavelength setting it is necessary that a

primary of increased inductance be used for every 10-kilocycle decrease in frequency.

There are 100 broadcasting channels between 200 and 600 meters. Therefore, to obtain maximum broadcast efficiency at any frequency, 100 separate primary coils, each having the exact number of turns, even to the fractional part of a turn, would be required. Since that many separate primary coils would be impractical and out of the question, the only logical solution has been to design a tuned radio

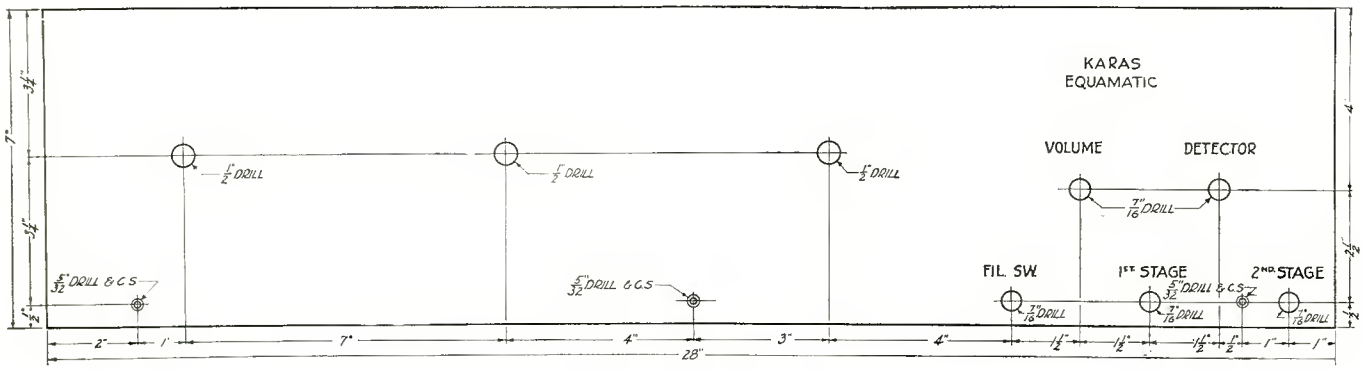


Fig. 1. Panel layout

frequency transformer with fixed inductances and coupling, using but a single primary coil. The inherent disadvantage of using a single primary coil in a transformer whose tuning range covers a wide band, is that a maximum energy transfer is realized at only one frequency. This fact has been recognized and taken into consideration by radio engineers in designing tuned radio frequency transformers. There is a great difference of opinion, nevertheless, as to the proper frequency at which the maximum energy transfer should take place.

For the sake of illustration assume that a transformer is designed so that it will operate at maximum efficiency when tuned to 300 meters. The inductance in the primary is just right to give maximum energy transfer when the secondary is tuned to 300 meters or 1000 k.c. If a frequency other than 300 meters is tuned in, two conditions are established. First, if the frequency is lower than 1000 k.c. the efficiency of the transformer is lowered due to insufficient primary inductance with attendant decrease of energy transfer. Second, if a higher frequency than 1000 k.c. is tuned in, the primary inductance is too high and out of proportion to the secondary, and the energy transfer is of such magnitude that violent oscillations occur. To overcome this tendency to oscillate, various methods have been resorted to. As a whole, the methods prevent oscillation effectively, but only at a sacrifice, the general effect being a decided broadening of tuning and a distinct loss of sensitivity and selectivity.

Continuing, assume that in order to obtain an optimum value of energy transfer to a secondary winding tuned to 600 meters, a tightly coupled primary consisting of 14 turns of wire is necessary. If the coupling between the primary and secondary is loosened and the secondary again tuned for maximum transfer of energy, it will be observed that the wavelength of greatest energy transfer, or efficiency, is no longer at 600 meters, but at some lower wavelength. An effect has thereby been obtained identical to both the removal of a number of turns from the 14-turn primary winding or the use of a separate closely coupled primary of exactly the correct number of turns for maximum efficiency at that wavelength. By loosening or tightening the coupling between the windings, highest efficiency may be attained at 300 meters, 400 meters, or any other desired wavelength within the broadcast spectrum. In other words, if the coupling between the primary and secondary can be varied (with the primary having the necessary number of turns to operate the tubes just under the point of oscillation when the secondary is tuned to 600 meters) in the same degree as the condenser changes the tuning of the secondary, the tubes can be operated just below the point of oscillation, regardless of frequency, thus transferring an optimum value of energy to the secondary over the entire range.

The only method of obtaining this automatic variation in coupling is to have a mechanical connection between the tuning condenser and the primary so arranged that the primary is drawn away from the secondary at exactly the proper rate to keep in step with the reduction in capacity of the tuning condenser. For practical purposes the mechanism must be simple and compact, yet capable of easy adjustment to permit varying range or mechanical movement, while at all times permitting a progressively increasing electrical action. Furthermore, the movement must be stable, precise, uniform and without backlash.

The Equamatic System, licensed under King Patents Pending, and incorporated in the receiver described herewith, successfully fulfills these requirements. The primary is entirely separate from the secondary, being attached to the extended shaft of the tuning condenser and capable of being angularly adjusted to it. The secondary, in addition to being angularly variable with respect to the position of the shaft of the condenser, is adjustable, by pushing it forward over the primary or backward away from the primary, so as to afford any practical, useful degree of coupling with the primary. It is often desirable to compensate for the losses incurred in the natural aging

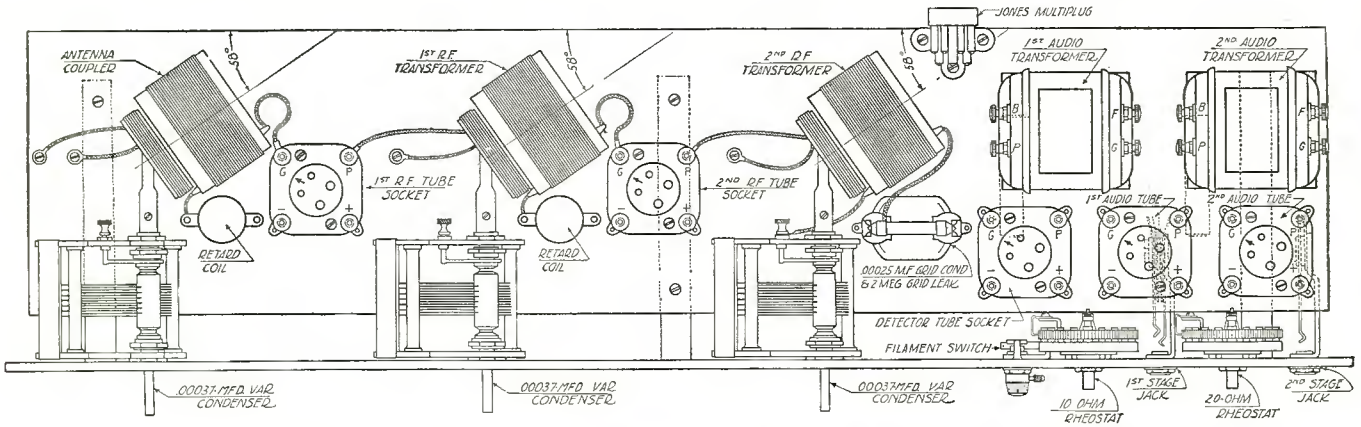


Fig. 2. Top view of receiver. Parts shown with dotted lines are mounted on bottom side of subpanel

of tubes or depreciation of "A" batteries. This is easily accomplished by tightening the coupling between the primary and secondary windings.

In this receiver the primary and secondary coils are so completely variable with respect to each other and the axis of the condenser shaft, that practically any degree of coupling and any rate of variation of coupling is obtainable by simple and quickly made adjustments of the primary and secondary. Once adjusted, the variation of the coupling is provided automatically by the turning of the condenser dial. The correct rate of variation is determined by the angle at which the secondary coil is placed with respect to the axis of the shaft of the condenser. Physical and electrical characteristics of the coils are such that the correct angle is 58 degrees. Incidentally, this angle is also the proper one to prevent overlapping of magnetic fields.

This absolutely correct rate of variation of coupling can be secured only when the coil is used in connection with a 180 degree straight line frequency condenser.

The comparative amplification of the Equamatic System in respect to the ordinary "loss stabilized" receiver is of such magnitude that the advantage of co-ordination of transformer coupling with wavelength control can only be appreciated in the actual operation of the receiver.

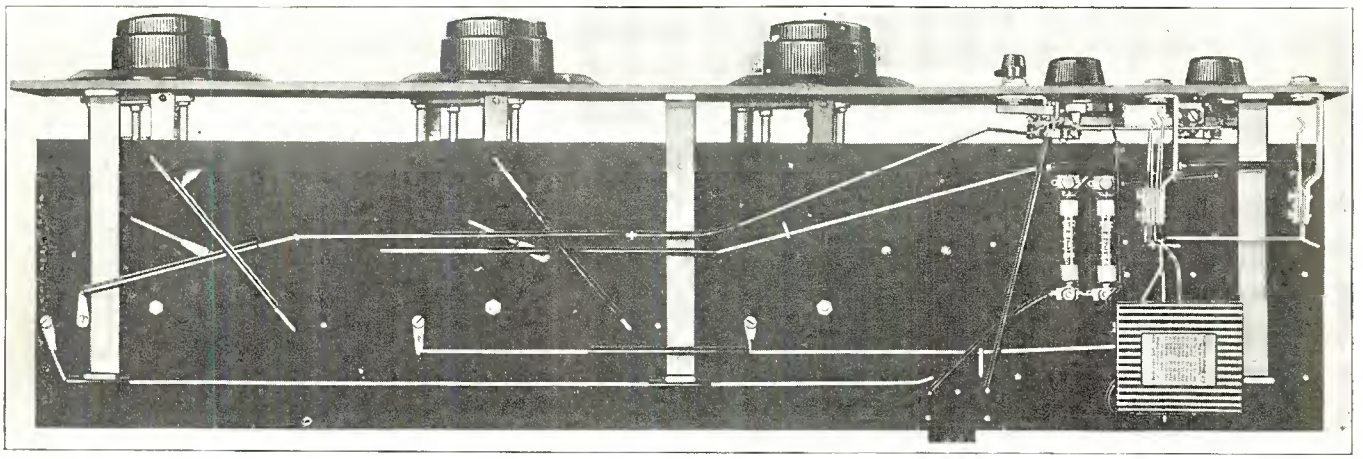


Fig. 3. Bottom view of receiver showing arrangement of parts secured to subpanel

tube, nor is it necessary to insert a resistance of any type in the plate circuit. To allow the system to be successfully and easily operated by the average person, a small retard coil has been inserted in the grid circuit.

A unique feature of this receiver which will appeal to many constructors is the fact that no limitation is imposed as to the length of the antenna. Varying the degree of coupling between the primary and secondary of the antenna coupler adapts the receiver to individual conditions. With an extremely long antenna, whose fundamental is 600 meters, minimum coupling would be required at that frequency and greater coupling for all lower wavelengths. However, if the fundamental were 350 meters, minimum coupling would be needed at that point and correspondingly greater coupling on either higher or lower wavelengths.

In Figure 1 is shown a layout of the front panel of the receiver. The correct location of all mounting holes is accurately shown as well as the necessary engraving. Three countersunk holes are provided along the bottom edge of the panel for attaching the special brackets which support the subpanel.

Figure 2 is a baseboard layout and shows all of the apparatus mounted into place upon the subpanel and front panel. Each piece of apparatus has its terminals plainly marked so that the correct location of each part, with respect to the terminal of adjacent pieces of apparatus, will insure short leads.

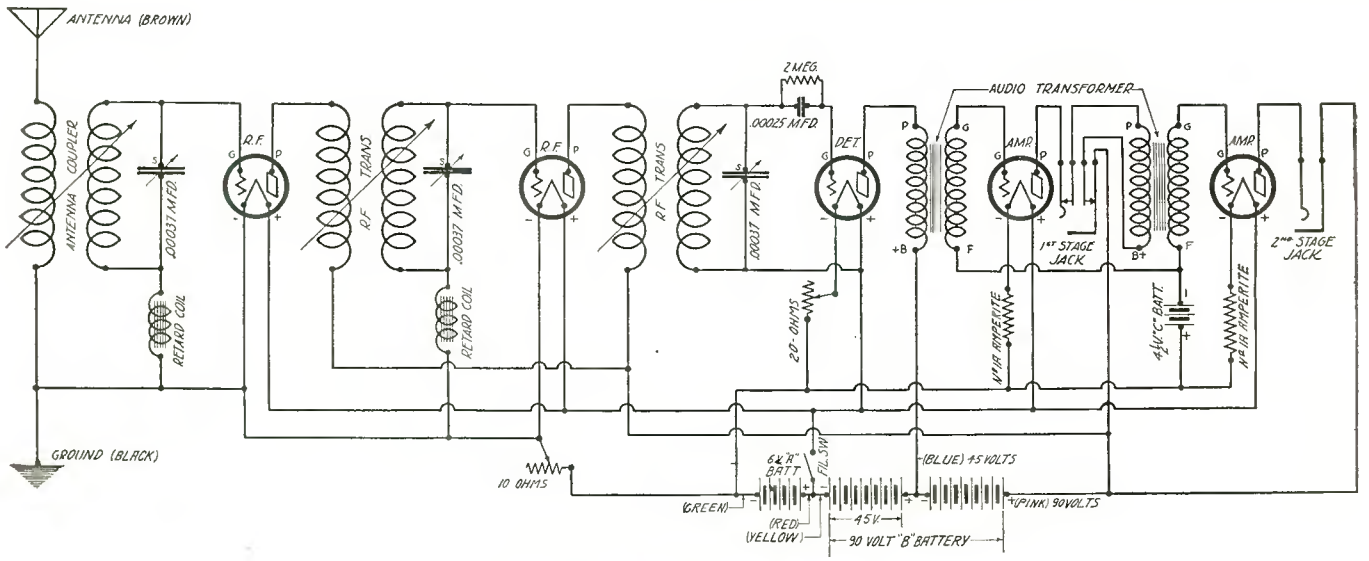


Fig. 4. Schematic wiring diagram

The receiver described herewith uses a standard tuned radio frequency circuit consisting of two stages of radio frequency amplification, detector and two stages of transformer coupled radio amplification. The use of an adjustable primary and secondary enables full advantage to be taken of the amplification factor of the tubes. It is not necessary to establish a positive bias on the grid of the detector tube, nor is it necessary to insert a resistance of any type in the plate circuit. To allow the system to be successfully and easily operated by the average person, a small retard coil has been inserted in the grid circuit.

Figure 3 is a layout of the subpanel and shows the location of all the holes necessary for the mounting of the parts as well as the holes through which the wires pass when making the necessary connections between the apparatus above and below the subpanel. Three holes

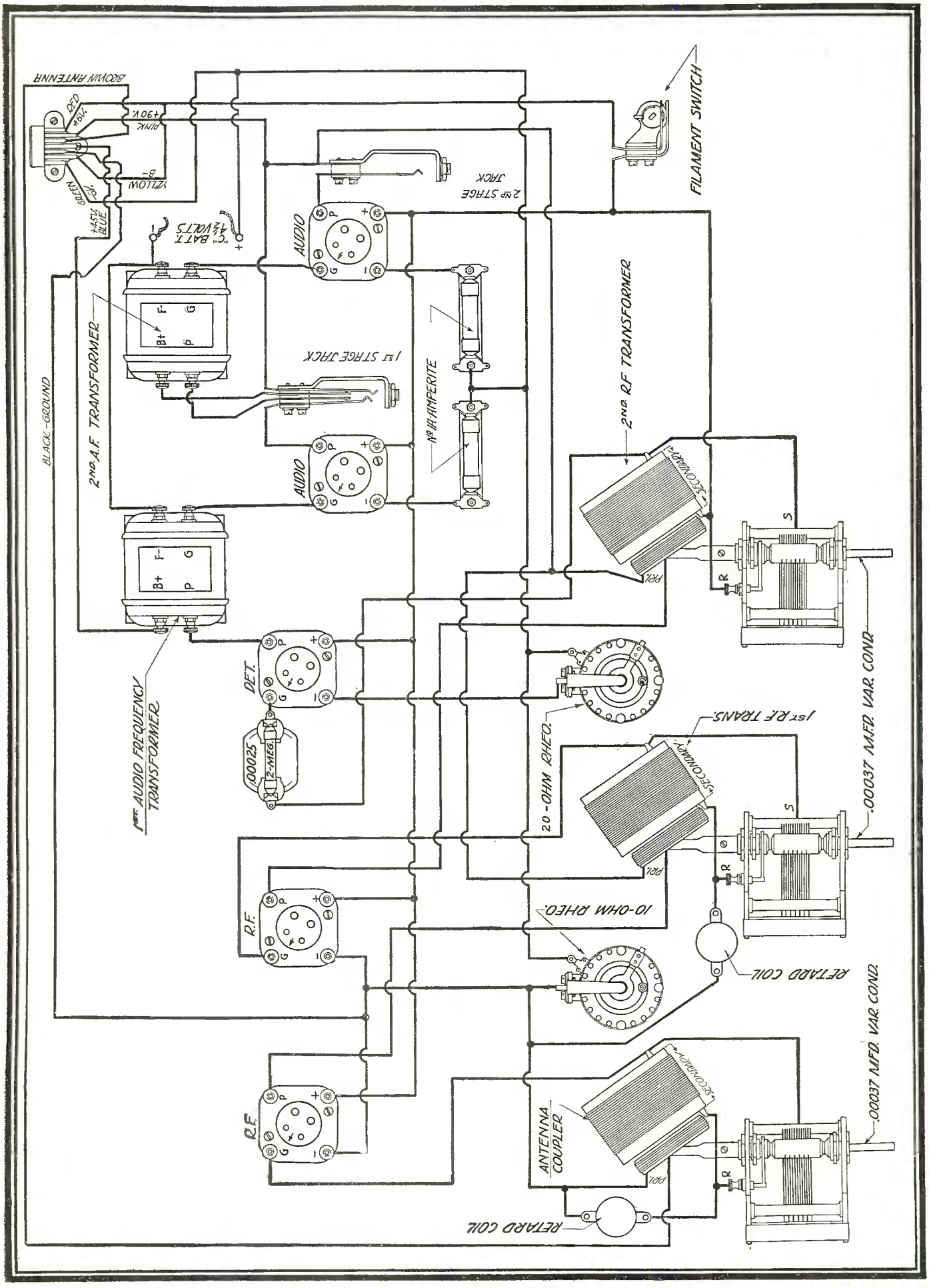


Fig. 5. Graphic wiring diagram. Check this carefully with receiver when completely wired

are provided for the clamping screws which normally hold the secondary in its proper position. These holes are drilled and tapped for No. 8-32 screw. The holes for mounting the Jones multi-plug, the sockets and the audio transformers are ⅛-inch drill and tap for No. 6-32 machine screw. Six holes for mounting the brackets supporting the subpanel are shown, with an extra heavy line around the actual hole. They are countersunk from the top side of subpanel for No. 6 oval head machine screws. Two holes are provided between the detector tube socket and the first audio tube sockets. They are ⅛-inch drill and tapped for No. 6 machine screws, and are for the purpose of mounting the two Amperites against the under side of the subpanel. The three lines shown adjacent to the tapped holes for clamping the secondary are at an angle of 58 degrees. They will facilitate the correct angular adjustment of the secondary so as to insure the proper angle to prevent interstage coupling. Those holes which are shown solid are No. 42 drill and are for the purpose of allowing hook-up wires to pass through the panel.

Figure 6 is a layout of the sub-panel itself. Those holes shown solid are No. 42 drill and are for the purpose of allowing hookup wires to pass through the sub-panel from one side to the other. The holes shown with an extra circle around them are No. 25 drill and

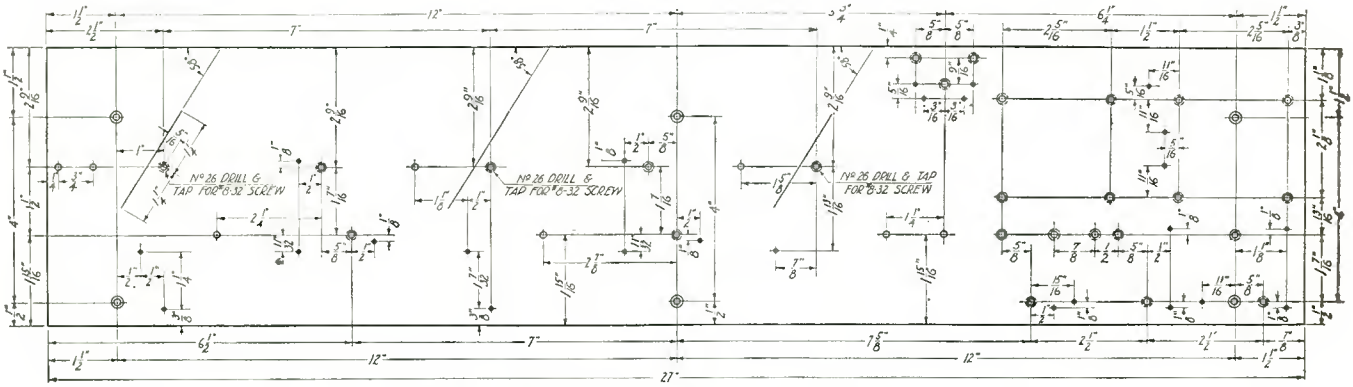


Fig. 6. Sub-panel template showing location of all holes necessary for properly mounting apparatus, as well as holes through which connecting wires pass

countersink for No. 6 machine screw. Other holes having a dotted circle around them are ⅛-inch drill and tap for No. 6-32 machine screw. All other holes are No. 25 drill.

Figure 4 is a schematic wiring diagram of the complete receiver and gives all connection to the various pieces of apparatus. The two radio frequency tubes are controlled by a 10-ohm Yaxley air-cooled rheostat, while the detector tube is regulated by a 20-ohm Yaxley air-cooled rheostat. The two audio tubes have Amperites in their filament leads, thereby insuring an automatic adjustment of the filament temperature.

No difficulties will be experienced in wiring up this receiver, although the work will be expedited by mounting the apparatus on the subpanel only and making all possible connections before assembling the front panel and mounting it in place.

A 4½ volt "C" battery is used in the audio. The battery is mounted on the under side of the subpanel under the audio transformers.

After the wiring of the set is completed, carefully check all connections against the large graphic illustration shown in Figure 5. Make those corrections in wiring that are necessary and then connect the batteries to the receiver by means of the Jones plug and cable. Connect the "A" battery first in order to test the filament circuit. Insert a 201-A tube in each socket and turn up the rheostats. If the tubes light and are properly controlled, the filament circuit is in proper working order. Then disconnect the positive "A" battery wire and connect all the other wires in the battery cable, in turn, to the positive "A" battery. If any of the tubes light, there is an incorrect connection in the circuit, which must be located before connecting the "B" battery. If everything appears to be in proper working order the batteries may all be connected, the phones plugged in the first jack, and the antenna and ground connected to the receiver.

Adjust the rheostats so that approximately 5 volts are applied to the tubes and slowly tune the variable condensers. The receiver should respond as soon as it is placed on the air, providing a station is broadcasting.

Adjust the secondary coils so that the bracket supporting the coils is parallel to the 58 degree line engraved on the subpanel. With the condenser plates entirely enmeshed adjust the primary so that maximum coupling is established. Tighten the set screw on the sleeve holding the primary and slowly push the secondary forward over the primary, after again tuning in a station, being careful to maintain the 58 degree angle. Withdraw the secondary again until oscillation ceases. Then securely fasten the secondary to the subpanel and repeat the operation with each of the other transformers. When the coils are properly adjusted it will be possible to tune the receiver over the entire broadcasting spectrum without the set oscillating at any wavelength.

Any antenna of reasonable wavelength can be used in conjunction with this receiver. Sometimes the set will not perform at maximum efficiency, in which case the reversal of the coupling between the primary and secondary of the antenna coupler will help materially. In other words, minimum coupling is used at the upper end of the broadcast band, while maximum is used at the lower end.

LIST OF PARTS

These parts or any reasonable substitute will give satisfactory results:

1—Drilled and Engraved Formica Front Panel, 7x28x3/16-inch
1—Formica Drilled Subpanel, 6x27x3/16-inch
3—Karas Equamatic R. F. Transformers
3—Karas Orthometric Extended Shaft .00037 Mfd. Condensers
3—Karas Micrometric Vernier Dials
2—Karas Harmonik Audio Transformers
2—Karas Equamatic Retard Coils
3—Karas Equamatic Subpanel Brackets
1—Yaxley 10-ohm Air-Cooled Rheostat
1—Yaxley 20-ohm Air-Cooled Rheostat
1—Yaxley No. 4 Interstate Phone Jack
1—Yaxley No. 1 Open Circuit Phone Jack
1—Yaxley Filament Switch
1—Sangamo .00025 Mfd. Fixed Condenser with Grid Leak Clip
1—Lynch 2-megohm Grid Leak
2—No. 1-A Amperites
1—National Carbon 4½-volt "C" Battery
1—Jones Multi-plug with 8-foot Battery Cable
5—Benjamin UX Cushion Sockets
12—No. 6-32x⅜-inch Oval Head Brass Machine Screws
12—No. 6-32x¾-inch Round Head Brass Machine Screws
No. 6-32x⅜-inch Round Head Brass Machine Screws
1—Package Kester Solder
30—Feet Belden No. 12 Tinned Copper Wire
24—Kellogg Tinned Soldering Lugs

RADIO'S

greatest receiver—

THE

WORLD'S RECORD SUPER

6000 to 8000 Miles Consistent Reception on a Loop

Selectivity

The following is a report of tests made by Radio Age Magazine with a World's Record Super in Chicago:

"The World's Record Super is extremely selective. . . . KDKA comes through clean and sharp without any interference from WGN below or WGES above that channel. Three stations between WJAZ and WGES (WSMB-KOA-WSAI) come in without the slightest difficulty of an overhang from either WGES below them or WJAZ above them. The same applies to KTNT being received without interference from WJAZ.

A little higher on the band WDAF at Kansas City is brought in without a trace of WEBH, and above the latter station, KTHS may be held during their entire program without a break-over from Edgewater. WGY, WTAM, WOAI, who lie between WEBH and WHT may be separated easily.

Against WQJ-WMAQ the Radio Corporation Station WJZ comes through with excellent volume and no hangover from the adjoining local station. KFNF, KFI, WRC, WBAP all come in nicely between WQJ below and WCFL above. WHO is copied solid for over an hour without any disturbance from KYW.

Tone

The World's Record Super possesses a tone quality of surprising naturalness at all volumes. It is a veritable revelation in realistic reproduction that amazes engineers and amateurs alike.

Distance

No other receiver has approached the marvelous DX Records that the World's Record Super has established, and it is safe to say none will for years to come.

Verified World's Records

The authenticity of the startling achievements of the World's Record Super (as listed below) is based upon hundreds of verifications by leading Broadcasting Stations and Publications from coast to coast.

1.

On March 17th established new World's Records for LOOP AERIAL RECEPTION—8,375 miles with Loud Speaker Volume.

2.

On the night of March 29th, established new World's Record with the reception of SIX FOREIGN STATIONS distant 6,000 miles or more.

3.

Established new World's Record for GREATEST NUMBER OF BROADCASTING STATIONS heard that are located 6,000 or more miles away.

4.

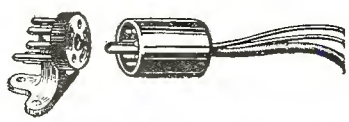
Established new World's Record for MOST CONSISTENT RECEPTION, night after night, of Stations 6,000 miles or more distant—117 programmes from 19 different Foreign Stations, heard between December 27th and April 10th.

Parts used and recommended by E. H. Scott,

R-400
SELECTONE Untuned Transformer—R400—has specially designed closed iron core, which limits interstage coupling and is impregnated in a vacuum so that all characteristics of coil remain constant. The coil design gives an extremely high amplification. Can be used in any circuit requiring a long wave transformer.
PRICE $6.00

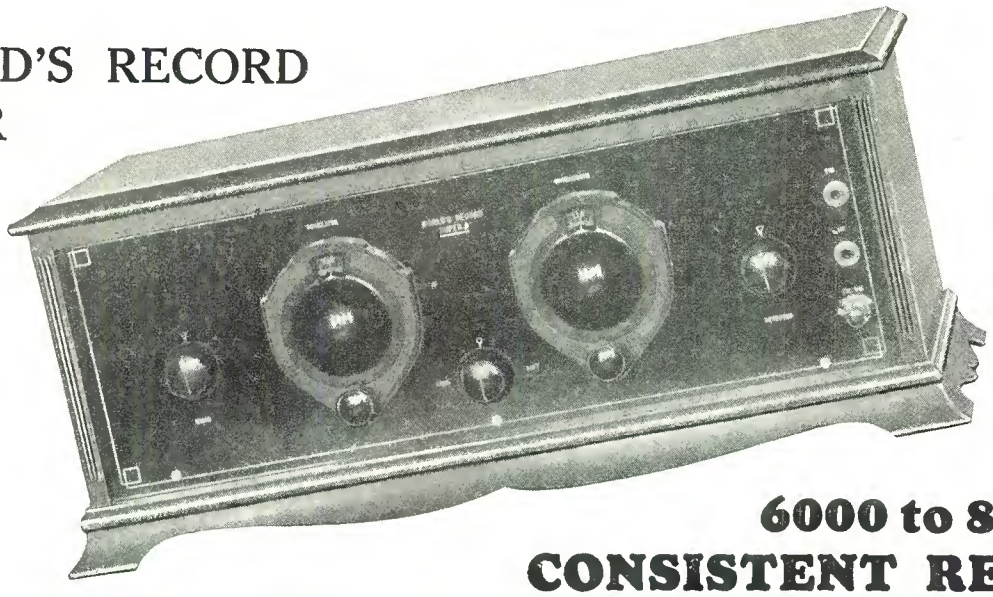
R-410
SELECTONE Tuned Stage Transformer—R410—is air core. Each transformer is matched to within one turn before sealing in case. The matching of these filters is so perfect that where extreme selectivity is desired, two can be used and are guaranteed to match perfectly.
PRICE $6.00

Jones
MULTI-PLUG
THE STANDARD SET CONNECTOR



In use by over ½ million satisfied customers.
Standard equipment on many reliable receivers.
B-M Multiplug, 4 feet complete..... $3.50
B-M Multiplug, 8 feet complete..... 4.50

THE WORLD'S RECORD SUPER



Read Article Following

6000 to 8000 MILES CONSISTENT RECEPTION!

You can build an exact duplicate of the World's Record Super Easily and Successfully

Parts Required for the World's Record Super

1 Panel 21x7x3/16	1 Dubilier Condenser, .001 mfd.
1 Wood Baseboard, 20x9	1 Dubilier Condenser, .005 mfd.
2 Rauland Lyric Audio Transf.	1 Dubilier Condenser, .00025 mfd.
2 Carter Rheostats (6 ohms)	1 XL Variodenser, Type N
1 Carter High Pot resis. 500,000	2 Selectone L. W. Transformers, R400
1 Carter Jack No. 1, single circuit	2 Selectone L. W. Transformers, R410
1 Carter Jack No. 2A	1 Dubilier Grid Leak, 2 megs.
1 Carter Fil. Switch	1 Jones Multiplug and Cable
2 Remler Condensers .0005 mfd.	6 Binding Posts
1 Elkay Resistance ¾ amp. and Mount	2 Pieces of Bakelite for Posts, 3x¾x3/16
8 Frost Sockets	2 Kurz-Kasch Vernier Dials
1 Thor Coupler, No. 460	12 Lengths of Bus Wire
2 Dubilier Condensers, .1 mfd. Type 907	3 dozen Screws, 5/8
1 Dubilier Condenser, .00025 mfd.	100 Kellogg Soldering Lugs
1 Dubilier Condenser, .002 mfd.	1 Small Can Kester Rosin Core Solder

With the parts here listed, anyone can build an exact duplicate of the remarkable World's Record Super with a screw driver, pliers and soldering iron. Building instructions make it almost impossible to err in construction and if followed carefully, assure the builder of a receiver that will duplicate the tremendous performance of the original model. Build the World's Record Receiver and you will have at small cost the finest Radio Set obtainable today.

Complete Set of Parts, List Price, $86.60

PARTS MANUFACTURERS

Scott Transformer Co.
7620 Eastlake Terrace, Chicago

Thor Radio Mfg. Co.
35 S. Dearborn St., Chicago

Carter Radio Co.
300 S. Racine Ave., Chicago

Howard B. Jones
618 S. Canal St., Chicago

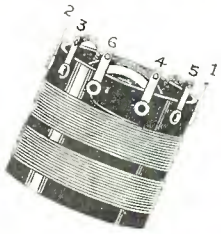
(Loop) Duro Metal Products Company
2649 N. Kildare Ave., Chicago

Designer of the World's Record Super

CARTER No. 5 HI-Ohm

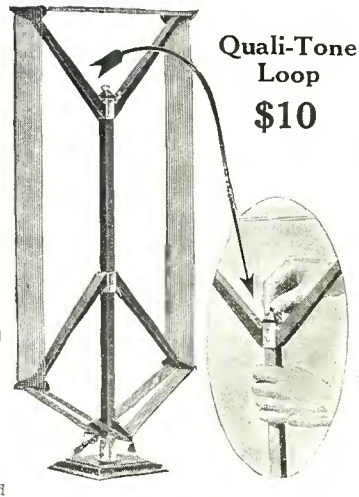
A stable, non-inductive, wire-protected variable resistance. Resistance characteristic curve gives straight line current variation insuring uniform control.
Price **$2.00**

Carter No. 1 and 2A Short Jack. Smallest on market. Heavy Bakelite insulation prevents leakage. Makes good contact with all standard plugs.
Price **25c** and **30c**



Thor Coupler

This coupler has a balanced winding giving an even output from 200 to 500 meters.
List Price **$3.50**



Quali-Tone Loop
$10

Patented

The Quali-Tone Loop was used exclusively on the World's Record Super and was in great part responsible for the marvelous records that remarkable receiver established. Note adjustment feature that keeps wires taut always. Get the QUALI-TONE for better reception.

How to Build the Latest World's Record Super

Here Is Full Constructional Data on a Remarkable Receiver That Holds Verified World's Records for DX Reception

All illustrations and construction data prepared by the Citizens Radio Laboratory

ABOUT 18 months ago reports of remarkable reception of stations located 6,000 miles or more from the receiving point on a set using 9 small dry cell tubes, created considerable interest among DX fans. Within a period of 13 weeks no less than four new World's Records were established, among them a world's record for the reception of voice on a receiver using a loop aerial—8,375 miles. In all 119 programs were logged from 19 different stations, all 6,000 miles distant or more.

The receiver was used in location where it was not possible to charge a storage battery, hence the reason for the use of the small tubes. Two of these were used in the last stage of audio to handle the volume without distortion, as the new power tubes were not then available. The receiver to be described uses storage battery tubes throughout with one power tube in the last stage and has considerably more volume than the original set.

The World's Record Super is, of course, a superhetrodyne, and, as most set builders are aware, the degree of success you have with this type of receiver lies principally in the efficiency and perfect matching of the intermediate frequency transformers. Mr. Scott, who built the original receiver and established the DX records, has specialized for the last three years in experimental work on superhetrodynes and the design of the transformers used in them, and the model to be described uses the latest product of his laboratory, the Selectone Long Wave Transformers.

Two Selectone air core transformers are used as filters to secure the necessary selectivity, and two Selectone iron core transformers are used to step up the amplification. Real long distance reception is only possible when all transformers used are perfectly matched. If these do not all peak exactly alike your overall amplification will be low. Where each transformer has a different peak, the receiver has no selectivity and very poor tone quality. The Selectone Transformers used in the World's Record Super are a laboratory product, very carefully matched. The air core filter transformers are actually matched to within one turn before sealing in the bakelite case. No extra condenser is required to tune the filter, as a condenser of correct capacity is placed across the primary. After transformer coils are peaked and matched they are sealed inside of case with condenser.

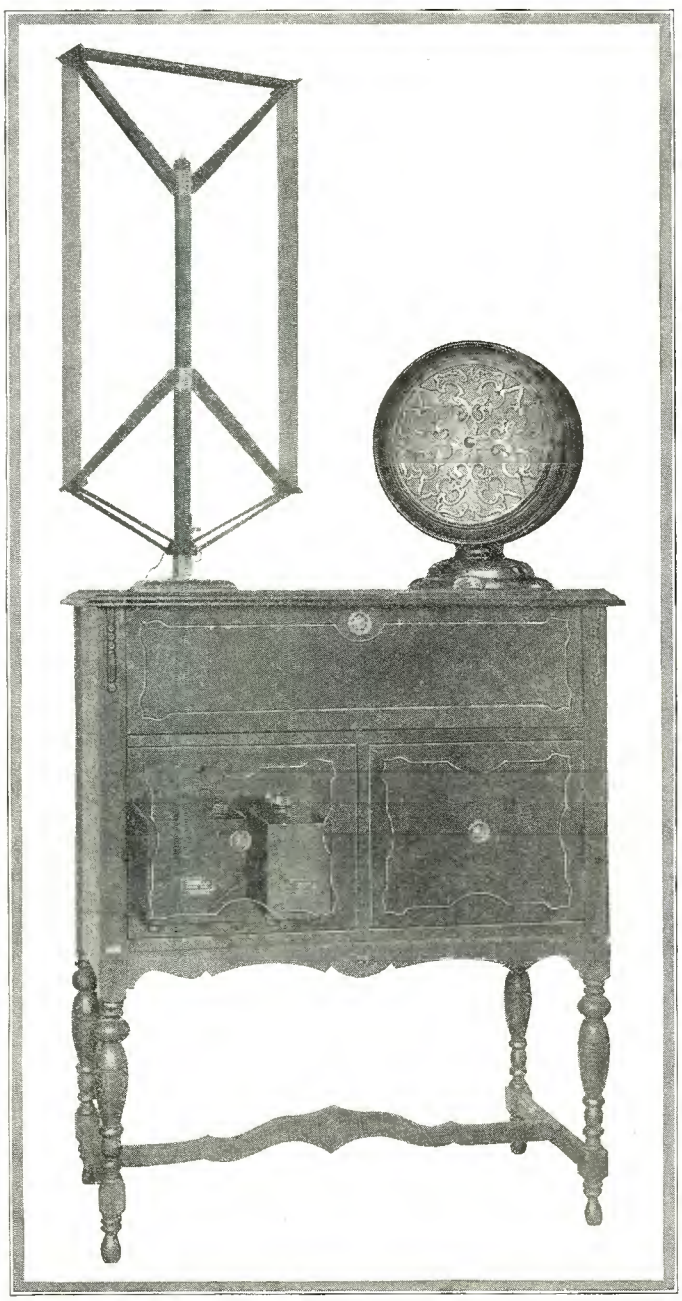


Photo A. Front view showing receiver mounted in console with accessories

The iron core transformers have a closed core of special design which limits stray fields and makes it possible to place transformers quite close together without danger of causing instability or coupling. Both laboratory and air tests have proved that properly designed iron core transformers give a much higher amplification than the air core type. The iron core increases the magnetic coupling between primary and secondary and causes a much greater transfer of energy than can be secured where no iron is used. Just enough iron is used in the core to broaden the peak sufficiently without decreasing the selectivity or cutting side bands. The result is clear, distortionless amplification and tone quality that makes the receiver a pleasure to listen to.

The Thor oscillator coupler is of the balanced winding type, with both grid and plate circuits tuned. The pick-up coil is wound on a movable rotor, so that the coupling can be adjusted, to secure maximum selectivity and sensitivity. Both a tube and loop oscillator coupler are each tuned by a .0005 variable condenser, which has an insulated shaft coming through to front of panel. If a condenser is used with a non-insulated shaft, trouble will be experienced with body capacity.

Although regeneration is employed to increase the selectivity and sensitivity of the loop circuit, a plate condenser is not

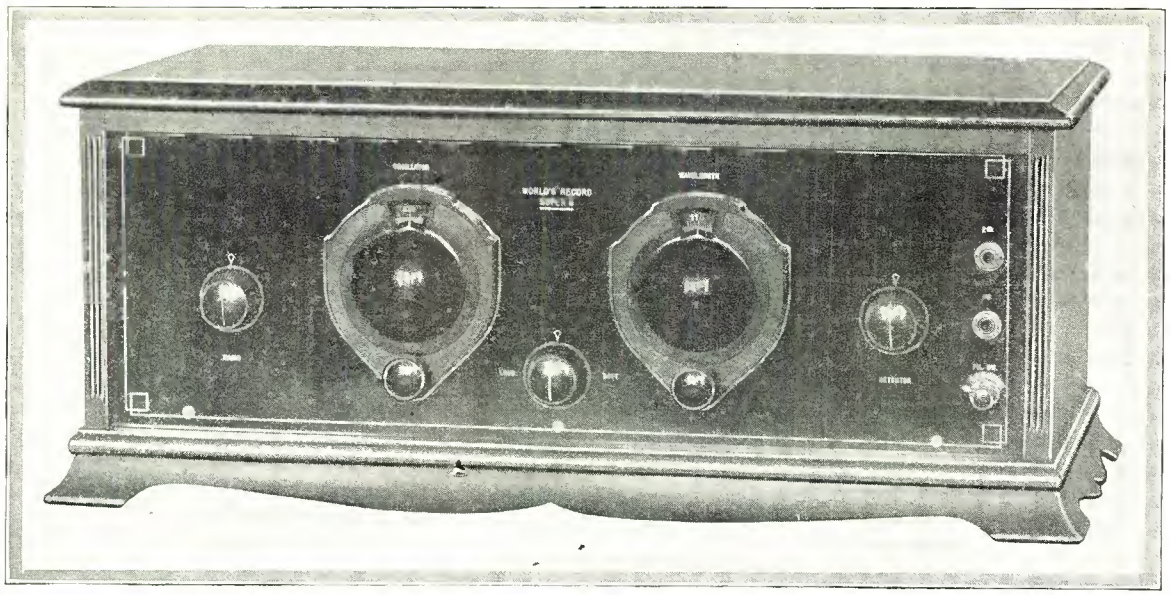


Photo B. Front view of receiver mounted in cabinet

used, as it has been found that with the large tubes this adjustment is not critical, so a semi-variable type is used. This removes a control from the front of the panel. To adjust, tune in a station on about 350 meters and after setting, it can be forgotten, except perhaps when you are going after a particularly distant station, when you may be able to use a little more regeneration with good results.

On referring to the circuit diagram it will be noted that two Carter rheostats are used, one for the oscillator and detectors, the other for the three intermediate stages. Neither of these controls are critical; in fact, they can be adjusted at the beginning of the evening and left set and the volume controlled by means of the variable resistance across the primary of the third intermediate transformer. The two audio tubes are controlled by a ¾-amp. resistance.

To reduce radiation as much as possible and suppress harmonics, 22½ volts are used on the plates of the oscillator and first detector. No grid leak or condenser is used on the first detector, but detection is obtained by biasing the grid with the voltage drop across the rheostat. A 1-mfd. condenser is used to localize the oscillator circuit and by-pass the 22½-volt "B."

The intermediate stages have 90 volts on the plates. The grids are biased with from 3 to 6 volts. The best value can be found very quickly by experiment.

The second detector will generally give the best results with 67½ volts on the plate, but from 45 to 90 volts can be tried and the voltage giving the best results used. The first audio has 90 volts on the plate with the grid return lead connecting to the grid returns on the intermediates.

Both the primary and secondary of the first audio transformer are by-passed. If these condensers are omitted trouble may be experienced with R. F. feeding through to the audio. A .005-mfd. condenser is also used between the plate of the last audio and A negative to improve tone quality, particularly when a cone speaker is used. The effect of a .0005 mf. condenser can be tried between P. of 1st Det. and A—.

Photo B shows the front view of the complete receiver and photo C shows a rear view. Notice the simple layout and how the parts have been placed to insure short leads.

Fig. 2 shows a baseboard layout giving the exact location of every part. The rheostats, variable tuning condensers and jacks can be mounted separately on the front panel and placed to one

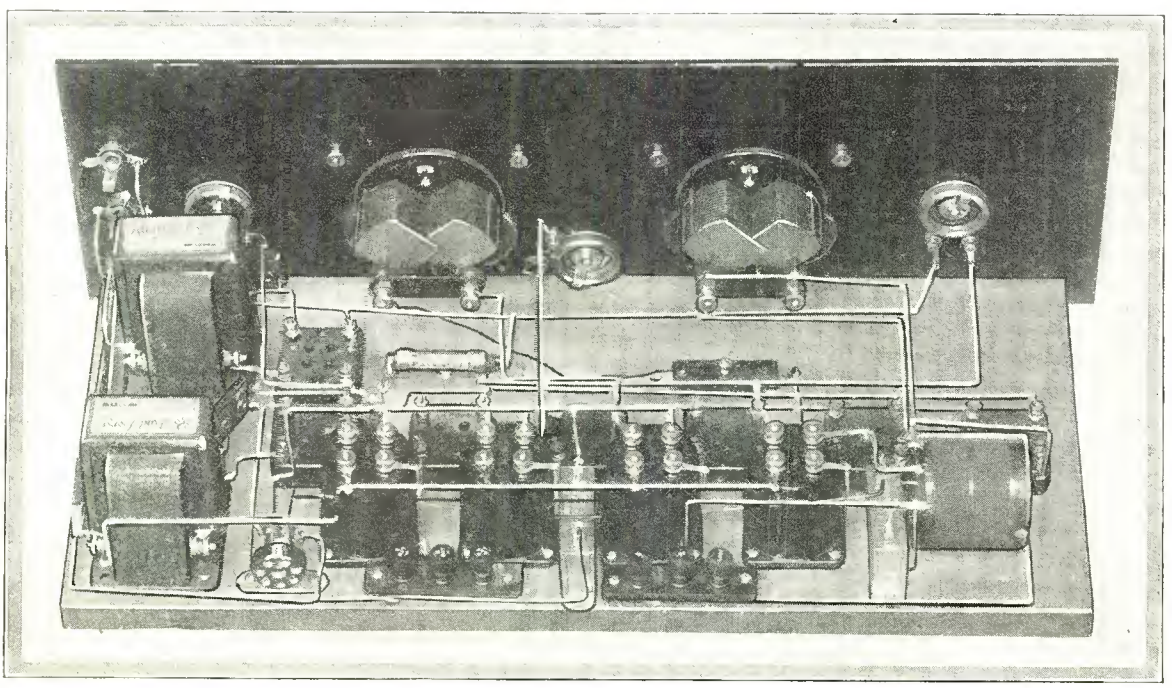


Photo C. Rear view of completed receiver

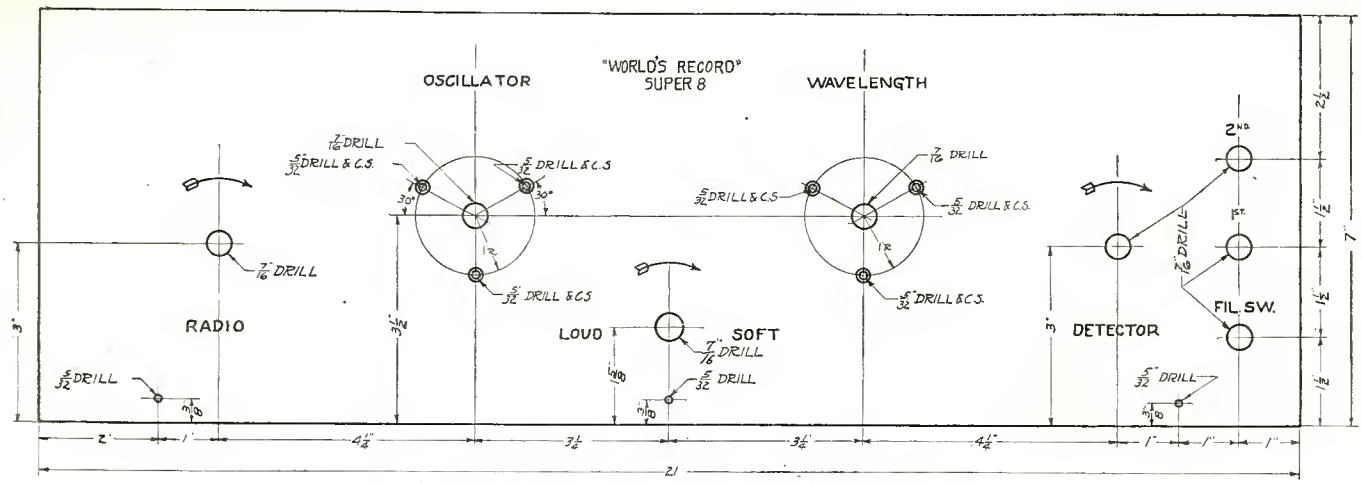


Fig. 1. Panel layout showing size and location of holes

side while the remaining apparatus is mounted on the baseboard prior to wiring.

We have submitted the wiring diagram in two forms. In the graphic illustration as shown in Fig. 3, every part is drawn out in detail, and this should be used in checking over the wiring when it is complete. For the more advanced radio fan, the schematic wiring diagram which is shown in Fig. 4 can be used.

The "World's Record Super" is shown in photo "A" installed in the Model 10 Charlotte Furniture Company's console. Genuine walnut is used in its construction, with the doors of butt walnut, and the tops and ends plain. A high grade and very durable finish is applied, consisting of several coats of lacquer, which is waxed. A complete self-contained "B" power supply and trickle charger is used for supplying the necessary plate voltages for the proper operation of the circuit as well as keeping the storage battery at full charge. Appropriate controls for varying the different voltages are provided. The trickle charger uses no acid, but rectifies by means of a gas tube. This unit, known as the type 201, is manufactured by the Storad Manufacturing Company of Cleveland, Ohio. The Troubador speaker and Qualitone loop are both manufactured by the Duro Metal Products Company of Chicago. The loop is entirely collapsible, being provided with a thumbscrew arrangement by which the wires are kept taut at all times. The cabinet in Photo "B" is one of the many models made by the Signal Electric Company of Menominee, Michigan.

(If any further information is desired regarding the accessories shown, a request direct to the manufacturer will bring full descriptive information.)

LIST OF PARTS

1—21x7x3/16-inch Insuline Panel
1—20x9-inch Wood Baseboard
1—Signal 7x21-inch Cabinet
2—Rauland Lyric Audio Transformers
2—Carter 10-ohm Rheostats
1—Carter 500,000-ohm Potentiometer
1—Carter Open Circuit Jack
1—Carter Closed Circuit Jack
1—Carter Filament Switch
2—Remler .0005-mfd. Variable Condensers
1—Elkay ¾-ampere Resistance with mounting
8—Frost Sockets
1—Thor No. 460 Coupler
2—Dubilier 1-mfd. Condensers
1—Dubilier .0025-mfd. Fixed Condenser
1—Dubilier .002-mfd. Fixed Condenser
1—Dubilier .001-mfd. Fixed Condenser
1—Dubilier .005-mfd. Fixed Condenser
1—Dubilier .00025-mfd. Condenser
1—Dubilier 2-megohm Grid Leak
1—XL Model "N" Variodenser
2—Selectone R400 Long Wave Transformers
2—Selectone R410 Long Wave Transformers
1—Jones Multiplug and Cable
6—Eby Binding Posts
1—Qualitone Loop
2—Kurz-Kasch Vernier Dials
100—Kellogg Soldering Lugs
1—Can Kester Rosin Core Solder
50 Feet Belden No. 12 Copper Tinned Wire

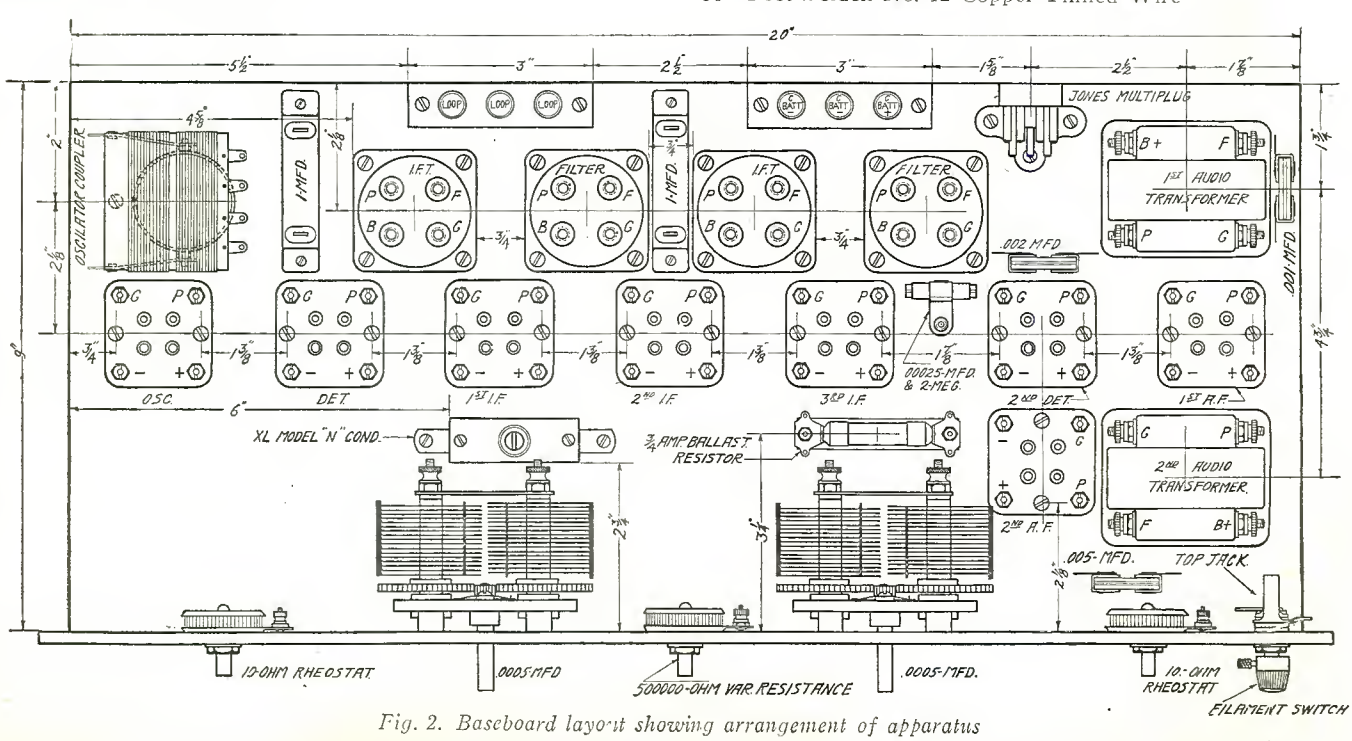


Fig. 2. Baseboard layout showing arrangement of apparatus

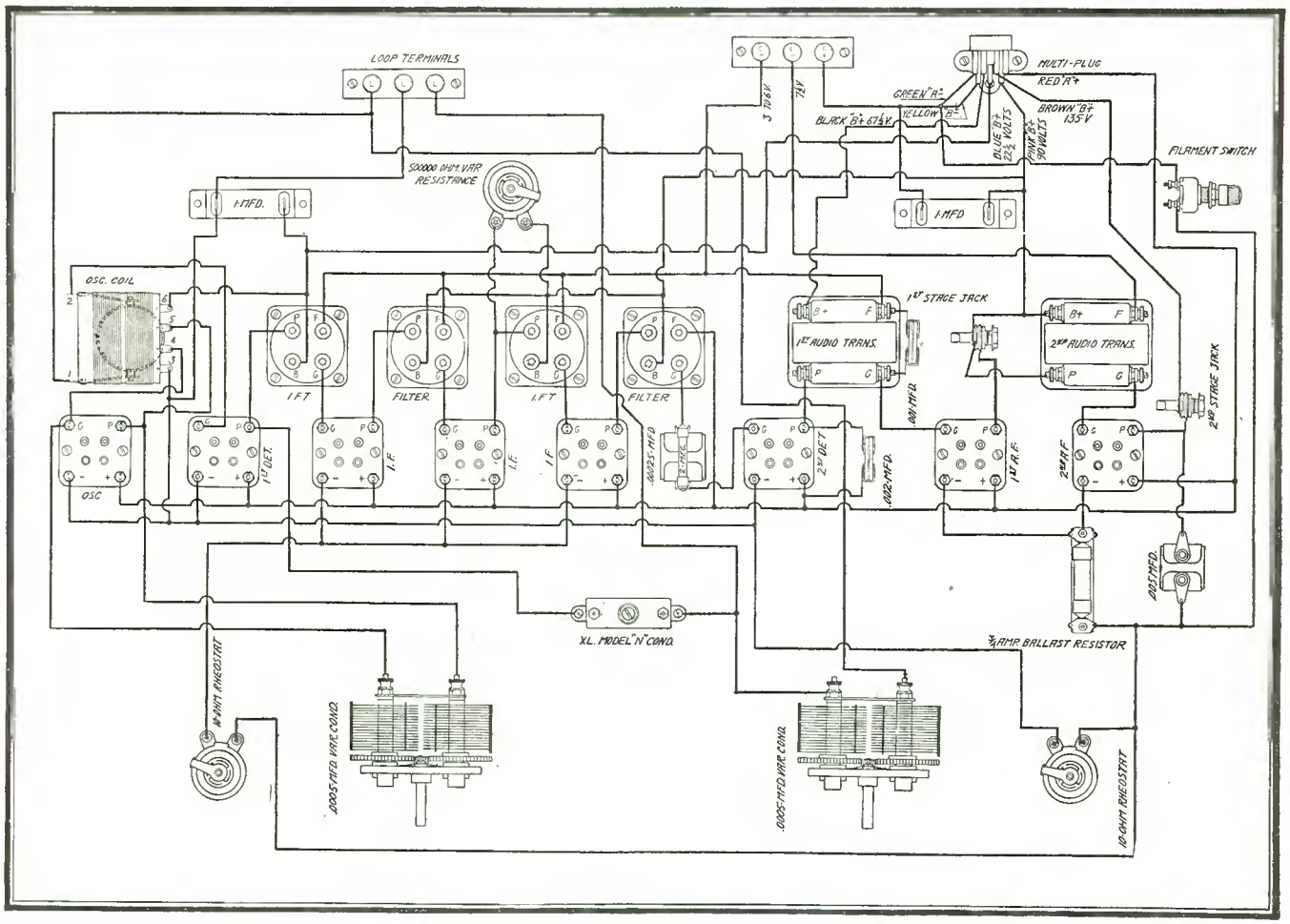


Fig. 3. Graphic illustration showing each connection in entire receiver

To obtain maximum efficiency from any receiver, all connections must be perfect. Use a good hot soldering iron, leaving the copper tip on joint long enough to thoroughly flow solder into it. Badly soldered joints made high resistance connections, which often account for lack of volume and distance. The contacts on sockets are fastened with a nut and screw. Make sure these nuts are tight before screwing sockets to baseboard. A loose nut on socket will result in noisy operation.

Although this receiver tunes very sharply, it is not critical or hard to tune, but vernier dials must be used. If trouble is experienced with the oscillator dial tuning broadly, or if it appears critical, the probability is there is too much capacity in the XL condenser. If there is still too much capacity with screw all out, try a small midget plate condenser in its place.

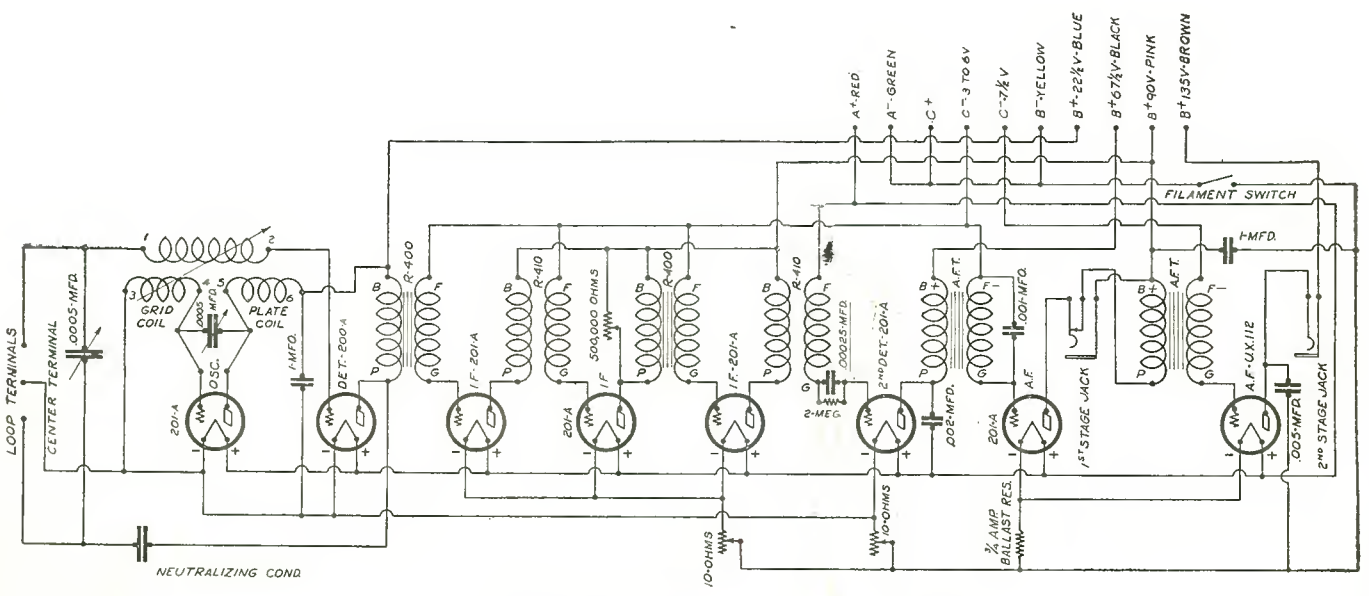
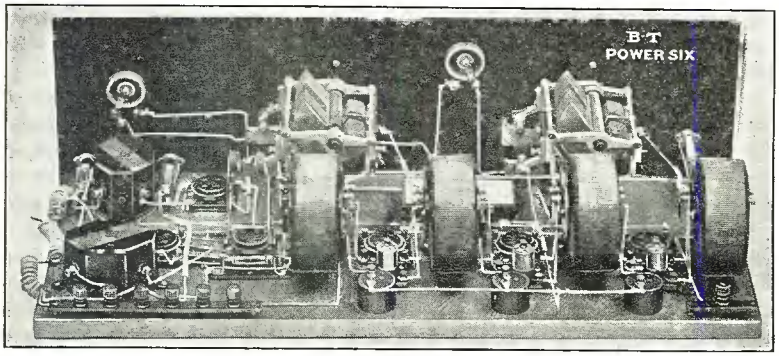


Fig. 4. Schematic wiring diagram

"—by far the best B-T receiver yet developed"

Says a Technical Leader.

Which is only another way of saying the **best** Receiver yet developed—the B-T Counterphase Power Six.



THE BREMER-TULLY POWER-SIX

Success is a Bremer-Tully habit. Anyone in radio will tell you that. And one success begets another—

Why? Why, because the B-T reputation is too valuable to chance anything that isn't successful.

Look over the past history of B-T products and you'll find one success after another, year after year.

So it means something when in October, 1926, **Gerald M. Best,** Technical Editor of **"Radio,"** and a superheterodyne expert, says:

"The new Bremer-Tully Power-Six is by far the best Bremer-Tully receiver yet developed.

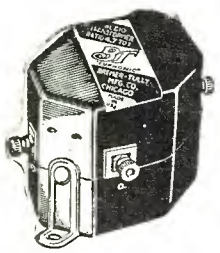
"Its remarkable selectivity and simplicity of operation leads me to believe it will be one of the season's most popular circuits.

"It is one of the easiest circuits to wire of any I have seen. Its engineering principle is sound.

"Congratulations to Bremer-Tully on this new development."

Fans, by thousands, will endorse these statements in every detail. They know the superiority of the circuit—the absence of any element of "hocus-pocus" in B-T design and that B-T have not spent another year without bringing their product up to the latest standards of perfection.

You can't build a better set—in fact, you can't build one as good.



The world's best sets use Transformer Amplification—why? Because good transformers furnish better reproduction than any other method known.

B-T build **only** audio transformers for audio amplification. No one has ever produced sets with finer tone because B-T "Euphonic" Transformers are unsurpassed at any price.

Two ratios: 2.2 to 1.....$5.00
4.7 to 1..... 5.75

The "Euphonic" Output Transformer is new. Use one with power-tube for pocketing your speaker and you'll find great tonal improvement. Price, $5.50.

The only socket of its kind—exclusively B-T in design. This socket absolutely absorbs shocks and vibrations. It will **not** continue to shake and vibrate after being jarred. It protects tubes and stops noises. For UX tubes, UXA Socket, $0.75.

The UX "Silent" for the Detector is the only remedy for microphonic noises. It has additional double absorbers. UXD, $1.00.

Two years ahead of its time—the longer this dial is in use the more you'll praise it. The first window dial—the best—the only one that reads 100-0-100 as well as in wavelengths or call letters; worth a dozen ordinary vernier dials. Black and gold striping, $2.50; mahogany and gold striping, $3.50.

Louisville, Ky., Oct. 28, 1926.

After reading "Better Tuning," tenth edition, I revamped my six tube Counterphase with Power Tube and would like to report to you that unquestionably I am having the best radio reception I have ever heard, and incidentally, I believe better than any eight tube receiving set at the present time. The B-T Counterphase Circuit is beyond an equal.

G. C. M.

Are You Missing Better Tuning?

If so you're missing one of the best things in Radio. It's straight from the shoulder talk that will save you money. Send 10c for a copy and read more about amplification, B-Eliminators, Kits, receivers, tuning fads, etc.

BREMER-TULLY MFG. CO.

520 So. Canal St.
Chicago, Illinois

The B-T Power-Six

An Unusually Selective Tuned Radio Frequency Receiver Producing Excellent Results

This Receiver Completed and All Illustrations Prepared by the Citizens Radio Laboratory

OUR READERS will recall the publication of constructional details deseribing the Counterphase Six receiver in the CITIZENS RADIO CALL BOOK, about a year ago. The success of this receiver during the past year is evidenced by the great popularity enjoyed by it, and is, no doubt, the result of the circuit used. Many improvements in the design of transformers and modification of the fundamental eircuit have been made during the past year, with the result that a new receiver is now offered our readers which, while very similar to the original Counterphase Six, incorporates these improvements in a slightly modified circuit.

Fundamentally, the circuit consists of three stages of balanced tuned radio frequency amplification, a detector and two stages of transformer coupled audio frequency amplification. A tapped antenna coil is provided by means of which best coupling may be obtained by panel control for either long or short wavelengths. The control of oscillation is accomplished by the use of an external circuit designed to feed back energy of opposite potential, in such manner and amount to overcome or neutralize the regenerative action of the tube. A peculiar and very fortunate result of this arrangement is that a surprising increase in energy transfer per stage with greater amplification is realized.

The "Counterphase Circuit" includes a bridge between output and input circuits. Counter potential is derived from a coil coupled inductively to the plate circuit and fed through an adjustable eapacity (neutralizing condenser) to a coil inductively coupled to the grid circuit. Any connection made between plate and grid circuits must, to some extent, increase grid to plate capacity, which in turn tends to increase the tendency to oscillate. This tendency can be overcome with careful design so as to allow proper neutralization in any circuit at both the upper and lower end of the broadcast spectrum.

The method of balancing used in this circuit allows sufficient coupling at all frequencies without the mechanical and electrical weaknesses that prevail where attempts are made to vary the coupling between coils, and other expediencies of that nature.

Radio frequency chokes are provided in the plate circuit of each radio frequency tube, thereby effectually choking out any stray radio frequency currents and preventing them from feeding through the "B" batteries and coupling the R. F. stages or feeding frequency amplifying circuits with attendant distortion in reproduction.

A resistance is inserted in the grid return of each of the radio frequency tubes. The function of this resistance is one of stabilization, and secures a smoother and more positive control over the entire wavelength range of the receiver.

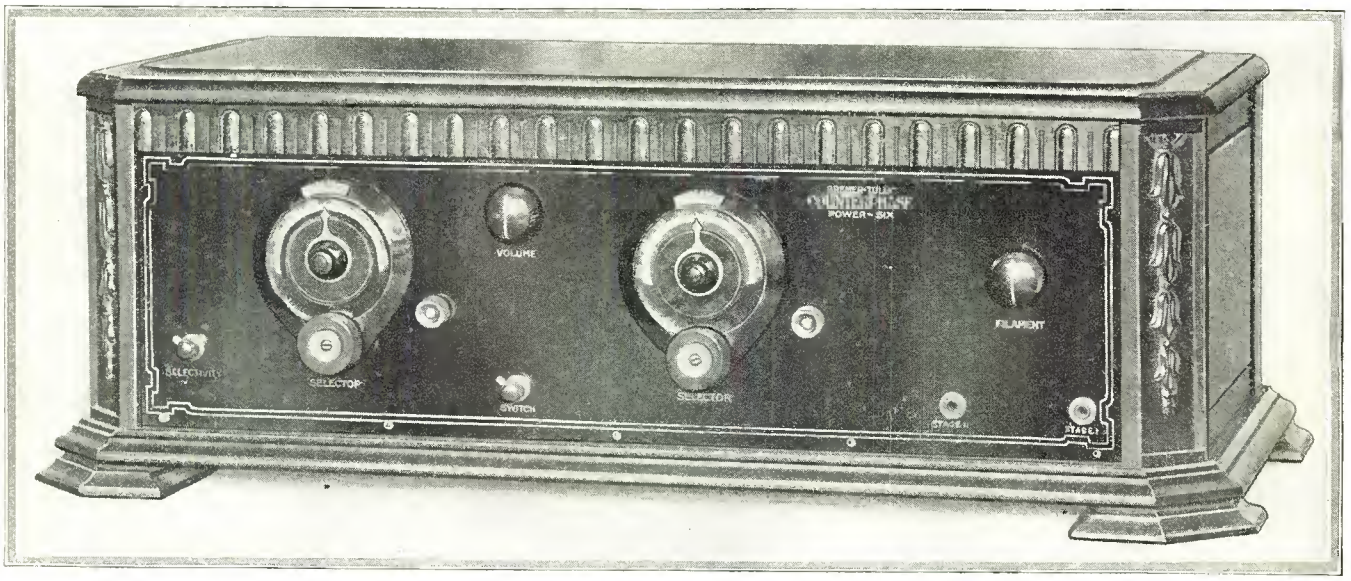


Photo A. Front view of completed receiver in cabinet

Two major tuning controls are used, each being a tandem condenser with the necessary trimming midgets to properly tune each stage. The use of these trimming condensers on each unit is to secure exact resonance of all tuned stages, so essential for tuning weak signals, as well as to compensate for any variations which are bound to occur in individual cases of wiring, and the variations which may occur between different coils and condensers.

The new circuit is more simple to eonstruct and much easier to balance and operate, due to the improvements made through an added year of research and development in the circuit itself, in addition to the apparatus now available for use, such as fixed high resistances and the like, whose characteristics are more dependable and accurate than in the past.

UX 201A tubes are used throughout the receiver with the exception of the last stage of audio frequency amplification and the detector. The last stage of audio uses a UX 112 power thbe, which allows excellent volume to be had on a cone speaker without pushing the receiver up to a point where distortion is caused. A UX 200A detector tube is recommended for the detector stage, since it is less critical in adjustment and delivers louder signals than the UX 201A type of tube. The necessary "C" battery bias is clearly shown on both the schematic wiring diagrams and the large graphic illustration. The radio frequency transformers have a bias of 3 volts, while the first and second stages of audio amplification have 4½ and 9 volts bias, respeetively. Using the proper "C" battery bias allows greater voltage to be used without the possibility of overloading the tubes as well as insuring long life to the "B" batteries.

All batteries with the exception of the "C" battery are con-

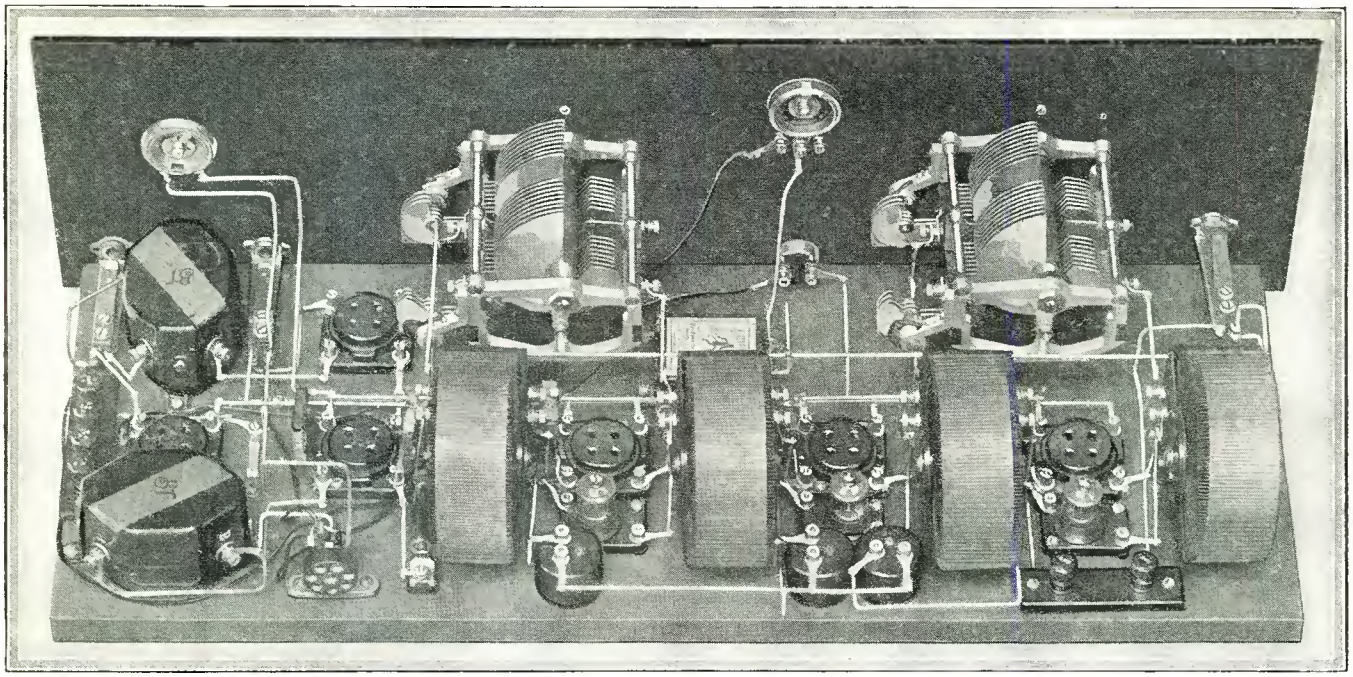


Photo B. Rear view of receiver completely wired

nected to the receiver by means of a Jones Multiplug and Cable. The regular color code supplied with the cable is utilized with the exception that the black is disregarded, and the brown, which is normally used for the antenna, supplies the receiver with 135 volts "B" potential. The "C" battery is connected to the receiver by separate binding posts along the left edge of the baseboard.

Fig. 1 is a layout of the front panel of the receiver. The correct location of all mounting holes is shown, as well as appropriate engraving. Fig. 2, the baseboard layout of the receiver, enables the constructor to easily place the apparatus in the proper position so as to allow short leads to be made wherever possible. The 1500-ohm fixed resistances are fastened to the "G" terminal of each of the radio frequency transformers and connection made to the free end. Fig. 3 is a complete wiring diagram of the set in schematic form. It is advisable that soldering lugs be placed under all terminals to facilitate soldering and assure a positive contact. While insulated wire may be used in hooking up the receiver, it is not essential. The constructor will have no difficulty in completely wiring the receiver and making a neat job of it, if he follows the various photographs and illustrations accompanying the article. It is best to first assemble all parts on the baseboard and complete all the wiring possible before the front panel is fastened into place.

After all wiring has been completed, carefully check all connections by referring to Fig. 4, the graphic illustration. Make those corrections which are necessary and then connect a 6-volt "A" battery to the proper terminals and insert the tubes in their respective sockets. Test all tubes as to operation; observe whether they are controlled by the proper rheostat or resistance. **Touch** the "A" positive battery wire to each of the other terminals of the Jones Plug. If the tubes do not light up except when the "A" battery is applied to the proper terminals, it is safe to connect the "B" and "C" batteries. However, if any of the tubes light up it is an indication that something is wrong and a mistake has been made in the wiring. Carefully recheck all connections until the mistake is found. Repeat the "A" battery test and connect the other batteries, the antenna and ground and plug in the speaker.

The receiver should respond as soon as it is placed in operation. In tuning, rotate the dials together and continually "cross" one over the other until a signal is heard. Then proceed to adjust the trimmers as follows: Set the rear trimmer on the right hand condenser fully enmeshed and then rotate panel trimmer back and forth rapidly as the selector is moved slowly a few degrees to each side of the point of maximum signal intensity. Try to get the position of greatest volume on the front trimmer when it is near its central position. If the position of maximum signal strength does not occur at or near the center point, adjust the rear trimmer until this condition occurs. The front trimmer is especially helpful in tuning in weak signals, and therefore a full range of adjustments must be allowed.

Next balance out the stages of radio frequency amplification. Adjust volume control to greatest volume and disconnect either the positive "A" or negative "A" filament lead of the third radio

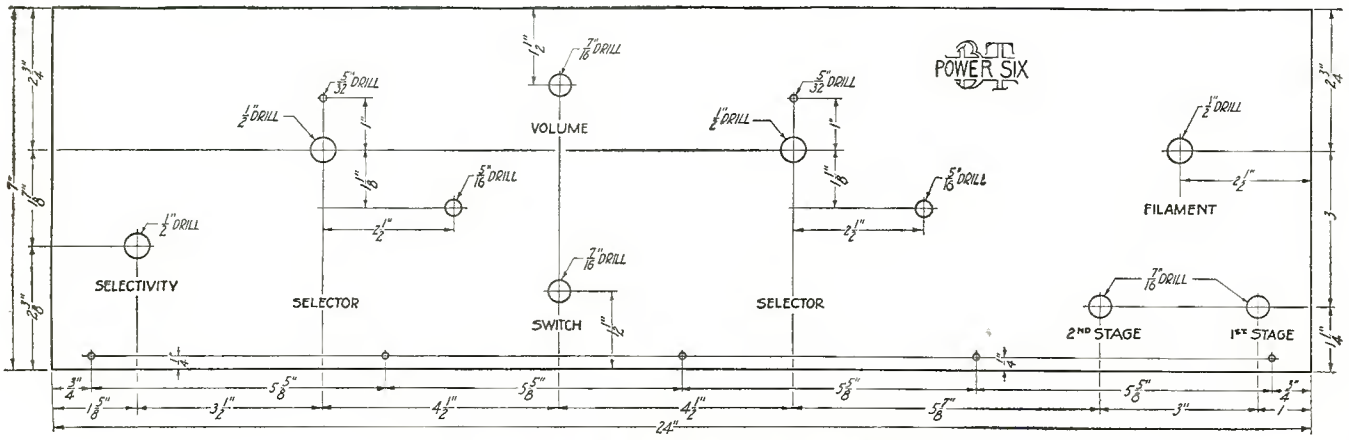


Fig. 1. Panel layout showing size and location of holes

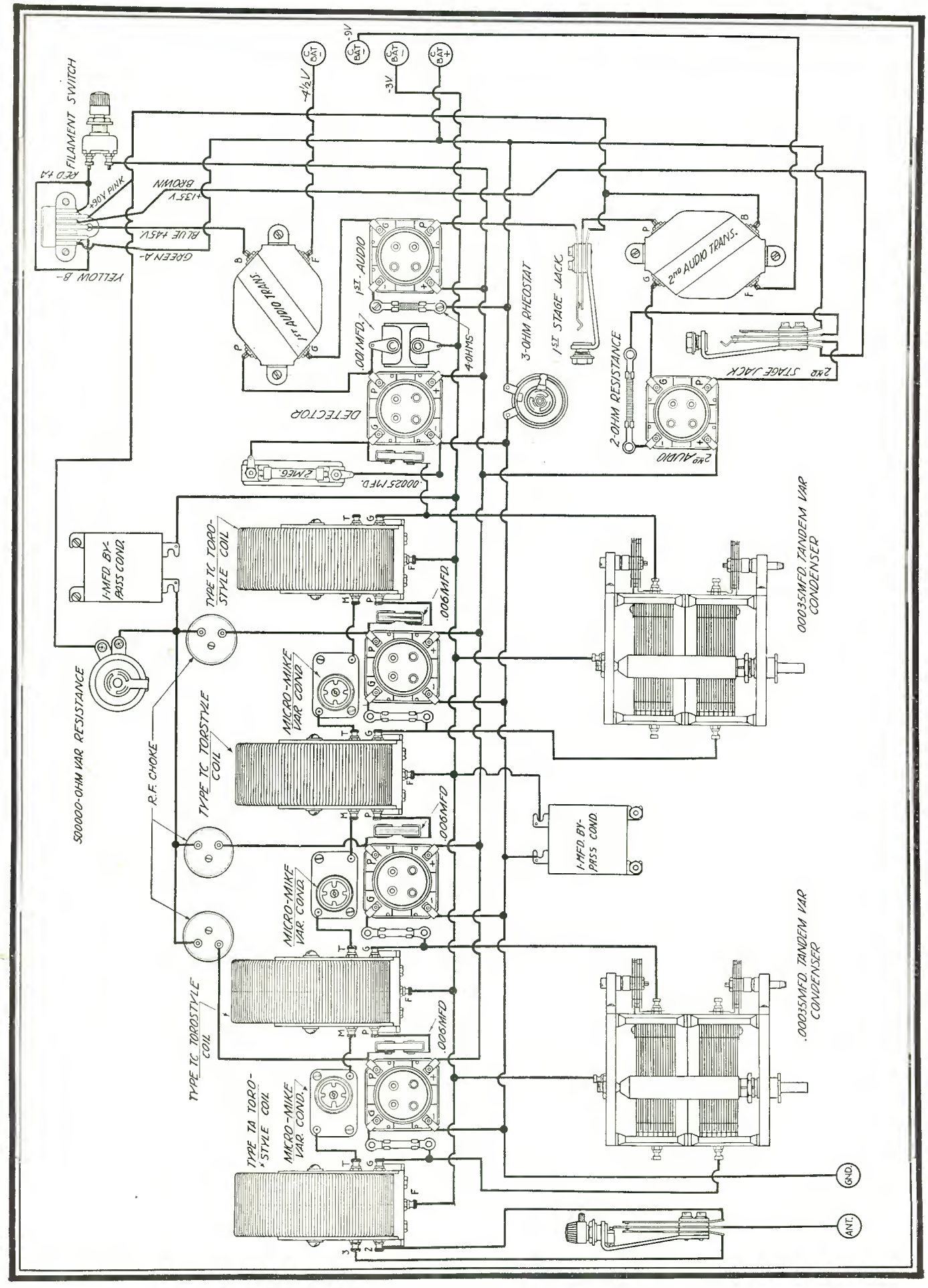


Fig. 4. Graphic illustration. Check this carefully after receiver has been completely wired up

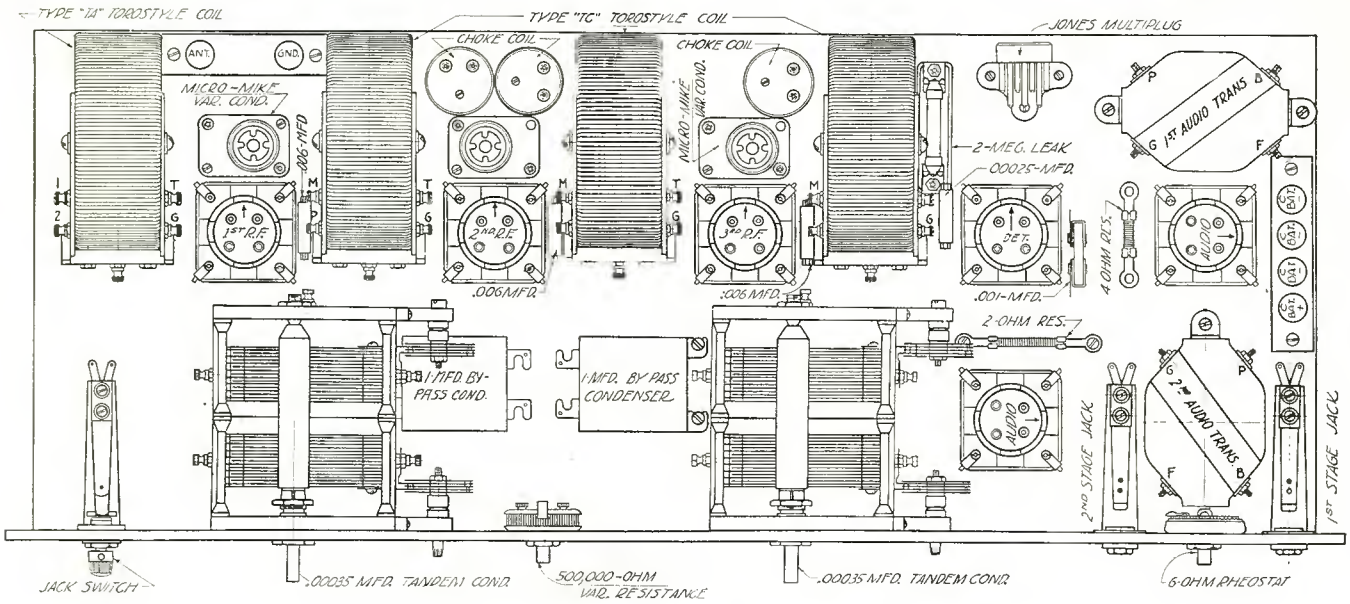


Fig. 2. Baseboard layout showing arrangement of parts

frequency amplifying tube socket. The signal should still be audible. Then turn the adjusting screw on the balancing condenser next to the socket until the signal is weak or disappears. Now retune the right hand dial until the signal again is loudest, using also the trimming condenser. Again adjust the balancing condenser until weak or inaudible signals are found. Replace the filament lead and carefully retune the set. Repeat the balancing procedure with the second and first radio frequency tubes in order. In adjusting the first and second tubes, detune the third and detector until volume is fairly weak. This will make the point more exact.

LIST OF PARTS

These parts or any reasonable substitute will give satisfactory results:

1—7x24x3/16-inch Drilled and Engraved Micarta Panel
1—¾x3x3/16-inch Micarta Terminal Strip
1—¾x3½x3/16-inch Micarta Terminal Strip
1—9¾x23½x½-inch Wooden Baseboard
1—B-T Type TA Torostyle Transformer
3—B-T Type TC Torostyle Transformers
2—B-T Type LD 17 Variable Condensers
3—B-T MMF. Condensers
3—B-T Radio Frequency Choke Coils
1—B-T 500,000-ohm Variable Resistance
1—B-T Euphonic Audio Transformer, 2.2 to 1
1—B-T Euphonic Audio Transformer, 4.7 to 1
2—B-T Tuning Controls
5—B-T Type UXA Sockets
1—B-T Type UXD Socket for Detector
3—B-T 1500-ohm Fixed Resistances
1—Carter 3-ohm Imp. Rheostat
1—Carter Imp. Filament Switch
1—Carter 4-ohm Fixed Resistance
1—Carter 2-ohm Fixed Resistance
1—Carter No. 104 Jack
1—Carter No. 101 Jack
1—Carter Three Spring Jack Switch
1—Dubilier .001 mfd. Fixed Condenser
1—Dubilier .00025 mfd. Fixed Condenser
3—Dubilier .006 mfd. Fixed Condensers
2—Dubilier 1 mfd. By-Pass Condensers
1—Lynch Grid Leak Mounting
1—2-meg. Lynch Grid Leak
6—Engraved Eby Binding Posts
1—Jones Multiplug and Cable
48—Kellogg Tinned Soldering Lugs

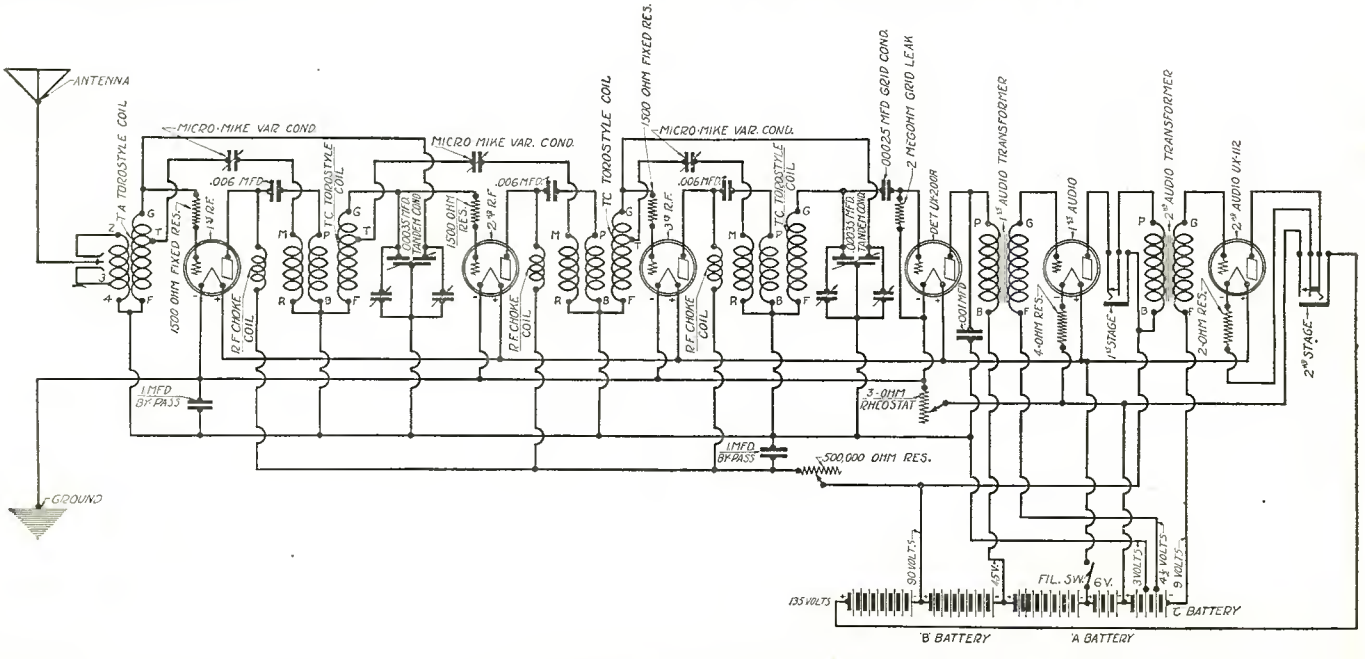


Fig. 3. Schematic Wiring Diagram

HOW IS THIS SET DIFFERENT?

The new **COUNTERPHASE** is different in many ways.

This ad briefly tells (*) about two features of the Counterphase not found in any other receivers.

Bremer-Tully Counterphase-Eight—Different and Better!

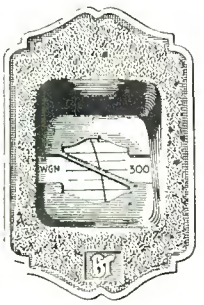
1. B-T did not offer a single control receiver until they could attain the same degree of selectivity as was possible with a well-designed multi-control set.

THE REJECTOR STAGE, exclusive to B-T Counterphase Sets makes possible selectivity never before equalled. The Rejector Stage rejects (grounds) all frequencies or signals except the one the operator desires to hear. It employs a principle long known to radio engineers but for the first time successfully applied to any receiver.

To gain this great selectivity so necessary to the up-to-date radio set, nothing else has been sacrificed. It's one of the easiest sets to tune that you will find.

2. THE STATION INDICATOR, patented Sept. 28th, 1926, is another exclusive B-T feature.

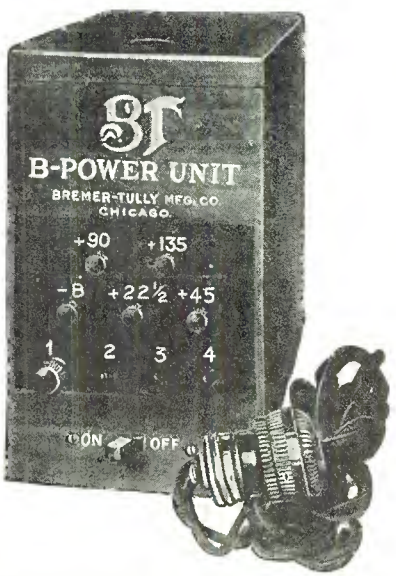
No log book is necessary to find stations with the new Counterphase. You simply refer to the daily newspaper and decide which station you want to hear. Turn the dial until the red line on the tape crosses the diagonal bar at the desired wave length and the station will be there.



This is true not only on one section of the scale but on high or low wavelength stations because each Counterphase Set is calibrated at the factory. Think of it, each set calibrated, **accurately!**

The length of the aerial or ground makes no difference in the wavelength readings.

You owe it to yourself to know more about this superior set. Send today for full information.



Why Is the B-T B-Power Unit Different?

B-T believe it is impossible for the user to know the voltage delivered by a B-Eliminator when variable resistances are used. Also it means that there is one or more knobs to turn. That is why B-T use fixed resistances, interchangeable for different size sets and a simple plug arrangement on the front panel. Adjustment is made once and thereafter the **correct** voltage is delivered without guess-work.

Capacity 150 volts at 60 milliamperes, sufficient for multitube sets using power tube. Originally designed to insure the satisfactory operation of the Counterphase-Eight. It is the best B-Power Unit that you can buy, one that will be good for years—a good investment.

* BETTER TUNING

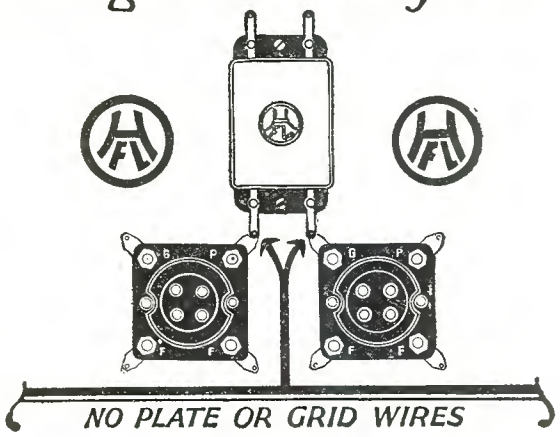
The 10th Edition tells in detail about all the features of the New Counterphase. Many things you should know about B-Eliminators are covered as well as general radio subjects. Sent postpaid for 10c.

BREMER-TULLY MFG. CO.

520 So. Canal St. **Chicago, Illinois**

H·F·L· Transformers

The Highest Standard of Radio



Praised

Mr. Donn Piatt of Monticello, Ill., writes: "Must say that the 9-in-Line with your H. F. L. Units is the most selective and finest operating set I have ever seen or used. We get KFI and KPO on the loud speaker with as much volume as Chicago stations. Pull them in with plenty of volume anytime they're on the air."

Endorsed—

H. F. L. Transformers have been endorsed and approved by Radio Authorities—Editors, Engineers and Set-Builders—for their supreme excellence and the improved quality of reception that they afford. H. F. L. Transformers represent the highest development of efficiency and the most advanced construction design. They make it possible to select radio programs at choice regardless of broadcast conditions. They combine tremendous power with an unexcelled purity of tone and amplify the weakest signals to full loud speaker volume. They operate with all types of standard tubes, and are altogether unsurpassed for quality, clarity and volume. Improve your new receiver with H. F. L. Transformers.

THE CALL BOOK SAYS:

Using H. F. L. Units, we secured hair-line selectivity, tremendous power and highest quality of tone combined with simplicity of tuning and economical cost of operation.

HOLLIS DeNEEFE RADIO ENGINEERING SAYS:

"You are to be congratulated on your H. F. L. Units. Tested a set in Poughkeepsie, N. Y., last night using your transformers with most gratifying results. First station received was Chicago, second was Minneapolis and the third San Antonio. Set was operated in a steel building on a Quali-Tone loop without antenna or ground connections."

RADIO NEWS SAYS:

Using H. F. L. Units received 105 stations in United States, 7 Canadian, 1 Mexican, 1 Cuban, all logged while 23 local broadcast stations were on the air.

H. 210—Iron core transformers with an exceptionally high amplification factor. Each unit carries laboratory calibration. Range 32,000 to 42,000 cycles. Price **$8.00**

H. 215—Air core transformer, tuned stage, designed to amplify signals at a maximum efficiency of 37,000 cycles. Each unit carries the laboratory calibration. Price..... **$8.00**

F. 320—Audio frequency transformer which will amplify signals to greatest volume with incomparable faithfulness of tone. These units are the result of an entirely new principle in transformer construction. Price..... **$8.00**

L. 425—Radio Frequency Choke Unit. Price..... **$5.50**

L. 430—Tuned Radio Frequency Transformer. Price **$5.50**

DEALERS— WRITE FOR DISCOUNTS —JOBBERS

HIGH FREQUENCY LABORATORIES

131 N. WELLS STREET
CHICAGO

The Unicontrole Nine-in-Line Super

A Single Control Super-Heterodyne Which Is Free from the Inherent Drawbacks of a Single Dial Receiver

All illustrations of this receiver were prepared by The Citizens Radio Laboratory

THE September issue of the CITIZENS RADIO CALL BOOK contained complete constructional details on the Nine-In-Line Super-heterodyne Receiver. The circuit has proven highly efficient among those who have built the receiver, and the total results have been so excellent that considerable time has been spent in the laboratory in making improvements. In compliance with the insistent demand of the public for a minimum number of controls, a single major dial control was decided upon. Unlike the average attempts for simplicity of control, this receiver does not use the conventional tandem condenser. The inherent difficulty of properly tuning a number of circuits with the tuning instruments rigidly fastened together was recognized. After careful consideration an instrument of established merit, known as a Hanscom Capacity Element, was decided upon for use as the tuning device. It consists of two Remler variable condensers mounted side by side on a bakelite frame so constructed that the large bakelite gears in each of the condensers are mechanically connected together by a driving gear in such a manner that the two condensers tune as one. However, a very clever cam arrangement on one of the condensers permits a rocking motion to be imparted to one set of its plates so as to provide sufficient latitude in capacity variation on that condenser to fully compensate for any variations between the circuits. In order to electrically separate the two condensers, the end of the spring normally soldered to one of the binding posts on the right-hand condensers is removed and fastened under a screw passing through the frame just to the left of the post to which it was soldered. The results obtained with this single control unit compare favorably with the standard two dial control. Maximum selectivity is attained and actual tests have proven that this receiver is much sharper than any of the single control receivers known today.

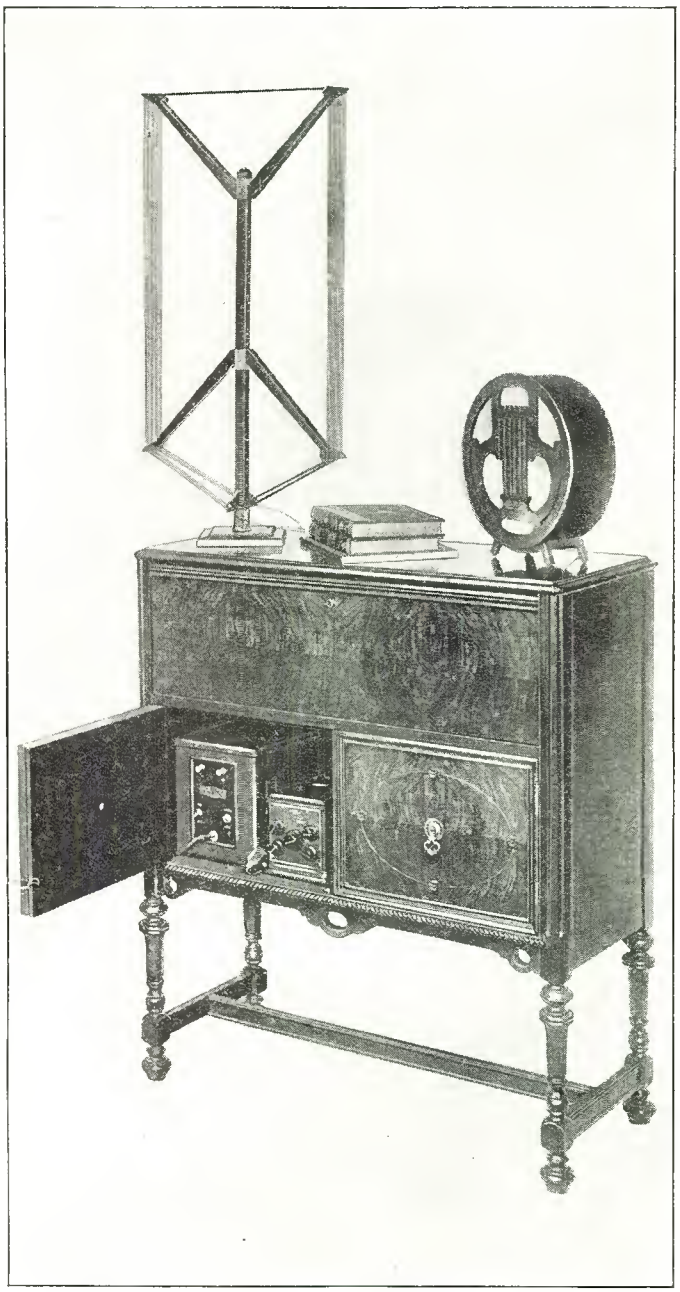


Photo A. View of receiver mounted in console, with suggested accessories

As in the former model, appearance has been emphasized. A simple symmetrical layout of apparatus is used which allows extremely short plate and grid leads. In fact, the completed receiver is a proof that it is possible to build a high grade receiver at home, of pleasing appearance, whose performance is more than satisfactory.

Fundamentally the circuit is identical in principle to the original Nine-In-Line Super. The .0005 mfd. fixed condenser across the secondary of the first audio transformer has been transferred to the second transformer, where it performs in the same manner. A 500,000-ohm C. R. L. modulator is shunted across the secondary of the first audio transformer, replacing the 200,000-ohm variable resistance. The outside terminals connect to both ends of the winding, while the center terminal is connected to the grid of the first audio tube. A 1 mfd. by-pass condenser has been omitted which was across the "C" battery. However, if a "B" battery eliminator is used this condenser should be placed in the circuit. In addition to the above changes the system of tube control has been slightly modified.

It is a well known fact that the use of more than three stages of intermediate frequency amplification has rarely been successfully accomplished because of the great difficulties associated with the use of multistage amplifiers. The average super-heterodyne receiver consists of a combination of one filter and three untuned intermediate frequency transformers. If the highly amplified intermediate frequency signal is passed through a second tuned stage a considerable increase in selectivity will result. This also may be accomplished if two untuned stages are used which are very closely peaked, possibly within 1 per cent. The untuned stages in this case act merely as intermediate frequency amplifiers and should have a very flat resonance curve. By using a coil of high capacity and a heavy closed iron core with a large surface, a large number of very fine high silicon content steel laminations, a transformer of these characteristics is possible. An untuned intermediate frequency transformer of this design will have a uniform amplification factor within a range of 6 to 8 kilocycles and will have a tendency to reduce or prevent oscillation or distortion. A signal passed through two transformers of this type will enter the first tuned stage on a very broad band, which, if passed through a filter, will sharpen it considerably. An additional stage of amplification with another filter will deliver a pure signal with maximum

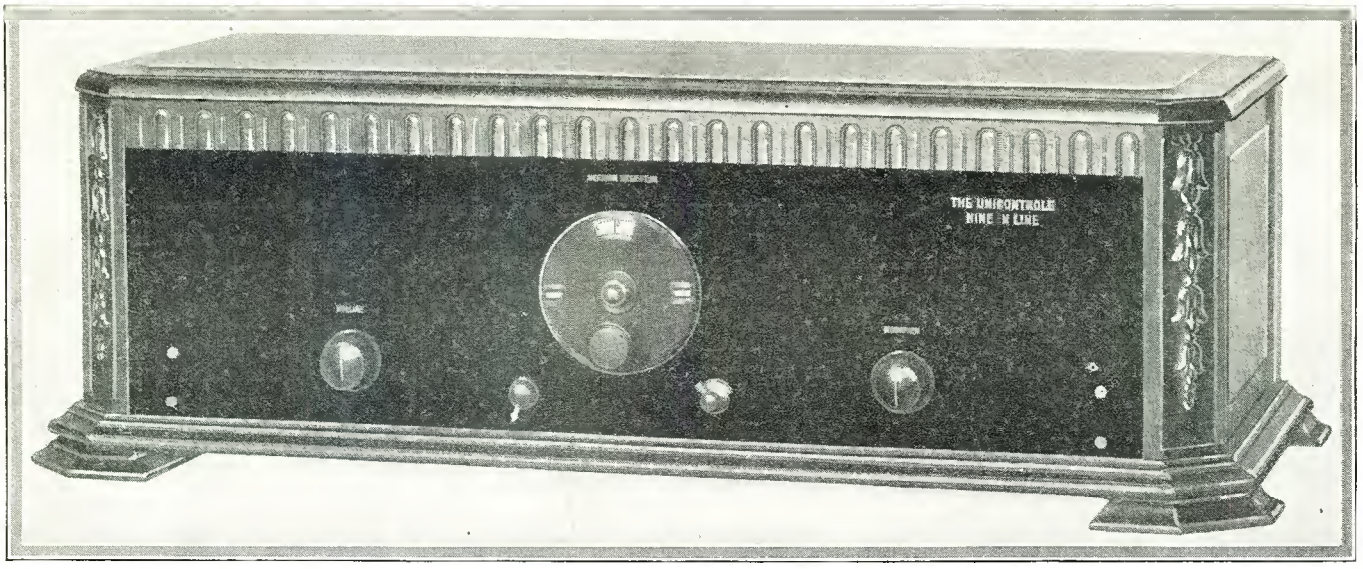


Photo B. Front view of receiver mounted in cabinet

intensity to the detector.

However, a highly amplified intermediate frequency signal of this character will have a tendency to feed into the audio frequency amplifying stages. For this reason it has been exceedingly difficult to incorporate impedance coupled or resistance coupled amplification in the audio frequency end of a super-heterodyne receiver. To obviate any possibility of this condition existing, transformer coupled audio frequency amplification is used in this receiver. Since a sensitive human ear will detect frequencies as high as 20,000 cycles per second, the audio transformers used in this receiver are designed to have very high impedance in the secondary winding, which, with its high capacity effect, will create a sharp decline on the amplification curve over 10,000 cycles and does not amplify the entering intermediate frequencies to the volume of audibility. In this way one of the greatest disadvantages of super-heterodyne receivers is eliminated.

Another factor which is given great consideration in this receiver is the design of the oscillator circuit so that the energy delivered will not be sufficient to unbalance the receiver. The range of the oscillator is within the broadcast wave band and its output energy matches that of the loop circuit so that overloading of the first detector grid is impossible. Therefore, the input circuit is of highest efficiency. This fully balanced system assures an extremely quiet operation and with no regeneration howls or oscillation. H. F. L. Transformer Units, originally designed for high wave receivers, are used in this receiver.

The use of four stages of intermediate frequency amplification and two tuned stages are applied successfully in this receiver. Actual laboratory tests of this set have proven that extreme selectivity can be obtained as well as a comparative excellent reproduction on a loud speaker.

Fig. 4, a schematic wiring diagram, details the complete hook-up of the receiver. Fig. 3 is a graphic wiring diagram of the receiver and accurately shows the connections that are made to the various pieces of apparatus.

A completely drilled Celeron sub-panel, as well as a lithographed Celeron front panel may be obtained from the Diamond State Fibre Company or any good radio store. It is best to assemble the sub-panel first and mount all apparatus upon it on both the top and bottom side. The grid and plate terminals of the transformers are directly bridged to the respective terminals of the sockets by means of small lengths of wire passing through the sub-panel, with the exception of the sixth and seventh transformers. The grid terminals on the sixth and seventh transformers, as well as the battery and filament terminals of all other transformers, are bent up and No. 4 32x⅝-inch screws placed through the eyelet holes and connected under the sub-panel to the respective leads.

The L-430 radio frequency transformer, used as an oscillator, is mounted on the bottom side of the sub-panel. The L-425 radio

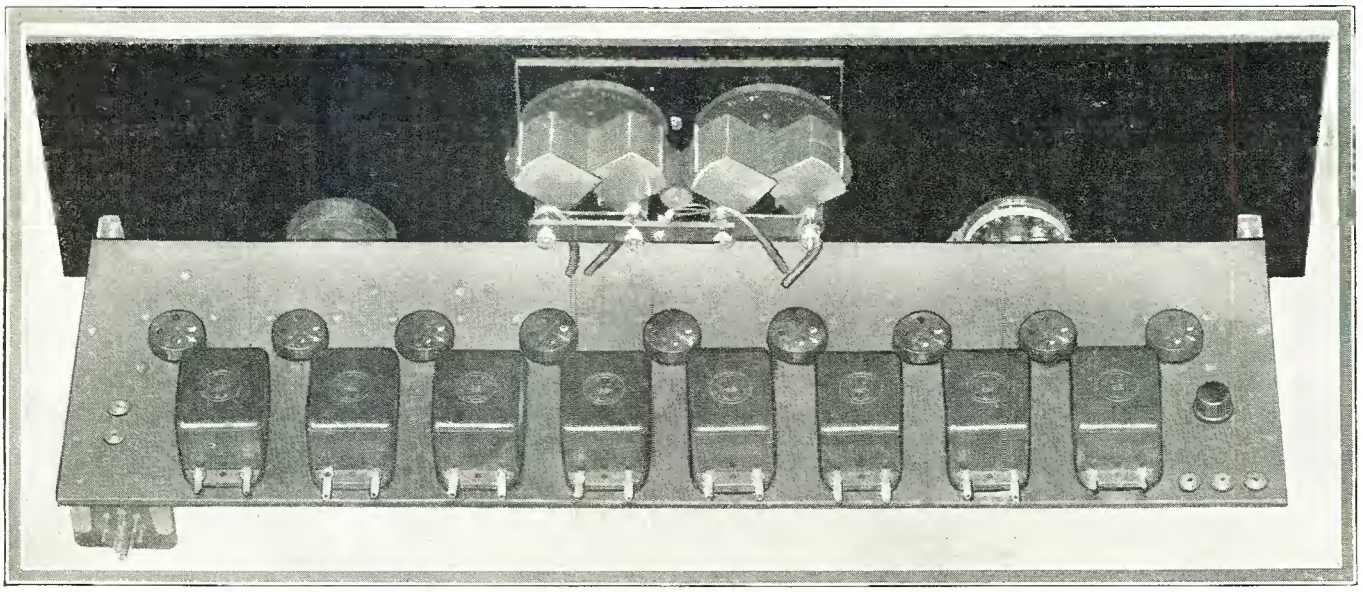


Photo C. Rear view of completed receiver. Notice absence of unsightly wiring

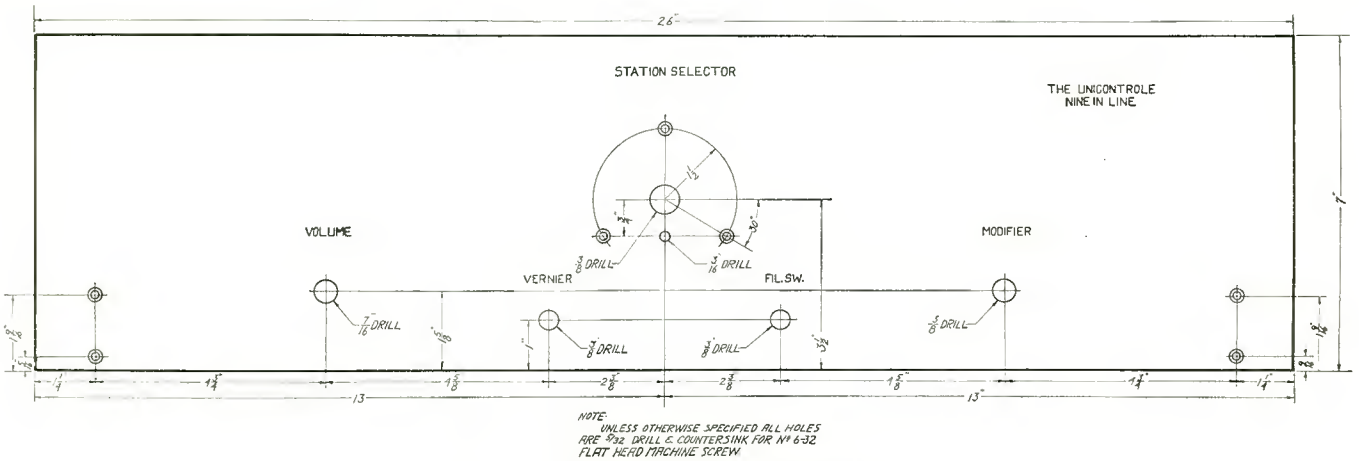


Fig. 1 Showing size and location of holes

frequency choke uses but three connections, the terminal "F" not being used. This choke consists of a combination of coil and by-pass condenser. The midget condenser, by-pass condensers, the Yaxley cable connector, the Elkay filament equalizers, and the pup jacks for loud speaker, and "C" battery connections, are all mounted on the under side of the sub-panel.

The entire wiring is done under the sub-panel. The rubber insulated flexible wire is quite suitable for this purpose, and if the leads are cabled a very neat job of wiring will result. The "B" battery leads of the transformers are run closely together into the prongs of the cable connector, and should be connected according to the color code shown in the graphic illustration.

The intermediate frequency amplifying tubes are controlled by a 25-ohm Yaxley rheostat mounted on the left end of the front panel, the two detectors and oscillator by a ¾-ampere filament ballast, as well as the two audio tubes. On account of the separate adjustment, flexible leads are to be used for connecting the loop condenser. A common "C" battery is used for all grid returns, with a voltage of 4½ to 6 volts recommended. It will be noted that this "C" battery provides the necessary bias also for the second detector tube so that rectification will be accomplished on the negative side of the characteristic curve of this tube. The types of tubes to be used are as follows: Oscillator, UX 201-A; first detector, UX 201-A; four intermediate frequency amplifiers, WX 12; second detector, UX 201-A; first audio, UX 201-A, and second audio, UX 112 power tube. It is emphatically advised that the very best material be used in this receiver, and that extreme care be exercised in connecting the various parts. Perfectly soldered joints will assure least resistance, and hence better reception.

LIST OF PARTS

These components or substitutes will give entirely satisfactory results:

1—Celeron 7x26x3/16-inch Drilled and Engraved Front Panel
1—Celeron 7x24x3/16-inch Drilled Sub-Panel
3—No. H 210 H.F.L. Transformers
2—No. H 215 H.F.L. Transformers
2—No. F 320 H.F.L. Transformers
1—No. L 425 H.F.L. R.F. Choke Unit
1—No. L 430 H.F.L. R.F. Transformer
9—Benjamin Sub-Panel Mounting UX Sockets
1 Pair of Benjamin Sub-Panel Brackets
1—Yaxley Cable Connector, complete
1—Yaxley 25-ohm Air-Cooled Rheostat
5—Yaxley Pup Jacks
1—Yaxley Filament Switch
1—C.R.L. 500,000-ohm Modulator
1—Hanscom S-C Capacity Element, each Condenser .0005 mfd.
1—Marco Vernier Dial
1—Chelton .000045 mfd. Midget Condenser
1—Sangamo 1 mfd. By-Pass Condenser
2—Sangamo .0005 mfd. Fixed Condensers
1—Sangamo .002 mfd. Fixed Condenser
2—Elkay Type 4/3 Equalizers with mounting
75—Kellogg Tinned Soldering Lugs
24—4-32x5/8-inch Round Head Brass Machine Screws
24—4-32 Hexagon Brass Nuts
60—6-32x½-inch Round Head Brass Machine Screws
60—6-32 Hexagon Brass Nuts
50 Feet of Belden Flexible Rubber Insulated Stranded Hook-up Wire
1 Package of Kester Solder

Photo "A" shows how the Unicontrole Nine-In-Line Super-

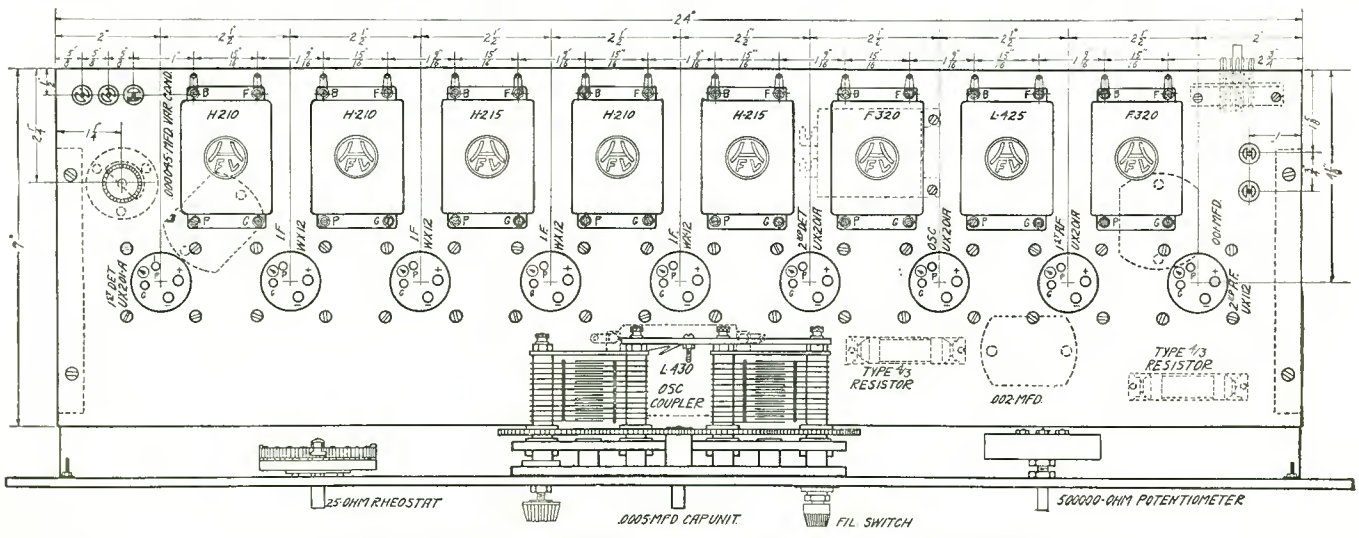


Fig. 2. Baseboard layout showing arrangement of apparatus on sub-panel

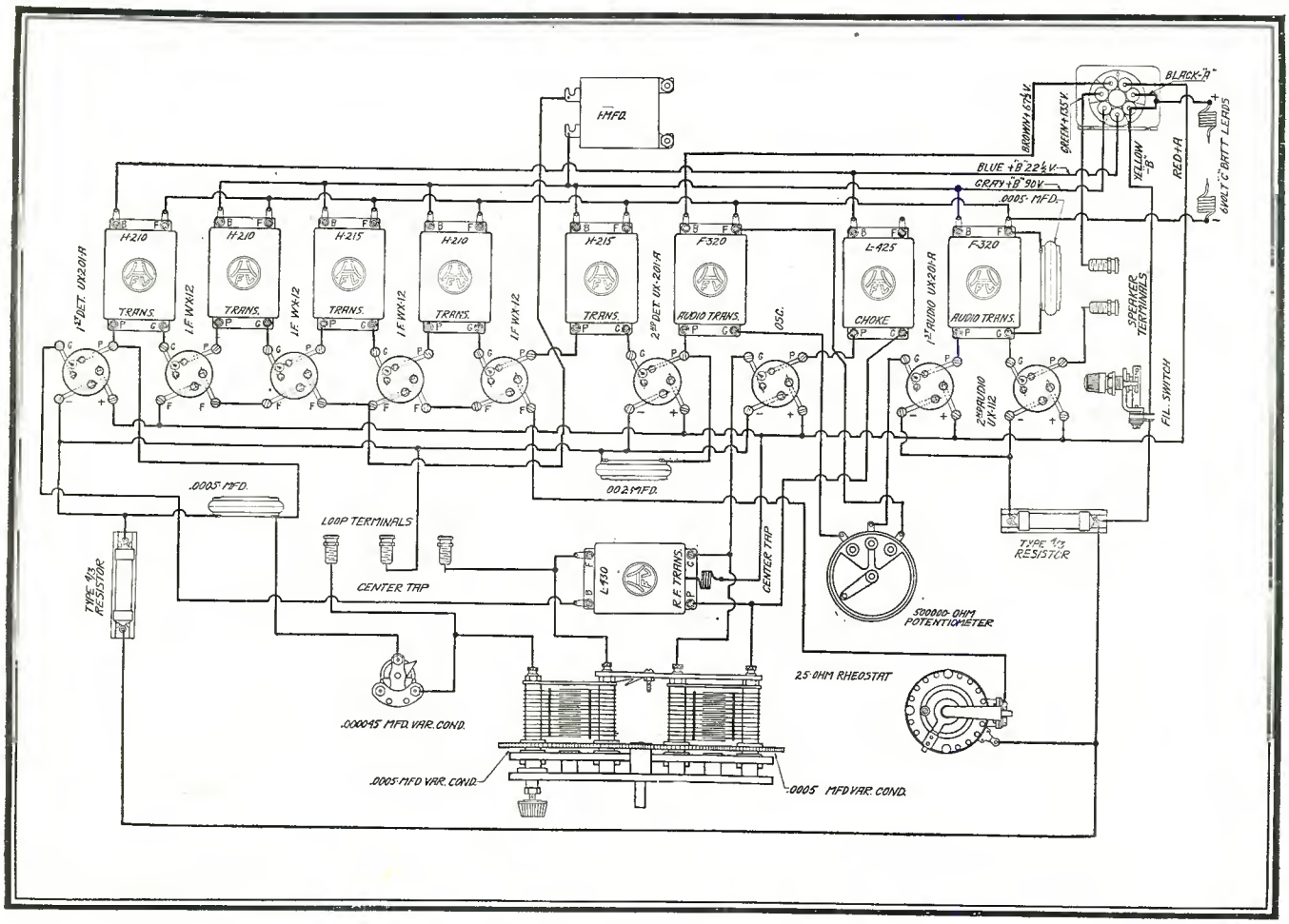


Fig. 3. A pictorial wiring diagram showing all connections

heterodyne appears when installed in a Charlotte Model 25 Console. This Console is manufactured by the Charlotte Furniture Company of Charlotte, Mich., and contains only genuine walnut lumber in its construction. The top and ends of the console are of plain walnut, while the doors at the front are of butt walnut. The console is highly finished in lacquer and carefully waxed.

A new type of combination charger and "A" battery is used to supply "A" potential for the receiver. Sufficient space is allowed within the unit for a Willard Glass Case Battery which is connected directly to the charger. A pair of toggle switches in the case of the instrument allows either a high or low rate of charging to be used, as well as turning the charger on or off. This unit is is manufactured by the Interstate Electric Company of St. Louis, Missouri.

"B" potential is derived from the Webster "Little Giant" "B" and "C" Eliminator, manufactured by the Webster Company of Chicago. This device utilizes a Raytheon Tube and supplies, in addition to "B" potential, the necessary "C" biases for the proper operation of the circuit.

The Speaker shown is the product of the Victor Radio Corporation of Chicago, and is known as the Operetta. It is a drum-type speaker, using a free floating, free edge cone supported at its apex by a driving pin.

A Qualitone Loop is shown, which is manufactured by the Duro Metal Products Company of Chicago. It is entirely collapsible and capable of being stowed away in a very small space. A thumbscrew arrangement allows the device to be tightened sufficiently to keep the wires taut at all times.

The Cabinet shown in Photo "B" is one of the many manufactured by D. H. Fritts & Co. of Chicago.

(If any further information on these accessories is desired, full descriptive matter may be obtained by writing the manufacturers direct.)

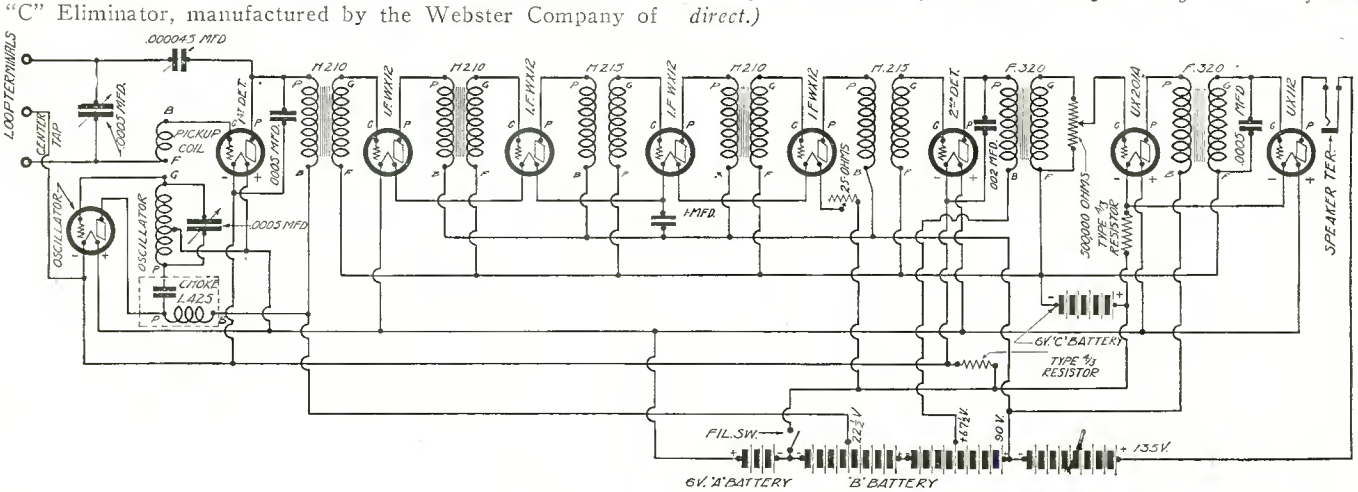


Fig. 4. Schematic wiring diagram

The Wonderful Value in Radio Cabinets

Increase the value of your set with a beautiful, practical Charlotte Radio Cabinet

THE Charlotte Radio Cabinet makes of your set a handsome home furnishing, a practical, well-balanced decoration, as well as a more enjoyable source of entertainment. Every part of your set is conveniently and accessibly contained.

No. 10

Number 10

Butt Walnut fronts, plain Walnut tops and ends. Balance Gum, finish Hugenot Walnut, lacquered and waxed. Dimensions in inches: Top 36¼x15¼. Height 41. Upper Compartment 32¼x14x8 high. Lower Compartment 32¼ x14x12. Will take panel 8 high and leave 12½ behind panel. Will take panel 24 long or less and leave room at end for grille and loud speaker.

Cabinet only.....$ 96.00

Cabinet, with Loud Speaker Unit and Grille..... 118.00

Shipping weight 138 lbs.

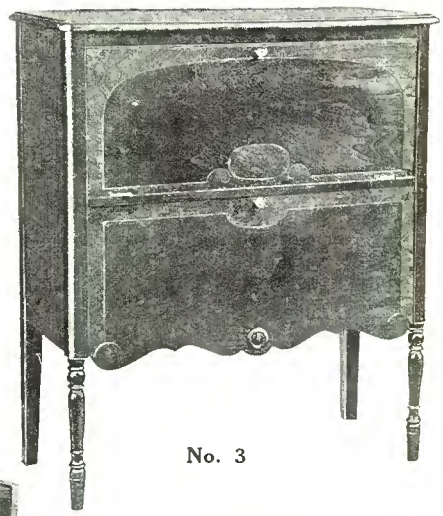
No. 3 Open

Number 5

Fronts Mahogany. Balance Gum. Finish Brown Mahogany, lacquered and waxed. Dimensions in inches: Top 38½x13½; height 39; set compartment 37 x12½x10 high; battery compartment 37x9x12 high. Lock on front.

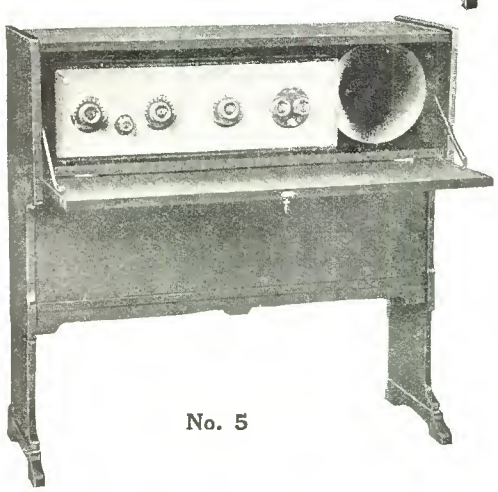
Cabinet only.....$30.00

Shipping weight 89 lbs.



No. 3

One of these models should enclose every table set for the convenient and practical accessibility of a console are nowhere better arranged than in the Charlotte. The Charlotte is the **supreme value** in Radio Cabinets.



No. 5

Number 3

Plain Mahogany or Walnut tops, fronts and ends. Balance gum. Finish Mahogany or Walnut, lacquered and waxed.

Dimensions in inches: Top 36 x 15; height 42; upper compartment 32¼x12½x13¾ high; lower compartment 32¼x12½x 11½ high. Locks top and bottom.

Number 3.....$39.00

Shipping weight 103 lbs.

Address

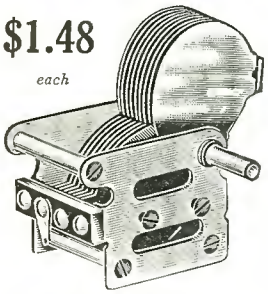
CHARLOTTE FURNITURE COMPANY **CHARLOTTE, MICHIGAN, U. S. A.**

RADIO CABINETS OF C BEAUTIFUL UTILITY

CHARLOTTE

Genuine Keystone Parts as Specified in Article on following pages of Citizens Radio Call Book

$1.48 each

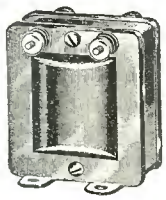


Keystone .00035 mfd. S L. F. Variable Condenser

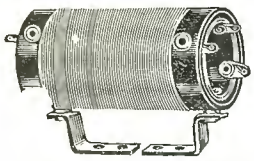
30c each

Keystone Grid Leak

$1.97 each



Keystone National All-Frequency Audio Transformer



$3.48 Set of 3 — $1.20 each

Keystone Coils, 1 Tapped Auto-Transformer and 2 R. F. Transformers

Here are the genuine Keystone parts as specified in the article on the Call Book's **Inexpensive 5-Tube T.R.F. Receiver** explained and illustrated on the following pages. You'll be surprised what an efficient, first-rate set you can make for very little money from these parts.

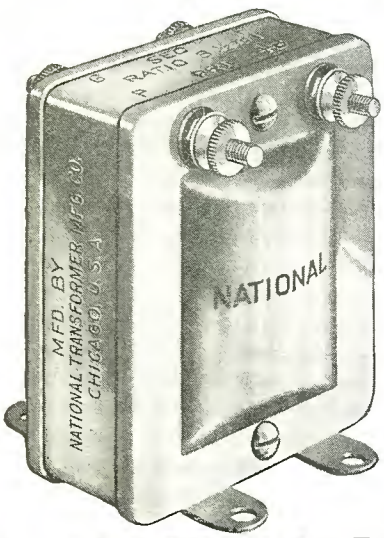
The cost of the genuine Keystone laboratory-made parts specified in this article total only $12.16 complete. Think of it!

Here is a real opportunity for set builders, fans and those who do not have a good 5-tube set, to get a receiver that performs admirably, with a tone volume and clarity most unusual.

Take advantage of our special offer to get these parts now, and add to your order the famous Keystone National Audio Transformers while the supply is available. Please use the handy coupon below when sending in your order.

AMAZING MONEY SAVING OFFER!

The wonderful Keystone National All-Frequency Audio Transformers specified by Radio Call Book offered special at less than half regular price. But—you must act NOW—supply is limited!



BASS NOTE AMPLIFICATION ONLY

$1.97

KEYSTONE RADIO LABORATORIES, Inc.
154 Whiting St., Dept. CR, Chicago, Ill.

You may send me the following, which I have checked:

☐.....Keystone National All-Frequency Audio Transformers at $1.97 each.
☐ Ratio 6 to 1 ☐ Ratio 3½ to 1
(Indicate ratio desired)

☐.....Sets of 3 coils (1 Keystone tapped Auto-transformer and 2 Keystone R. F. transformers at $3.48 set.
(Any one coil separately $1.20 each)

☐.....Keystone .00035 Mfd. Variable Condensers (S.L.F.) at $1.48 each.

☐.....Keystone 2 meg. Grid Leak, at $0.30 ea.

I agree to pay postman $.....plus (add total amt. of order) few cents postage. We pay postage if you send cash with order.

Name.....

Street.....

City.....State.....

Why "NATIONALS" Are BETTER

The secret of National's Supremacy is in its extra large, especially shaped, high grade silicon steel core, and its oversize special-wound core. No other transformer, regardless of price, can boast of the same combination of ideal features. Hence, no other transformer, regardless of price, can out-perform the National—in amplification, in fidelity of reproduction. Then think, too, of the improvement these wonder transformers will make in the appearance of your set. They are heavily nickel plated, all over, and polished so they are just like mirrors. To make a neat looking job of any set they can't be beaten.

INSTANTLY—You'll Notice a Tremendous Improvement in Volume and Tone

Rip out your old audio transformers—no matter what they are, or how good you think them. Put these oversize, nickel-plated giants of amplification in place and prepare yourself for a distinct revelation. An orchestra will sound like an orchestra. You'll hear every instrument, round, full, clear, natural. No more jumbled mess, no more flat, tin-pan noise when the musical program happens to be at the lower end of the musical scale. National All-Frequency Transformers cover the whole scale, perfectly. And instead of paying $7, $8, or $9 for this kind of amplification, you can NOW, for a limited time, get it for only $1.97.

Seldom comes an opportunity like this. Certainly—you should take instant advantage of it—because never again will such a startling offer be made. Just think! National Transformers, the new type all-frequency units that amplify the lowest bass and the highest soprano with equal volume and clarity. And instead of paying their regular price of $4.50, you can buy them for only $1.97 each. Truly, the very money-saving opportunity you have been watching for.

YOU CAN SAVE MONEY!

Hundreds of thousands of National Transformers have modernized radio sets everywhere in the land. Thousands upon thousands of fans have found them to be the final answer to perfect tone reproduction of voice and music. And everyone else who has ever bought Nationals has paid the full, regular price of $4.50 each. They are a bargain at that price. They are a super-bargain at our price of $1.97 each. Think! You save $2.53 on each transformer, or more than $5.00 on a pair. Money talks! Order now.

USE COUPON BEFORE IT IS TOO LATE

Only a few thousand National All-Frequency Audio Transformers are in our present stocks. The special, low price of $1.97 will hold only so long as this stock lasts. The thousands of set building fans who have used Nationals will order as many transformers from this stock as they can—because they know there is no better transformer at any price. This will take most of our present supply. If you want to make sure of obtaining a pair of Nationals for your own set, order at once. Use the coupon below, being careful to write your name and address plainly. Save money. Order TODAY!

Keystone Radio Laboratories, Inc,
154 Whiting St., Dept. CR, Chicago, Ill.

An Inexpensive Five Tube Tuned Radio Frequency Receiver

Here Is a Very Moderately Priced Receiver Easily Constructed, Which Is Capable of Giving Excellent Results

This Receiver Was Designed and All Illustrations Prepared by the Citizens Radio Laboratory

ONE of the assumptions that seem to be taken for granted in radio today is that good results cannot be obtained with a receiver unless the parts entering into its construction are of the very latest design and more or less expensive in price. This fact is well borne out when the cost of the average kit of apparatus for constructing a good four or five tube receiver is taken into consideration. While the usual price of a complete set of parts is in the neighborhood of $65.00, many kits are being sold for considerably more. The receivers constructed from these parts will invariably give excellent results. It is true that many factory-made receivers perform in a manner equal to that of the best of home constructed sets, yet the cost of the commercially made set is considerably lower than that of the receiver made in the "kitchen laboratory." An examination of the facts surrounding this condition will disclose that it is quite logical and practical, as illustrated by the following actual case. A manufacturer of high quality apparatus regularly supplied a number of receiver factories with his merchandise. These parts are of excellent quality, being designed with certain electrical effects in view and constructed according to established engineering principles. However, the apparatus consists primarily of only the essential parts and is so designed and constructed that the lowest cost of production is maintained without sacrificing the quality of the finished product.

The manufacturer knew that his parts were of such merit as to successfully compete with other products, so he placed them upon the market. He found that it was impossible to sell his apparatus entirely on its merit alone. Applying a little psychology, he discovered that by improving the physical appearance of his products they sold more easily. He accordingly enclosed some parts in enameled cases, added a bit of nickel plate here and there, replaced soldering lugs by clamping screws, and added various mechanical niceties which highly enhanced the appearance of the product but did not add to its electrical efficiency. Naturally the cost of production increased, necessitating a proportional increase in the retail selling price. Thus it may be plainly seen that while a purchaser of a piece of apparatus in a radio store will get a product of pleasing appearance, the performance of that piece of apparatus will be in no way any better than that of its uglier brother in a factory-made set, although there is a considerable difference in price between the two.

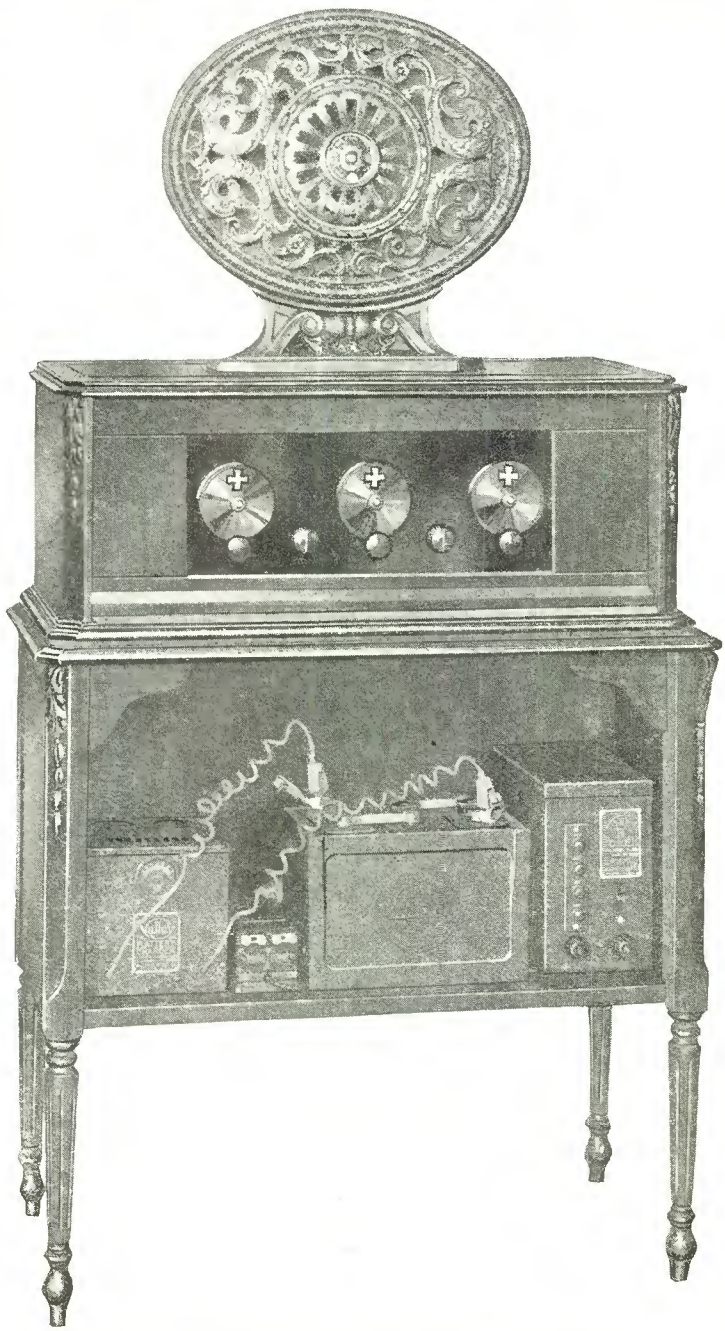


Photo A. Front view of receiver mounted on console with suggested accessories

The purpose of this article is to describe a very inexpensive five-tube receiver, the parts of which are of very good quality and capable of performing in a very capable manner. This receiver will particularly appeal to those who appreciate good reproduction and are not in a position to spend a large sum of money.

The circuit used in this receiver is an ordinary tuned radio frequency hook-up consisting of two stages of tuned radio frequency amplification, detector, and two stages of transformer coupled audio frequency amplification. A tuned auto-transformer is used to couple the antenna and ground to the first tube. The auto-transformer tap is so proportioned as to be approximately correct for the average antenna of from 60 to 100 feet in length.

A volume control consisting of a combination rheostat and battery switch controls the filament temperatures of the radio frequency tubes. The switch is so arranged that when the volume of reproduction is reduced to a very minimum point the "A" battery circuit is automatically opened. A separate rheostat is used for the detector

tube, while the two audio tubes have fixed resistances in their filament leads to reduce the 6 volts delivered from the battery to the normal tube operating voltage of 5 volts.

Careful engineering consideration has been given the design of the radio frequency transformers. The inductances are of such physical dimensions that the undesirable large magnetic and electrical fields are not present, yet the size is large enough to provide an optimum electrical efficiency. Each primary winding is wound on a small bakelite tube and mounted inside of the tube holding the secondary and is concentric with it. The secondary, or outer winding, is carefully wound by machine so that a pure inductance is maintained with a high degree of consistency. This allows the various tuning circuits to be carefully matched. High coefficiency of coupling as well as a tendency to reduce the possibility of uncontrollable oscillations are provided by this method of construction.

Three major tuning controls are used in this receiver, each being a variable condenser of .00035 mfd. capacity. The plates are so shaped that the usual crowding at the lower end of the broadcast band is rendered negligible. Being matched to each other in a manner similar to the radio frequency transformer, the condensers make uniform dial settings possible.

The two audio transformers are each of 3½ to 1 ratio. Their electrical characteristics are such that uniform amplification is possible over the entire broadcast musical scale. Considerable emphasis is laid upon the use of a .002 mfd. fixed condenser across the primary of the first audio transformer. Due to the load effect in the plate circuit of the detector tube imposed by the primary, there is a tendency to reduce the input impedance of the detector tube. The result is a decided broadening or damping of the tuning circuit, preceding the detector. By using the fixed condenser this effect will be greatly reduced and rendered negligible.

LIST OF PARTS

These parts, or their equivalent, will give satisfactory results:

1—7x18x3/16-inch Radion Panel
1—9x17x½-inch Wooden Baseboard
1—1¼x3x3/16-inch Radion Terminal Strip
1—XL Terminal Strip with Posts
2—Push Type XL Binding Posts
1—Keystone Tapper Auto-transformer
2—Keystone Radio Frequency Transformers
3—Keystone .00035 mfd. Variable Condensers
2—Keystone 3½ to 1 Audio Frequency Transformers
1—Keystone 2-meg. Grid Leak

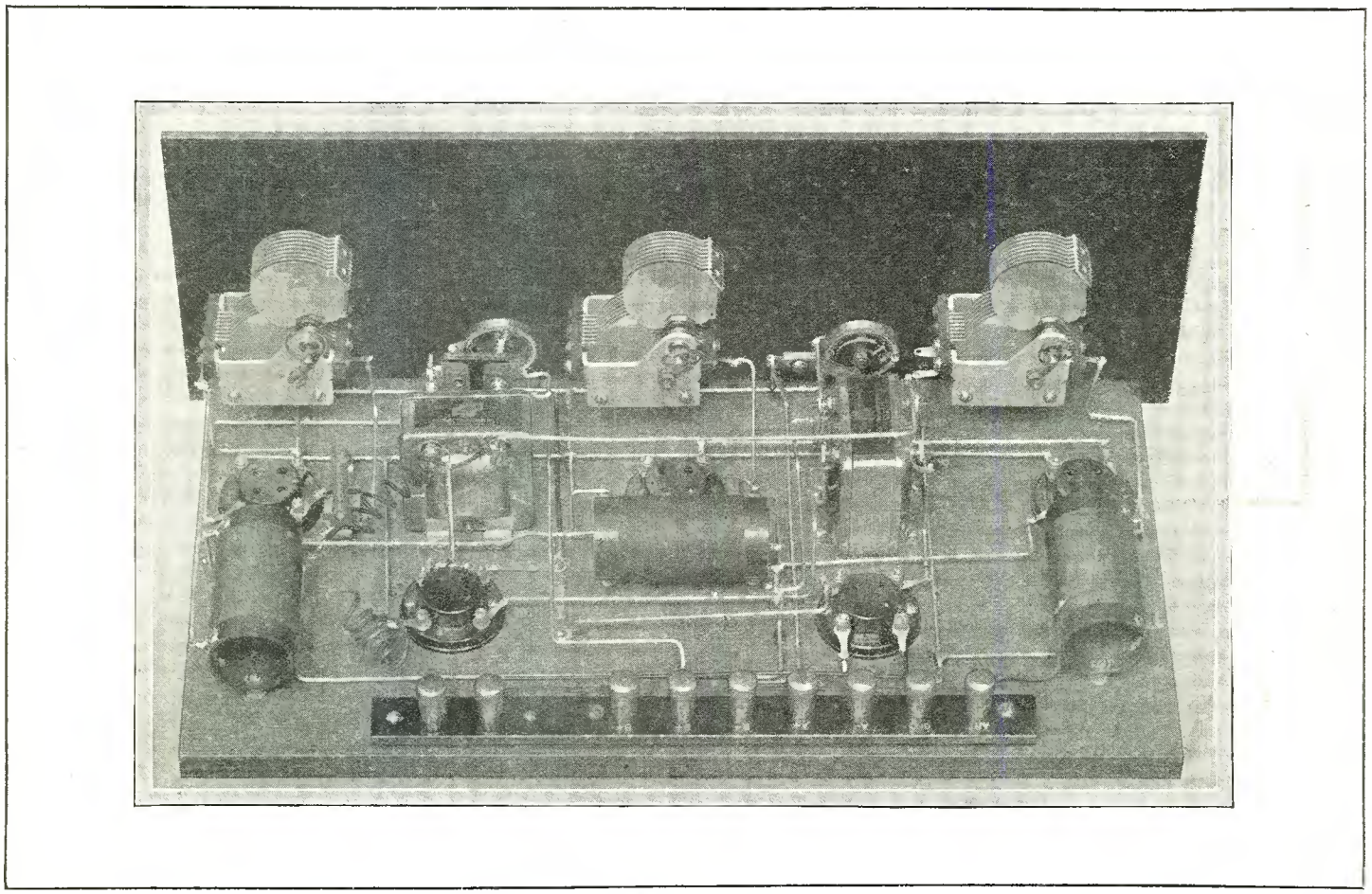


Photo B. Rear view of completely wired receiver. Notice neat arrangement of parts

5—Alden UX Sockets
1—Carter 25-ohm Midget Rheostat
1—Carter 10-ohm Midget Rheostat and Switch
2—Carter 4-ohm Fixed Resistances
1—Dubilier Type 601 .002-mfd. Fixed Condenser
1—Dubilier Type 642 .00025-mfd. Grid Condenser
3—Loughman Whitecross Dials
1 Package Kester Solder
50 Feet Belden No. 12 Copper Tinned Wire
Miscellaneous Screws, Lugs, Wire, etc.

The accessories shown are:

One Blandin Versailles Model Console, a beautifully carved

piece of radio furniture having ample room for all necessary accessories. Photo shows accessory compartment with panel removed. Made by Blandin Phonograph Company, Racine, Wis.

will supply all necessary voltages to operate detector and amplifier circuits, manufactured by Valley Electric Company, St. Louis, Mo.

The same company makes the charger shown in left of compartment, which has ample capacity to keep "A" battery fully charged.

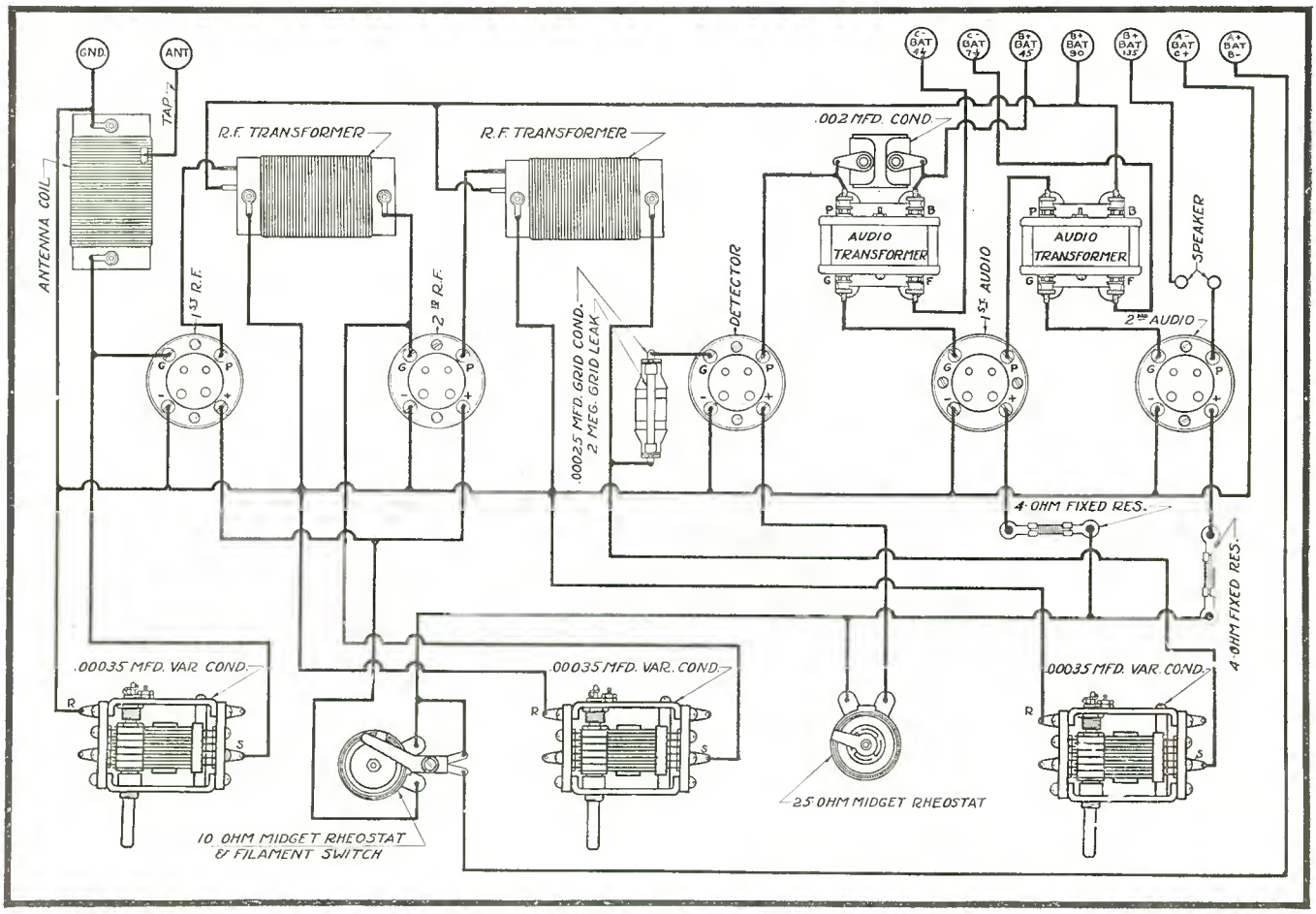


Fig. 1. Graphic illustration showing all connections in entire receiver

The Speaker is manufactured by Radio Foundation Company, New York City.

A 6-volt Willard Radio "A" battery is shown, made by the Willard Storage Battery Company, Cleveland, Ohio.

The "B" current is supplied by a Valley "B" Eliminator which

(If any further information is desired regarding these accessories, kindly address manufacturer direct.)

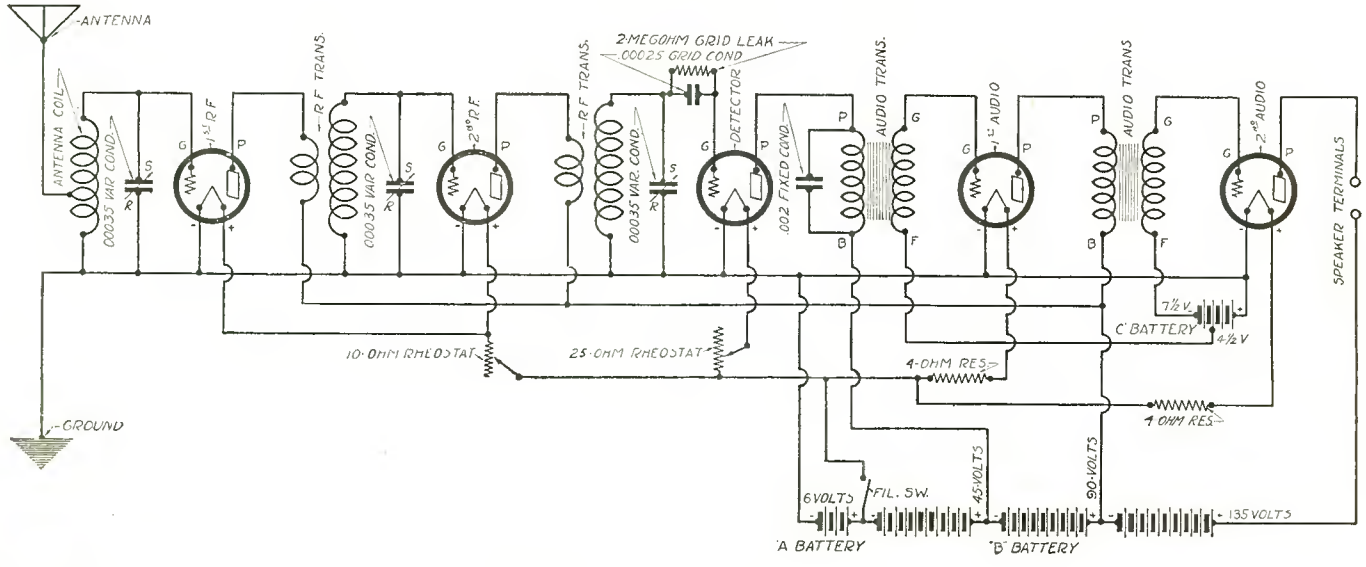


Fig. 2. Schematic wiring diagram

The Henry-Lyford Receiver

Here Is a Receiver So Designed That It Will Never Become Obsolete Due to Changes in the Wavelengths of Broadcasting Stations

PROGRESS in the Radio art, as in everything else, comes through gradual development and refinement. Once in a decade may come a revolutionary idea, but in general the advance is in the form of refinements in the individual parts of a radio receiver, and in refinements of old ideas, with new and better applications of them to present-day needs.

The receiver here described employs five tubes. The first two are radio frequency amplifiers, and the third is a detector, and the last two are audio amplifiers. The first stage of radio frequency amplification is tuned, and the second is untuned, with oscillation in both, controlled by the application of a system of reversed e.m.f. to the grid of the first tube. The detector is tuned and is non-regenerative, and the two audio stages are transformer coupled.

Five 1 mfd. by-pass condensers are used in the audio amplifier, also, to by-pass every grid and plate circuit return directly back to filament. This point, incidentally, has been quite generally overlooked by set designers, but too much importance cannot be laid upon it. These by-pass condensers are essential to perfect reproduction.

Sensitivity and selectivity go hand in hand, though one is usually gained at a sacrifice of the other. Both have been secured to an equally high degree in the Henry-Lyford by the method of oscillation control mentioned before. It is common knowledge that "losser" systems, using a resistance somewhere in the circuit to "kill" the oscillations, are inefficient, and regulation of the plate or filament voltage of a radio frequency tube is not much better. The ideal way is not to "kill" these oscillations by forceful methods, but to compensate for them and counterbalance them—in other words, to strike at the cause of the trouble rather than the effect.

The cause of these troublesome oscillations in the radio frequency amplifier is the ability of the plate-grid capacity of the tube to pass back energy—to "regenerate," and consequently to oscillate. In this circuit, enough energy is passed back, reversed, to just compensate for that which is causing the trouble and to balance it out. Thus the oscillation is scientifically controlled without recourse to any resistances, and the result is of course much greater sensitivity. A feedback coil and a small condenser on the panel are used for this balancing. With the balancing condenser on the panel, the amount of compensation may be varied at will, and the receiver made as sensitive as desired.

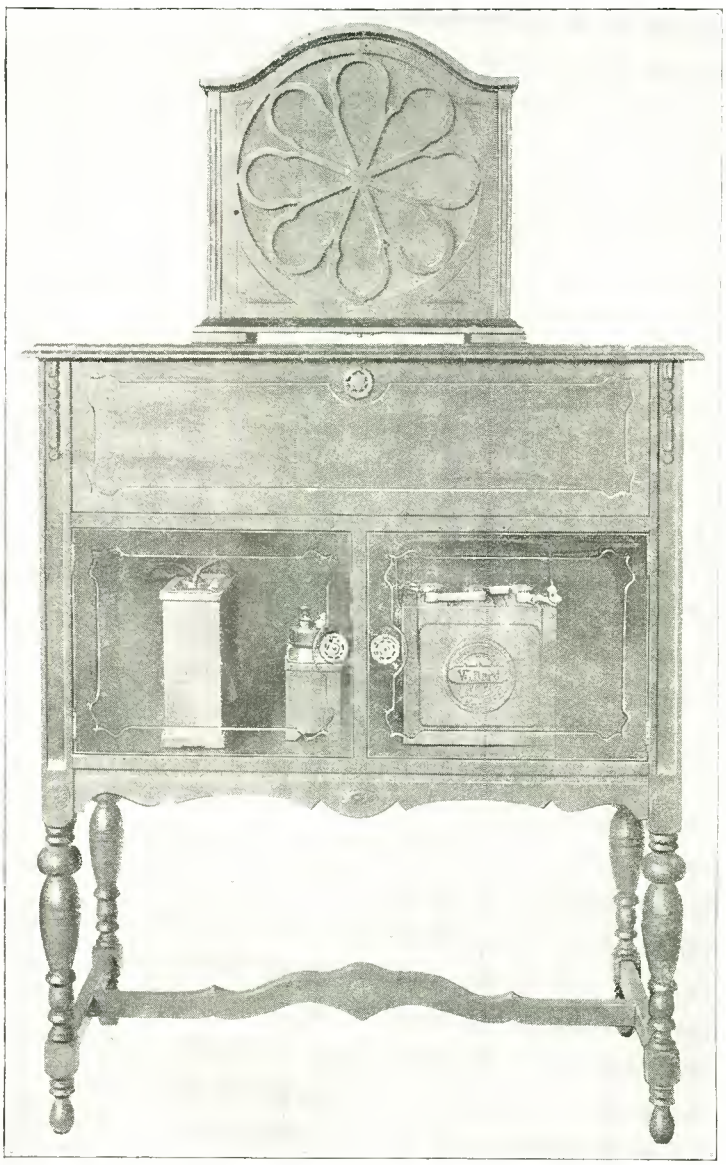


Photo A. View showing how receiver can be placed in a console with suggested accessories

The grids or both of the radio frequency tubes are biased negatively with 1½ volts of "C" battery. This is the condition of maximum amplification and sensitivity, with the plate voltage 90. The detector tube is also biased with 1½ volts of "C" and 22½ volts of "B" used on this tube. This method of detection is much better than the usual grid-leak and condenser method, for it is quieter. Ninety volts is supplied to the plate of the first audio frequency tube from the same supply as that for the radio frequency tubes.

Selectivity has been assured by correct design of the two tuned circuits—the first radio frequency stage and the detector. The coils and condensers are of approved low-loss construction and the selectivity is all that could be desired. Control of the degree of selectivity is provided for by an adjustable coupling to the antenna. This coupling may be close, when selectivity will be as great as with the average receiver, or it may be loose, when selectivity will be much increased. This adjustable feature is quite necessary to enable the receiver to be used under varying conditions in different localities. By adjusting this coupling coil once to the position where maximum results are obtained, it is set for good, and need not be adjusted any further.

LIST OF PARTS

These parts or their equivalent will give satisfactory results:

1—Formica panel, drilled and engraved, 7x24
1—Formica subpanel, drilled with 5 Benjamin cushion sockets mounted
2—Precise 350 mmfd. variable condensers, type 845
1—Precise 55 mmfd. variable condenser, type 940
1—Centralab modulator, 500,000 ohms
1—Carter Imp. filament switch
1—Carter No. 102A jack
1—Carter No. 103 jack
1—University antenna coupling transformer, type B-1
1—University radio frequency transformer, type B-2
1—University tuned radio frequency transformer, type B-3

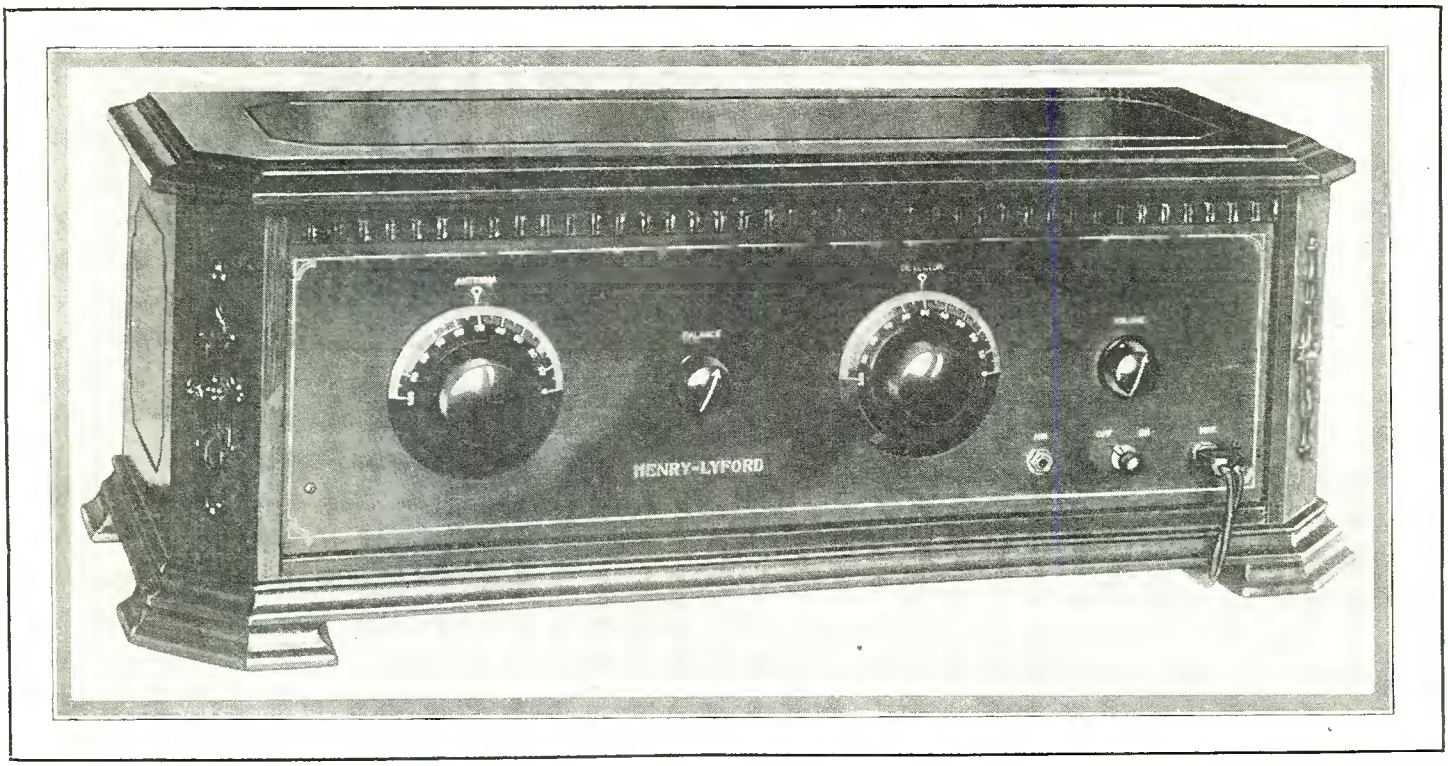


Photo B. Front view of receiver mounted in cabinet

2—Thordarson audio frequency transformers, type R-200
5—Tobe Deutschmann 1 mfd. fixed condensers, No. 201
1—Micamold .002 mfd. fixed condenser
1—Micamold .001 mfd. fixed condenser
3—Amperites, No. 112
10—Coil mounting jacks
1—Pair of Benjamin brackets, type 8629
1—Bakelite post
2—Eby binding posts, Ant. Gnd.
2—4-inch Kurz Kasch dials
1—8-wire battery cable
1—Coil of Belden hook-up wire
1—Complete set of hardware

The accompanying illustrations show that the receiver is simply laid out and very easy to build. By makng use of a bakelite subpanel, as is done here, the work of assembling and wiring is greatly facilitated, and the appearance of the finished receiver is greatly improved. It does not have the crude "home-made" look of the average set which is assembled by the average home constructor or novice. All of the wiring is hidden beneath the subpanel and there is nothing unsightly in view.

There are only two tuning controls, and these run together over the whole range of the receiver. The only other controls are two small knobs on the panel. One of them, marked "Balance," controls oscillation in the radio frequency amplifier—it is the balancing or compensating condenser mentioned before. The other knob, marked

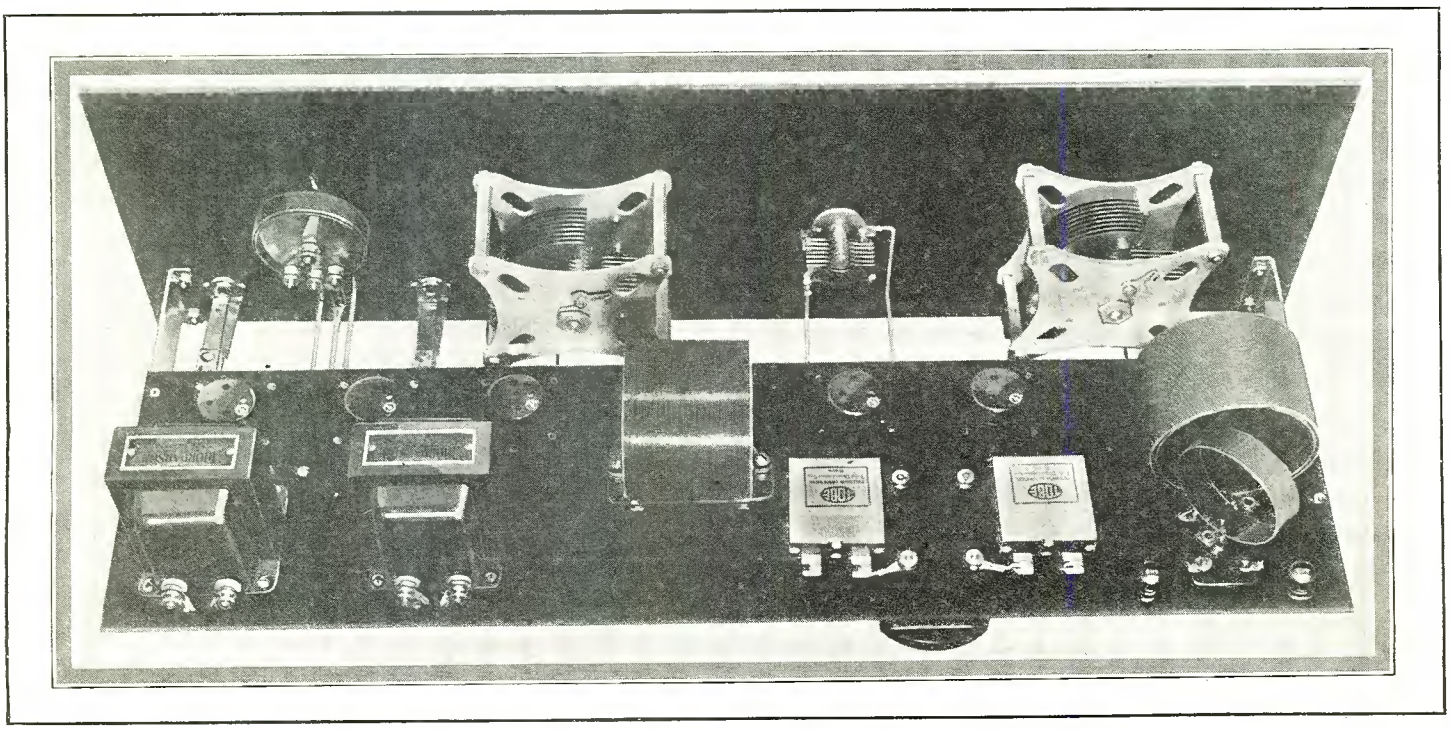


Photo C. Rear view, showing arrangement of parts mounted on subpanel

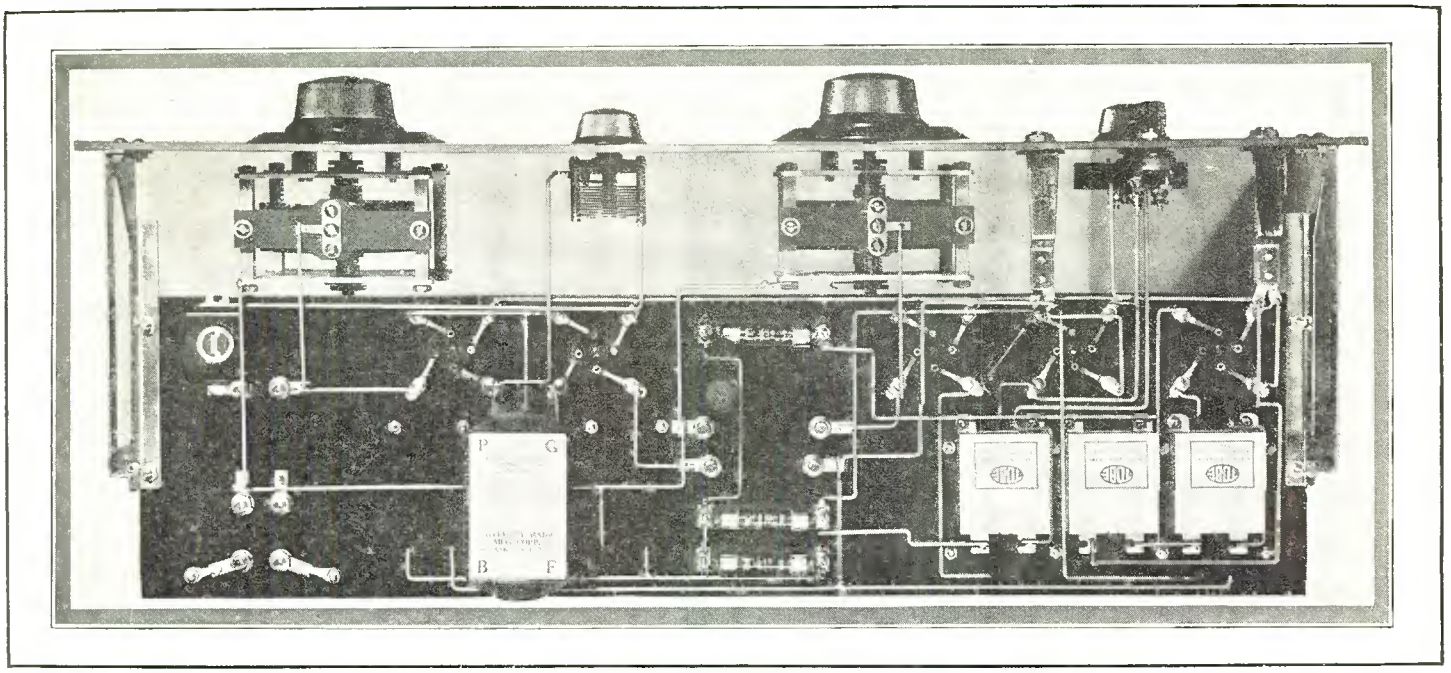


Photo D. Bottom view, showing apparatus supported by subpanel

"Volume," is a volume control, and nothing else. It is a variable resistance placed across the secondary of the first audio frequency transformer, and it gives a very smooth and uniform control of the output of the receiver.

The coils used in the tuned circuits are plug-in type, which gives this receiver a much greater tuning range than the average. With the three sets of coils (two to a set) which are available, this receiver will tune to all wavelengths between 37 and 550 meters. The set of coils for the broadcast wavelengths tune from 550 down to 185 meters. The next lower set of coils cover the band from 125 down to 37 meters. This provides a generous overlapping of ranges, so that there is no wavelengths between 37 and 550 meters which cannot be tuned in.

This circuit has been designed to employ standard storage battery tubes. Four of the 201A type should be used, but the last one—the second audio tube—should be larger. The 112 type is recommended, though any other suitable "power tube" may be used. The C-leads of the last two tubes and the plate supply of the last one are brought out on separate leads in the battery cable, enabling any suitable tubes to be used as audio amplifiers without any changes in the wiring of the receiver. A "C" battery is recommended in connection with this circuit having a 1½-volt tap.

In testing out a receiver of this type, it is always advisable to try the A battery circuit first. This is generally done by taking one tube only, inserting it in each tube socket to check the filament wiring. The last socket is tested by first inserting a plug in the maximum jack to close this circuit. In making these tests, see that the prong in the side of the tube is pointing in the direction of the arrow in the tube socket. If, by these tests, the filament circuit has been checked O.K. the B and C batteries are connected. Using but one tube, again insert this tube in each individual socket, and of course it should light up as before. This is an indication that all battery circuits are properly wired.

Insert all of the tubes in their proper sockets, taking care that the 112-tube or other similar power tube is placed in the fifth socket. Hook up the antenna and ground, putting the plug-in coils and connect a good cone speaker in the maximum jack. Turn the volume control half way on, set the Balance so that arrow points at the letter E, and rotate the tuning dials slowly, keeping them together within 10 degrees in reading.

When the desired station is tuned in, adjust the Balance for clarity, which might mean a very slight movement of the knob. For general purposes the Balance works best pointing at the letter E of the word Balance. The antenna rotor coil for greatest volume and distance

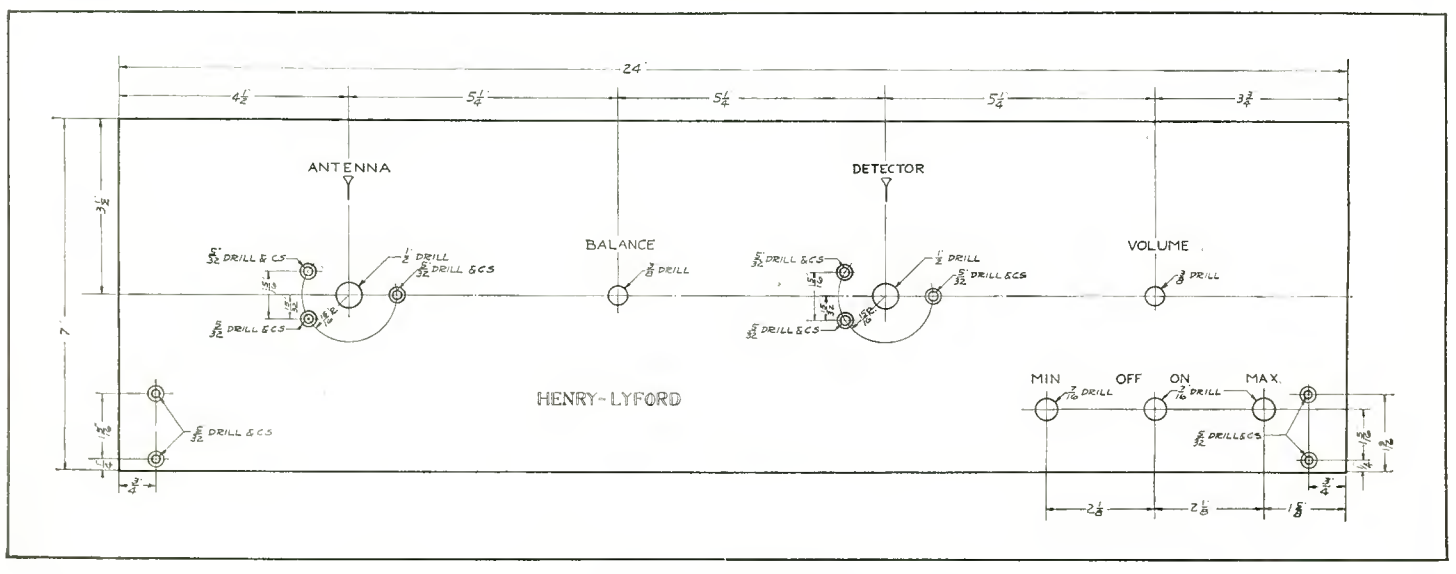


Fig. 1. Panel layout

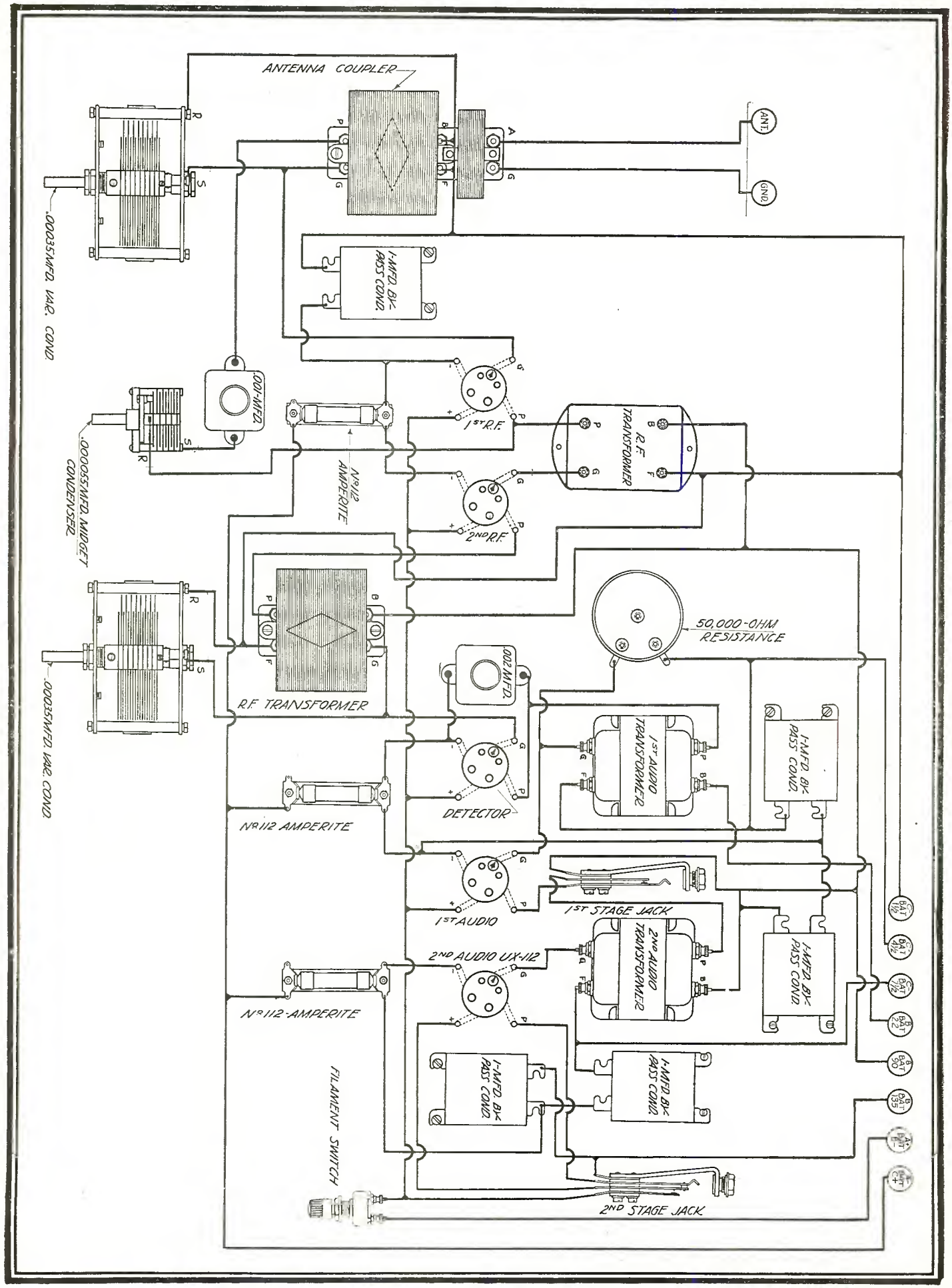


Fig. 2. Graphic illustration showing each connection in entire receiver

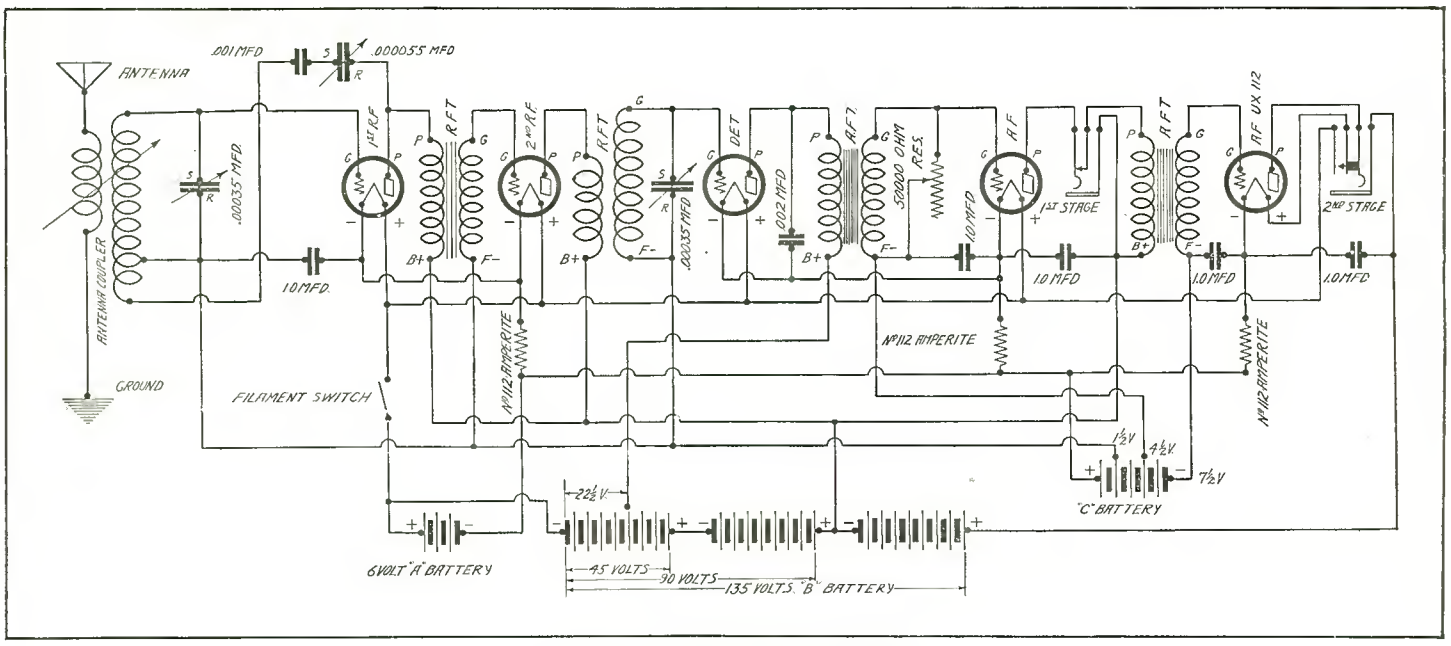


Fig. 3. Schematic wiring diagram

should be set parallel to the fixed coil. If greater selectivity is desired, moving the coil toward a right angle position will give the desired effect.

The Acme "B" eliminator shown in the Console has a switch for high or low voltage and a variable resistance for obtaining the correct voltage on the intermediate frequency tubes and detectors.

A Kodel trickle charger, manufactured by the Kodel Radio Corp., Cincinnati, Ohio, is shown connected to a standard 6-volt radio battery made by the Willard Storage Battery Co., Cleveland, Ohio.

The new Acme Double Disc, Type K-2, cone speaker, is shown. This is shown in a finished walnut cabinet also manufactured by Acme Apparatus Co., Cambridge, Mass.

The Console shown is manufactured by the Charlotte Furniture Co., Charlotte, Mich.

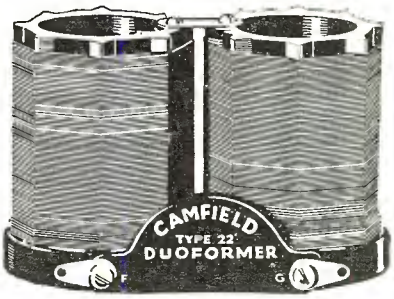
The Super Cabinet shown in Photo B is made by D. H. Fritts & Co., Hearst Square, Chicago.

(Any information regarding these suggested accessories can be obtained by writing direct to the manufacturers.)

Stop Disturbing Oscillations!

By Using

CAMFIELD DUOFORMERS



The Finest Radio Frequency Transformer Ever Made

The Camfield Duoformers use a new and highly efficient system of preventing oscillations, as described in the article on the opposite page. Circuits using this radio frequency transformer have good sensitivity, good selectivity, and are extremely simple to construct and operate.

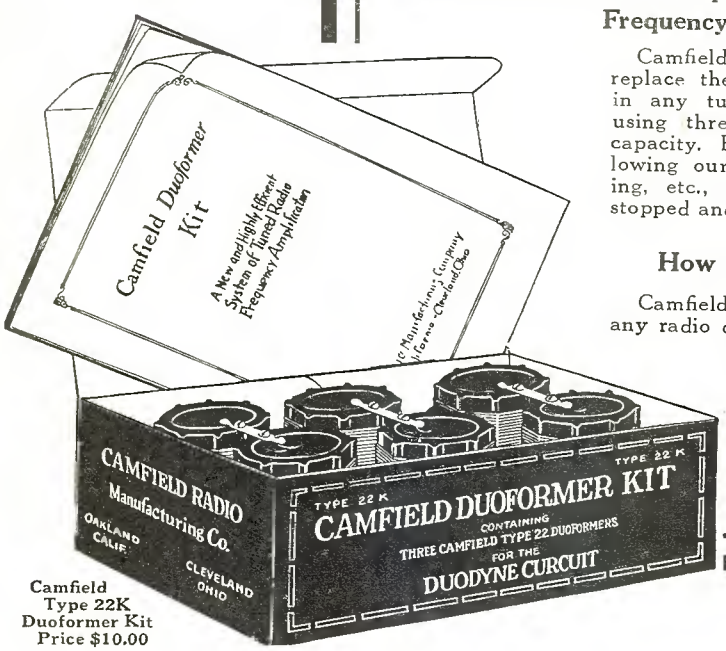
In the receiver described on the opposite page, the use of the new Camfield Equaltune condenser (see page 113) gives the same efficiency with two controls as has heretofore been obtainable in three control sets.

Stop Oscillations and Improve Your Present Radio Frequency Receiver

Camfield Duoformers may be used to replace the radio frequency transformer in any tuned radio frequency receiver using three condensers of .00035 MF capacity. By making this change and following our instructions for lay-out, wiring, etc., disturbing oscillations will be stopped and reception improved generally.

How to Buy Camfield Parts

Camfield parts may be bought through any radio dealer or you may order direct from us. Send a money order direct to our Chicago office for the exact amount of the parts wanted, and they will be sent post paid, by return mail.



Camfield Type 22K Duoformer Kit Price $10.00

Use This Coupon Today!

It Will Receive Our Immediate Attention

Camfield Radio Mfg. Co.
57 East Wacker Drive
Chicago, Illinois

Check one or more of the following:

( ) Inclosed find $10.00 for one Type 22K Kit of Three Camfield Duoformers

( ) Inclosed find $3.30 for one Camfield Type 620 Coupling Unit

( ) Inclosed find 10c, in coin or stamps, for a copy of "Radio Frequency Amplification Without Disturbing Oscillations," and descriptive literature of your complete line.

Name.....

Street.....

City.....

State.....

CAMFIELD RADIO MFG. CO.

57 East Wacker Drive, Chicago, Ill.

Branch Sales Offices at

BOSTON NEW YORK PHILADELPHIA BALTIMORE CLEVELAND SAN FRANCISCO LOS ANGELES PORTLAND SEATTLE

The Camfield Duoformer Five Receiver

A New Non-Oscillating Two-Control Radio Frequency Receiver

This Receiver Was Built and All Illustrations Made in The Citizens Radio Laboratory

IT SEEMS as though the general tendency of home builders' construction is, more or less, towards the tuned radio frequency type of receiver. The cause of this popularity is, probably, due to the simplicity of construction, ease of operation, and general efficiency of this type of receiver. Various manufacturers have spent a great deal of time and experimentation in an effort to make the home builders' problems less, and to increase the general efficiency of this type of receiver. The receiver herewith described contains many features of advance design and general improvement that will be of value and interest to home builders.

The principal objection to the tuned radio frequency receiver, of the past, has been due to the condition known as oscillation, which is a very undesirable feature in any type of receiver. This is strikingly absent in this receiver. The absence of oscillation in this receiver is due to the special design of the Camfield Duoformer Radio Frequency Transformer.

In order to understand the method used for the suppression of oscillation in the Camfield Duoformer "Five," a brief explanation of the causes of oscillation in a tuned radio frequency amplifier is necessary.

Oscillation in a tuned radio frequency amplifier is due to the coupling between the input and the output circuits of the tube. There are three major causes of coupling that are always to some degree inherent in all radio frequency amplifiers:

1. Inductive coupling between the windings of the radio frequency transformers.
2. Capacity and conductive coupling in the wiring of the set itself.
3. Capacity coupling between the input and output of the tube due to the capacity between the grid and the plate elements of the tube itself.

Photo A. View of receiver mounted in console, with suggested accessories

The first and second causes of coupling are not difficult to eliminate by careful arrangement of parts and wiring. This receiver has been very carefully laid out in this respect, and it is suggested that the constructor follow instructions to the most minute detail, otherwise satisfactory operation and reception may be difficult to obtain.

The third cause of coupling is more or less difficult to eliminate, in most of the usual types of receivers. The actual capacity of the tube itself cannot be altered.

Several methods for the compensating of energy, fed back from the plate circuit to the grid circuit, have been developed and worked out to a very exacting degree. The summary of these methods is feeding back energy from the plate circuit to the grid circuit is such a manner that the energy fed back is out of phase with the energy feeding back through the tube in itself, at an equal potential and a capacity equal to that of the internal grid to plate capacity of the tube. By the use of precision construction of circuits and radio frequency transformers, and very accurate neutralizing adjustments, the tendency of the tube to break into self-oscillation is entirely eliminated. In the majority of compensating methods, this operation of neutralizing is very critical and difficult for the average layman with a limited amount of apparatus to adjust, with great enough accuracy to permit maximum efficiency from the receiver.

There are several other ways in use for the suppression of oscillation, such as inserting a resistance in the grid circuit of the tube, which will prevent oscillation but decreases the selectivity and broadens the tuning to a very noticeable extent. Another method is to make the primary inductance of the radio frequency transformer sufficiently small and the coupling so loose that oscillation is prevented. In this method the transfer of energy is so low and the amplification per stage so small, that the total efficiency of the amplifier is not great enough to be, in the least, desirable.

The usual conditions that exist in a tuned radio frequency amplifier are such that the current fed back from the plate circuit to the grid circuit is of such phase that will add to the already existing current between the grid and the plate of the tube and, therefore, causes it to break into self-oscillation. It is, therefore, self-evident that if the correct phase relation between the current fed back through the tube and the existing current in the grid circuit is obtained, that oscillation will not be present. It is known that phase relation between current and voltage in any circuit or combination of circuits depends entirely upon the impedance of the circuit, which consists of inductance, resistance and capacity.

In the design of the Camfield Duoformer, the relative proportion of all the impedance constants have been arranged in such a manner as to cause the current fed back from the plate circuit, to the grid circuit, to be in proper phase relation with the already existing current between grid and plate, to suppress any oscillation that may have the tendency to arise.

Combined with this phase relation feature of the Camfield Duoformer, certain physical features have also been incorporated

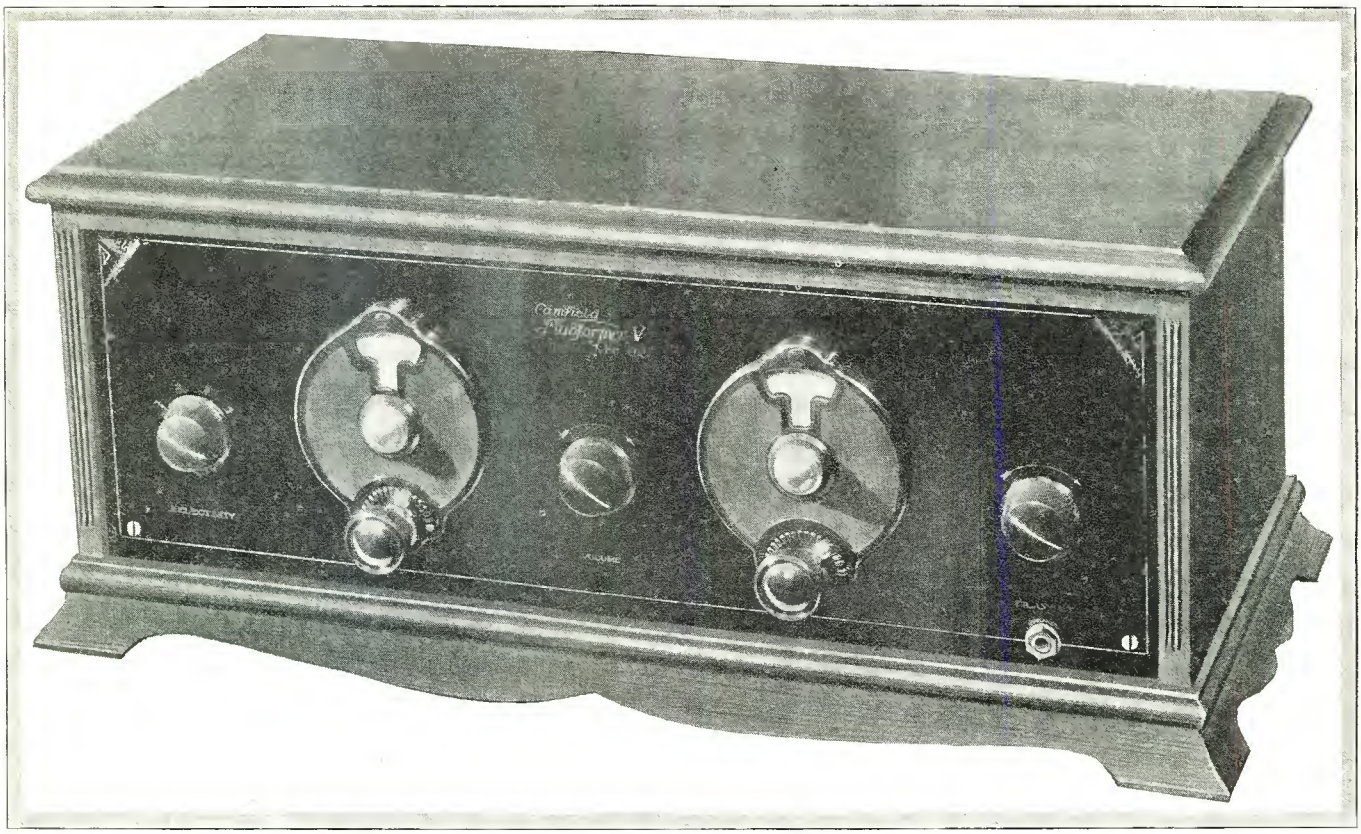


Photo B. Front view of receiver mounted in cabinet

in the design of the transformer in such a way that all electro-magnetic coupling between successive stages is practically eliminated. With the correct use of by-pass condensers, it is possible to build this Five Tube Non-oscillating Radio Frequency Receiver in an extremely simple way and yet retain a very high and uniform efficiency over the entire broadcast wave band.

The circuit used is the usual tuned radio frequency type, but incorporates many refinements in the apparatus used. The circuit consists of two stages of tuned radio frequency, detector, and two stages of audio frequency. The two-control feature is accomplished by a dual gang condenser, tuning the second stage of radio frequency and detector. These condensers are of the straight frequency line, grounded rotor type. The method of balancing the gang condenser is of rather unique design and insures perfect resonance at all dial settings, thus eliminating the necessity of trimming or compensating condensers. The balancing is accomplished by the moving of the stator plates to or from the rotor plates. After being balanced, the adjustment is locked, which insures constant adjustment. The condensers used in tuning the first stage of radio frequency or the antenna coupler is of the same type and design as the gang condensers. These condensers have a maximum capacity of 350 mmf. and are made by the Camfield Manufacturing Company especially for use with the Camfield radio frequency transformers. The radio frequency transformers are the Camfield Duoformers, Type 22, which incorporate the unique field control, as previously explained, and are

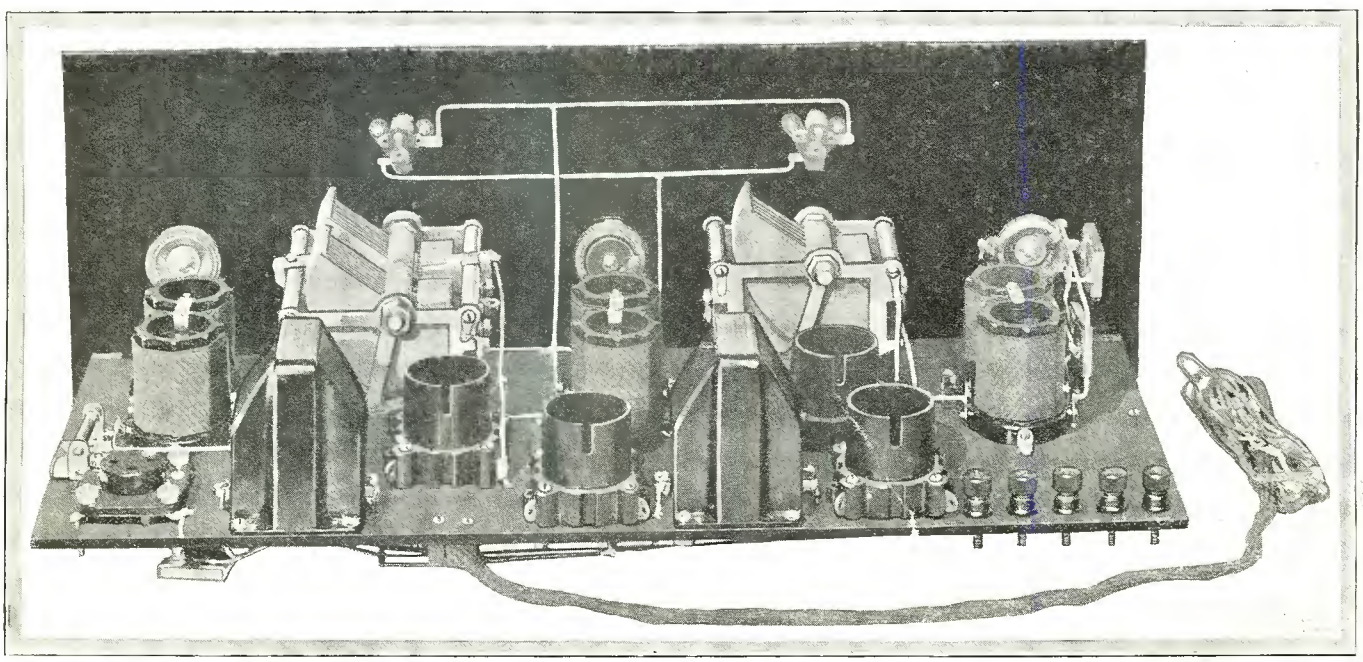


Photo C. Rear view of completely wired receiver

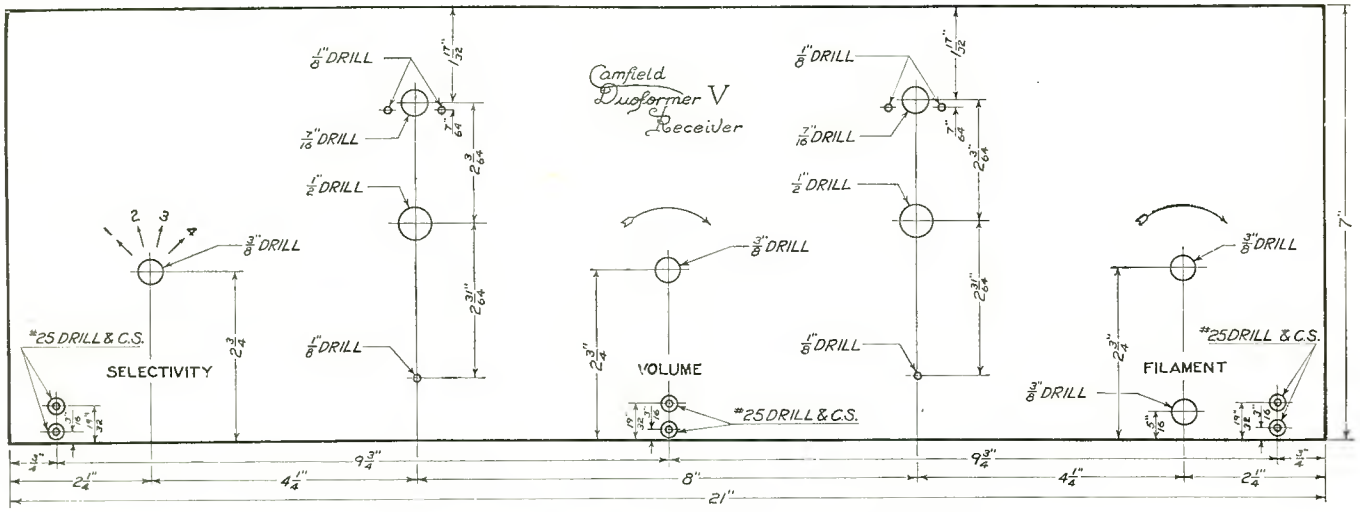


Fig. 1. Panel layout showing size and location of holes

unusually uniform in their characteristic. Camfield "Bull Dog Grip" sockets are used throughout the receiver, with the exception of the detector, which is a Benjamin spring cushion socket, which eliminates the microphonic noises which are characteristic in most detectors. The audio frequency transformers are of a very high grade and produce a wonderful tone quality. The amplification curve of these transformers is surprisingly flat between 200 and 5000 cycles. Due to this fact, equal clarity and volume may be had from the lowest bass to the highest treble.

A UX 200-A is used for the detector tube and a UX 112 in the second stage of audio frequency. The other three tubes are the standard UX 201-A.

LIST OF PARTS

These parts or their equivalent will give satisfactory results.

1—7x21x3/16-inch Drilled and Engraved Formica Panel
1—7x20x3/16-inch Drilled Formica Sub-Panel
1—Camfield Type 22K Duoformer Kit
1—Camfield Type 352 (two-gang) Equaltune Condenser
1—Camfield Type 351 (single) Equaltune Condenser
4—Camfield Type 11 UX Sockets
1—Benjamin UX Cushion Socket
1—Dubilier .00025 mfd. Fixed Condenser
1—Dubilier .002 mfd. Fixed Condenser
2—Dubilier .0025 Fixed Condensers
1—Dubilier 2-ohm Grid Leak
1—Dubilier ½ mfd. By-Pass Condenser
1—Carter Imp. Inductance Switch
1—Carter 10-ohm Midget Rheostat
1—Carter 6-ohm Midget Rheostat Filament Switch
1—Samson Type HW-A3, 2-1 Audio Transformer
1—Samson Type HW-A3, 3-1 Audio Transformer
2—National Illuminated Dials
1—Carter Open Circuit "Short" Jack
1—Jones Cable and Cable Lug
1—Pair of Karas Sub-Panel Brackets
5—Engraved Eby Binding Posts
30 Feet of Belden No. 12 Gauge Tinned Copper Wire
60 Kellogg Tinned Soldering Lugs
1 Package Kester Solder

The Camfield Duoformer Five is shown in Photo "A" installed in a Model 22 Excello Console. This console is manufactured by the Excello Products Corporation of Chicago and is exceptionally well made. The console is finished in a two-tone effect, with matched wood door panels of butt walnut. Ample space is provided in the lower compartment for the storage of accessories. Any size panel may be accommodated between 7x18-inch and 10½x32-inch. A sliding leaf is provided by which it is possible to withdraw the apparatus placed upon it from the cabinet.

A complete Willard "A" unit is shown. It consists of a Glass Case Willard Storage Battery combined with a Charger which is capable of either ½-ampere or 2-ampere charging rate. In addition to this, it is capable of recharging up to 96 volts of "B" battery.

A Sterling "B" Power Unit manufactured by the Sterling

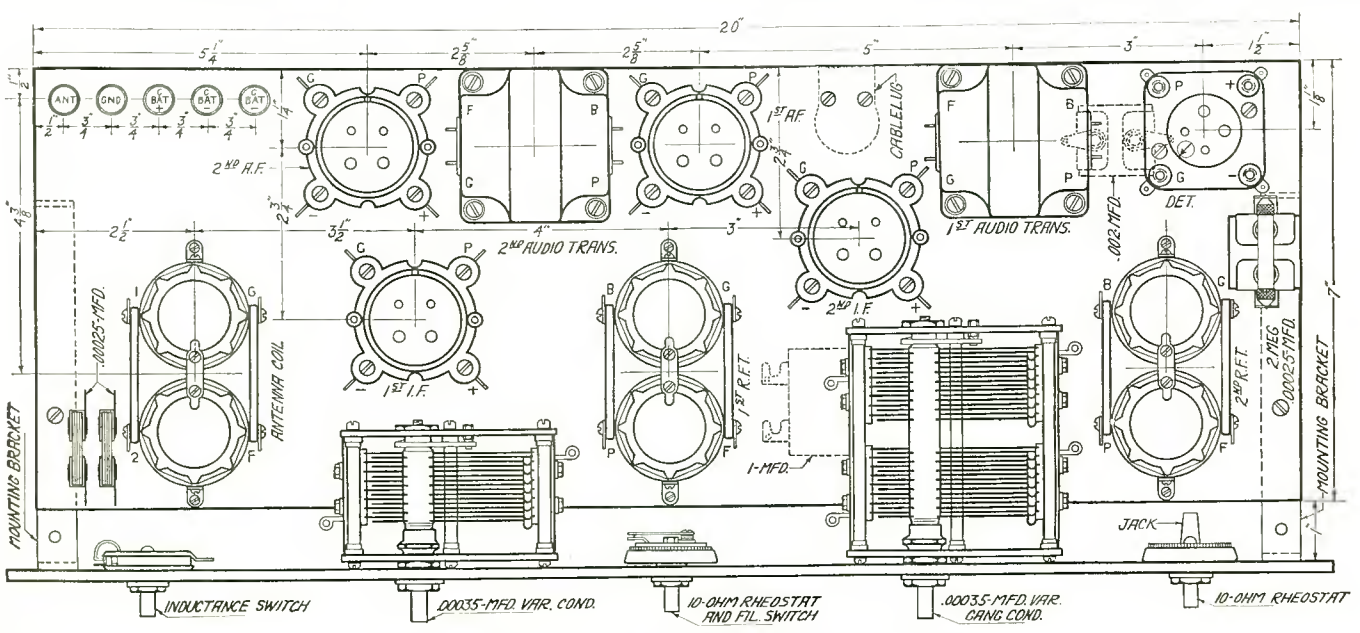


Fig. 2. Baseboard layout showing arrangement of parts

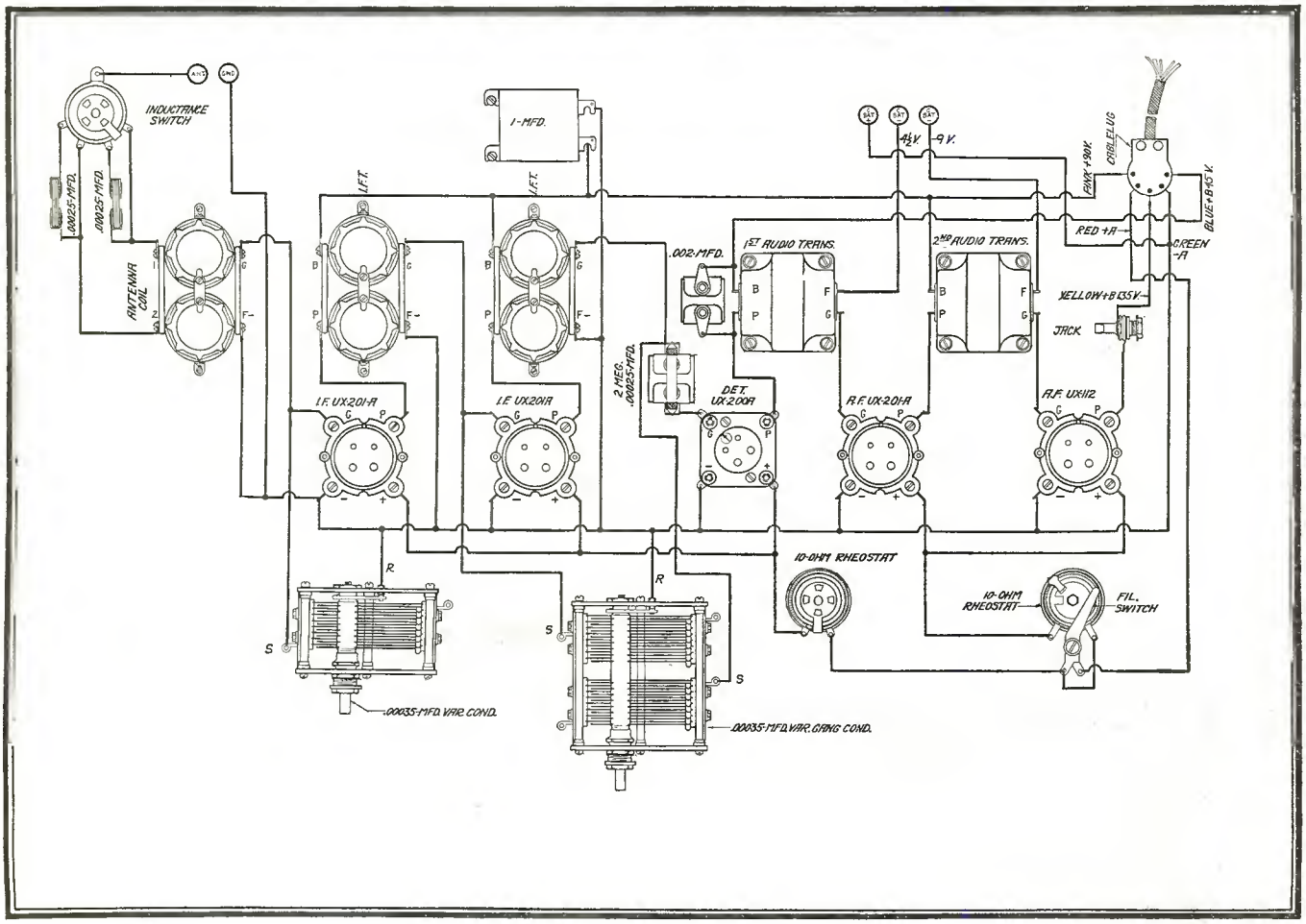


Fig. 3. Graphic illustration showing all connections

Manufacturing Company of Cleveland, Ohio, supplies the necessary "B" potential. This device uses a Raytheon rectifying tube and is capable of delivering up to 60 milliamperes without overloading.

The Speaker is one of the models manufactured by the Tower Manufacturing Corporation of Boston, Mass. This speaker is one of the free-edge type and will give very excellent reproduction. The cabinet shown in Photo "B" is a product of the Signal Electric Company of Menominee, Mich.

(If any further information on these accessories is desired, full descriptive matter may be obtained by writing the manufacturers direct.)

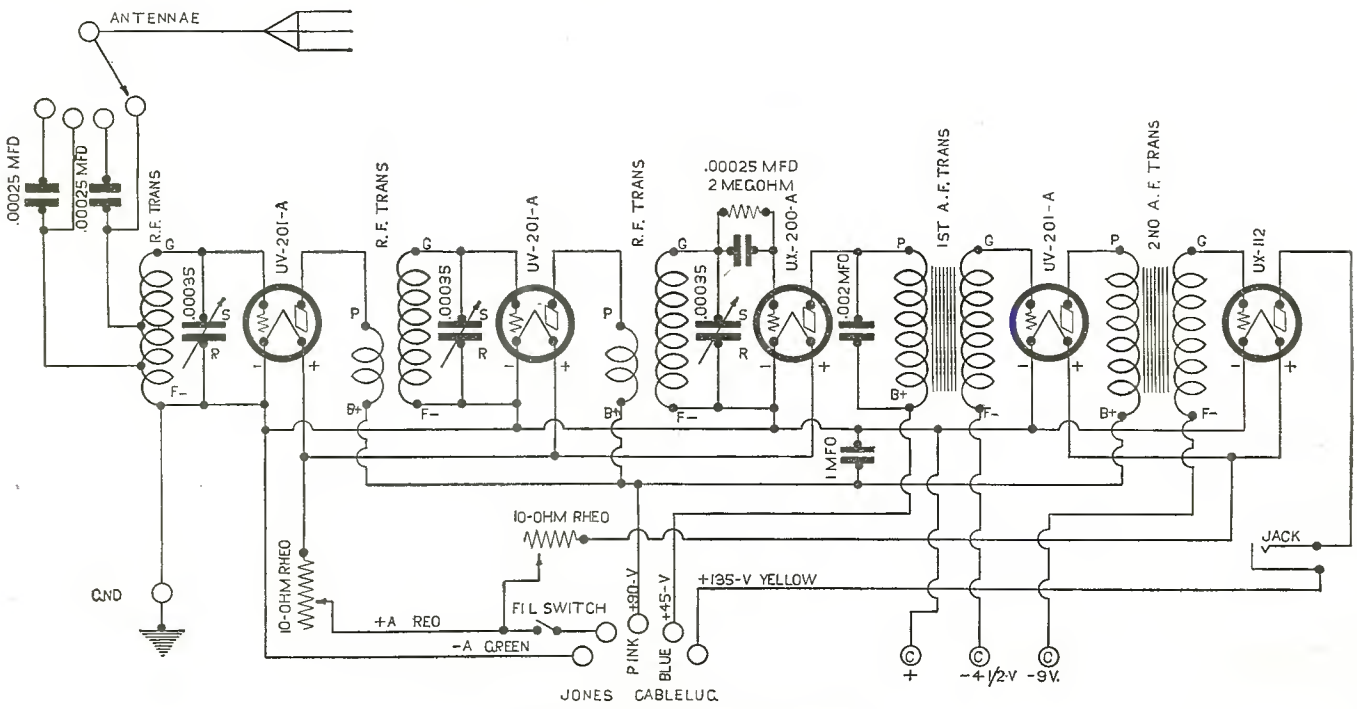


Fig. 4. Schematic wiring diagram

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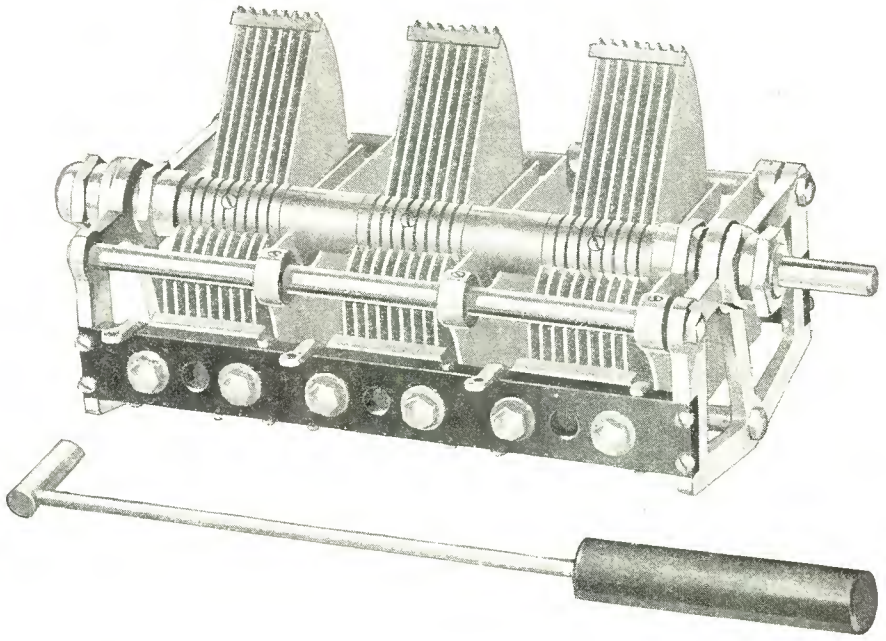

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Camfield Equaltune Condensers Have Features Never Before Incorporated in Any One Unit

1. There is a special adjustment feature which makes possible perfect equalization of all circuits after the receiver has been completely wired. Complete instructions and a special tool for making this adjustment are packed with each condenser.
2. Adjustable shield plates minimize grid to grid capacity and further assist in balancing the circuits.
3. The condenser is so designed that it may be mounted from either end. Thus a clockwise or counterclockwise rotation may be obtained at the option of the user.
4. The shaft may be shortened or lengthened or entirely removed without effecting the adjustment of the rotor plates. This provides a simple means for connecting several units together with a single shaft and anywhere from one to six condenser units may be operated with one dial.
5. A variable spring tension is provided and the rotor is mounted on ball bearings which insure extremely smooth running over a long period of operation.
6. Camfield Equaltune Condensers are beautifully finished. The rotor and stator plates are of bright dipped brass. All other parts are highly polished and nickel plated.

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Type		Capacity	Price
351	(Single)	.00035 Mfd.	$ 5.00
352	(Two Gang)	.00035 Mfd.	10.00
353	(Three Gang)	.00035 Mfd.	15.00
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The Special T-C Receiver

An Efficient Neutralizing Tuned R.F. Receiver Using a New Type of High-Grade Audio Amplifier

THE following article does not describe an entirely new development in a circuit or a receiver, but is simply about the application of an audio amplifier of surpassing merit to a well known receiving system which has given entire satisfaction in the past to those who have used it. The audio amplifier consists of an entirely new development in impedance coupled amplification. Fundamentally, the circuit used in the amplifier is the same as that which is used in all impedance coupled amplifiers, but various changes have been made, such as substituting an impedance for a grid leak in place of a resistance, and various other refinements in the apparatus used in the circuit.

As compared to other radio frequency receivers, the difference in this receiver is largely in the neutralizing of the radio frequency tube. This is accomplished by a method somewhat different than that ordinarily employed. A neutralizing condenser, capable of very precise adjustment, is placed between the grid return and the plate of the radio frequency tube. A radio frequency choke coil, whose inductance is 85 millihenrys, is inserted between the grid return of the radio frequency tube and a three-volt bias. A .0001-mfd. fixed condenser is inserted between one side of the radio frequency choke and the negative filament of the radio frequency tube. This, in effect, is the same as shunting the condenser directly across the radio frequency choke.

The question naturally arises as to why a condenser, which allows radio frequency currents to pass, is shunted across the choke coil, designed especially to stop radio frequency currents. Inasmuch as the choke coil used in this circuit has an exceptionally small distributed capacity, sufficient current does pass to permit the proper operation of the circuit. The condenser acts as a gate or valve, and permits a sufficient amount of radio frequency to pass through.

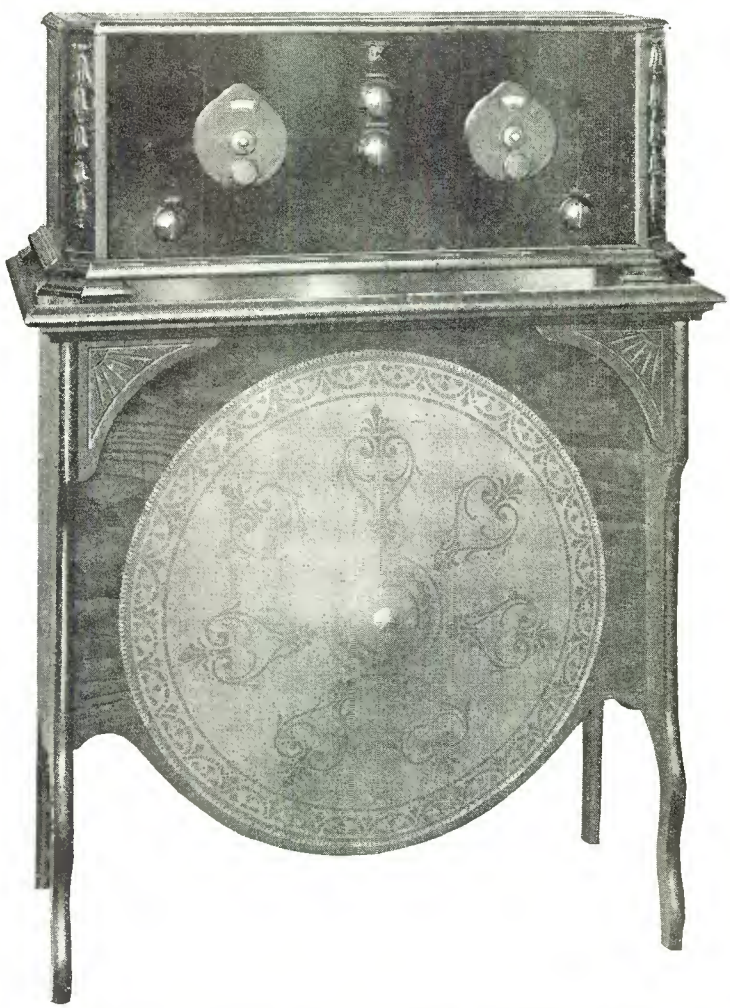

Photo A. Front view of receiver in cabinet with Windsor console cone loud speaker

The connection of the "C" battery to the grid circuit without the use of the radio frequency choke would permit the radio frequency currents to pass around that condenser to the filament, thus rendering the condenser impotent. The insertion of the choke prevents the radio frequency currents from passing through this path for the direct current, and forces them through the path intended for them, i.e., through the .0001-mfd. fixed condenser.

A radio frequency choke is also inserted in the plate circuit of the radio frequency tube, and the "tickler" lead going to the input of the audio amplifier. The object of these two chokes is to prevent radio frequency currents from entering either the audio amplifier directly or feeding through the "B" battery into the amplifier, where distortion will be caused in reproduction.

The circuit itself consists primarily of one stage of neutralized tuned radio frequency and a regenerative detector and three stages of high grade impedance coupled amplification. Unlike the ordinary tuned radio frequency receiver using regeneration, this set makes use of a double rotor coupler. One rotor is the "tickler" or regeneration control, the other the primary of the radio frequency transformer, which is used for a selectivity control. In metropolitan areas where air congestion is severe, the selectivity may be increased so interference will be reduced to a minimum. On the other hand, in suburban districts, where interference is negligible, the receiver may be tuned broadly without sacrificing volume or distance. With the primary rotor in a vertical position, maximum selectivity is obtained, and vice versa. The selectivity control need not be varied after it has once been set according to the degree of selectivity desired by the operator.

Audio frequency chokes are inserted in the plate circuit of each of the amplifying tubes. They are designed primarily for a stabilizing effect and a suppression of distortion, as well as the isolation of the different stages of the audio amplifier.

In conjunction with these audio frequency chokes are used large by-pass condensers of 4 mfd. capacity each. These condensers are placed across the output of each of the plate impedances and the positive "A" battery line. These effectively prevent, when properly used with "B" lead chokes, any tendency of the amplifier to howl and distort, caused by the passage of currents through the common "B" battery with attendant disturbing coupling effect between stages. Properly constructed, the amplifier will give excellent reproduction; but conditions may be present in a home constructed receiver which will make distortion possible. Therefore the use of the chokes and condensers precludes any possibility of such an occurrence. Owing to its construction, the choke has a self-capacitance of only 5 mmfds. with an inductance of 3½ henrys. Its direct current resistance of 640 ohms is low enough so that when the choke is used in series with the "B" battery it does not drop the plate voltage. In other words, its use in no way affects the battery consumption or the power output of the set.

Special attention is called to the use of large fixed condensers in the audio frequency end of the set. The coupling condensers used between the plate and grid circuits are of unusually large size, 1, 2 and 4 mfds. respectively. The result is that the lowest

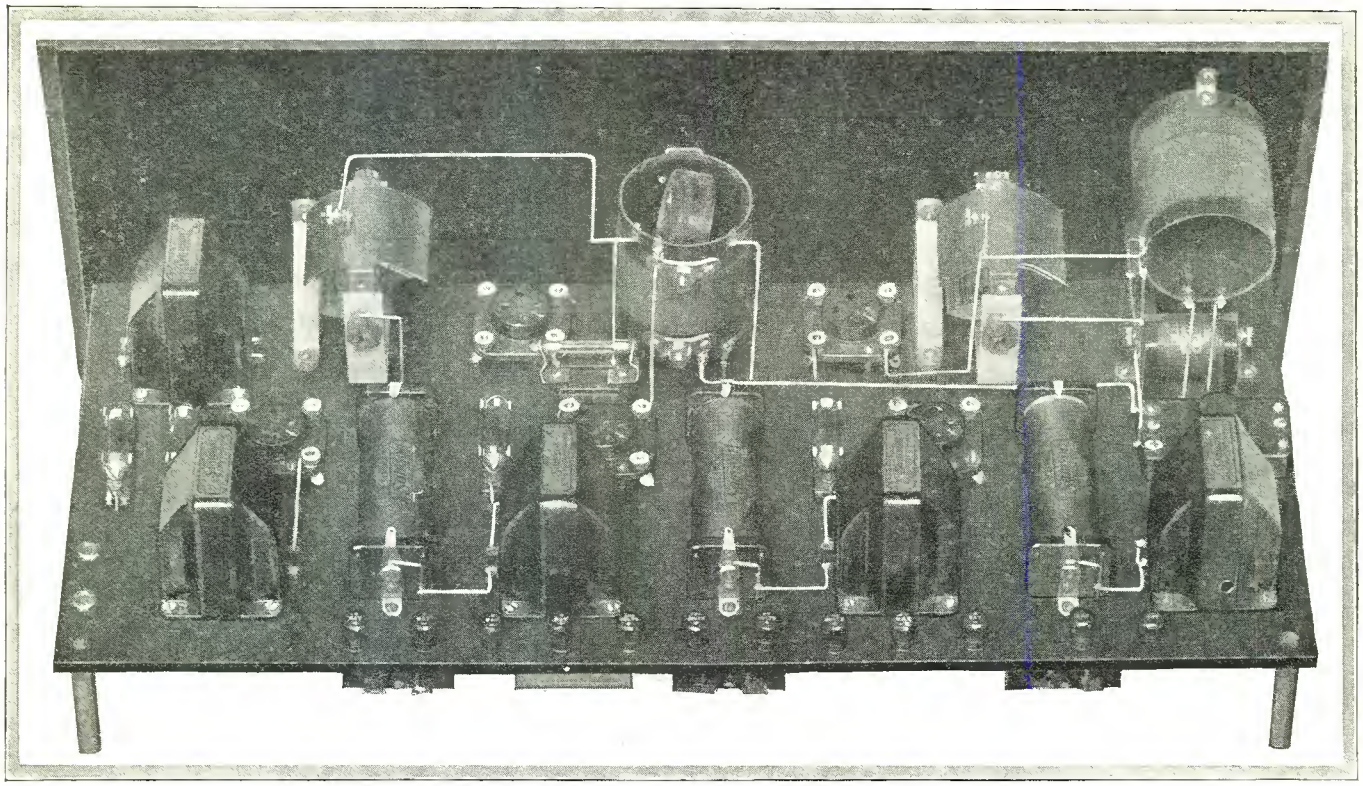

Photo B. Rear view of completely wired receiver

notes are passed by them, and the music which issues from the speaker retains all that background of double bass, drums, and low wood notes which is absolutely essential for perfect reproduction. The usual receiver loses these notes almost entirely. The condensers used for this purpose must be of highest quality. Their construction must be such so as to avoid slight leaks with corresponding noisiness and waste of current.

In place of the usual grid leak in the grid return of the last audio tube, an impedance is substituted for the resistance. Such an impedance leak is of value, particularly in this case, since the impressed signal is quite large. A leak of this type helps considerably to suppress blocking in the amplifier due to overloading the tubes. While this overloading is most likely to occur in the last stage of an amplifier, it may occur in other stages to a certain extent. Through the use of plenty of copper and iron in its construction, the grid impedance has ample inductance to prevent it from suppressing amplification of the low frequencies.

Unlike the average amplifier, an output impedance is used in this receiver. Its purpose is primarily to supply a path to the filament for the direct grid currents as well as to keep the high potential "B" current out of the speaker. This impedance obviates the necessity for an output transformer with its sacrificing of efficiency, especially in the amplification of low notes. The impedance is so designed that a tap is provided by which a speaker of incorrect impedance may be coupled to the last amplifier tube efficiently. The inductance of the unit is sufficiently high so that its efficiency is not impaired. Its use does not, in any way, decrease the efficiency of an amplifier as a transformer would in the same position.

Photo A shows receiver installed in a Fritts Super Cabinet made by D. H. Fritts Co., Hearst Square, Chicago. The console contains a very practical arrangement for the 22-inch type of cone type speaker and is finished in walnut and there is ample room in rear compartment to arrange all necessary accessories to operate the set. Made by the Windsor Furniture Company, Chicago, Ill.

(If any further information is desired regarding these accessories, kindly address the manufacturers direct.)

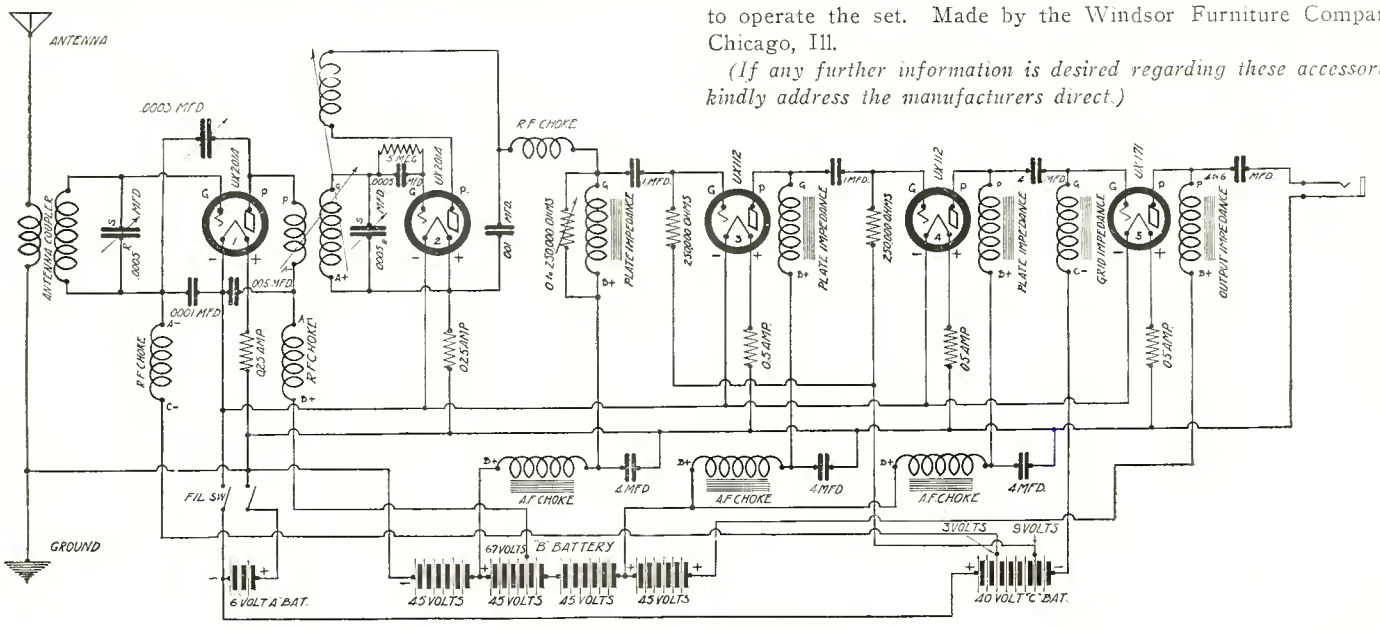

Fig. 2. Schematic wiring diagram

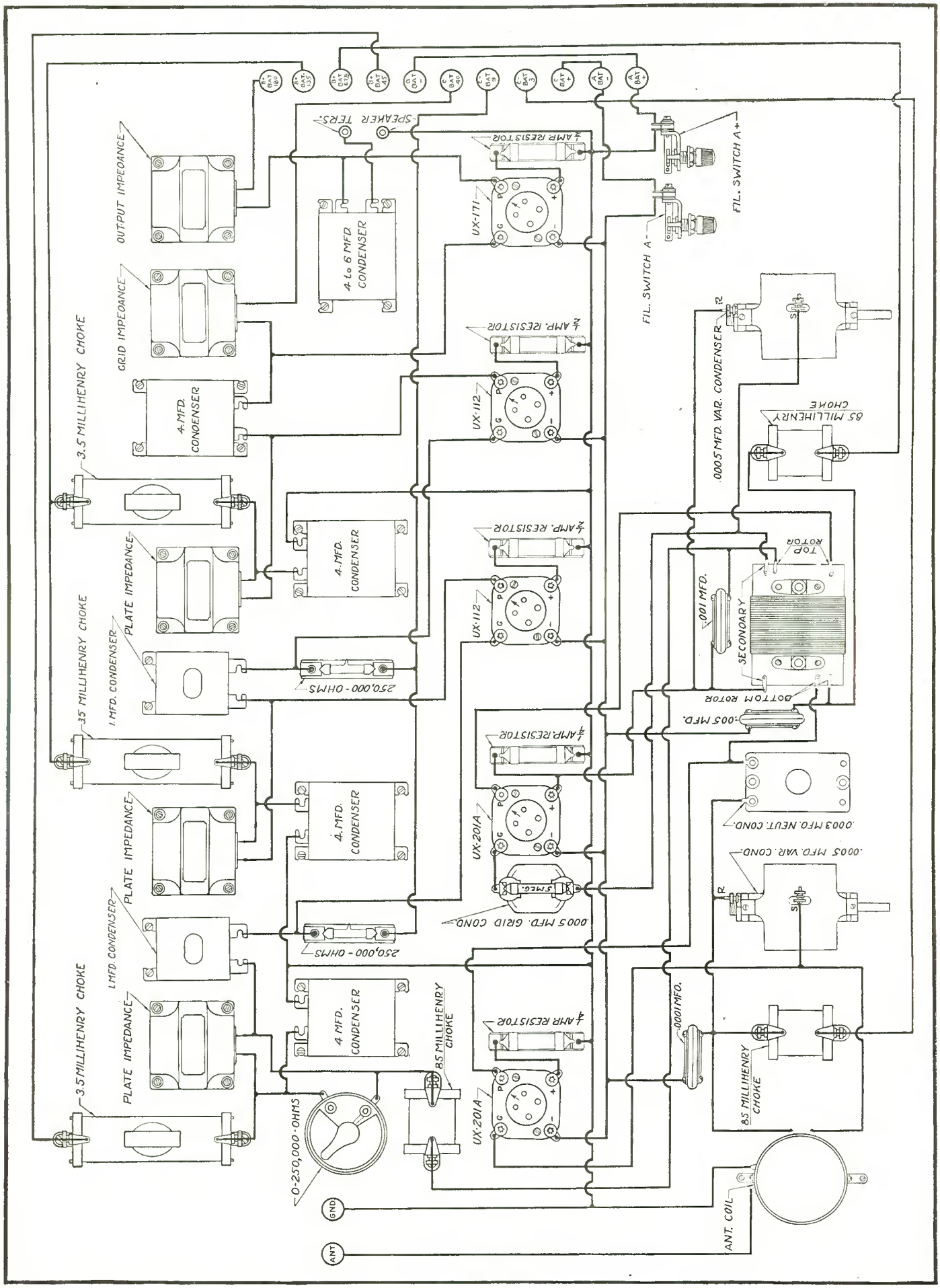

Fig. 1. Graphic illustration showing all connections

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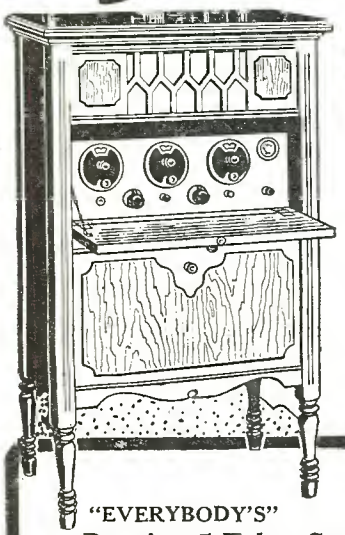

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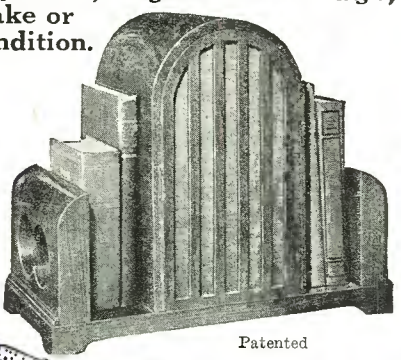

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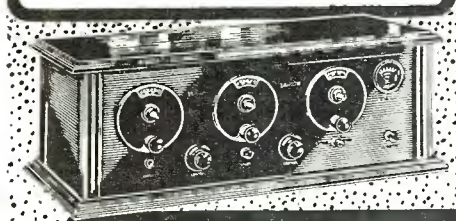

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A Six-Tube Receiver Using Three Stages of Tuned Radio Frequency

This Receiver Is Extremely Selective and Has an Abundance of Available Power

Construction and all illustrations made in The Citizens Radio Laboratory

IN BUILDING a receiver the home constructor usually has a desire to incorporate three major desirable features, namely, selectivity, volume, and simplicity of construction. The herewith described receiver has these three most desirable features incorporated in its design and, if properly constructed, should give results sufficient to satisfy the most discriminating fan.

In considering the first of the foregoing mentioned desirable features, which is selectivity, a brief discussion on "What makes a set selective" will be made. First, the ability of the tuning condensers to give a frequency separation of operating stations sufficient to prohibit any jamming or heterodyning of the station's carrier wave within the tuned circuits of the receiver. Second, in addition to the tuning condensers' virtue of frequency separation, the design of the radio frequency transformers must be such that the losses be minute enough to permit the tuning condensers to retain their point of electrical efficiency. Third, that the interstage electro-magnetic coupling be sufficiently loose to permit a high gain factor per stage, to be used without danger of oscillation.

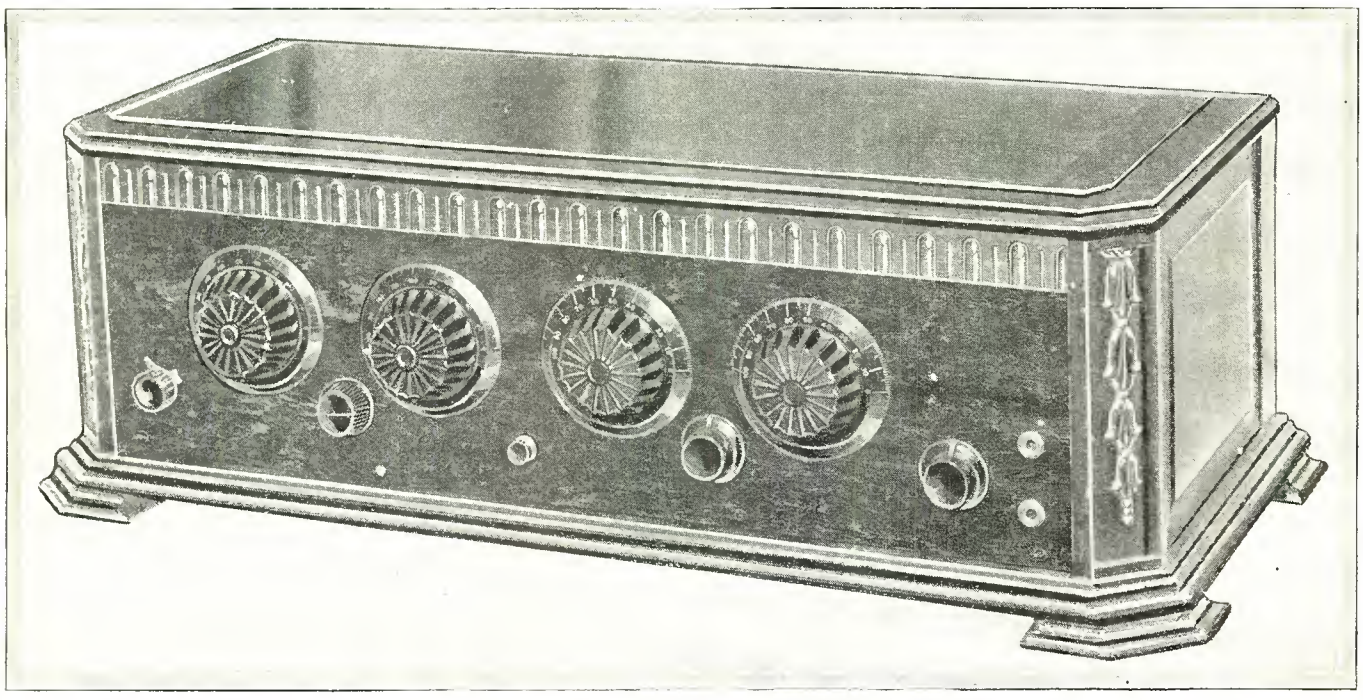


Photo A. Front view of receiver mounted in cabinet

In considering the requisites of an efficient tuning condenser, several factors in the design must be considered: a mechanical construction that will insure continuancy of capacitance accuracy over a long period of time; electrical construction such that the frequency curve will be straight, or nearly so, in respect to the dial setting, and of low loss to permit of great enough efficiency for satisfactory operation. Condensers incorporating these features are generally known as the straight frequency line, grounded rotor type. This type condenser, when used with a good radio frequency transformer and interstage coupling, is reduced to the minimum, full 10 kilocycle separation may be obtained.

The essentials of a good radio frequency transformer depend upon the distributive capacity, resistance, and the amount of coupling in the transformer. The ideal transformer would have a very low distributive capacity and resistance and a very close coupling, but as ideals cannot always be realized, the constants must be proportioned relative to their merits. When the distributive capacity is high, the capacity reactance will probably be greater than the inductive reactance and the transformer will cease to be an inductance and have a condenser effect in the circuit. When the resistance is high, the signal is so impeded that the amplification factor is undesirably low. Low resistance may be had by using a large diameter wire, but which increases the distributive capacity. By the use of adjacent winding, distributive capacity will be reduced, but the radio frequency resistance will be increased. The efficiency of a radio frequency transformer may be increased by the use of bare or enameled wire. As this method requires intricate and expensive methods of construction, the usual practice is to select a satisfactory medium of resistance and distributive capacity.

The question of coupling in radio frequency transformers is of great importance. If coupling is very tight, the receiver will tune very broadly and have a tendency to oscillate due to plate feed-back, and if the coupling is very loose, the transfer of energy is very small. The correct percentage of coupling is of a very critical nature and requires considerable experimentation to determine the correct values. The most satisfactory factors are selected and an efficient transformer may be produced.

The third essential of selectivity is that of interstage coupling. The regulation or elimination of interstage coupling is a very broad subject and requires considerable attention in a great many different ways. There are three ways in which coupling may be regulated or eliminated. One of the usual methods is in setting the radio frequency transformer at one angle or various angles in respect to the baseboard in such a way as to give zero coupling. The objection to this method is that the angle of magnetic coupling changes with the tuned frequency. This will cause oscillation at various frequency settings. Another method is to place the transformer in a complete shield. This method is most desirable and very satisfactory results are obtainable, but it is not extensively used, due to the expense of construction. The most widely used method of regulating interstage coupling is to construct a transformer with a completely, or nearly so, enclosed field. This type of transformer is built in many different shapes and forms and the desired effect is obtained.

Volume, the second of the desirable features, may be accomplished by one of two methods, or both. Several stages of radio frequency amplification may be used, but when more than two or three stages are used, difficulty in control arises and is unadvisable. Three or more stages of audio frequency may be used, but suffers from distortion. The usual method is of selecting a moderate number of stages of radio frequency and audio frequency, whereby ease of control is obtained and distortion is absent.

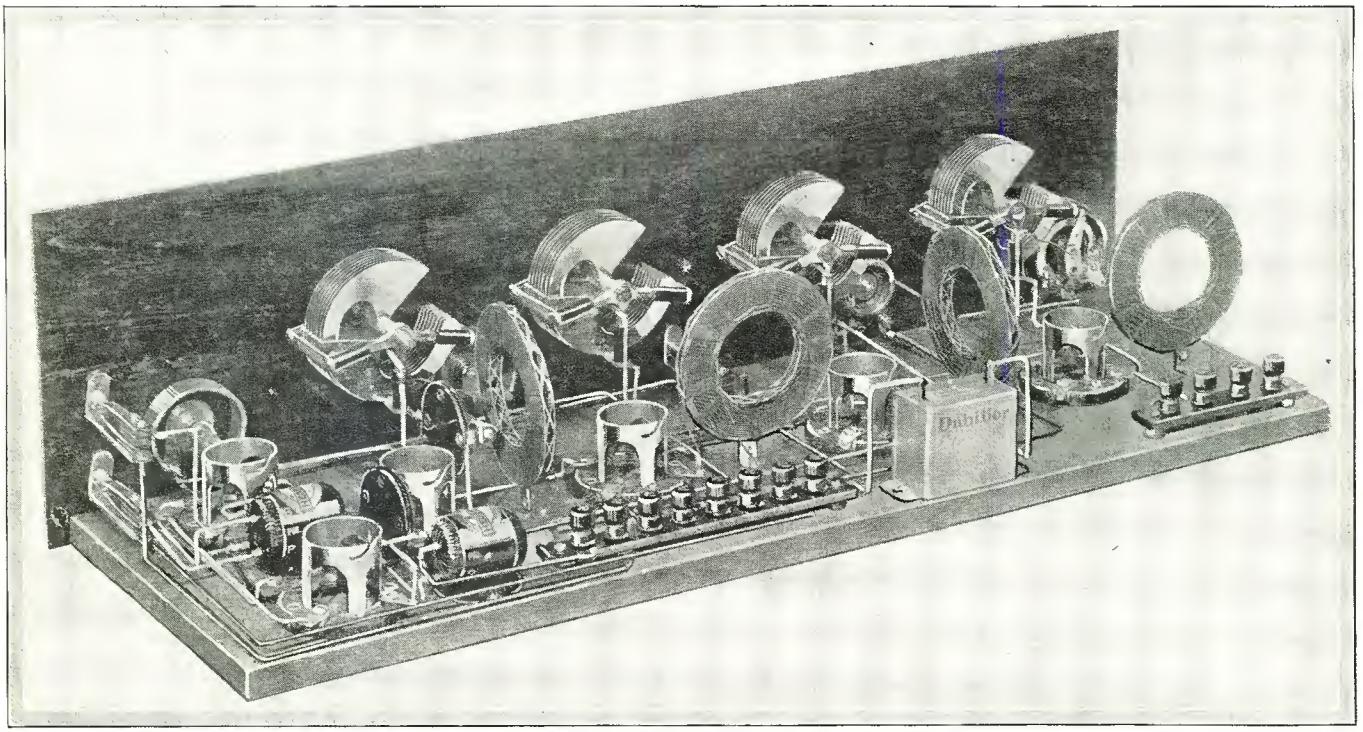


Photo B. Rear view of completely wired receiver

The average constructor does not possess apparatus sufficient for intricate and expensive construction. Thus, the receiver which can be constructed in a simple and efficient manner finds favor in the home construction field.

The herein described receiver has been designed with the foregoing features in mind. This receiver consists of three stages of tuned radio frequency, detector, and two stages of audio frequency. The condensers used in tuning the three stages of radio

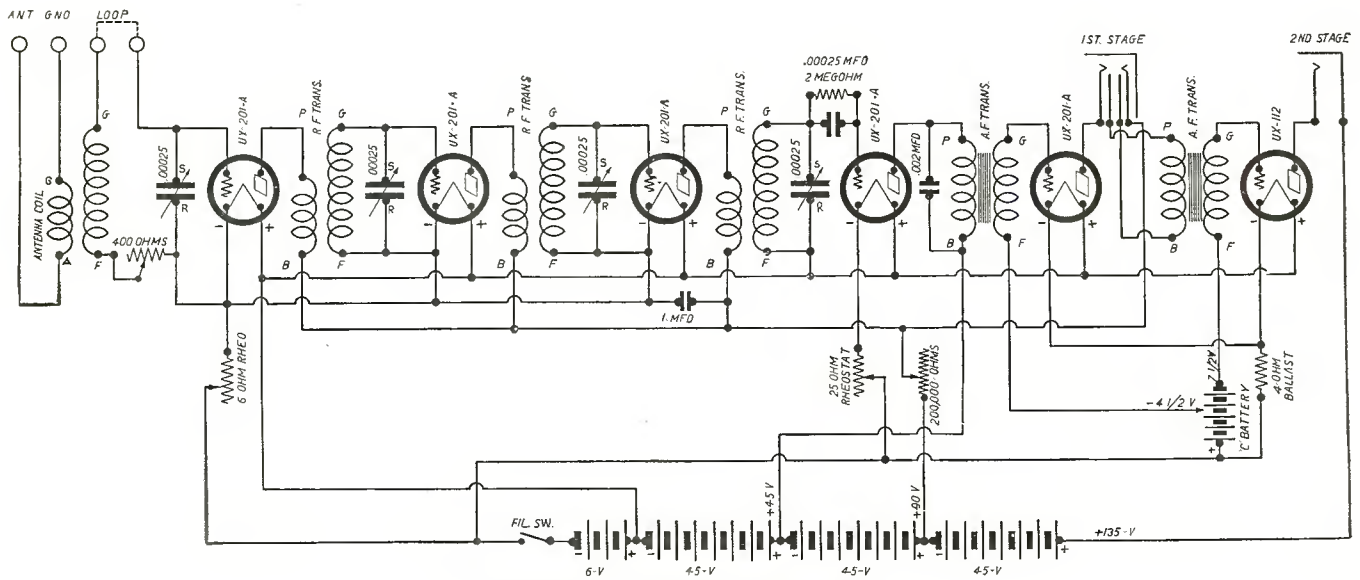


Figure 1. Schematic wiring diagram

frequency and the detector contain the desirable features as mentioned in the foregoing discussion on condenser design, and are made by the Premier Electric Company. These condensers have a maximum capacity of 250 mmf. The radio frequency transformers are of the confined field type, being wound in the self-supporting spiderweb form, and reduces the interstage magnetic coupling to a minimum. Premier sockets are used throughout. These sockets will accommodate tubes with either the old type base or the new UX type base. Hedgehog audio frequency transformers are used. Both transformers have a four to one ratio and are completely shielded, which reduces distortion to a minimum, yet retains sufficient volume for general use. A .0005 mfd. Premier fixed condenser is connected across the primary of the first audio frequency transformer, which will by-pass any stray radio frequency currents which may come through the binding posts are provided whereby a loop antenna may be placed in the secondary circuit of the first stage of radio frequency, thus making the receiver either loop or antenna operated.

For details of circuit connections, reference is made to the schematic wiring diagram illustrated in Fig. 1. Fig. 2 is a graphic illustration of all connections to the actual parts in use.

LIST OF PARTS

1—7x26x3/16-inch Radion Drilled and Engraved Front Panel
1—9x25x¾-inch Wood Baseboard
4—Premier .00025 Crofoot SLF Condensers
4—Premier "Tran" Radio Frequency Transformers
4—Radion 4-inch Dials
2—Premier 4-1 Hedgehog Audio Frequency Transformers

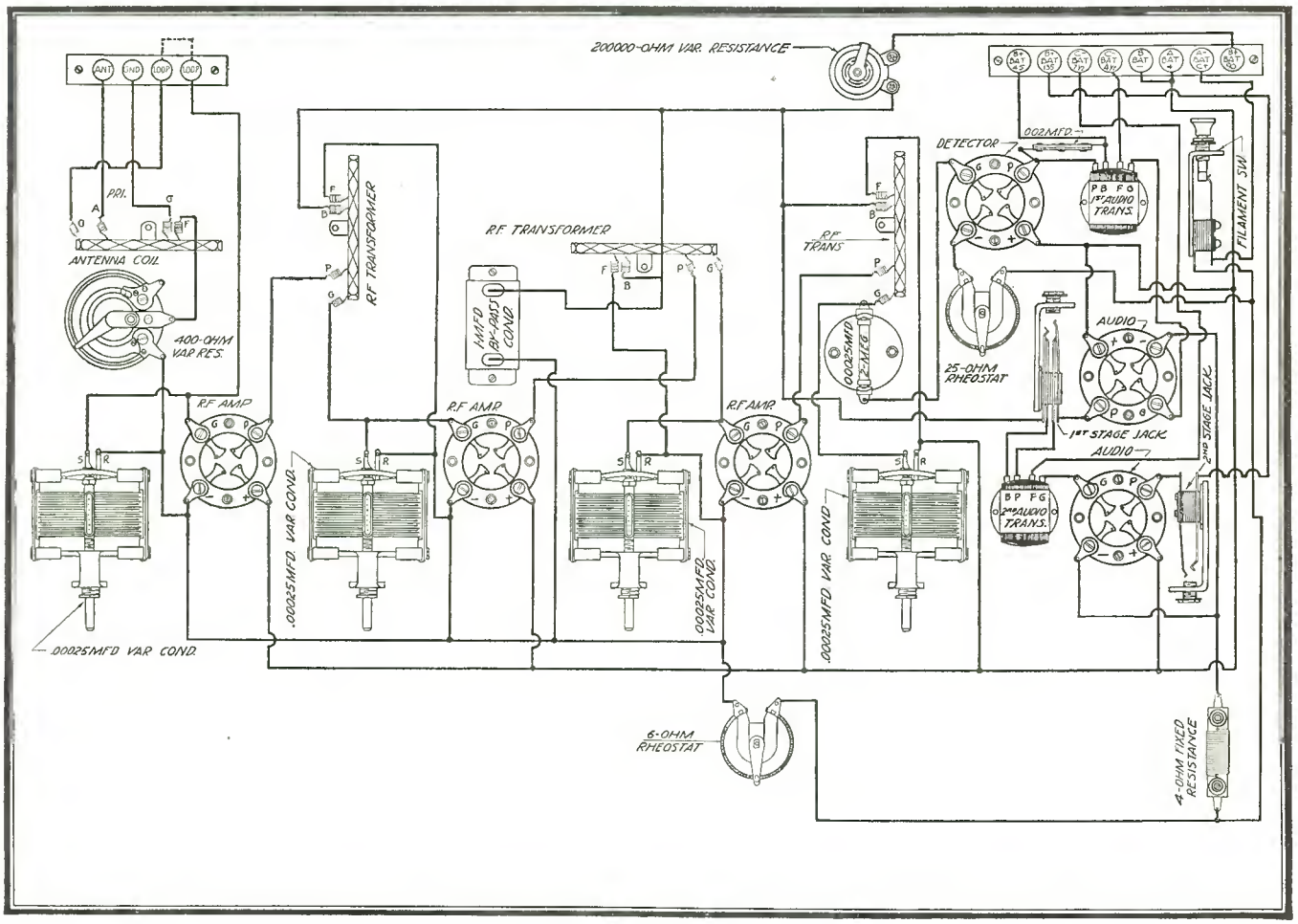


Figure 2. Graphic illustration

detector tube. A Dubilier 1 mfd. by-pass transformer is shunted across the "B" battery for the purpose of keeping radio frequency currents out of the batteries, which would have a tendency to cause the set to oscillate. Two Premier jacks, one a closed circuit jack in the output of the first stage of audio frequency and the other an open circuit jack in the output of the second stage of audio frequency, are used. The filament switch is a Premier jack type switch. A Premier 25-ohm "Arctic" rheostat is used in the negative filament lead of the detector. A Premier 6-ohm "Arctic" rheostat is used in controlling the filaments of the three stages of radio frequency. A 400-ohm Premier potentiometer is used in the grid return of the first stage of radio frequency. A 4-ohm fixed resistance is used to control the filament voltage of the two audio frequency tubes. A Carter 200,000-ohm Variable Resistance is used in the plate circuit supply of the three radio frequency tubes and first stage of audio frequency amplification as a volume control. Two

1—Premier Type No. 5 .00025 Grid Condenser with Prongs
1—Premier Type No. 4 .0005 Fixed Condenser
1—Dubilier Type No. 908 1-mfd. By-Pass Condenser
1—Premier "Arctic" 25-ohm Rheostat
1—Premier "Arctic" 6-ohm Rheostat
1—Premier Type No. 2 ½-ampere Filament Resistor
1—Premier Universal Type No. 131 Jack
1—Premier Universal Type No. 133 Jack
1—Premier Cam Switch
1—Premier No. 30 400-ohm Potentiometer
1—Carter 200,000-ohm Variable Resistance
1—Dubilier 3-megohm Grid Leak
12—Engraved Eby Binding Posts
2—Bakelite Strips for mounting binding posts
3—Rheostat Knobs
4—4-inch Bakelite Dials
Miscellaneous Screws and Wire

The Improved Infradyne Receiver

Here Is a Revised Infradyne Incorporating Extensive Developments, Greatly Adding to the Efficiency of This Receiver

This Receiver Was Constructed and All Illustrations Made in the Citizens Radio Laboratory

THERE appeared in the last issue of the CITIZENS RADIO CALL BOOK complete construction details of the Infradyne Receiver. Considerable time was spent before publication in developing a set which was easy to build, balance and operate. However, certain difficulties have been experienced by constructors in assembling the receiver and placing it in operation. These difficulties have been carefully examined, and the means of overcoming them found by careful experimentation in our laboratory. We now offer an Improved Infradyne Receiver which incorporates the following changes:

For tuning the two stages of radio frequency and the first detector, a Cardwell, balanced rotor, triple gang, condenser of the straight frequency line type is used. In conjunction with this gang condenser, there are two trimming or compensating condensers used on the two stages of tuned radio frequency. By the use of these trimming condensers, it is possible to compensate for any discrepancy in the three gang condensers, at any dial setting. Also on a very sharp signal absolute resonance may be obtained by the use of these condensers. These trimming condensers are of precise make, three plate, .00001 mfd. capacity, and mounted directly on the front panel on either side of the wavelength dial. Electrad rheostats are now used throughout, and are of the Bakelite shell type and have a very high heat-dissipating factor. Electrad and Sangamo by-pass and blocking condensers are also used throughout the Receiver.

The test jack in the plate circuit of the first detector has been discontinued. This jack was formerly used in the balancing of the gang condenser, but due to the advent of the two trimming condensers, it has been found unnecessary. Amertran De Luxe Audio Frequency transformers are used. The Yaxley pup jacks are used on the first and second stages of the Audio Frequency. A slight change has also been made in the sub-panel layout. The oscillator coil has been moved directly in back of the first detector socket, and the oscillator socket has been placed in back of the oscillator tuning condensers. In other words, the oscillator socket and the oscillator coil have been reversed in their respective positions. The resonate frequency of the Infradyne amplifier has been changed from that of 95 meters or 3,200,000 cycles to 86 meters or 3,490,000 cycles. A Jones Multiple Plug has been placed on top of the sub-panel.

When an incoming signal, or frequency, is combined with a locally generated frequency, there are two resultant frequencies generated in the circuit. The two frequencies are, namely, "the difference of the frequencies" and "the sum of the frequencies."

Heretofore, "the difference of the frequencies" has been the only one that has been put into practical use, which has been due largely to the supposition that a low frequency could be much more easily controlled than a high frequency. For this reason the exact value of "the sum of the frequencies" method had never been realized or exploited to any great extent.

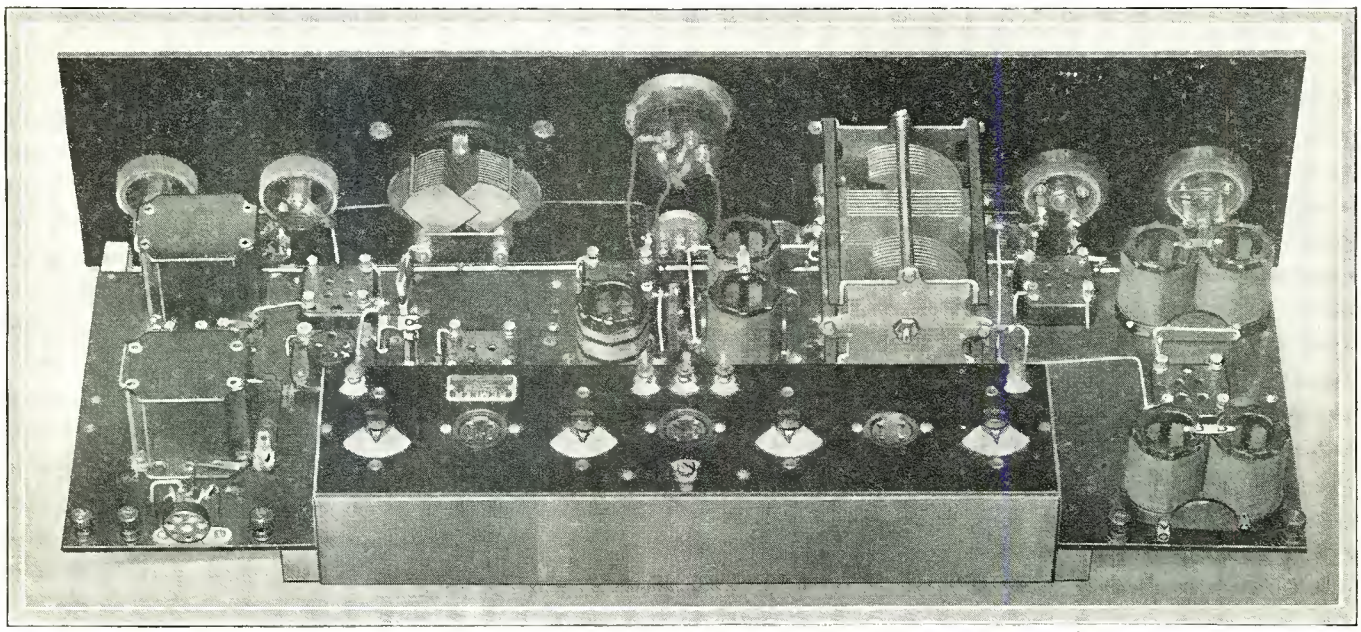


Photo A. Rear view of receiver removed from cabinet. Note simplicity of arrangement of parts and absence of unsightly wiring

The greatest objection to "the difference of the frequencies" method is very probably due to the characteristic action of the method which causes the oscillator to be subjected to harmonics, which causes the reception of long wave code stations on the harmonics of their fundamental wavelengths, "arc mush," and the commonly called repeater action, or the reception of one station on more than one setting of the oscillator dial.

In the Infradyne circuit "the sum of the frequencies" method is used to many advantages over "the difference of the frequencies" method. Actual tests in our laboratory have shown that only one dial setting of the oscillator is used for each station of the same wavelength, which avoids the usual undesirable repeater actions so common to receivers of this type. When properly balanced the method employed in the Infradyne amplifier has the faculty of eliminating harmonics of double or treble the wavelength of the station being received. The Infradyne amplifier

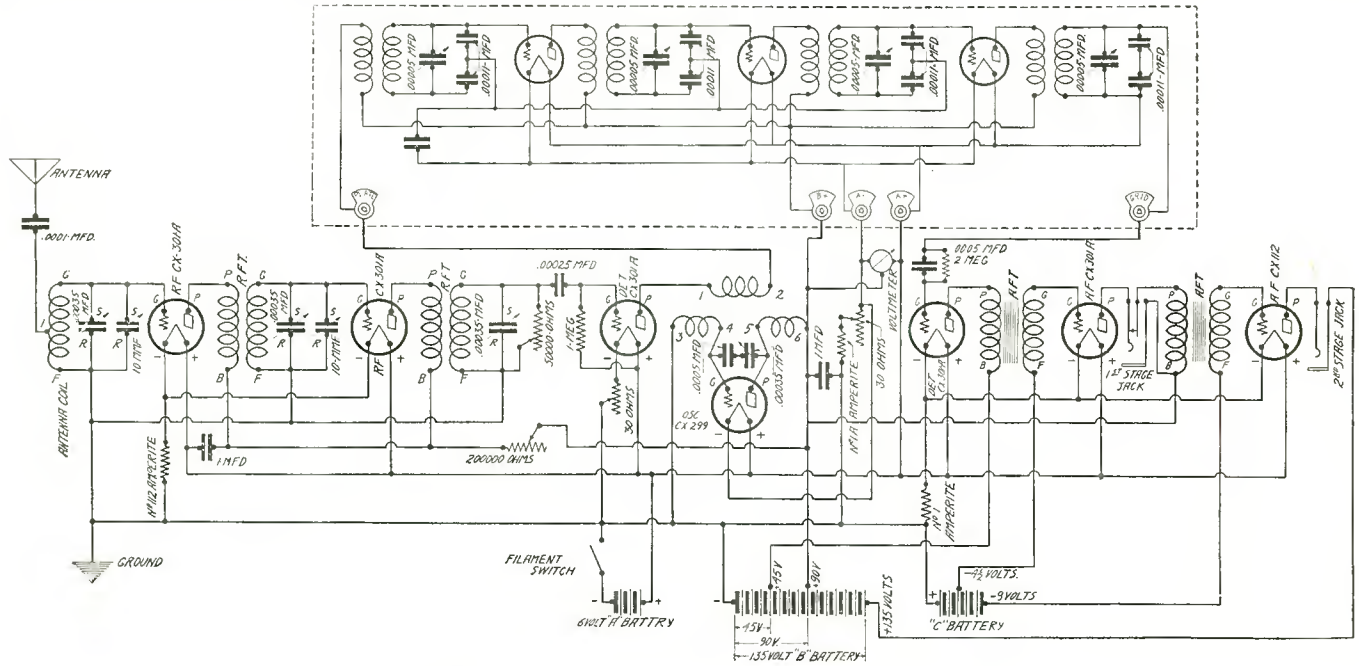


Fig. 1. Schematic wiring diagram of completed receiver

is very sharply resonated at 86 meters. From this fact it is obvious that the amplification of any other frequency is very low, which means that tube noises, etc., being of much lower frequency, or higher wavelength, will be amplified very little, if any at all.

There are ten tubes used in the, herewith described, Infradyne Receiver, two stages of Tuned Radio Frequency, first detector, osdillator, three stages of Infradyne intermediate amplification, second detector, and two stages of Audio Frequency amplification. It is self-evident that with the incoming signal passing through two sharply tuned stages of radio frequency, that it is in a high state of amplification before reaching the Infradyne intermediate amplifier and the audio frequency ampli-

(Continued on Page 184)

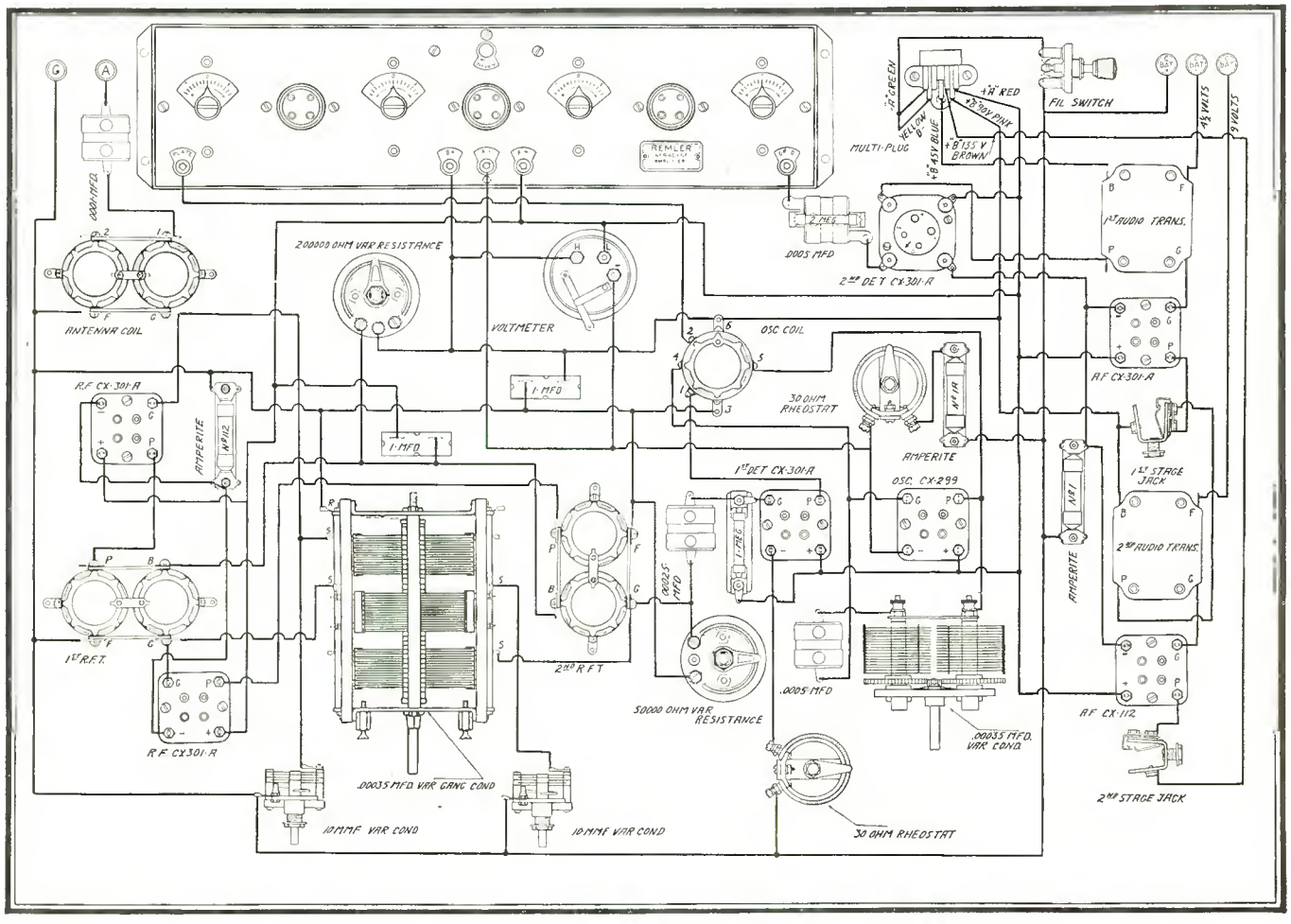


Fig. 2. Graphic illustration showing in a pictorial manner all the necessary connections for properly wiring receiver

SM

Build YOUR Infradyne Right.

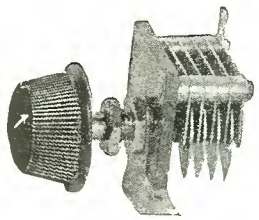
The S-M parts illustrated on this page have been selected by the inventors of the "Infradyne" as the only ones ideally suited to the "Infradyne." In building *your* Infradyne take advantage of the months of experimenting and research work of the inventors and insure success by using the parts they have endorsed above all others.

Prices 10% higher west of the Rockies

Do you know the secret of quality reproduction?

Have you your copy of "The Secret of Quality"? It tells how to get the most out of your audio amplifier—how to get real quality. It contains laboratory data never before available even to many manufacturers. It is one of the few authoritative treatises on all types of audio amplification written in non-technical language ever published.

It's free! Ask your dealer for a copy.



S-M Compensating Condenser, $1.50

S-M 220 Audio and 221 Output Transformers, $6.00 Each

S-M Uniformly Interchangeable Coils, $2.50
Coil Socket, $1.00

Silver-Marshall, Inc.
836 West Jackson Blvd.
CHICAGO, U. S. A.

A STATEMENT FROM THE INVENTORS

THE Infradyne circuit, as originated by us, was first described in August, 1926, "RADIO." While we have no connection with this magazine, Mr Sargent has agreed to write exclusively for it under his own name concerning the circuit. Otherwise our co-operation is freely given to anyone interested in its development and sale. We alone are responsible for the selection of the parts recommended for use in building sets which incorporate the Infradyne principle. This recommendation is based upon our personal experience and will be adhered to without change for at least six months. Consequently the parts specified herewith may be safely used in building the set. As the art progresses there may be new recommendations of parts perhaps better adapted to the peculiar needs of this circuit.

(Signed) E. M. SARGENT,
L. C. RAYMENT.

HERE IS THE LIST OF SPECIFIED PARTS

1 Remler Infradyne Amplifier
1 Cardwell 31-CL Triple Condenser
1 Remler No. 630 .00025 Condenser
1 Silver-Marshall Vernier Condensers, No. 340
1 Silver-Marshall 110-B Inductance Coil
1 Silver-Marshall 220 Audio Transformer
1 Silver-Marshall No. 850, 50,000 ohm Variable Resistance
1 Frost No. 850, 50,000 ohm Variable Resistance
1 Centralab 500,000 ohm Variable Resistance (for Frost)
1 set 131 Camfield Duoformers
2 National Type B, CCK Dials
1 Frost 30 ohm Baseboard Rheostat
1 Frost 30 ohm Panel Mount Rheostat
1 Frost Single Open Jack
1 Frost Single Open Jack
1 Frost Single Open Dials
1 Kurz-Kasch 2-in. Dials
2 Kurz-Kasch 1-X Type Cushion Sockets
2 Benjamin, No. 112
1 Amperite, No. 1A
1 Amperite, No. 1B, Pattern 115, 0.5
1 Jewell Voltmeter, Pattern 115, 0-5
1 Durham 1 meg. Grid Leak
1 Durham 2 meg. Grid Leak
1 Durham Grid Leak Mounting
1 Yaxley Filament Switch
1 Tobe .0001 Fixed Condenser
1 Tobe .00025 Fixed Condensers
2 Tobe .0005 Fixed Condensers
2 Tobe 1 mfd. Fixed Condensers
9 Eby Binding Posts
1 Eby Binding and Cable
1 Jones Plug and Cable
1 Panel, 3/16x7x20
1 Baseboard, 3/4x10x34
1 Cabinet Cabinet
1 Set Official Blueprints by L. C. Rayment

INFRA-DYNE

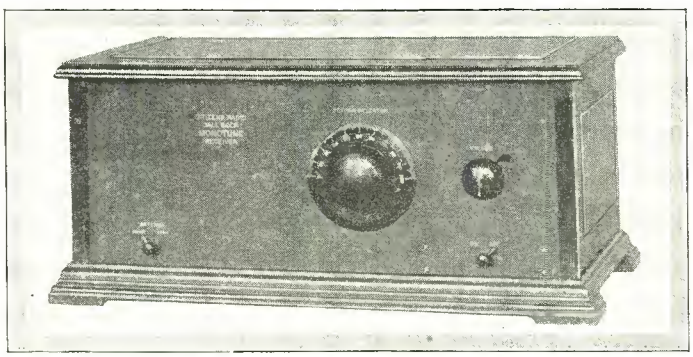
E. M. SARGENT and L. C. RAYMENT, 721 McKINLEY AVE., Oakland, Calif.

A Completely Shielded Single Control Receiver

Here Is a Modern Shielded Receiver Which Is Remarkably Sensitive and Stable in Operation

THE complete shielding of a receiver, in the past, has been strictly confined to only those receivers which were manufactured commercially in plants where production methods were employed. Home constructors found it exceedingly difficult, if not impossible, to shield receivers, due to the lack of exact information on the proper application of electrostatic and electromagnetic shielding as well as the great difficulty in properly forming the metal and assembling it.

The amazing increase in sensitivity of receiver designed during the past year, coupled with the introduction of high power in broadcast stations has made it imperative that a great amount of attention be given to the question of proper shielding. It is a well known fact that enough energy may be picked up by the radio frequency coils in a receiver to broaden the tuning and cause interference with stations operating on adjacent wavelengths. In addition to this, a trouble inherent with tuned radio frequency receivers is the interstage coupling between transformers. Placing the coil at certain angles sometimes relieved the interaction, but usually the angle was one of precision and difficult to maintain. Hand capacity and audio frequency feedback were also encountered.



Front view of receiver mounted in cabinet

These objectionable features are readily eliminated by the use of proper shielding. It is not sufficient to simply place sheets of metal in a haphazard manner around the instruments in order to obtain beneficial results. The problems at hand must be carefully considered and the best method of arriving at a solution determined from an engineering standpoint.

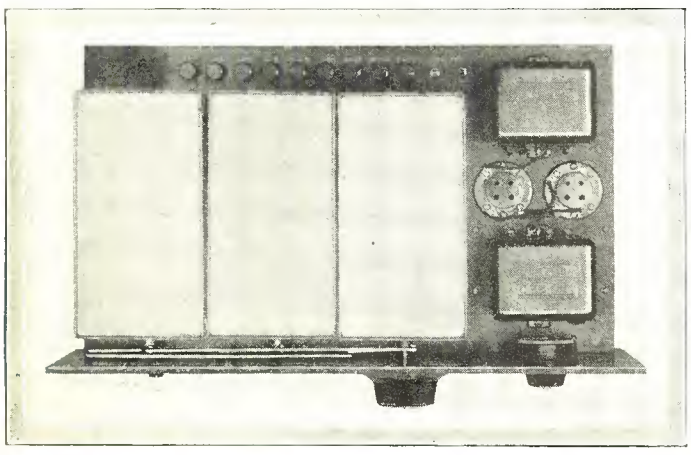
With the use of proper shielding, the construction of three- or four-stage tuned radio frequency amplifiers is possible, due to the removal of stray capacity and inductive coupling, perfect neutralization is obtainable and the number of major tuning controls easily reduced to two.

The receiver described herewith is probably the first type of thoroughly shielded five tube radio frequency receiver ever made available to the home constructor that might be easily built in the home workshop. The general design and aspect of the receiver in itself is not new, since many of the finest radio sets of today, as produced by the leading manufacturers in this country, incorporate the major features of this particular outfit, which is known as the Monotune Receiver.

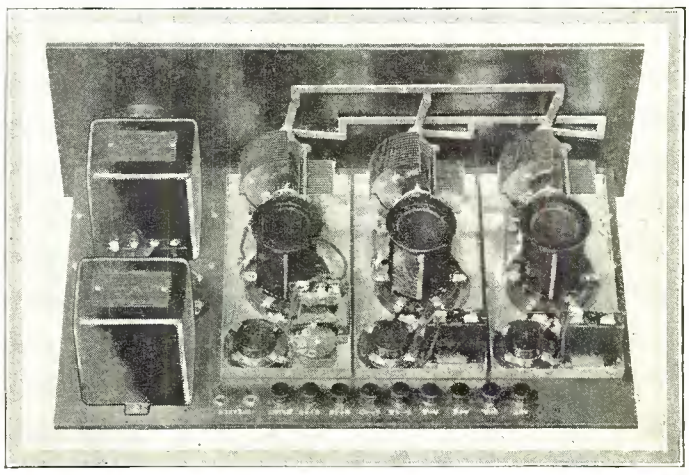
The Monotune Receiver contains five tubes, the circuit consisting of two stages of tuned radio frequency, a detector and two stages of transformer coupled audio frequency amplification. Only one major tuning control is used. This consists of the mechanical coupling, by means of a link motion, of the tuning condensers in such a manner that they operate as one. An antenna switch is provided so that either a long or short aerial may be used or the relative degree of selectivity of the receiver coarsely regulated. A twenty-ohm rheostat in the filament lead of the first radio frequency tube serves as a very efficient volume control.

Unlike the average set which may be built by the home constructor, this receiver is mounted on a 10x17½-inch Formica subpanel that is supported on brackets fastened to the front panel. Along the rear edge of the sub-panel are located nine binding posts. All external connections, batteries, antenna and ground, are made to these posts, while the speaker is connected to the receiver by a pair of pin jacks located beside the binding posts. Thus, no wires appear upon the front panel; even the loud speaker connections are taken from the rear.

At the front of this sub-base are three aluminum stage shields, each containing one of the three radio frequency circuits of the receiver. This type of shielding is particularly advantageous, for not only does it prevent coupling of the various circuits housed in the separate shields, as well as eliminate entirely the pick-up



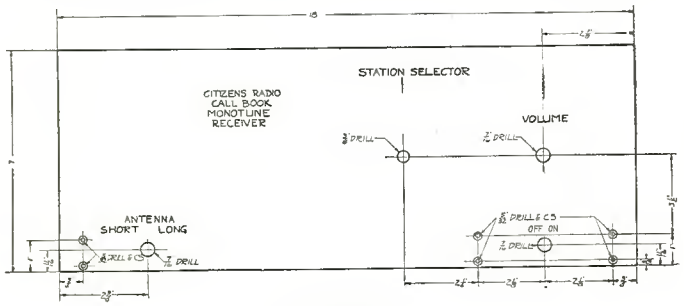
Top view, showing shields in place



Rear view of receiver with shields removed

of outside disturbances, but it does this in a much more effective way than ordinary shielding. This is because, where two circuits are isolated only by a single thickness of metal, circulating currents are frequently set up in the metal shielding by one circuit and transmitted to the second circuit. In the case of the Monotune Receiver, due to the use of two separate walls between each circuit the possibilities of circulating currents in one shield being communicated through another shield to the other circuits is very effectively obviated.

In each one of these stage shields is contained a specially constructed type of condenser which gives practically straight line frequency tuning over the upper range of the dial or on



Panel layout

the lower wavelengths and gradually verges into straight line wavelength tuning on the lower dial readings, or the higher wavelengths. The use of this type of tuning allows of maximum ease of adjustment, both in the hands of inexperienced and experienced users.

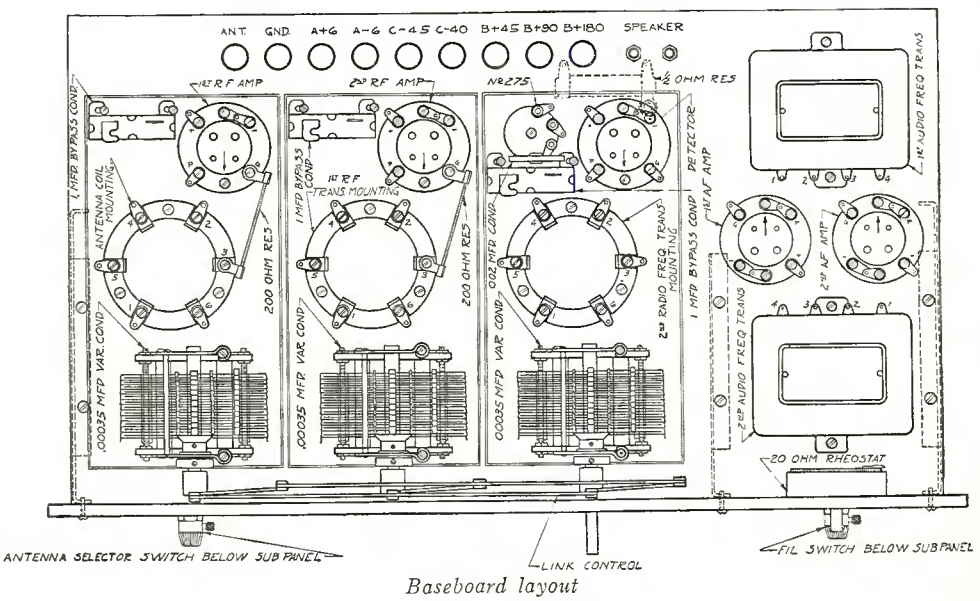
The condensers are very solidly fastened to the Formica subpanel as well as to the bottom section of the stage shields in such a manner that their positions cannot alter and that their capacities may not change appreciably over long periods of time.

Particular attention has been given the designing of the inductance coils so that their uniformity will be constant at all times and that their inductance will not vary appreciably. These coils are interchangeable and are plugged into six contact sockets located in the respective stage shields. Thus, if a coil is damaged or in any way injured, it may be easily removed and a new one substituted. Further, the possibility for seasoned experimenters of constructing special coils, say, for the European wavelength ranges, is thus left open.

In each of the two left-hand R. F. amplifier shield compartments there are located, in addition to the tuning condensers and inductance coils, a tube socket, a by-pass condenser and a stabilizing resistance. In the detector compartment practically the same equipment is located except that instead of the stabilizing resistance there is a small choke coil which aids in isolating the radio frequency and audio frequency portions of the circuit.

All metal work in the receiver, as well as the shields themselves, are grounded and connected to negative "A." The antenna lead feeds in through the small antenna control switch to the primary of the modified antenna coupling coil, which is known as type No. 116-A. The coil used in this receiver differs from the regular type No. 116-A coil in that a different 1-2 winding is used. This new winding consists for 9½ turns of No. 24 double silk covered wire, wound in the same direction as the 3-6 wiring. The primary of the No. 116-A coil is tapped so that adjustment can be made for either a short or a long antenna. This also means that if only one size of antenna is used the selectivity of the receiver can be altered at will within certain limits by using one or the other of the two positions of the antenna switch in operation. The secondary winding of this antenna coupling coil is exactly similar to the secondary of all the other transformers and consists of a winding of enamcled wire upon six supporting ridges of a bakelite coil form. These ridges are threaded and the turns of the winding spaced in a uniform manner. The shape of the coil is such that practically maximum advantage is taken of every possible factor contributing to efficiency. One very interesting feature is the location of this coil directly upon the bottom of the stage shield, separated from it only by the thickness of the coil socket. This spacing has been very carefully worked out and results in effective oscillation control at the lower end of the wavelength range and a pronounced increase in efficiency toward the higher end of the wavelength range; for the radio frequency resistance of the grid circuit actually is lower at 500 meters with the coil shielded than it is with the coil unshielded.

The function of the stabilizing resistance referred to above is to secure uniform amplification over the entire wavelength range of the receiver. This resistance combines two effects—one inductive and the other resistive. The theory of the operation is that in any tuned R. F. receiver as the wavelength at which it is operated decreases, the tendency to oscillate increases. This is obviously an undesirable condition, inasmuch as maximum amplification will be obtained only with a uniform amount of regeneration at all wavelengths, which is impossible without some means of compensation. The stabilizing resistance is placed in the grid circuit of the first and second radio frequency tubes and is of such electrical characteristics that the radio frequency resistance increases fairly rapidly as the wavelength at which the receiver is operated decreases. In this manner these resistances serve to even up the amplification over the entire wavelength range and to allow the receiver to be operated in an extremely sensitive condition both at the high and low ends of its range. The resistances alone are not depended upon for adequate oscillation control. A small tickler winding is used in each stage which serves to control regeneration in that stage, since each stage is individually so designed that without the resistance considered it would be in an oscillating condition. Careful experimentation has formed the combination of grid resistance, and the small tickler coil results in a receiver not only stable over its entire wavelength range, but one which operates at practically peak efficiency at all wavelengths. The audio frequency amplifier incorporates a pair of extremely heavy audio transformers designed with a rising low frequency characteristic. This means that they will provide maximum amplification and maximum power handling capacity at low frequencies in a neighborhood of 30 cycles and that the amplification will fall off gradually as the frequency increases. The use of these transformers overcomes the variations in broadcasting and other discrepancies in loud speaker design so that a surprisingly faithful reproduction is obtained from the receiver as



Baseboard layout

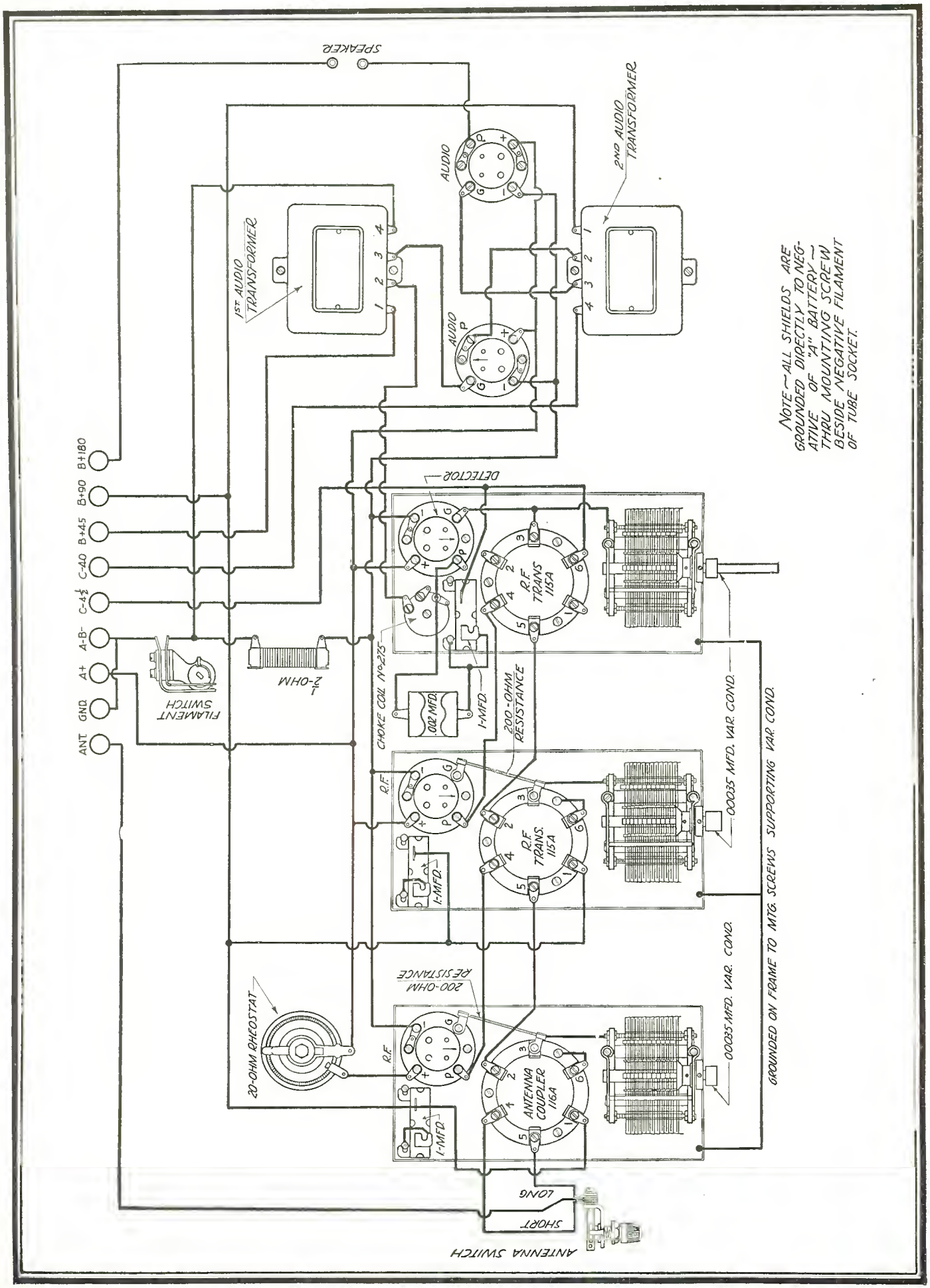


Fig. 3. Graphic illustration showing all connections

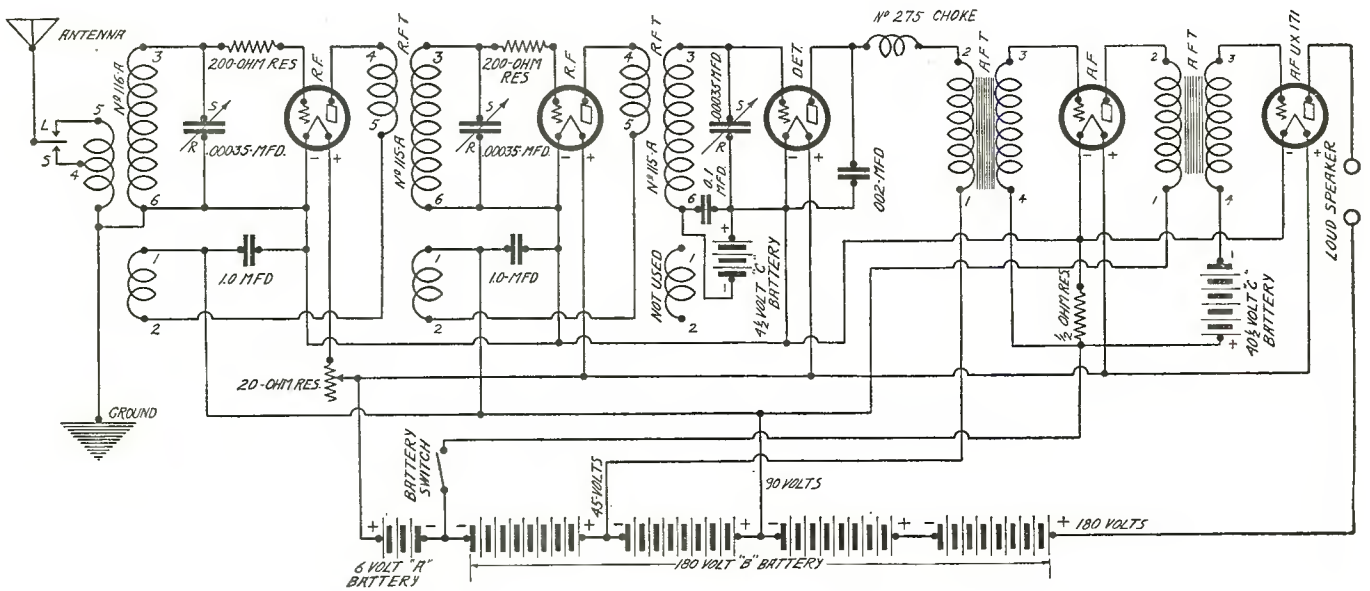
judged by the human ear.

UX 201-A tubes are used throughout the receiver up to and including the first audio frequency amplifier. The second stage of audio frequency amplifier uses a UX 171 power tube. It is advisable that as high a voltage be used on the output so as to insure that maximum quality of reproduction will be obtained.

LIST OF PARTS

These components or their equivalent may be used for satisfactory results:

1—7x18x3/16-inch Drilled Engraved Formica Panel
1—10x17½x3/16-inch Drilled Formica Sub-Panel
2—S-M Type 220 Audio Transformers
5—S-M Type 511 Sockets
3—S-M Type 631 Stage Shields



Schematic wiring diagram

3—S-M Type 515 Coil Sockets
2—S-M Type 115-A Coils
1—S-M Type 116-A (Modified)
2—S-M Type 316-A Condensers
1—S-M Type 316-B Condenser
1—S-M Type 275 Choke
3—S-M Type 540 Brackets
1—Yaxley 20-ohm Rheostat
2—Yaxley Tip Jacks
1—Yaxley ½-ohm Resistance
2—Yaxley 200-ohm Resistances
1—Yaxley Type 10 Switch
1—Yaxley Type 11 Switch
3—Polymet 1-mfd. By-Pass Condensers
1—Polymet .002 Fixed Condenser
9—Eby Binding Posts
1—Kurtz Kasch O-Left 4-inch Bakelite Dial
1 Package of Kester Solder
36—Kellogg Tin Soldering Lugs
40 Feet of Beldon Insulated Hook-up Wire
Miscellaneous Screws, Nuts, Bolts, etc.

No trouble should be experienced in the proper assembling and wiring of this receiver. By carefully observing the various illustrations and photographs incorporated in this article, the correct location of parts, as well as the shortest leads for best results will be found. It will aid considerably if the constructor would first assemble all the apparatus upon a sub-base and complete all wiring possible before fastening the front panel into place.

There is only one caution that need be observed, particularly in mounting the parts—that is, in respect to the variable condensers. It is barely possible that after they have been mounted a strain may have occurred which will pull the plates slightly out of alignment. If it is noticed that as the rotary plates are rotated there is a tendency for them to come closer to one side of the stationary plate than the other, it will be necessary to adjust the positions of the stator plate sections so that each rotor plate will center up between its two adjacent stator plates, when viewed from above. The necessary adjustment of the position of the stator plate sections may be made by loosening the nuts to be found on either side of the bakelite supporting strips, these nuts being actually on the tie-bars of the stator plate. This will allow the shifting of the entire stator plate sections to any desired position, where they may be locked by means of these same nuts.

One precaution must be observed in wiring. The two wires which run from one shield to the next must be kept free and away from all other wiring of the set. Terminals are plainly marked on all wiring diagrams and it is comparatively simple to correctly wire the receiver. After all wiring has been done on the sub-base, the front panel may be attached after the three condensers have been ganged. The method of ganging them is to push the link motion over their shafts, as illustrated in the photographs, and then setting the condensers so that the rotor plates are just about to interleave with the stator plates, but so that to the eye there is a tiny gap between them. This gap should be set so that it is uniform on all three condensers and the link motion then locked into position in such a fashion that the condensers can be turned only about 1/16 inch further out in each case, but so that if the shaft of one is rotated the other three can be carried to the full interleaved position, due to the link connection.

Before placing the receiver into operation it is best to carefully check all connections against the large graphic illustration appearing in Fig. 3. Make those connections which are necessary and then connect a six-volt battery to the "A" terminals. Try a single 201-A tube in each of the sockets and observe whether it lights and is properly controlled by the resistance in series with its filament. If each socket appears to be correctly wired, insert the other tubes and connect the "A" battery to the remaining binding posts in such a manner that each battery circuit will be tested. If the tubes do not light except when the "A" battery is correctly connected, it is safe to plug in the speaker and connect the remaining batteries.

An antenna not exceeding 60 feet will give very excellent results with this receiver.

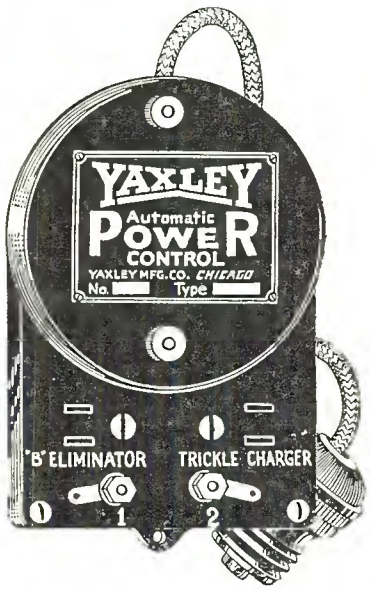
Know Greater Enjoyment

with these new radio conveniences

YAXLEY
APPROVED RADIO PRODUCTS

Your radio hours will be more enjoyable with these new radio conveniences. Yaxley Approved Radio Products have always meant a great deal to the enthusiast because they bring clearer reception and have a permanence that guarantees their ability to give service through years of use.

Study closely these new conveniences and start today on a course of greater radio pleasure.



Automatic Power Control

No more plugging in sockets and turning several switches every time you use your set. No more pulling out plug from sockets and turning of switches when you turn off the set. No more needless burning of lamps which reduces their usefulness, and runs down your battery.

These are some of the things the Yaxley Automatic Power Control will take off your mind. It does all the extra switching for you. It takes care of your B eliminator or trickle charger or both. You know that when you turn the switch on your set, the trickle charger is off, the B eliminator is on. You know that when you turn the set off, the Power Control is standing guard for you. It works automatically, surely and without fail to turn off the B eliminator and turn on the trickle charger.

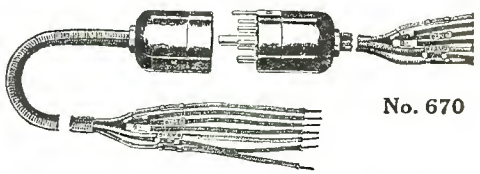
No. 444—Automatic Power Control, Series type—for use with sets having tubes with a current draw equal to or greater than 6 U.V.-199 types of Tubes.....Each, $5.00

No. 445—Automatic Power Control, Multiple type—for use with any set, but especially for sets having tubes with a current draw lower than that of 6 U.V.-199 types of Tubes. Each $6.00

Special Switches

Special Switches in a wide variety of spring combinations, ranging from single pole single throw to four pole double throw, are available. These switches are made in two or three positions as desired. Send a sketch of what is wanted. Prices on request.

At your Dealer's. If he cannot supply you, send his name with your order to



No. 670

Cable Connector with Cable

Let the Yaxley Cable Connector Plug be the answer to your radio wiring problems. This Plug is one of the most practical accessories to a radio outfit as it does away with the old-fashioned unsightly mass of battery wires, simplifies your battery wiring and makes an instant and correct connection. The very appearance and sure positive action as you put it together will impress you immediately.

Bakelite construction, phosphor bronze double contact springs, convenient mounting plate with permanently attached color guide for wiring, are some of the features that show you the unusual merits of the Yaxley Cable Connector Plug.

No. 670—For the set with binding posts—no soldering. Just hook up the terminals to your set and batteries and the job is done.....Each, $4.00

No. 660—With Connector Plate.....Each, $3.50

Yaxley Manufacturing Co.

Dept. C, 9 South Clinton Street
Chicago, Ill.

—COUPON—

Yaxley Manufacturing Company,
9 So. Clinton St., Dept. C.,
Chicago, Ill.

Enclosed find $..... Please send me
(670) (660) Cable Connector Plug
(444) (445) Automatic Power Control

Name.....
Address.....
City.....State.....
Dealer's Name.....

The New Madison-Moore "One-Spot" Super-Heterodyne Receiver

This Receiver Incorporates the Latest Development in Super-Heterodyne Circuits Using a New Design of Precision Units

Design, construction and all illustrations of this receiver were prepared in The Citizens Radio Laboratory

AMONG a discriminating public, the Super-Heterodyne is generally conceded to be the ultimate in radio receivers. Considering its multiplicity of units, it is quite simple to operate and the results of reception due to its excellent selectivity and sensitivity, are very gratifying. However, the inherent difficulty experienced with this type of receiver has been the interference between the high beat of one station and the low beat of another. Many stations were not efficiently received due to this fact, in that the high beat of one local station interfered with another station whose wavelength corresponded to the setting of the local station's high beat. In addition to this, many Super-heterodyne receivers are of such design that the reappearance of any station throughout the broadcast range is quite possible. In congested areas where extreme selectivity is necessary, these phenomena are very annoying and very much detract from the value of the receiver.

It has been the aim of research engineers to design a Super-heterodyne receiver with which it is impossible to receive any station at more than one place over the tuning range of the receiver. Considerable success has been attained in this research, as can be noted from the excellent design of receivers which have appeared during the last year or so.

The receiver described herewith is the result of considerable development both in the circuit itself and the design of the transformers. It incorporates an entirely new circuit, which is capable of extreme selectivity and yet has the advantage of being incapable of duplicating any particular station within its tuning range, provided that the receiver is properly operated.

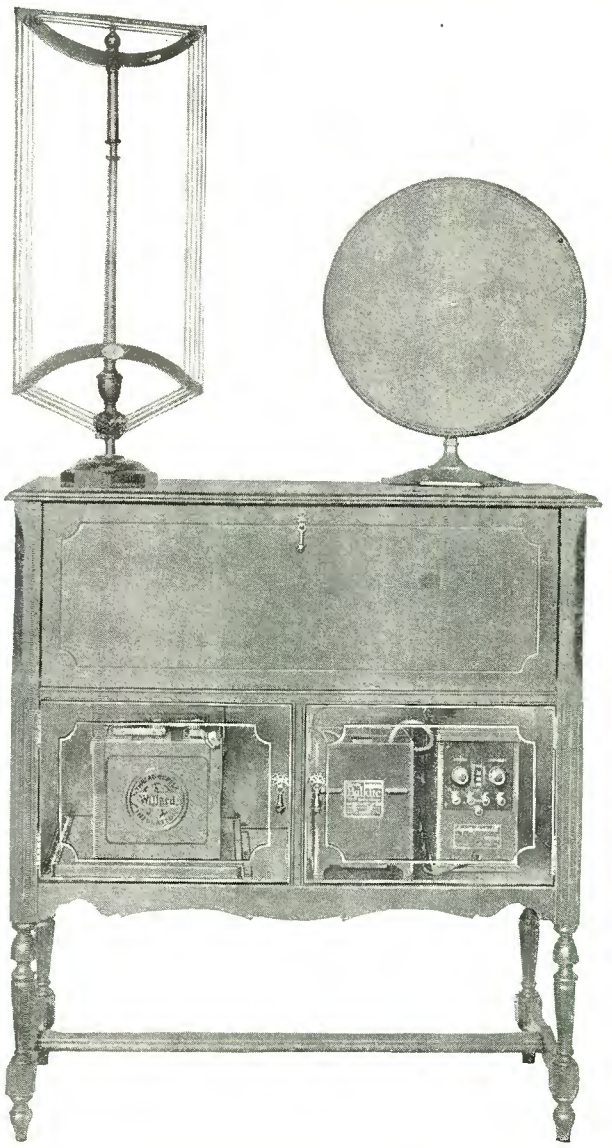


Photo A. Front view showing how receiver can be placed in a console, with suggested accessories

The feature in which this receiver differs from others is in the method of providing for heterodyne action, and the means of coupling the intermediate frequency to the amplifying system. The radio frequency current set up in the plate circuit of the first detector tube by the broadcast signal in the tuned loop passes through the primary of unit No. 2 as well as through the plate winding of the oscillator, or unit No. 1. When the current passes through the plate winding of the No. 1, a heterodyne action occurs, since a locally generated frequency is also built up in the plate inductance of the oscillator unit. The mixture of the original signal frequency and the locally generated frequency in the plate inductance causes the generation of a third or intermediate frequency. By virtue of the inductive reaction of this intermediate frequency on the plate inductance of the oscillator unit, the heterodyne frequency reacts through the primary of the No. 2 unit. Since the No. 2 unit is adjusted to be resonant only to this third or intermediate frequency, its presence, therefore, stimulates the amplifying action of the three stage intermediate frequency amplifier. This circuit arrangement makes possible a more simple and direct means of producing the intermediate frequency. A comparison of the new circuit to that which was previously used emphasizes this fact very forcibly.

The design of the oscillator unit has been so proportioned that the operating voltage is such that a power balance with maximum efficiency between the incoming signal and the locally generated energy is obtained. While the set is not regenerative, the ability to bring the first tube just under the point of oscillation gives infinitely more sensitivity to weak signals than is possible under any other method known today. The greatest care must be exercised in the manufacture of the units, as a slight deviation from the extremely high frequency at which the transformers are built to function at will result in an unbalanced receiver.

Fig. 4 is a schematic wiring diagram of the complete receiver. All tubes in the receiver are controlled by a filament equalizer which prevents the filament temperature from rising above the normal operating point, and assures the correct function of the tubes at all times. A 20-ohm rheostat is connected in series with a type 4 equalizer in the positive filament lead of the first tube. The correct use of this rheostat will assure satisfactory results in reception, and should be kept at a position which allows just enough current to pass through the filament to prevent the tube from establishing a condition of self-oscillation. The second tube is automatically controlled by the use of a type 4 equalizer in the negative filament lead. The three intermediate tubes are controlled by both a type 4/3 equalizer and a 10-ohm rheostat. The 10-ohm rheostat is connected in series with the equalizer and is used as a volume control. The sixth tube, or second detector, is a UX-200-A and is controlled by a type 4 equalizer in

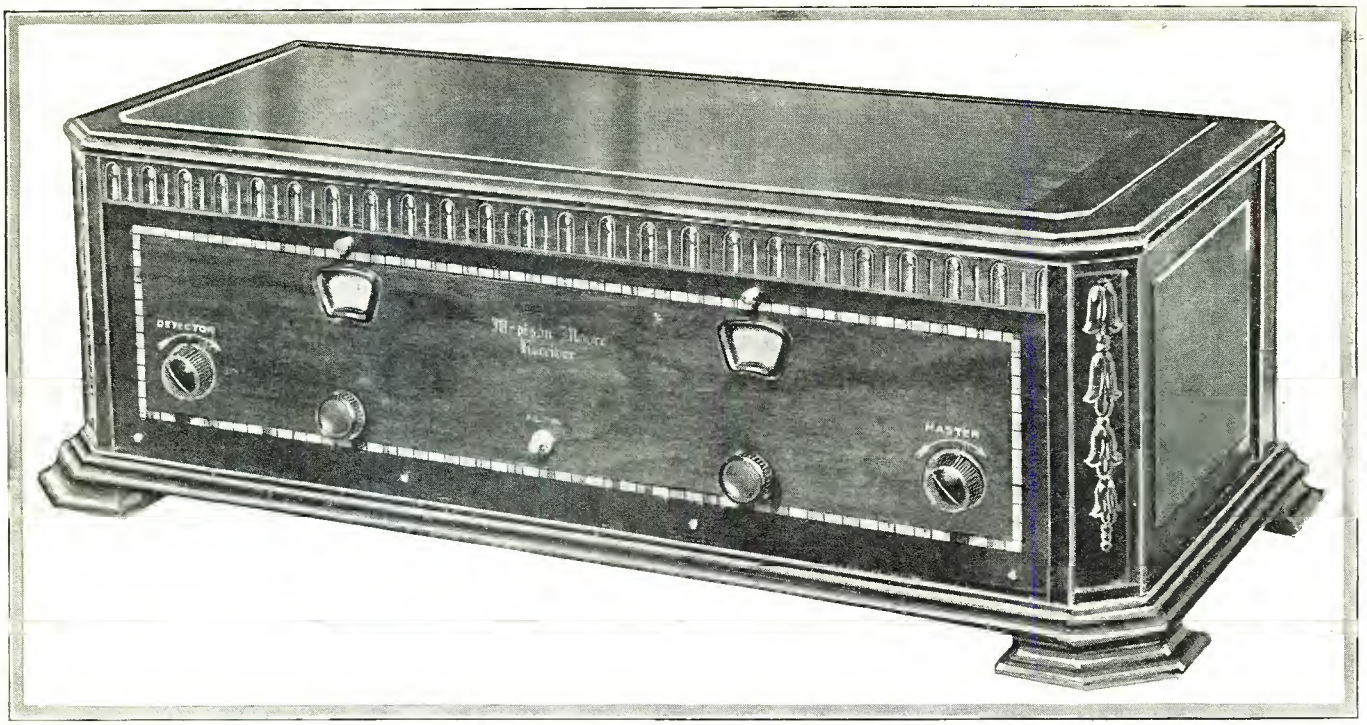


Photo B. Front view of receiver mounted in cabinet

the negative filament lead. The grid return of this tube is to the negative filament. Each of the two audio tubes are controlled by equalizers, the first being a type 4 and the second a type 2. The last stage of audio uses the UX 112 power tube. All other tubes are UX 201-A.

Fig. 1 is a layout of the front panel, which shows the necessary drilling for the proper mounting of apparatus, as well as appropriate engraving. In the event that the constructor does not have the facilities to properly drill the front panel and have it engraved, a completely drilled and engraved Lignole panel may be secured at any good radio store.

Fig. 2 is a baseboard layout of the completed receiver, and shows in detail the correct location of all parts mounted on the baseboard, as well as the proper position of the terminals in relation to other pieces of apparatus, so that short leads will be possible.

The new type of Marco illuminated dial is used in this receiver. The mechanism of this dial is housed entirely behind the panel. A small aperture in the panel allows a view of the indicator, which is illuminated by a six-volt lamp. The Karas Orthometric condensers, used as tuning controls, are mounted directly on the mechanism forming the dial. A General Radio type 285-D transformer is used in the first stage of audio, while a General Radio type 285-L is used in the second stage. A Yaxley cable connector is used for connecting the battery to the receiver. The regular color code is used, which is supplied with the connector, with the exception that the "B" detector has 22½ volts connected to it, and the "B" Amp., 45 volts. One hundred and thirty-five volts is connected to the brown terminal, while 90 volts is connected to the green.

No difficulty should be experienced in correctly mounting the apparatus and wiring it, if the various illustrations and diagrams are carefully followed. The wiring may be considerably simplified if the apparatus mounted on the baseboard is first con-

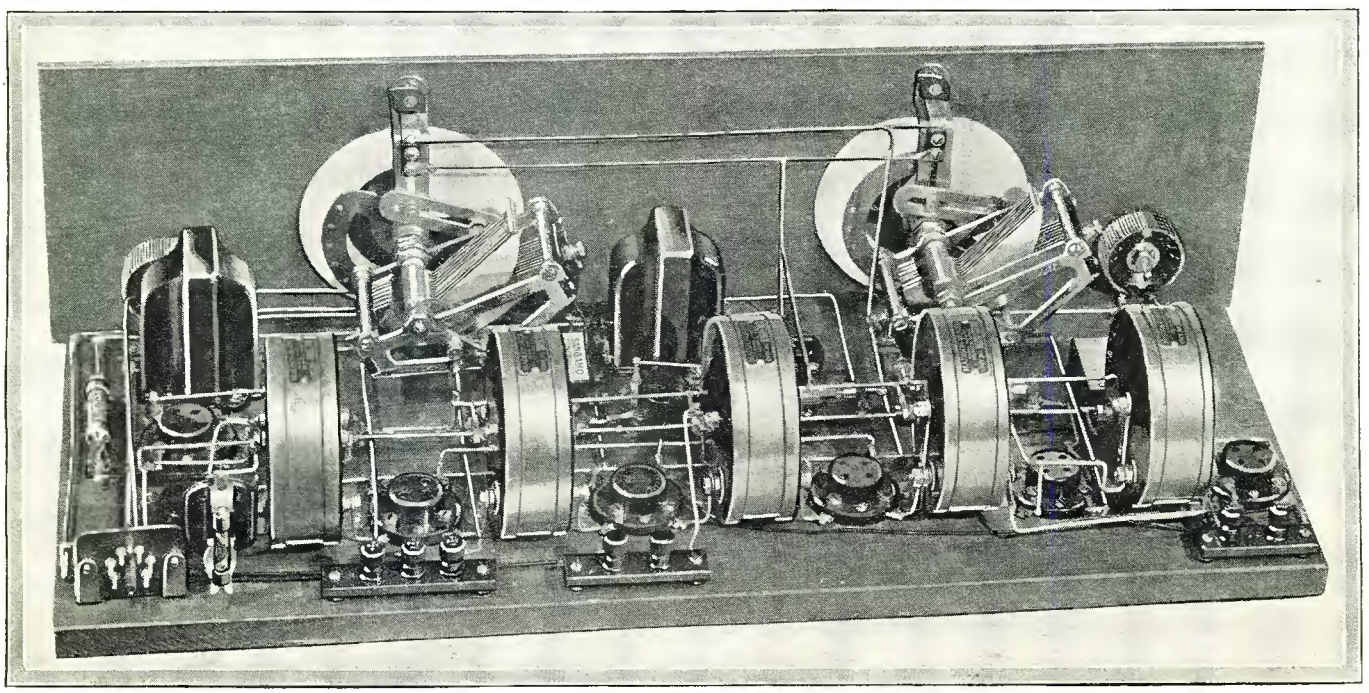


Photo C. Rear view of completed receiver

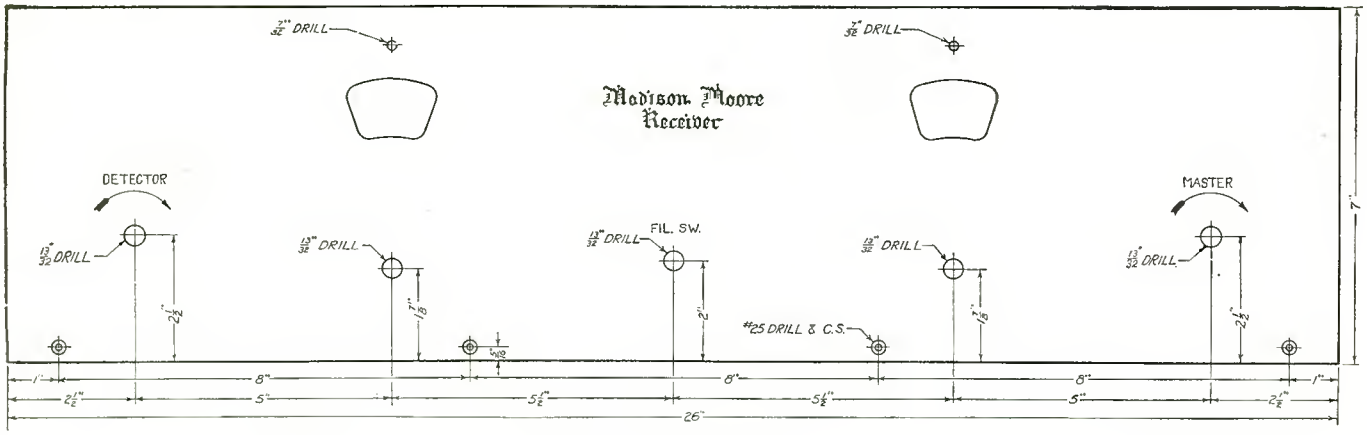


Fig. 1. Panel layout

nected up with the panel not in place. After the receiver is completely wired, carefully check it against the large graphic illustration shown in Fig. 3. If there are any incorrect connections, correct them, and then connect the "A" battery alone to the receiver. Insert the proper tube in each socket, test each tube one at a time, and observe whether it is controlled by the proper resistance, etc. Then disconnect one of the terminals of the "A" battery on the receiver and touch it in turn to the remaining terminals on the cable connector, and observe whether any of the tubes light. If there is no indication that the tubes light except when the "A" battery is properly connected, it is safe to connect the remaining batteries and insert all the tubes, and connect the speaker and loop.

This set is not as easy to operate as one where it is merely necessary to turn the dials. Due to its extreme selectivity and sensitivity, together with its wonderful tone quality, it will prove to be the latest thing in radio reception when its operating characteristics are thoroughly understood and patient tuning is observed. In its operation, however, some instruction and practice are necessary. For local stations, lower filament temperature is used on the intermediates than for distant ones. Properly constructed, this receiver will tune in a station at only one place on each dial. This is possible, however, only with the proper operation of the first tube. If the rheostat controlling the first tube is kept at a position which keeps the first tube just under the point of oscillation, the loop tuning dial will be extremely sharp and stations will not be heard unless both circuits—the loop and oscillator circuits—are kept in absolute resonance. It is absolutely essential that both circuits be in resonance, as otherwise even local stations will not be heard.

If the first tube is permitted to oscillate, a condition will be established by which a station will be received at more than one place on the dial.

It will be entirely unfair to expect this receiver to give phenomenal results as soon as it is placed on the air. Being an extremely sensitive receiver, considerable time should be spent in properly mastering its peculiarities before the best results can be obtained. If ordinary patience is observed in tuning, and proper consideration given to the fact that the operation of the receiver is more or less strange, a properly constructed receiver will, in time, perform in such a manner that the utmost satisfaction in reception will be obtained.

LIST OF PARTS

This material, or any reasonable substitute, will give satisfactory results:

1—7x26x3/16-inch Drilled and Engraved Lignole Front Panel
1—¾x3¼x3/16-inch Drilled Formica Terminal Strips
2—¾x2½x3/16-inch Drilled Formica Terminal Strips
1—10½x25x¾-inch Wooden Baseboard
1 Set of 5 Type HW Madison-Moore Precision Units
1—Karas .0005 mfd. Orthometric Variable Condenser
1—Karas .00025 mfd. Orthometric Variable Condenser
2—Marco Illuminated Dials
8—Type 349 General Radio UX Sockets
1—Type 285D General Radio Audio Transformers
1—Type 285L General Radio Audio Transformers
1—Frost 10-ohm Rheostat
1—Frost 20-ohm Rheostat
1—Frost Filament Switch

(Continued on Page 220)

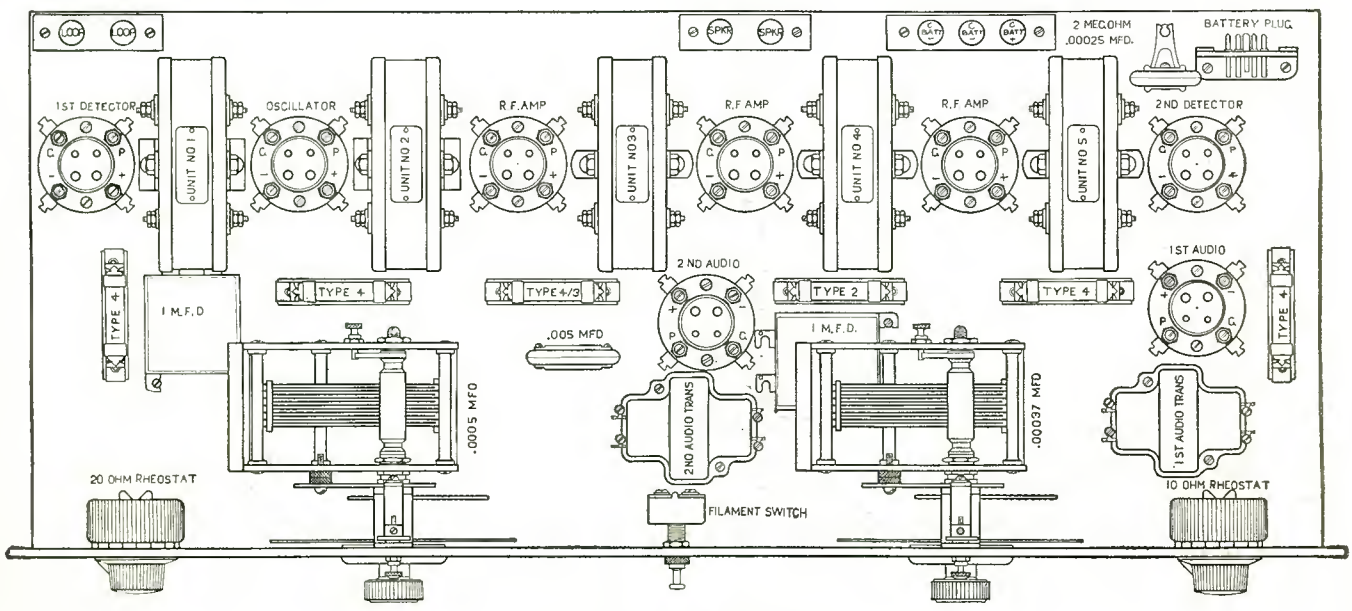


Fig. 2. Baseboard layout

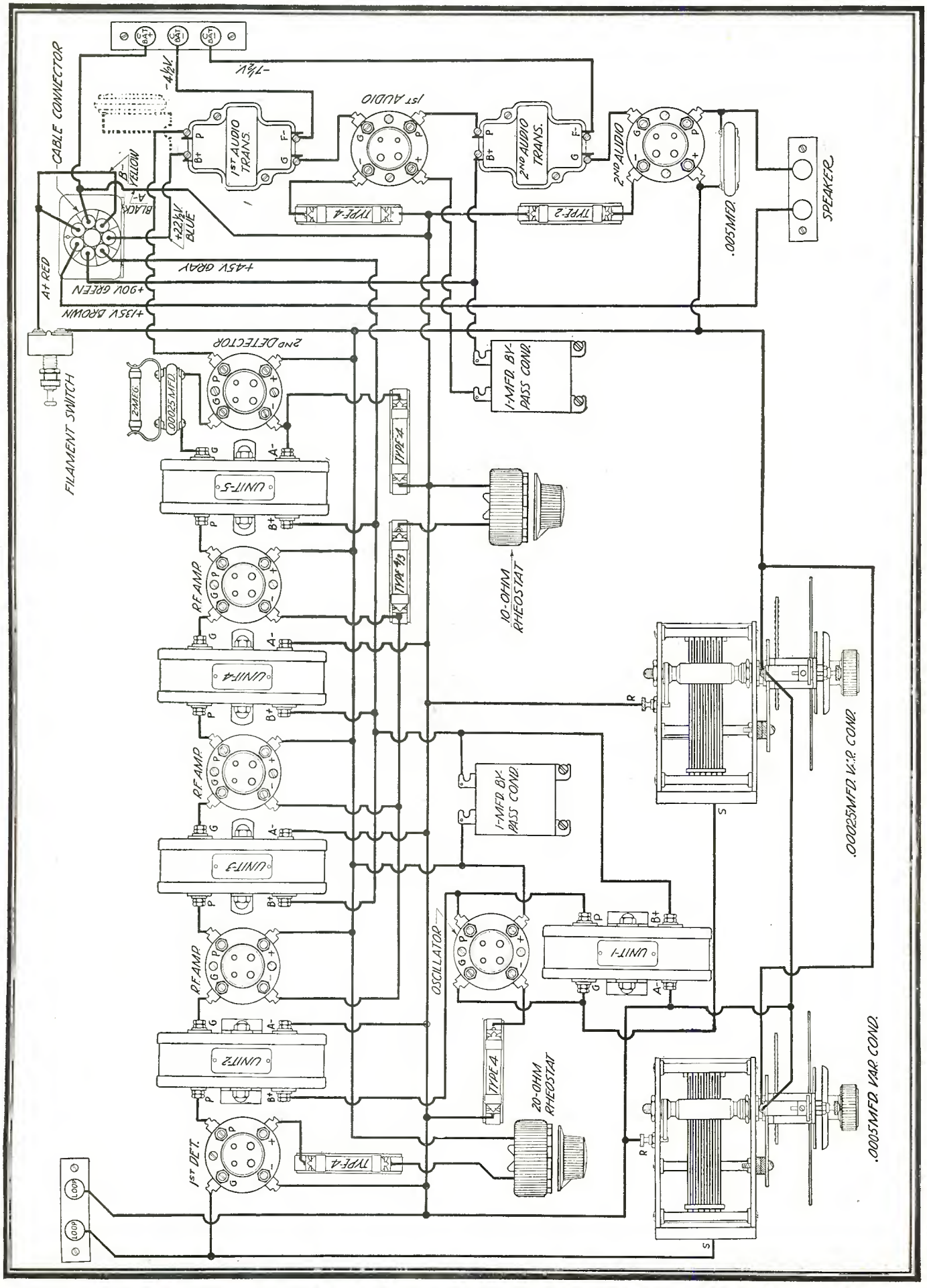


Fig. 3. Graphic illustration Check this carefully when wiring is completed

285 RADIO SETS

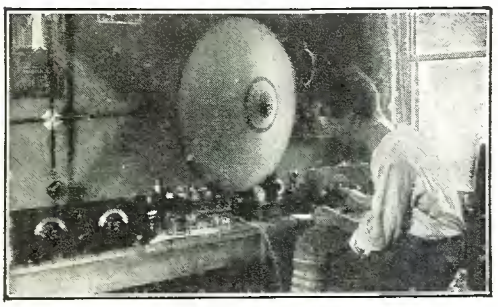
And then he built—

The Ultimax

his Latest and Best

And Used

PACENT PARTS



THE ULTIMAX is the outstanding example of what perfection can be reached in radio after fifteen years of experimenting by such skilled experimenters as Ludwig Seigman. There are vital elements which go to make up every radio receiver. Mr. Seigman, in assembling the parts used to put together what he feels the perfect radio receiver, has specified Pacent Parts in nearly every case throughout the receiver, because his long experience and knowledge has shown him what Pacent Parts really can do.

Pacent Superaudioformer

These Transformers can be relied on to give better tone quality.

Type 27A.....**$6.00** Shielded.....**$7.50**

Special Ultimax Unit

Upon the Ultimax Unit depend largely the sharp tuning and fine tone of the complete receiver.

Supplied in neat metal bronze case.

Price, **$5.00**

Special Ultimax Coils

The Ultimax Coils are wound exactly with the designer's specification and have just the right amount of wire for best results. From 190 to 570 meters.

Set of three, price, **$6.50**

Pacent Triple-Gang Condenser

(True Straight Line Frequency)

This condenser gives sharp, accurate tuning and control, and operates as a one-dial tuning condenser. Its low loss features assure splendid efficiency in the Ultimax.

Price, **$12.50**

Pacent Jacks

Made of best possible materials with high percentage of German Silver spring member, sturdy nipples and extra washers to accommodate varying thickness of panels.

No. 61, price **$0.50**
No. 63, price, **$0.60**

Pacent Rheostats

Simplifies installation and preserves accurate factory adjustment. Supplied with silver or gold finished dials and black or mahoganized knobs.

95A— 6 ohm, **$1.00**
95B—10 ohm, **$1.00**

Pacent Universial Cushion Sockets

A genuine Bakelite socket with real phosphor bronze spring suspension. Unique spring design insures positive, non-microphonic cushion effect. Push contacts seat tube prongs properly and effect positive, reliable contact.

Price, **$0.65**

Pacent Switch

Built for long, lasting service and will withstand rough usage. Its action is positive.

Price, **$0.40**

A booklet on "How to Assemble the Ultimax" with full details on assembling these parts, and carefully laid out blueprints made up under the direction of skilled engineers will be furnished you for a nominal fee of **$1.00.**

Ask any progressive dealer, or write today for full information on the Ultimax Circuit

PACENT ELECTRIC COMPANY, Inc.

91 Seventh Avenue, New York City

Washington, Birmingham, Cleveland, Chicago, Jacksonville, San Francisco, Buffalo, Boston, St. Louis, Minneapolis, Philadelphia, Pittsburgh

Canadian Licensed Manufacturers: White Radio, Limited, Hamilton, Ont.
Manufacturing Licensees for Great Britain and Ireland: Igranic Electric Co., Ltd., London and Bedford, Eng.

How to Build the Ultimax

This Popular Five-Tube Receiver Combines Fine Tone, One Control Tuning, and Uniform Selectivity from 200 to 570 Meters

CAN you imagine building 285 radio sets before you were finally satisfied that you had the tone quality that you wanted? Not only the tone quality, but selectivity, volume and high efficiency on the radio frequency side of the receiver: It sounds almost incredible, 286 radio sets, but it's true, and all of them built by one man. The Ultimax combines the experience and the fine points gained by actually building, operating and comparing 285 radio receivers in an attempt to concentrate the best and most efficient features in one set which can be easily constructed at a price well within the range of the average radio builder's purse.

The story of the development of The Ultimax is not only highly interesting, but valuable to the man who contemplates building this popular set. It shows that while certain features in the set, the R. F. system, for example, may appear quite new and untried, they have, as a matter of fact, been developed and perfected thoroughly before being offered to the radio public.

The man who designed The Ultimax has been actively interested in radio for more than fifteen years. As early as 1910, Ludwig Siegmann built his first receiving set, a loosely coupled crystal set. It was not beautiful, and far from efficient as we know radio sets today. But it worked—that was the important thing—and the designer received his first thrill from radio when he picked up weak code messages from a ship off Fire Island. Over a period of more than fifteen years his initial enthusiasm has never dwindled.

It is no exaggeration to say that Siegmann has built and operated 95 per cent of the sets and circuits presented to the public during the past six years. A trip to his laboratory and workshop would convince you of that. There you will find all types and kinds of receivers from one to twelve tubes, not to mention power amplifiers, B eliminators, and short wave sets. Over the fifteen-year period Siegmann has built with his own hands, operated and compared 285 radio sets!

The 286th is The Ultimax.

If you were to ask him why he calls it The Ultimax (as dozens of fans have asked him) he would reply: "Because to me it is the ultimate in fine tone quality."

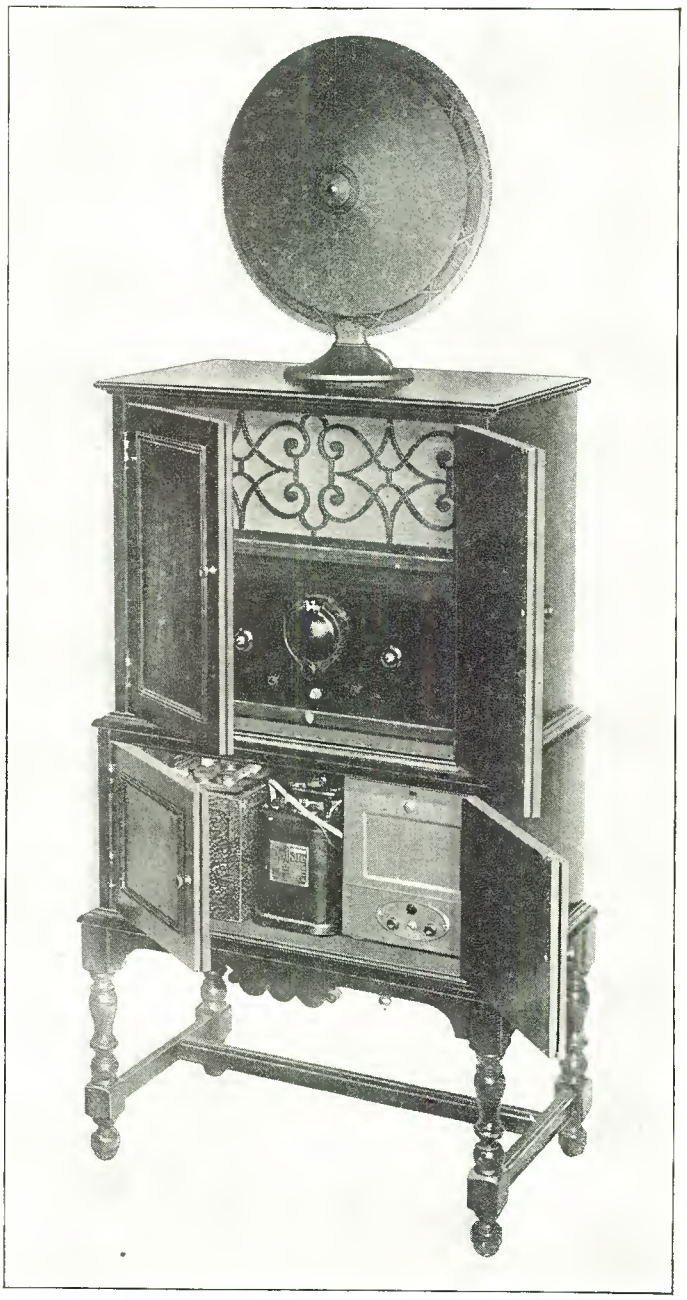


Photo A. View of receiver mounted in console, with suggested accessories

The Ultimax is designed primarily to give fine quality and range of reproduction. But to this is added a uniformly high degree of selectivity from 200 to about 570 meters. You will find that The Ultimax has the same remarkable sharp tuning (without being critical) on high and low wavelengths alike. In this day of congested broadcasting the value of this feature is at once apparent.

In the radio frequency high radio frequency amplification is achieved without self-oscillation. However, this condition is not gained by the ordinary method of cutting down the inductance in the plate circuits of the radio frequency tubes. The reason that most radio frequency sets on the market today do not squeal is that the transformer primaries rarely have more than eight or ten turns, and they are, therefore, tuned far below the broadcast band. Energy transfer to the succeeding stage is poor, particularly on the higher wavelengths.

In The Ultimax a new method is employed which not only prevents oscillation at the low waves, but also gives tremendous amplification at the longer wavelengths. The set has practically the same high degree of radio frequency amplification over its entire receiving range.

If the primary of the radio frequency transformers is tuned at or near the resonance point of the incoming signal, the circuit will approach oscillation. Therefore, the designer places the resonance point of the radio frequency plate circuits above the highest wavelength to which the grid circuit can be tuned, thereby achieving maximum impedance, and with that maximum energy transfer. The natural tendency of the vacuum tube to oscillate on the lower waves will produce efficiency at that point.

It should be understood that The Ultimax is not designed primarily for extreme long distance work. The designer makes no claims that it will bring in more distant stations than any other receiver of the same number of tubes. The Ultimax is designed for fine quality of tone, that most desirable of all attributes of any radio set. And, after all, if one has fine quality and range of reproduction, plus true selectivity, he has just about all that is needed for a splendid radio receiver.

The Ultimax Unit is really the heart of the set. Funda-

mentally, the success or failure of the completed receiver depends upon it. In designing this unit, extended experiments were conducted to determine just the right size wire, the right number of turns, and the best values of fixed condensers for use in it. The unit comes housed and sealed in a compact bronze finished case which fits handily into the complete assembly of the set.

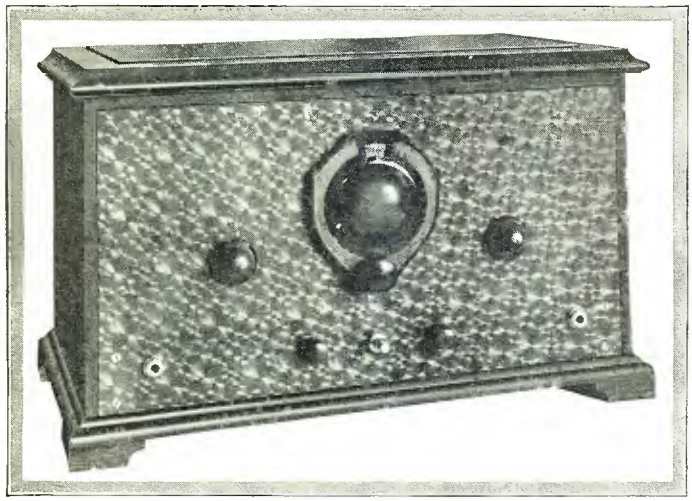


Photo B. Front view of receiver mounted in cabinet

LIST OF PARTS

These parts of their equivalent will give satisfactory results:

1—Ultimax Unit
1—Set of 3 Ultimax Coils
1—Pacent No. 3251B 3 Gang Straight Line Frequency Condenser
2—Hammarlund Junior Midget Condensers MC5, .00016 mfd.
5—Pacent No. 83 Universal Cushion Sockets
1—No. 62 Pacent Jack
1—No. 65 Pacent Jack
1—No. 95A Pacent 6-ohm Rheostat
1—No. 95B 10-ohm Pacent Rheostat
1—Kurz-Kasch Vernier Dial No. 592-0-100-1, port dial black
1—Pacent No. 16 Battery Switch
2—No. 27A Pacent Superaudioformers, shielded
1—4-ohm Special Resistance Strip
1—.002 Fixed Condenser, Dubilier No. 601
1—.00025 Fixed Condenser, Dubilier No. 601
1—2-megohm Resistance Electrad
8—Eby Binding Posts
1—Panel, Friezc Insuline, 8½x16x3/16-inch
1—Sub-Panel, 15x7x3/16-inch
2—Benjamin Sub-Panel Brackets
1—Special Pillar Post, for supporting center of sub-panel
1—No. 1 Electrad Grid Leak, Single Mount

Fig. 1 shows a complete schematic wiring diagram. Those who find it easy to work from this form of diagram will find that it meets their needs.

Fig. 2 shows a complete pictorial layout and wiring diagram of the receiver. This in combination with the photographs of the set shows exactly where each part goes and how to connect them.

The Ultimax works very well with either dry cell or storage battery tubes. Built according to the instructions and specifications, it may be used for either tubes.

Proper tube combinations are important, however. So are correct battery voltages. After trying many different combinations the designer of the set recommends the following:

For Dry Cell Operation

For 2 Radio Frequency Stages: UX 199 or CX 199.

For Detector: UX or CX 199.

For 2 Audio Stages: UX or CX 120, with 135 volts "B" battery and **22½ volts "C" battery on both.**

For Storage Battery Tubes

Radio Frequency Stages: 2 UX 201-A or CX 301-A.

For Detector: UX 200-A or CX 300-A.

For Audio Stages: 2 UX or CX 112, with 135 volts "B" battery and 7½ volts "C" battery.

Use either of these tube combinations you prefer. You will not find any other combinations more satisfactory and economical.

Tuning The Ultimax

Referring to Photo B, front panel view of the set: The left-hand knob (rheostat) controls all five tubes. The first time you turn on the set the rheostat may be turned well up until you tune in a strong signal from a nearby station. Then turn down the filament current until there is a real loss in signal strength when you decrease it further. Then leave the rheostat set, turning the tubes off with the filament switch.

The right-hand knob controls the volume of the set, and by varying it you can have a whisper or maximum volume, as you wish.

The main dial tunes the set, and the little trimming condensers below it need not be touched for local or nearby reception.

Since the detector circuit is non-regenerative, there is no regeneration control to bother with.

Turn the volume control well up, then tune slowly and carefully with the middle dial controlling the 3 gang condenser. Bring in the signal as strongly as you can, then manipulate the little trimming condensers.

Start with either one and slowly adjust it until the volume is built up as desired. Then adjust the other in the same way and you will have the set at its most efficient point.

The Ultimax gives all the volume the average person will desire or require for ordinary home use. However, where there is a particularly large room, or for outdoor entertainment in summer, provision has been made for the addition of a power

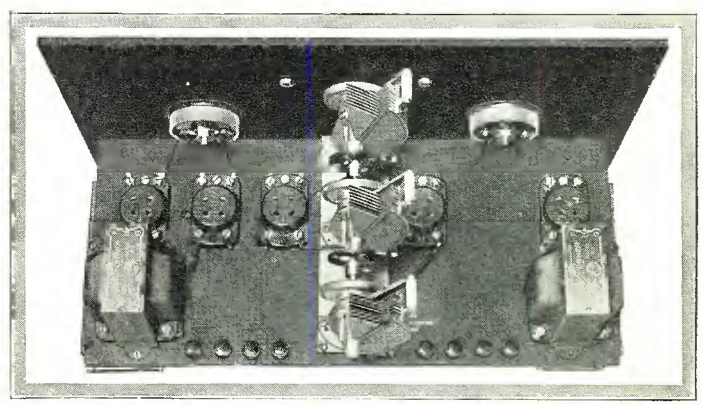


Photo C. Rear view of receiver with cabinet removed

amplifier or combination power amplifier and "B" eliminator.

The left-hand jack on the front panel is the first stage jack. Plug in the power amplifier here and you will get the additional volume wanted, with the splendid tone quality that has made The Ultimax one of the most talked of sets today.

Information on Accessories for The Ultimax Receiver

The accessories shown in Photo A are as follows: The Con-

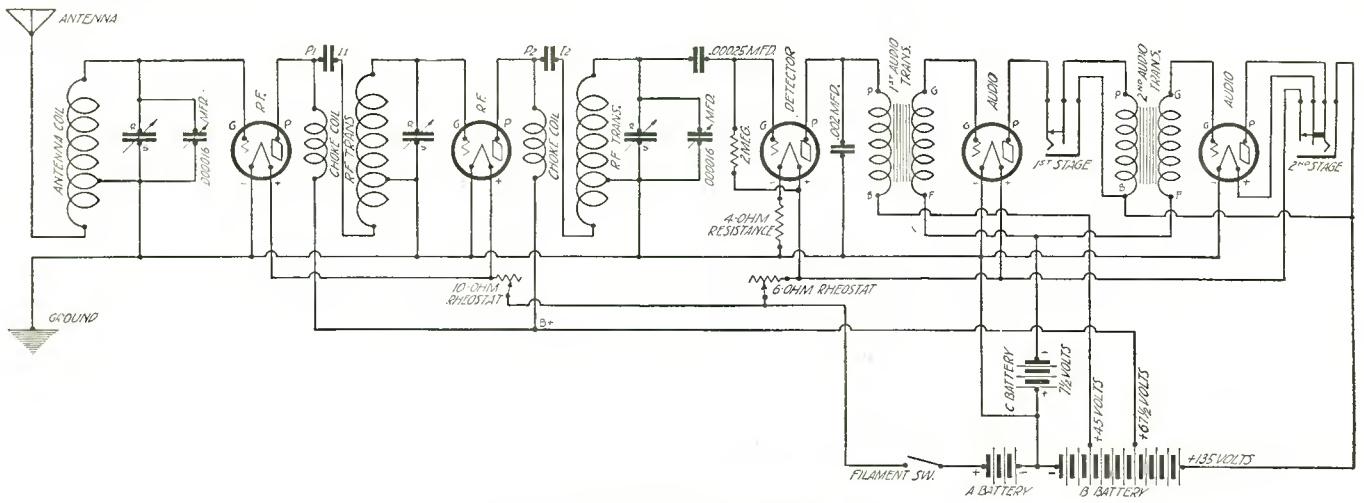


Fig. 1. Schematic wiring diagram

sole is a Model 10 and is manufactured by the Charlotte Furniture Company, Charlotte, Mich. Only genuine walnut is used in its construction. The front doors are of matched butt walnut, while the top and ends are of straight grain walnut. The highly polished finish consists of several coats of lacquer with a carefully waxed finishing coat.

A 100 Ampere Hour Willard Storage Battery is used to supply sufficient "A" potential to properly operate the receiver. The Battery is provided with a convenient carrying strip and Fahnestock Clips so that leads may be quickly attached or disconnected.

The new type of Balkite Charger will operate very satisfactorily in keeping the Willard Battery at full charge. This new type of charger is constructed along the same lines as the original Balkite Trickle Charger, in that a glass jar is used for the electrolyte. This allows an instant visible check on the height of the solution in the jar. The Charger is a product of the Fansteel Products Company, North Chicago, Ill.

The Speaker used is the Type "A" Pacent Cone, which, when used in conjunction with the Pacent Powerformer, which is also illustrated, reproduces music and speech with exceptional tone quality, reproducing all audible frequencies broadcast. The Powerformer is primarily a combination "B" Eliminator and Power Amplifier. The two last mentioned devices are manufactured by the Pacent Radio Corporation of New York City.

(If any further information on these accessories is desired, full descriptive matter may be obtained by writing the manufacturers direct.)

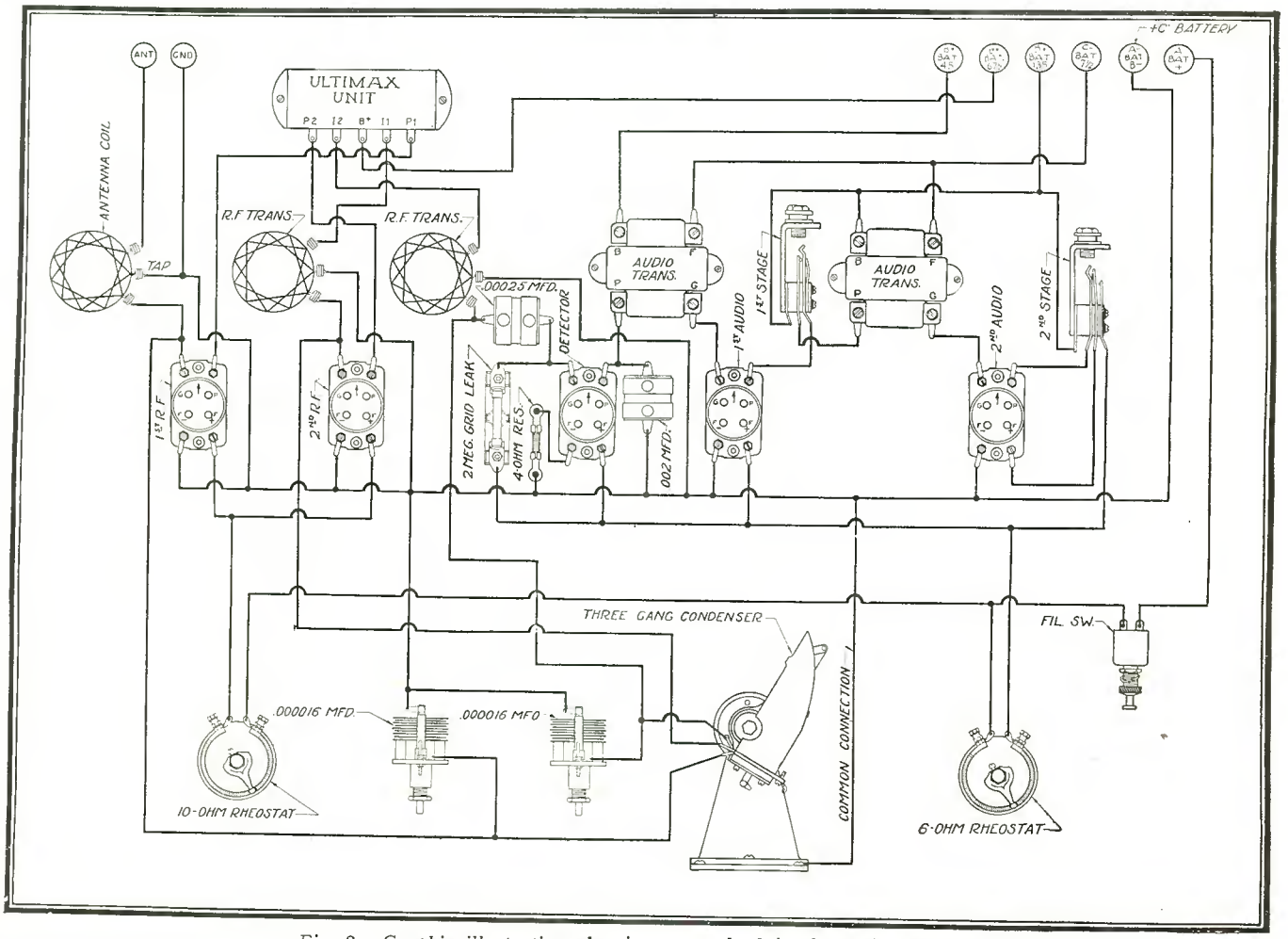
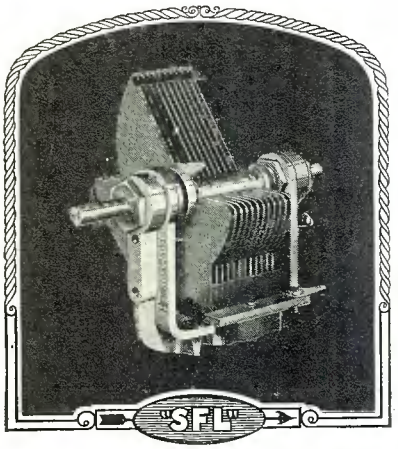


Fig. 2. Graphic illustration showing every lead in the entire receiver

HAMMARLUND *Precision* PRODUCTS

Are Officially Specified In These New Featured Circuits

Cockaday "LC27"
Sargent "Infradyne"
Lacault "LR4"
Henry-Lyford
St. James Super
Victoreen Super
Morrison "Varion"
New Harkness
Carborundum
Pacent "Ultimax"
Browning-Drake
Popular Science Monthly "Powerful"
Loftin & White
Hammarlund-Roberts "Hi-Q"

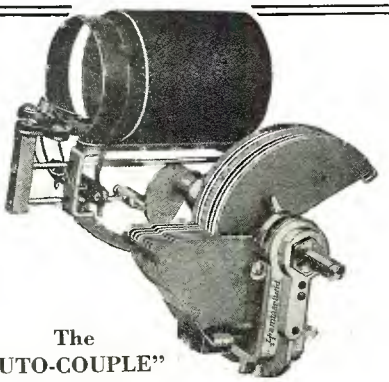


The Improved "SFL" Condenser

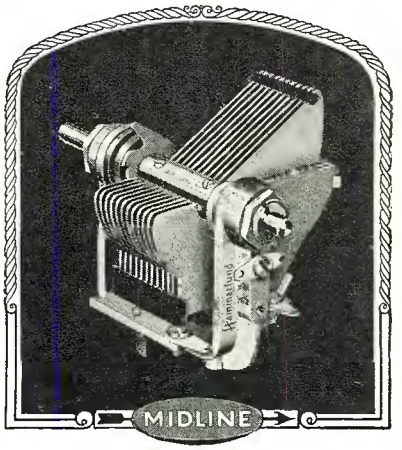
For the many enthusiasts who still prefer to use "Straight Frequency Line" Condensers, Hammarlund offers the best of its type, an improved model embodying all of the mechanical features found in the new Hammarlund "Midline" Condenser, described on this page. It is also made in the same standard sizes and sold at the same prices.

Space-Wound Coils

Hammarlund Coils are space-wound on a mere film of dielectric material, giving utmost efficiency with low losses. The "Auto-Couple" Coil provides automatic primary coupling for every broadcast wavelength. Actuated by a scientifically shaped cam attached to the extension shaft of the condenser, maximum transfer of energy is assured at every condenser setting, with control of undesirable oscillations. Coils, condensers and shields sold separately.

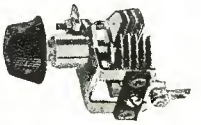


The "AUTO-COUPLE"
Used in the Hammarlund-Roberts "Hi-Q" Receiver



The New "Midline" Condenser

The most advanced condenser now before the radio public, the "Midline" includes all of the advantages of previous types without any of their disadvantages. It avoids crowding at any part of the broadcast wave band. The shaft of its full-floating rotor may be adjusted to any position or may be entirely removed and replaced by a longer shaft for tandem coupling to other condensers. It has ball and cone bearings and only one small piece of dielectric material. Strong, compact—measuring only four inches with plates fully open. One-hole mounting, with anchoring screw.



"Hammarlund, Jr."

A high ratio, shielded midget condenser with all the distinctive earmarks of Hammarlund design and workmanship. Used wherever small variable capacities and fine tuning are required. Baseboard or one-hole panel mounting. Knob included.

HAMMARLUND MANUFACTURING CO.
424-438 W. 33rd Street, New York City

We shall be pleased to refer to the proper authorities any inquiries regarding the above-mentioned receivers.

For Better Radio
Hammarlund
PRECISION
PRODUCTS

Write for Descriptive Literature of Hammarlund Products, used in the Popular 1927 Receivers.

The Hammarlund-Roberts HI-Q Receiver

This Modern Receiver Incorporates Dual Tuning, Stage Shielding, Automatic Coupling Variation, High Detection Efficiency, and a High Power Output

TRIED and proven fundamentals have been adhered to in the design of this circuit, but they are applied in new and different ways that produce greater selectivity, clearer tone, simpler tuning. This new Hammarlund-Roberts is the united achievement of ten of the leading radio engineers in the country; all concentrating on producing the most advanced and efficient receiver, regardless of cost.

Here is a receiver of five tubes, which employs two highly efficient stages of tuned radio amplification, a non-regenerative detector and two stages of high quality transformer coupled audio amplification, the second stage of which is so arranged that the new power tubes may be used.

Tuning has been held down to two major controls. Scientific shielding of the radio frequency units produces a receiver of unusual selectivity, sensitivity, quality and volume.

In theory the Hammarlund-Roberts Hi-Q Receiver is comparatively simple. It combines the sensitivity and selectivity of two stages of radio frequency amplification with the inherent stability and distortionless characteristics of a non-regenerative detector. While it is admitted that a regenerative detector provides a considerable degree of radio frequency amplification, it is well known that amplification secured in this manner has many drawbacks. Chief among these is the tendency to cut "side bands," a type of tone distortion which has a very disagreeable effect when passed on to the loud speaker. In order to avoid this and other types of "regenerative" troubles without sacrificing sensitivity, the two radio frequency stages have been designed to insure an extremely high degree of amplification.

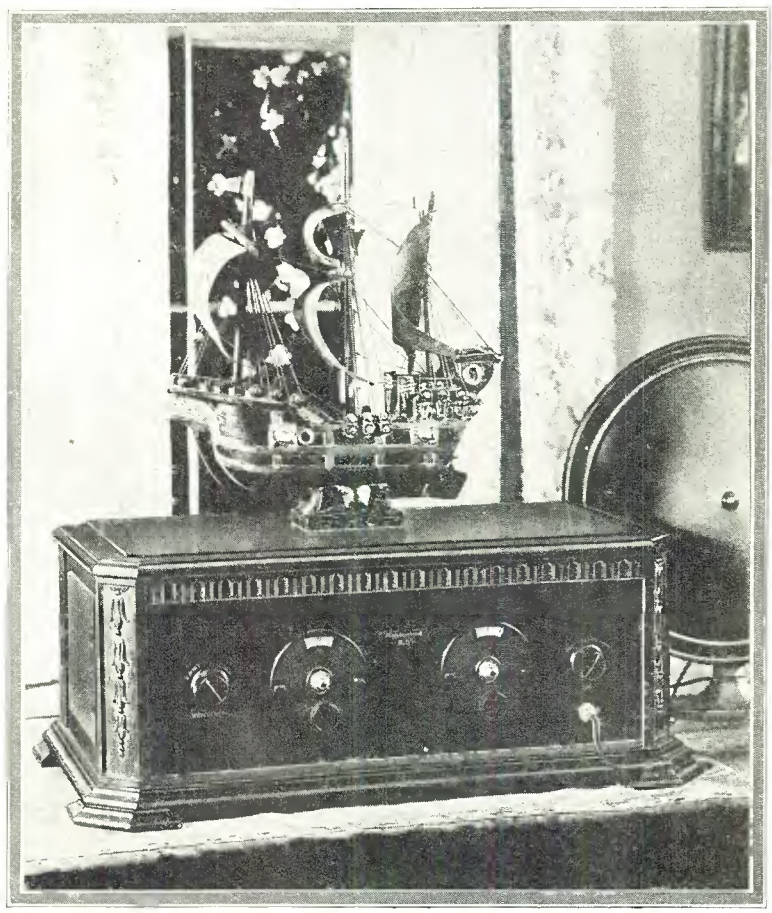


Photo A. Front view of receiver in cabinet

After providing for a high quality audio output from the detector, a two stage transformer coupled audio amplifier is used to step up the signals to loud speaker intensity. The transformers used in the audio amplifier have a high primary impedance, insuring faithful reproduction of the lower musical and speech tones. The secondaries are wound by a special helical process which reduces distributed capacity to a minimum so that the higher audio frequencies and their harmonics are passed on to the loud speaker without loss. This results in the reproduction of the higher musical tones of such instruments as the violin with full "life" and "brilliance," and aids very materially in removing the "dull" and "muffled" effects so commonly associated with loud speaker reproduction.

Although the receiver has three radio frequency circuits, the tuning controls have been reduced to two by placing the second and third variable condensers on the same shaft. A small compensating condenser in parallel with the third variable condenser has been provided to compensate for the small difference in circuit capacity of the third tuning circuit chiefly due to the detector grid condenser. This compensator needs no adjustment after its setting has once been determined.

A volume control has been provided which is exceptionally smooth and gradual, allowing the operator to adjust for a powerful local or a weak and distant station with equal facility. This volume control is a Carter 10-ohm rheostat regulating the filament brilliancy of the two radio frequency amplifier tubes. To eliminate the possibility of applying more than the rated voltage to the filaments of these tubes, a 2-ohm resistance unit is used in series with the radio frequency tubes and rheostats. The filaments of the remaining tubes are held at their proper operating temperatures by separate amperites.

Since the second radio frequency stage and the detector stage are shielded, unwanted signals are weeded out due to the filtering action of the three sharply tuned circuits through which they would have to pass in order to reach the detector tube. This shielding also prevents direct pick-up by the second radio frequency and detector circuits.

The use of stage shielding also eliminates any interaction between circuits, thereby stabilizing the radio frequency amplifier and greatly increasing its overall efficiency.

No shield is necessary on the first radio frequency stage, although the receiver is designed so that a shield can also be used for this stage if desired.

The output of the second radio frequency stage, which is a highly amplified copy of the original signal picked up by the antenna, is then fed to the non-regenerative detector, where it is demodulated or converted into audible frequencies. These audio currents, or electric sound waves, are then further increased in strength by the two stages of transformer coupled audio frequency amplification and passed on to the loud speaker.

The two stages of radio frequency amplification used present some rather new and novel features in the design of the antenna coupling coil and the interstage radio frequency transformers. The design of these coils is based on two fundamental laws of radio engineering that are as old as radio itself. The first of these laws is this: up to a certain point an increase in the coupling between two coils affords an increase in energy transfer and a decrease in selectivity. The second law is this: the energy transfer between two coils such as the primary and secondary of an ordinary radio frequency transformer increases rapidly as

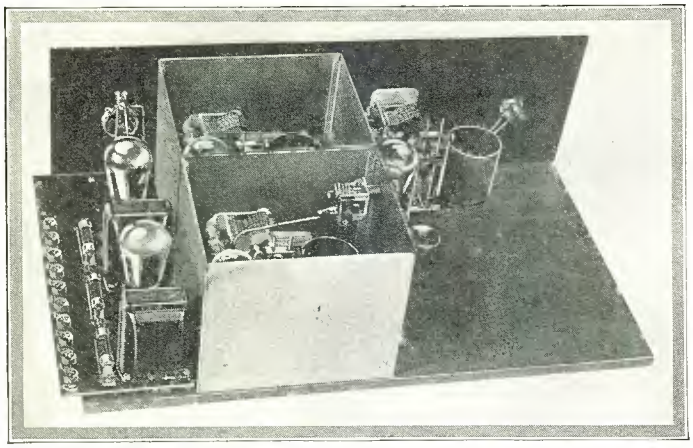


Photo B. Rear view showing parts assembled on baseboard

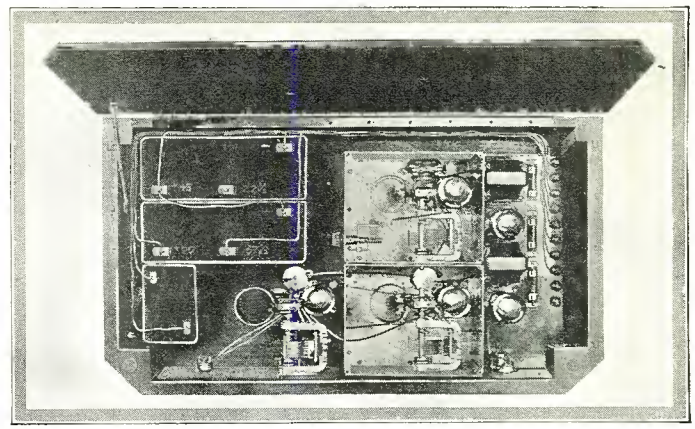


Photo C. Top view of receiver in cabinet with "B" batteries

the frequency increases. In other words, the energy transfer is much greater at high frequencies (short wavelengths) than at low frequencies (long wavelengths), and the relative selectivity is less at high frequencies and greater at low frequencies. Conversely, a constant transfer of energy and constant selectivity can be maintained by loosening the coupling as the frequency is increased.

A successful broadcast receiver must be capable of receiving wavelengths from 200 meters (1500 K. C.) up to 545 meters (550 K. C.). This represents two extremes in frequency corresponding to a range of about three to one. These requirements together with the two laws stated above make it evident that some means of variable coupling must be provided if we are to obtain equal energy transfer and selectivity throughout the broadcast spectrum. Since the trend in modern broadcast receivers is toward simplicity of tuning, the addition of variable coupling controls was not advisable. Therefore, designers have developed a radio frequency transformer in which the coupling between the primary and secondary coils is automatically varied by the rotation of its associated tuning condenser. This variation in coupling is smooth and continuous and is accomplished by means of a cam on the variable condenser shaft. At the setting of zero on the condenser dial (which tunes the transformer to a wavelength slightly below 200 meters) the coupling between primary and secondary is minimum. As the tuning dial is advanced toward 100 the coupling increases gradually until it reaches maximum, when the condenser dial reads 100, at which time the circuit is tuned to a wavelength of about 560 meters. The antenna coupler is designed to make use of this same efficient principle, and, in addition, the antenna coil itself is tapped and a switch provided in order to afford a further coupling variation to suit different length antennas and to provide extremely loose coupling in very congested areas.

This automatic variable coupling feature made it possible to use a comparatively large number of turns in the primaries of the radio frequency transformers. This large primary allows great energy transfer and consequent loud signals on the longer wavelengths where the coupling between primary and secondary is closest.

However, this large primary and close coupling would be totally unsuitable at the shorter wavelengths. This difficulty is overcome by automatically loosening the coupling as the receiver is tuned to the shorter wavelengths, thereby maintaining a high degree of selectivity without sacrificing signal strength. This is due to the fact that the same amount of energy transfer can be obtained with looser coupling at short wavelengths than at long wavelengths.

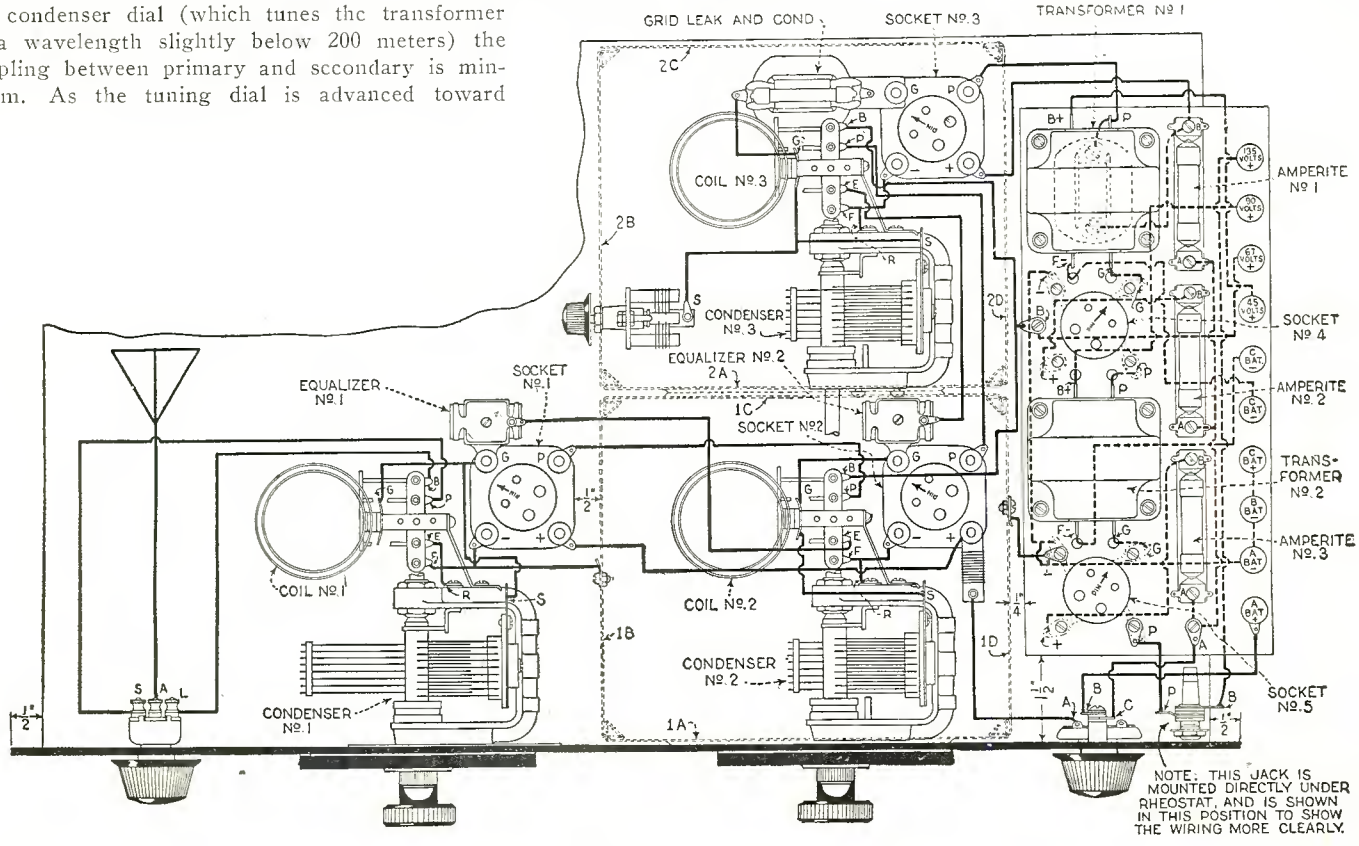


Fig. 1. Pictorial wiring diagram

In order to permit the use of more efficient stage coupling coils, equalization of disturbing potentials has been incorporated, thereby allowing a higher degree of amplification, with consequent louder signals and greater distance-getting ability, without the usual troubles caused by self-oscillation.

It will be well for the builder to observe closely the system employed in assembling and wiring. Usually it is the custom to assemble the entire receiver and then do all the wiring. Here the assembly is done jointly with the wiring. This tends toward ease of building because the hand is not hindered by the obstruction of parts not yet in place. The section method of building up the shield makes it possible to wire easily the parts which will later be completely enclosed by the shield.

The first step in the construction of the receiver is to attach the front panel to the baseboard and mount the panel instrument as shown in the picture diagram.

Now mount tuning condenser No. 1 with its small shield. The single hole mounting nuts on this and the other tuning condensers are not used and may be discarded.

After removing the mounting nuts and the short shafts from the remaining two condensers, mount one of them, first placing shield section No. 1A between the condenser and the panel.

Loosen the screws in the friction brakes of all condensers. Now slide the two aluminum strips of the foundation unit in place, taking care to place them in their correct positions. Then slide shield section 1E on top of these strips and under the lip of the panel shield section so that the holes in the lip of the panel shield, the bottom shield and the shield strips line up.

Socket No. 2 should then be screwed in place and socket No. 1 is fastened to the baseboard in line with socket No. 2.

Now loosen the two set screws in the rotor of the first tuning condenser, slide the shaft back so that ⅜ inch projects beyond the rear bearing, and then retighten the rotor set screws. Mount one of the Auto-Couple coil cams on the projecting shaft so that the set screw in the cam is exactly on top (looking down on the set) when the plates of the condensers are all the way in.

Before mounting the coils on their condensers remove the long adjusting screws in the square brass posts at the primary end of the coils, because they will be extremely difficult to remove when the assembly is completed.

After removing these screws mount the coils on the two condensers as shown, using the brackets and screws packed with the coils.

The cams on tuning condensers Nos. 2 and 3 are not yet to be mounted, but the same mounting instructions given above will later apply to these two condensers.

The assembly is now ready for the first part of the wiring.

Use the special wire solder in the foundation unit and a light iron, which should first be cleaned and properly tinned.

Be extremely sparing with the amount of flux used and use just enough solder to run in the joint and make a firm connection. Large gobs of solder are entirely unnecessary and only serve to make an otherwise good job look unworkmanlike. If the iron is hot enough to cause the solder to flow freely, no trouble should be experienced in making neat and permanent joints.

In wiring, all leads should be run by the most direct routes, and no attempt should be made to secure square bends or other old-fashioned ideas in wiring. Care should be taken to see that none of the wires interfere with the full motion of the condenser rotor plate moving primary coils and their cams and flexible connectors.

LIST OF PARTS

These parts or their equivalent will give satisfactory results:

2—Samson Transformers, type HW-43 (3-1 ratio)
3—Hammarlund .00035-mfd. Midline Condensers
3—Hammarlund Auto-Couple Coils (set of 3 coils)
1—Hammarlund Jr. Condenser, 9 plates, 32 mmfd.
1—Hammarlund-Roberts "How to Build It" Book
2—Mar-co No. 192 Vernier Dials
3—Benjamin No. 9040 Sockets (with bases)
2—Benjamin No. 9049 Sockets (without bases)
2—Amperites No. 1A
1—Amperite No. 112
1—Carter No. M-10-S Combined Rheostat and Filament Switch, 10-ohm
1—Carter No. 1 "Short" Jack
1—Carter No. 12 "Imp" Aerial Switch
1—Sangamo .00025-mfd. Fixed Condenser
1—Sangamo .001 mfd. Fixed Condenser
1 Pair Sangamo Grid-Leak Clips
1—Durham Metallized Resistor, 3 megohms
10—Eby Engraved Binding Posts
1—Hammarlund-Roberts Hi-Q Foundation Unit (containing drilled and engraved Westinghouse Bakelite Micarta panel, drilled Bakelite Micarta sub-panel, two complete shields, two equalizers, extension shaft, resistance unit, wire, screws, nuts and all special hardware required to complete receiver.

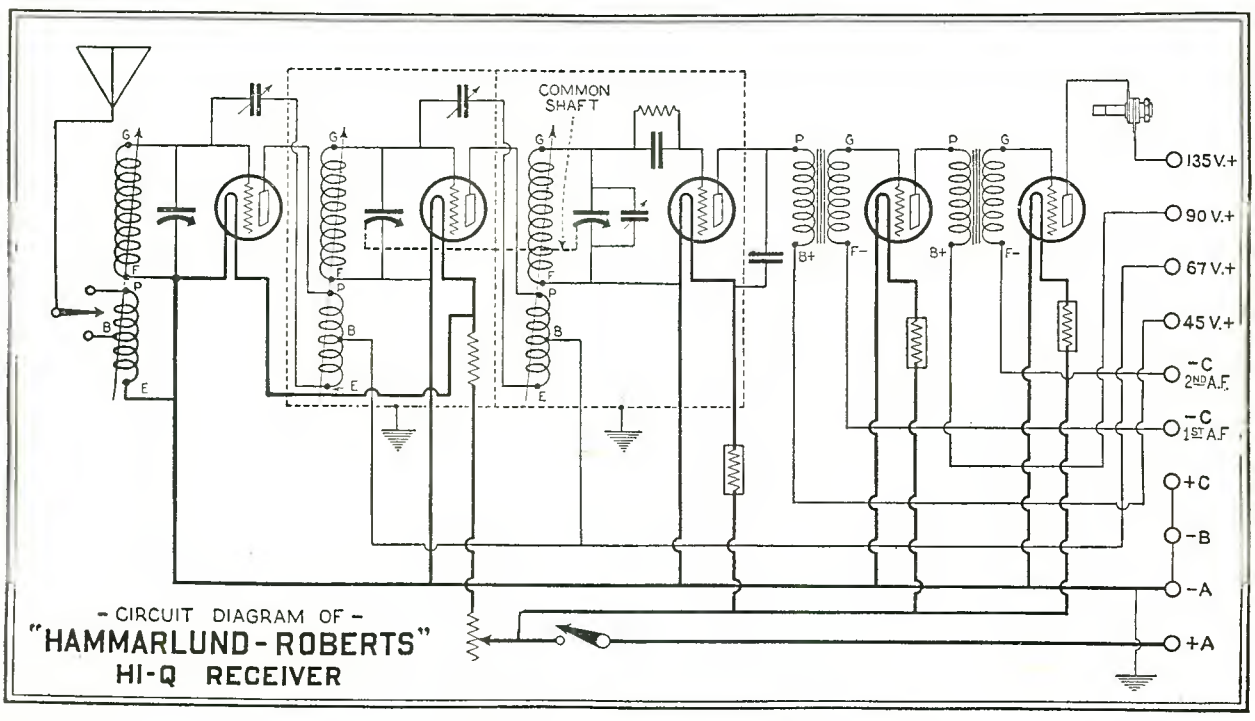
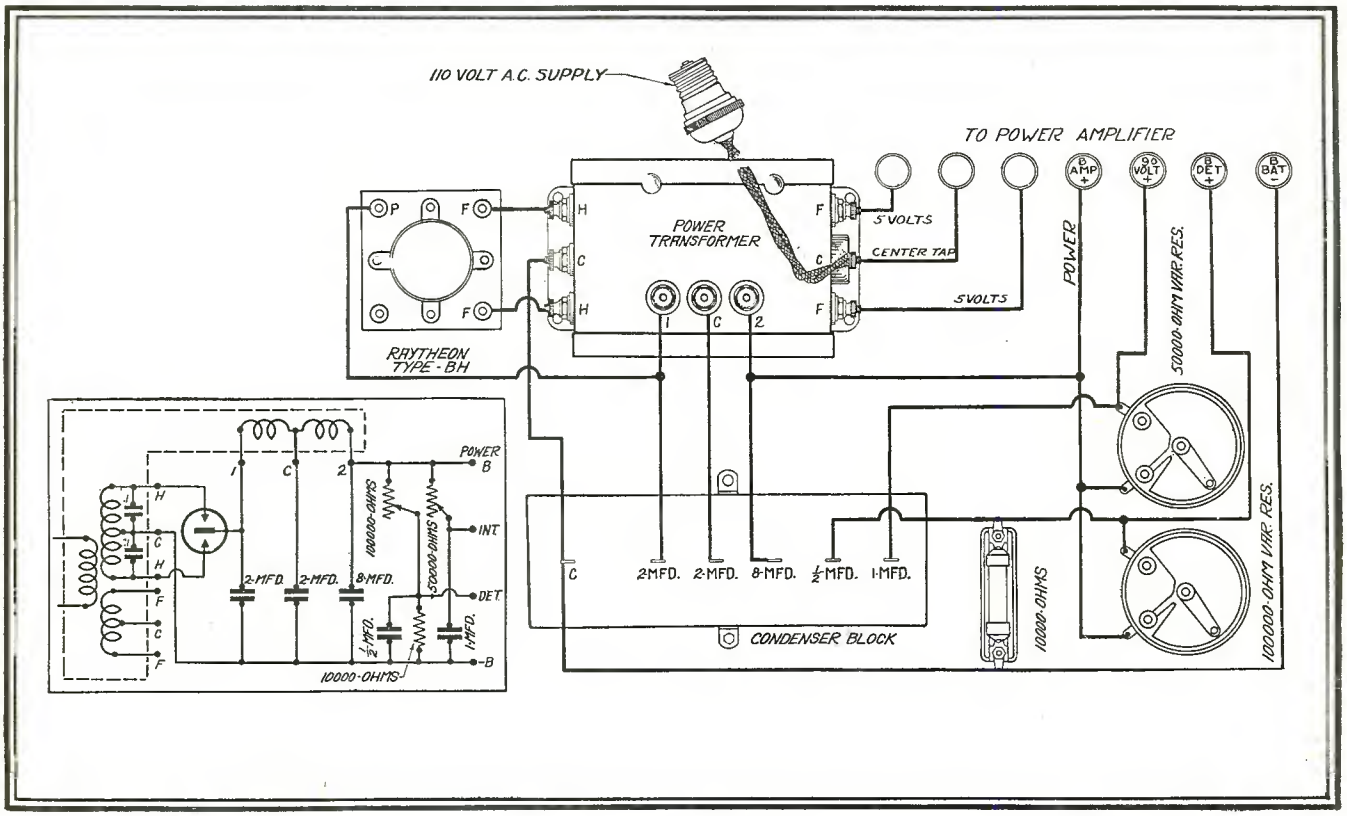
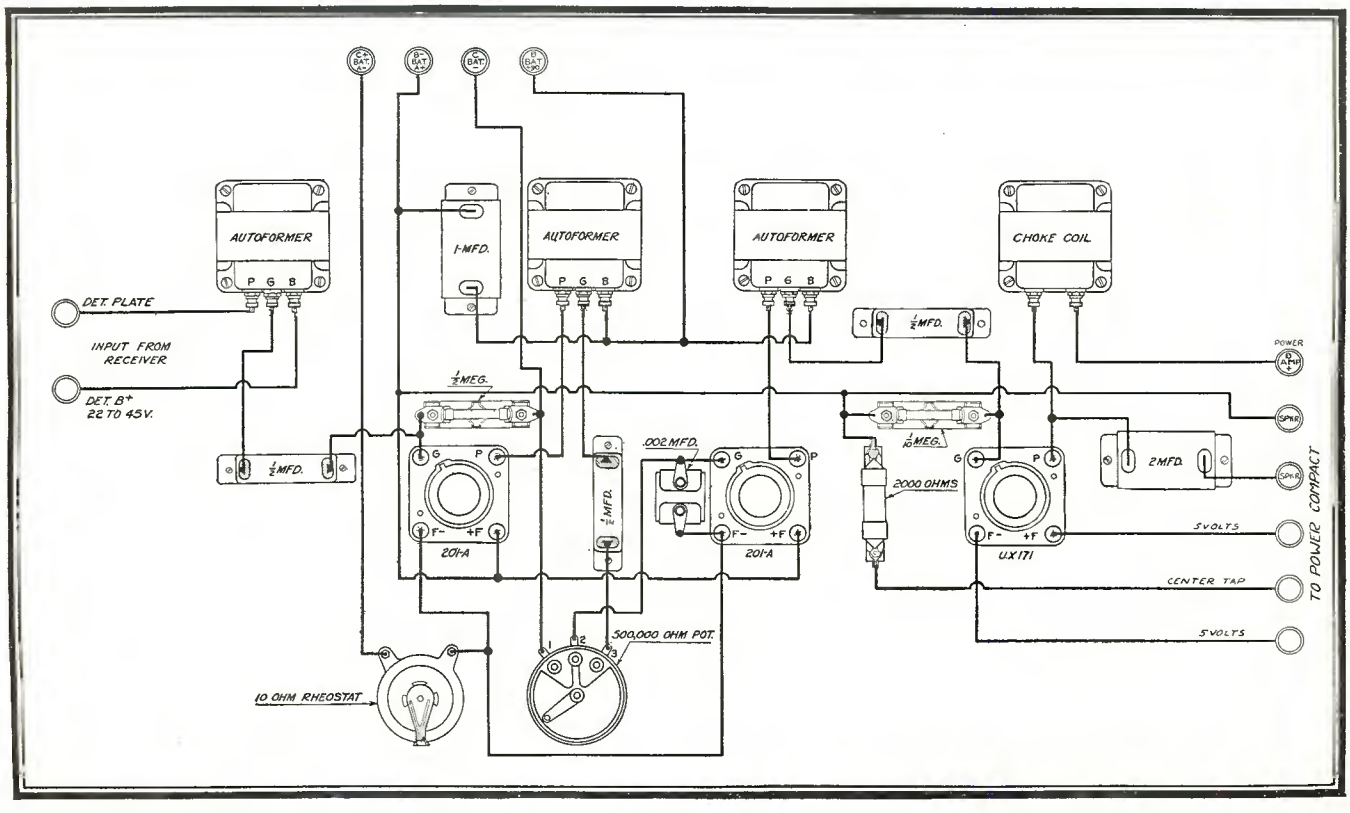


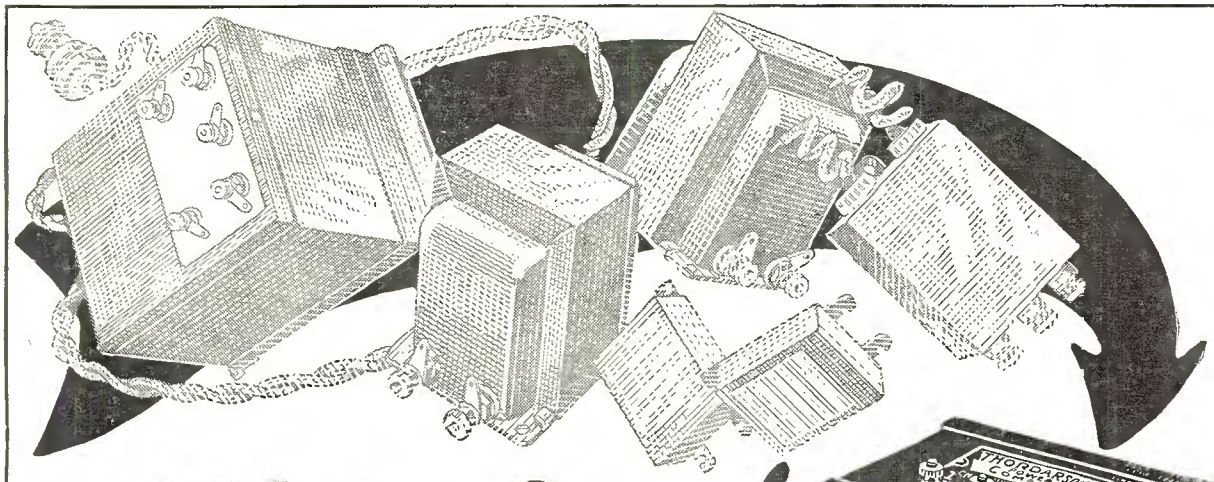
Fig. 2. Schematic wiring diagram



Graphic and Schematic Diagrams of Thordarson "B" Compact

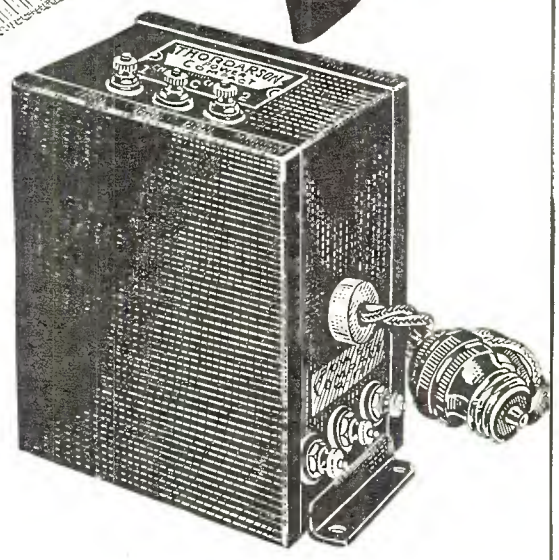


Thordarson Power Amplifier Using Autoformers



All in One!

THORDARSON POWER COMPACT



TYPE R-171

Contains a power supply transformer for Raytheon BH rectifier, 2 filter chokes, 2 buffer condensers, and a filament supply for UX 171 power amplifying tube.

$15.00

TYPE R-210

Contains a power supply transformer for UX 216-B rectifier, 2 filter chokes, and a filament supply of 7½ volts for UX 210 power amplifying tube.

$20.00

The Complete Foundation Unit

for power amplification and B supply

Simplified Assembly. The Power Compact contains within itself the greater part of the complete B supply unit. With the Type R-171, only 14 leads complete the Raytheon assembly. All terminals are carefully located for the greatest ease of assembly

Compactness. The only additional apparatus required to build the B supply are the condenser block (Raytheon type), a Raytheon tube BH, and the resistance units. The complete eliminator occupies a space of but 6 in. x 9 in. without crowding.

High Efficiency. The power supply of either Power Compact furnishes the proper current for maximum efficiency of the rectifiers used; the chokes are of sufficient capacity to carry the maximum output. Conservatively rated, will not heat up in continuous service.

High Voltage Output. The R-171 Power Compact assembly will deliver a maximum plate voltage output of 300 volts at 30 milliamperes, or 275 volts at 40 milliamperes.

The R-210 type assembly will deliver 400 volts to the plate of the power tube, and in addition, will supply a constant 90 volts to the receiver at any current drain up to 40 milliamperes.

Silent in Operation. There is no traceable hum, either mechanical in the compact itself, or electrical through the loudspeaker.

Complete Supply for Power Amplification. The Power Compact not only supplies B voltage, but also provides for the filament current and grid bias of the stage of power amplification. *Makes it possible to use power amplification even on sets designed for dry battery operation.*

Electrically Centered Filament Supply. The power tube filament supply *is tapped at the exact electrical center for grid return.* The center tap is taken from the common lead of two perfectly balanced windings—completely obliterating the A. C. hum. (An exclusive Thordarson feature.)

Write for instruction booklets SD-49 and SD-50.
If your dealer cannot supply, order direct from the factory.

THORDARSON ELECTRIC MANUFACTURING CO.
Transformer Specialists Since 1895
WORLD'S OLDEST AND LARGEST EXCLUSIVE TRANSFORMER MAKERS
Huron and Kingsbury Streets — Chicago, Ill. U.S.A.

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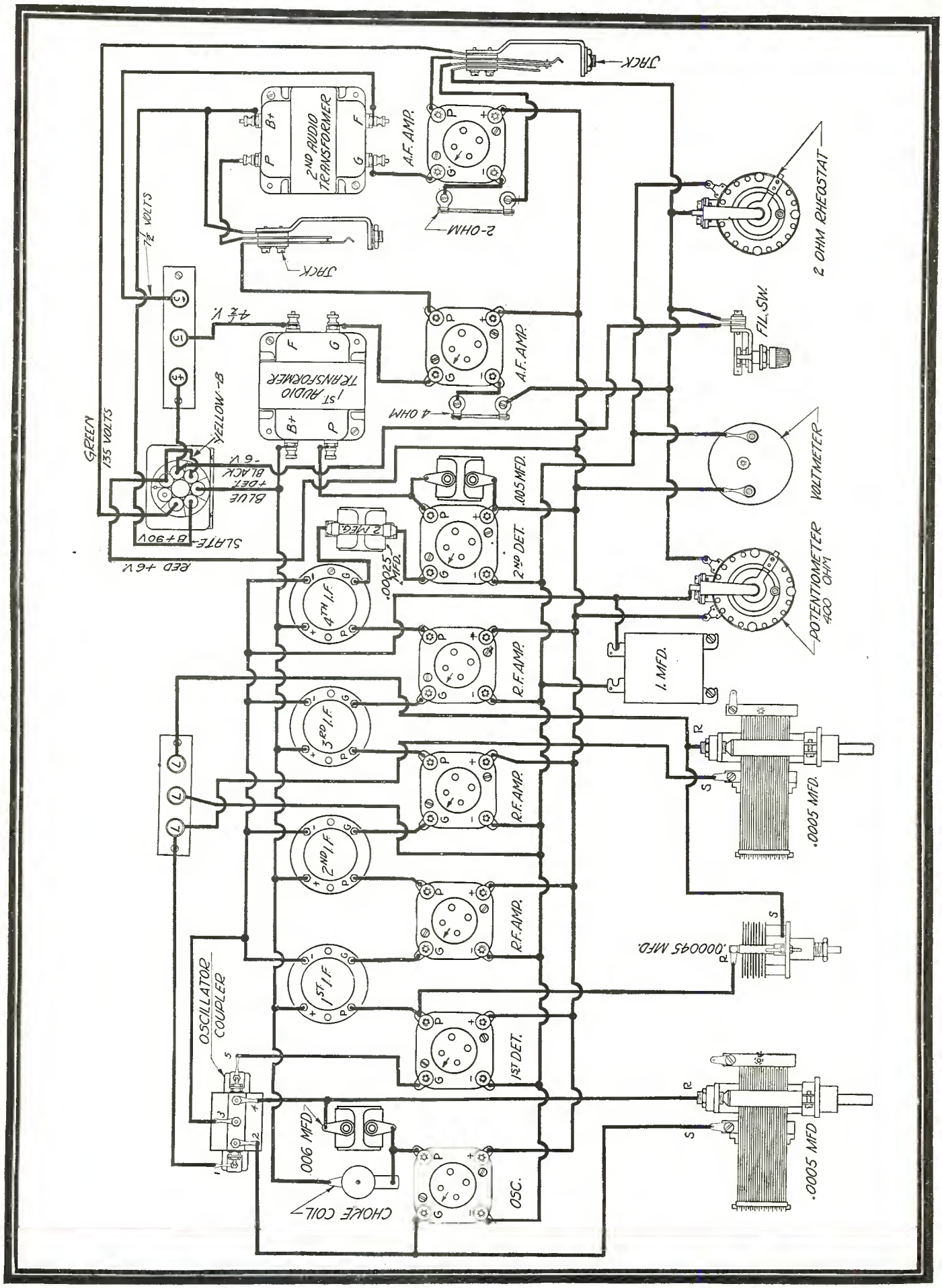
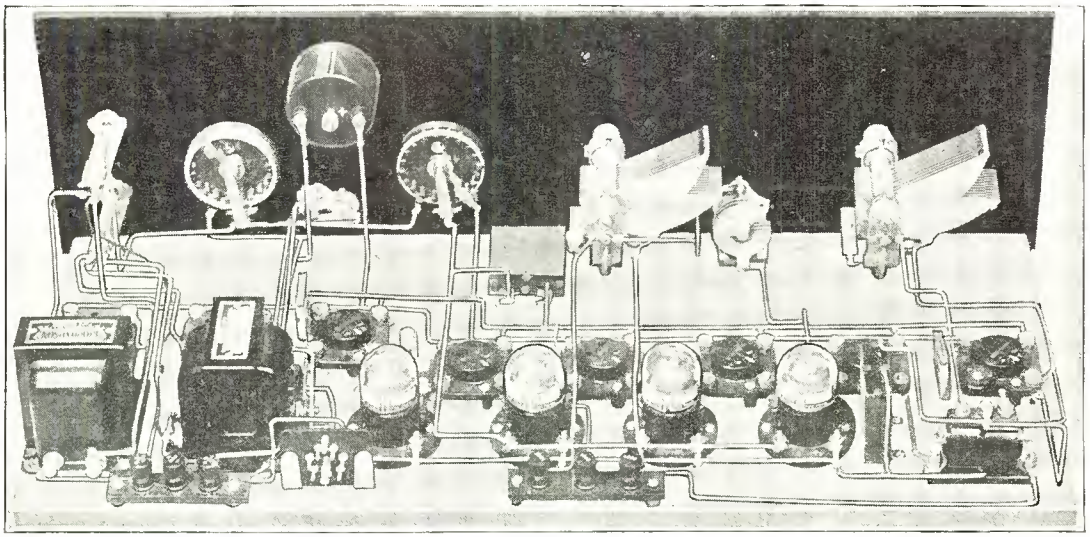


The Improved St. James Superheterodyne

The ST. JAMES Two Forty Receiver



Radio's Outstanding Development of the Year

Using the vacuum treated, dehydrated air core transformer designed for highest efficiency. Operating at 240,000 cycles they are guaranteed to be matched within 50 cycles.

Note the simple wiring scheme as shown above, and the absence of large inductances — that means greater selectivity and less effects from extraneous or interfering causes, giving smooth powerful quality reception.

Hundreds of congratulatory letters, telegrams and personal calls have testified to the wonderful performance of the ST. JAMES TWO-FORTY, and invariably, special comment is made on the extraordinary tone quality and volume of the distant stations.

The St. James Transformer

Especially wound air core inductances, exactly matched.

Bakelite base with terminals permitting very short leads.

Pat. Pend.

Full size illustration shows the small dimensions of coils.

Glass bulb enclosure with contents vacuum treated, then sealed from further effects of moisture.

YOU can build this set, as the full size working plans are very complete and easy to follow. **Absence of adjustments** insures immediate operation and consistent results. Our service department gives you prompt, courteous and intelligent assistance.

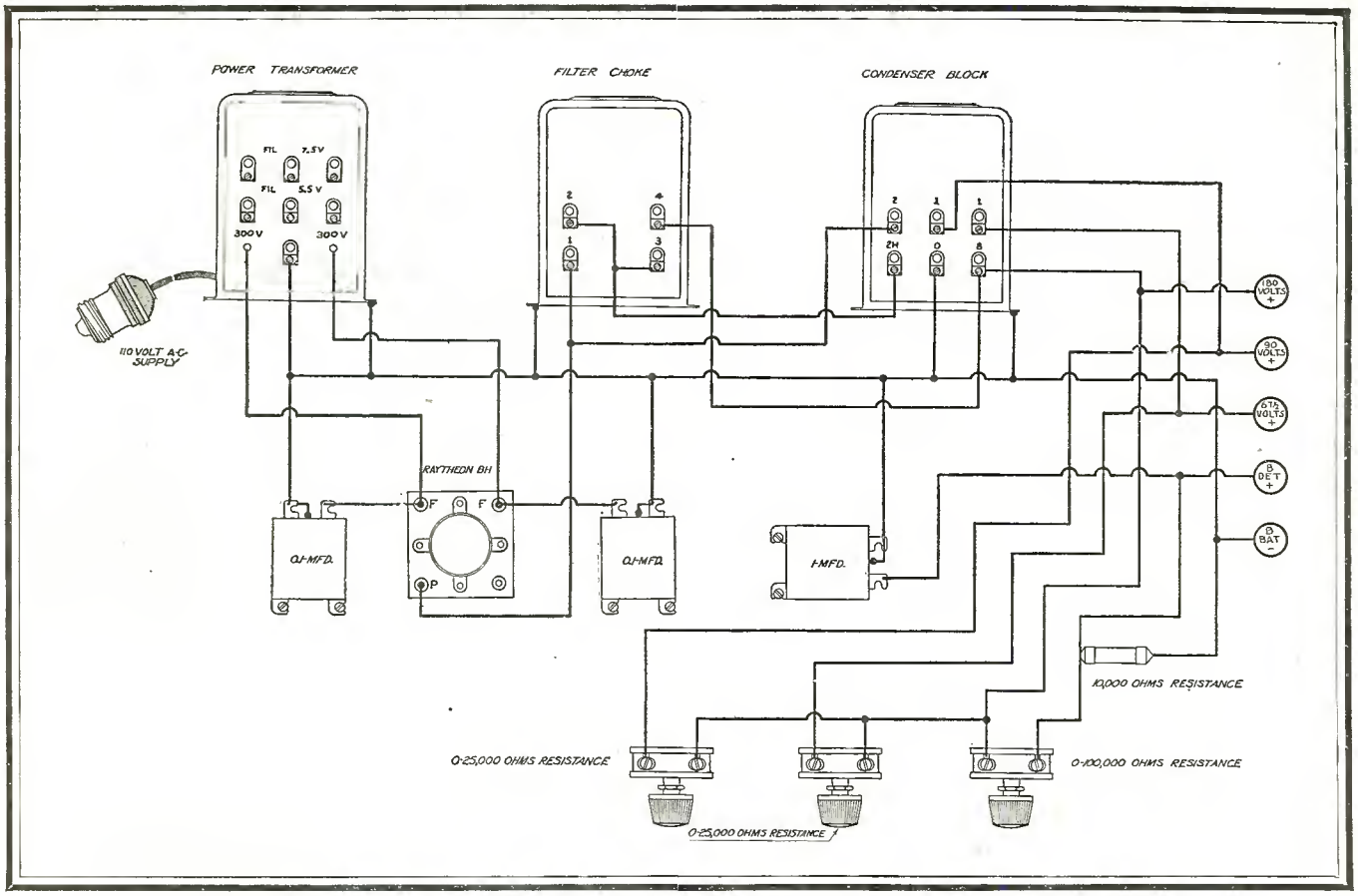
Folder B furnished on request, tells you more of the principles involved in the design of this receiver. Write today.

Special offer. If your dealer cannot or will not supply you with St. James Devices, we will on receipt of $36.50 furnish you with the four specially matched transformers, Oscillector and choke coil, all shipping charges paid. The working plans will be included without charge.

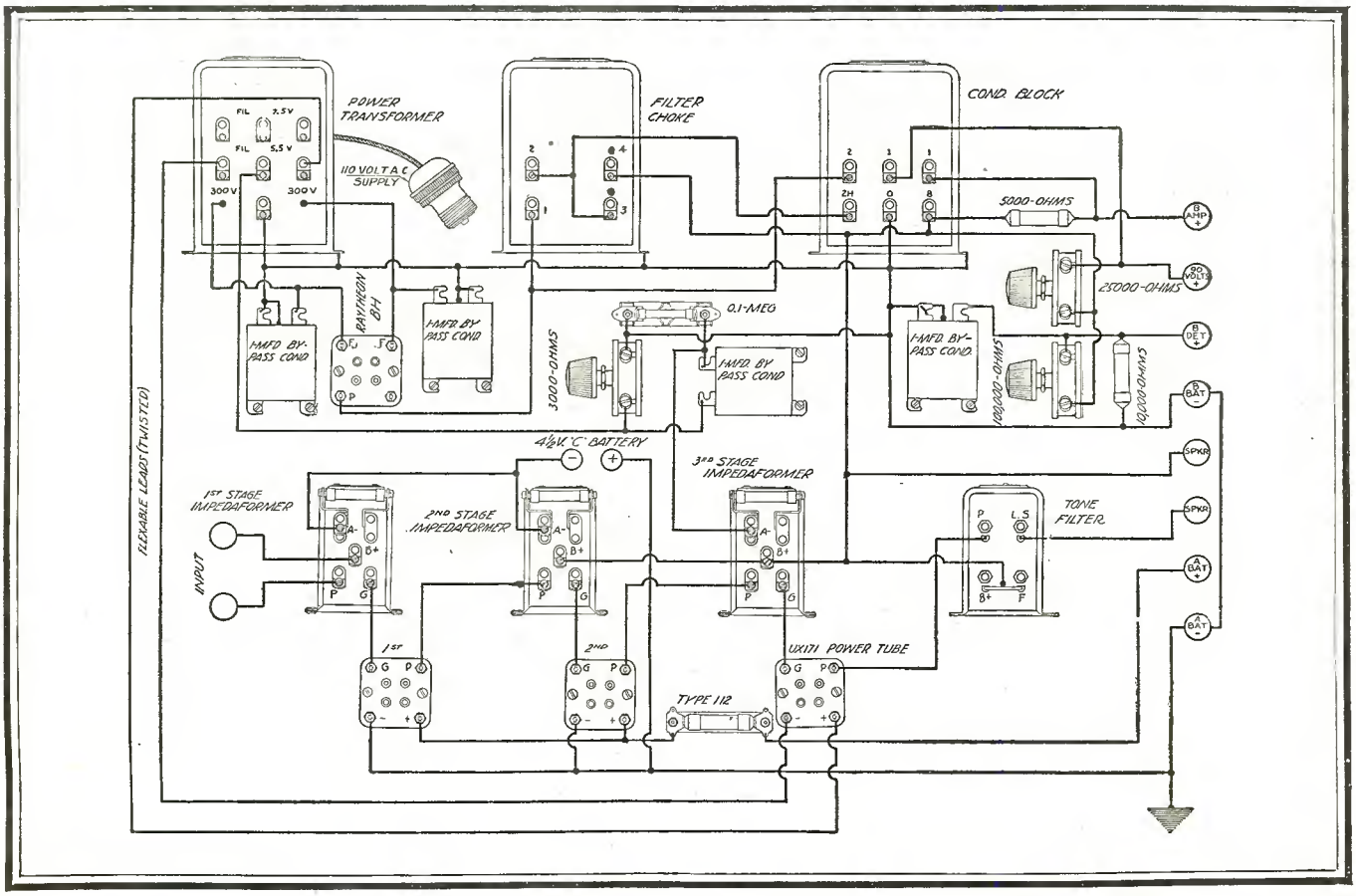
If, after a fair test, you are not satisfied with its performance, and you do not obtain finer reception than you ever have heard before, we will refund your money immediately they are returned to us in good condition.

St. James Laboratories, Inc.

845 Washington Blvd. **Chicago, Ill.**



National "B" Eliminator Using Type "BH" Raytheon Tube



National "B" Eliminator and Power Amplifier

NATIONAL B-POWER SUPPLY EQUIPMENT

To MAKE GOOD

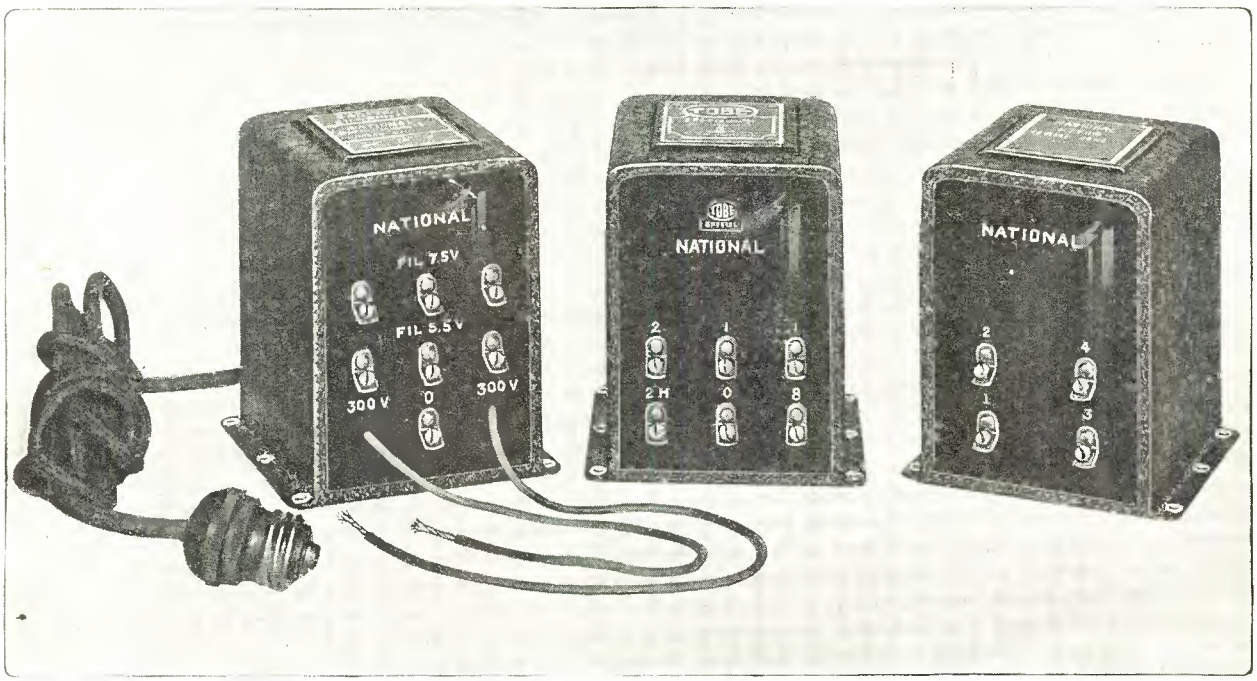
B-Power-Supply Units and Power Amplifiers, NATIONAL CO. INC. has now developed in collaboration with James Millen, these finer units;—adaptable to several best makes of rectifier tubes,—capable of carrying heavy loads continuously without heating or harm,— arranged for simplest and most direct wiring. Only the finest and most adequate materials we can buy are used. TOBE High-Voltage Condensers are employed in the TOBE SPECIAL B BLOCK.

First, we made these units as well as we could;— then and only then determined what they must sell for. The makers of the NATIONAL BROWNING-DRAKE Coils and R.F. Transformers have standards and a reputation to guard and maintain. And the fine appearance of these units reflects their sound engineering design.

National
Tone-Filter

An iron-core inductance of proper value and 2 Mfd. TOBE Filter Condenser, through which to pass power tube output, for improvement of quality and protection of speaker windings. Complete with 5 foot cord and tip jacks, for instant attachment.

Price $8.00



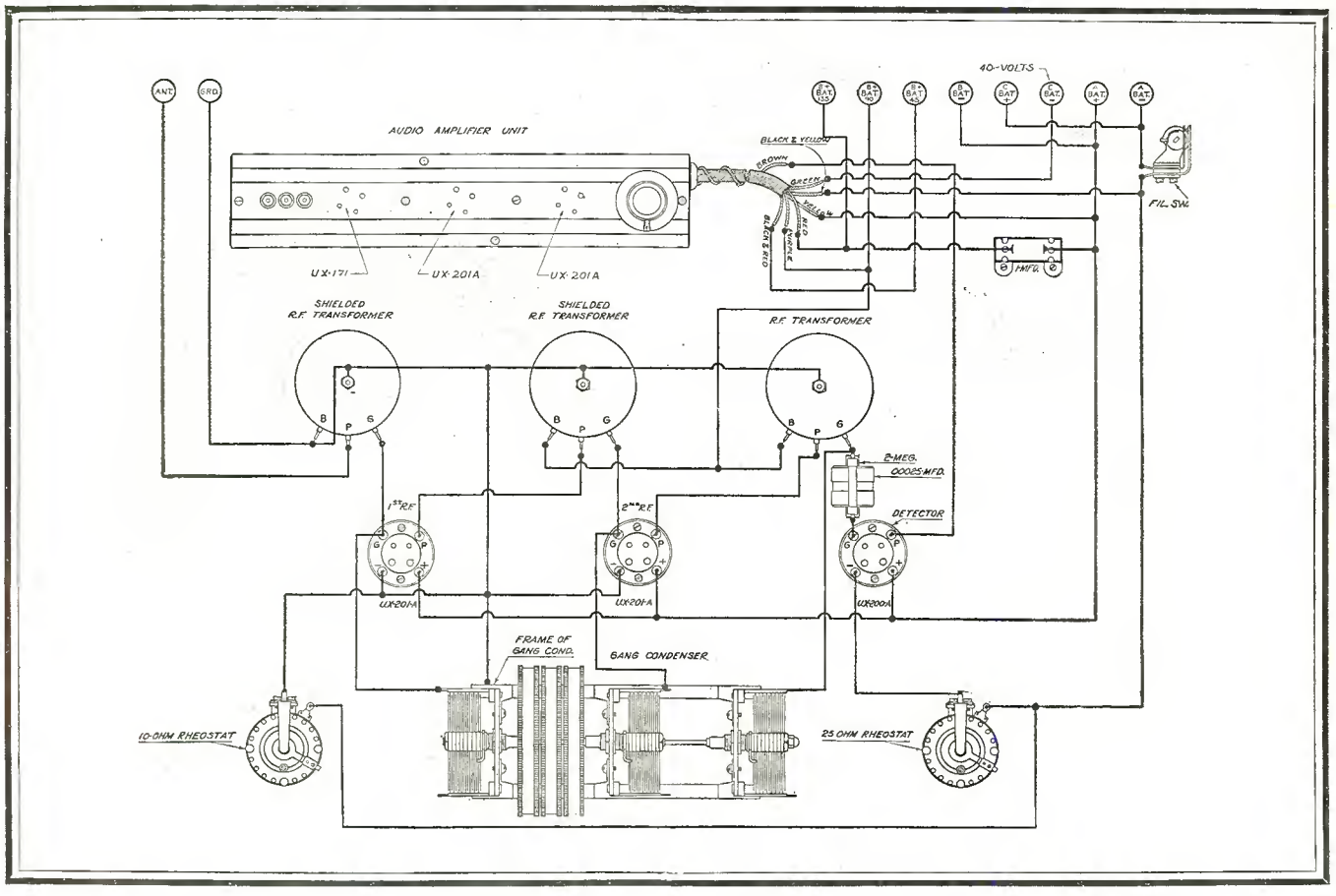
NATIONAL Power Transformer, $16.50; TOBE SPECIAL B-BLOCK, $17.50; Filter Choke Unit, Type 80, $10.00.

BE SURE YOU GET THE GENUINE

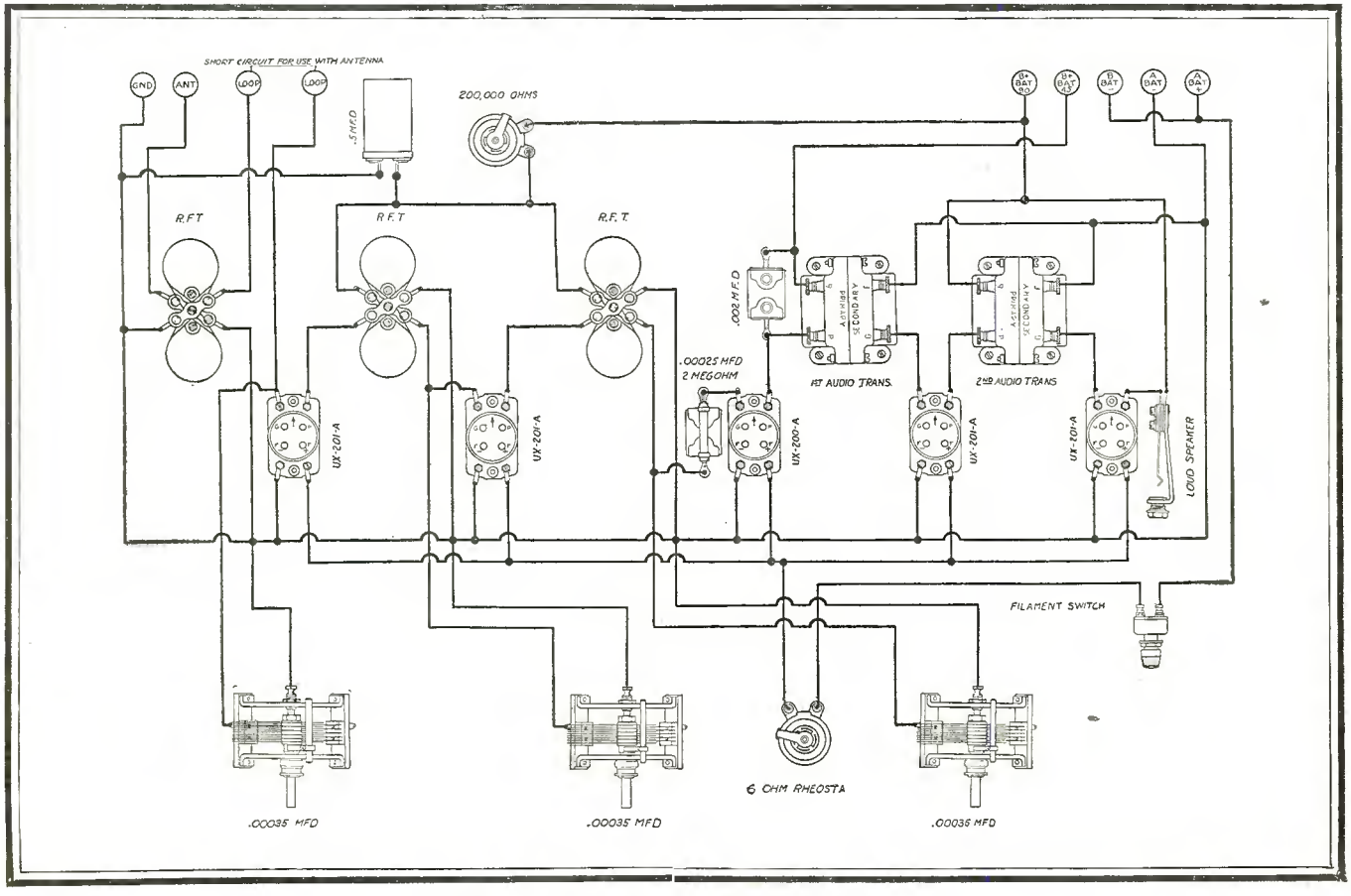
NATIONAL

RADIO PRODUCTS

NATIONAL CO., Inc. makes BROWNING-DRAKE Coils and R. F. Transformers;—NATIONAL "EQUICYCLE" and "EQUIMETER" Variable Condensers, NATIONAL VELVET-VERNIER Dials, including the ILLUMINATED Type C Dial;—NATIONAL Impedaformers, for quality audio;—NATIONAL Transmitting Variable Condensers and other Radio products.—NATIONAL COMPANY, Inc., Cambridge, Mass.



Six-Tube Receiver Using Alden Localized Control and Truphonic Amplifier



Bodine "Twin Eight" Receiver

"— remarkably good!"

ALL-AMERICAN
TRADE MARK
Reproducer

ALL-AMERICAN
TRADE MARK
Constant-B
Battery Eliminator

That is the judgment, without exception, of radio experts and enthusiasts who have examined and tested these two fine units.

They mean *better reception.* Both have a great deal to do with finer tone-quality. You owe it to your own enjoyment of radio, to know the facts about these fine-quality accessories.

ALL-AMERICAN *Reproducer*

For purity of tone this handsome product is outstanding among reproducers. It combines ingeniously all advantages of good cone-type reproducers —and the improved quality provided by a special sounding board and sounding chamber. A highly sensitive unit which reproduces voice and instruments naturally and clearly. Perfect uniformity is maintained over the entire musical range, whether amplifiers are turned to full volume, or down to a whisper. Absolute freedom from "inherent pitch" prevents low throaty tones or twangy nasal effects.

Price $25.00

ALL-AMERICAN *Constant-B*

An attractive compact unit of silent efficiency —insures a dependable supply of uniform plate current. Five output taps; negative, +45, +67, +90, and a power tube tap adapt "Constant-B" to all requirements. A "Detector" control provides voltage variation between 10 to 60 volts. An "Amplifier" control allows a variation of 10 to 120 volts on the intermediate tap, without affecting the 90 volts supplied to first audio stage. A High-low switch adapts "Constant-B" to receivers of various current requirements.

Price $37.50 Complete with Raytheon Tube

Prices are slightly higher West of the Rockies

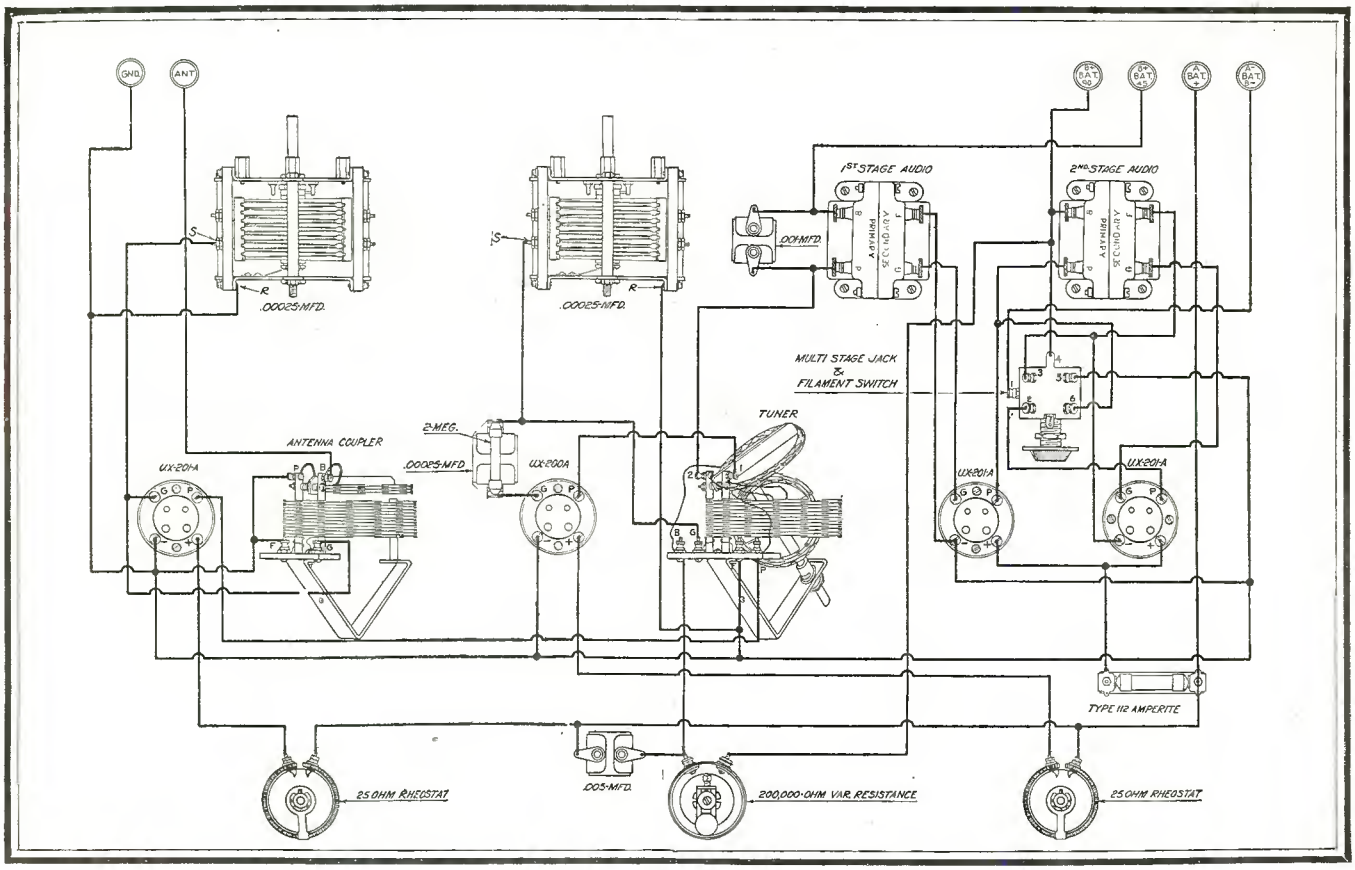
New 1927 Radio Key Book

Learn more about the fundamentals of radio. This *new* 48-page book contains an interesting analysis of radio in language anyone can understand—also complete constructional details of the leading types of circuits. Sent for 10c (coin or stamps) to pay for postage and mailing.

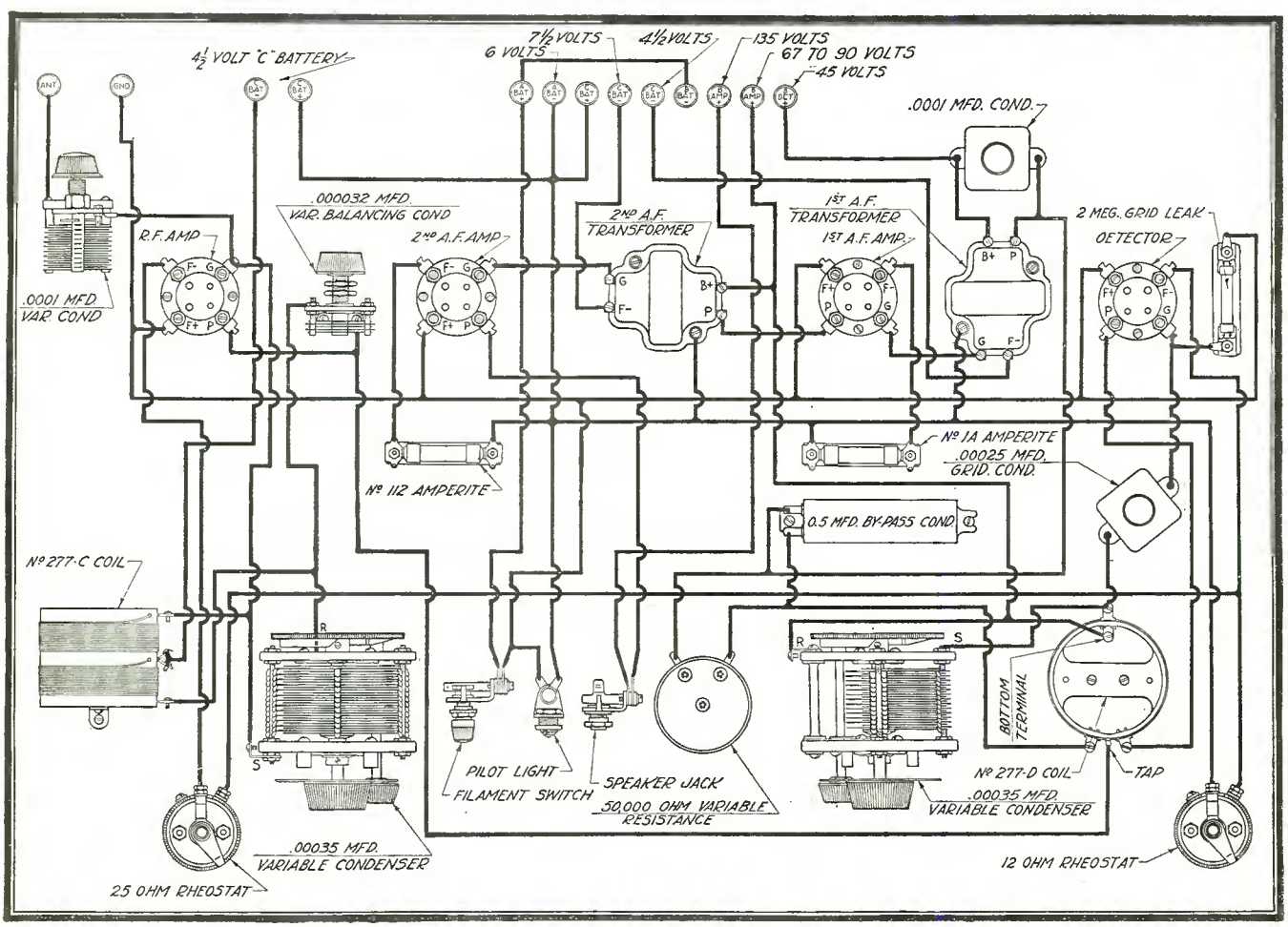
ALL-AMERICAN RADIO CORPORATION

4221 Belmont Avenue, Chicago, Illinois

OWNING AND OPERATING STATION WENR ~ 266 METERS



Four-Tube Non-Radiating Receiver



The Universal Receiver

30 Days Trial

Only ONE Dial to Tune

1 Dial 5 Tube $57.00 RETAIL PRICE

THE LAST WORD IN RADIO--- and the biggest values ever offered

Yes Sir!—you can put a NEW 1927 Model Westingale, 5-tube Radio in your own home and use it to your heart's content on 30 DAYS' TRIAL. Entertain your family and friends. Listen to the music, concerts, sports, news, market reports from stations all over the country. Compare it with other sets for beautiful appearance—wonderful performance and low price—and if you are not convinced that Westingale gives you the greatest measure of Radio satisfaction and the best value for the money—YOU DON'T HAVE TO KEEP IT.

Westingale Sets have been tested and approved by Popular Science Institute, Radio News and Popular Radio Laboratories,—also by the Radio Depts. of Farm Mechanics Magazine and Capper's Farm Publications.

POWERFUL-- DEPENDABLE **WESTINGALE** 5-TUBE-- COAST TO COAST

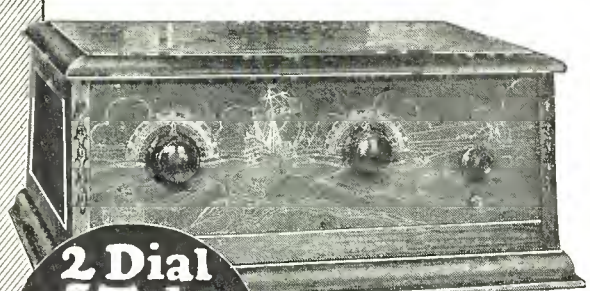
Don't buy any Radio until you send the coupon below for our FREE Catalog which pictures and describes both the new 1-Dial and 2-Dial Models. Why pay more? Why not get the NEWEST Radio? Why take chances when all we ask is a 30-Day Trial at our risk to convince you that these NEW 1927 Westingale Models are years ahead in powerful reception—wonderful loud clear tone—handsome appearance—and EASY, simple control.

Look at these two distinctive Westingale Models—they're the last word in every way. Every late feature—every new worth while idea is embodied in their make up. Newest style period type cabinets. Two-tone, hand rubbed Walnut finish. The front panels enhanced with an artistic Spanish Galleon design embossed in dull gold, these new Westingale Models are unsurpassed in appearance—unbeatable in performance—and unbeatable in price.

Agents Wanted Everywhere---Buy at Cost

Right now we want to appoint an agent or dealer and place one demonstrating set in each locality because we know that each demonstration will sell more sets. This is your chance to get a Westingale Radio at a big discount and make it pay you big money. For a limited time we offer a big reduction, way below retail prices on the FIRST Westingale outfit placed in each locality. Anyone can make quick sales and big profits in taking orders for Westingale sets. No radio experience necessary. We show you how. $50 to $100 a week—full or spare time. Our FREE book tells all about it.

YOUR OWN RADIO--*FREE*



2 Dial 5 Tube $47.00 RETAIL PRICE

Special Discount Way Below Retail Prices To Agents and Dealers

Our FREE Catalog also explains a plan whereby you can put a Westingale Radio in your home on 30 Days' Trial — demonstrate it to your neighbors and friends in your spare time, and get your own set without cost before the trial period is up. Mail the coupon or a post card for our FREE Radio Catalog today. Be first in your locality to get special discount prices and our FREE Radio offer.

Be First - Mail Now!

Westingale Electric Co.,
Dept. 126—1751 Belmont Ave.,
Chicago, Ill., U. S. A.

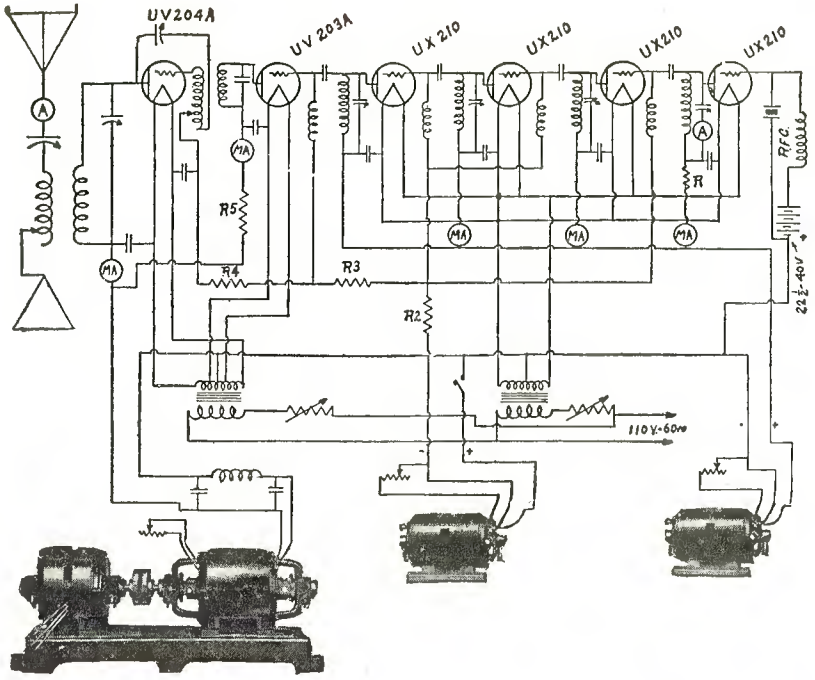
Please send your FREE Catalog on the New 1927 Westingale Radios. Also full particulars of your special Discount on the first outfit placed in each locality and your FREE Radio Offer.

Name .....

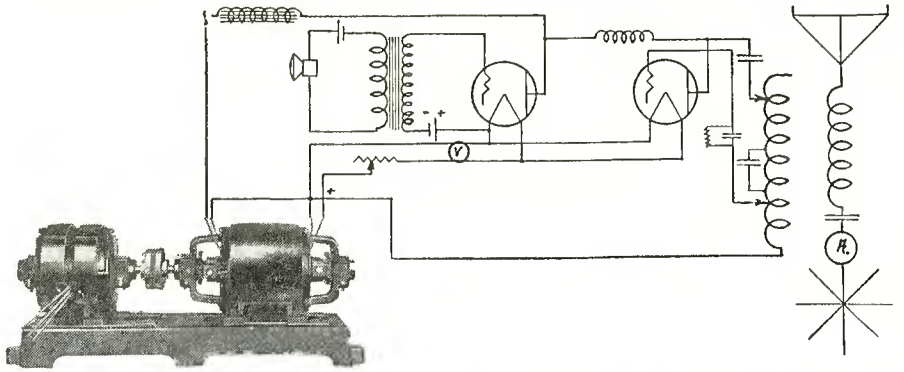
Address .....

.....

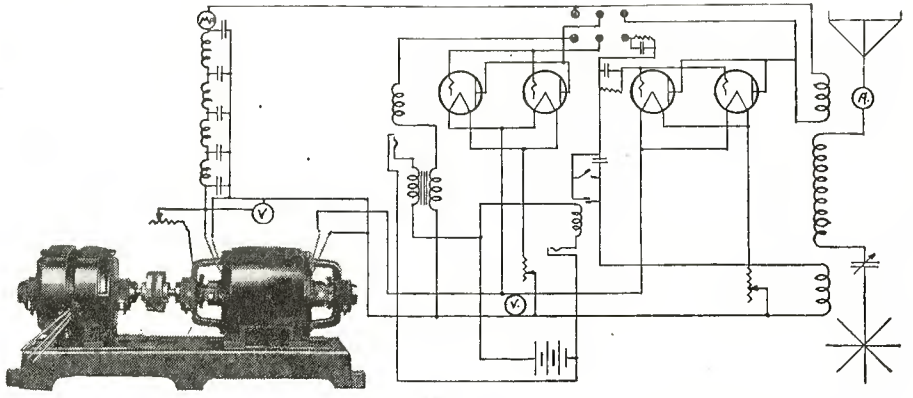
Westingale Electric Co.
Dept. 126
1751 Belmont Ave., Chicago



This set requires a UX210 oscillator, three UX210 frequency doublers of the UX210 type, a 203-A power amplifier and a 204-A power amplifier. The crystal is a 320 meter one for 40 meter operation or a 160 for 20 meter work. Filament supply comes from two filament transformers, one for the 210s and another tapped for 11 and 13 volts for the 203-A and 204-A tubes. Plate supply for the 210s is obtained from Item 8, a resistance in the plate circuit of the oscillator tube producing the necessary IR drop to supply the tube with only 300 volts. Plate supply for the 203-A and 204-A tubes is obtained from Item 22, resistance R5 supplying the drop, allowing 1000 volts to be used on the 203-A. Grid bias for the tubes is obtained from Item 4 with IR drop resistances in those circuits requiring less than 400 volts. The grid bias for the oscillator tube comes from a block of B battery.



Item 35. Two unit four bearing set. Furnished with ring oiled or ball bearings. Motor to suit local supply. This "ESCO" set delivers 1000 volts, 300 watts for plate supply and 12 volts, 150 watts for filament supply. This set driving two 50 watters will make a good consistent station.



This is Item No. 8, furnishing Power Supply for 4/5 watters in the reversed feed back hook up.

Item 8 can be furnished with either AC or DC motors, or as a separate generator. The machine is two bearing, wick oil, and its output is conservatively rated at 500 volts, 150 watts. It's a real little maximum miles per watt DX getter.

Review of Circuits

Our Question and Answer Department

We receive thousands of questions yearly from our readers on every phase of Radio maintenance, construction and design. In order to handle this on an economical basis we are going to make a slight charge for this service. Our engineers will answer your questions under the following conditions:

1. Make your questions brief and to the point.
2. No more than four questions allowed to one person.
3. Write on one side of the paper, in ink or on the typewriter.
3. Schematic wiring diagrams must be submitted on separate sheets.
5. We cannot answer questions free of charge. Send 25c in stamps or coin.
6. If your question requires considerable laboratory work or an unusual amount of time for research, an extra charge will be made, but you will be informed of that charge.
7. Do not send us checks.

Avail yourself of this service. It is conducted to help You.

The Thordarson Power Amplifier

(See Diagram on Page 144.)

WITH the passing of the novelty age in radio broadcast reception, and the acceptance of the receiver as a necessary luxury in the home, there has come a widespread demand for equipment that will faithfully reproduce the broadcast music or voices, as it may be.

Several methods have been attempted and worked out with a fair degree of success, in an endeavor to attain perfect reproduction by comparatively simple methods. Loud speakers have been improved by great strides recently, and have done much to improve the quality of reception. Power tubes have been substituted in the last stage of audio frequency in order that the input power of the last tube could be handled sufficiently fast enough to reduce distortion to a minimum by not working the tube at full rated capacity. Either of these, or a combination of these methods may be used with a fair amount of success.

The usual starting point of distortion is in the input of the first stage of audio frequency. The cause of distortion is closely confined to two points, transformer amplification and over-worked tubes. If these conditions are relieved, distortion will not be present.

In the described power amplifier, these difficulties have been eliminated and the output impedance of the amplifier has been matched with the internal impedance of the usual cone speaker, which will give as perfect reproduction as is possible at the present time.

The amplifier consists of three stages of impedance coupled amplification. This method does not have an amplification factor as high as that of a transformer coupled amplifier, but distortion, due to the transfer of energy, is eliminated. Two UX 201-A tubes are used and a UX171 is used in the last stage. A high voltage blocking condenser is placed in the loud speaker circuit, which prevents the high plate voltage of the last tube from causing any damage to the loud speaker windings. A 500,000 ohm potentiometer is placed in the grid circuit of the second tube, so that the proper grid bias may be easily obtained; 0.5 mfd. blocking condensers are placed in the grid circuits of all tubes to keep the high voltages of the autoformers from the grids.

The power amplifier method of amplification is highly recommended for those who desire the utmost in reproduction.

LIST OF PARTS

3—Thordarson R-190 Autoformer Impedance Units
1—Thordarson R-196 Output Choke Coil
1—Centralab 500,000 Ohm Potentiometer
1—Centralab 10 Ohm Rheostat
3—All American Sockets
1—Dubilier 1 mfd. By-Pass Condenser
3—Dubilier ½ mfd. By-Pass Condenser
1—Dubilier 2 mfd. High Voltage By-Pass Condenser
1—Dubilier .002 mfd. Fixed Condenser
1—Bradley 2000 Ohm Fixed Resistance and Mounting
1—1/10 Megohm Lynch Resistor and Mounting
1—½ Megohm Lynch Resistor and Mounting
12—Engraved Eby Binding Posts
1—Package Kester Solder
20 ft. Belden No. 12 ga. Copper Wire (Tinned)

A Four-Tube Non-Radiating Receiver

See Page 152 for Diagram

A GREAT many of the home constructors are partial to the regenerative type of receiver, but, due to the effects of "blooping" and the limited range of "pick up" since the number of new stations has caused an air conges-

View showing the completed receiver installed in a console with accessories

tion, have had trouble in getting satisfactory results from this type of receiver.

Here is a receiver that has been designed to fulfill two of the desires of the user of a regenerative receiver: greater distance and a reduction of blooping interference. The method adopted to bring about these two features has been accomplished by adding a stage of tuned radio frequency before the detector. This will cause the signal to be amplified before reaching the detector and at the same time prevent any of the regenerated energy from passing into the antenna, and thus into the air to cause undue interference.

This receiver consists of a tuning arrangement of an antenna coupler with an adjustable primary, a three circuit tuner consisting of a radio frequency tube, secondary winding and a variable tickler coil used for regeneration in the plate circuit of the detector tube.

The secondaries of each coil are tuned with a .00025-mfd. variable condenser. A variable resistance of 200,000 ohms is used in the plate circuit of the radio frequency tube to control volume. The primary of the radio frequency coil is variable, and once adjusted for maximum selectivity and sensitivity, it needs no further adjustment.

The coils are of the self-supporting basket weave type, and are very efficient. The tuning condensers are of the S. F. L. variety, of rather odd design, the plates being wedge shape. A Rono switch is used as a combination control for filament, first and second stage of audio frequency.

LIST OF PARTS

1—7x21x3/16-inch Formica Panel
1—General Radio Antenna Coupler
1—General Radio Tuner
2—National .00025-mfd. Variable Condensers
2—Ferantte Audio Frequency Transformers
4—Alden Sockets
1—Frost 200,000-ohm Variable Resistance
2—Frost 25-ohm Rheostats
1—Dubilier .005-mfd. Fixed Condenser
1—Dubilier .001-mfd. Fixed Condenser
1—Dubilier .00025-mfd. Grid Condenser
1—Dubilier 2-megohm Grid Leak
1—Type 112 Amperite and Mounting
1—Rono Multi-Stage Jack Filament Switch
6—Engraved Eby Binding Posts
1—Package Kester Solder
25 ft. No. 12 ga. Belden Tinned Copper Wire
Miscellaneous Screws, etc.

This receiver is shown installed in a console in the photo reproduction appearing herewith. The console is a Model 10 manufactured by the Charlotte Furniture Company of Charlotte, Mich. In its construction only genuine walnut and high grade gumwood is used. All visible portions are made of walnut—the top and ends in straight grain walnut, while the front and doors are of carefully matched butt walnut.

A 100 ampere-hour six-volt Willard Storage Battery is used to supply the necessary "A" current. The battery is provided with a convenient carrying strap and Fahnestock Clips on terminals.

A Sterling "B" Power Unit capable of delivering up to 60 milliamperes without overloading is used to supply "B" potential. This unit uses the Raytheon Tube for rectification purposes and has two variable voltages.

The Sterling Charger is so constructed that it is capable of charging either "A" or "B" batteries. A switch is provided by which either the "A" or "B" charging rate is indicated. This charger uses a two-ampere Tungar bulb.

An automatic radio power control switch is used in this receiver to secure automatic control of eliminator and charger. It plugs into the light socket and is connected in series with the receiver and the "A" battery. It has the facility of automatically cutting out the trickle charger and turning on the "A"

A Brief Study of Audio Amplification

Type 285

Audio Transformers

Under average conditions two stages of audio amplification are necessary to produce the desired loudspeaker volume.

Usually a combination of 1 to 2.7 and 1 to 6 ratio transformers proves most satisfactory, with the high ratio preferably in the last stage.

The new General Radio Type 285-D transformer has a ratio of 1 to 2.7 and has been designed specifically for use in the first stage of audio amplification following the new type 200-A detector tube. Because of its high input impedance, it produces very noticeably better tone quality than is possible with other transformers having a lower input impedance.

This transformer is particularly adapted, therefore, to use in the first stage of audio amplification and gives excellent results in the second stage as well.

		Price
Type 285	1 to 6	$6.00
Type 285-D	1 to 2.7	6.00
Type 285-L	1 to 2	6.00

IN the design of any amplifying device for use at audio frequencies, it should be kept in mind that the curve of voltage amplification against frequency should approximate as closely as possible a horizontal line, if true tone quality is to be preserved in the process of intensifying the audible notes.

Since the purpose of amplification is to effect a considerable increase in volume, the curve representing the character of amplification should be as high as possible as well as a straight line running in a horizontal direction.

While it is a comparatively simple task to design a transformer to have a high and even amplification curve over any narrow frequency band, it is considerably more difficult to maintain the same degree of amplification at very low and very high frequencies as in the middle of the range.

In order that a transformer may function efficiently at low frequencies, its input impedance must be high—several times the plate impedance of the tube at 100 cycles. This is accomplished in the General Radio Type 285 transformers by means of a core of large cross-section of high permeability steel and a primary coil of many turns. Proper coil design, avoiding excessive coil capacity and magnetic leakage prevents loss of notes above the middle register.

Careful laboratory measurements of all General Radio Type 285 Audio Transformers show a high and comparatively flat curve over practically the entire section of the audio range covered by the human voice and musical instruments.

It will be remembered by radio experimenters whose interest in the science dates back to the early days of broadcasting, that in 1917 the General Radio Company brought out the first closed core transformer to be sold commercially. This instrument was the type 166. It established a new and higher standard of audio frequency transformer design. Since that time the subject of amplification has been exhaustively studied in the laboratories of the General Radio Company with the result that transformer design has been constantly improved and today the General Radio Company is universally recognized as an outstanding manufacturer of quality transformers.

Ask your dealer or write for Catalog 925 containing full descriptions of all General Radio Parts

GENERAL RADIO CO., Cambridge, Mass.

Type 369

Coupling Impedance

While the greater amplification that is obtained by a transformer coupled amplifier has much in its favor, slightly better quality can sometimes be obtained by the use of impedance coupling, if one is willing to dispense with the greater amplification per stage of transformer coupled amplification.

The impedance method of coupling is considerably more efficient than the use of resistances because it allows a much larger proportion of the plate voltage to be impressed on the plate of the amplifier tube.

By using a choke of sufficiently high inductance a quality of reproduction may be obtained, which cannot be distinguished from that obtained by the use of resistances and a larger amplification per stage produced.

Type 369 Coupling Impedance. Price $5.00 each

GENERAL RADIO
PARTS AND ACCESSORIES

battery and "B" eliminator when the receiver is in operation, and cutting out the "B" eliminator and connecting the charger to the "A" battery when the receiver is not in operation. The last three mentioned items are products of the Sterling Manufacturing Company of Cleveland, Ohio.

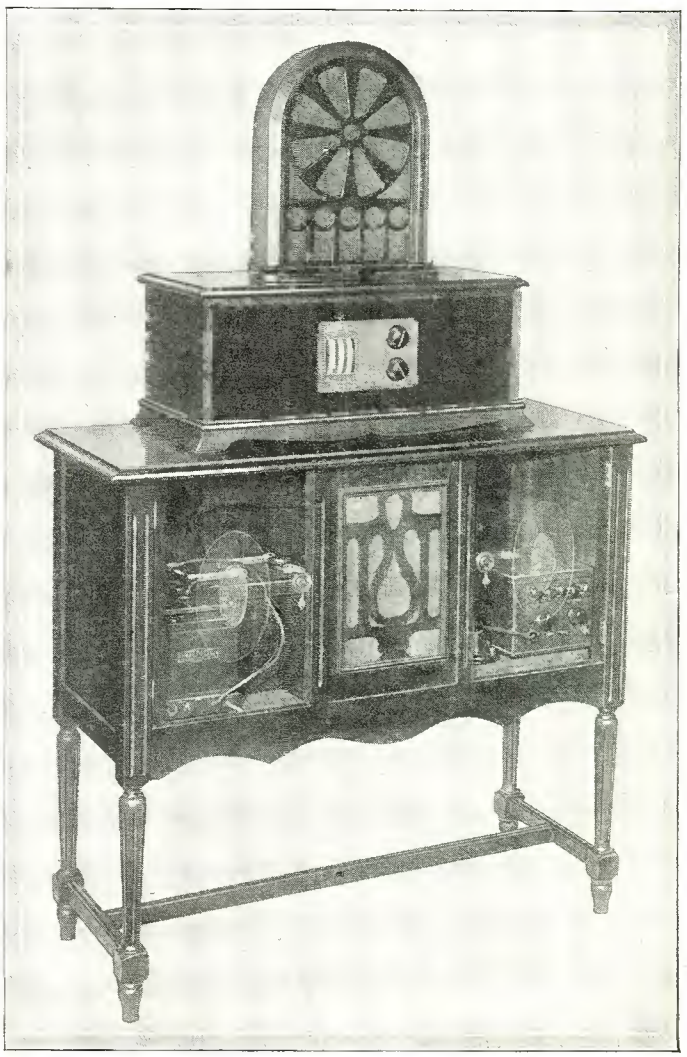
The speaker is known as the Orchestrion. It is a well-known horn, made entirely of wood and capable of excellent reproduction. This speaker is manufactured by the Radio Cabinet Company of Indianapolis, Ind.

(If any further information on these accessories is desired, full descriptive matter may be obtained by writing the manufacturers direct.)

A Six-Tube Receiver Incorporating Localized Control and Truphonic Amplification

(See Page 150 for Diagram)

WITH the continued advancement in the design of radio receivers, there has developed an era of simplicity of control and faithfulness in reproduction. Heretofore the home constructor has experienced some difficulty in building this type of receiver. The troublesome factor that has entered into the construction of a localized control system has been that when an attempt was made to "gang" several single tuning condensers, the discrepancy in the frequency curve at various dial settings was great enough, on a sharply tuned receiver, to cause part, or all, of the

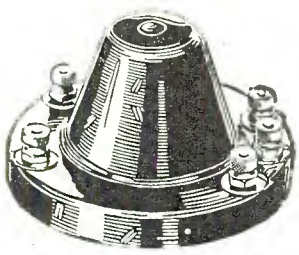


View showing the completed receiver mounted on table, with accessories

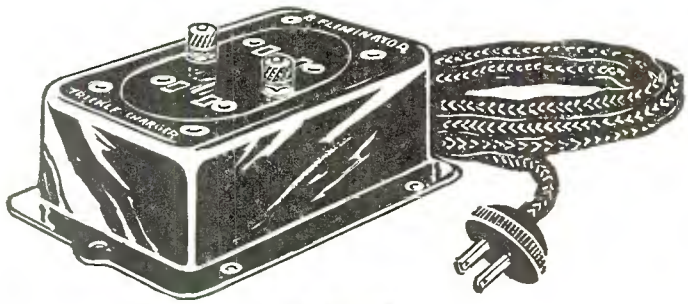
These Automatic Switches
$2.00 to $3.75

Owners of radio receiving sets may now have their choice of two types of the Reliable Automatic Power Control Switch at prices ranging from $2.00 to $3.75. It is no longer necessary to pay more for this new necessity of radio.

Either type of device will make the A Battery Switch on your receiving set, automatically turn on and off, either or both the Trickle Charger and B Eliminator as required. The charger is always off when the set is in operation, eliminating hum from the AC line. When the set is not in use, the charger will be on, insuring an adequate filament supply at all times without worry or bother. The B Eliminator will be on when the set is in operation and off when set is not in use.



$2.00



$3.50

Convenience Types

Model 23—This model illustrated above, is complete with cord and plug and receptacles for connection with Trickle Charger and B Eliminator cords. This model is for receiving sets using 3 to 8 Type 201-A tubes or their equivalent in amperage drain. Retails at $3.50.

Model 24—Same construction as Model 23 but is intended for use with sets using from 5 to 10 Type 199 tubes or their equivalent in amperage drain. Retails at $3.75.

Utility Types

Model 13—This model, illustrated at the left, is identical electrically with Model 23 but is without cord and plug or receptacles for Charger and Eliminator cords. Connections are easily made to binding posts. It is for use with sets using from 3 to 8 Type 201-A tubes or their equivalent in amperage drain. Retails at $2.00.

Model 14—This switch is identical electrically with Model 24 except that it is without cord and plug and receptacles for Charger and Eliminator cords. Connections are easily made to binding posts. Intended for use with sets using from 5 to 10 Type 199 tubes or their equivalent in amperage drain. Retails at $2.50.

Ask the nearest radio dealer to show you these newest necessities of radio. If he cannot supply you, order direct, giving us the name of the dealer.

THE RELIABLE PARTS MANUFACTURING COMPANY
2829 Prospect Avenue, Cleveland, Ohio

Reliable Automatic Power Contro Switch

received carrier wave to be cut off, due to the lack of resonance in one or more of the tuning circuits, to such an extent that the signal was weak or entirely inaudible. The usual method of remedying this condition was to insert, in parallel with the tuning condensers, small variable condensers to bring about a point of resonance. When this was done, the actual number of controls were increased to the same number as if individual control were in use.

In the design of this receiver an endeavor has been made to incorporate the desirable points of a single control and still retain the flexibility and sharpness of a multiple control receiver. The method adopted is the use of an Alden triple-gang, localized condenser. This unit consists of three .00035 mfd. condensers mounted on telescoping sleeve and rod shafts. Three edge reading dials are assembled between two of the condensers in such a manner that the dial readings are adjacent. By the use of this method the three condensers may be moved together, by one hand, and yet retain absolute resonance by varying each individual tuning condenser. This unit mounted in a receiver makes a very pleasing and attractive radio set.

The faithfulness of reproduction depends upon the quality of the audio frequency amplifier. The usual home constructed audio amplifier is given very little attention and often contains a maze of unmatched parts that cannot reproduce a true tone. In order to produce an audio frequency amplifier that will give a tonal quality which will resemble that of the original, great care must be exerted in the selection of parts and the exact position of them in the receiver. The method and placement of wiring of the amplifier is of much more importance than is usually supposed. The audio frequency amplifier specified in this receiver consists of three stages of dual impedance amplification. This method produces a tonal quality that is unsurpassed and is very easily and quickly installed in the receiver.

The circuit used in this receiver consists of two stages of radio frequency, detector and three stages of dual impedance coupled audio frequency amplification.

The radio frequency unit consists of three shielded radio frequency transformers. The coils are of solenoid construction and are housed in metal cases; thus any possible chance of electro-magnetic interstage coupling is eliminated, which permits a much higher gain factor per stage to be used than is the usual practice.

The two radio frequency tubes are controlled by a 10-ohm rheostat, the detector by a 25-ohm rheostat, and the three stages of audio frequency are controlled by a rheostat that is self-contained in the unit.

The low distributed capacity and negligible resistance of the parts used in this receiver make it very sharp in tuning. It cannot pick up undesirable signals, since the shielding of the coils nullifies any stray currents which may arise.

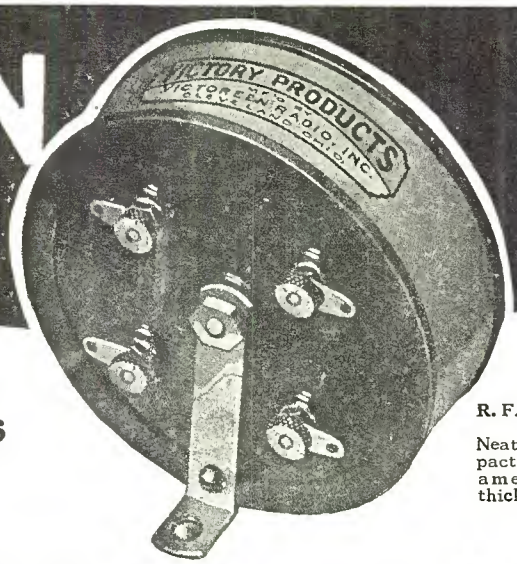
A battery cable is attached to the amplifier unit which may be connected to the binding posts of the set or directly to the batteries.

An example of how this receiver will appear when it is installed in an appropriate table and cabinet is shown herewith. The table is a product of the Standard Radio Cabinet Works of Chicago, and is made entirely of high grade material and finished in a dark mahogany. The front doors have a two-tone effect and allow access to the accessories. The cabinet shown is a product of the Signal Electric Company of Menominee, Mich., and is finished in a walnut which harmonizes very nicely with the finish of the table.

The speaker is the All-American Reproducer. Its construction is such that the unit is adjustable and will give excellent reproduction throughout the entire musical range.

A Constant "B" Eliminator is used in this receiver to supply the "B" potential. It uses a Raytheon rectifying tube, and has a switch by which either high or low voltage may be used. It is provided with five terminals by which any voltage from 10 to 180 volts may be had. It, as well as the speaker, is manufactured by

VICTOREEN Radio Products



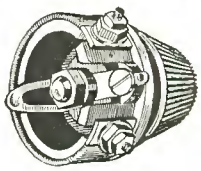
R. F. Transformer
No. 170
Neat and compact, 3 in. in diameter, 1 in. thick.

Use these Parts and

BUILD A VICTOREEN SUPER!

A Victoreen Super will satisfy your craving for a set that has range, clarity, volume and selectivity. Victoreen Super sets are free from oscillations, howls or squeals—no matching of tubes is necessary.

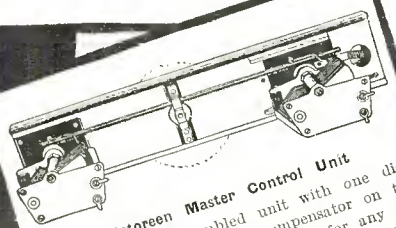
Victoreen Air Core Transformers are not merely "matched" but are actually tuned to a guaranteed precision of 1/3 of 1 %—a Victoreen feature.



Victoreen Rheostat

Zero temperature coefficient resistance remains absolutely constant; double the number of turns of wire used on ordinary rheostats. Three terminals simplify wiring.

Five resistances—2, 6, 10, 20, 30 ohms. $1.20.
Victoreen Potentiometers—200 and 400 ohms resistances. $1.50.



Victoreen Master Control Unit

A completely assembled unit with one dial reading controlled by a compensator on the Vernier dial which compensates for any difference in the capacities of your condensers within 20 points on the dial. Used in circuits employing two or more condensers of the same capacity. Easy to mount—no change of wire necessary.

Victoreen Master Control Unit 2 Condenser type, $19.50. Extra condenser, $4.50.

Victoreen Coils

No. 170 This coil has a very sharp curve or peak. Interstage oscillation is prevented and amplification constants are uniform due to the adjustment which is made and then sealed at the factory. Use four of them in your Victoreen set. Price $7.00 each.

No. 150 Coupling Unit. This coil is especially designed for use with Victoreen Transformers. Carefully made. Price $5.50.

No. 160 Antenna Coupler for use in case outside aerial is desired. Otherwise this coil is not necessary. Price $3.50.

Read What One Victoreen Fan Says:—

"Cohoes, N. Y., Oct. 5, 1926."

"I wish to state that I constructed a Victoreen, using Air Core Transformers and Manganin Rheostats and will say that it is a wonder set. I sure am delighted. Your parts are all that you claim them to be. Hoping for your continued success and that you sell a million transformers.

Yours very truly,
CHARLES ENGLISH.

P. S. From now on I am a Victoreen booster."

Get a Victoreen Folder

A Victoreen folder gives you complete information about the Victoreen Super. It tells you the necessary parts and it answers all of your questions. Get one from your dealer or write us direct.

The George W. Walker Co.

Merchandisers of Victoreen Radio Products

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Salt Lake City, Utah

the All-American Radio Corporation of Chicago.

A 100 Ampere Hour Willard Storage Battery is used in this receiver. It is kept in full charge by Handy Charger, manufactured by the Interstate Electric Company of St. Louis, Mo. This charger is equipped with a rectifying tube, and has a switch by which either a high or low rate of charge may be used. A Reliable Switch, manufactured by the Reliable Parts Manufacturing Company of Cleveland, Ohio, is used in this installation for the purpose of automatically turning on and off both the Trickle Charger and "B" Eliminator, as required. The charger is always off when the set is in operation, and on when the set is not in use. On the other hand, the eliminator will be on when the set is in use and off when the battery is charging. This, therefore, allows a complete automatic control of all power supplies, which is, indeed, a very satisfactory arrangement.

(If any further information on these accessories is desired, full descriptive matter may be obtained by writing the Manufacturers direct.)

LIST OF PARTS

These parts or their equivalent will give satisfactory results:

1—7x21x3/16-inch Radion Panel
1—Alden Localized Control Three-Gang Condenser
1—Alden Truphonic Audio Amplifier
1—Yaxley 25-ohm Rheostat
1—Yaxley 10-ohm Rheostat
1—Yaxley Filament Switch
10—Engraved Eby Binding Posts
3—Aalco Shielded R.F. Transformers
3—Alden Sockets
1—Electrad .00025 mfd. Grid Condenser
1—Electrad 2-megohm Grid Leak
1—Electrad ½-mfd. By-Pass Condenser
1 Package of Kester Solder
25 feet No. 12 ga. Tinned Copper Wire

The New Orchestrion Console Model Speaker

A RECENT development in a combination Speaker and Console has been placed on the market by the Radio Cabinet Company of Indianapolis, Indiana.

The over-all dimensions of this piece of furniture are 36 inches long, 30 inches high and 15¾ inches deep. This size allows ample space upon the top for large size receivers in cabinets. Ample space is provided within the table for the stor-

The Orchestrion Console Model Speaker

age of batteries, eliminators, chargers and the like. In addition to the storage room, an Orchestrion Tone Arm and Unit is incorporated in the table. This unit is capable of reproducing true tones with sweetness and clarity at full volume. The table is rigidly built of five-ply sliced walnut and beautifully finished.

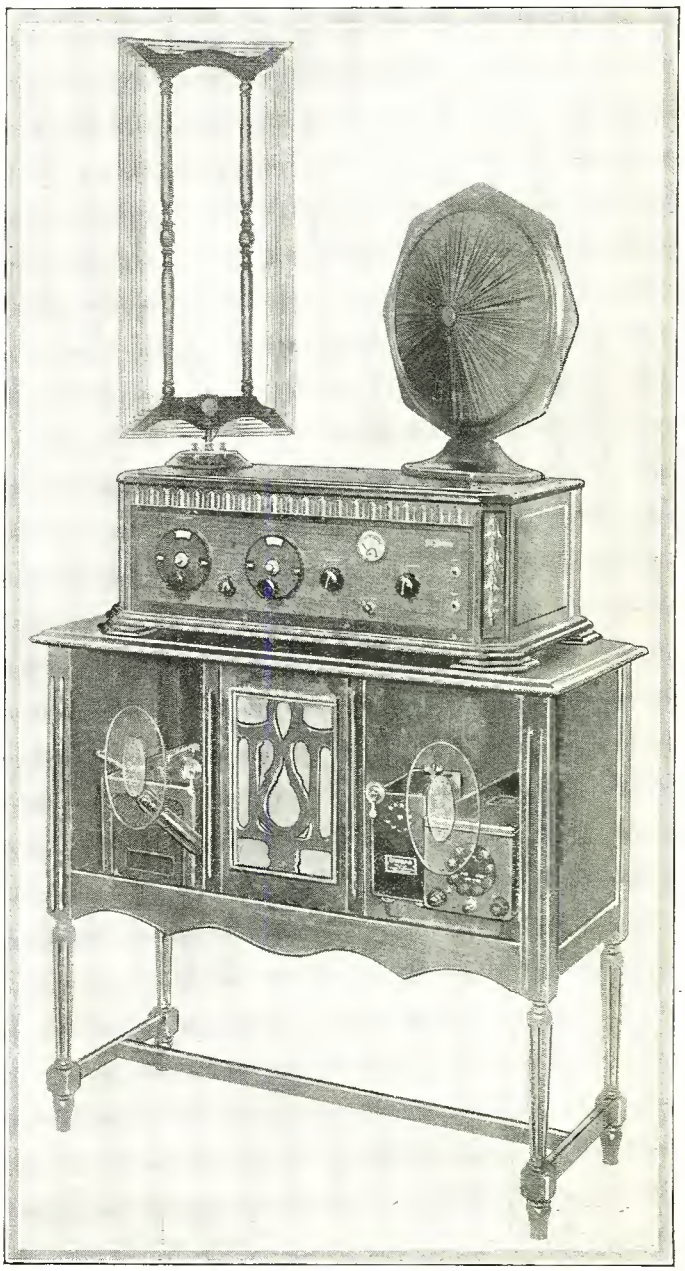
(Any additional information will be gladly supplied by the Manufacturer direct.)

The Revised St. James Super-Heterodyne

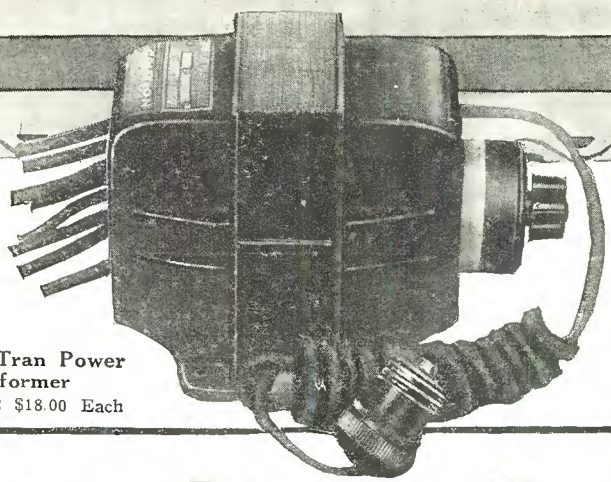
(See Page 146 for Diagram.)

REPORTS from various localities are substantiating the claims made of new St. James "Two-Forty" Super Heterodyne Receiver, which was first described in the Fall, 1926, issue of the CITIZENS RADIO CALL BOOK. Several changes have been made, which are to the advantage of the receiver. There have been no major changes made and no additional material is necessary, and very little time is required to make the changes.

The changes consist of returning the grids of the oscillator and second detector to the center terminal of the potentiometer. By this



The improved St. James Receiver installed in a cabinet and table with appropriate accessories



The AmerTran Power Transformer
Type PF 52 $18.00 Each

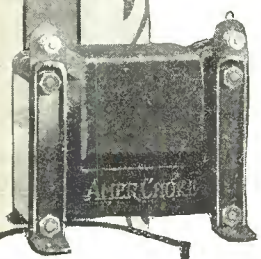
AMERTRAN RADIO PRODUCTS

A REAL POWER TRANSFORMER

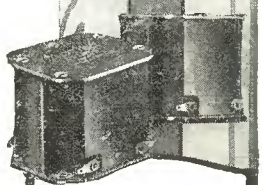
Perfected on the firm foundation of twenty-five years successful experience in transformer building, AmerTran Radio Products enjoy a reputation second to none in their respective fields. Their continued selection by leading engineers and experimenters gives ample proof of their high efficiency and dependable performance.

Of particular interest is the AmerTran Power Transformer Type P. F. 52—*the* transformer for real "honest-to-goodness" power supply. This transformer is intended for use on the standard 110 volt, 60 cycle house-lighting circuit and can be depended on to give and maintain satisfaction.

It has three separate windings—one for 525 volts and two 8-volt windings for the filament of the Rectifier and power tubes. The windings are enclosed in a strong metal case, provided with mounting feet. There are three primary taps for 110, 118 and 125 volts, connected to a three point snap switch, and a six-foot lamp cord and plug attached to the primary is standard equipment. The shipping weight is approximately 9 pounds and the price is $18.00 each.



The AmerChoke type 854
This is a scientifically designed impedance or choke coil of general utility, designed primarily for use in filter circuits. As an output impedance for by-passing direct current from the loudspeaker it is both efficient and economical.
Price—$6.00 each



The AmerTran De Luxe Audio Transformer
This new transformer sets an entirely new standard of Audio Amplification. It makes possible a transformer coupled amplifier that excels all other forms of amplifiers. Made in two types, for first and second stages. Price—$10.00 each

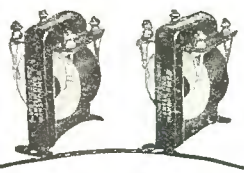
AMERICAN TRANSFORMER COMPANY

178 Emmet Street, Newark, N. J..

"Transformer builders for over twenty-five years"

AmerTran Products are Sold only at Authorized AmerTran Dealers

Other AmerTran Products:
AmerTran Resistor Type 400—$7.50. AmerTran Heater Transformer Type H-28 (for A. C. Tubes)—$10.00.



We shall be very glad to send you upon request a copy of our booklet "Improving the Audio Amplifier," together with other interesting and constructional data.

AmerTran Types AF-7 and AF-6
AmerTran Audio Transformers, types AF-7 and AF-6, have been considered for years among the leaders in audio amplification. These popular and efficient models are made in two types — AF-7 (ratio 3½:1) — AF-6 (ratio 5:1) $5.00 each.

method full advantage of the characteristics of the transformers is taken. Due to this, the oscillatory point of the tubes may be kept at a balance, which will give a somewhat more stable operation.

The points commented upon, that are oustanding, are the tonal qualities, which, when reproduced on a good speaker, give all the instrumentation of orchestras, with an amount of volume limited only by the ear to tolerate. There is a very noticeable quietness of operation and absence of background noises.

Considering operation from an economical standpoint, the maintenance of this receiver is exceptionally low. With reception at normal volume the "B" battery consumption is ordinarily 10 milliamperes, and at full volume approximately 22 milliamperes. These figures are from 25 to 40 per cent lower than is usual upon using eight tubes including a power tube.

The principles underlying the operation of the Super-Heterodyne have previously been explained to such an extent that an extended explanation is unnecessary. The fundamentals of the circuit demand transformers that have the utmost point of efficiency in amplification. The St. James intermediate frequency transformer is of unusual and unique design and the only one of its type now manufactured.

The construction of the transformer consists of two air-core coils wound in a special way, which reduces the inter-turn capacity to a minimum. The coils are mounted on Bakelite tubing and placed in a high-lead content glass casing. The coils are then dehydrated by repeated addition and subtraction of dehydrated air. When the last trace of moisture is removed, the transformers are sealed.

It is evident that one of the major handicaps of the usual intermediate radio frequency transformers has been entirely eliminated by this method. The added efficiency, due to the complete absence of moisture, must be experienced to be appreciated.

The diameter of the coils in the St. James transformers is slightly less than ⅞ in. This unusually small size, together with the effect of the vacuum treatment and the shielding effect of the high-lead content glass, combine to produce a very concentrated field.

The manner of final checking of the intermediates insures limits of variation far below a 1 KC limit, and the final dehydrating of the coils and their sealing off from further moisture effects, precludes future changes in their electrical characteristics.

The large engraving appearing herewith shows the St. James Superheterodyne receiver installed in a combination of table and cabinet. The table is a product of the Standard Radio Cabinet Works of Chicago, Illinois. Ample space is provided under the top for the storage of accessories, with two doors opening outward. The finish is in dark Mahogany, which harmonizes with the Fritts Super Cabinet, placed on top. Only genuine Walnut is used throughout the construction of the Fritts Cabinet, which is highly finished with Lacquer, and waxed. It is made by D. H. Fritts and Company of Chicago.

A new type Cone Speaker manufacturcd by the Boudette Manufacturing Company, Chelsea, Mass., is incorporated in the Sonochorde. The reproducing mechanism in this Speaker is adjustable so that it readily lends itself to any receiver.

An Electrolytic "B" Battery Eliminator is used to supply the necessary "B" and "C" potentials for the proper operation of the receiver. The various voltages may be accurately controlled by means of variable resistances. The Eliminator is made by the DeWitt-LaFrance Company, whose main offices are in Cambridge, Mass.

A Storad Manufacturing Company's Trickle Charger using tube rectification keeps the Willard Storage Battery at full charge at all times.

The Loop which is shown is a new design of the Bodine Electrie Company of Chicago. It is equipped with a jack by which it may be mounted directly on top of the cabinet.

(If any further information on these accessories is desired, full descriptive matter may be obtained by writing the Manufacturers direct.)

LIST OF PARTS

These parts or their equivalent will give satisfactory results.

1—Lignole Drilled and Engraved Panel 7x24x3/16 in.
1—Jewel pattern No. 135 0 to 8 Volts Voltmeter
1—9x23x½ in. Baseboard

$12.50

COMPLETE
Nothing else to buy. Replaces "B" Batteries. Operates direct from Electric Light Socket on 110-120 volt A. C. Lighting Circuit. Delivers up to 100 volts.

$17.50
New High Voltage Model
Complete: Delivers up to 180 Volts

Not only the most reasonable-

but proved by 40,000 users to be also the most convenient, unfailing and satisfactory "B" Eliminator

They Want YOU to Know

Montreal, Canada
I am pleased to state that the Ferbend "B" Eliminator purchased from you is a wonder and is giving results far beyond my expectations. The tone and volume would satisfy the most critical.
James Stroud,
Electrical Engineer.

Youngstown, Ohio
Your Eliminator is the best buy I have made in a long time. It has already more than paid for itself in saving on "B" batteries.
R. L. Welsh.

Springville, N.Y.
Having had perfect results with the seven Eliminators recently purchased you may send me six more by express at once.
Leonard J. Cooper.

Burbank, Calif.
I am more than pleased with your Eliminator. I am getting several Eastern stations through about 15 locals using the Eliminator.
Jean Barnard.

St. Petersburg, Fla.
I used your Eliminator all last winter, and it was as good, if not better than several I tried of much higher price. I am more than satisfied.
Ben M. Pyatt.

Trenton, N. J.
I have used your Eliminator for several months and unhesitatingly recommend it. It has added 25 per cent to the volume of my set and always has full voltage.
J. M. Starger

New Orleans, La.
The "B" Eliminator which I purchased from you some three or four months ago has given entire satisfaction and I am well pleased with its performance.
C. J. Murphy

Wilmington, N. C.
I am well pleased with the Eliminator I purchased some time ago. It is all you claim and more. It brings in signals louder and clearer than any set of dry batteries I ever used.
T. E. Lyon.

Amsterdam, N.Y.
I have compared your Eliminator with other makes and it cannot be beat. My reception has easily increased 50 per cent. It gives me much better results than I was ever able to get with dry batteries.
William Davis.

Wheeling, W. Va.
The Eliminator purchased some time ago is giving remarkable results.
William A. Raper, Jr.

Des Moines, Ia.
Your Eliminator is fine.
Rev. F. A. Case.

Louisville, Ky.
Your Eliminator is all you claim it to be. Am very much pleased with it.
Alonzo G. Smith.

Oil City, La.
Your Eliminator has given me good service for over a year.
George May.

St. Louis, Mo.
After giving your "B" Eliminator a thorough trial wish to state that I am thoroughly satisfied. It's performance is perfect—absolutely no hum whatever.
Frank Kolar.

Mattapan, Mass.
I have used your Eliminator for six months and am satisfied with it in every way. It has increased the volume of my 6-tube Neutrodyne fully 50 per cent and there is absolutely no hum from the 60-cycle line.
John W. Purssell, Jr.

Second Successful Year

New High Voltage Model

for extremely large sets, or sets using power tubes, now perfected. Delivers up to 180 volts. One control adjusts voltages on all taps.

Equal to any "B" Eliminator regardless of price—not only in operation, but in workmanship, quality, durability and appearance

Money Back Guarantee

Stop paying out money for costly, unreliable battery service and repairs. Permanent excellence ***can*** be built into economical "B" service. 40,000 users of the good Ferbend "B" Eliminator agree. That is why during the slack summer season we worked at full capacity to meet orders. That is why hundreds of unsolicited testimonials prove beyond the shadow of a doubt its splendid, enduring performance.

Ask Your Dealer—or Send Direct

Shipment made direct on receipt of price, or C. O. D. if preferred. Use for 10 days to convince yourself—if unsatisfactory write us within that time and purchase price will be refunded. Use Coupon NOW.

Makers of the original and genuine FERBEND Wave Trap

FERBEND ELECTRIC COMPANY
426 W. Superior St., Chicago, Ill.

FERBEND "B" ELIMINATOR

Approved and passed by the rigid Laboratory Tests of the two foremost Radio Laboratories in America —Radio News and Popular Radio

FERBEND ELECTRIC CO.
426 W. Superior St., Chicago, Ill.

☐ Send $12.50 model. ☐ Send $17.50 model.
☐ Send at once. Payment enclosed.
☐ Send C. O. D. ☐ Send literature.

Name .....

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City ..... State .....

2—Marco Vernier Dials
1—Hammarlund .000045 mfd. Midget Condenser
2—Hammarlund .0005 mfd. Variable Condensers
1—Yaxley 2 Ohm Rheostat
1—Yaxley 400 Ohm Potentiometer
1—Yaxley No. 10 Battery Switch
1—Yaxley 2 Ohm Fixed Resistance
1—Yaxley 4 Ohm Fixed Resistance
1—Yaxley No. 2 Jack
1—Yaxley No. 3 Jack
1—Yaxley No. 660 Cable Connector and Plug
4—St. James Dehydrated Intermediate Frequency Transformers
1—St. James Oscillector
1—St. James Choke Coil
1—Electrad Single Grid Leak Mounting
8—Benjamin UX Cushion Sockets
2—Thordarson R-200 Audio Frequency Transformers
2—Dubilier 1 mfd. By-Pass Condensers
1—Dubilier No. 601 .00025 mfd. Grid Condenser with Prongs
1—Dubilier No. 601 .00025 mfd. Fixed Condenser
1—Dubilier 2-Megohm Grid Leak
2—Formica Terminal Strips 1x3x3/16 in.
6—Eby Engraved Binding Posts
1—Package Kester Radio Solder
4—Dozen Kellogg Tinned Soldering Lugs
5—Dozen 5x½ in. Round Head Wood Screws
50 ft. Belden No. 12 Tinned Copper Hook-up Wire

The Bodine Twin Eight Receiver

(See Diagram on Page 150)

THE herewith described receiver has been designed with the point of view in mind of economy in cost and excellence in reproduction.

The described receiver uses two stages of tuned radio frequency, detector and two stages of transformer-coupled audio frequency. The radio frequency transformers in use are quite unusual and unique in design and construction. Construction is of the self-supporting type and is wound in the form of a figure eight. By this peculiar method of winding, two important factors in radio frequency transformer design are accomplished. First: Interstage magnetic coupling is reduced to a minimum, due to the fact that the transformers are wound in such a way as to have a "bucking field," which results in a very small local concentrated magnetic field. Second: Also due to this peculiar method of winding, the distributed capacity of the entire winding is materialy reduced. By the virtue of these two factors, the point of oscillation, is materially reduced and, at the higher wavelengths, entirely absent.

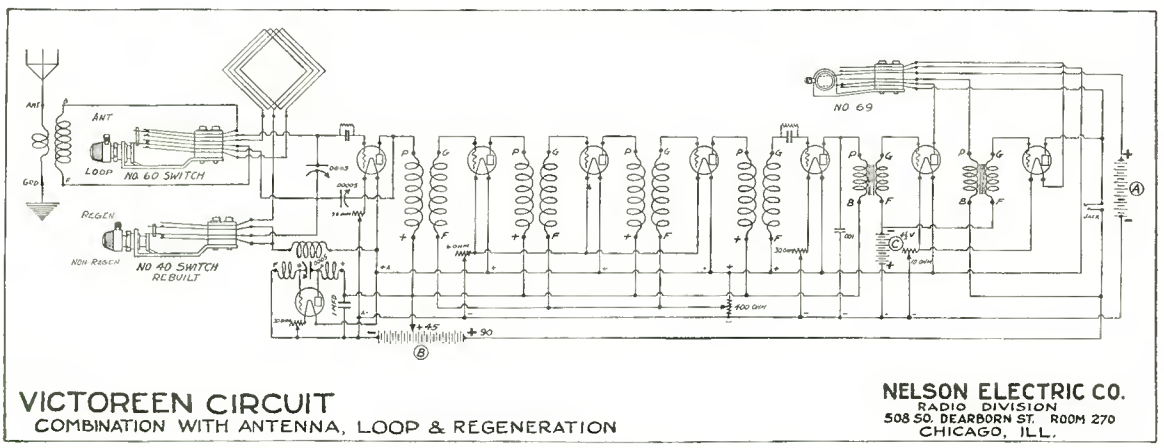
The three tuning condensers are of the straight frequency line, grounded rotor type, having a maximum capacity of 350 mmf. By the use of this type of tuning condenser, the usual condition of jamming on the lower wavelengths is greatly relieved, and will space the stations almost at evently divided points on the dial.

The audio frequency transformers in use are of a very reliable make and very efficient in operation. The case is grounded, which passes off any eddy currents that may arise. There is a .002 mfd. fixed condenser shunted across the primary of the transformer. There is an open circuit jack in the output of the second stage of audio frequency for attachment of loud speaker or phones. A 200,000 ohm Variable Resistance is connected in the plate supply lead of the radio frequency transformers, which acts as an efficient volume control. A 6-ohm rheostat is placed in the positive "A" battery lead of all tubes for the controlling of filament voltage.

There are provided two binding posts in the secondary circuit of the first radio frequency transformer, whereby a loop antenna may be inserted. This method makes portability convenient, and aids very materially in separating a jammed condition of powerful local stations.

The photographic reproduction appearing herewith shows the

VICTOREEN
SUPREME



VICTOREEN CIRCUIT
COMBINATION WITH ANTENNA, LOOP & REGENERATION

NELSON ELECTRIC CO.
RADIO DIVISION
508 SO. DEARBORN ST. ROOM 270
CHICAGO, ILL.

THE above CIRCUIT, designed in our laboratory, is proving so popular with our trade that we wish to bring it before the public. We use SUB-PANEL wiring throughout, and have the panels and sub-panels, fully drilled and engraved, in stock at all times. The FAMOUS VICTOREEN is so well known now that no comments need be made here on its merits. You will note by referring to the above circuit diagram that the antenna, ground and the loop can be connected to the set, all at the same time, and the set can be changed from one to the other by simply throwing the required switch, and regeneration can be added to the loop when desired by throwing the special No. 40 switch shown on the diagram. We have given particular attention to the design, quality and the arrangement of the parts for the greatest possible efficiency.

WE have hundreds of these sets in actual operation in Chicago, the most congested RADIO DISTRICT in the world, giving results that far surpass any RADIO SET of any other make. Unlimited range, tone perfect, greatest possible selectivity, terrific power and unequalled flexibility.

Full Detail on the Sensational "Karas Equamatic Set" Furnished on Request

List of parts required to complete this unequalled set, for the most satisfactory results, as follows:

1—No. 150 VICTOREEN Coupling Unit.
1—No. 160 VICTOREEN Antenna Coupler.
3—No. 170 VICTOREEN Intermediate Transformers.
1—No. 170 VICTOREEN input Transformer.
1—7 in. x 26 in. LIGNOLE Front Panel, drilled and engraved.
1—7 in. x 25 in. LIGNOLE Sub-Panel, drilled and engraved.
1—2 in. x 25 in. LIGNOLE Back Panel Strip, drilled and engraved.
2—.00025 mfd. MICAMOLD Fixed Condensers with clips.
1—.001 MICAMOLD Fixed Condenser.
2—2 meg. MICAMOLD grid leaks.
1—1 mfd. MUTER By-Pass Condenser.
1—6 Ohm VICTOREEN Rheostat.
1—10 Ohm VICTOREEN Rheostat.
3—30 Ohm VICTOREEN Rheostats.
1—400 Ohm VICTOREEN Potentiometer.
1—No. 69 Yaxley Combination Jack Switch.
1—No. 60 Yaxley Combination Jack Switch.
1—No. 40 SPECIAL Combination Jack Switch.
1—No. 1 Yaxley Single Circuit Jack.
75—Assorted Lugs.
3—½ in. x ¾ in. No. 03602 Brass Angle Irons.
16—8/32 ½ in. Brass Machine Screws.
18—6/32 ½ in. Brass Machine Screws.
12—6/32 ¾ in. Brass Machine Screws.
30—6/32 in. Brass Hex Nuts.
1—8/32 Screw Tap.
1—No. 10 Yaxley "A" Battery Switch for Voltmeter.
1—R641 Sterling Voltmeter 0 to 8 v.
8—No. 9040 Benjamin, NEW STYLE Claratone Sockets.
2—0005 HAMMARLUND, MIDLINE Condensers Variable.
2—No. 592 Kurz Kasch, Port Type, UNIVERSAL Dials.
2—KARAS HARMONIC or THORDARSON R.200 Audio Transformers.
11—X. L. New Style, Binding Posts, ANT. GND. "A" Plus, "A" Minus, "C" Minus, "B" 45, "B" 90, "B" minus, 3 LOOP.
6—Lengths Black Celatsite.
25 ft. Black Flexible Celatsite.
1—Pr. 8629 Benjamin Brackets.
1—.00005 Hammarlund Midget Condenser.
1—SET BLUE PRINTS, Templates, and INSTRUCTIONS.

Blueprints, Templates and Instruction Sheets, Postpaid, $1.00

We Are Wholesale Distributors for the Following Lines:

Amperites.
Kurz-Kasch Co.
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Hammarlund Mfg. Co.
Leslie F. Muter Co.
Micamold Radio Corp.
Thordarson Electric Mfg. Co.
Naxon Laboratories.
X. L. Radio Laboratories.
Rathbun Dials.
Karas Electric Co.
Star Brackets.
Hood Rubber Co.
Benjamin Electric Mfg. Co.
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Cunningham Tubes.
Cunningham Grid Leaks.
Saal Loud Speakers.
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Kodel Radio Corp.
Dynamik Chargers.
Sterling Mfg. Co.
Universal Storage Batteries.
Diamond "B" Batteries.
Meloformer Sales Co.
Pal Radio Co.

DEALERS WANTED EVERYWHERE -:- **WRITE FOR CATALOG AND DISCOUNTS**

LIBERAL DISCOUNTS

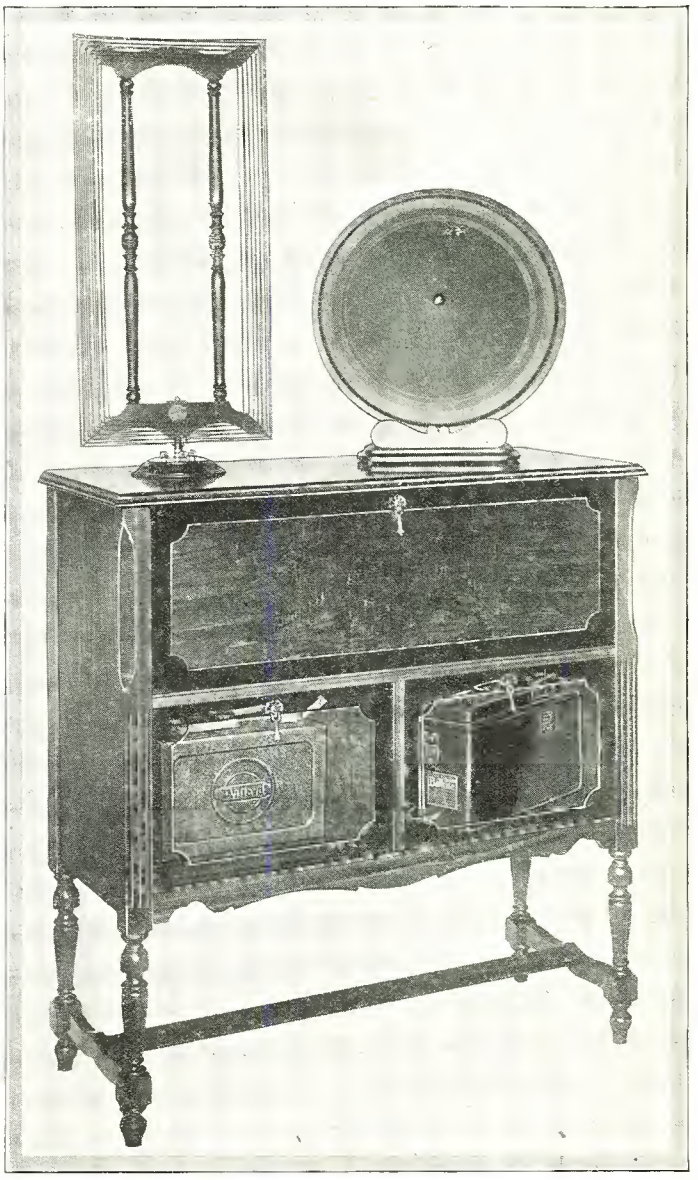
NELSON ELECTRIC CO.

Telephone Wabash 8719
508 S. Dearborn St., CHICAGO, ILL.

IMMEDIATE DELIVERIES

Bodine Twin Eight Receiver installed in an Excello Model 22 Console, manufactured by the Excello Products Corporation of Chicago. This console is thoroughly constructed of walnut wood, and is finished in a two-tone effect. The front doors are carefully matched and are made of butt walnut. Ample space is provided in the lower compartment for the storage of accessories.

The Willard Storage Battery is one of the 100 ampere hour type, manufactured by the Willard Storage Battery Company of Cleveland, Ohio. It is equipped with a carrying strap as well as Fahnestock Clips on the positive and negative terminals.



Receiver installed in console with accessories

A new type Balkite Charger is connected to the Willard Battery and supplies automatic power to both "A" and "B" circuits. It is entirely automatic in operation, being controlled by the filament switch on the set. It is capable of supplying "B" potential to any receiver using not in excess of 30 milliamperes.

The Stevens Speaker is a product of the Stevens Company, Inc., of New York City. Two types of this speaker are available. One is provided with a silk cord by which the speaker may be hung from the wall, and the other has a base by which it may be set upon any flat surface. Either of the speakers are capable of giving very excellent reproduction over the entire musical range.

The Bodine Loop, which is shown with this receiver, is a product of the Bodine Electric Company of Chicago. It is ad-

30 DAYS FREE TRIAL

7 Tube Set
Single Dial Radio

The Metrodyne

ONLY ONE DIAL TO TUNE

Retail Price
$75
Completely Assembled
Big Discounts to Agents and Dealers

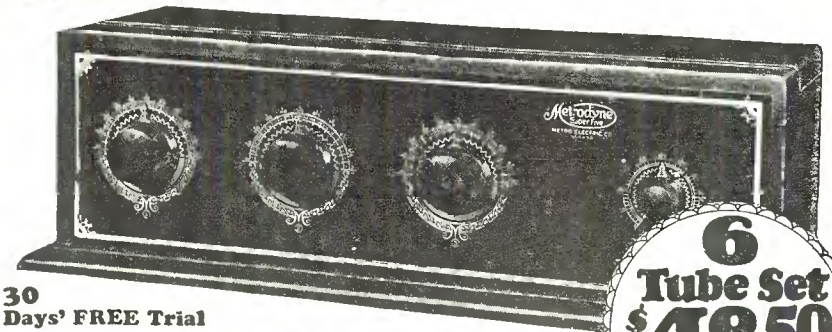
Wonderful offer direct from the factory! The world's greatest radio.
A perfect working, single dial control, 7 tube receiver. And just to prove our claims, we will ship it to your home for **30 days' free trial.** Test it under all conditions. Test it for distance, volume and tonal quality — and if you are not convinced that it is the best single dial set you ever heard, return it to the factory. We don't want your money unless you are completely satisfied.

BIG PROFITS TO AGENTS AND DEALERS
Our Agents and Dealers make big money selling Metrodyne Sets. You can work all or part time. Demonstrate the superiority of Metrodynes right in your home. Metrodyne Radios have no competition. Lowest wholesale prices. Demonstrating set on 30 days' free trial. Greatest money-making opportunity. Send coupon below—or a letter—for our agent's proposition.

Metrodyne Super-Seven Radio

A single dial control, 7 tube, tuned radio frequency set. Approved by America's leading radio engineers. Designed and built by radio experts. Only the highest quality low loss parts are used. Magnificent, two-tone walnut cabinet. Artistically gilded genuine Bakelite panel, nickeled piano hinge and cover support. All exposed metal parts are beautifully finished in 24-k gold.

Easiest set to operate. Only one small knob tunes in all stations. The dial is electrically lighted so that you can log stations in the dark. The volume control regulates the reception from a faint whisper to thunderous volume, 1,000 to 3,000 miles on loud speaker! The Metrodyne Super-Seven is a beautiful and efficient receiver, and we are so sure that you will be delighted with it, that we make this liberal **30 days' free trial offer.** You to be the judge.



30 Days' FREE Trial

6 Tube Set $48.50 RETAIL PRICE *Completely Assembled*

Metrodyne Super-Six

Another triumph in radio. Here's the new 1927 model Metrodyne 6 tube long distance tuned radio frequency receiving set. Approved by leading radio engineers of America. Highest grade low loss parts, completely assembled in a beautiful walnut cabinet. Easy to operate. Dials easily logged. Tune in your favorite station instantly on same dial readings every time. No guessing.

Mr. Howard, of Chicago, said: "While five Chicago broadcasting stations were on the air I tuned in seventeen out-of-town stations, including New York and San Francisco, on my loud speaker horn, very loud and clear, as though they were all in Chicago."

We are one of the pioneers of radio. The success of Metrodyne sets is due to our liberal **30 days' free trial offer,** which gives you the opportunity of trying before buying.

MAIL THIS COUPON
or send a postal or letter. Get our proposition before buying a radio. Deal direct with manufacturer—
Save Money.

Mail COUPON Below!

Let us send you proof of Metrodyne quality

F. L. Warnock, Greentown, Ind., writes: "I received the Metrodyne in good shape and am more than pleased with it. Got stations 2,000 miles away."

C. J. Walker, Mariposa, Calif., writes: "Received my Metrodyne Single Dial set O. K. I believe that these one-dial sets are going to be excellent sellers. I had no trouble in tuning in stations enough to satisfy anyone, so you will please send me another set."

Roy Bloch, San Francisco, Calif., writes: "Very often we travel from New York to the Hawaiian Islands quickly — from station to station — by means of the little tuning-knob which operates the electrically-lighted dial. The Metrodyne Single Dial Set is much easier to operate than any radio set I've ever seen."

We will send you hundreds of similar letters from owners who acclaim the Metrodyne as the greatest radio set in the world. A postal, letter or the coupon brings complete information, testimonials, wholesale prices, and our liberal **30 days' free trial offer.**

METRO ELECTRIC COMPANY
2161-71 N. California Ave., Dept. 599
Chicago, Illinois

Gentlemen:

Send me full particulars about Metrodyne 6 tube and 7 tube sets and your **30 days' free trial offer**

*Name*_____

*Address*_____

If you are interested in AGENT'S proposition, place an "X" in the square ☐

METRO ELECTR C COMPANY

2161-71 N. California Ave. • Dept. 599 • Chicago, Illinois

mirably suited for this circuit inasmuch as both the loop and the circuit were designed to match.

(If any further information on these accessories is desired, full descriptive matter may be obtained by writing the Manufacturers direct.)

LIST OF PARTS

These parts or their equivalent will give satisfactory results:

1—7x24x3/16 Micarta Panel
3—Bodine Twin Eight Radio Frequency Transformers
3—.00035 mfd. Windham Condensers
5—Pacent Sockets
2—Ferranti Audio Frequency Transformers
1—Muter .00025 Grid Condenser
1—Muter 2-megohm Grid Leak
1—Muter .5 mfd. By-Pass Condenser
1—Carter 200,000 ohm Variable Resistance
1—Carter Open Circuit Jack
1—Carter 6-ohm Rheostat
10—Engraved Eby Binding Posts
1—Carter Filament Switch
Miscellaneous Screws
1 Package Kester Solder
25 ft. No. 12 ga. Tinned Copper Wire

The Universal Receiver

(See Page 152 for Diagram)

OUR readers are continually requesting information and details of a receiver which is easy to construct, economical in price and operation, and contains a minimum number of tubes consistent with loud speaker

The Universal Receiver installed in a console with appropriate accessories

reproduction of good quality over long distances. In addition to this, many desire a receiver in which either dry cell or storage battery tubes may be used.

In our search for a receiver which would fulfill the requirements, our attention was attracted by many excellent circuits. Each was carefully experimented with and a selection made. We now offer our readers a receiver which we consider to be the ultimate in four tube possibilities. The Universal Receiver, as it is known, is comparatively new and while it has been described before in other publications, various changes and modifications have been made in the interest of increased sensitivity and selectivity as well as appearance and ease of wiring.

A combination of one stage of balanced tuned radio frequency amplification, a regenerative detector with a fixed tickler and two stages of first grade transformer coupled audio amplification with a power tube in the last stage make up the circuit in this unique receiver.

A .0001 mfd. variable condenser is in series with the antenna. This small condenser in the antenna system, when used in conjunction with the type 277-C coil, allows extreme selectivity with maximum sensitivity. If local broadcast interference is experienced, tuning may be sharpened by adjusting the capacity of the condenser toward minimum. For all-around reception the capacity of the condenser should be set at maximum. The type 277-C coil is the antenna coil, tapped to establish a bias on the radio frequency tube, and tuned by a .00035 mfd. variable condenser. The remaining major control is also a .00035 mfd. variable condenser tuning the type 277-D coil, which is a radio frequency transformer of the auto-transformer type, with a fixed tickler. A 500 to 50,000-ohm variable non-inductive resistance is in series with the tickler and adjusts it electrically. A pilot light operated from the "A" battery and controlled by the filament switch indicates at all times whether or not the tubes are burning. In the first stage of audio a 6-1 ratio audio transformer is used, the second stage using a 2-1 ratio audio transformer. These transformers when used with a good cone type of loud speaker will reproduce the lowest audio frequencies as broadcast today as well as the highest, with a very excellent tone quality. A first stage jack is not necessary, since the variable resistance in the tickler circuit acts as a very efficient volume control.

The Universal Receiver is designed to operate from a 6-volt storage "A" battery, using three UX 201-A tubes and one UX 112 power tube in the last stage of audio. To convert the receiver into one which operated on 4½ volts, substitute the UX 201-A tubes with UX 199 tubes and the UX 112 with a UX 120 power tube. Also remove the No. 112 and No. 1-A Amperite units and replace them with a No. 120 and 4 V 199 Amperite unit respectively. Circulars are supplied with the various tubes explaining their correct working voltage.

The Universal Receiver is shown in the illustration appearing herewith installed in a Charlotte Model 10 Console. The console is a product of the Charlotte Furniture Company of Charlotte, Michigan, and is exceedingly well constructed, being made entirely of high grade walnut and gum stock, and highly finished in lacquer and waxed. The top and ends of the console are in plain straight grain walnut, while the doors are of matched butt walnut.

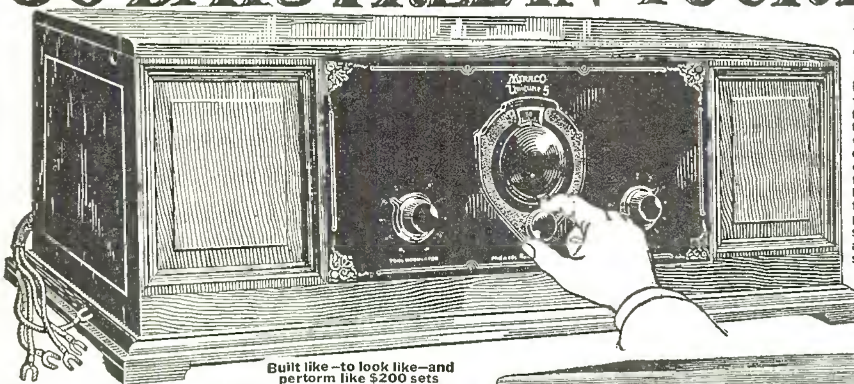
A Model K-3 Acme Free-edge Cone Speaker, manufactured by the Acme Apparatus Company of Cambridge, Massachusetts, is used as a reproducer. This is one of the recent developments of this corporation, being tastefully finished in a neutral color, and capable of reproducing practically all audible frequencies now broadcast.

A new type of combination charger and "A" battery is used to supply "A" potential for the receiver. Sufficient space is allowed within the unit for a Willard Glass Case Battery which is connected directly to the charger. A pair of toggle switches in the case of the instrument allows either a high or low rate of charging to be used, as well as turning the charger on or off. This unit is manufactured by the Interstate Electric Company of St.

30 DAYS FREE IN YOUR HOME

Tested and approved by all of Radio's Highest Authorities

RADIO NEWS · POPULAR RADIO · RADIO BROADCAST



Send Coupon for Amazing Special Offer!

NOTE: This offer is made to prospective buyers by famous big Radio Corporation, one of America's oldest reliable manufacturers of fine sets—seventh successful year. Many satisfied users in every state. Postal or coupon brings testimony of nearby users and proof Miraco's outperform sets costing up to 4 times as much. Very easy to install and operate.

AMAZING SPECIAL OFFER to User-Agents who will allow friends to listen to their Miracos.

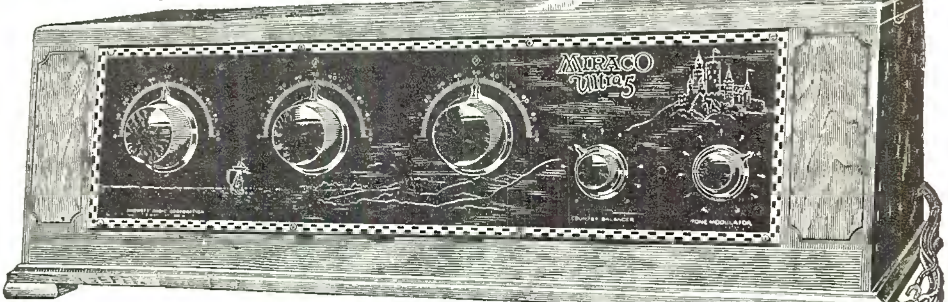
BEAUTIFUL-BIG-POWERFUL Ultra Selective MIRACO Ultra 5

Retail $ LIST Price now only $49.75

GET SPECIAL OFFER

one year GUARANTEE

Built like—to look like—and perform like $200 sets



Real Single Dial Control!

Magnificent Big Powerful Miraco "Unitune-5" Get Special Offer and Amazing Low Price!

The celebrated Miraco Ultra-5—U.S. Navy type circuit, has also been adapted to Single Dial Tuning—**without sacrifice of selectivity, volume, clearness, power, tone, or distance getting qualities!** In the magnificent big Miraco Unitune-5, above shown, you turn one vernier knob for stations everywhere. Beautiful hand-rubbed, piano hinged, solid walnut cabinet, 28 in. long, 15 in. deep, 10 in. high. Sloping Bakelite panel is walnut finished to match. Also **offered on 30 days free trial!**

Coast to Coast and Foreign Reception Certified by Miraco users

MIRACO RADIO GETS'EM COAST to COAST

Send for Proof!

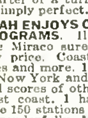
Notice! Enormous sales of the celebrated Miraco big fine Receivers (resulting from delighted users so highly endorsing them to friends) again enable us to add hosts of costly new features, latest refinements and up-to-the-minute improvements such as you might expect to find only on much higher priced sets. Miraco's this year are still better—more beautiful—more selective—more powerful for less money than ever before.

USER-AGENTS WANTED - - WRITE!

Reports from users everywhere leave little for us to add. These are only a few of the many in our files and which we receive daily. Send coupon for plenty of additional proof and testimony of nearby users.

HAS NO EQUAL FOR TONE, VOLUME, DISTANCE. North Wildwood, N.J. Miraco best packed set I ever saw shipped. Words cannot express the wonderful tone quality volume, and distance. First night received 47 stations on Loudspeaker. Up to last night, the 5th day, I have received exactly 103 stations; farthest is KGO, Oakland, Calif. on loudspeaker. Also Porto Rico, Cuba and Canada. Francis B. Lee.

TONE QUALITY PLEASES EVERYONE. Philadelphia, Pa. Everyone that hears the Miraco is very pleased with tone, distance, etc. I tuned in during International Test Week; KGO, Oakland, Calif.; CYB, Mexico City, Mex.; 6KW, Cuba; 2EH, Edinburgh, Scot.; also a station in Buenos Aires, Argentine. Geo. W. Hill, Jr.



WISCONSIN HEARS COAST TO COAST. Racine, Wisc. I got station 2LO London last Wednesday night on my Miraco. I heard a choir sing and announcement. Have also heard PWX, Havana, Cuba; CYZ, Mexico City and 104 American stations from coast to coast. Lawrence Risberg.

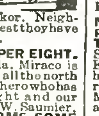
SELECTIVITY!--CUTS THROUGH STRONG LOCALS. Detroit, Mich. I am more than satisfied with my Miraco. I can cut through WWJ, WCX, WJR, WGHP, very strong local stations, and this is done with quarter of a turn. In every way it is simply perfect. Charles Paul.

UTAH ENJOYS COAST TO COAST PROGRAMS. Heber City, Utah. The Miraco sure can't be beat at any price. Coast to coast it sure does and more. I have had stations in New York and Cuba in the east, and scores of other stations on the west coast. I have logged up to date 150 stations and they all come in wonderfully. Monte Giles.

MIRACO WINS AGAINST 3 OTHER MAKES. Pearland, Texas. I tried three other makes and the Miraco is the best of them all. Received KFI, Los Angeles, Calif. on loudspeaker. O. H. Richards.

Nacogdoches, Texas. On my Miraco I have heard stations from Cuba to San Francisco and from Mexico City to Pittsburgh. Walter M. Frisbie.

COAST TO COAST LOUD AND CLEAR. Guthrie, Minn. We logged over 30 stations and got over 1500 miles on the loud speaker the first night--our first experience tuning a radio. The third night we got WJAX Jacksonville, Florida and KFI Los Angeles, Calif., on the loudspeaker. Neighbors say Miraco is the best they have ever heard. O. R. Wolf.



MIRACO BEATS A SUPER EIGHT. Cobalt, Ontario, Canada. Miraco is one of the best radios in all the north country. There is a man here who has a big Super eight and our Miraco beat it. W. Saumier.

OUTPERFORMS SOME $300 SETS. Blakely, Ga. I am well pleased with my Miraco. It does better than machines that cost $300 or more. J. D. Tison.

MOST SELECTIVE-SUPERIOR TO $120.00 SET. Santa Cruz, California. I do not hesitate to show my friends the "Miraco Superiority" over my (names another set) costing $120.00. The Miraco is the most selective set I have seen yet and cuts out the jumble of stations on the low wave lengths in 1 1/2 points. Wm. Schuette.

MELLOW TONE -- LOUD AND CLEAR. Indian River City, Fla. A wonder set. Am having splendid results. Have had Miraco four nights and have stations on my list from Cuba to New York, Chicago, Denver, Texas, all coming in loud, mellow in tone and clear. I have one sold already and did not even try. Mr. H. G. Duff.

REFUSED TO TRADE IT FOR EXPENSIVE SET. Prosper, Ore. Over 31 stations brought in first night on loud speaker. I ordered the Miraco for a friend and he is more than pleased. I offered to trade my Neutrodyne for it but he refused and it has the name of the best set in the community. M. E. Hulton.

PENNSYLVANIA BEGINNER GETS 'EM ALL OVER. Corry, Pa. Have had Miraco one month today and have received over 115 stations from all parts of the United States, Canada, Cuba, and Mexico. I think this is pretty good for one that never had any experience before. Clarence Drugfelder.

LIKES IT BETTER THAN $150--$250 SETS. Westville, Ill. Miraco sure is a wonderful set. I get the stations easily without noise--that's one of the things I like about the Miraco. I've had three other sets that have ranged from $150 to $250 each but Miraco beats them all. My friends all like the Miraco. I have had stations all over the U.S.A. I tune in Mexico City and Havana, Cuba any time they are on the air. Alex Kinder.

BEATS COSTLIER SETS WITH MORE TUBES. Lexington, O. I have given Miraco a thorough try out and find it to do all you claim. 85 stations logged so far; getting new ones every week. This list includes coast to coast, Canadian, Cuban and Mexican stations. The **selectivity is remarkable.** Others here in town have more expensive and elaborate sets with more tubes but do not ever do this. Fuller Temple.

MIRACO OUTPERFORMS THEM ALL. St. Francis, Kansas. I've heard a lot of radios but the Miraco is best all around. I am proud of mine. Comes in fine and clear. No noises. Get lots of distant stations. Surely am satisfied. Orvey Sharpe.

Send coupon for Amazing Special Offer!

Big Powerful New MIRACO

Solid Walnut Cabinet — Unitune 5 — 28 in. long

Solid Walnut Cabinet — Ultra 5 — 27 in. long

TRADE MARK REGISTERED

ULTRA-SELECTIVE LONG DISTANCE 5 TUBE SETS EASY ON BATTERIES

Unless Trial Proves Your Miraco the Most Selective, Clearest Toned, and Most Powerful Distance Getter—Don't Buy it!

No need to wear out expensive batteries burning 6, 7 or 8 tubes when users everywhere are reporting that the big latest Miraco 5-tube sets actually are *unsurpassed* (even at much higher prices) for razor-edge selectivity, extreme long distance reception, clear natural tone and powerful loud speaker volume combined with great economy in use of battery current! Enjoy a powerful Miraco 30 days in your home —*at our risk*—and be convinced! Your verdict final—absolutely no strings to this. *Save or make a lot of money* on sets and accessories this season by sending **IMMEDIATELY** for our *Amazing Special Offer!*

Deal Direct with a Big Reliable Corporation

Remember this offer is made direct to you by a big responsible manufacturing corporation—one of the oldest and most successful set-builders in the industry—a concern which has grown to immense size thru recommendations of its many thousands of satisfied customers who bought after trial.

Our Factory Prices Save You Up to One-Half

We deal direct by mail with users, agents and dealers, thereby effecting great savings which are reflected in amazingly low prices. *Everything we sell is high-grade. Don't confuse Miraco's with small, cheap sets.*

You'll be Proud of Your Miraco

In its big, handsome, expensive-looking solid walnut cabinet with sloping front, you'll be proud to have friends examine and hear your Miraco. In construction, appearance and performance, every inch a high-priced set. Handsomely gold illustrated genuine Bakelite front panel and genuine Bakelite knobs—finished in grained walnut. Finest parts obtainable —the kind used in $200 sets. Bakelite sub-panel. *Many exclusive features.* Each Miraco reaches you completely assembled, rigidly tested, splendidly packed and factory guaranteed for one year. Easy to install and operate—full instructions supplied. Send NOW for testimony of nearby users and *Amazing Offer!*

The Provident Savings Bank and Trust Co. Building

What a $3,000,000 Federal Reserve Bank Says:

"For years the Midwest Radio Corporation of this city have been very satisfactory customers of this Bank, one of the largest in Southern Ohio. The Midwest organization was one of the very first to engage in the manufacture of radio sets, and to us their success is evidenced by the sound and steady expansion of their business which we have observed year after year. We are personally acquainted with all officers of the Corporation and from experiences know them to be men of honor, integrity and ability. We consider them to be both morally and financially responsible. **They have a reputation for fair and square dealings.**" THE PROVIDENT SAVINGS BANK & TRUST CO. Member Federal Reserve System. Capital and Surplus over $3,000,000.

AGENTS! DEALERS! Write for our latest Miraco proposition. Nation-wide popularity, superior performance of Miraco Radio sets, at amazingly lower prices, make them easy to sell. Send coupon today for proof

Midwest Radio Corporation — Pioneer Set Builders 7th Successful Year — Cincinnati, O.

All the Proof you want is waiting for You!

Coupon or postal brings reports from hosts of users in your vicinity and elsewhere proving that Miraco sets **at rock-bottom money-saving factory prices,** outperform sets costing up to four times as much. **You can also buy speakers, tubes, batteries, etc., at big savings from us!** Get our proposition before spending money elsewhere.

MIDWEST RADIO CORPORATION
Pioneer Builders of Sets
531-R Miraco Building — Cincinnati, O.

Without obligation, send free literature, testimony of users, AMAZING SPECIAL OFFER and full particulars of your **big money-saving factory-price proposition** on Guaranteed Miraco sets and all radio supplies. ( ) Agent ( ) User ( ) Dealer

NAME

ADDRESS

Louis, Missouri.

A Kingston "B" Battery Eliminator is used to supply the "B" potential for this receiver. It is a product of the Kokomo Electric Company of Kokomo, Indiana, and is capable of delivering sufficient current to properly operate the receiver without overloading. It uses the well-known Raytheon Tube for rectification purposes.

(If any further information on these accessories is desired, full descriptive matter may be obtained by writing the Manufacturers direct.)

LIST OF PARTS

These parts or their equivalent will give satisfactory results:

1—7x21x3/16 in. Drilled and Engraved I. C. A. Etchogravure Panel
1—7x20x3/16 in. Drilled I. C. A. Etchogravure Sub-Panel
1—Pair Type M-V Pan Brackets
2—General Radio Type 247-H .00035 Variable Condensers
2—General Radio Type 310 Dials
1—General Radio Type 285 6-1 Ratio Audio Transformer
1—General Radio Type 285-L 2-1 Ratio Audio Transformer
4—General Radio Type 349 Sockets
1—General Radio Type 277-C Coil
1—General Radio Type 277-D Coil
1—General Radio Type 301 12-ohm Rheostat
1—General Radio Type 301 25-ohm Rheostat
1—General Radio Type 368 Midget Condenser
1—General Radio Type 236 .5 mfd. Paper By-Pass Condenser
1—Yaxley Type 310 Pilot Light Bracket
1—Yaxley Type 701 Open Circuit Midget Jack
1—Yaxley Type 10 Filament Switch
1—CRL 50,000-ohm Variable Non-Inductive Resistance
1—Precise Type 940 .0001 mfd. Variable Condenser
13—Eby Engraved Binding Posts
1—Lynch Single Resistor Mounting
1—Lynch 3-megohm Grid Leak
1—Amperite Type No. 112
1—Amperite Type No. 1-A
1—Micamold .0001 mfd. Fixed Condenser
1—Micamold .00025 mfd. Grid Condenser (without leak mounting)
3—Dozen No. 6x32x½ in. Round Head Brass Machine Screws
1—Dozen No. 6x32x½ in. Flat Head Brass Machine Screws
3—Dozen Kellogg Tinned Soldering Lugs
1—Blackburn Ground Clamp
1—Package Kester Radio Solder
50—Feet Belden No. 12-gauge Tinned Copper Hook-up Wire
1—Foot Flexible Insulated Wire

The Thordarson Power Compact

(See Illustrating Diagram on Page 144.)

WITH the advent of the "B" battery eliminator and the perfection of the same, there comes a demand for an eliminator which incorporates efficiency, compactness and flexibility, in such a form that the unit may be readily installed within the cabinet of the receiver and such that the output voltages may be regulated with ease and at will.

The "B" battery eliminator which is described in this review has the foregoing features embodied in its design and should give exceptional results if properly constructed and adjusted.

Full rectification is accomplished by means of a Raytheon Type BH rectifying tube. The low voltage primary windings, high voltage secondary windings, and the audio frequency chokes are contained in one unit. There is also a low voltage secondary winding, in case a power amplifier tube is used. This combination makes a very neat and highly efficient compact unit. A thirteen and one-half mfd. Sangamo filter condenser block is used in conjunction with the audio frequency filter chokes. A 10,000 ohm fixed resistance is shunted across the detector positive and the negative leads. This resistor acts as a voltage regulator or stabilizer, and retains the detector voltage constant through changes in the input line voltage. The flexibility of output voltage control is obtained by means of two Centralab Variable Resistances. A 50,000 ohm Variable Resistance is placed in the inter-

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Over 2000 -ITEMS- Everything in RADIO

Send for this guide to Radio prices and Radio quality. All of our vast resources and radio experience have been utilized to assemble for you in one gigantic institution, the best and newest things in radio. The Randolph catalog is indeed the radio market place of the world — a masterpiece of merchandising that befits our house—the largest exclusive radio mail order house in the world.

What Our Catalog Contains

Over 2,000 items—from the most beautiful, fully equipped console model radio set, down to the smallest part or tool for the set builder—kits, parts, and supplies of every conceivable type and style. All beautifully illustrated and interestingly described. And to give this book added value, we have included radio data that makes it an invaluable text book for every lover of today's most fascinating and most wonderful achievement—RADIO.

Radio Sets

In this great radio market place you will find table model sets and console types with built-in loud speakers; the newest ampliphonic console sets; new Spanish period consoles; **five, Six, seven, and eight tube sets.** with three dial, two dial, and the **newest and most popular single simplified control.** All sets are assembled in beautiful, genuine mahogany and walnut cabinets in a choice of latest types and designs.

5 Tube sets as low as $24.90 Latest 1927 Models

All Randolph sets are sold at amazingly low prices. No matter what kind of set you want—no matter how little you want to pay—you can select YOUR SET AT YOUR PRICE from the Randolph catalog.

Radio Parts—Supplies

The Randolph catalog also contains a most complete line of *"B" Battery Eliminators*, including the famous *Raytheon Eliminators*; the latest type of Loud Speakers, Cone Speakers, a complete line of quality "A" power units—in fact, you will find listed in this wonder book every part that goes into the construction of a radio set, or any accessories you desire, at prices that mean a *substantial saving to you.*

Why We Save You Money

Because we handle radio exclusively and sell a tremendous volume of everything in Radio, we can concentrate our buying power for the benefit of our customers.

Volume purchases regulate prices. We command rock bottom prices from manufacturers, and in many cases we contract for entire factory output of exclusive products. You will benefit by our great volume of purchases and sales, by securing anything you may want in radio at a substantial saving.

Free Radio Service

Everyone has need for radio service. The average man has no time to keep up with the rapid developments of radio. We employ Radio Engineers who have made radio their life work. Their expert advice and helpful suggestions solve every radio problem of our customers.

Our Guarantee

Every article in our catalog is based on careful laboratory analyses and tests. We guarantee to back up every Item in our catalog with our own as well as manufacturer's assurance of quality.

All The Latest Radio Kits

Our catalog includes the following well known circuits, designed and approved by the world's foremost radio engineers: Karas Equamatic; Henry Lyford Receiver; B. T. Counterphase Power Six; Samson DeLuxe Transcript; Hammarlund Hi "Q" Receiver; Infradyne; Silver Marshall Kits; Neutrodyne; Remler Super; Bests 45,000 Cycle Super; Madison Moore Super; Nine-in-line Super; New Acme Reflex; Aerodyne; Sargents Infradyne; Victoreen; Short Wave Kits; Cockaday; Browning Drake. All classes of radio frequency, Superheterodyne and every other approved, popular circuit.

YOU MUST HAVE THIS BOOK

Space limitations here prevent our telling you more about the Randolph Catalog. Simply fill out and mail the coupon—or you may send a postal or letter—and this truly remarkable Radio book will come to you **ABSOLUTELY FREE. MAIL THE COUPON NOW.**

Randolph Radio Corporation

180 North Union Avenue • Dept. 196 • Chicago, Ill.

This Coupon Brings the Great RADIO Book FREE

RANDOLPH RADIO CORPORATION
180 N. Union Ave., Dept. 196
Chicago, Illinois

Send me—free—your 84-page, 1927 Radio Book.

*Name*_____

*Street and No.*_____

*R. F. D.*_____ *Box*_____

*City*_____ *State*_____

mediate voltage lead and a 100,000 ohm variable resistance is placed in the detector lead. By the means of these two variable resistances any desired or required voltage may be placed upon their respective circuits. The complete "B" supply unit occupies a space of but 6x9 in. without crowding.

This point is well worth bearing in mind, for it is now possible to build the "B" supply unit as a part of the receiver without cramping the other apparatus.

LIST OF PARTS

1—Thordarson Power Compact R-171
1—Raytheon Rectifying Tube, type BH
1—Howard Socket
1—Sangamo 13.5 mfd. Filter Condenser Block
1—Centralab 50,000 Ohm Variable Resistance
1—Centralab 100,000 Ohm Variable Resistance
1—Allen-Bradley 10,000 Ohm Fixed Resistance
7—Engraved Eby Binding Posts
1—Engraved Formica Drilled Panel
1—Wood Baseboard
Assorted Screws and Copper Hook-up Wire

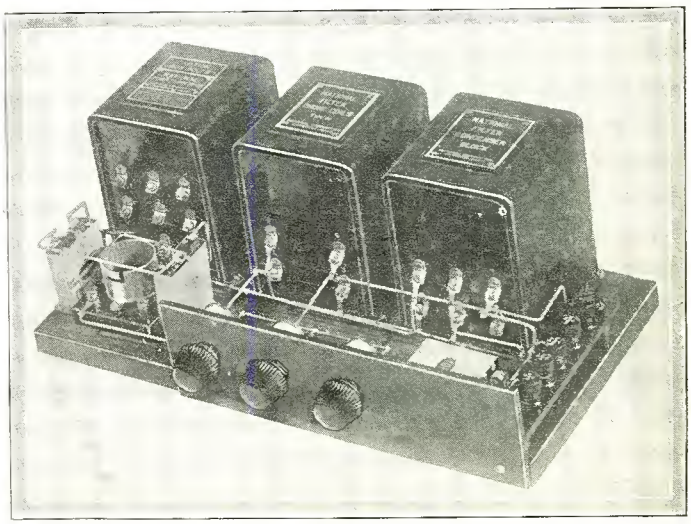
National Power Amplifier and "B" Supply Unit

(See Diagram on Page 148)

WITH the coming of the "B" battery eliminator and the power amplifier there has come a request for a combination of these two units whereby the home builder may incorporate the two units in the design of his receiver in such a way that the output be very flexible, in order that various types of tubes may be used at their greatest point of efficiency and lend the appearance of a factory-built job.

The herein described unit has been designed with three thoughts in mind, namely: flexibility of output, utility, and neatness in appearance. The power supply unit consists of the necessary high tension transformer, filter chokes, and filter condensers. These units are in separate metal cases and are finished in black crystalline enamel. There are furnished variable high resistances in the intermediate and detector voltage leads for the purpose of adjusting the voltage applied to these tubes. A variable high resistance is also placed in the grid bias circuit. By the means of these variable resistances, the applied voltages on the various circuits may be so adjusted that the greatest point of efficiency of the tube in use may be obtained. A 10,000 ohm fixed resistance is shunted across the detector positive and negative leads, which will regulate or hold constant the voltage applied to the plate of the detector of a varying input line voltage. Full wave rectification is obtained by means of a Raytheon type BH tube.

The power amplifier unit consists of three stages of impedance



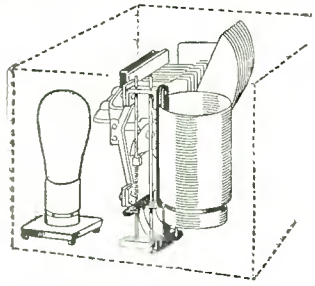
View of completed "B" Supply Unit. Note the extreme simplicity of the layout as well as the ease of wiring

YOU CAN BUILD THE NEW SHIELDED HI-Q*

The Hammarlund-Roberts Board of Engineers

The Hammarlund-Roberts Hi-Q Receiver is the joint creation of ten leading engineers. A wealth of experience plus highest reputation for quality parts guarantee unexcelled performance.

Benjamin Electric Mfg. Co.	Martin-Copeland Co.
Carter Radio Co.	Radiall Company (Amperite)
Durham Resistors	Samson Electric Co.
Eby Mfg. Co.	Sangamo Electric Co.
Hammarlund Mfg. Co.	Westinghouse Micarta

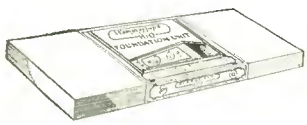


Automatic Variable Coupling

A wonderful new feature. Same control operates both tuning condenser and primary coil coupling. This gives maximum and equal amplification and selectivity over entire tuning range.

"How to Build It" Book

Written by the Hammarlund-Roberts Board of Engineers in very simple A B C language. Every detail described, numbered and diagrammed so that you can easily understand it. Send **25c** for your copy.



The Hi-Q Foundation Set

The Key to this wonderful receiver. Includes drilled and engraved panel, and subpanel and all the essentials required to start building. Price **$10.50.**

Over 57,000 Built at Home

You Can Do It Too

LAST year 57,453 radio lovers had the fun of building the Hammarlund-Roberts Receiver at home—a wonderful tribute to the genius of America's ten leading engineers, who designed this remarkable instrument.

The new Hi-Q Receiver is even more wonderful than our set of last year. A study of its modern features will disclose simple dual tuning, Complete Shielding, Automatic Variable Coupling, high detection efficiency, high power output and utter absence of oscillation.

An inspection of any home-built Hi-Q Receiver will prove that here for the first time 5 tubes equal 8. Actual test will prove a sensitivity equal to that of expensive "Supers." Reception is startling both in distance and power; volume is full and all signals have those rich, undistorted tone qualities which fall like a caress on the most sensitive ear.

Save $50 to $100—Build It Yourself

When over 57,000 novices have built successful Hammarlund-Roberts Receivers, you can build one, too. Send 25c for the "How to Build It" book or get a copy from your dealer. Follow the simple directions, solder a few connections and in a few hours you, too, will have the satisfaction of having built one of the world's finest receivers at less than half the price of factory-made sets not nearly so good.

Hammarlund ROBERTS Hi-Q*

**High ratio of reactance to resistance. High Ratio—Great selectivity—Loud Signals.*

HAMMARLUND-ROBERTS - 1182-T Broadway, New York

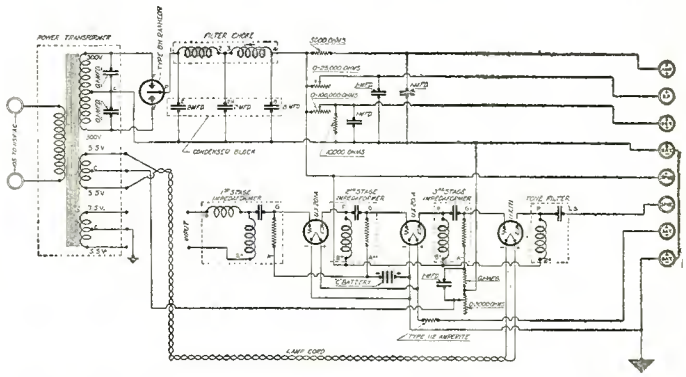
coupled amplification. By this method the tonal quality of reproduction is quite unsurpassed, clearly bringing out all audio frequencies from the lowest bass to the highest treble when a good grade of speaker is used. The units of the power amplifier are contained in separate metal cases and are also finished in black crystalline enamel. A "tone filter" is placed in the loud speaker circuit, which keeps the high plate voltages from entering and damaging the windings of the loud speaker, also filtering any ripples that may have come through the power supply unit.

A UX 171 power tube is used in the last stage, so that all available power may be handled without danger of excess distortion. The conventional "A" type of tube is used in the two preceding stages.

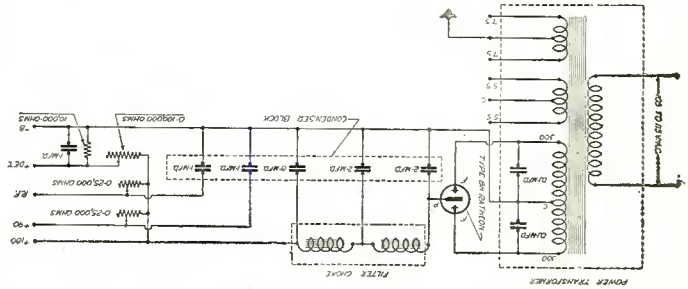
By utilizing these two units, two very important factors in radio reception are accomplished. A continuous, steady flow of plate voltage at any desired potential and flawless reproduction may be reproduced if constructed properly and with care.

LIST OF PARTS

1—National Power Transformer
1—National Type 80 Filter Choke
1—National Filter Condenser Block
3—National Impedaformers
1—National Tone Filter
4—Tobe 1 mfd. By-Pass Condensers
1—Allen-Bradley 3,000-ohm Variable Resistance
1—Allen-Bradley 25,000-ohm Variable Resistance
1—Allen-Bradley 10,000-ohm Variable Resistance
1—Allen-Bradley 10,000-ohm Fixed Resistance
1—Allen-Bradley 5,000 Fixed Resistance
3—Frost Sockets
1—Lynch .1-megohm Resistor and mounting
1—Type 112 Amperite and mounting
10—Engraved Eby Binding Posts
1—Package Kester Solder
25 feet Belden No. 12 gr. Tinned Copper Wire



Schematic wiring diagram of National "B" Eliminator and power amplifier

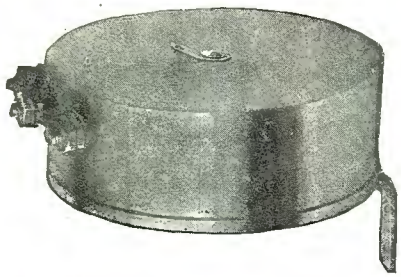


Schematic wiring diagram of National "B" Eliminator

AALCO

Shielded T. R. F. Transformer

A product of remarkable results and compactness. Can be mounted at any angle and within one-half inch of each other. No inter-stage coupling, greater selectivity. Shielding on coils is of copper and lacquered so as not to discolor or corrode.



Aalco T. R. F. Transformer

Can be used on all circuits, such as Freshman type, Neutrodyne, Infradyne, and all others using .00035 variable condenser. AALCO SHIELDED COILS may be mounted direct to condenser or on sub-panel. Dimensions of case, 1⅛x3 inches.

List price, $2.00 each

Aalco Shielded Coupler

For .0005 condenser having three windings, which makes it possible for use in oscillator circuits. Small in size and mounted in copper shield, the same specifications as above.

List price, $3.00

Aalco Radio Laboratories, Inc.
1912 Wabash Ave., Chicago
Makers of the Famous Aalco Loop

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Your name and address on a postal or in a letter, will bring you—absolutely FREE—

THIS 84-PAGE BARGAIN RADIO CATALOG

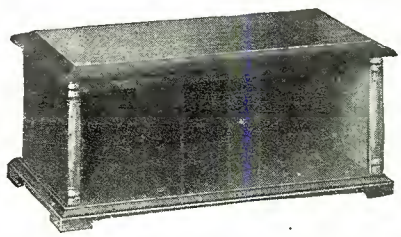
Contains the most complete array of Sets, Kits, Parts and Supplies, at prices that will astonish you.

SPECIAL—We Are Also Featuring the Wonderful Karas Equamatic Set.

Write for Book Today

RANDOLPH RADIO CORP.
180 N. Union Ave., Dept. 198
Chicago, Ill.

RADIO CABINETS



Princess Cabinet, Genuine Black Walnut

Panel	Depth	Prices
7x18	10 in.	$6.95
7x21	10 in.	7.50
7x24	10 in.	8.25
7x26	10 in.	8.75
7x30	10 in.	9.85
7x18	8 in.	6.10
7x21	8 in.	6.50
7x24	8 in.	6.70
7x26	8 in.	7.10

Transportation extra.
The upper panel strip is removable to allow set to slide into place through slide groove. No screws necessary. Panel or mounting board not included. Equipped with piano hinges and lid holders.
Description: Our Princess Cabinets are finely finished, very pretty and well proportioned, with plain, graceful lines.
The tops of these cabinets are made of solid, selected black walnut, hand faced so they cannot warp. The ends also are made of solid black walnut and set in cross ways grain. The backs and bases are selected hand faced gumwood.
These cabinets have a beautiful hand rubbed genuine lacquer finish. You can easily notice the distinctive difference this cabinet will make in your set. We also carry a fine line of Consoles, Desks and Tables. Send for Catalog.
UTILITY RADIO CABINET COMPANY, 448 27th Street, Milwaukee, Wis.

FREE HOOK-UPS AND BIG RADIO GUIDE

NEW EDITION

Complete Parts for All the Newest Circuits—Browning Drake, Victoreen, Etc.

Read through this issue of the CALL BOOK — then let BARAWIK fill your order for the parts of the newest circuit you wish to build. We supply over ¼ million radio fans with everything from complete factory built console sets to the thinnest magnet wire, or smallest screw. If it's radio, we have it, for we carry the biggest radio stocks in the world. Get the parts you need from BARAWIK — quick — and save money, time and trouble.

164 Pages of 1927 Goods—Bigger Bargains Than Ever

Our newest 1927 Radio Guide contains 164 pages brimful of radio's newest creations, just what you have longed for, at the lowest prices in radio history. You'll be astounded at the savings. All brand-new merchandise of the famous makers, standard guaranteed goods of known value. Everything you need is here, including the newest amateur receiving and transmitting equipment—a new department directed by F. J. Marco, 9ZA.

Send for free copy of this new Radio Guide today—NOW. Also please send names of other radio fans you know.

The BARAWIK CO.
540-570 Monroe St., CHICAGO, U. S. A.

MAIL THIS COUPON NOW

Name.....
Address.....
Friend.....
Address.....

The flux is everything in radio soldering says this Radio Engineer

"In our laboratory we made a thoro analysis of the two groups of fluxes (natural and chemical). We found the natural flux, rosin, the only safe one to use on radio work.

Pure rosin, as in Kester Radio Solder, will not fume, sputter, or creep over large areas, and being a hard, dense substance, rosin will not attract and collect dust (carbon particles), which makes an excellent path for leakages. These are the faults of fluxes containing chloride, be it either in paste, liquid or compound form. Any flux containing chloride will eventually cause heavy leakage. Hence they should be strictly avoided.

We find Kester Radio Solder the most convenient way to solder on radio work, for it has the proper amount of pure rosin right inside the solder itself. In fact, we used it exclusively on all of our work."

There's your guide, radio fans—the approval of an expert radio engineer. Surely there can be no doubt as to what you should use on YOUR SET.

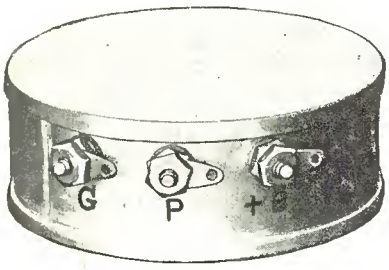
A free Sample write for it now

KESTER *Radio* SOLDER

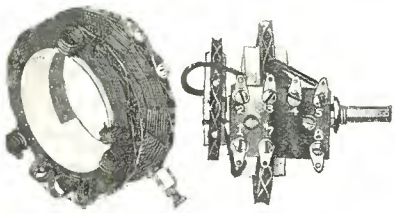
the safe solder for radio, requires only heat

CHICAGO SOLDER CO.
4226 Wrightwood Ave. Chicago, U. S. A.

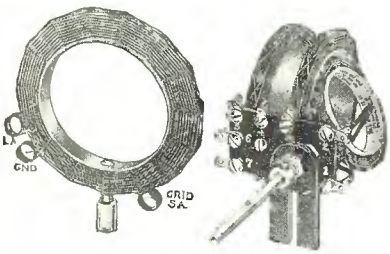
Originators and the World's Largest Manufacturers of Self-fluxing Solder



No. 30 Shielded Tuned Radio Frequency Transformer $2.00



No. 18A Roberts Circuit.....$8.00 set



No. 24 Browning-Drake.....$7.50 set

DIAMOND-WEAVE

(TRADE-MARK REGISTERED Aug. 4, 1925)

SICKLES COILS

(Patented Aug. 21, 1923)

Our No. 30 Shielded Tuned Radio Frequency Transformer is designed on entirely new scientific principle. It will tune sharply to wave lengths from 200 to 550 meters with a .00035 variable condenser. The shielding prevents intercoupling between coils, and local interference. Outside dimension of shield 3 in. diameter, 1⅛ in. high.

Our No. 18A Coils are designed for use in all Roberts Circuits with or without reflex. They are equipped with the new center-tap NP Coil, and are provided with one whole panel mounting.

Our No. 24 Coils are carefully designed to meet all specifications of the Brown & Drake Circuit. The windings in the regenerative unit are designed to attain maximum magnetic and minimum capacity coupling.

Special Coils will be made for other circuits if desired.

OTHER COIL PRICES

		Set
No. 20	Craig Circuit	$4.50
No. 19	Acme Reflex	4.50
No. 8	Knockout Reflex	4.00
No. 21	Hoyt Circuit	10.00
No. 25	"Aristocrat" Circuit	8.00

Send for descriptive catalog

THE F. W. SICKLES CO.

144 Union Street — Springfield, Mass.

The famous

Melo-Heald Eleven Circuit

THE CIRCUIT FOR PARTICULAR SET BUILDERS

The One Circuit That Lives Up to Its Reputation and Claims!

Robertson-Davis Co.
Chicago, Ill.

Nov. 5, 1926.

Gentlemen:—

I have finished the construction of the Melo-Eleven superheterodyne. It certainly is a "knock-out"; it is far better than my expectations. I can tune in on nearly any station in St. Louis, Canada, Mexico, or any place in the United States, consistently and at will, without any interference from another station. The selectivity of the set is nothing short of marvelous, and the volume of these distant stations when tuned in is so great that the set can be heard out on the street.

I really doubted the claims that were made for the "Eleven," but in this instance hearing is believing. I believe that I am safe in saying that there is nothing obtainable at the present time that can equal its performance.

The tone is marvelous and it is difficult for me to tell from volume which is out-of-town broadcast.

Yours truly,
(Signed) **DR. LOUIS G. FRUMSON,**
Missouri Theatre Bldg.,
St. Louis, Mo.

Cuts Through All Interference —Cross Country on Any Night!

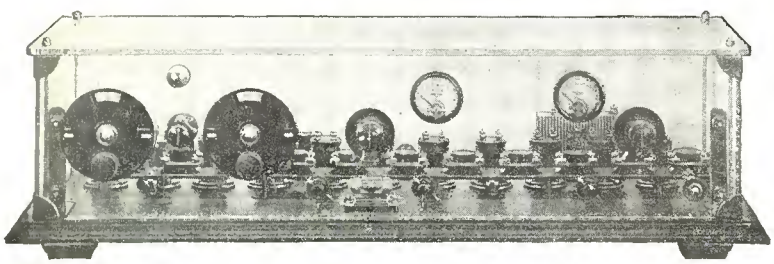
The accompanying letter is a word for word copy of letter received unsolicited from Dr. Frumson. Photograph gladly sent on request.

Dr. Frumson's experience is not the exception. In our advertisements in the current Citizens' Radio AMATEUR Call Book, and Everybody's Radio Home Builder for Oct. 15th and Nov. 1st, we published the letters of Mr. John J. Christoffel and Mr. J. H. Jenkins, of Chicago. Did you read them?

These letters are typical of hundreds of messages that are constantly pouring in. They explain, better than anything we, as originators of the famous Melo-Heald Eleven Circuit might say, why it is **the circuit for particular set builders.**

The Certified Meloformer and Melocouplers are the audio frequency and radio frequency transformers upon which the great success of this circuit depends. **All the other parts are standard, stock parts of no particular make, that you can purchase anywhere.**

Only two major controls are embodied in the MELO-HEALD ELEVEN TUBE CIRCUIT—loop and oscillator. It enables the operator to handle or dispense with local stations with such ease that distant stations come in clearly even in the most congested districts.



FREE BLUE PRINTS—FULL SIZE The illustration above gives an idea of the simplicity of wiring and constructing a receiver from this wonderful circuit. You can build one in about one-third the time required for the average eight-tube set. Only 7-in. by 30-in. panel needed. Neat and sturdy. Send for FREE Blue Prints.

Mail Coupon or Write Today

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DEPT. RCB-12

412 Orleans Street -:- **Chicago, U. S. A.**

FILL IN AND MAIL THIS COUPON TODAY FOR BLUE PRINT AND PLANS FREE

Robertson-Davis Co., Inc., 412 Orleans St., Chicago, U. S. A.

Gentlemen:—
I am interested in the Melo-Heald Eleven Circuit and the transformers used to build a receiver of that type. Please send me Blue Prints, Plans, Specifications and literature about your products, which I understand will be sent FREE and without obligation.

Name.....
(WRITE OR PRINT CLEARLY)
Address.....
City.....
State.....
RCB 12

(Continued from Page 123)

fiers. Due to this fact, it stands to reason that greater volume and selectivity will be available than heretofore supposed possible. It then follows that distant stations will be more readily received during favorable and unfavorable conditions and considerable more volume on all stations than is usual in the ordinary methods of amplification.

Fig. 1 shows a schematic wiring diagram of the complete receiver. A standard tuned radio frequency circuit of the non-oscillating type, tuned by a triple gang condenser, is used before the detector. The audio frequency of the receiver is of standard transformer coupled type.

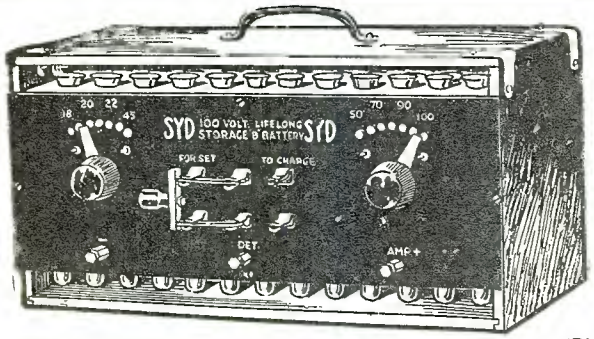
Fig. 2 is a graphic illustration, showing in pictorial manner all the necessary connections for properly wiring the receiver. Photograph "A" is a rear view of the completed receiver removed from the cabinet. It will be noted the simplicity and the symmetrical arrangement of the various parts and the unusual absence of unsightly wiring.

As we go to press, Mr. Sargent, inventor of the Infradyne, writes that Silver-Marshall 220 audio transformers are his final selection for the Infradyne. Needless to say, these transformers as well as the S-M No. 110 oscillator coupler and the S-M midget condensers also selected by Mr. Sargent can be satisfactorily substituted in our model of the Infradyne.

LIST OF PARTS

These parts or their equivalent will give satisfactory results:

1—7x28x3/16-inch Insuline Panel
1—8¾x27x3/16-inch Insuline Sub-Panel
1—Remler Type 700 Infradyne Amplifier
1—Remler Type 630 .0035-mfd. Variable Condenser
1—Gardner & Hepburn or Cardwell .00035-3-gang Variable Condenser
1—Weston Model 506, Type 217 O-7-140 Voltmeter
1—Pair Karas Shelf Brackets
1—Benjamin Type 9040 UX Cushion Sockets
1—Yaxley Double Circuit Jack. Pup Model
1—Yaxley Single Circuit Jack. Pup Model
1 Set Camfield Type 22K Duoformers
2—Amertran De Luxe Audio Frequency Transformers or
2—Silver-Marshall Type 220 Audio Transformers
2—Kurz-Kasch Aristocrat Vernier Dials
1—Jones Type BM Multiplug
2—10-ohm Electrad Rheostats
6—Frost No. 530 UX Sockets
1—Frost Type 608 Filament Switch
1—200,000-ohm Electrad Variable Resistance
1— 50,000-ohm Electrad Variable Resistance
1—Electrad .00025-mfd. Grid Condenser with Prongs
2—Electrad .0005-mfd. Fixed Condenser
1—Electrad Grid Leak Mounting
1—Electrad 2-megohm Grid Leak
1—Electrad 1-megohm Grid Leak
2—Sangamo 1-mfd. By-Pass Condensers
2—Silver-Marshall 25-mnf. Midget Condensers
1—Silver-Marshall No. 110 or Camfield No. 23 Oscillator Coupler
1—No. 112 Amperite
1—No. 1-A Amperite
1—No. 1 Amperite
3—Amperite Mountings
5—Eby Engraved Binding Posts
2 Dozen No. 6x1-inch R. H. Br. Mach. Screws
2 Dozen No. 6x½-inch R. H. Br. Mach. Screws
1 Dozen No. 6x½-inch Flat Head Br. Mach. Screws
½ Dozen No. 5x1-inch Flat Head Br. Mach. Screws
1 Dozen No. 6x¼-inch R. H. Br. Mach. Screws
100 Kellogg Tinned Soldering Lugs
50 Feet Belden No. 12 Copper Tinned Wire



SYD 100 VOLT LIFE LONG STORAGE "B" BATTERY SYD

The Syd Battery pictured above is a storage "B" Battery made of Edison Elements, which have nickel and iron in their construction.

The solution used is a preserver of nickel and iron, thereby giving the battery practically unlimited life.

Radio Fans' unqualified approval of the SYD "B" Battery, product of the SYD Battery Co., is founded solely on merit. Experience is a wise teacher and has taught the need of exact voltage at all times to insure greater volume, clearer reception and better selectivity from any radio set. The unvarying adequate power derived from the SYD "B" Battery explains its great and ever-growing popularity.

Operating on an average of 4 or 5 hours daily the SYD Batteries will last six weeks or more on a single charge. The cost of recharging is less than 5 cents. SYD Batteries do not discharge through idleness. The SYD Battery is assembled in a beautiful polished, chemically treated quarter oak cabinet. The Bakelite front panel has a voltage selector switch and various binding posts, which make it easy to obtain voltage from 16 to 100 volts. The battery unit is 14 inches long, 7½ inches high and 6½ inches wide and weighs less than eighteen pounds.

There Are Many Satisfied Users—
Ask Your Friend Who Owns One

MANUFACTURED AND SOLD EXCLUSIVELY BY

SYD Storage "B" Battery Co.

1452½ South Wabash Avenue Chicago

Mail Orders Filled Promptly

The Battery of Many Advantages

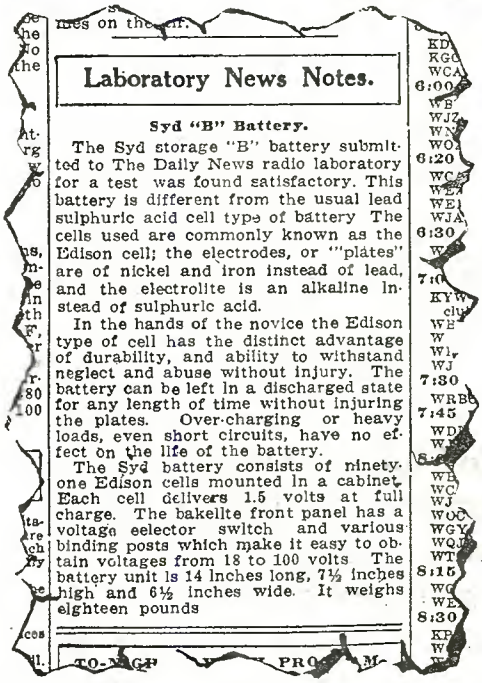
Tested and approved by The Chicago Daily News Radio Laboratory.

It is only through our policy of selling direct to the consumer that we are enabled to sell this battery at the remarkable prices of—

100 Volts
Complete with Charger
$15.50

145 Volts
Complete with Charger
$21.50

Slightly higher west of Rockies and Canada



Laboratory News Notes.

Syd "B" Battery.

The Syd storage "B" battery submitted to The Daily News radio laboratory for a test was found satisfactory. This battery is different from the usual lead sulphuric acid cell type of battery The cells used are commonly known as the Edison cell; the electrodes, or "plates" are of nickel and iron instead of lead, and the electrolite is an alkaline instead of sulphuric acid.

In the hands of the novice the Edison type of cell has the distinct advantage of durability, and ability to withstand neglect and abuse without injury. The battery can be left in a discharged state for any length of time without injuring the plates. Over-charging or heavy loads, even short circuits, have no effect on the life of the battery.

The Syd battery consists of ninety-one Edison cells mounted in a cabinet. Each cell delivers 1.5 volts at full charge. The bakelite front panel has a voltage selector switch and various binding posts which make it easy to obtain voltages from 18 to 100 volts The battery unit is 14 inches long, 7½ inches high and 6½ inches wide. It weighs eighteen pounds

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PARTS, HOOK-UPS, SETS and KITS

Now is the opportunity to secure radio's newest creations, to build for yourself any of the new, up-to-date circuits, at bigger savings than ever before. You want the latest. We have it—bargain prices, too.

164-Page Guide Free. To everyone writing us we will mail free the new 1927 Barawik Radio Guide. It shows 164 pages of everything for the radio fan—complete factory-built sets, speakers, batteries, tubes, accessories, new devices and complete parts for every known circuit, including the newest in amateur equipment—a new Dept. directed by F. J. Marco, 9ZA. Never in the history of radio has such a tremendous collection of radio supplies been assembled.

BARAWIK CO.

540-570 Monroe St., CHICAGO, U. S. A.

Mail This Coupon—NOW!

Dear Sirs: You may send me free copy of your 164-page RADIO GUIDE, also to friends listed below. No obligation.

Your Name.....

Address.....

Name and address of friend.....

.....

Friend.....

Address.....

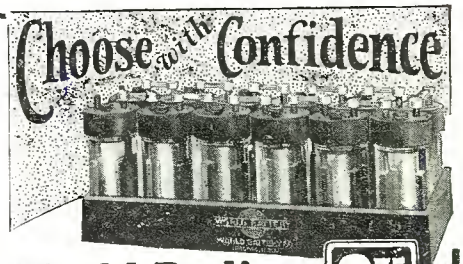
Get this guide into your hands before you buy another part. Send coupon today, NOW; also please includes names of other radio fans.

Proved value. Thousands of users find reception almost magical. Clear, true power — instantly and unendingly. Wise economy. Sturdy construction—**Solid Rubber Case** protection. Recharged for almost nothing. Endorsed and listed as standard by famous Radio institutions including Pop. Radio Laboratories, Pop. Sci. Inst. Standards, Radio News Lab., Lefax, Inc., and other Radio authorities. What more need be said? **Extra Offer: 4 Batteries in series (96 volts) $10.50.**

SEND NO MONEY

Just state number wanted and we will ship same day order is received by express C. O. D. Pay expressman after examining batteries. 5% discount for cash with order.

Choose with Confidence



World Radio Storage "B" Battery
12 Cell—24 Volt

2.75

WORLD BATTERY COMPANY

1219 S. Wabash Ave. Dept. 26 Chicago, Ill.

Makers of the Famous World Radio "A" Storage Battery Prices: 6-volt, 100 Amp., $10.00; 120 Amp., $12.00; 140 Amp., $13. All equipped with Solid Rubber Case Set your radio dials at 288.3 meters for the World Storage Battery Station WSBC. Variety—New Talent —Always Interesting. Jerry Sullivan, Director and Announcer—"Chi-CAW-go"

Lowest Prices on RADIO SETS, KITS and PARTS on EVERYTHING IN RADIO!

Latest edition. Write for it. Free.

Randolph Radio Corp.
180 NORTH UNION AVE.
Dept. 216 Chicago, Illinois

We Can Supply

Specified parts for these circuits for immediate shipment by return mail.

We are specializing in:

Browning Drake, with impedance coupled amplification.
Universal Improved Receiver.
Samson Super-Power Circuit.
Silver Marshall Circuits

Complete Parts, List Price

Hammarlund Hi Q and drilled and eng. panel	$ 63.05
Karas Equamatic Single Control Receiver, and drilled and eng. panel	81.45
Silver One Dial Control, and drilled and eng. panel	60.75
Samson T. C., no panel	101.60

Henry-Lyford
Browning-Drake
Powers-Casem
Alden Somerbridge

Daven Bass Note
Radio Broadcast
Laboratory
Loftin-White

FORMICA PANELS TUBING RODS CUT TO SIZE

Complete Stock of Q. S. T. Short Wave Receiving Apparatus and Transmitting Parts

An Ultra Low Loss, 2 to 220 Meter, 3 Tube Receiver for the Short Wave Fan

Specified Parts **$42.50** Sets Built to Order

General Radio Power Pack

We specialize in the following Power Packs:
General Radio Varion Amer-Tran

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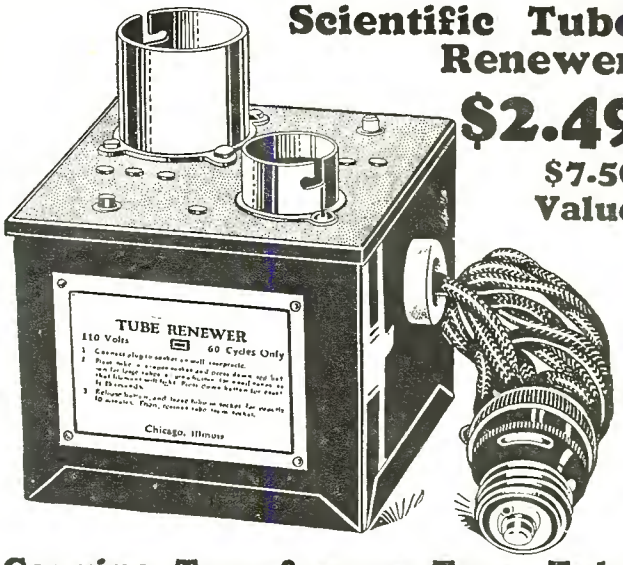
THE OLDEST RADIO HOUSE — WIRELESS EGERT — DOWNTOWN

Cortlandt 5275

Write us for our special prices. Mail orders promptly filled

Scientific Tube Renewer

$2.49
$7.50 Value



Genuine Transformer Type Tube Rejuvenator

Reconditions the filament of 201-A, 301-A, UV-199, C-299 types of radio tubes, presenting a fresh surface for electronic emission and making the tubes like new. Weak or paralyzed tubes in a radio mar reception, just the same as weak batteries. SCIENTIFIC Tube Renewers enable you to secure the maximum of receptive ability from your radio as they are of the genuine transformer type, being far superior to the resistance type and give much better results.

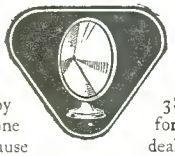
The SCIENTIFIC Tube Renewer "brings back tubes" in ten minutes. It trebles the life of radio tubes. Many tubes which you have long discarded as It is equipped with flexible cord and plug and may be connected to your being "dead," may be easily and quickly restored to their original efficiency. regular lighting circuit. Operation is so simple that no experience is required. Size, 4x4x4¾ in.

No. 1 for 110 volt 60 cycle current **$2.49**
No. 2 for 110 volt 25 to 40 cycle current .....

Send $2.49 today—NOW—or pay postman C. O. D. plus postage.

Belmont Scientific Laboratories
1301 Wilson Ave., Dept. A, CHICAGO, ILL.

Building Your Own 3 Foot Cone?



THERE is just one product made especially for the cones of cone type speakers — Alhambra FON-O-TEX. It is used by practically all the leading cone speaker manufacturers because it produces tone quality far superior to papers or other substitutes for Alhambra FON-O-TEX.

This remarkable product has practically no grain: therefore it has no resonance point of its own but resonates uniformly at all frequencies.

Price 75c for a sheet 38x38 inches—large enough for a 3 foot cone. Ask your dealer. If he hasn't Alhambra FON-O-TEX we will supply you. To the cost of the number of sheets you need add $1. for packing, f.o.b. New York City. All orders will be shipped on the day received.

The SEYMOUR Company Desk 126

ALHAMBRA FONOTEX

PRODUCT AND PROCESS PATENTED

FOR CONE TYPE LOUD SPEAKERS

325 West 16th Street New York City

RADIO BARGAINS

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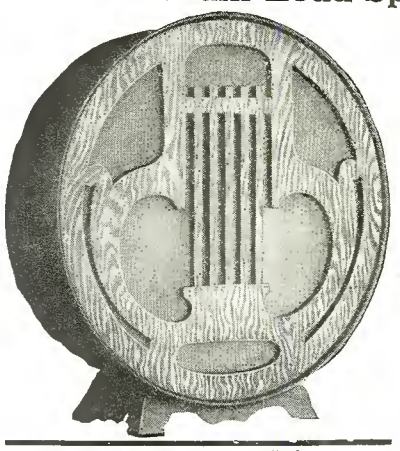
Drum Loud Speaker



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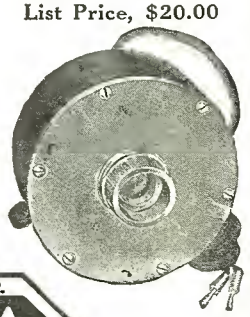

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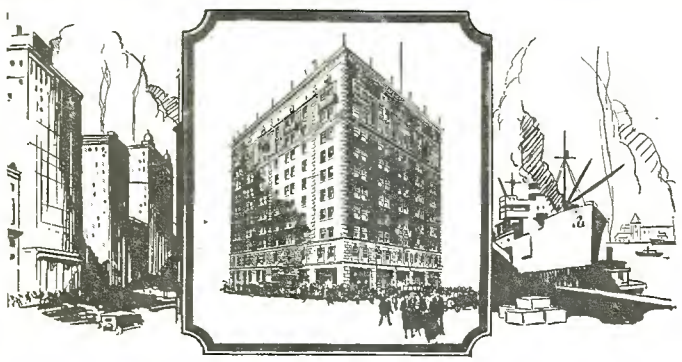

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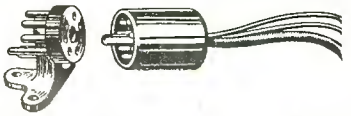

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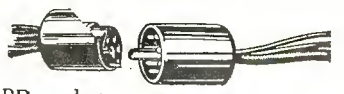

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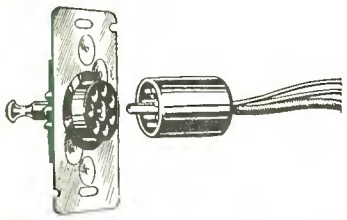

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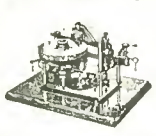

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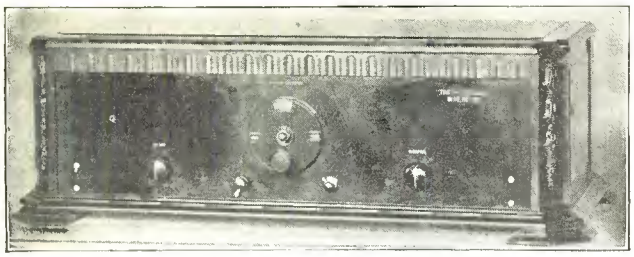

Front View of Unicontrole Nine-in-Line Receiver

Unicontrole Nine-In-Line Receiver

Parts as Specified

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1 Jones Multiplug	4.50
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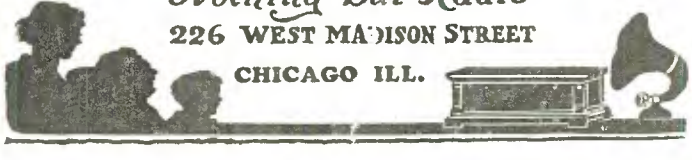

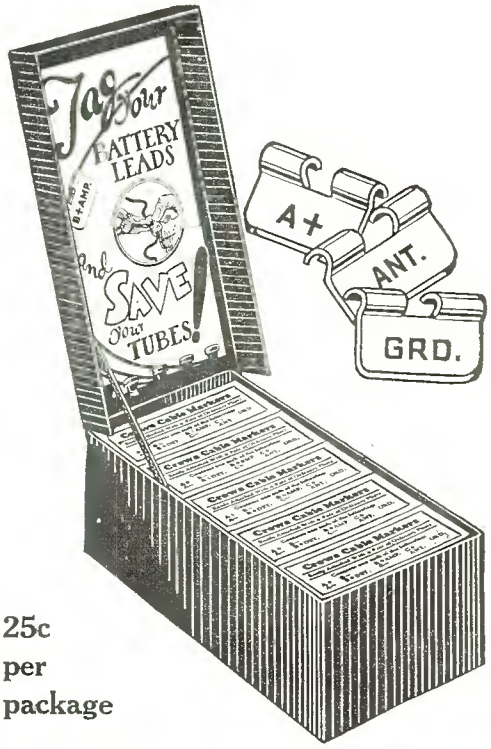

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The Raytheon Tube: The Raytheon Tube is used as a rectifier—only the highest quality is used in the Kingston.

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—the new scientific SAAL EC-CENTRIC CONE *whose balanced tone color is the sensation in radio today.*

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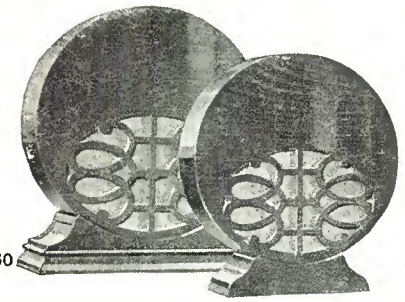

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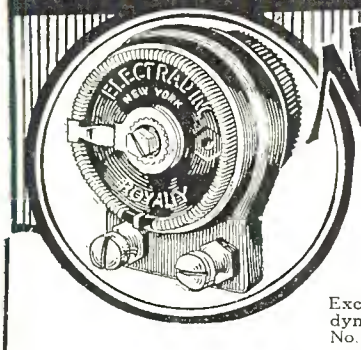

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Used and endorsed by leading radio authorities.

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Where dependable and accurate resistances are required, the radio engineer or technician specifies "ROYALTY." Built to last, all of these resistances will dissipate a maximum of three watts without overheating. Note the following features of superiority:

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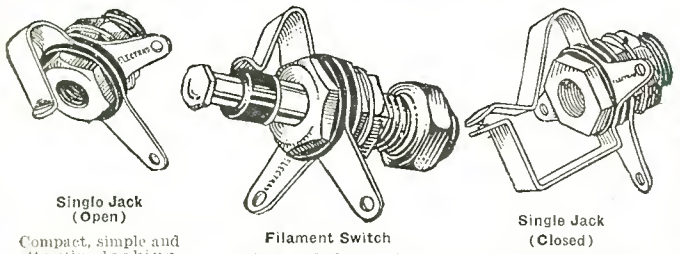

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Correct design, positive acting. Oversize contact spring; solid brass construction. Only 40c.

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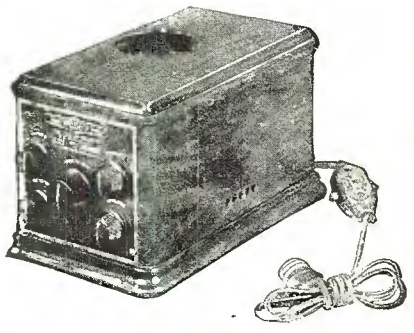
ELECTRAD Inc

Webster "Little Giant B-C"

With Raytheon Tube and Webster "Duo-Choke"



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The Webster "Little Giant B-C" under load delivers a surplus current supply to the most powerful receiver. Ideal for sets with power tubes. ALL TAPS ARE MINUTELY CONTROLLABLE TO THE EXACT REQUIREMENTS for best reception. Adjustments easily made and when set require no further attention. The detector B supply is variable from 5 to 90 volts; the intermediate amplifier B from 20 to 125 volts; the power tube B supply from 125 to 180 volts; the intermediate C supply from 0 to 45 volts; and the power tube C supply from 0 to 45 volts. May be used without ground on loop receiver.

Its beauty adds a touch of distinction to any set.

PRICE COMPLETE with Raytheon B. H. Tube.....$50.00

Two other models; the Webster "Super B" has three voltages with positive variable controls. The detector supply from 5 to 75 volts, the intermediate amplifier supply 20 to 125 volts and the power tube supply from 125 to 180 volts. Nothing better for a straight "B" eliminator for over 5 tube set.

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"POPULAR-B"—Open type. Delivers ample "B" current for the detector supply, intermediate amplifier supply and power tube supply for any receiver requiring up to 35 milliamperes with 7 standard tubes or 6 standard and one power tube.

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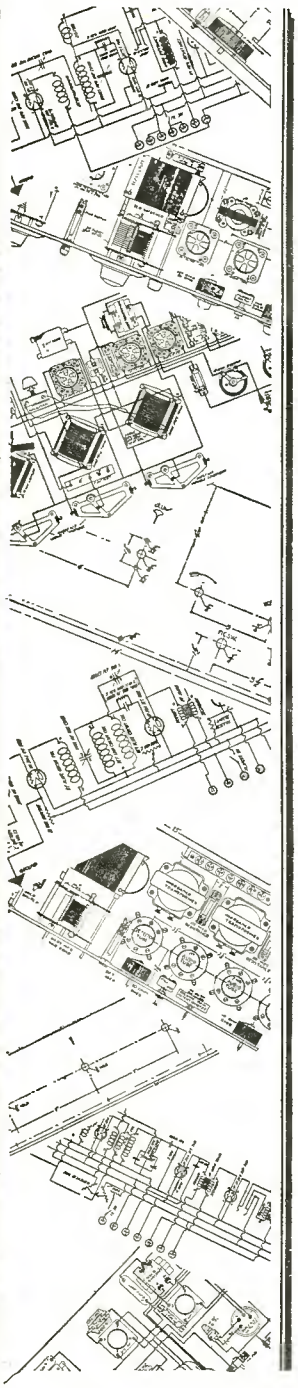

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No. 9	Improved St. James Super-Heterodyne Receiver	1.25
No. 10	De Luxe 5 Tube T. R. F. Receiver	1.25
No. 11	9 Tube 45 K. C. Super-Heterodyne	1.25
No. 12	Madison-Moore Super-Heterodyne Using 201-A Tubes	1.25
No. 14	Browning-Drake 4 Tube Receiver Using Audio Transformer	1.25

Full Size Graphic Wiring Diagrams

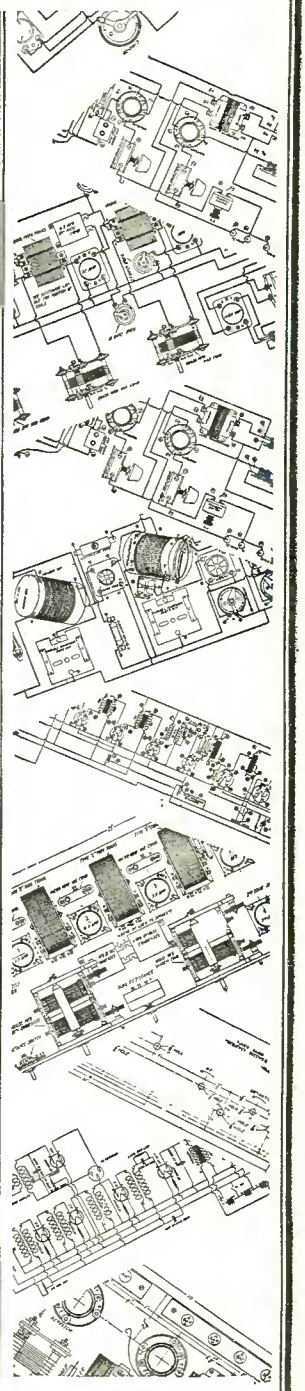
60 Cents Each

No. 38 Premier 6 Tube T. R. F. Receiver
No. 39 Unicontrole Nine-In-Line Super-Heterodyne
No. 40 Inexpensive 5 Tube T. R. F. Receiver
No. 41 Samson Special T. C. Receiver
No. 42 Improved Infradyne Receiver
No. 43 Six Tube T. R. F. Receiver Using Alden Localized Control
No. 21 All-American 5 Tube Toroid Receiver
No. 22 Premier 5 Tube T. R. F. Receiver
No. 29 6 Tube All-American Toroid Receiver Using Impedance Amplification

PRICES ON LABORATORY TEST KITS

All necessary parts for any of the above circuits will be quoted upon request, if you are unable to purchase them in your locality. If we supply the kit to you, every piece of apparatus will be tested in our laboratory without charge, insuring the best operation of your set.

Construction and Designing



Our completely equipped laboratory is at your service. We will design, construct, or repair any make set you desire or advise receiver best suited for your location. We will rebuild your present receiver —bringing it up to date.

The charges will be nominal and all work fully guaranteed as to performance. This work is under the personal supervision of our Chief Engineer and is part of our service to our thousands of readers.

If you are unable to call in person **do not telephone,** but write us giving details and we will give estimate of cost by letter. If you merely wish to ask a question regarding some type of apparatus or problem, please consult top of page 155.

CITIZENS RADIO LABORATORY

508 So. Dearborn St. **Chicago, Ill.**

Contrast the clumsy dials of only two years back . . . with the handsome illuminated controls MAR-CO *makes today. Here is another good reason for building your set yourself!*

Now dials give place to glowing spots of light

PICTURE a soft, subdued light in the room . . . your set in the corner with glowing spots of light illuminating its swiftly readable *back panel* scales. this is radio at its handsomest . . . this is the panel arrangement the type of skillful tuning that distinguishes the 1927 trend in set construction.

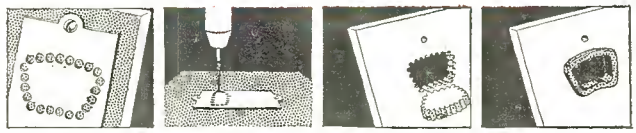
Already, these new MAR-CO controls are specified or optional equipment in a score of this season's most advanced circuits. At once, they have become the standard in tuning control design. Use them, in whatever set you build, to give the final touch of style, and the utmost in precision control.

MAR-CO controls are easy to install. The steel template provided reduces panel-drilling to the simple, fool-proof operation illustrated below. The original MAR-CO *"friction-drive"*—the action that makes backlash impossible—has been strengthened, to accommodate gang condensers. The MAZDA lamp supplied runs on your "A" battery, using only .1 ampere. The switch that controls this lamp may also be used as your filament switch the lighted scales then serve as pilots. Scales read 0 to 100, or 100 to 0, as preferred. Price, including template, bulb, and bezel, $3.50. Replacement bulbs, $.20. Write today for the booklet that illustrates 15 standard makes of condensers mounted on MAR-CO back-panel controls. Martin-Copeland Company, Providence, R. I. Branch offices and representatives in principal cities.

Prominent among the advanced circuit designs which call for MAR-CO *controls, is the* Madison-Moore

MAR-CO *Illuminated* Controls

Here's how you drill the panel..



Screw Template to panel — Drill holes through Template — Remove window opening — Bezel covers rough edge

that's ALL *you* CAN'T *go wrong!*

(Continued from Page 133)

4—Type 4 Elkay Equalizers with mounting
1—Type 2 Elkay Equalizer with mounting
1—Type 4/3 Elkay Equalizer with mounting
1—Dubilier 2-meg. Grid Leak
1—Sangamo .00025 mfd. Fixed Condenser
1—Sangamo .005 mfd. Fixed Condenser
2—Sangamo 1 mfd. By-Pass Condensers
1 Pair Sangamo Grid Leak Clips
1—Yaxley Cable Connector, complete
7—Eby Engraved Binding Posts
1 Package of Kester Solder
60 Feet of Belden No. 12 Gauge Tinned Copper Wire
Miscellaneous Screws, Nuts, Soldering Lugs, etc.

The Madison-Moore Receiver, in Photo "A," is shown installed in a Model 22 Excello Console, manufactured by the Excello Products Corporation, Chicago. Sufficient space is allowed in the upper compartment so that any panel up to 10½x32-inch may be accommodated by using the adjustable filler pieces supplied with the console. The battery compartment measures 14x32 inches and is provided with a sliding leaf upon which the "A" battery is placed. Walnut is used throughout in the construction of this console. Sufficient "B" potential to properly operate the receiver is secured from the Majestic Standard "B" Eliminator. This eliminator is manufactured by the Grigsby-Grunow-Hinds Company of Chicago, and uses the new Raytheon Rectifying Tube. The Willard Storage Battery Company of Cleveland make the "A" battery shown, while the Fansteel Products of North Chicago, Ill., manufacture the Balkite Charger, which will serve admirably to keep the battery at full charge.

(If any further information is desired regarding the accessories shown, full descriptive matter will be supplied if you will address the manufacturer direct.)

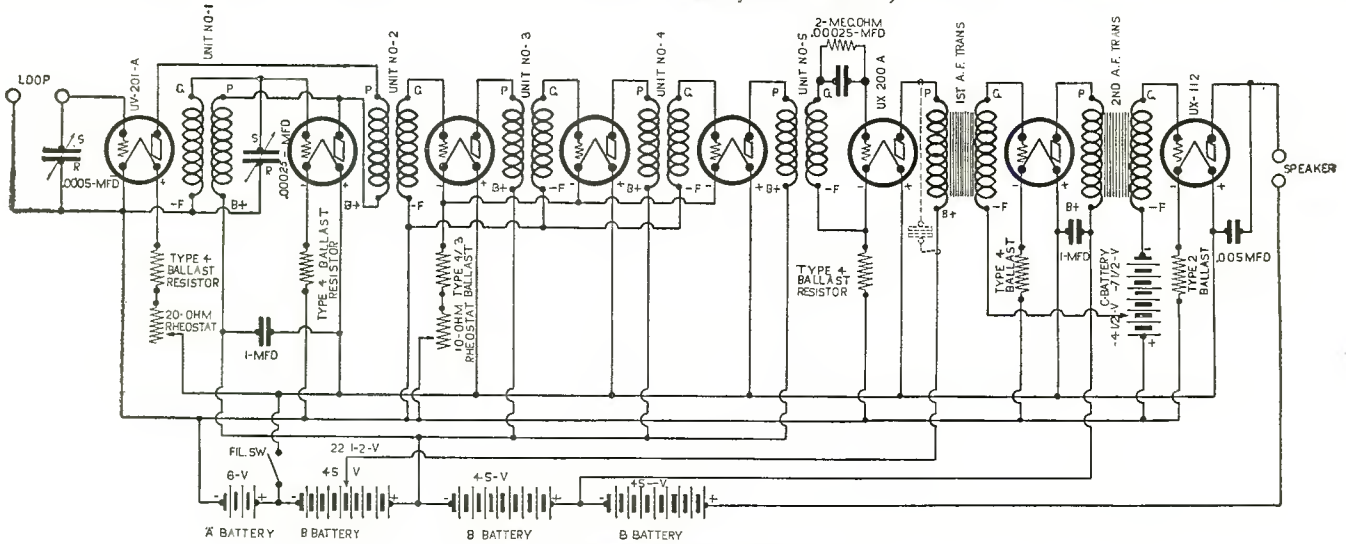
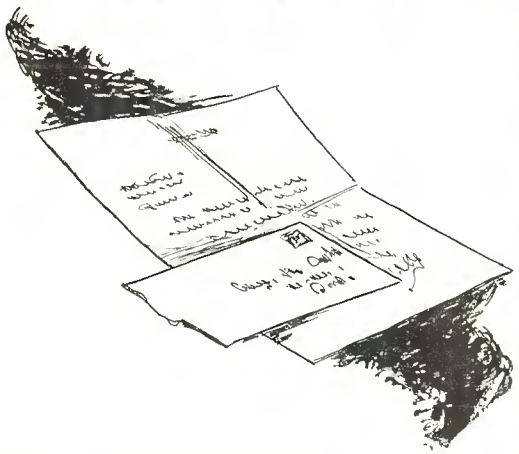


Fig. 4. Schematic wiring diagram



$100 for a Letter

THE publishers of The Citizens Radio Call Book being extremely anxious to place before our readers the exact kind of content that the readers of this publication may desire, offer one hundred dollars for the best letter of constructive criticism received before March 1, 1927.

THE RULES ARE AS FOLLOWS:

Not over 1500 words. Write on one side of paper only; typewritten preferred but not necessary. The letter should show information on what you like best in our book as it is now and what suggestions you have to improve it, specifying what kind of editorial—nature of same—that you think would tend to improve same. No letter will be entered unless this questionnaire is filled out fully and attached.

SPECIAL REQUEST

We are extremely anxious to obtain the answers contained in the questionnaire below. Even if you do not write us a letter, won't you be so kind as to tear out this page and mail it to us? It will enable us to give you just the kind of editorial you want.

QUESTIONNAIRE

Would you like to see us print the following? Pictures of broadcasting studios..... Pictures of broadcasting transmitters..... Pictures of Radio wrinkles on how to improve your present receiver..... More construction articles..... More details on construction articles..... Notes how to tune different receivers..... Pictures ..... How to hook up your batteries..... Radio cartoons..... Past history of Radio..... Any new method of listing broadcasting stations..... More logging space..... Answers to questions in Question and Answer Dept..... Simple hookups, such as crystal sets..... One tube sets..... Two tube sets..... Three tube sets..... Highly technical articles..... Very simple articles, written for beginners..... Tips on installing aerials and ground systems..... History of lives of prominent men and their achievements in Radio..... Do you like the Rotogravure Section of pictures..... Do you read any other Radio magazines, and if so, how many..... Have you ever built any receiver described in our columns..... How many of each..... How many different circuits..... Did you follow our specifications..... Did they give entire satisfaction..... What do you care most for in your receiver, distance or quality..... Would you like to see one or two very high class designed receivers, completely shielded, laboratory work only that would cost from $150 to $200, that would be so laid out that they would be simple for the home constructor to build..... There have been nine separate issues of the Citizens Radio Call Book printed since 1921—how many of them have you purchased..... How many have you now.....

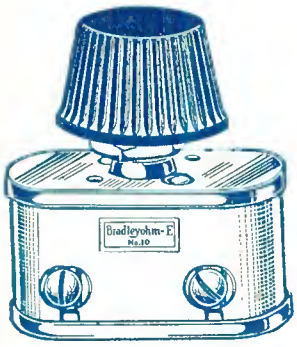
Answer the questions that interest you "Yes" or "No." Place an X in those that you are not interested in.

Name..... City.....

Address..... State.....

Kindly mail filled-in Questionnaire to D. H. Bell, Managing Director, Citizens Radio Call Book, 508 So. Dearborn Street, Chicago, Ill.

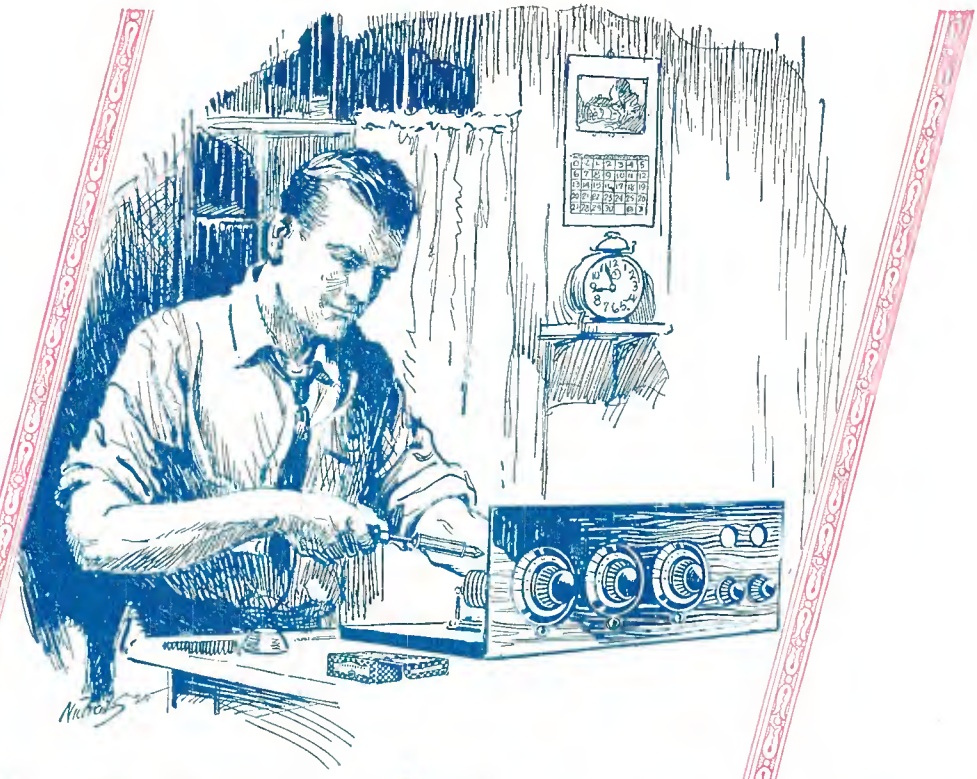
Index to Advertisers



Bradleyohm-E

PERFECT VARIABLE RESISTOR

This new oversize resistor is used as standard equipment by leading B-eliminator manufacturers such as Acme, All-American, American Bosch, Majestic, Philadelphia Storage Battery, and Willard. It is the ideal variable resistor for controlling plate voltage output. The scientifically treated graphite discs in Bradleyohm-E provide stepless, noiseless, plate voltage control, and the setting will be maintained indefinitely. Do not experiment with makeshift variable resistors, when Bradleyohm-E has been pronounced the ideal unit by the largest manufacturers of B-eliminators in the world. Ask your dealer for Bradleyohm-E when you build your B-eliminators.



For Radio Sets or B-Eliminators Use Allen-Bradley Radio Devices

RADIO set owners throughout the country are improving their sets by substituting resistance coupled amplifiers for their old audio transformers, or by replacing their old B-batteries with B-eliminators.

If you are building a B-eliminator, be sure to ask your dealer for Bradleyohm-E. Avoid the delay and expense of experimenting with substitutes. Follow the example of successful B-eliminator manufacturers by standardizing on Bradleyohm-E for your kit.

The Bradleystat, Bradleyleak, and other Allen-Bradley perfect radio devices will make your old radio set more perfect in operation. Send the coupon for latest folder on Allen-Bradley perfect radio devices.

Bradleyunit-A

PERFECT FIXED RESISTOR

Another triumph of the Allen-Bradley Research Laboratory is Bradleyunit-A, a perfect fixed resistor that contains no glass, requires no hermetic sealing, and can be soldered into place without the use of clip mountings. Bradleyunit-A is not affected by temperature or moisture and it maintains its calibration indefinitely. It is not affected by the weather.

Be sure to ask your dealer for Bradleyunit-A when you need a fixed resistor for any purpose.

Bradley-Amplifier

Resistance-Coupled
PERFECT AUDIO AMPLIFIER

ALLEN-BRADLEY COMPANY
488 Clinton St., Milwaukee, Wisconsin

Please send me by return mail your latest folder of Allen-Bradley perfect radio devices.

Name.....

Address.....

.....

Know these RADIOTRONS — *and keep your set up to date*

RADIOTRON AND RECTRON CHARACTERISTICS

MODEL	USE	BASE	MAXIMUM OVERALL DIAMETER	MAXIMUM OVERALL HEIGHT	"A" BATTERY VOLTAGE (SUPPLY)	FILAMENT TERMINAL VOLTAGE	FILAMENT CURRENT (AMPERES)	DETECTOR GRID RETURN LEAD TO	GRID LEAK (MEGOHMS)	GRID CONDENSER (MFD)	DETECTOR "B" BATTERY VOLTAGE	DETECTOR PLATE CURRENT (MILLIAMPERES)	AMPLIFIER "B" BATTERY VOLTAGE	AMPLIFIER "C" BATTERY VOLTAGE	AMPLIFIER * PLATE CURRENT (MILLIAMPERES)	OUTPUT RESISTANCE * (OHMS)	MUTUAL CONDUCTANCE * (MICROMHOS)	VOLTAGE AMPLIFICATION FACTOR	MAXIMUM UNDISTORTED OUTPUT (MILLIWATTS)
GENERAL								**DETECTORS AND AMPLIFIERS**											
RADIOTRON UX-201-A	Detector Amplifier	R C A Large Standard UX Base	1 13/16"	4 11/16"	6 Storage	5.0	.25	+F	2 to 9	.00025	45	1.5	135 90	9 4½	2.5 2	11,000 12,000	725 675	8 8	55 15
RADIOTRON UV-199	Detector Amplifier	UV-199 Base	1 1/16"	3 1/2"	Dry Cell 4½ Storage 4	3.0	.06	+F	2 to 9	.00025	45	1	90	4½	2.5	16,500	380	6.25	7
RADIOTRON UX-199	Detector Ar.plifier	R C A Small Standard UX Base	1 3/16"	4 1/8"	Dry Cell 4½ Storage 4	3.0	.06	+F	2 to 9	.00025	45	1	90	4½	2.5	16,500	380	6.25	7
RADIOTRON WD-11	Detector Amplifier	WD-11 Base	1 3/16"	4 1/8"	Dry Cell 1½ Storage 2	1.1	.25	+F	3 to 5	.00025	22½ to 45	1.5	90	4½	2.5	15,000	400	6	7
RADIOTRON WX-12	Detector Amplifier	R C A Large Standard UX Base	1 7/16"	4 11/16"	Dry Cell 1½ Storage 2	1.1	.25	+F	3 to 5	.00025	22½ to 45	1.5	90	4½	2.5	15,000	400	6	7
								DETECTORS											
RADIOTRON UX-200	Detector Only	R C A Large Standard UX Base	1 13/16"	4 11/16"	6 Storage	5.0	1.0	−F	½ to 2	.00025	16½ to 22½	1	—	—	—	—	—	—	—
RADIOTRON UX-200-A	Detector Only	R C A Large Standard UX Base	1 13/16"	4 11/16"	6 Storage	5.0	.25	−F	2 to 3	.00025	45	1.5	—	—	—	—	—	—	—
								POWER AMPLIFIERS											
RADIOTRON UX-120	Power Amplifier Last Audio Stage Only	R C A Small Standard UX Base	1 3/16"	4 1/8"	Dry Cell 4½ Storage 4	3.0	.125	—	—	—	—	—	135	22½	6.5	6,600	500	3.3	110
RADIOTRON UX-112	Power Amplifier	R C A Large Standard UX Base	1 13/16"	4 11/16"	6 Storage	5.0	.5	—	—	—	—	—	157½ 135 90	10½ 9 6	8 6 2.5	4800 5500 8800	1670 1435 890	8.0 7.9 7.9	195 120 40
RADIOTRON UX-171	Power Amplifier Last Audio Stage Only	R C A Large Standard UX Base	1 13/16"	4 11/16"	6 Storage	5.0	.5	—	—	—	—	—	180† 135† 90	40½ 27 16½	20 16 10	2000 2200 2500	1500 1360 1200	3.0 3.0 3.0	700 330 130
RADIOTRON UX-210	Power Amplifier Oscillator	R C A Large Standard UY Base	2 3/16"	5 5/8"	Transformer or Storage	7.5 7.5 7.5	1.25 1.25 1.25	—	—	—	—	—	425† 350* 250*	54 35 27	22 18 12	5000 5100 5600	1550 1500 1330	7.7 7.6 7.5	1540 925 340
						6 6 6	6.0 6.0 6.0	1.1 1.1 1.1					157½ 135 90	18 10½ 9 4½	6 4.5 3	7400 8000 9700	940 775	7.5 7.5 7.5	90 65 18

RECTIFIERS

MODEL	USE	BASE	MAXIMUM OVERALL DIAMETER	MAXIMUM OVERALL HEIGHT	PURPOSE
RECTRON UX-213	Full Wave Rectifier	R C A Large Standard UX Base	2 3/16"	5 5/8"	For use in rectifying systems particularly designed for this Rectron.
RECTRON UX-216-B	Half Wave Rectifier	R C A Large Standard UX Base	2 3/16"	5 5/8"	For use in rectifying systems particularly designed for this Rectron.

Filament Terminal Voltage:..... 5.0 Volts
Filament Current:..... 2.0 Amperes
Max. AC Input Voltage per plate:..... 220 Volts (RMS) △
Max. Rectified Current (both plates):..... 65 Milliamperes

Filament Terminal Voltage:..... 7.5 Volts
Filament Current:..... 1.25 Amperes
Max. AC Input Voltage:..... 550 Volts (RMS) △
Max. Rectified Current..... 65 Milliamperes

SPECIAL PURPOSE RADIOTRONS

RADIOTRON UX-874	Voltage Regulator Tube	R C A Large Standard UX Base	2 3/16"	5 5/8"	Constant Voltage Device	Especially designed for use in the following devices operated from alternating current lighting mains: — R C A Duo-Rectron ("B" Battery Eliminator); R C A Loudspeaker Model 104. Voltage Drop:..... 90 Volts DC; Starting Voltage:..... 125 Volts DC; Maximum Current:..... 50 Milliamperes DC. Positive (+) to Rod, Negative (−) to Cylinder
RADIOTRON UV-876	Ballast Tube	Standard Mogul Type Screw Base	2 1/16"	8"	Constant Current Device	Especially designed for use in the following devices operated from: 105-125 Volts, 50-75 Cycles. Radiola Loudspeaker Model 104; R C A Loudspeaker Models: PR-16C, -26C, -36C, -46C, P-3; Brunswick Models: PR-28C, -38C, -48C. Victor Models: W 15-1, W 9-2, W 12-2. Current Rating:..... 1.7 Amperes; Voltage Drop:..... 40-60 Volts
RADIOTRON UV-886	Ballast Tube	Standard Mogul Type Screw Base	2 1/16"	8"	Constant Current Device	Especially designed for use in the following devices operated from: 105-125 Volts, 40-45 Cycles. Radiola 30; Radiola Loudspeaker Model 104; R C A Loudspeaker Models: PR-16C, -26C, -36C, -46C, P-3; Brunswick Models: PR-28C, -38C, -48C. Victor Models: W 15-1, W 9-2, W 12-2. Current Rating:..... 2.05 Amperes; Voltage Drop:..... 40-60 Volts
RADIOTRON UV-877	Protective Tube	Double Contact Bayonet Automobile Type △△	1 7/16"	2 1/2"	Current Limiting Device	Used in "B" Battery circuits to prevent excessive current resulting from short circuit which might damage tubes or wiring. Voltage Drop Across: Half Filament 2.5, 45; Entire Filament 5, 90. At 20 Milliamperes DC; At 90 Milliamperes DC

† Loudspeaker coupling recommended at this plate potential due to large plate current.
* At indicated "B" and "C" battery voltages

△ R.M.S. indicates "Root Mean Square" as indicated on an AC voltmeter.
△△ Connection to shell of base for third terminal which is the lead to mid-point of filament.

RADIO CORPORATION OF AMERICA
New York Chicago San Francisco

RCA Radiotron

MADE BY THE MAKERS OF THE RADIOLA