

# Radio Listeners' Guide and Call Book

Edited by S. Gernsback



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Music critics, musicians, music lovers, Radio Engineers, and Radio fans — you have not heard real radio reproduction until you have heard the famous ENSCO. A few minutes' audition will astound you.



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# Radio Listeners' Guide and Call Book

Volume II

Number 1

JUNE, 1927

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### RADIO LISTENERS' GUIDE AND CALL BOOK

VOL. II, No. 1

JUNE, 1927

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INDEX TO ADVERTISERS

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# RADIO

# from A

A sample page from the encyclopedia



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to

# Z





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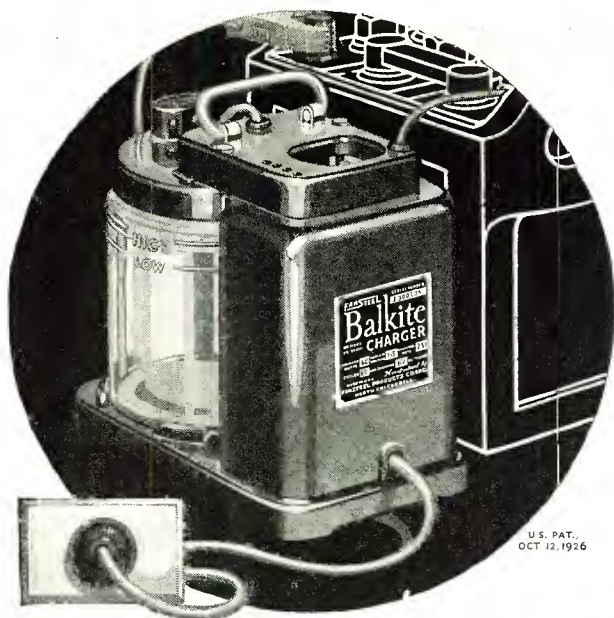
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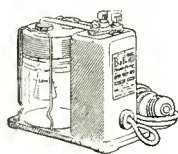


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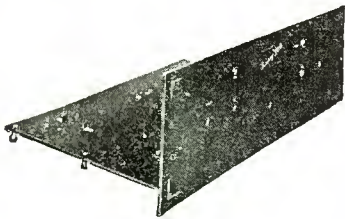
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**BROWNING-DRAKE KIT**

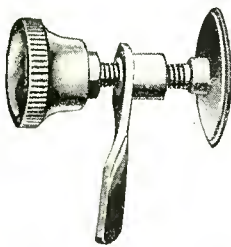
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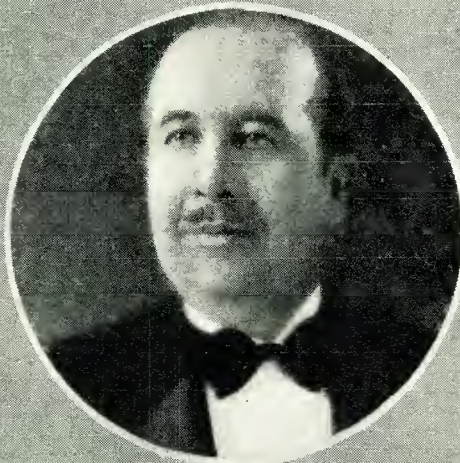
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WMCA  
NEW YORK, N.Y.



# AERO COIL

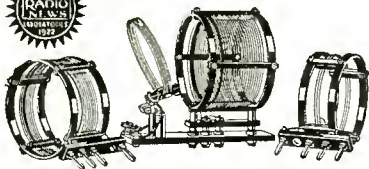
## SUPER-SENSITIVE INDUCTANCE UNITS

### The Perfect Inductances for Low Wave Receiving!



#### THE AERO SHORT WAVE RECEIVER

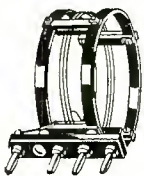
A short wave receiver built around the famous interchangeable AERO Low Wave Tuner Kit is sure to give splendid results, as thousands of radio experts and amateurs have proved. These wonderful inductances are of special patented construction that reduces high frequency resistance to a minimum. AERO Coils are wound without dope, and are capable of greater volume without distortion. Every amateur should use these super-sensitive coils for perfect short wave reception.



Price \$12.50

Low Wave Tuner Kit.....Price \$12.50

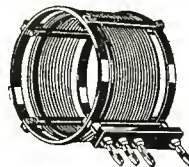
Completely interchangeable. Adopted by experts and amateurs everywhere. Range 15 to 130 meters. Includes 3 coils and base mounting, covering U. S. bands, 20, 40 and 80 meters. You can increase or decrease the range of this short wave tuner by securing the AERO Interchangeable Coils described below. All coils fit the same base and use the same condensers. Use code No. INT-125 in ordering.



#### Interchangeable Coil No. 0

Range 13 to 29.4 meters: This is the most efficient inductance for this low band. Code No. INT-0.

Price.....\$4.00



#### Interchangeable Coil No. 4

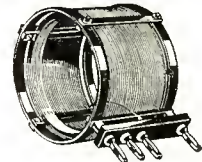
Range 125 to 250 meters. Fits same base supplied with low tuner kit. Code No. INT-4.

Price.....\$4.00

#### The New AERO Interchangeable Coil No. 5

Normal range 235 to 550 meters. However, by using .0001 Sangamo fixed condenser across the rotor and stator of the .00014 variable condenser, the maximum wave band of this coil is increased to 725 meters. This gives you coverage of the following bands: Airplane to Airplane, Land to Airplane, Ship to Shore (Great Lakes), Ship to Shore (Atlantic and Pacific Oceans). Code No. INT-5.

Price.....\$4.00





**AERO  
COIL  
BASE**

Fits all INT. Coils.  
Code Number Int.  
Base.

Price .....\$4.00

#### Plan for D.X. Records NOW!

Order any of the coils on this page direct from us if your dealer hasn't them, and start now for wonderful records. Specify code or key numbers when ordering. Or write at once for descriptive literature.

## AERO PRODUCTS, Inc.

DEPT. 111

1772 WILSON AVENUE

CHICAGO, ILL.



**DOUGLAS STANBURY**  
BARITONE  
W J Z  
NEW YORK  
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**EDDIE & FANNIE CAVAHAUGH**  
THE GAELIC TWINS  
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**"ROXY"**  
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**"DADDY" JIM COOMBS**  
BASSO  
W J Z  
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**DOLLY VARDON ENTERTAINERS**  
W H K  
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**E. E. DENNISON**  
ANNOUNCER  
W H A R  
ATLANTIC CITY, N. J.



**RUTH GARVIN**  
SOPRANO  
K M M J  
CLAY CENTER, NEB.



# There are many fluxes for soldering but only one — is safe for Radio!

**F**LUX for soldering is a general term; it embraces, as a class, all types of soldering fluxes. To designate a flux as safe for radio construction is specific; *it means rosin*. Chloride pastes, acids and fluid solutions are soldering fluxes, and are well adapted for certain work, *but conductive and corrosive properties forbade their use for radio assembly*. Their active elements, zinc and ammonium chlorides, display spreading, creeping tendencies that promote leakage and will eventually cause increased resistance in the wiring.

Rosin, an organic mixture, *is a non-conductor and non-corrosive*. The glass-like surface of this material does not readily lend itself to the collection of dust (carbon particles) as will the sticky organic greases of paste. Nor will rosin attract moisture from the atmosphere; the chlorides of pastes and fluids will. *Moisture plus carbon particles defeat the best insula-*

*tions produced. Moisture plus chlorides direct a slow but determined corrosive attack upon supporting metals.* Such slow corrosion in wiring causes a steadily increasing resistance to the flow of electrical energy.

Kester Rosin Core Radio Solder scientifically combines radio's premier flux, Rosin, with a solder alloy of unvarying quality. The use of Kester Radio Solder furnishes the user with a means of accomplishing Safer, Faster, and Cleaner set wiring. Constructors who solder-protect wiring with Kester Radio Solder enjoy increased receptive range, improved tonal quality and the satisfying assurance that their receivers will never be forced into the discard through the corrosive and conductive action of a chloride flux.



**A Kester Soldered Receiver Is a Better Set**

*Manufacturers of Radio Sets and Equipment:* Tests conducted with the various types of commercial fluxes are under constant observation in our laboratory. Can we assist you in your soldering problems?

## KESTER *Radio* SOLDER

CHICAGO SOLDER COMPANY

4252 Wrightwood Avenue, Chicago, U. S. A.

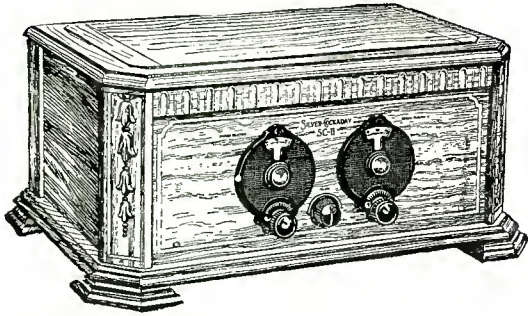
*Originators and World's Largest Manufacturers of Self-fluxing Solder*

*Convince Yourself Without Expense*

**USE THIS COUPON NOW!**

|   |            |
|---|------------|
| CHICAGO SOLDER CO.,   | R. R. 6-27 |
| 4252 Wrightwood Ave., Chicago, U.S.A.   |            |
| Gentlemen: Please send me a test sample of Kester Radio Solder, together with descriptive literature. |            |
| Name .....  |            |
| Address .....   |            |
| City.....   | State..... |
| Dealer .....  |            |

# SM



What greater proof of the excellence of S-M parts could be asked than their selection by the designers of over half the season's popular sets?

*Infradyne*  
*Shielded Six*  
*Silver-Cockaday*  
*Silver-Cockaday II*  
*Best's A. C. Browning-Drake*  
*Best's A. C. Diamond of the Air*  
*Radio News Batteryless Receiver*  
*Radio Broadcast Super*  
*Radio Age Super*  
*Radio Broadcast Local*  
*LC-27 Junior Power Pack*  
*Citizen's Call Book Monotone*  
*Receiver*  
*Call Book Power Pack*  
*Callies Super*  
*Radio Mechanics "A," "B" and*  
*"C" Eliminator*  
*Radio Engineering "A," "B" and*  
*"C" Eliminator*  
*Radio Mechanics Man-O-War*  
*Super*  
*Lincoln Super*  
*Best's Short Wave Set*  
*Hush-Hush II Short Wave Set*  
*Popular Mechanics Super*  
*Christian Science Monitor 6-tube*  
*Browning-Drake*  
*Radio Engineering Short Wave Set*  
*New York Sun "B" and "C" Eliminator*  
*for Resistance Amplifiers*  
*Chicago American Short Wave Set*  
*Chicago Post Power Amplifier*  
*Best's 1927 Super*  
*Radio News Power Amplifier*  
*Loftin-White*  
*Popular Radio, Town and*  
*Country Receiver*  
*Radio News Super*  
*Nakken's Ultra Five*  
*Cockaday's Pre-Selector*  
*Chicago Daily News Short Wave*  
*Adapter*  
*Camfield Super 9*  
*Call Book "B" Eliminator*  
*Popular Mechanics "A," "B" and*  
*"C" Eliminator and Receiver*  
*Radio Mechanics Portable Super*  
*Chicago Daily News Receiver*  
*Citizens Super 8*  
*Improved Victoreen Super*  
*Radio Broadcast Laboratory B*  
*supply.*

## Build the S-C II

Take home a set of parts any evening—your dealer has them—and build yourself an up-to-the-minute radio set. After you've had a couple of hours fun in the kitchen putting the S-C II together, hook 'er to the loud speaker and just listen to the stations pound in.

You'll lean back in your chair with a sense of a good job well done—and money saved—and as you listen to your favorite program, you won't be able to help exclaiming, "Oh, boy! *that's* music." And the family will agree with you, for once.

Then as you look with pride at the S-C II *you've* built all yourself, you'll appreciate its big value—complete individual shielding, sturdy steel chassis and panel, its two simple tuning dials, tone quality that pleases even the neighbors—real value and satisfaction just sticking out all over it, and it cost you only \$64.35, plus lots of fun.

## 652 Reservoir B

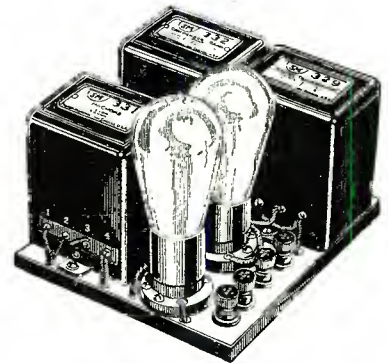
The S-M 652 B supply kit is the guaranteed answer to your B eliminator or B battery troubles. It won't run down, its output voltages are constant to a few per cent, and it won't "motor-boat" or "putt."

Its power output is sufficient for the largest set—up to 45 milliamperes at 90 volts, 10 milliamperes at 45 volts and plenty of current for a 171 power tube on the 180 volt tap. And, all adjustments are automatic!

You can put it together in a few hours on the living room table, hook it to your set and enjoy reception with B troubles at an end, for the 652 is a veritable reservoir of ample, constant, reserve power.

All parts ready to assemble, less CX-313 and CX-374 tubes, price \$34.50.

Ask your dealer for a booklet on S-M parts, or write direct.



**SILVER-MARSHALL, Inc.**  
 866 W. Jackson Blvd. Chicago, Ill.

# RADIO LISTENERS' GUIDE and CALL BOOK

*Sidney Gernsback, Editor*



*W. G. Mann, Managing Editor*

## RADIO BROADCAST STATIONS OF THE UNITED STATES

Indexed Alphabetically by Call Letters

*As this issue of Radio Listeners' Guide and Call Book goes to press, all of the changes that had been suggested up to date by the Federal Radio Commission have been incorporated in it. However, additional changes are being made daily by the commission in all sections of the country.*

*Those of our readers who desire the very latest information on future changes before our next edition is published may have same by addressing a post card to the Radio Broadcast Station Editor, care of the Radio Listeners' Guide and Call Book.*

| Radio Call Letters  | BROADCAST STATIONS<br>Location and Owner   | Power<br>Watts | Wave<br>Length<br>(Meters) | Frequency<br>(Kilocycles) | Time at<br>Station |
|---|--|----------------|----------------------------|---------------------------|--------------------|
| <b>KD</b>   | KDKA—Pittsburgh, Pa. (Transmitter is in East Pittsburgh)—Westinghouse Elec. & Mfg. Co..... | Var.           | 309.1                      | 970                       | Eastern            |
|   | KDLR—Devils Lake, N. D.—Radio Elec. Co.....  | 5              | 231                        | 1300                      | Central            |
|   | KDYL—Salt Lake City, Utah—Intermountain Broadcasting Corp., 1009 Ezra Thompson Bldg.....   | 250            | 246                        | 1220                      | Pacific            |
| <b>KE</b>   | KELW—Burbank, Cal.—E. L. White, 3702 Magnolia Ave.....                                     | 250            | 535                        | 560                       | Pacific            |
|   | KEX—Portland, Ore.—Western Broadcasting Co.....  | 1000           | 447                        | 670                       | Pacific            |
| <b>KF</b>   | KFAB—Lincoln, Nebr.—Nebraska Buick Auto Co.....  | 5000           | 340.7                      | 880                       | Central            |
|   | KFAD—Phoenix, Ariz.—Electrical Equipment Co.....   | 100            | 272.6                      | 1100                      | Mountain           |
|   | KFAF—San Jose, Calif.—Alfred E. Fowler, Montgomery Hotel.....                              | 50             | 217.3                      | 1380                      | Pacific            |
|   | KFAU—Boise, Idaho—Independent School District of Boise.....                                | 5000           | 280                        | 1070                      | Mountain           |
|   | KFBB—Havre, Mont.—F. A. Buttrey Co., F. A. Buttrey Co. Bldg.....                           | 50             | 275                        | 1090                      | Mountain           |
|   | KFBC—San Diego, Calif.—W. K. Azbill and Howard Shores, 5038 Cliff Place.....               | 50             | 215.7                      | 1390                      | Pacific            |
|   | KFBK—Sacramento, Calif.—Bee-Kimball Upson Co., 610 California St.....                      | 100            | 248                        | 1210                      | Pacific            |
|   | KFBL—Everett, Wash.—Leese Bros., 2814 Rucker Ave.....                                      | 100            | 223.7                      | 1340                      | Pacific            |
|   | KFBS—Trinidad, Colo.—School Dist. No. 1.....   | 15             | 238                        | 1260                      | Mountain           |
|   | KFBU—Laramie, Wyo.—St. Mathews Cathedral, Bishop N. S. Thomas.....                         | 500            | 374.8                      | 800                       | Mountain           |
|   | KFCB—Phoenix, Ariz.—Nielsen Radio Supply Co., 311 N. Central Ave.....                      | 125            | 238                        | 1260                      | Mountain           |
|   | KFCR—Santa Barbara, Calif.—Santa Barbara Broadcasting Co.....                              | 15             | 413                        | 730                       | Pacific            |
|   | KFDD—Boise, Idaho—St. Michaels Episcopal Church..  | 50             | 275                        | 1090                      | Mountain           |
|   | KFDM—Beaumont, Tex.—Magnolia Petroleum Co....  | 500            | 315.6                      | 950                       | Central            |
|   | KFDX—Shreveport, La.—1st Baptist Church.....   | 100            | 236.1                      | 1270                      | Central            |
| KFDY—Brookings, S. Dakota—South Dakota State College..... | 1000   | 299.8          | 1000                       | Central                   |                    |

\*Stations granted permits for continuation of operation or have applied for same up to and including April 30, 1927.

| Radio Call Letters | BROADCAST STATIONS<br>Location and Owner  | Power<br>Watts | Wave<br>Length<br>(Meters) | Frequency<br>(Kilocycles) | Time at<br>Station |
|--------------------|---|----------------|----------------------------|---------------------------|--------------------|
| <b>KF</b>          | <b>KFDZ—Minneapolis, Minn.—H. O. Iverson, 2510 Thomas Ave. South.....</b>   | 10             | 231                        | 1300                      | Central            |
|                    | <b>KFEC—Portland, Oregon—Meier &amp; Frank Co.....</b>  | 150            | 252                        | 1190                      | Pacific            |
|                    | <b>KFEL—Denver, Colo.—Eugene P. O. Fallon, Argonaut Hotel.....</b>  | 250            | 254                        | 1180                      | Mountain           |
|                    | <b>KFEQ—St. Joseph, Mo.—John L. Scroggin.....</b>   | 200            | 268                        | 1120                      | Central            |
|                    | <b>KFEU—Lower Lake Cal.—L. W. Clement.....</b>  | 50             | 222.1                      | 1350                      | Pacific            |
|                    | <b>KFEY—Kellogg, Idaho—Bunker Hill &amp; Sullivan Mining &amp; Concentrating Co., 834 McKinley Ave.....</b>       | 10             | 233                        | 1290                      | Pacific            |
|                    | <b>KFFP—Moberly, Mo.—First Baptist Church.....</b>  | 50             | 242                        | 1240                      | Central            |
|                    | <b>KFGB—Iowa City, Iowa—Albert C. Dunhill, 205 East College Street.....</b>                                       | 10             | 223.7                      | 1340                      | Central            |
|                    | <b>*KFGQ—Boone, Iowa—Boone Biblical College, 924 Second Ave.....</b>  | 10             | 299.8                      | 1000                      | Central            |
|                    | <b>KFH—Wichita, Kans.—Rigby-Gray Hotel Co., Hotel Lassen.....</b>   | 50             | 241.8                      | 1240                      | Central            |
|                    | <b>KFHA—Gunnison, Colo.—Western State College of Colo.....</b>  | 50             | 252                        | 1190                      | Mountain           |
|                    | <b>KFHL—Oskaloosa, Iowa—Penn College.....</b>   | 10             | 240                        | 1250                      | Central            |
|                    | <b>KFI—Los Angeles, Calif.—Earle C. Anthony, Inc., Packard Motor Car Bldg., 1000 S. Hope St.....</b>              | 5000           | 467                        | 640                       | Pacific            |
|                    | <b>KFIF—Portland, Ore.—Benson Polytechnic School....</b>  | 100            | 248                        | 1210                      | Pacific            |
|                    | <b>KFIO—Spokane, Wash.—North Central High School...</b>   | 250            | 272.6                      | 1210                      | Pacific            |
|                    | <b>KFIQ—Yakima, Wash.—Dr. I. M. Miller.....</b>   | 500            | 256                        | 1170                      | Pacific            |
|                    | <b>KFIZ—Fond du Lac, Wis.—Fond du Lac Commonwealth Reporter, 22 Forest Ave.....</b>                               | 100            | 273                        | 1100                      | Central            |
|                    | <b>*KFJB—Marshalltown, Iowa—Marshall Electric Co...</b>   | 15             | 248                        | 1210                      | Central            |
|                    | <b>KFJF—Oklahoma City, Okla.—National Radio Mfg. Co.....</b>  | 1000           | 261                        | 1150                      | Central            |
|                    | <b>KFJI—Astoria, Ore.—Liberty Theatre (E. E. Marsh)...</b>  | 10             | 246                        | 1220                      | Pacific            |
|                    | <b>KFJM—Grand Forks, N. D.—University of N. D.....</b>  | 100            | 278                        | 1080                      | Central            |
|                    | <b>KFJR—Portland, Ore.—Ashley C. Dixon &amp; Son., associated with Ralph Schneeloch Co., 1350 E. 36th St.....</b> | 120            | 263                        | 1140                      | Pacific            |
|                    | <b>KFJY—Fort Dodge, Iowa—Tunwall Radio Co., 1004 Central.....</b>   | 100            | 246                        | 1220                      | Central            |
|                    | <b>KFJZ—Fort Worth, Tex.—W. E. Branch, 3rd and Main.</b>  | 50             | 254.1                      | 1180                      | Central            |
|                    | <b>KFKA—Greeley, Colo.—Colorado State Teachers College.....</b>   | 50             | 273                        | 1100                      | Mountain           |
|                    | <b>*KFKB—Milford, Kans.—J. R. Brinkley, MD.....</b>   | 3500           | 218.8                      | 1370                      | Central            |
|                    | <b>*KFKU—Lawrence, Kans.—University of Kansas.....</b>  | 500            | 275                        | 1090                      | Central            |
|                    | <b>KFKX—Hastings, Neb.—National Broadcasting Co....</b>   | 5000           | 288.3                      | 1040                      | Central            |
|                    | <b>KFKZ—Kirksville, Mo.—State Teachers College.....</b>   | 75             | 226                        | 1330                      | Central            |
|                    | <b>KFLR—Albuquerque, N. Mex.—University of New Mexico.....</b>  | 100            | 254                        | 1180                      | Mountain           |
|                    | <b>KFLU—San Benito, Tex.—San Benito Radio Club....</b>  | 20             | 236                        | 1270                      | Central            |
|                    | <b>KFLV—Rockford, Ill.—Swedish Evangelical Mission Church.....</b>  | 100            | 229                        | 1310                      | Central            |
|                    | <b>KFLX—Galveston, Tex.—Geo. R. Clough, 3327 Ave. P.</b>  | 250            | 240                        | 1250                      | Central            |
|                    | <b>KFMR—Sioux City, Iowa—Morningside College.....</b>   | 100            | 261                        | 1150                      | Central            |
|                    | <b>KFMX—Northfield, Minn.—Carleton College.....</b>   | 500            | 336.9                      | 890                       | Central            |
|                    | <b>KPNF—Shenandoah, Iowa—Henry Field Seed &amp; Nursery Co.....</b>   | 1000-2500      | 461.3                      | 650                       | Central            |
|                    | <b>KFOA—Seattle Wash.—Rhodes Department Store, 6144 Arcade Bldg.....</b>  | 1000           | 454.3                      | 660                       | Pacific            |
|                    | <b>KFOB—Burlingame, Calif.—KFOB Inc.....</b>  | 50             | 226                        | 1330                      | Pacific            |
|                    | <b>KFON—Long Beach, Calif.—Nichols &amp; Warinner, Inc., Jergins Trust Bldg.....</b>                              | 500            | 233                        | 1290                      | Pacific            |
|                    | <b>KFOR—David City, Neb.—David City Tire &amp; Elec. Co.</b>  | 100            | 226                        | 1330                      | Central            |
|                    | <b>KFOT—Wichita, Kans.—College Hill Radio Club (College Hill Methodist Church).....</b>                           | 50             | 231                        | 1300                      | Central            |

| Radio Call Letters | BROADCAST STATIONS<br>Location and Owner  | Power<br>Watts | Wave<br>Length<br>(Meters) | Frequency<br>(Kilocycles) | Time at<br>Station |
|--------------------|---|----------------|----------------------------|---------------------------|--------------------|
| <b>KF</b>          | <b>KFOX—Omaha, Neb.</b> —Technical High School (Board of Education).....                            | 100            | 248                        | 1210                      | Central            |
|                    | <b>KFOY—St. Paul, Minn.</b> —Beacon Radio Service (M. G. Goldberg), 376 Robert St.....              | 50             | 252                        | 1190                      | Central            |
|                    | <b>KFPL—Dublin, Tex.</b> —C. C. Baxter, 205 Grafton St....  | 20             | 252                        | 1190                      | Central            |
|                    | <b>KFPM—Greenville, Tex.</b> —The New Furniture Co.....   | 10             | 242                        | 1240                      | Central            |
|                    | <b>KFPR—Los Angeles, Calif.</b> —Los Angeles County Forestry Dept.....                              | 500            | 231                        | 1300                      | Pacific            |
|                    | <b>KFPW—Cartersville, Mo.</b> —St. Johns M. E. Church, South. (L. E. Stewart).....                  | 20             | 258                        | 1160                      | Central            |
|                    | <b>KFPY—Spokane, Wash.</b> —Symons Investment Co.....   | 500            | 266                        | 1130                      | Pacific            |
|                    | <b>KFQA—St. Louis, Mo.</b> —(Transmitter in Kirkwood)—The Principia, 5539 Page Ave.....             | 5000           | 280.2                      | 1070                      | Central            |
|                    | <b>KFQB—Fort Worth, Tex.</b> —Lone Star Broadcast Co., 205 Worth Bldg.....                          | 2500           | 508.2                      | 590                       | Central            |
|                    | <b>KFQU—Alma (Holy City), Calif.</b> —W. E. Riker.....  | 250            | 230.6                      | 1300                      | Pacific            |
|                    | * <b>KFQW—Seattle, Wash.</b> —Carl F. Knierim.....  | 100            | 215.7                      | 1390                      | Pacific            |
|                    | <b>KFOX—Seattle, Wash.</b> —Alfred M. Hubbard.....  | 15             | 210                        | 1430                      | Pacific            |
|                    | <b>KFQZ—Hollywood, Calif.</b> —Taft Radio & Broadcasting Co., Inc., 1641 N. Argyle.....             | 500            | 226                        | 1330                      | Pacific            |
|                    | <b>KFRB—Beeville, Tex.</b> —Hall Bros.....  | 250            | 248                        | 1210                      | Central            |
|                    | <b>KFRC—San Francisco, Calif.</b> —Don Lee (Inc).....   | 50             | 267.7                      | 1120                      | Pacific            |
|                    | * <b>KFRU—Columbia, Mo.</b> —Stephens College, Administration Bldg.....                             | 500            | 499.7                      | 600                       | Central            |
|                    | <b>KFSD—San Diego, Calif.</b> —Airfan Radio Corp., 402 B. St.                                       | 1000           | 245.8                      | 1220                      | Pacific            |
|                    | <b>KFSG—Los Angeles, Calif.</b> —Echo Park Evangelistic Assn., Angelus Temple.....                  | 500            | 275                        | 1090                      | Pacific            |
|                    | <b>KFUL—Galveston, Texas</b> —Thos. Groggan and Bros. Music Co., 2126 Market St.....                | 500            | 258                        | 1160                      | Central            |
|                    | <b>KFUM—Colorado Springs, Colo.</b> —Corley Mountain Highway, Ford Vollmer Bldg.....                | 100            | 239.9                      | 1250                      | Mountain           |
|                    | <b>KFUO—St. Louis, Mo.</b> —Lutheran Church of the Missouri Synod, Concordia Theological Seminary.. | 500            | 545.1                      | 550                       | Central            |
|                    | <b>KFUP—Denver, Colo.</b> —Fitzsimons General Hospital, Red Cross Bldg.....                         | 50             | 234                        | 1280                      | Mountain           |
|                    | <b>KFUR—Ogden, Utah</b> —Peery Building Co., 420 Twenty-fifth St.....                               | 50             | 224                        | 1340                      | Pacific            |
|                    | <b>KFUS—Oakland, Calif.</b> —Louis L. Sherman, 529 Twenty-eighth St.....                            | 50             | 256                        | 1170                      | Pacific            |
|                    | <b>KFUT—Salt Lake City, Utah</b> —University of Utah....  | 100            | 261                        | 1150                      | Pacific            |
|                    | <b>KFVD—Venice, Calif.</b> —McWhinnie Elec. Co., 1825 So. Pacific Ave.....                          | 50             | 208                        | 1440                      | Pacific            |
|                    | <b>KFVE—St. Louis, Mo.</b> —Greater St. Louis Broadcasting Corp., Hotel Chase.....                  | 5000           | 240                        | 1250                      | Central            |
|                    | <b>KFVG—Independence, Kans.</b> —First Methodist Episcopal Church.....                              | 15             | 236                        | 1270                      | Central            |
|                    | <b>KFVI—Houston, Texas</b> —Dunlap, Wilkes, Hills & Hjorth  | 50             | 240                        | 1250                      | Central            |
|                    | <b>KFVN—Fairmont, Minn.</b> —Carl E. Bagley.....  | 50             | 227                        | 1320                      | Central            |
|                    | <b>KFVR—Denver, Colo. (near)</b> —The Olinger Corp., 1075 Penn St.....                              | 50             | 244                        | 1230                      | Mountain           |
|                    | <b>KFVS—Cape Girardeau, Mo.</b> —Hirsch Battery and Radio Co., 312 S. Fred. St.....                 | 50             | 224                        | 1340                      | Central            |

| Radio Call Letters | BROADCAST STATIONS<br>Location and Owner  | Power<br>Watts | Wave<br>Length<br>(Meters) | Frequency<br>(Kilocycles) | Time at<br>Station |
|--------------------|---|----------------|----------------------------|---------------------------|--------------------|
| <b>KF</b>          | <b>KFVY—Albuquerque, N. Mexico—Radio Supply Co.,</b><br>407 West Central Ave.....                       | 10             | 250                        | 1200                      | Mountain           |
|                    | <b>KFWB—Hollywood, Calif.—Warner Bros. Pictures</b><br>(Inc.), 5842 Sunset Blvd.....                    | 750            | 252                        | 1190                      | Pacific            |
|                    | <b>KFWC—San Bernardino, Calif.—L. E. Wall.....</b>  | 200            | 211.1                      | 1420                      | Pacific            |
|                    | <b>KFWF—St. Louis, Mo.—St. Louis Truth Center, Rev.</b><br>Emil C. Hartmann, 4030 Lindell Blvd.....     | 500            | 214.2                      | 1400                      | Central            |
|                    | <b>KFWH—Eureka, Calif.—F. Wellington Morse, Jr., Hotel</b><br>Vance.....                                | 100            | 254                        | 1180                      | Pacific            |
|                    | <b>KFWI—San Francisco, Calif.—(Transmitter is in So.</b><br>San Francisco.)—Radio Entertainments, Inc.. | 500            | 250                        | 1200                      | Pacific            |
|                    | <b>KFWM—Oakland, Calif.—Oakland Educational Society,</b><br>1520 8th Ave.....                           | 500            | 315.6                      | 950                       | Pacific            |
|                    | <b>KFWO—Avalon, Catalina Island, Calif.—Major</b><br>Lawrence Mott, Signal Corps, U. S. Army....        | 250            | 211.1                      | 1420                      | Pacific            |
|                    | <b>KFWU—Pineville, La.—Louisiana College.....</b>   | 100            | 238                        | 1260                      | Central            |
|                    | <b>KFWV—Portland, Ore.—KFWV Broadcast Studios</b><br>(Inc.), 385 East Fifty-eighth St., So.....         | 50             | 212.6                      | 1410                      | Pacific            |
|                    | <b>KFXB—Los Angeles, Calif.—Bertram O. Heller, Com-</b><br>mercial Exchange Bldg.....                   | 4000           | 352.7                      | 850                       | Pacific            |
|                    | <b>KFXD—Logan, Utah—Service Radio Company.....</b>  | 10             | 205.4                      | 1460                      | Mountain           |
|                    | <b>KFXF—Denver, Colo.—Colorado Radio Corp., The</b><br>Brown Palace Hotel.....                          | 100            | 422                        | 710                       | Mountain           |
|                    | <b>KFXH—El Paso, Texas—Bledsoe Radio Co., 115 S.</b><br>El Paso St.....                                 | 50             | 242                        | 1240                      | Central            |
|                    | <b>KFXJ—Edgewater, Colo.—R. G. Howell.....</b>  | 15             | 215.7                      | 1390                      | Mountain           |
|                    | <b>KFXR—Oklahoma City, Okla.—Classen Film Finishing</b><br>Co., 132½ W. Main Street.....                | 15             | 214.2                      | 1400                      | Central            |
|                    | <b>KFXY—Flagstaff, Ariz.—Mary M. Costigan (Orpheum</b><br>Theatre).....                                 | 10             | 205.4                      | 1460                      | Mountain           |
|                    | <b>KFYF—Oxnard, Calif.—Carl's Radio Den, 207—5th St.</b>  | 10             | 205.4                      | 1460                      | Pacific            |
|                    | <b>KFYJ—Houston, Texas—(Portable) Houston Chroni-</b><br>cle Pub. Co.....                               | 10             | 238                        | 1260                      |                    |
|                    | <b>KFYR—Bismarck, N. D.—Hoskins Meyer, Inc., 200</b><br>Fourth St.....                                  | 250            | 248                        | 1210                      | Central            |
| <b>KG</b>          | <b>KGA—Spokane, Wash.—Northwest Radio Co., 375</b><br>Rowan Ave.....                                    | 20000          | 340.7                      | 880                       | Pacific            |
|                    | <b>KGAR—Tucson, Ariz.—Tucson Citizen, 80 South</b><br>Stone St.....                                     | 100            | 243.8                      | 1230                      | Mountain           |
|                    | <b>KGBS—Seattle, Wash.—A. C. Dailey, 844 E. 58 St....</b>   | 100            | 227                        | 1320                      | Pacific            |
|                    | <b>KGBX—St. Joseph, Mo.—Foster-Hall Tire Co., 1221</b><br>Fred. Ave.....                                | 100            | 347.8                      | 860                       | Central            |
|                    | <b>KGBY—Shelby, Nebr.—Dunning &amp; Toddiken.....</b>   | 50             | 202.6                      | 1480                      | Central            |
|                    | <b>KGBZ—York, Nebr.—Federal Live Stock Remedy Co.,</b><br>303 W. Fifth St.....                          | 100            | 333.1                      | 900                       | Central            |
|                    | <b>KGCA—Decorah, Iowa—Chas. W. Greenley.....</b>  | 15             | 280.2                      | 1070                      | Central            |
|                    | <b>KGCB—Oklahoma City, Okla.—Wallace Radio Inst.,</b><br>105 W. 13 St.....                              | 100            | 331                        | 900                       | Central            |
|                    | <b>KGCG—Newark, Ark.—Moore Motor Co.....</b>  | 100            | 234.2                      | 1280                      | Central            |
|                    | <b>KGCH—Wayne, Nebr.—Wayne Hospital (S. A. Lutgen)</b>  | 500            | 434                        | 690                       | Central            |
|                    | <b>KGCI—San Antonio, Tex.—Liberty Radio Sales, 409</b><br>S. Flores St.....                             | 15             | 239.9                      | 1250                      | Central            |
|                    | <b>KGCL—Seattle, Wash.—Louis Wasmer and Archie Taft,</b><br>609 Washington Blvd.....                    | 10             | 238                        | 1260                      | Pacific            |
|                    | <b>KGCM—Concordia, Kans.—Alva E. Smith, 1117 So.</b><br>Hill St.....                                    | 50             | 235                        | 1270                      | Central            |
|                    | <b>KGCR—Brookings, S. Dak.—Cutler's Radio Broadcast-</b><br>ing Service (Inc.), 415 Main St.....        | 10             | 252                        | 1190                      | Central            |

| Radio Call Letters | BROADCAST STATIONS<br>Location and Owner  | Power<br>Watts | Wave<br>Length<br>(Meters) | Frequency<br>(Kilocycles) | Time at<br>Station |
|--------------------|---|----------------|----------------------------|---------------------------|--------------------|
| <b>KG</b>          | <b>KGCU—Mandan, N. Dak.</b> —Mandan Chamber of Commerce.....                                | 250            | 290                        | 1030                      | Central            |
|                    | <b>KGCX—Vida, Mont.</b> —First State Bank of Vida.....                                      | 10             | 240                        | 1250                      | Mountain           |
|                    | <b>*KGDA—Dell Rapids, S. Dak.</b> —Home Auto Co. (J. R. Nelson).....                        | 15             | 254.1                      | 1180                      | Central            |
|                    | <b>KGDE—Barrett, Minn.</b> —Jaren Drug, Co.....   | 50             | 232.4                      | 1290                      | Central            |
|                    | <b>KGDJ—Cresco, Iowa</b> —R. Rathert, Cresco Theatre.....                                   | 7½             | 214.2                      | 1400                      | Central            |
|                    | <b>KGDM—Stockton, Calif.</b> —Victor G. Koping & E. F. Peffer, 42 S. California St.....     | 5              | 217.3                      | 1380                      | Pacific            |
|                    | <b>KGDO—Dallas, Tex.</b> —C. H. and Henry Garret, 2012 Main St.....                         | 100            | 285                        | 1050                      | Central            |
|                    | <b>*KGDP—Pueblo, Colo.</b> —Pueblo Council, Boy Scouts of America.....                      | 10             | 260.7                      | 1150                      | Mountain           |
|                    | <b>KGDR—San Antonio, Tex.</b> —Radio Engineers.....   | 15             | 240                        | 1250                      | Central            |
|                    | <b>*KGDW—Humboldt, Neb.</b> —Frank J. Rist.....   | 100            | 241.8                      | 1240                      | Central            |
|                    | <b>KGDX—Shreveport, La.</b> —Wm. Erwin Anthony.....   | 500            | 291.1                      | 1030                      | Central            |
|                    | <b>KGDY—Oldham, S. D.</b> —J. Albert Loesch.....  | 15             | 210                        | 1430                      | Central            |
|                    | <b>KGEF—Los Angeles, Calif.</b> —Trinity Methodist Church                                   | 1000           | 516.9                      | 580                       | Pacific            |
|                    | <b>KGEH—Eugene, Ore.</b> —Eugene Broadcasting Station                                       | 50             | 236.1                      | 1270                      | Pacific            |
|                    | <b>KG EK—Yuma, Colo.</b> —Beehler Elec. Equipment Co., 109 W. 2nd St.....                   | 10             | 252                        | 1190                      | Mountain           |
|                    | <b>KGEL—Jamestown, N. Dak.</b> —Ernest W. Ellison, 118 4th Ave. S.....                      | 50             | 225                        | 1330                      | Central            |
|                    | <b>KGEN—El Centro, Calif.</b> —E. R. Ireby & F. M. Bowels.                                  | 15             | 281                        | 1070                      | Pacific            |
|                    | <b>KGEO—Grand Island, Nebr.</b> —Raymond D. Chamberlain, 116 N. Locust St.....              | 50             | 271                        | 1100                      | Central            |
|                    | <b>KGEQ—Minneapolis, Minn.</b> —Fred W. Herrmann, 920 5th Ave.....                          | 50             | 330                        | 910                       | Central            |
|                    | <b>KGER—Long Beach, Calif.</b> —C. Merwin Dobyns, 435 Pine Ave.....                         | 100            | 325.9                      | 920                       | Pacific            |
|                    | <b>KGES—Central City, Nebr.</b> —Central Radio Electric Co.                                 | 10             | 205.4                      | 1460                      | Central            |
|                    | <b>KG EW—Fort Morgan, Colo.</b> —City of Fort Morgan...                                     | 10             | 256                        | 1170                      | Mountain           |
|                    | <b>KGEY—Denver, Colo.</b> —J. W. Dietz, 1631 California St.                                 | 15             | 204                        | 1470                      | Mountain           |
|                    | <b>KGEZ—Kalispell, Mont.</b> —Flathead Broadcasting Assoc.                                  | 100            | 352                        | 850                       | Mountain           |
|                    | <b>KGFF—Alva, Okla.</b> —Earl E. Hampshire.....   | 25             | 205.4                      | 1460                      | Central            |
|                    | <b>KGFG—Oklahoma City, Okla.</b> —Full Gospel Church..                                      | 50             | 384                        | 780                       | Central            |
|                    | <b>KG FH—La Crescenta, Calif.</b> —Frederick Robinson, Box 163.....                         | 100            | 218                        | 1370                      | Pacific            |
|                    | <b>KGFI—Fort Stockton, Tex.</b> —M. L. Eaves.....   | 15             | 220.4                      | 1360                      | Central            |
|                    | <b>KG FJ—Los Angeles, Calif.</b> —Ben S. McGiashan, 2333 W. 21st St.....                    | 100            | 218                        | 1370                      | Pacific            |
|                    | <b>KGFK—Hallock, Minn.</b> —Kittson County Enterprise (C. W. Bouvette).....                 | 100            | 225                        | 1330                      | Central            |
|                    | <b>KGFL—Trinidad, Colo.</b> —Trinidad Broadcasting Co., 219 W. Main St.....                 | 50             | 222                        | 1350                      | Mountain           |
|                    | <b>KGFM—Yuba City, Calif.</b> —Geo. W. Johnson, 336 Plumas St.....                          | 15             | 450                        | 670                       | Pacific            |
|                    | <b>KGFN—Aneta, N. Dak.</b> —Haraldson & Thingstad.....                                      | 15             | 222.1                      | 1350                      | Central            |
|                    | <b>KGFP—Mitchell, S. Dak.</b> —Mitchell Broadcast Co., 113 W. Fourth Ave.....               | 15             | 263                        | 1140                      | Central            |
|                    | <b>KGO—Oakland, Calif.</b> —General Electric Co.....  | 5000           | 361.2                      | 830                       | Pacific            |
|                    | <b>*KGRC—San Antonio, Tex.</b> —G. Roth & Co.....   | 50             | 315                        | 950                       | Central            |
|                    | <b>KGRS—Amarillo, Tex.</b> —Gish Radio Service, 108 E. 8th Street.....                      | 100            | 234                        | 1280                      | Central            |
|                    | <b>*KGTT—San Francisco, Calif.</b> —Glad Tidings Temple and Bible Inst., 1451 Ellis St..... | 50             | 207                        | 1450                      | Pacific            |

| Radio Call Letters | BROADCAST STATIONS<br>Location and Owner   | Power<br>Watts | Wave<br>Length<br>(Meters) | Frequency<br>(Kilocycles) | Time at<br>Station |
|--------------------|--|----------------|----------------------------|---------------------------|--------------------|
| <b>KG</b>          | KGW—Portland, Ore.—The Oregonian Pub. Co.....  | 1000           | 491.5                      | 610                       | Pacific            |
|                    | KGY—Lacey, Wash.—St. Martins College.....  | 50             | 278                        | 1080                      | Pacific            |
| <b>KH</b>          | KHJ—Los Angeles, Calif.—The Times Mirror Co....  | 500            | 405.2                      | 740                       | Pacific            |
|                    | KHQ—Spokane, Wash.—Louis Wasmer, Davenport<br>Hotel.....   | 1000           | 394.5                      | 760                       | Pacific            |
| <b>KI</b>          | KICK—Anita, Iowa—Walnut Grove Co.....  | 100            | 273                        | 1100                      | Central            |
| <b>KJ</b>          | KJBS—San Francisco, Calif.—Julius Brunton and Sons<br>Co., 1380 Bush St.....                               | 5              | 220                        | 1360                      | Pacific            |
|                    | KJR—Seattle, Wash.—Northwest Radio Service Co.,<br>Vincent I. Kraft, Mgr., 614 Terminal Sales<br>Bldg..... | 20000          | 384.4                      | 780                       | Pacific            |
| <b>KK</b>          | KKP—Seattle, Wash.—City of Seattle, Harbor Dept..  | 15             | 260                        | 1150                      | Pacific            |
| <b>KL</b>          | KLDS—Kansas City, Mo.—Reorganized Church of<br>Jesus Christ of Latter Day Saints.....                      | 1000           | 440.9                      | 680                       | Central            |
|                    | KLIT—Portland, Ore.—Lewis I. Thompson, 475 21st St.  | 10             | 380                        | 790                       | Pacific            |
|                    | KLS—Oakland, Calif.—Warner Bros. Radio Supplies<br>Co., 2201 Telegraph Ave.....                            | 250            | 250                        | 1200                      | Pacific            |
|                    | KLX—Oakland, Calif.—The Oakland Tribune.....   | 500            | 508.2                      | 590                       | Pacific            |
|                    | KLZ—Denver, Colo.—Reynolds Radio Co., 1534 Glen-<br>arm Street.....  | 500            | 384.4                      | 780                       | Mountain           |
| <b>KM</b>          | KMA—Shenandoah, Iowa—May Seed and Nursery Co.  | 500            | 461.3                      | 650                       | Central            |
|                    | KMED—Medford, Ore.—W. J. Virgin.....   | 50             | 250                        | 1200                      | Pacific            |
|                    | KMIC—Inglewood, Calif.—J. R. Fouch, 217 Market St.   | 500            | 387                        | 770                       | Pacific            |
|                    | KMJ—Fresno, Calif.—Fresno Bee.....   | 50             | 234                        | 1280                      | Pacific            |
|                    | KMJP—Kansas City, Mo.—Kansas City Journal-Post.  | 1000           | 440.9                      | 680                       | Central            |
|                    | KMMJ—Clay Center, Nebr.—M. M. Johnson Co.....  | 1000           | 229                        | 1310                      | Central            |
|                    | KMO—Tacoma, Wash.—KMO, Inc., Hotel Winthrop..  | 500            | 250                        | 1200                      | Pacific            |
|                    | KMOX—St. Louis, Mo. (Transmitter is in Kirkwood.)<br>The Voice of St. Louis, Inc., Mayfair Hotel..         | 5000           | 280.2                      | 1070                      | Central            |
|                    | KMTR—Los Angeles, Calif.—KMTR Radio Corp., 1025<br>N. Highland Ave.....                                    | 500            | 370.2                      | 810                       | Pacific            |
| <b>KN</b>          | KNRC—Santa Monica, Calif.—Kierulff and Ravens-<br>croft, Co., 1630 So. Los Angeles St.....                 | 750            | 208                        | 1440                      | Pacific            |
|                    | KNX—Los Angeles, Calif.—Los Angeles Evening<br>Express, 6116 Hollywood Blvd.....                           | 500            | 336.9                      | 890                       | Pacific            |
| <b>KO</b>          | KOA—Denver, Colo.—General Electric Co.....   | 5000           | 322.4                      | 930                       | Mountain           |
|                    | KOAC—Corvallis, Ore.—Oregon Agricultural College...  | 500            | 280.2                      | 1070                      | Pacific            |
|                    | KOB—State College, N. Mex.—New Mexico College of<br>Agriculture and Mechanic Arts.....                     | 1500           | 348.6                      | 860                       | Mountain           |
|                    | KOCH—Omaha, Neb.—Central High School, 22nd and<br>Dodge.....   | 500            | 258                        | 1160                      | Central            |
|                    | KOCW—Chickasha, Okla.—Oklahoma College for<br>Women.....   | 200            | 270.1                      | 1110                      | Central            |
|                    | KOIL—Council Bluffs, Iowa—Mona Motor Oil Co....  | 500            | 305.9                      | 980                       | Central            |
|                    | KOIN—Sylvan, Ore. (Transmitter is 6 miles west of<br>City.)—KOIN, Inc.....                                 | 1000           | 319                        | 940                       | Pacific            |
|                    | KOLO—Durango, Colo.—Gerald K. Hunter, Box 786..  | 5              | 355.1                      | 840                       | Mountain           |
|                    | KOMO—Seattle, Wash.—Bert F. Fisher, 604 Home<br>Savings Bldg.....  | 1000           | 305.9                      | 980                       | Pacific            |
|                    | KOWW—Walla Walla, Wash.—Blue Mountain Radio<br>Association. (Frank A. Moore).....                          | 500            | 285                        | 1050                      | Pacific            |
| <b>KP</b>          | *KPCB—Seattle, Wash.—Pacific Coast Biscuit Co., 505<br>Central Bldg.....                                   | 50             | 521                        | 580                       | Pacific            |
|                    | KPJM—Prescott, Ariz.—Wilburn Radio Service, Journal<br>Miner Bldg.....                                     | 15             | 215                        | 1390                      | Mountain           |



| Radio Call Letters   | BROADCAST STATIONS<br>Location and Owner  | Power<br>Watts  | Wave<br>Length<br>(Meters) | Frequency<br>(Kilocycles) | Time at<br>Station |         |
|--|---|---|----------------------------|---------------------------|--------------------|---------|
| <b>KP</b>  | KPNP—Muscatine, Iowa—Central Radio Co., East Second St.....                       | 100   | 256                        | 1170                      | Central            |         |
|  | KPO—San Francisco, Calif.—Hale Bros. and the San Francisco Chronicle.....         | 1000  | 428.3                      | 700                       | Pacific            |         |
|  | KPPC—Pasadena, Calif.—Pasadena Presbyterian Church.....                           | 50  | 229                        | 1310                      | Pacific            |         |
|  | KPRC—Houston, Texas—Houston Post Dispatch.....                                    | 500   | 296.9                      | 1010                      | Central            |         |
|  | KPSN—Pasadena, Calif.—The Star-News.....  | 1000  | 315.6                      | 950                       | Pacific            |         |
| <b>KQ</b>  | KQV—Pittsburgh, Pa.—Doubleday-Hill Electric Co., 719 Liberty Ave.....             | 500   | 275                        | 1090                      | Eastern            |         |
|  | KQW—San Jose, Calif.—First Baptist Church of San Jose, Montevina Ave.....         | 500   | 333.1                      | 900                       | Pacific            |         |
| <b>KR</b>  | KRAC—Shreveport, La.—Caddo Radio Club—Fair Grounds.....                           | 500   | 220                        | 1360                      | Central            |         |
|  | KRE—Berkeley, Calif.—Berkeley Daily Gazette (C. E. Dunscomb).....                 | 100   | 256                        | 1170                      | Pacific            |         |
|  | *KRLD—Dallas, Tex.—Dallas Radio Laboratories, 208 North St. Paul St.....          | 500   | 336.9                      | 890                       | Central            |         |
|  | KRLO—Los Angeles, Calif.—Freeman Lang and A. B. Scott, 218 N. Larchmont Blvd..... | 250   | 440                        | 680                       | Pacific            |         |
|  | KROW—Portland, Ore.—Oregon Broadcast Co.....                                      | 50  | 231                        | 1300                      | Pacific            |         |
|  | KROX—Seattle, Wash.—N. B. Brown and W. J. Calsamalia, 4728 Beannett St.....       | 100   | 265.3                      | 1130                      | Pacific            |         |
|  | KRSC—Seattle, Wash.—Radio Sales Corporation, 1202 Fifth Avenue.....               | 100   | 499.6                      | 600                       | Pacific            |         |
|  | <b>KS</b>   | KSAC—Manhattan, Kans.—Kansas State Agricultural College.....                      | 500                        | 340.7                     | 880                | Central |
|  |   | KSBA—Shreveport, La.—Shreveport Broadcasting Co., W. G. Paterson.....             | 1000                       | 312.6                     | 960                | Central |
|  |   | KSCJ—Sioux City, Iowa—Sioux City Journal.....                                     | 10                         | 444                       | 670                | Central |
| KSD—St. Louis, Mo.—Pulitzer Publishing Co.—The St. Louis Post-Dispatch.....        |   | 500   | 545.1                      | 550                       | Central            |         |
| KSEI—Pocatello, Idaho—KSEI Broadcasting Association.....                           |   | 500   | 260.7                      | 1150                      | Mountain           |         |
| KSL—Salt Lake City, Utah—Radio Service Corp. of Utah, 505 Templeton Bldg.....      |   | 1000  | 299.8                      | 1000                      | Mountain           |         |
| KSMR—Santa Maria, Calif.—Santa Maria Valley R. R. Co.....                          |   | 100   | 282.8                      | 1060                      | Pacific            |         |
| KSO—Clarinda, Iowa—A. A. Berry Seed Co.....  |   | 500   | 405.2                      | 740                       | Central            |         |
| KSOO—Sioux Falls, S. D.—Sioux Falls Broadcast Association, 609 Minnehaha Bldg..... |   | 250   | 360                        | 830                       | Central            |         |
| <b>KT</b>  |   | KTAB—Oakland, Calif.—The Associated Broadcasters, Inc., 1410 10th Ave.....        | 1000                       | 302.8                     | 990                | Pacific |
|  | KTAP—San Antonio, Tex.—Robert B. Bridge, Radio Service Shop, 2412 Main Ave.....   | 10  | 263                        | 1140                      | Central            |         |
|  | KTBI—Los Angeles, Calif.—Bible Institute of Los Angeles.....                      | 750   | 293.9                      | 1020                      | Pacific            |         |
|  | KTBR—Portland, Ore.—Brown's Radio Shop, 172 Tenth St.....                         | 50  | 263                        | 1140                      | Pacific            |         |
|  | *KTHS—Hot Springs Nat'l Park, Ark.—New Arlington Hotel Co.....                    | 750   | 375                        | 800                       | Central            |         |
|  | KTNT—Muscatine, Iowa—Norman Baker.....  | Var.  | 333.1                      | 900                       | Central            |         |
|  | KTUE—Houston, Texas—Uhalt Electric, W. J. Uhalt 614 Fannin St.....                | 5   | 263                        | 1140                      | Central            |         |
|  | KTW—Seattle, Wash.—The First Presbyterian Church of Seattle, Wash.....            | 1500  | 454.3                      | 660                       | Pacific            |         |
|  | <b>KU</b>   | KUJ—Seattle, Wash.—Puget Sound Radio Broadcasting Co., 5811 Fifth Ave., N. E..... | 15                         | 352.5                     | 850                | Pacific |
|  |   | KUOA—Fayetteville, Ark.—University of Arkansas....                                | 750                        | 299.8                     | 1000               | Central |
| KUOM—Missoula, Mont.—State University of Montana                                   |   | 500   | 244                        | 1230                      | Mountain           |         |

| Radio Call Letters                                      | BROADCAST STATIONS<br>Location and Owner  | Power<br>Watts   | Wave<br>Length<br>(Meters) | Frequency<br>(Kilocycles) | Time at<br>Station |
|---|---|--|----------------------------|---------------------------|--------------------|
| <b>KU</b>   | KUSD—Vermillion, S. D.—University of South Dakota.  | 1000   | 278                        | 1080                      | Central            |
|   | KUT—Austin, Texas—University of Texas   | 500  | 272.6                      | 1100                      | Central            |
| <b>KV</b>   | KVI—Tacoma, Wash.—Puget Sound Radio Broadcast-<br>ing Co., Ninth and A Sts.                 | 15   | 342.5                      | 870                       | Pacific            |
|   | KVOO—Bristow, Okla.—Southwestern Sales Corp.,<br>Tulsa and Bristow, Okla.                   | 500  | 375                        | 800                       | Central            |
|   | *KVOS—Seattle, Wash.—L. L. Jackson and L. Kessler,<br>1208 Tenth Ave.                       | 500  | 333.1                      | 900                       | Pacific            |
| <b>KW</b>   | *KWBS—Portland, Ore.—Schaeffer Mfg. Co., 226 E.<br>41st St.                                 | 10   | 200                        | 1500                      | Pacific            |
|   | KWCR—Cedar Rapids, Ia.—H. F. Paar, Cedar Rapids<br>Broadcasting Corp., 1444 Second Ave., E. | 500  | 296                        | 1010                      | Central            |
|   | KWG—Stockton, Calif.—Portable Wireless Telephone<br>Co., 530 East Market St.                | 50   | 248                        | 1210                      | Pacific            |
|   | KWKC—Kansas City, Mo.—Wilson Duncan Broadcast-<br>ing Studios, Werby Building.              | 100  | 236                        | 1270                      | Central            |
|   | KWLC—Decorah, Iowa—Norwegian Lutheran College.  | 50   | 431                        | 690                       | Central            |
|   | KWSC—Pullman, Wash.—State College of Washington,<br>Mechanic Arts Bldg.                     | 500  | 348.6                      | 860                       | Pacific            |
|   | KWTC—Santa Ana, Calif.—Dr. John W. Hancock, 1101<br>North Ross Street.                      | Var.   | 263                        | 1140                      | Pacific            |
|   | KWUC—Le Mars, Iowa—Western Union College, Dubs<br>Bldg.                                     | 1500   | 252                        | 1190                      | Central            |
|   | KWWG—Brownsville, Texas—Chamber of Commerce.  | 750  | 278                        | 1080                      | Central            |
|   | <b>KXL</b>  | KXL—Portland, Ore.—KXL Broadcasters (Love Elec.<br>Co.), 171 Lawnsdale St. | 500                        | 400                       | 750                |
| <b>KY</b>   | KYA—San Francisco, Calif.—Pacific Broadcasting Co.  | 1000   | 399.8                      | 750                       | Pacific            |
|   | KYW—Chicago, Ill.—Westinghouse Electric and Mfg.<br>Co., 508 S. Michigan Ave.               | 5000   | 535.4                      | 560                       | Central            |
| <b>KZ</b>   | KZM—Oakland, Calif.—Preston D. Allen, 13th and<br>Harrison Streets                          | 1000   | 240                        | 1250                      | Pacific            |
| <b>NA</b>   | NAA—Arlington, Va.—United States Navy   | 1000   | 434.5                      | 690                       | Eastern            |
| <b>WA</b>   | WAAD—Cincinnati, Ohio—Ohio Mechanics Institute  | 25   | 258                        | 1160                      | Central            |
|   | WAAF—Chicago, Ill.—Chicago Daily Drivers Journal.   | 500  | 278                        | 1080                      | Central            |
|   | WAAM—Newark, N. J.—I. R. Nelson, 1 Bond St.   | 500  | 263                        | 1140                      | Eastern            |
|   | WAAT—Jersey City, N. J.—Bremer Broadcasting Corp.,<br>210 Jackson Ave.                      | 500  | 235                        | 1280                      | Eastern            |
|   | WAAW—Omaha Neb.—Omaha Grain Exchange  | 500  | 384.4                      | 780                       | Central            |
|   | WABB—Harrisburg, Pa.—Harrisburg Radio Co.   | 10   | 204                        | 1470                      | Eastern            |
|   | WABC—Richmond Hill, N. Y.—Atlantic Broadcasting<br>Corp., 113 W. 57th St., N. Y. C.         | 500  | 315.6                      | 950                       | Eastern            |
|   | WABF—Kingston, Pa.—Markle Broadcasting Corp.,<br>294 Wyoming Ave.                           | 500  | 410.7                      | 730                       | Eastern            |
|   | WABI—Bangor, Me.—First Universalist Church, Park St.  | 100  | 239.9                      | 1250                      | Eastern            |
|   | *WABO—Rochester, N. Y.—Lake Ave. Baptist Church.  | 100  | 277.6                      | 1080                      | Eastern            |
|   | WABQ—Philadelphia, Pa.—Keystone Broadcasting Co.,<br>Haverford College Radio Club.          | 500  | 260.7                      | 1150                      | Eastern            |
|   | WABR—Toledo, Ohio—Scott High School   | 50   | 263                        | 1140                      | Eastern            |
|   | *WABW—Wooster, Ohio—College of Wooster  | 50   | 206.8                      | 1450                      | Eastern            |
|   | WABX—Mount Clemens, Mich. (near)—Henry B. Joy,<br>1830 Penobscot Bldg., Detroit, Mich.      | 500  | 246                        | 1220                      | Central            |
|   | WABY—Philadelphia, Pa.—John Magaldi, Jr., 815<br>Kimball St.                                | 50   | 242                        | 1240                      | Eastern            |
| WABZ—New Orleans, La.—Coliseum Place Baptist<br>Church. | 50  | 275  | 1090                       | Central                   |                    |
| WADC—Akron, Ohio—Allen T. Simmons                       | 500   | 258  | 1160                       | Eastern                   |                    |

| Radio Call Letters   | BROADCAST STATIONS<br>Location and Owner   | Power<br>Watts  | Wave<br>Length<br>(Meters) | Frequency<br>(Kilocycles) | Time at<br>Station |         |
|--|--|---|----------------------------|---------------------------|--------------------|---------|
| <b>WA</b>  | WAFD—Detroit, Mich.—Albert B. Parfet Co., Charles-<br>ton St. & Woodward Ave.....                              | 500   | 312.3                      | 960                       | Eastern            |         |
|  | WAGM—Royal Oak, Mich.—Robert L. Miller, 309 So.<br>Main St.....  | 50  | 225.4                      | 1330                      | Eastern            |         |
|  | WAGS—Somerville, Mass.—Willow Garages (Inc.) (W.<br>E. Hartwell and J. Smith Dodge), 131 Willow<br>Avenue..... | 5   | 250                        | 1200                      | Eastern            |         |
|  | WAIT—Taunton, Mass.—A. H. Waite and Co., Inc.,<br>32 Weir St.....  | 10  | 229                        | 1310                      | Eastern            |         |
|  | WAIU—Columbus, Ohio—Elk Country Club.....  | 5000  | 293.9                      | 1020                      | Eastern            |         |
|  | WALK—Bethayres, Pa. (Portable)—Albert A. Walker..  | 50  | 285                        | 1050                      |                    |         |
|  | WAMD—Minneapolis, Minn.—Hubbard and Company<br>and Radisson Radio Corp.....                                    | 5000  | 243.8                      | 1230                      | Central            |         |
|  | WAOK—Richmond Hill, N. Y.—A. H. Andreasen<br>10317-116th St.....   | 100   | 247.8                      | 1210                      | Eastern            |         |
|  | WAPI—Auburn, Ala.—Extension Service Alabama Poly-<br>technic Institute.....                                    | 1000  | 461                        | 650                       | Central            |         |
|  | WARC—Medford Hillside, Mass.—The Amrad Corp..  | 100   | 261                        | 1150                      | Eastern            |         |
|  | *WARS—Brooklyn, N. Y.—Amateur Radio Specialty<br>Co., 77 Cortlandt St., N. Y.....                              | 500   | 295                        | 1010                      | Eastern            |         |
|  | WASH—Grand Rapids, Mich.—The Baxter Launderers<br>and Cleaners.....  | 500   | 256.4                      | 1170                      | Eastern            |         |
|  | WATT—Boston, Mass. (Portable)—Edison Electric<br>Illuminating Company of Boston.....                           | 100   | 243.8                      | 1230                      |                    |         |
|  | <b>WB</b>  | WBAA—Lafayette, Ind.—Purdue University.....   | 500                        | 273                       | 1100               | Central |
|  |  | WBAK—Harrisburg, Pa.—Pennsylvania State Police...   | 500                        | 275                       | 1090               | Eastern |
|  |  | WBAL—Baltimore, Md. (Transmitter is in Glen<br>Morris.) Consolidated Gas, Electric Light<br>and Power Co..... | 5000                       | 246                       | 1220               | Eastern |
|  |  | WBAO—Decatur, Ill.—James Millikin University.....   | 100                        | 270                       | 1110               | Central |
|  |  | WBAP—Fort Worth, Texas—Carter Publishing Co., Inc.  | 1500                       | 475.9                     | 630                | Central |
| WBAW—Nashville, Tenn.—Braid Elec. Co. and Wal-<br>drum Drug Co.....                        |  | 100   | 236.1                      | 1270                      | Central            |         |
| WBAX—Wilkes-Barre, Pa.—John H. Stenger, Jr., 66<br>Gildersleeve St.....                    |  | 100   | 256                        | 1170                      | Eastern            |         |
| WBBC—Brooklyn, N. Y.—Brooklyn Broadcasting Corp.,<br>Peter J. Testan, 2123 Troy Ave.....   |  | 500   | 267.7                      | 1120                      | Eastern            |         |
| WBBL—Richmond, Va.—Grace-Covenant Presbyterian<br>Church, 1627 Monument Ave.....           |  | 100   | 228.9                      | 1310                      | Eastern            |         |
| WBBM—Chicago, Ill.—Atlas Investment Co., 1554<br>Howard St.....                            |  | 10000   | 225.4                      | 1330                      | Central            |         |
| WBBP—Petoskey, Mich.—Petoskey High School.....   |  | 100   | 238                        | 1260                      | Central            |         |
| *WBBR—Rossville, N. Y.—People's Pulpit Assn., 124<br>Columbia Heights, Brooklyn, N. Y..... |  | 1000  | 416.4                      | 720                       | Eastern            |         |
| WBBW—Norfolk, Va.—Ruffner Junior High School....   |  | 50  | 222                        | 1350                      | Eastern            |         |
| WBBY—Charleston, S. C.—Washington Light Infantry   |  | 10  | 267.9                      | 1120                      | Eastern            |         |
| WBBZ—Chicago, Ill. (Portable)—C. L. Carrell, 1506<br>No. American Building.....            |  | 50  | 215.7                      | 1390                      |                    |         |
| *WBCN—Chicago, Ill.—Foster and McDonnell, 728<br>West Sixty-fifth St.....                  |  | 500   | 266                        | 1130                      | Central            |         |
| WBES—Takoma Park, Md.—Bliss Electrical School....  |  | 100   | 222                        | 1350                      | Eastern            |         |
| *WBET—Boston, Mass.—Boston Transcript.....   |  | 500   | 394.5                      | 760                       | Eastern            |         |
| WBKN—Brooklyn, N. Y.—Arthur Faske, 1515 Eastern<br>Parkway.....                            | 100  | 291.1   | 1030                       | Eastern                   |                    |         |
| WBMC—Woodside, N. Y.—Malbrook Co.....  | 500  | 293.9   | 1020                       | Eastern                   |                    |         |
| WBMH—Detroit, Mich.—Braun's Music House, 13214<br>E. Jefferson Ave.....                    | 100  | 352.7   | 850                        | Central                   |                    |         |
| WBMS—Union City, N. J.—George J. Schowerer, State-<br>Capitol Bldg., 837 34th St.....      | 100  | 223.7   | 1340                       | Eastern                   |                    |         |

| Radio Call Letters | BROADCAST STATIONS<br>Location and Owner   | Power<br>Watts | Wave<br>Length<br>(Meters) | Frequency<br>(Kilocycles) | Time at<br>Station |
|--------------------|--|----------------|----------------------------|---------------------------|--------------------|
| <b>WB</b>          | <b>WBNY—New York, N. Y.—Baruchrome Corp., 400 E. 139th St.</b> .....   | 1000           | 322                        | 930                       | Eastern            |
|                    | <b>WBOQ—Richmond Hill, N. Y.—Atlantic Broadcasting Corp., 113 W. 57th St., N. Y. C.</b> .....                                      | 100            | 236                        | 1270                      | Eastern            |
|                    | <b>WBRC—Birmingham, Ala.—Birmingham Broadcasting Corp., Age-Herald Bldg.</b> .....   | 50             | 248                        | 1210                      | Central            |
|                    | <b>WBRE—Wilkes-Barre, Pa.—Baltimore Radio Exchange, 17 West Northampton St.</b> .....  | 100            | 231                        | 1300                      | Eastern            |
|                    | <b>WBRL—Tilton, N. H.—Booth Radio Laboratories, 23 Summer St.</b> .....  | 500            | 420                        | 710                       | Eastern            |
|                    | <b>*WBRS—Brooklyn, N. Y.—Universal Radio Mfg. Co., 1062 Broadway.</b> .....  | 100            | 394                        | 760                       | Eastern            |
|                    | <b>WBSO—Wellesley Hills, Mass.—Babson's Statistical Organization.</b> .....  | 100            | 242                        | 1240                      | Eastern            |
|                    | <b>WBT—Charlotte, N. C.—Charlotte Chamber of Commerce, 500 W. Trade St.</b> .....  | 250            | 275                        | 1090                      | Eastern            |
|                    | <b>WBZ—Springfield, Mass. (Transmitter is in East Springfield, Mass.)—Westinghouse Electric and Mfg. Co., Hotel Kimball.</b> ..... | 5000           | 333.1                      | 900                       | Eastern            |
|                    | <b>WBZA—Boston, Mass.—Westinghouse Electric and Mfg. Co., Hotel Brunswick.</b> .....   | 250            | 333.1                      | 900                       | Eastern            |
| <b>WC</b>          | <b>WCAC—Storrs, Conn.—Connecticut Agricultural College.</b> .....  | 500            | 275.1                      | 1090                      | Eastern            |
|                    | <b>WCAD—Canton, N. Y.—St. Lawrence University.</b> .....   | 500            | 263                        | 1140                      | Eastern            |
|                    | <b>WCAE—Pittsburgh, Pa.—Pittsburgh Press and Kaufmann Bros. and Baer Co., 6th and Smithfield Streets.</b> .....                    | 500            | 461.3                      | 650                       | Eastern            |
|                    | <b>WCAH—Columbus, Ohio—Entrekin Electric Co., 321 W. Tenth Ave.</b> .....  | 500            | 265.3                      | 1130                      | Eastern            |
|                    | <b>WCAJ—University Place, Neb.—Nebraska Wesleyan University.</b> .....   | 500            | 254                        | 1180                      | Central            |
|                    | <b>*WCAL—Northfield, Minn.—St. Olaf College.</b> .....   | 500            | 336.9                      | 890                       | Central            |
|                    | <b>WCAM—Camden, N. J.—City of Camden, Civic Centre</b> .....   | 1000           | 336.9                      | 890                       | Eastern            |
|                    | <b>WCAO—Baltimore, Md.—Monumental Radio (Inc.), 848 N. Howard St.</b> .....  | 500            | 275                        | 1090                      | Eastern            |
|                    | <b>WCAR—San Antonio, Texas—Southern Radio Corp. of Texas, 101 West Pecan St.</b> .....   | 5000           | 263                        | 1140                      | Central            |
|                    | <b>WCAT—Rapid City, S. D.—South Dakota State School of Mines.</b> .....  | 50             | 240                        | 1250                      | Mountain           |
|                    | <b>WCAU—Philadelphia, Pa.—Universal Broadcasting Co. (Durham and Co.)</b> .....  | 500            | 278                        | 1080                      | Eastern            |
|                    | <b>WCAX—Burlington, Vt.—Extension Service, University of Vermont.</b> .....  | 100            | 252                        | 1190                      | Eastern            |
|                    | <b>WCAZ—Carthage, Ill.—Carthage College.</b> .....   | 50             | 246                        | 1220                      | Central            |
|                    | <b>WCBA—Allentown, Pa.—Charles W. Heimbach, 1015 Allen St.</b> .....   | 150            | 254                        | 1180                      | Eastern            |
|                    | <b>*WCBD—Zion, Ill.—Wilbur G. Voliva.</b> .....  | 5000           | 344.6                      | 870                       | Central            |
|                    | <b>WCBE—New Orleans, La.—Uhalt Bros., 1219 No. Rampart St.</b> .....   | 5              | 263                        | 1140                      | Central            |
|                    | <b>WCBH—Oxford, Miss. (near)—University of Mississippi</b> .....   | 50             | 242                        | 1240                      | Central            |
|                    | <b>WCBM—Baltimore, Md.—Hotel Chateau, Charles St. and North Ave.</b> .....   | 100            | 229                        | 1310                      | Eastern            |
|                    | <b>WCBR—Providence, R. I. (portable)—Chas. H. Messter, 42 Doyle Ave.</b> .....   | 100            | 209.7                      | 1430                      |                    |
|                    | <b>WCBS—Providence, R. I. (portable)—Harold L. Dewing and Chas. H. Messter, 22 Freeborn Ave.</b> .....                             | 250            | 242.5                      | 1240                      |                    |
|                    | <b>WCCO—St. Paul - Minneapolis, Minn.—Washburn - Crosby Co.</b> .....  | 5000           | 416.4                      | 720                       | Central            |
|                    | <b>WCFL—Chicago, Ill.—Chicago Federation of Labor 166 W. Washington St.</b> .....  | 1500           | 491.5                      | 610                       | Central            |

| Radio Call Letters | BROADCAST STATIONS<br>Location and Owner  | Power<br>Watts | Wave<br>Length<br>(Meters) | Frequency<br>(Kilocycles) | Time at<br>Station |
|--------------------|---|----------------|----------------------------|---------------------------|--------------------|
| <b>WC</b>          | <b>WCFT—Tullahoma, Tenn.</b> (Ovaca)—Knights of Pythias Home (Orphanage).....   | 10             | 252                        | 1190                      | Central            |
|                    | <b>WCGU—Lakewood, N. J.</b> —Charles G. Unger, New Perl House.....  | 500            | 350.6                      | 850                       | Eastern            |
|                    | <b>WCLO—Camp Lake, Wis.</b> —C. E. Whitmore.....  | 100            | 230.6                      | 1300                      | Central            |
|                    | <b>WCLS—Joliet, Ill.</b> —WCLS (Inc.), 301 East Jefferson St.   | 150            | 214.2                      | 1400                      | Central            |
|                    | <b>WCMA—Culver, Ind.</b> —Culver Military Academy.....  | 500            | 258.5                      | 1160                      | Central            |
|                    | <b>WCOA—Pensacola, Fla.</b> —City of Pensacola.....   | 500            | 252                        | 1190                      | Central            |
|                    | <b>WCOC—Columbus, Miss.</b> —Crystal Oil Co., H. B. Holmes, Jr.....   | 100            | 265.3                      | 1130                      | Central            |
|                    | <b>WCOM—Manchester, N. Y.</b> —172nd Field Artillery, N.H.N.G.....  | 100            | 252                        | 1190                      | Eastern            |
|                    | <b>WCOT—Olneyville, R. I.</b> —Jacob Conn.....  | 50             | 265.3                      | 1130                      | Eastern            |
|                    | <b>WCRW—Chicago, Ill.</b> —Clinton R. White, 650 Waveland Ave.....  | 1000           | 410.7                      | 730                       | Central            |
|                    | <b>WCSH—Portland, Me.</b> —Henry P. Rines, Congress Square Hotel Co.....  | 500            | 500                        | 600                       | Eastern            |
|                    | <b>WCSO—Springfield, Ohio</b> —Wittenberg College.....  | 750            | 248                        | 1210                      | Central            |
|                    | <b>WCWK—Fort Wayne, Ind.</b> —Chester W. Keen, 1729 Lafayette St.....   | 500            | 234                        | 1280                      | Central            |
|                    | <b>WCX—Pontiac, Mich.</b> —Detroit Free Press.....  | 5000           | 516.9                      | 580                       | Eastern            |
| <b>WD</b>          | <b>WDAD—Nashville, Tenn.</b> —Dad's Auto Accessory and Radio Store, 171 Eighth Ave., North.....   | 5000           | 226                        | 1330                      | Central            |
|                    | <b>WDAE—Tampa, Fla.</b> —Tampa Daily Times.....   | 500            | 273                        | 1100                      | Eastern            |
|                    | <b>*WDAF—Kansas City, Mo.</b> —The Kansas City Star.....  | 1000           | 365.6                      | 820                       | Central            |
|                    | <b>WDAG—Amarillo, Tex.</b> —J. Laurance Martin, 655 E. 4th St.....  | 100            | 263                        | 1140                      | Central            |
|                    | <b>WDAH—El Paso, Tex.</b> —Trinity Methodist Church, Cor. Boulevard and Mesa Ave.....   | 100            | 267.7                      | 1120                      | Mountain           |
|                    | <b>WDAY—Fargo, N. D.</b> —Radio Equipment Corp., 119 Broadway.....  | 500            | 261                        | 1150                      | Central            |
|                    | <b>WDBE—Atlanta, Ga.</b> —Gilham Electric Co., 35 Cone St.....  | 100            | 270                        | 1110                      | Central            |
|                    | <b>WDBJ—Roanoke, Va.</b> —Richardson-Wayland Electric Corp., 106 Church Ave., S. W.....   | 250            | 229                        | 1310                      | Eastern            |
|                    | <b>WDBK—Cleveland, Ohio</b> —S. J. Broz, Furniture, Hardware and Radio Store, Bolton Sq. Hotel.....   | 50             | 327                        | 920                       | Eastern            |
|                    | <b>*WDBO—Winter Park, Fla.</b> —Central Florida Broadcast Station, Inc.....   | 500            | 240                        | 1250                      | Eastern            |
|                    | <b>WDBZ—Kingston, N. Y.</b> —Kingston Radio Club (Boy Scouts of America, Ulster County Council)...  | 10             | 233                        | 1290                      | Eastern            |
|                    | <b>WDEL—Wilmington, Del.</b> (Transmitter at 6th and Market Sts.)—Willard S. Wilson, Wilmington Electric Specialty Co., 405 Delaware Ave..... | 100            | 266                        | 1130                      | Eastern            |
|                    | <b>WDGY—Minneapolis, Minn.</b> —Geo. W. Young, 909 West Broadway.....   | 500            | 263                        | 1140                      | Central            |
|                    | <b>WDOD—Chattanooga, Tenn.</b> —Chattanooga Radio Co., Inc., 615 Market St.....   | 500            | 256                        | 1170                      | Central            |
|                    | <b>WDRC—New Haven, Conn.</b> —Doolittle Radio Corporation, 115 Crown St.....  | 100            | 268                        | 1120                      | Eastern            |
|                    | <b>WDWF—Cranston, R. I.</b> —Dutee W. Flint and Lincoln Studios, Inc.....   | 500            | 440.9                      | 680                       | Eastern            |
|                    | <b>WDWM—Newark, N. J.</b> —Radio Industries Broadcast Co., 20 Central Ave.....  | 500            | 280.2                      | 1070                      | Eastern            |
|                    | <b>WDXL—Detroit, Mich.</b> —WDXL Radio Corporation, 5769 Stanton Ave.....   | 250            | 296.9                      | 1010                      | Eastern            |
|                    | <b>WDZ—Tuscola, Ill.</b> —Jas. L. Bush.....   | 100            | 278                        | 1080                      | Central            |
| <b>WE</b>          | <b>WEAF—New York, N. Y.</b> (Transmitter at 463 West St.)—National Broadcasting Co., Inc., 195 Broadway.....                                  | 5000           | 491.5                      | 610                       | Eastern            |

| Radio Call Letters | BROADCAST STATIONS<br>Location and Owner   | Power<br>Watts | Wave<br>Length<br>(Meters) | Frequency<br>(Kilocycles) | Time at<br>Station |
|--------------------|--|----------------|----------------------------|---------------------------|--------------------|
| <b>WE</b>          | <b>WEAI—Ithaca, N. Y.—Cornell University.....</b>  | 250            | 254                        | 1180                      | Eastern            |
|                    | <b>*WEAM—North Plainfield, N. J.—Borough of North Plainfield (W. G. Buttfield).....</b>            | 250            | 261                        | 1150                      | Eastern            |
|                    | <b>WEAN—Providence, R. I.—The Shepard Co., 122 Mathewson St.....</b>                               | 500            | 367                        | 820                       | Eastern            |
|                    | <b>WEAO—Columbus, Ohio—The Ohio State University..</b>   | 750            | 293.9                      | 1020                      | Eastern            |
|                    | <b>WEAR—Cleveland, Ohio—Willard Storage Battery Co.</b>  | 1000           | 389.4                      | 770                       | Eastern            |
|                    | <b>WEAU—Sioux City, Iowa—Davidson Bros. Co.....</b>  | 150            | 275                        | 1090                      | Central            |
|                    | <b>*WEBC—Superior, Wis.—Superior Telegram-Ross Elec. Co., 1225 Tower St.....</b>                   | 250            | 242                        | 1240                      | Central            |
|                    | <b>WEBE—Cambridge, Ohio—R. W. Waller, 219 Wall Ave.</b>  | 10             | 234                        | 1280                      | Eastern            |
|                    | <b>WEBH—Chicago, Ill.—Edgewater Beach Hotel Co., 5300 Sheridan Road.....</b>                       | 2000           | 370                        | 810                       | Central            |
|                    | <b>WEBJ—New York, N. Y.—Third Ave. Railway Co., 2396 Third Ave.....</b>                            | 1000           | 272.6                      | 1100                      | Eastern            |
|                    | <b>WEBL—United States (Portable) Radio Corp. of America</b>  | 100            | 226                        | 1330                      |                    |
|                    | <b>WEBQ—Harrisburg, Ill.—Tate Radio Co., 700 West Robinson St.....</b>                             | 100            | 225.4                      | 1330                      | Central            |
|                    | <b>WEBR—Buffalo, N. Y.—Howell Broadcasting Co., Inc., 54 Niagara St.....</b>                       | 100            | 244                        | 1230                      | Eastern            |
|                    | <b>WEBW—Beloit, Wis.—Beloit College.....</b>   | 700            | 268                        | 1120                      | Central            |
|                    | <b>WEDC—Chicago, Ill.—Emil Denmark Broadcasting Station, 3860 Ogden Avenue.....</b>                | 1000           | 250                        | 1200                      | Central            |
|                    | <b>WEEI—Boston, Mass.—The Edison Electric Illuminating Co. of Boston.....</b>                      | 500            | 348.6                      | 860                       | Eastern            |
|                    | <b>WEHS—Evanston, Ill.—A. T. Becker, 1318 Elmwood Ave.....</b>                                     | 10             | 202.6                      | 1480                      | Central            |
|                    | <b>WEMC—Berrien Springs, Mich.—Emmanuel College..</b>  | 4000           | 315.6                      | 950                       | Central            |
|                    | <b>WENR—Chicago, Ill.—All-American Radio Corporation, 4201 Belmont Ave.....</b>                    | 1000           | 266                        | 1130                      | Central            |
|                    | <b>WEPS—Gloucester, Mass.—Matheson Radio Co., 209 Main St.....</b>                                 | 100            | 295                        | 1016                      | Eastern            |
|                    | <b>*WEW—St. Louis, Mo.—St. Louis University.....</b>   | 1000           | 360                        | 830                       | Central            |
| <b>WF</b>          | <b>*WFAA—Dallas, Tex.—Dallas News and Dallas Journal, Baker Hotel.....</b>                         | 500            | 475.9                      | 630                       | Central            |
|                    | <b>WFAM—St. Cloud, Minn.—Times Publishing Co., Inc..</b>   | 10             | 273                        | 1100                      | Central            |
|                    | <b>WFAV—Lincoln, Neb.—University of Nebraska, Dept. of Electrical Engineering.....</b>             | 500            | 275                        | 1090                      | Central            |
|                    | <b>WFBC—Knoxville, Tenn.—First Baptist Church.....</b>   | 50             | 250                        | 1200                      | Central            |
|                    | <b>WFBE—Cincinnati, Ohio—Garfield Place Hotel Co. (Robert A. Casey).....</b>                       | 10             | 226                        | 1330                      | Central            |
|                    | <b>WFBG—Altoona, Pa.—The William F. Gable Co.....</b>  | 100            | 277.8                      | 1080                      | Eastern            |
|                    | <b>WFBJ—Collegeville, Minn.—St. John's University....</b>  | 100            | 236                        | 1270                      | Central            |
|                    | <b>WFBL—Syracuse, N. Y.—The Onondaga Co.....</b>   | 500            | 252                        | 1190                      | Eastern            |
|                    | <b>WFBM—Indianapolis, Ind.—Merchants Heat and Light Co.....</b>                                    | 250            | 268                        | 1120                      | Central            |
|                    | <b>WFBR—Baltimore, Md.—Fifth Infantry Maryland National Guard, Fifth Regt. Armory.....</b>         | 100            | 254                        | 1180                      | Eastern            |
|                    | <b>WFBZ—Galesburg, Ill.—Knox College.....</b>  | 20             | 254                        | 1180                      | Central            |
|                    | <b>*WFCI—Pawtucket, R. I.—Frank Crook, Inc., 103 Exchange St.....</b>                              | 100            | 258.5                      | 1160                      | Eastern            |
|                    | <b>WFDF—Flint, Mich.—Frank D. Fallain, Police Building</b>   | 100            | 234                        | 1280                      | Eastern            |
|                    | <b>WFHH—Clearwater, Fla. (Transmitter is in Dunedin.) —Fort Harrison Hotel (Ed. A. Haley).....</b> | 500            | 355.4                      | 840                       | Eastern            |
|                    | <b>*WFI—Philadelphia, Pa.—Strawbridge &amp; Clothier.....</b>                                      | 500            | 394.5                      | 760                       | Eastern            |
|                    | <b>WFIW—Hopkinsville, Ky.—Acme Mills, Inc.....</b>   | 1000           | 356.9                      | 840                       | Central            |
|                    | <b>WFKB—Chicago, Ill.—Francis K. Bridgman, 4536 Woodlawn Ave.....</b>                              | 1000           | 217.3                      | 1380                      | Central            |

| Radio Call Letters | BROADCAST STATIONS<br>Location and Owner   | Power<br>Watts | Wave<br>Length<br>(Meters) | Frequency<br>(Kilocycles) | Time at<br>Station |
|--------------------|--|----------------|----------------------------|---------------------------|--------------------|
| <b>WF</b>          | <b>WFKD—Philadelphia, Pa.</b> —Foulkrod Radio Engineering Co.....  | 10             | 249.9                      | 1200                      | Eastern            |
|                    | <b>WFLA—Boca Raton, Fla.</b> —Boca Raton Radio Corp....  | 1000           | 440                        | 680                       | Eastern            |
|                    | <b>WFRL—Brooklyn, N. Y.</b> —Robt. M. Lacey and Jas. A. Bergner (Flatbush Radio Labs.), 1421 E. 10th St.....                                       | 100            | 205.4                      | 1460                      | Eastern            |
| <b>WG</b>          | <b>WGAL—Lancaster, Pa.</b> —Lancaster Elec. Supply & Construction Co., 23 East Orange St.....  | 10             | 248                        | 1210                      | Eastern            |
|                    | <b>WGBB—Freeport, N. Y.</b> —Harry H. Carman, 217 Bedell St.....   | 100            | 244                        | 1230                      | Eastern            |
|                    | <b>WGBC—Memphis, Tenn.</b> —Radio Bible Class, First Baptist Church.....   | 15             | 278                        | 1080                      | Central            |
|                    | <b>WGBF—Evansville, Ind.</b> —Finke Furniture Co., 307 South Seventh St.....   | 500            | 236.1                      | 1270                      | Central            |
|                    | <b>WGBI—Scranton, Pa.</b> —Scranton Broadcasters, Inc., 608 Linden St.....   | 100            | 240                        | 1250                      | Eastern            |
|                    | <b>WGBS—New York, N. Y.</b> (Transmitter is in Astoria, L. I.)—Gimbel Bros., 33d St. and Broadway..  | 500            | 315.6                      | 950                       | Eastern            |
|                    | <b>WGBU—Fulford, Fla.</b> —Florida Cities Finance Co.....  | 500            | 384.4                      | 780                       | Eastern            |
|                    | <b>WGBX—Orono, Me.</b> —University of Maine.....   | 500            | 234.2                      | 1280                      | Eastern            |
|                    | <b>WGCP—Newark, N. J.</b> —May Radio Broadcast Corp. 380 Central Ave.....  | 500            | 252                        | 1190                      | Eastern            |
|                    | <b>WGES—Chicago, Ill.</b> (Transmitter is in Oak Park, Ill.), Oakleaves Broadcasting Station, Coyne Electrical School, 128 North Crawford Ave..... | 500            | 250                        | 1200                      | Central            |
|                    | <b>WGHP—Mount Clemens, Mich.</b> —Geo. H. Phelps, 110 Rowena St.....   | 1500           | 270                        | 1110                      | Central            |
|                    | <b>WGL—New York, N. Y.</b> —International Broadcast Corp.  | 1000           | 442.4                      | 680                       | Eastern            |
|                    | <b>WGM—Jeanette, Pa.</b> —Verne & Elton Spencer, 501 Cowan Ave.....  | 50             | 372                        | 810                       | Eastern            |
|                    | <b>WGMU—Richmond Hill, N. Y.</b> (Portable)—A. H. Grebe & Co.....  | 100            | 236                        | 1270                      |                    |
|                    | <b>WGN—Chicago, Ill.</b> —The Chicago Tribune, Drake Hotel   | 1000           | 303                        | 990                       | Central            |
|                    | <b>WGR—Buffalo, N. Y.</b> —Federal Radio Corp., Hotel Statler.....   | 750            | 319                        | 940                       | Eastern            |
|                    | <b>WGST—Atlanta, Ga.</b> —Georgia School of Technology..   | 500            | 270                        | 1110                      | Central            |
|                    | <b>WGWB—Milwaukee, Wis.</b> —Geo. W. Browne, Inc., Radiocast Corporation of Wisconsin, 144 Broadway.....   | 1000           | 384.4                      | 780                       | Central            |
|                    | <b>WGY—Schenectady, N. Y.</b> —General Electric Co.....  | 50,000         | 379.5                      | 790                       | Eastern            |
| <b>WH</b>          | <b>WHHA—Madison, Wis.</b> —University of Wisconsin.....  | 1000           | 535.4                      | 560                       | Central            |
|                    | <b>WHAD—Milwaukee, Wis.</b> —Marquette University and Milwaukee Journal.....   | 500            | 275                        | 1090                      | Central            |
|                    | <b>WHAM—Rochester, N. Y.</b> —Stromberg-Carlson Telephone Mfg. Co.....   | 100            | 278                        | 1080                      | Eastern            |
|                    | <b>*WHAP—New York, N. Y.</b> —W. H. Taylor Finance Corp., 9 West 96th St.....  | 1000           | 431                        | 690                       | Eastern            |
|                    | <b>WHAR—Atlantic City, N. J.</b> —F. B. Cook's Sons, Owners, Seaside Hotel.....  | 500            | 275                        | 1090                      | Eastern            |
|                    | <b>WHAS—Louisville, Ky.</b> —Courier-Journal and Louisville Times.....   | 500            | 399.8                      | 750                       | Central            |
|                    | <b>*WHAZ—Troy, N. Y.</b> —Rensselaer Polytechnic Institute   | 1000           | 379.5                      | 790                       | Eastern            |
|                    | <b>*WHB—Kansas City, Mo.</b> —Sweeney Automotive and Elec. School, Sweeney Building.....   | 500            | 365.6                      | 820                       | Central            |
|                    | <b>WHBA—Oil City, Pa.</b> —Shaffer Music House.....  | 10             | 250                        | 1200                      | Eastern            |
|                    | <b>WHBC—Canton, Ohio</b> —Rev. E. P. Graham, 627 McKinley Ave., N. W.....  | 10             | 254                        | 1180                      | Eastern            |
|                    | <b>WHBD—Bellefontaine, Ohio</b> —Chamber of Commerce.  | 100            | 222                        | 1350                      | Central            |

| Radio Call Letters | BROADCAST STATIONS<br>Location and Owner   | Power<br>Watts | Wave<br>Length<br>(Meters) | Frequency<br>(Kilocycles) | Time at<br>Station |
|--------------------|--|----------------|----------------------------|---------------------------|--------------------|
| <b>WH</b>          | <b>WHBF—Rock Island, Ill.—Beardsley Specialty Co.,</b><br>217 Eighteenth St. ....  | 100            | 222                        | 1350                      | Central            |
|                    | <b>WHBL—Chicago, Ill. (Portable),—C. L. Carrell</b> .....  | 100            | 215.7                      | 1390                      |                    |
|                    | <b>WHBM—Chicago, Ill. (Portable),—C. L. Carrell, 1536</b><br>South State St. ....  | 100            | 215.7                      | 1390                      |                    |
|                    | <b>WHBN—St. Petersburg, Fla.—First Ave. Methodist</b><br>Church. ....  | 10             | 238                        | 1260                      | Eastern            |
|                    | <b>WHBP—Johnstown, Pa.—Johnstown Automobile Co.,</b><br>101 Main St. ....  | 100            | 256                        | 1170                      | Eastern            |
|                    | <b>WHBQ—Memphis, Tenn.—Men's Fellowship Class of</b><br>St. Johns Methodist Episcopal Church, South<br>805 Central Bank Bldg. .... | 50             | 233                        | 1290                      | Central            |
|                    | <b>WHBR—Cincinnati, Ohio—United Research Lab.,</b><br>2317 Gilbert Ave. ....   | 300            | 215.7                      | 1390                      | Central            |
|                    | <b>WHBU—Anderson, Ind.—Rivera Theatre and Bing's</b><br>Clothing Store, 1002 Meridian St. ....                                     | 10             | 218.8                      | 1370                      | Central            |
|                    | <b>*WHBW—Philadelphia, Pa.—D. R. Kienzle, 4916</b><br>Chestnut St. ....  | 100            | 216                        | 1390                      | Eastern            |
|                    | <b>WHBY—West De Pere, Wis.—St. Norbert's College</b> ...   | 50             | 250                        | 1200                      | Central            |
|                    | <b>WHDI—Minneapolis, Minn.—Wm. Hood Dunwoody</b><br>Industrial Institute, 818 Superior Blvd. ....                                  | 500            | 278                        | 1080                      | Central            |
|                    | <b>WHEC—Rochester, N. Y.—Hickson Electric Co., 36</b><br>South Ave. ....   | 500            | 258                        | 1160                      | Eastern            |
|                    | <b>WHFC—Chicago, Ill.—Triangle Broadcasters, Hotel</b><br>Flanders (Stanley Ehrmann), 4145 Broadway. ....                          | 150            | 258.5                      | 1160                      | Central            |
|                    | <b>WHK—Cleveland, Ohio—Radio Air Service Corp.,</b><br>1116 Carnegie Hall. ....  | 1000           | 272.6                      | 1100                      | Eastern            |
|                    | <b>*WHN—New York, N. Y.—George Schubel, 1540 B'way.</b>  | 1000           | 361.2                      | 830                       | Eastern            |
|                    | <b>*WHO—Des Moines, Ia.—Bankers Life Co., 1110</b><br>Liberty Building. ....   | 5000           | 526                        | 570                       | Central            |
|                    | <b>WHOG—Huntington, Ind.—Huntington Broadcasters'</b><br>Association, 409 N. Jefferson St. ....                                    | 15             | 241.8                      | 1240                      | Central            |
|                    | <b>WHT—Chicago, Ill.—(Transmitter is in Deerfield, Ill.)</b><br>Radiophone Broadcasting Corp., 410 North<br>Michigan Blvd. ....    | 3500           | 400                        | 750                       | Central            |
| <b>WI</b>          | <b>WIAD—Philadelphia, Pa.—Howard R. Miller, 6318</b><br>North Park Ave. ....   | 100            | 250                        | 1200                      | Eastern            |
|                    | <b>WIAS—Burlington, Iowa—Home Electric Co., 315</b><br>North 3rd St. ....  | 100            | 254                        | 1180                      | Central            |
|                    | <b>WIBA—Madison, Wis.—Capital Times Studio, and</b><br>Strand Theatre Corp., 14 E. Mifflin St. ....                                | 100            | 236.1                      | 1270                      | Central            |
|                    | <b>WIBG—Elkins Park, Pa.—St. Paul's Protestant Epis-</b><br>copal Church. ....   | 50             | 222                        | 1350                      | Eastern            |
|                    | <b>WIBI—Flushing, N. Y.—Frederick B. Zittel, Jr., 369</b><br>Amity St. ....  | 50             | 218.8                      | 1370                      | Eastern            |
|                    | <b>WIBJ—Chicago, Ill.—(Portable), C. L. Carrell, 1506</b><br>N. American Bldg. ....  | 100            | 215.7                      | 1390                      |                    |
|                    | <b>WIBM—Chicago, Ill.—(Portable), C. L. Carrell, 1506</b><br>N. American Bldg. ....  | 10             | 215.7                      | 1390                      |                    |
|                    | <b>WIBO—Chicago, Ill.—Nelson Bros. Russo &amp; Fiorito</b> ...   | 5000           | 226                        | 1330                      | Central            |
|                    | <b>WIBR—Steubenville, Ohio—Thurman A. Owings</b> .....   | 50             | 246                        | 1220                      | Eastern            |
|                    | <b>WIBS—Elizabeth, N. J.—(Portable), Lieut. Thos. F.</b><br>Hunter. ....   | 10             | 202.6                      | 1480                      |                    |
|                    | <b>WIBU—Poynette, Wis.—The Electric Farm</b> .....   | 20             | 222                        | 1350                      | Central            |
|                    | <b>WIBW—Chicago, Ill. (Portable) C. L. Carrel, 1506 N.</b><br>American Bldg. ....  | 100            | 220                        | 1360                      |                    |
|                    | <b>WIBX—Utica, N. Y.—WIBX (Inc.), Hotel Utica</b> .....  | 150            | 234.2                      | 1280                      | Eastern            |
|                    | <b>WIBZ—Montgomery, Ala.—A. D. Trum, 217 Catoma</b><br>St. ....  | 10             | 230.6                      | 1300                      | Central            |
|                    | <b>WICC—Bridgeport, Conn.—Chas. W. Selen and Harold</b><br>D. Feuer, 1188 Main St. ....  | 500            | 285                        | 1050                      | Eastern            |



| Radio Call Letters | BROADCAST STATIONS<br>Location and Owner  | Power<br>Watts | Wave<br>Length<br>(Meters) | Frequency<br>(Kilocycles) | Time at<br>Station |
|--------------------|---|----------------|----------------------------|---------------------------|--------------------|
| <b>WI</b>          | WIL—St. Louis, Mo.—St. Louis Star & Benson Radio Co.....  | 250            | 273                        | 1100                      | Central            |
|                    | WILL—Urbana, Ill.—University of Illinois.....   | 1000           | 272.6                      | 1100                      | Central            |
|                    | WIOD—Miami Beach, Fla.—Carl G. Fisher Co.....   | 1000           | 247.8                      | 1210                      | Eastern            |
|                    | *WIP—Philadelphia, Pa.—Gimbel Bros., Market St. Bldg.....   | 500            | 508.2                      | 590                       | Eastern            |
| <b>WJ</b>          | WJAD—Waco, Tex.—Frank P. Jackson.....   | 500            | 352.7                      | 850                       | Central            |
|                    | WJAG—Norfolk, Neb.—Norfolk Daily News.....  | 200            | 270                        | 1110                      | Central            |
|                    | WJAK—Kokomo, Ind.—J. A. Kautz, Kokomo Tribune, 1531 Washington St.....                            | 50             | 254                        | 1180                      | Central            |
|                    | WJAM—Cedar Rapids, Ia.—D. M. Perham, 322 Third Ave. W.....  | 500            | 268                        | 1120                      | Central            |
|                    | WJAR—Providence, R. I.—The Outlet Co.....   | 500            | 483.6                      | 620                       | Eastern            |
|                    | WJAS—Pittsburgh, Pa.—Pittsburgh Radio Supply House, 10th & Pennsylvania Ave.....                  | 500            | 275                        | 1090                      | Eastern            |
|                    | WJAX—Jacksonville, Fla.—City of Jacksonville.....   | 1000           | 336.9                      | 890                       | Eastern            |
|                    | WJAY—Cleveland, Ohio—Cleveland Radio Broadcasting Corp., Hotel Hollenden.....                     | 1000           | 435.7                      | 690                       | Eastern            |
|                    | WJAZ—Chicago, Ill.—(Transmitter is in Mount Prospect, Ill.), Zenith Radio Corp., 3620 Iron St..   | 10,000         | 329.8                      | 910                       | Central            |
|                    | WJBA—Joliet, Ill.—D. H. Lentz, Jr., 301 Whitley Ave.  | 50             | 206.8                      | 1450                      | Central            |
|                    | WJBB—St. Petersburg, Fla.—Financial Journal, J. E. Dadsure, Publisher, 126 13th St. N.....        | 250            | 254                        | 1180                      | Eastern            |
|                    | WJBC—LaSalle, Ill.—Hummer Furniture Co., 2nd & Joliet Sts.....                                    | 100            | 234.2                      | 1280                      | Central            |
|                    | WJBI—Red Bank, N. J.—Robt. S. Johnson, 63 Broad St.   | 250            | 218.8                      | 1370                      | Eastern            |
|                    | WJBK—Ypsilanti, Mich.—Ernest F. Goodwin, 803 Congress St.....                                     | 10             | 233                        | 1290                      | Central            |
|                    | WJBL—Decatur, Ill.—Wm. Gushard Dry Goods Co., 301 N. Water St.....                                | 500            | 270                        | 1110                      | Central            |
|                    | WJBO—New Orleans, La.—Valdemar Jensen, 119 S. St. Patrick St.....                                 | 100            | 267.7                      | 1120                      | Central            |
|                    | WJBR—Omro, Wis.—Gensch & Stearns.....   | 100            | 227.1                      | 1320                      | Central            |
|                    | WJBT—Chicago, Ill.—John S. Boyd, 1554 Howard St..   | 10             | 238                        | 1260                      | Central            |
|                    | WJBU—Lewisburg, Pa.—Bucknell University, Engineering Bldg.....                                    | 100            | 211.1                      | 1420                      | Eastern            |
|                    | WJBW—New Orleans, La.—C. Carlson, Jr., 2743 Dumaine St.....                                       | 20             | 270                        | 1110                      | Central            |
|                    | WJBY—Gadsden, Ala.—Electric Const. Co. (T. G. Erwin), 517 Broad St.....                           | 100            |                            | 1110                      | Central            |
|                    | WJBZ—Chicago Heights, Ill.—Roland G. Pamler and A. Coppotelli, 144 East Sixteenth St.....         | 100            | 419.3                      | 710                       | Central            |
|                    | WJJD—Mooseheart, Ill.—Supreme Lodge, Loyal Order of Moose.....                                    | 1000           | 370.2                      | 810                       | Central            |
|                    | WJPW—Ashtabula, Ohio—J. P. Wilson, 192 Prospect St.....   | 15             | 239.9                      | 1250                      | Eastern            |
|                    | WJR—Detroit, Mich. (Transmitter is in Pontiac, Mich.) —Station WJR, Inc., Book-Cadillac Hotel.... | 5000           | 516.9                      | 580                       | Central            |
|                    | WJUG—New York, N. Y.—Uda Benjamin Ross, 30 Park Place.....  | 250            | 516.9                      | 580                       | Eastern            |
|                    | WJZ—New York, N. Y.—(Transmitter is in Bound Brook, N. J.), Radio Corp. of America.....           | 50,000         | 455                        | 660                       | Eastern            |
| <b>WK</b>          | WKAF—Milwaukee, Wis.—Radio Service Corporation, 4 Plankinton Arcade Bldg.....                     | 750            | 261                        | 1150                      | Central            |
|                    | WKAR—East Lansing, Mich.—Michigan State College   | 1000           | 285.5                      | 1050                      | Central            |
|                    | WKAV—Laconia, N. H.—Laconia Radio Club, 533 Main St.....  | 100            | 223.8                      | 1340                      | Eastern            |
|                    | WKBA—Chicago, Ill.—Arrow Battery Co. (Jos. Silverstein), 1217 Wabash Ave.....                     | 200            | 209.7                      | 1430                      | Central            |

| Radio Call Letters | BROADCAST STATIONS<br>Location and Owner  | Power<br>Watts | Wave<br>Length<br>(Meters) | Frequency<br>(Kilocycles) | Time at<br>Station |
|--------------------|---|----------------|----------------------------|---------------------------|--------------------|
| <b>WK</b> WKBB     | Joliet, Ill.—Sanders Bros., 607 Jefferson St. . . . .                                   | 100            | 282.8                      | 1060                      | Central            |
| WKBC               | Birmingham, Ala.—H. L. Ansley, 1428 North Twelfth Ave. . . . .                          | 10             | 225                        | 1330                      | Central            |
| WKBE               | Webster, Mass.—K. & B. Electric Co., 59 Emerald Ave. . . . .                            | 100            | 270.1                      | 1110                      | Eastern            |
| WKBF               | Indianapolis, Ind.—Noble B. Watson, 233 Iowa St. . . . .                                | 500            | 244                        | 1230                      | Central            |
| WKBG               | Chicago, Ill.—(Portable), C. L. Carrell, 36 So. State St. . . . .                       | 100            | 215.7                      | 1390                      |                    |
| WKBH               | La Crosse, Wis.—Callaway Music Co., 221 Main St. . . . .                                | 500            | 250                        | 1200                      | Central            |
| WKBI               | Chicago, Ill.—Fred L. Schoenwolf, 1917 Warner Ave. . . . .                              | 50             | 220.6                      | 1360                      | Central            |
| WKBJ               | St. Petersburg, Fla.—Gospel Tabernacle, Inc., 5th Ave. and 10th St. South. . . . .      | 250            | 280                        | 1070                      | Eastern            |
| WKBL               | Monroe, Mich.—Monrona Radio Mfg. Co., 16 S. Monroe St. . . . .                          | 15             | 252                        | 1190                      | Eastern            |
| WKBM               | Newburgh, N. Y.—WKBM Radio Broadcasting Co., John W. Jones, Mgr., 130 Broadway. . . . . | 100            | 285.5                      | 1050                      | Eastern            |
| WKBN               | Youngstown, Ohio—Y. M. C. A. . . . .  | 100            | 360                        | 870                       | Eastern            |
| WKBO               | Jersey City, N. J.—Camith Corporation, 2866 Boulevard. . . . .                          | 1000           | 472.7                      | 630                       | Eastern            |
| WKBP               | Battle Creek, Mich.—Battle Creek Enquirer & News. . . . .                               | 50             | 265                        | 1130                      | Eastern            |
| *WKBQ              | New York, N. Y.—Starlight Amusement Park, Inc., 1100 E. 177 St. . . . .                 | 8              | 285                        | 1050                      | Eastern            |
| *WKBS              | Galesburg, Ill.—Pernil N. Nelson, 227 Duffield Ave. . . . .                             | 200            | 361.2                      | 830                       | Central            |
| WKBT               | New Orleans, La.—First Baptist Church. . . . .  | 50             | 252                        | 1190                      | Central            |
| WKBU               | New Castle, Pa.—(Portable.) Harry K. Armstrong. . . . .                                 | 50             | 238                        | 1260                      |                    |
| WKBV               | Brookville, Ind.—Knox Battery & Electric Co., 1058 Main St. . . . .                     | 250            | 236.1                      | 1270                      | Central            |
| WKBW               | Buffalo, N. Y.—Churchill Evangelistic Assn. . . . .                                     | 5000           | 352.5                      | 850                       | Eastern            |
| WKBY               | Danville, Pa. (Portable.)—Fernwood Quick. . . . .                                       | 100            | 220                        | 1360                      |                    |
| WKBZ               | Ludington, Mich.—Karl L. Ashbacker, First National Bank Bldg. . . . .                   | 15             | 256                        | 1170                      | Eastern            |
| WKDR               | Kenosha, Wis.—Edward A. Dato, 936 N. Michigan Ave., Chicago, Ill. . . . .               | 10             | 428.3                      | 700                       | Central            |
| WKJC               | Lancaster, Pa.—Kirk Johnson Co., 16 King St. . . . .                                    | 50             | 258                        | 1160                      | Eastern            |
| WKRC               | Cincinnati, Ohio—Kodel Radio Corp., 507 E. Pearl St. . . . .                            | 2000           | { 325.9<br>422.3           | { 920<br>710              | Central            |
| WKY                | Oklahoma City, Okla.—WKY Radiophone Co. (Huckins Hotel). . . . .                        | 100            | 352.7                      | 850                       | Central            |
| <b>WL</b> WLAC     | Nashville, Tenn.—Life & Casualty Ins. Co. . . . .                                       | 5000           | 225.4                      | 1330                      | Central            |
| WLAL               | Tulsa, Okla.—W. & E. Radio Service Co. . . . .  | 100            | 250                        | 1200                      | Central            |
| *WLAP              | Louisville, Ky.—Virginia Avenue Baptist Church, 2600 Virginia Ave. . . . .              | 30             | 275                        | 1090                      | Central            |
| WLB                | Minneapolis, Minn.—University of Minnesota . . . . .                                    | 500            | 278                        | 1080                      | Central            |
| WLBA               | Philadelphia, Pa.—J. C. Van Horn. . . . .   | 50             | 236.1                      | 1270                      | Eastern            |
| WLBC               | Muncie, Ind.—D. A. Burton, 2224 S. Jefferson St. . . . .                                | 5              | 223.7                      | 1340                      | Central            |
| WLBE               | Brooklyn, N. Y.—J. Henri Fruitman, 2029 Sixty-fifth St. . . . .                         | 100            | 230.6                      | 1300                      | Eastern            |
| WLBF               | Kansas City, Mo.—Everett L. Dillard, 300a E. 33rd St. . . . .                           | 25             | 211.1                      | 1420                      | Central            |

| Radio Call Letters | BROADCAST STATIONS<br>Location and Owner  | Power<br>Watts | Wave<br>Length<br>(Meters) | Frequency<br>(kilocycles) | Time at<br>Station |
|--------------------|---|----------------|----------------------------|---------------------------|--------------------|
| <b>WL</b>          | *WLBG—Petersburg, Va.—R. A. Gamble.....   | 100            | 332.3                      | 900                       | Eastern            |
|                    | WLBH—Farmingdale, N. Y.—Joseph J. Lombardi.....   | 30             | 230                        | 1300                      | Eastern            |
|                    | *WLBI—East Wenona, Ill.—Aloysius Yarc.....  | 250            | 296.9                      | 1010                      | Central            |
|                    | WLBJ—Cleveland, Ohio—Henry Grossman.....  | 100            | 300                        | 1000                      | Eastern            |
|                    | WLBL—Madison, Wis.—(Transmitter is in Stevens Point, Wis.), Wisconsin Department of Markets | 750            | 278                        | 1080                      | Central            |
|                    | WIBM—Boston, Mass.—Browning-Drake Corp., 353 Washington St.....                             | 50             | 480                        | 620                       | Eastern            |
|                    | WLBN—Chicago, Ill. (Portable)—Wm. E. Hiler 339 S. Homan Ave.....                            | 100            | 225                        | 1330                      |                    |
|                    | WLBO—Galesburg, Ill.—Frederick Trebbe, Jr.....  | 100            | 243                        | 1230                      | Central            |
|                    | WLBP—Ashland, Ohio—Robert A. Fox.....   | 15             | 220.4                      | 1360                      | Eastern            |
|                    | WLBQ—Atwood, Ill.—E. Dale Trout.....  | 25             | 230.6                      | 1300                      | Central            |
|                    | WLBK—Belvedere, Ill.—Alford Radio Co.....   | 15             | 335                        | 890                       | Central            |
|                    | WLBK—Crown Point, Ind.—Harold Wendell.....  | 100            | 230                        | 1300                      | Central            |
|                    | WLBV—Mansfield, Ohio—J. F. Weimer and D. A. Snick   | 50             | 230.6                      | 1300                      | Central            |
|                    | WLBW—Oil City, Pa.—Petroleum Telephone Co.....  | 250            | 321                        | 930                       | Eastern            |
|                    | WLBX—Long Island City, N. Y.—John N. Brahy, 283 Crescent St.....                            | 250            | 230.6                      | 1300                      | Eastern            |
|                    | WLBZ—Iron Mountain, Mich.—Aimone Electric.....  | 50             | 249.9                      | 1200                      | Central            |
|                    | WLBZ—Dover-Foxcroft, Me.—Thompson L. Guernsey.  | 250            | 299                        | 1000                      | Eastern            |
|                    | WLCT—Ithaca, N. Y.—Lutheran Assoc. of Ithaca, N. Y..  | 50             | 266                        | 1130                      | Eastern            |
|                    | WLIB—Chicago, Ill.—Liberty Weekly.....  | 4000           | 303                        | 990                       | Central            |
|                    | WLIT—Philadelphia, Pa.—Lit Bros.....  | 500            | 394.5                      | 760                       | Eastern            |
|                    | WLS—Chicago, Ill.—(Transmitter is in Crete, Ill.), Sears Roebuck & Co.....                  | 5000           | 345                        | 870                       | Central            |
|                    | WLSI—Cranston, R. I.—Dutee W. Flint & Lincoln Studios, Inc., 335 Westminster St.....        | 500            | 440.9                      | 680                       | Eastern            |
|                    | WLTS—Chicago, Ill.—Lane Technical High School, Hotel Flanders.....                          | 100            | 258.5                      | 1160                      | Central            |
|                    | WLW—Cincinnati, Ohio.—(Transmitter is in Harrison, Ohio), Crosley Radio Corp.....           | 5000           | 422.3                      | 710                       | Central            |
|                    | *WLWL—New York, N. Y.—Paulist Fathers, 415 W. 59th St.....                                  | 5000           | 384.4                      | 780                       | Eastern            |
| <b>WM</b>          | WMAC—Cazenovia, N. Y.—Clive B. Meredith.....  | 100            | 275                        | 1090                      | Eastern            |
|                    | WMAF—Dartmouth, Mass.—Round Hills Radio Corp.   | 1000           | 440.9                      | 680                       | Eastern            |
|                    | WMAK—Lockport, N. Y.—Norton Laboratories.....   | 1000           | 266                        | 1130                      | Eastern            |
|                    | *WMAL—Washington, D. C.—M. A. Leese Radio Co., 720 Eleventh St., N. W.....                  | 100            | 90                         | 1030                      | Eastern            |
|                    | WMAN—Columbus, Ohio—W. E. Heskett, 507 North High St.....                                   | 50             | 286                        | 1050                      | Eastern            |
|                    | WMAQ—Chicago, Ill.—Chicago Daily News, 15 N. Wells St.....                                  | 1000           | 447.5                      | 670                       | Central            |
|                    | WMAY—St. Louis, Mo.—Kings Highway Presbyterian Church.....                                  | 100            | 248                        | 1210                      | Central            |
|                    | *WMAZ—Macon, Ga.—Mercer University.....   | 500            | 261                        | 1150                      | Eastern            |
|                    | WMBA—Newport, R. I. (Portable.)—LeRoy Joseph Beebe.....                                     | 100            | 249.9                      | 1200                      |                    |
|                    | WMBB—Chicago, Ill.—American Bond & Mortgage Co., 6201 Cottage Grove Ave.....                | 500            | 250                        | 1200                      | Central            |
|                    | WMBC—Detroit, Mich.—Mich. Broadcasting Co.....  | 100            | 256.4                      | 1170                      | Eastern            |
|                    | WMBD—Peoria Heights, Ill.—Peoria Heights Radio Laboratory, 107 E. Glen Ave.....             | 250            | 279                        | 1070                      | Central            |
|                    | WMBE—St. Paul, Minn.—Dr. C. S. Stevens, 2018 Grand Ave.....                                 | 5              | 220                        | 1360                      | Central            |
|                    | *WMBF—Miami Beach, Fla.—Fleetwood Hotel Corp..  | 500            | 384.4                      | 780                       | Eastern            |
|                    | WMBG—Richmond, Va.—Havens & Martin, 914 W. Broad St.....                                    | 10             | 220                        | 1360                      | Eastern            |

| Radio Call Letters | BROADCAST STATIONS<br>Location and Owner  | Power<br>Watts | Wave<br>Length<br>(Meters) | Frequency<br>(Kilocycles) | Time at<br>Station |
|--------------------|---|----------------|----------------------------|---------------------------|--------------------|
| <b>WM</b>          | <b>WMBH—Chicago, Ill.</b> —(Portable) Edwin Dudley Aber   | 100            | 280                        | 1070                      |                    |
|                    | <b>WMBI—Chicago, Ill.</b> —Moody Bible Institute of Chicago<br>153 Institute Place.....                               | 500            | 288.3                      | 1040                      | Central            |
|                    | <b>WMBJ—Monessen, Pa.</b> —Wm. Roy McShaffrey.....  | 50             | 277.6                      | 1080                      | Eastern            |
|                    | <b>WMBK—Hamilton, Ohio</b> —John C. Slade, The Green<br>Lantern.....  | 10             | 360                        | 830                       | Central            |
|                    | <b>WMBL—Lakeland, Fla.</b> —Benford Radio Studios, 14<br>Marble Arcade Bldg.....                                      | 10             | 410                        | 730                       | Eastern            |
|                    | <b>WMBM—Memphis, Tenn.</b> —Seventh Day Adventist<br>Church.....  | 10             | 245                        | 1220                      | Central            |
|                    | <b>WMBO—Auburn, N. Y.</b> —Radio Service Laboratories,<br>17 South St.....  | 200            | 238                        | 1260                      | Eastern            |
|                    | <b>WMBQ—Brooklyn, N. Y.</b> —Paul J. Gollhofer, 95<br>Leonard St.....   | 100            | 210                        | 1430                      | Eastern            |
|                    | <b>WMBR—Tampa, Fla</b> —Premier Elec. Co., 109 Franklin<br>St.....  | 100            | 250                        | 1200                      | Eastern            |
|                    | <b>WMBS—Harrisburg, Pa.</b> —Mack's Battery Co.....   | 500            | 360                        | 830                       | Eastern            |
|                    | <b>WMBU—Pittsburgh, Pa.</b> —Paul J. Miller, 1133 Greed-<br>moor Ave.....   | 50             | 236.1                      | 1270                      | Eastern            |
|                    | <b>WMBW—Youngstown, Ohio</b> —Youngstown Broadcast-<br>ing Co., 647 Market St.....                                    | 50             | 279                        | 1070                      | Eastern            |
|                    | <b>WMBY—Bloomington, Ill.</b> —R. A. Isaacs, 108 E. Front<br>St.....  | 15             | 290                        | 1030                      | Central            |
|                    | * <b>WMC—Memphis, Tenn.</b> —The Commercial Publishing<br>Co., Commercial Appeal Bldg.....                            | 500            | 499.7                      | 600                       | Central            |
|                    | <b>WMCA—New York, N. Y.</b> (Transmitter is in Hoboken,<br>N. J.)—Associated Broadcasters, Inc. Hotel<br>McAlpin..... | 500            | 340.7                      | 880                       | Eastern            |
|                    | <b>WMHA—New York, N. Y.</b> —YMHA, 975 St. Nicholas<br>Ave.....   | 30             | 230                        | 1300                      | Eastern            |
|                    | <b>WMPC—Lapeer, Mich.</b> —First Methodist Protestant<br>Church.....  | 15             | 202                        | 1480                      | Eastern            |
|                    | <b>WMRJ—Jamaica, L. I., N. Y.</b> —Peter J. Prinz, 10 New<br>York Blvd.....   | 10             | 227.1                      | 1320                      | Eastern            |
|                    | <b>WMSG—New York, N. Y.</b> —Madison Square Garden<br>Broadcasting Corp., 319 W. 49th St.....                         | 500            | 302.8                      | 990                       | Eastern            |
|                    | <b>WMVM—Newark, N. J.</b> —Edward J. Malone, Jr.....  | 500            | 475.9                      | 630                       | Eastern            |
| <b>WN</b>          | * <b>WNAB—Boston, Mass.</b> —The Shepard Stores.....  | 100            | 280.2                      | 1070                      | Eastern            |
|                    | <b>WNAC—Boston, Mass.</b> —The Shepard Stores.....  | 500            | 447.5                      | 670                       | Eastern            |
|                    | <b>WNAD—Norman, Okla.</b> —University of Oklahoma.....  | 500            | 254                        | 1180                      | Central            |
|                    | <b>WNAL—Omaha, Neb.</b> —R. J. Rockwell, 5019 Capital Ave.  | 50             | 258                        | 1160                      | Central            |
|                    | * <b>WNAT—Philadelphia, Pa.</b> —Lennig Bros. Co., Spring<br>Garden and 9th Sts.....                                  | 100            | 250                        | 1200                      | Eastern            |
|                    | <b>WNAX—Yankton, S. D.</b> —Dakota Radio Apparatus Co<br>and Gurney Seed & Nursery Co.....                            | 100            | 244                        | 1230                      | Central            |
|                    | <b>WNBA—Forest Park, Ill.</b> —M. T. Rafferty, 810 Des-<br>plaines Ave.....   | 500            | 238                        | 1260                      | Central            |
|                    | <b>WBNF—Endicott, N. Y.</b> —Howitt-Wood Radio Co.,<br>117 W. Main St.....  | 50             | 205.4                      | 1460                      | Eastern            |
|                    | <b>WNBH—New Bedford, Mass.</b> —New Bedford Hotel,<br>(Irving J. Vermilya and A. J. Lopez).....                       | 250            | 248                        | 1210                      | Eastern            |
|                    | <b>WNBI—Peru, Ill.</b> —Wm. J. Romanouski, 621 E. Seventh<br>St.....  | 10             | 357                        | 840                       | Central            |
|                    | <b>WNBK—Knoxville, Tenn.</b> —Lonsdale Baptist Church...  | 15             | 335                        | 890                       | Central            |
|                    | <b>WNBK—Le Roy, N. Y.</b> —H. C. Barton Electrical Co.,<br>18 Myrtle St.....  | 250            | 354                        | 850                       | Eastern            |
|                    | <b>WNBL—Bloomington, Ill.</b> —Harvey R. Storm, 107 E.<br>Front St.....   | 15             | 495                        | 610                       | Central            |
|                    | <b>WNBO—Washington, Pa.</b> —John B. Spriggs, 319 East<br>Beau St.....  | 15             | 215                        | 1390                      | Eastern            |

| Radio Call Letters | BROADCAST STATIONS<br>Location and Owner  | Power<br>Watts | Wave<br>Length<br>(Meters) | Frequency<br>(Kilocycles) | Time at<br>Station |
|--------------------|---|----------------|----------------------------|---------------------------|--------------------|
| <b>WN</b>          | <b>WNBQ—Rochester, N. Y.</b> —Gordon P. Brown, 192 S. Goodman St. ....  | 15             | 410                        | 730                       | Eastern            |
|                    | <b>WNBR—Memphis, Tenn.</b> —Popular Radio Shop, 883 Poplar Ave. ....  | 25             | 316                        | 950                       | Central            |
|                    | <b>*WNJ—Newark, N. J.</b> —Radio Shop of Newark (Herman Lubinsky), 89 Lehigh Ave. ....  | 500            | 352.7                      | 850                       | Eastern            |
|                    | <b>WNOX—Knoxville, Tenn.</b> —People's Telephone & Telegraph Co., 313 Commerce Ave. ....  | 500            | 267.7                      | 1120                      | Central            |
|                    | <b>WNRC—Greensboro, N. C.</b> —Wayne M. Nelson. ....  | 500            | 224                        | 1340                      | Eastern            |
|                    | <b>WNYC—New York, N. Y.</b> —Dept. of Plants and Structures, Municipal Bldg. ....   | 1000           | 526                        | 570                       | Eastern            |
| <b>WO</b>          | <b>WOAI—San Antonio, Texas</b> —Southern Equipment Co. ....   | 5000           | 394.5                      | 760                       | Central            |
|                    | <b>WOAN—Lawrenceburg, Tenn.</b> —Jas. D. Vaughn. ....   | 500            | 356.4                      | 840                       | Central            |
|                    | <b>WOAX—Trenton, N. J.</b> —Franklyn J. Wolff, The Monument Pottery Co. ....  | 500            | 240                        | 1250                      | Eastern            |
|                    | <b>WOBB—Chicago, Ill.</b> —Longacre Engineering & Construction Co., 127 North Dearborn St. ....   | 5              | 555.2                      | 540                       | Central            |
|                    | <b>WOC—Davenport, Iowa</b> —The Palmer School of Chiropractic, 1002 Brady St. ....  | 5000           | 483.6                      | 620                       | Central            |
|                    | <b>WOCB—Orlando, Fla.</b> —Orlando Broadcasting Co., 19 South Main Street. ....   | 250            | 213                        | 1400                      | Eastern            |
|                    | <b>WOCL—Jamestown, N. Y.</b> —A. E. Newton, Jamestown Furniture Market Assn. ....   | 15             | 275.2                      | 1090                      | Eastern            |
|                    | <b>WODA—Paterson, N. J.</b> —James K. O'Dea, Inc., 115 Ellison St. ....   | 500            | 391.5                      | 760                       | Eastern            |
|                    | <b>WOI—Ames, Iowa</b> —Iowa State College. ....   | 5000           | 270                        | 1110                      | Central            |
|                    | <b>WOK—Chicago, Ill.</b> (Transmitter is in Homewood, Ill.) Neutrowound Radio Mfg. Co., 1721 Prairie Ave. ....                          | 5000           | 410                        | 730                       | Central            |
|                    | <b>WOKO—Peekskill, N. Y.</b> —Harold E. Smith. ....   | 500            | 233                        | 1290                      | Eastern            |
|                    | <b>WOKT—Rochester, N. Y.</b> —Titus-Ets. Corp. ....   | 1000           | 340                        | 880                       | Eastern            |
|                    | <b>WOMT—Manitowoc, Wis.</b> —Mikadow Theatre (Francis M. Kadow). ....   | 50             | 254.1                      | 1180                      | Central            |
|                    | <b>*WOO—Philadelphia, Pa.</b> —John Wanamaker. ....   | 500            | 508.2                      | 590                       | Eastern            |
|                    | <b>WOOD—Grand Rapids, Mich.</b> (Transmitter is in Farmwood, Mich.)—Don Gildersleeve, Leo Robinson and Maurice Wetzel, Hotel Rowe. .... | 1000           | 241.8                      | 1240                      | Central            |
|                    | <b>WOQ—Kansas City, Mo.</b> —Unity School of Christianity. ....   | 1000           | 278                        | 1080                      | Central            |
|                    | <b>*WOR—Newark, N. J.</b> —L. Bamberger and Co. ....  | 500            | 405                        | 740                       | Eastern            |
|                    | <b>*WORD—Batavia, Ill.</b> —People's Pulpit Assn., 124 Columbia Heights, Brooklyn, N. Y. ....   | 5000           | 275                        | 1090                      | Central            |
|                    | <b>*WOS—Jefferson City, Mo.</b> —Missouri State Marketing Bureau. ....  | 500            | 440.9                      | 680                       | Central            |
|                    | <b>*WOW—Omaha, Neb.</b> —Woodmen of the World Life Insurance Assn. ....   | 1000           | 526                        | 570                       | Central            |
|                    | <b>WOWO—Fort Wayne, Ind.</b> —The Main Auto Supply Co., 213 West Main St. ....  | 10,000         | 227                        | 1320                      | Central            |
| <b>WP</b>          | <b>WPAB—Norfolk, Va.</b> —Radio Corp. of Virginia. ....   | 100            | 319                        | 940                       | Eastern            |
|                    | <b>WPAK—Fargo, N. D.</b> —North Dakota Agricultural College. ....   | 50             | 275                        | 1090                      | Central            |
|                    | <b>WPAP—Cliffside, N. J.</b> —Palisades Amusement Park. ....  | 100            | 361.2                      | 830                       | Eastern            |
|                    | <b>WPCC—Chicago, Ill.</b> —North Shore Congregational Church. ....  | 750            | 258                        | 1160                      | Central            |
|                    | <b>WPCH—New York, N. Y.</b> —Concourse Radio Corporation, Park Central Hotel. ....  | 500            | 272.6                      | 1100                      | Eastern            |
|                    | <b>WPDQ—Buffalo, N. Y.</b> —WPDQ, Inc., 121 Norwood Ave. ....   | 100            | 205.4                      | 1460                      | Eastern            |

| Radio Call Letters | BROADCAST STATIONS<br>Location and Owner  | Power<br>Watts | Wave<br>Length<br>(Meters) | Frequency<br>(Kilocycles) | Time at<br>Station |
|--------------------|---|----------------|----------------------------|---------------------------|--------------------|
| <b>WP</b>          | <b>WPEP—Waukegan, Ill.—Maurice Mayer.</b> .....   | 500            | 212.6                      | 1410                      | Central            |
|                    | <b>WPG—Atlantic City, N. J.—Municipality of Atlantic City.</b> .....  | 5000           | 299.8                      | 1000                      | Eastern            |
|                    | <b>WPRC—Harrisburg, Pa.—Wilson Printing and Radio Co., Fifth and Kelker Streets.</b> .....                              | 100            | 215.6                      | 1390                      | Eastern            |
|                    | <b>WPSC—State College, Pa.—Pennsylvania State College, Dept. of Elec. Engineering.</b> .....                            | 500            | 282.8                      | 1060                      | Eastern            |
| <b>WQ</b>          | <b>WQAA—Parkersburg, Pa.—Horace A. Beale, Jr.</b> .....   | 500            | 220                        | 1360                      | Eastern            |
|                    | <b>WQAE—Springfield, Vt.—Moore Radio News Station.</b> ..   | 50             | 246                        | 1220                      | Eastern            |
|                    | <b>WQAM—Miami, Fla.—Electrical Equipment Co., 42 Northwest Fourth St.</b> .....   | 1000           | 285.5                      | 1050                      | Eastern            |
|                    | <b>WQAN—Scranton, Pa.—Scranton Times.</b> .....   | 100            | 250                        | 1200                      | Eastern            |
|                    | <b>WQAO—Cliffside, N. J.—Calvary Baptist Church.</b> .....  | 100            | 361.2                      | 830                       | Eastern            |
|                    | <b>WQJ—Chicago, Ill.—Calumet Baking Powder Co. and Rainbo Gardens.</b> .....  | 1000           | 447.5                      | 670                       | Central            |
| <b>WR</b>          | <b>WRAF—Laport, Ind.—The Radio Club, Inc., 719 Michigan Ave.</b> .....  | 100            | 223.8                      | 1340                      | Central            |
|                    | <b>WRAH—Providence, R. I.—Stanley N. Read, 191 Alabama Ave.</b> .....   | 450            | 235                        | 1280                      | Eastern            |
|                    | <b>WRAK—Escanaba, Mich.—Economy Light Co., 1105 Ludington St.</b> .....   | 100            | 256.3                      | 1170                      | Central            |
|                    | <b>WRAL—Ithaca, N. Y.—Ralph Edwin Parry, Eclipse Studio, 317 Elm St.</b> .....  | 25             | 365                        | 820                       | Eastern            |
|                    | <b>WRAM—Galesburg, Ill.—Lombard College.</b> .....  | 100            | 243.8                      | 1230                      | Central            |
|                    | <b>WRAV—Yellow Springs, Ohio—Antioch College.</b> .....   | 100            | 263                        | 1140                      | Central            |
|                    | <b>WRAW—Reading, Pa.—Avenue Radio and Electric Shop, 460 Schuylkill Ave.</b> .....                                      | 100            | 238                        | 1260                      | Eastern            |
|                    | <b>WRAX—Philadelphia, Pa.—Berachach Church, Inc., 1608 Alleghany Ave.</b> .....   | 500            | 268                        | 1120                      | Eastern            |
|                    | <b>WRBC—Valparaiso, Ind.—Immanuel Lutheran Church</b>   | 500            | 278                        | 1080                      | Central            |
|                    | <b>WRC—Washington, D. C.—Radio Corporation of America.</b> .....  | 1000           | 468.5                      | 640                       | Eastern            |
|                    | <b>WRCO—Raleigh, N. C.—Wynne Radio Co., 226½ Fayetteville St.</b> .....   | 250            | 252                        | 1190                      | Eastern            |
|                    | <b>WREA—Shellington, Pa.—Paul Kenneth Musselman, 54 S. Miller St.</b> .....   | 100            | 300                        | 1000                      | Eastern            |
|                    | <b>WREC—Whitehaven, Tenn.—Wooten's Radio and Electric Co.</b> .....   | 15             | 254                        | 1180                      | Central            |
|                    | <b>WREO—Lansing, Mich.—Reo Motor Car Co.</b> .....  | 500            | 286                        | 1050                      | Eastern            |
|                    | <b>WRES—Wollaston, Mass.—Harry L. Sawyer, 335A Newport Avenue.</b> .....  | 50             | 295                        | 1020                      | Eastern            |
|                    | <b>WRHF—Washington, D. C.—Washington Radio Hospital Fund, 525 Eleventh St., N. W.</b> .....                             | 50             | 256                        | 1170                      | Eastern            |
|                    | <b>*WRHM—Minneapolis, Minn.—Rosedale Hospital Co., Inc., Andrews Hotel.</b> .....                                       | 1000           | 252                        | 1190                      | Central            |
|                    | <b>WRK—Hamilton, Ohio—Doron Bros. Electrical Co.</b> ...  | 100            | 270                        | 1110                      | Central            |
|                    | <b>*WRM—Urbana, Ill.—University of Illinois.</b> .....  | 1000           | 273                        | 1100                      | Central            |
|                    | <b>WRMU—Richmond Hill, N. Y. MU-1 (Yacht)—A. H. Grebe and Co., Inc.</b> .....   | 100            | 236                        | 1270                      |                    |
|                    | <b>*WRNY—New York, N. Y. (Transmitter is in Coytesville, N. J.)—Experimenter Publishing Co., Hotel Roosevelt.</b> ..... | 500            | 374                        | 800                       | Eastern            |
|                    | <b>WRR—Dallas, Tex.—City of Dallas, Police and Fire Signal Department.</b> .....  | 500            | 246                        | 1220                      | Central            |
|                    | <b>WRRS—Racine, Wis.—Racine Radio Co.</b> .....   | 10             | 360                        | 830                       | Central            |
|                    | <b>WRSC—Chelsea, Mass., The Radio Shop.</b> .....   | 15             | 270.1                      | 1110                      | Eastern            |
|                    | <b>WRST—Bay Shore, N. Y.—Radiotel Mfg. Co., Carleton Theatre.</b> .....   | 150            | 215.7                      | 1390                      | Eastern            |
|                    | <b>WRVA—Richmond, Va.—Larus &amp; Brother Co., Inc., 22nd and Cary Sts.</b> .....                                       | 1000           | 256                        | 1170                      | Eastern            |

| Radio Call Letters | BROADCAST STATIONS<br>Location and Owner   | Power<br>Watts | Wave<br>Length<br>(Meters) | Frequency<br>(Kilocycles) | Time at<br>Station |
|--------------------|--|----------------|----------------------------|---------------------------|--------------------|
| <b>WS</b>          | <b>WSAI—Cincinnati, Ohio</b> —(Transmitter is in Mason, Ohio), United States Playing Card Co.....  | 5000           | 325.9                      | 920                       | Central            |
|                    | <b>WSAJ—Grove City, Pa.</b> —Grove City College.....   | 250            | 229                        | 1310                      | Eastern            |
|                    | <b>*WSAN—Allentown, Pa.</b> —Allentown Call Publishing Co.....                                     | 100            | 229                        | 1310                      | Eastern            |
|                    | <b>WSAR—Fall River, Mass.</b> —Doughty & Welch Electric Co., Inc., 46 N. Main St.....              | 100            | 322                        | 930                       | Eastern            |
|                    | <b>WSAX—Chicago, Ill.</b> —(Portable), Zenith Radio Corp., 332 South Michigan Ave.....             | 100            | 268                        | 1120                      |                    |
|                    | <b>WSAZ—Pomeroy, Ohio</b> —Chase Electric Shop.....  | 50             | 244                        | 1230                      | Eastern            |
|                    | <b>WSB—Atlanta, Ga.</b> —The Atlanta Journal.....  | 1000           | 428.3                      | 700                       | Central            |
|                    | <b>WSBC—Chicago, Ill.</b> —World Battery Co., 1219 South Wabash Ave.....                           | 1500           | 288.3                      | 1040                      | Central            |
|                    | <b>WSBF—St. Louis, Mo.</b> —Stix, Baer & Fuller Dept. Store  | 250            | 273                        | 1100                      | Central            |
|                    | <b>*WSBT—South Bend, Ind.</b> —South Bend Tribune.....   | 500            | 315.6                      | 950                       | Central            |
|                    | <b>WSDA—New York, N. Y.</b> —The City Temple (Seventh Day Adventist Church, 120th St. & Lenox Ave. | 250            | 263                        | 1140                      | Eastern            |
|                    | <b>WSEA—Virginia Beach, Va.</b> —Virginia Beach Broadcasting Co., 17th St. & Atlantic Ave.....     | 500            | 516.9                      | 580                       | Eastern            |
|                    | <b>WSIX—Springfield, Tenn.</b> —Tire & Vulc. Co.....   | 150            | 250                        | 1200                      | Central            |
|                    | <b>WSKC—Bay City, Mich.</b> —World's Star Knitting Co. . .   | 500            | 260.7                      | 1150                      | Eastern            |
|                    | <b>WSM—Nashville, Tenn.</b> —The National Life & Accident Ins. Co.....                             | 5000           | 282.8                      | 1060                      | Central            |
|                    | <b>WSMB—New Orleans, La.</b> —Saenger Theatres, Inc. & Maison Blanche Co.....                      | 500            | 319                        | 940                       | Central            |
|                    | <b>WSMH—Owosso, Mich.</b> —Shattuck Music House, 207 Washington St.....                            | 20             | 20                         | 1250                      | Eastern            |
|                    | <b>WSMK—Dayton, Ohio</b> —S. M. K. Radio Corporation, 39 East Third St.....                        | 500            | 275                        | 1090                      | Eastern            |
|                    | <b>WSOE—Milwaukee, Wis.</b> —School of Engineering of Milwaukee, 415 Marshall St.....              | 500            | 246                        | 1220                      | Central            |
|                    | <b>*WSOM—Woodhaven, N. Y.</b> —Union Course Laboratories, 9024-78th St.....                        | 100            | 288.3                      | 1040                      | Eastern            |
|                    | <b>WSRO—Hamilton, Ohio</b> —The Radio Co., 421 High St.....  | 100            | 252                        | 1190                      | Central            |
|                    | <b>WSSH—Boston, Mass.</b> —Tremont Temple Baptist Church.....                                      | 100            | 261                        | 1150                      | Eastern            |
|                    | <b>WSUI—Iowa City, Iowa</b> —State University of Iowa . . .  | 500            | 484                        | 620                       | Central            |
|                    | <b>WSVS—Buffalo, N. Y.</b> —Seneca Vocational School, 666 E. Delavan Ave.....                      | 50             | 219                        | 1370                      | Eastern            |
|                    | <b>WSWS—Batavia, Ill.</b> —Richmond Harris & Co. (Illinois Broadcasting Co.).....                  | 5000           | 275                        | 1090                      | Central            |
|                    | <b>WSYR—Syracuse, N. Y.</b> —Clive B. Meredith, Hotel Syracuse.....                                | 500            | 352.7                      | 850                       | Eastern            |
| <b>WT</b>          | <b>WTAD—Quincy, Ill.</b> —Illinois Stock Medicine Broadcasting Corp.....                           | 50             | 236                        | 1270                      | Central            |
|                    | <b>WTAG—Worcester, Mass.</b> —Worcester Telegram Pub. Co., 18 Franklin St.....                     | 500            | 545.1                      | 550                       | Eastern            |
|                    | <b>WTAL—Toledo, Ohio</b> —Toledo Broadcasting Co. (Hotel Waldorf).....                             | 100            | 252                        | 1190                      | Eastern            |
|                    | <b>WTAM—Cleveland, Ohio</b> —Willard Storage Battery Co.   | 1000           | 389.4                      | 770                       | Eastern            |
|                    | <b>*WTAQ—Eau Claire, Wis.</b> —Gillette Rubber Co.....   | 1000           | 254                        | 1180                      | Central            |
|                    | <b>WTAR—Norfolk, Va.</b> —Reliance Electric Co., 519 West 21st St.....                             | 100            | 261                        | 1150                      | Eastern            |
|                    | <b>WTAW—College Station, Tex.</b> —Agricultural & Mechanical College of Texas.....                 | 500            | 270                        | 1110                      | Central            |
|                    | <b>WTAX—Streator, Ill.</b> —Williams Hardware Co., 115 So. Vermillion St.....                      | 50             | 231                        | 1300                      | Central            |
|                    | <b>WTAZ—Lambertville, N. J.</b> —Thos. J. McGuire.....   | 15             | 261                        | 1150                      | Eastern            |

| Radio Call Letters                            | BROADCAST STATIONS<br>Location and Owner  | Power<br>Watts | Wave<br>Length<br>(Meters) | Frequency<br>(Kilocycles) | Time at<br>Station | Sending<br>Hours |
|---|---|----------------|----------------------------|---------------------------|--------------------|------------------|
| <b>WT</b>                                     | WTHO—Ferndale, Mich.—W. T. Thomas Broadcasting Co., Whittier Hotel.....                         | 1000           | 405.2                      | 740                       | Eastern            |                  |
|   | WTIC—Hartford, Conn.—Travelers Insurance Co.....  | 500            | 475.9                      | 630                       | Eastern            |                  |
|   | WTRC—Brooklyn, N. Y.—Twentieth Assembly District Regular Republican Club, Inc., 62 Woodbine St. | 100            | 239.9                      | 1250                      | Eastern            |                  |
| <b>WW</b>                                     | WTRL—Midland Park, N. J.—Technical Radio Labs..   | 15             | 280.2                      | 1070                      | Eastern            |                  |
|   | WWAE—Chicago, Ill.—Lawrence J. Crowley.....   | 500            | 241.8                      | 1240                      | Central            |                  |
|   | WWJ—Detroit, Mich.—Detroit News.....  | 1000           | 352.7                      | 850                       | Eastern            |                  |
|   | WWL—New Orleans, La.—Loyola University.....   | 100            | 275                        | 1090                      | Central            |                  |
|   | WWNC—Asheville, N. C.—Asheville Chamber of Commerce, 101 Patton Ave.....                        | 1000           | 254                        | 1180                      | Central            |                  |
|   | WWRL—Woodside, N. Y.—Woodside Radio Labs., 41-30 Fifth-Eighth Street.....                       | 100            | 258.5                      | 1160                      | Eastern            |                  |
| WWVA—Wheeling, West Va.—John C. Stroebel..... | 100   | 348.6          | 860                        | Eastern                   |                    |                  |

*This list has been corrected up to and including April 30, 1927.*

**Radio Broadcast Station WRVA—Richmond, Va.**



Twinkling Stars

Smithers Hawaiian Trio

The Edgeworth Country Fiddlers





**THE COMMODORES**  
**WLAC**  
**NASHVILLE, TENN.**



**CASEY SPEAR**  
**KMOX**  
**ST. LOUIS, MO.**



**ADELINE FOSS,**  
**PIANIST**  
**KMO**  
**TACOMA,**  
**WASH.**



**CHARLIE WHITE**  
**VOCALIST**  
**WCFL**  
**CHICAGO, ILL.**



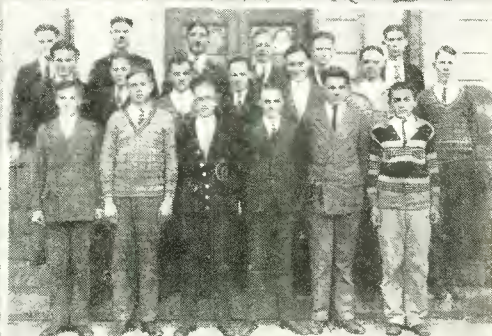
**BUDDY BAKER**  
**BANJOIST**  
**KYW**  
**CHICAGO, ILL.**



**BABE LOVE**  
**SINGER**  
**KYW**  
**CHICAGO, ILL.**



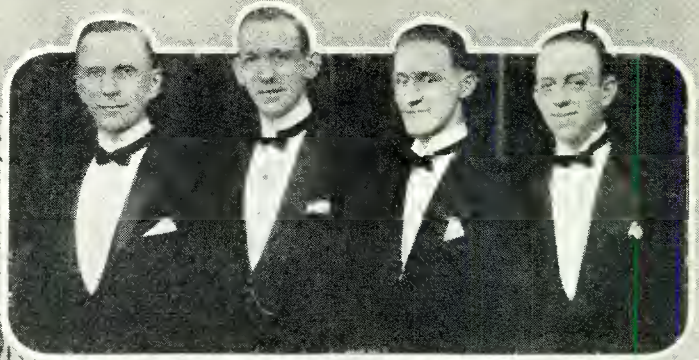
**FRED. L. JESKE**  
**BARITONE**  
**WBMB**  
**CHICAGO, ILL.**



**NORTH CENTRAL RADIO CLUB**  
**KFIO**  
**SPOKANE, WASH.**



THE WHITNEY TRIO  
W M A Q  
CHICAGO ILL.



THE INDIANA  
MALE QUARTET  
W F B M  
INDIANAPOLIS, IND.



STUTE JOHNSON  
VOCALIST  
K M M J  
CLAY CENTER, NEB.



MABEL LEONARD  
STUDIO PIANIST  
K F W B  
HOLLYWOOD, CAL.



FITZ SISTERS  
W B A L  
BALTIMORE, M.D.



PROF. W. ALLEN  
PIANIST  
K M M J  
CLAY CENTER, NEB.

# RADIO BROADCAST STATIONS OF THE UNITED STATES

By Wavelengths and Frequencies

| Meters | Kilocycles | Power | Call Letters | Location                   | Meters | Kilocycles | Power  | Call Letters | Location            |
|--------|------------|-------|--------------|----------------------------|--------|------------|--------|--------------|---------------------|
| 200    | 1500       | 10    | KWBS         | Portland, Ore.             | 216    | 1390       | 100    | WHBW         | Philadelphia, Pa.   |
| 202    | 1480       | 15    | WMPC         | Lapeer, Mich.              | 217.3  | 1380       | 50     | KFAF         | San Jose, Cal.      |
| 202.6  | 1480       | 50    | KGBY         | Shelby, Neb.               | 217.3  | 1380       | 5      | KGDM         | Stockton, Calif.    |
| 202.6  | 1480       | 10    | WEHS         | Evanston, Ill.             | 217.3  | 1380       | 1000   | WFKB         | Chicago, Ill.       |
| 202.6  | 1480       | 10    | WIBS         | Elizabeth, N. J.           | 218    | 1370       | 100    | KGFJ         | Los Angeles, Cal.   |
| 204    | 1470       | 15    | KGEY         | Denver, Colo.              | 218.8  | 1370       | 3500   | KFKB         | Milford, Kans.      |
| 204    | 1470       | 10    | WABB         | Harrisburg, Pa.            | 218.8  | 1370       | 100    | KGFH         | La Crescenta, Cal.  |
| 205.4  | 1460       | 10    | KFXD         | Logan, Utah                | 218.8  | 1370       | 10     | WHBU         | Anderson, Ind.      |
| 205.4  | 1460       | 10    | KFXY         | Flagstaff, Ariz.           | 218.8  | 1370       | 50     | WIBI         | Flushing, N. Y.     |
| 205.4  | 1460       | 10    | KFYF         | Oxnard, Cal.               | 218.8  | 1370       | 250    | WJBI         | Red Bank, N. J.     |
| 205.4  | 1460       | 10    | KGES         | Central City, Neb.         | 219    | 1370       | 50     | WSVS         | Buffalo, N. Y.      |
| 205.4  | 1460       | 25    | KGFF         | Alva, Okla.                | 220    | 1360       | 5      | KJBS         | San Francisco, Cal. |
| 205.4  | 1460       | 100   | WFRL         | Brooklyn, N. Y.            | 220    | 1360       | 500    | KRAC         | Shreveport, La.     |
| 205.4  | 1460       | 50    | WNBF         | Endicott, N. Y.            | 220    | 1360       | 100    | WIBW         | Chicago, Ill.       |
| 205.4  | 1460       | 100   | WPDQ         | Buffalo, N. Y.             | 220    | 1360       | 100    | WKBY         | Danville, Pa.       |
| 206.8  | 1450       | 50    | WABW         | Wooster, Ohio              | 220    | 1360       | 5      | WMBE         | St. Paul, Minn.     |
| 206.8  | 1450       | 50    | WJBA         | Joliet, Ill.               | 220    | 1360       | 10     | WMBG         | Richmond, Va.       |
| 207    | 1450       | 50    | KGTT         | San Francisco, Cal.        | 220    | 1360       | 500    | WQAA         | Parkersburg, Pa.    |
| 208    | 1440       | 50    | KFVD         | Venice, Cal.               | 220.4  | 1360       | 15     | KGFI         | Ft. Stockton, Tex.  |
| 208    | 1440       | 750   | KNRC         | Santa Monica, Cal.         | 220.4  | 1360       | 15     | WLBP         | Ashland, Ohio       |
| 209.7  | 1430       | 100   | WCBR         | Providence, R. I.          | 220.6  | 1360       | 50     | WKBI         | Chicago, Ill.       |
| 209.7  | 1430       | 200   | WKBA         | Chicago, Ill.              | 222    | 1350       | 50     | KGFL         | Trinidad, Colo.     |
| 210    | 1430       | 15    | KFOX         | Seattle, Wash.             | 222    | 1350       | 50     | WBBW         | Norfolk, Va.        |
| 210    | 1430       | 15    | KGDY         | Oldham, S. Dak.            | 222    | 1350       | 100    | WBES         | Takoma Park, Md.    |
| 210    | 1430       | 100   | WMBQ         | Brooklyn, N. Y.            | 222    | 1350       | 100    | WHBD         | Bellefontaine, Ohio |
| 211.1  | 1420       | 200   | KFWC         | San Bernardino, Cal.       | 222    | 1350       | 100    | WHBF         | Rock Island, Ill.   |
| 211.1  | 1420       | 250   | KFWO         | Avalon, Catalina Is., Cal. | 222    | 1350       | 50     | WIBG         | Elkins Park, Pa.    |
| 211.1  | 1420       | 100   | WJBU         | Lewisburg, Pa.             | 222    | 1350       | 20     | WIBU         | Poynette, Wis.      |
| 211.1  | 1420       | 25    | WLBF         | Kansas City, Mo.           | 222.1  | 1350       | 50     | KFEU         | Lower Lake, Cal.    |
| 212.6  | 1410       | 50    | KFWV         | Portland, Ore.             | 222.1  | 1350       | 15     | KGFN         | Aneta, N. Dak.      |
| 212.6  | 1410       | 500   | WPEP         | Waukegan, Ill.             | 223.7  | 1340       | 100    | KFBL         | Everett, Wash.      |
| 213    | 1410       | 250   | WOCB         | Orlando, Fla.              | 223.7  | 1340       | 10     | KFGB         | Iowa City, Iowa     |
| 214.2  | 1400       | 500   | KFWF         | St. Louis, Mo.             | 223.7  | 1340       | 100    | WBMS         | Union City, N. J.   |
| 214.2  | 1400       | 15    | KFXR         | Oklahoma City, Okla.       | 223.7  | 1340       | 5      | WLBC         | Muncie, Ind.        |
| 241.2  | 1400       | 7½    | KGDJ         | Cresco, Iowa               | 223.8  | 1340       | 100    | WKAV         | Laconia, N. H.      |
| 214.2  | 1400       | 150   | WCLS         | Joliet, Ill.               | 223.8  | 1340       | 100    | WRAF         | Laport, Ind.        |
| 215    | 1390       | 15    | KPJM         | Prescott, Ariz.            | 224    | 1340       | 50     | KFUR         | Ogden, Utah         |
| 215    | 1390       | 15    | WNBO         | Washington, Pa.            | 224    | 1340       | 50     | KFVS         | Cape Girardeau, Mo. |
| 215.6  | 1390       | 100   | WPRC         | Harrisburg, Pa.            | 224    | 1340       | 500    | WNRC         | Greensboro, N. C.   |
| 215.7  | 1390       | 50    | KFBC         | San Diego, Cal.            | 225    | 1330       | 50     | KGEL         | Jamestown, N. Dak.  |
| 215.7  | 1390       | 100   | KFQW         | Seattle, Wash.             | 225    | 1330       | 50     | KGFK         | Hallock, Minn.      |
| 215.7  | 1390       | 15    | KFXJ         | Edgewater, Colo.           | 225    | 1330       | 10     | WKBC         | Birmingham, Ala.    |
| 215.7  | 1390       | 50    | WBBZ         | Chicago, Ill.              | 225    | 1300       | 100    | WLBN         | Chicago, Ill.       |
| 215.7  | 1390       | 100   | WHBL         | Chicago, Ill.              | 225.4  | 1330       | 50     | WAGM         | Royal Oak, Mich.    |
| 215.7  | 1390       | 100   | WHBM         | Chicago, Ill.              | 225.4  | 1330       | 10,000 | WBBM         | Chicago, Ill.       |
| 215.7  | 1390       | 300   | WHBR         | Cincinnati, Ohio           | 225.4  | 1330       | 100    | WEBQ         | Harrisburg, Ill.    |
| 215.7  | 1390       | 100   | WIBJ         | Chicago, Ill.              | 225.4  | 1330       | 5000   | WLAC         | Nashville, Tenn.    |
| 215.7  | 1390       | 10    | WIBM         | Chicago, Ill.              | 226    | 1320       | 75     | KFKZ         | Kirkville, Mo.      |
| 215.7  | 1390       | 100   | WKBG         | Chicago, Ill.              | 226    | 1320       | 50     | KFOB         | Burlingame, Cal.    |
| 215.7  | 1390       | 150   | WRST         | Bay Shore, N. Y.           | 226    | 1320       | 100    | KFOR         | David City, Neb.    |
|        |            |       |              |                            | 226    | 1320       | 500    | KFOZ         | Hollywood, Cal.     |

| Meters | Kilocycles | Power  | Call Letters | Location                | Meters | Kilocycles | Power | Call Letters | Location                 |
|--------|------------|--------|--------------|-------------------------|--------|------------|-------|--------------|--------------------------|
| 226    | 1320       | 5000   | WDAD         | Nashville, Tenn.        | 236    | 1270       | 100   | WBOQ         | Richmond Hill, N. Y.     |
| 226    | 1320       | 100    | WEBL         | U. S. (Portable)        | 236    | 1270       | 100   | WFBJ         | Collegeville, Minn.      |
| 226    | 1320       | 10     | WFBE         | Cincinnati, Ohio        | 236    | 1270       | 100   | WGMU         | Richmond Hill, N. Y.     |
| 226    | 1320       | 1000   | WIBO         | Chicago, Ill.           | 236    | 1270       | 100   | WRMU         | Rich. Hill, N.Y. (Yacht) |
| 227    | 1320       | 50     | KFVN         | Fairmont, Minn.         | 236    | 1270       | 50    | WTAD         | Quincy, Ill.             |
| 227    | 1320       | 100    | KGBS         | Seattle, Wash.          | 236.1  | 1270       | 100   | KFDX         | Shreveport, La.          |
| 227    | 1320       | 10,000 | WOWO         | Ft. Wayne, Ind.         | 236.1  | 1270       | 50    | KGEH         | Eugene, Ore.             |
| 227.1  | 1320       | 100    | WJBR         | Omro, Wis.              | 236.1  | 1270       | 100   | WBAW         | Nashville, Tenn.         |
| 227.1  | 1320       | 10     | WMRJ         | Jamaica, N. Y.          | 236.1  | 1270       | 500   | WGBF         | Evansville, Ind.         |
| 228.9  | 1310       | 100    | WBBL         | Richmond, Va.           | 236.1  | 1270       | 100   | WIBA         | Madison, Wis.            |
| 229    | 1310       | 100    | KFLV         | Rockford, Ill.          | 236.1  | 1270       | 250   | WKBV         | Brookville, Ind.         |
| 229    | 1310       | 1000   | KMMJ         | Clay Center, Nebr.      | 236.1  | 1270       | 50    | WLBA         | Philadelphia, Pa.        |
| 229    | 1310       | 50     | KPPC         | Pasadena, Cal.          | 236.1  | 1270       | 50    | WMBU         | Pittsburgh, Pa.          |
| 229    | 1310       | 10     | WAIT         | Taunton, Mass.          | 238    | 1260       | 15    | KFBS         | Trinidad, Colo.          |
| 229    | 1310       | 100    | WCBM         | Baltimore, Md.          | 238    | 1260       | 125   | KFCB         | Phoenix, Ariz.           |
| 229    | 1310       | 250    | WDBJ         | Roanoke, Va.            | 238    | 1260       | 100   | KFWU         | Pineville, La.           |
| 229    | 1310       | 250    | WSAJ         | Grove City, Pa.         | 238    | 1260       | 10    | KFYJ         | Houston, Tex.            |
| 229    | 1310       | 100    | WSAN         | Allentown, Pa.          | 238    | 1260       | 10    | KGCL         | Seattle, Wash.           |
| 230    | 1300       | 50     | WLBH         | Farmingdale, N. Y.      | 238    | 1260       | 100   | WBBP         | Petoskey, Mich.          |
| 230    | 1300       | 100    | WLBT         | Crown Point, Ind.       | 238    | 1260       | 10    | WHBN         | St. Petersburg, Fla.     |
| 230    | 1300       | 30     | WMHA         | New York, N. Y.         | 238    | 1260       | 10    | WJBT         | Chicago, Ill.            |
| 230.6  | 1300       | 250    | KFQU         | Alma (Holy City), Cal.  | 238    | 1260       | 50    | WKBU         | New Castle, Pa.          |
| 230.6  | 1300       | 100    | WCLO         | Camp Lake, Wis.         | 238    | 1260       | 200   | WMBO         | Auburn, N. Y.            |
| 230.6  | 1300       | 10     | WIBZ         | Montgomery, Ala.        | 238    | 1260       | 500   | WNBA         | Forest Park, Ill.        |
| 230.6  | 1300       | 100    | WLBE         | Brooklyn, N. Y.         | 238    | 1260       | 100   | WRWA         | Reading, Pa.             |
| 230.6  | 1300       | 25     | WLBQ         | Atwood, Ill.            | 239.9  | 1250       | 100   | KFUM         | Colorado Springs, Colo.  |
| 230.6  | 1300       | 50     | WLBV         | Mansfield, Ohio         | 239.9  | 1250       | 15    | KGCI         | San Antonio, Tex.        |
| 230.6  | 1300       | 250    | WLBX         | Long Island City, N. Y. | 239.9  | 1250       | 100   | WABI         | Bangor, Me.              |
| 231    | 1300       | 5      | KDLR         | Devils Lake, N. D.      | 239.9  | 1250       | 15    | WJPW         | Ashtabula, Ohio          |
| 231    | 1300       | 10     | KFDZ         | Minneapolis, Minn.      | 239.9  | 1250       | 100   | WTRC         | Brooklyn, N. Y.          |
| 231    | 1300       | 50     | KFOT         | Wichita, Kans.          | 240    | 1250       | 10    | KFHL         | Oskaloosa, Iowa          |
| 231    | 1300       | 500    | KFPR         | Los Angeles, Cal.       | 240    | 1250       | 250   | KFLX         | Galveston, Tex.          |
| 231    | 1300       | 50     | KROW         | Portland, Ore.          | 240    | 1250       | 5000  | KFVE         | St. Louis, Mo.           |
| 231    | 1300       | 100    | WBRE         | Wilkes-Barre, Pa.       | 240    | 1250       | 50    | KFVI         | Houston, Tex.            |
| 231    | 1300       | 50     | WTAX         | Streator, Ill.          | 240    | 1250       | 10    | KGCX         | Vida, Mont.              |
| 232.4  | 1290       | 50     | KGDE         | Barrett, Minn.          | 240    | 1250       | 15    | KGDR         | San Antonio, Tex.        |
| 233    | 1290       | 10     | KFEY         | Kellogg, Idaho          | 240    | 1250       | 1000  | KZM          | Oakland, Cal.            |
| 233    | 1290       | 500    | KFON         | Long Beach, Cal.        | 240    | 1250       | 50    | WCAT         | Rapid City, S. D.        |
| 233    | 1290       | 10     | WDBZ         | Kingston, N. Y.         | 240    | 1250       | 500   | WDBO         | Winter Park, Fla.        |
| 233    | 1290       | 50     | WHBQ         | Memphis, Tenn.          | 240    | 1250       | 100   | WGBI         | Scranton, Pa.            |
| 233    | 1290       | 10     | WJBK         | Ypsilanti, Mich.        | 240    | 1250       | 500   | WOAX         | Trenton, N. J.           |
| 233    | 1290       | 500    | WOKO         | Peekskill, N. Y.        | 240    | 1250       | 20    | WSMH         | Owosso, Mich.            |
| 234    | 1280       | 50     | KFUP         | Denver, Colo.           | 241.8  | 1240       | 50    | KFH          | Wichita, Kans.           |
| 234    | 1280       | 100    | KGRS         | Amarillo, Tex.          | 241.8  | 1240       | 100   | KGDW         | Humboldt, Nebr.          |
| 234    | 1280       | 50     | KMJ          | Fresno, Cal.            | 241.8  | 1240       | 15    | WHOG         | Huntington, Ind.         |
| 234    | 1280       | 500    | WCWK         | Fort Wayne, Ind.        | 241.8  | 1240       | 1000  | WOOD         | Grand Rapids, Mich.      |
| 234    | 1280       | 10     | WEBE         | Cambridge, Ohio         | 241.8  | 1240       | 500   | WWAE         | Chicago, Ill.            |
| 234    | 1280       | 100    | WFDF         | Flint, Mich.            | 242    | 1240       | 50    | KFFP         | Moberly, Mo.             |
| 234.2  | 1280       | 100    | KCGG         | Newark, Ark.            | 242    | 1240       | 10    | KFPM         | Greenville, Tex.         |
| 234.2  | 1280       | 500    | WGBX         | Orono, Me.              | 242    | 1240       | 50    | KFXH         | El Paso, Tex.            |
| 234.2  | 1280       | 150    | WIBX         | Utica, N. Y.            | 242    | 1240       | 50    | WABY         | Philadelphia, Pa.        |
| 234.2  | 1280       | 100    | WJBC         | La Salle, Ill.          | 242    | 1240       | 100   | WBSO         | Wellesley Hills, Mass.   |
| 235    | 1280       | 50     | KGCN         | Concordia, Kans.        | 242    | 1240       | 50    | WCBH         | Oxford, Miss.            |
| 235    | 1280       | 500    | WAAT         | Jersey City, N. J.      | 242    | 1240       | 250   | WEBC         | Superior, Wis.           |
| 235    | 1280       | 450    | WRAH         | Providence, R. I.       | 242.5  | 1240       | 250   | WCBS         | Providence, R. I.        |
| 236    | 1270       | 20     | KFLU         | San Benito, Tex.        | 243    | 1230       | 100   | WLBO         | Galesburg, Ill.          |
| 236    | 1270       | 15     | KFVG         | Independence, Kans.     | 243.8  | 1230       | 100   | KGAR         | Tucson, Ariz.            |
| 236    | 1270       | 100    | KWKC         | Kansas City, Mo.        | 243.8  | 1230       | 5000  | WAMD         | Minneapolis, Minn.       |

| Meters | Kilocycles | Power | Call Letters | Location              | Meters | Kilocycles | Power | Call Letters | Location               |
|--------|------------|-------|--------------|-----------------------|--------|------------|-------|--------------|------------------------|
| 243.8  | 1230       | 100   | WATT         | Boston, Mass.         | 252    | 1190       | 50    | KFOY         | St. Paul, Minn.        |
| 243.8  | 1230       | 100   | WRAM         | Galesburg, Ill.       | 252    | 1190       | 20    | KFPL         | Dublin, Tex.           |
| 244    | 1230       | 50    | KFVR         | Denver, Colo.         | 252    | 1190       | 750   | KFWB         | Hollywood, Cal.        |
| 244    | 1230       | 500   | KUOM         | Missoula, Mont.       | 252    | 1190       | 10    | KGCR         | Brookings, S. Dak.     |
| 244    | 1230       | 100   | WEBR         | Buffalo, N. Y.        | 252    | 1190       | 10    | KGEK         | Yuma, Colo.            |
| 244    | 1230       | 100   | WGBB         | Freeport, N. Y.       | 252    | 1190       | 1500  | KWUC         | Le Mars, Iowa          |
| 244    | 1230       | 500   | WKBF         | Indianapolis, Ind.    | 252    | 1190       | 100   | WCAX         | Burlington, Vt.        |
| 244    | 1230       | 100   | WNAX         | Yankton, S. D.        | 252    | 1190       | 10    | WCFT         | Tullahoma, Tenn.       |
| 244    | 1230       | 50    | WSAZ         | Pomeroy, Ohio         | 252    | 1190       | 500   | WCOA         | Pensacola, Fla.        |
| 245    | 1220       | 10    | WMBM         | Memphis, Tenn.        | 252    | 1190       | 100   | WCOM         | Manchester, N. Y.      |
| 245.8  | 1220       | 1000  | KFSD         | San Diego, Calif.     | 252    | 1190       | 500   | WFBL         | Syracuse, N. Y.        |
| 246    | 1220       | 250   | KDYL         | Salt Lake City, Utah  | 252    | 1190       | 500   | WGCP         | Newark, N. J.          |
| 246    | 1220       | 10    | KFJI         | Astoria, Ore.         | 252    | 1190       | 15    | WKBL         | Monroe, Mich.          |
| 246    | 1220       | 100   | KFJY         | Fort Dodge, Ia.       | 252    | 1190       | 50    | WKBT         | New Orleans, La.       |
| 246    | 1220       | 500   | WABX         | Mount Clemens, Mich.  | 252    | 1190       | 250   | WRCO         | Raleigh, N. C.         |
| 246    | 1220       | 5000  | WBAL         | Baltimore, Md.        | 252    | 1190       | 1000  | WRHM         | Minneapolis, Minn.     |
| 246    | 1220       | 50    | WCAZ         | Carthage, Ill.        | 252    | 1190       | 100   | WSRO         | Hamilton, Ohio         |
| 246    | 1220       | 50    | WIBR         | Steubenville, Ohio    | 252    | 1190       | 100   | WTAL         | Toledo, Ohio           |
| 246    | 1220       | 50    | WQAE         | Springfield, Vt.      | 254    | 1180       | 250   | KFEL         | Denver, Colo.          |
| 246    | 1220       | 500   | WRR          | Dallas, Tex.          | 254    | 1180       | 100   | KFLR         | Albuquerque, N. M.     |
| 246    | 1220       | 500   | WSOE         | Milwaukee, Wis.       | 254    | 1180       | 100   | KFWH         | Eureka, Cal.           |
| 247.8  | 1210       | 100   | WAOK         | Richmond Hill, N. Y.  | 254    | 1180       | 500   | WCAJ         | University Place, Neb. |
| 247.8  | 1210       | 1000  | WIOD         | Miami Beach, Fla.     | 254    | 1180       | 150   | WCBA         | Allentown, Pa.         |
| 248    | 1210       | 100   | KFBK         | Sacramento, Cal.      | 254    | 1180       | 250   | WEAI         | Ithaca, N. Y.          |
| 248    | 1210       | 100   | KFIF         | Portland, Oregon      | 254    | 1180       | 100   | WFBR         | Baltimore, Md.         |
| 248    | 1210       | 15    | KFJB         | Marshalltown, Ia.     | 254    | 1180       | 20    | WFBZ         | Galesburg, Ill.        |
| 248    | 1210       | 100   | KFOX         | Omaha, Neb.           | 254    | 1180       | 10    | WHBC         | Canton, Ohio           |
| 248    | 1210       | 250   | KFRB         | Beeville, Tex.        | 254    | 1180       | 100   | WIAS         | Burlington, Ia.        |
| 248    | 1210       | 250   | KFYR         | Bismarck, N. D.       | 254    | 1180       | 50    | WJAK         | Kokomo, Ind.           |
| 248    | 1210       | 50    | KWVG         | Stockton, Cal.        | 254    | 1180       | 250   | WJBB         | St. Petersburg, Fla.   |
| 248    | 1210       | 50    | WBRC         | Birmingham, Ala.      | 254    | 1180       | 500   | WNAD         | Norman, Okla.          |
| 248    | 1210       | 750   | WCSSO        | Springfield, Ohio     | 254    | 1180       | 15    | WREC         | Whitehaven, Tenn.      |
| 248    | 1210       | 10    | WGAL         | Lancaster, Pa.        | 254    | 1180       | 1000  | WTAQ         | Eau Claire, Wis.       |
| 248    | 1210       | 100   | WMAY         | St. Louis, Mo.        | 254    | 1180       | 1000  | WWNC         | Asheville, N. C.       |
| 248    | 1210       | 250   | WNBH         | New Bedford, Mass.    | 254.1  | 1180       | 50    | KFJZ         | Fort Worth, Tex.       |
| 249.9  | 1200       | 10    | WFKD         | Philadelphia, Pa.     | 254.1  | 1180       | 15    | KGDA         | Dell Rapids, S. Dak.   |
| 249.9  | 1200       | 50    | WLBY         | Iron Mountain, Mich.  | 254.1  | 1180       | 50    | WOMT         | Manitowoc, Wis.        |
| 249.9  | 1200       | 100   | WMBA         | Newport, R. I.        | 256    | 1170       | 500   | KFIQ         | Yakima, Wash.          |
| 250    | 1200       | 10    | KFVY         | Albuquerque, N. Mex.  | 256    | 1170       | 50    | KFUS         | Oakland, Cal.          |
| 250    | 1200       | 500   | KFWI         | San Francisco, Calif. | 256    | 1170       | 10    | KGEW         | Ft. Morgan, Colo.      |
| 250    | 1200       | 250   | KLS          | Oakland, Cal.         | 256    | 1170       | 100   | KRE          | Berkeley, Cal.         |
| 250    | 1200       | 50    | KMED         | Medford, Ore.         | 256    | 1170       | 100   | KPNP         | Muscatine, Iowa        |
| 250    | 1200       | 500   | KMO          | Tacoma, Wash.         | 256    | 1170       | 100   | WBAX         | Wilkes-Barre, Pa.      |
| 250    | 1200       | 5     | WAGS         | Somerville, Mass.     | 256    | 1170       | 500   | WDOD         | Chattanooga, Tenn.     |
| 250    | 1200       | 1000  | WEDC         | Chicago, Ill.         | 256    | 1170       | 100   | WHBP         | Johnstown, Pa.         |
| 250    | 1200       | 50    | WFBC         | Knoxville, Tenn.      | 256    | 1170       | 15    | WKBZ         | Ludington, Mich.       |
| 250    | 1200       | 500   | WGES         | Chicago, Ill.         | 256    | 1170       | 50    | WRHF         | Washington, D. C.      |
| 250    | 1200       | 10    | WHBA         | Oil City, Pa.         | 256    | 1170       | 1000  | WRVA         | Richmond, Va.          |
| 250    | 1200       | 50    | WHBY         | West De Pere, Wis.    | 256.3  | 1170       | 100   | WRAK         | Escanaba, Mich.        |
| 250    | 1200       | 100   | WIAD         | Philadelphia, Pa.     | 256.4  | 1170       | 500   | WASH         | Grand Rapids, Mich.    |
| 250    | 1200       | 500   | WKBH         | LaCrosse, Wis.        | 256.4  | 1170       | 100   | WMBC         | Detroit, Mich.         |
| 250    | 1200       | 100   | WLAL         | Tulsa, Okla.          | 258    | 1160       | 20    | KFPW         | Cartersville, Mo.      |
| 250    | 1200       | 500   | WMBB         | Chicago, Ill.         | 258    | 1160       | 500   | KFUL         | Galveston, Tex.        |
| 250    | 1200       | 100   | WMBR         | Tampa, Fla.           | 258    | 1160       | 500   | KOCH         | Omaha, Neb.            |
| 250    | 1200       | 100   | WNAT         | Philadelphia, Pa.     | 258    | 1160       | 25    | WAAD         | Cincinnati, Ohio       |
| 250    | 1200       | 100   | WQAN         | Scranton, Pa.         | 258    | 1160       | 500   | WADC         | Akron, Ohio            |
| 250    | 1200       | 150   | WSIX         | Springfield, Tenn.    | 258    | 1160       | 500   | WHEC         | Rochester, N. Y.       |
| 252    | 1190       | 150   | KFEC         | Portland, Oregon      | 258    | 1160       | 50    | WKJC         | Lancaster, Pa.         |
| 252    | 1190       | 50    | KFHA         | Gunnison, Colo.       | 258    | 1160       | 50    | WNAL         | Omaha, Neb.            |

| Meters | Kilocycles | Power | Call Letters | Location                | Meters | Kilocycles | Power | Call Letters | Location              |
|--------|------------|-------|--------------|-------------------------|--------|------------|-------|--------------|-----------------------|
| 258    | 1160       | 750   | WPCC         | Chicago, Ill.           | 268    | 1120       | 500   | WRAX         | Philadelphia, Pa.     |
| 258.5  | 1160       | 500   | WCMA         | Culver, Ind.            | 268    | 1120       | 100   | WSAX         | Chicago, Ill.         |
| 258.5  | 1160       | 100   | WFCI         | Pawtucket, R. I.        | 270    | 1110       | 100   | WBAO         | Decatur, Ill.         |
| 258.5  | 1160       | 150   | WHFC         | Chicago, Ill.           | 270    | 1110       | 100   | WDBE         | Atlanta, Ga.          |
| 258.5  | 1160       | 100   | WLTS         | Chicago, Ill.           | 270    | 1110       | 1500  | WGHP         | Mt. Clemens, Mich.    |
| 258.5  | 1160       | 1000  | WWRL         | Woodside, N. Y.         | 270    | 1110       | 500   | WGST         | Atlanta, Ga.          |
| 260    | 1150       | 15    | KKP          | Seattle, Wash.          | 270    | 1110       | 200   | WJAG         | Norfolk, Nebr.        |
| 260.7  | 1150       | 10    | KGDP         | Pueblo, Colo.           | 270    | 1110       | 500   | WJBL         | Decatur, Ill.         |
| 260.7  | 1150       | 500   | KSEI         | Pocatello, Idaho        | 270    | 1110       | 20    | WJBW         | New Orleans, La.      |
| 260.7  | 1150       | 500   | WABQ         | Philadelphia, Pa.       | 270    | 1110       | 5000  | WOI          | Ames, Ia.             |
| 260.7  | 1150       | 500   | WSKC         | Bay City, Mich.         | 270    | 1110       | 100   | WRK          | Hamilton, Ohio        |
| 261    | 1150       | 1000  | KFJF         | Oklahoma City, Okla.    | 270    | 1110       | 500   | WTAW         | College Station, Tex. |
| 261    | 1150       | 100   | KFMR         | Sioux City, Ia.         | 270.1  | 1110       | 200   | KOCW         | Chickasha, Okla.      |
| 261    | 1150       | 100   | KFUT         | Salt Lake City, Utah    | 270.1  | 1110       | 100   | WJBY         | Gadsden, Ala.         |
| 261    | 1150       | 100   | WARC         | Medford Hillside, Mass. | 270.1  | 1110       | 100   | WKBE         | Webster, Mass.        |
| 261    | 1150       | 500   | WDAY         | Fargo, N. D.            | 270.1  | 1110       | 15    | WRSC         | Chelsea, Mass.        |
| 261    | 1150       | 250   | WEAM         | No. Plainfield, N. J.   | 271    | 1110       | 50    | KGEO         | Grand Island, Nebr.   |
| 261    | 1150       | 750   | WKAF         | Milwaukee, Wis.         | 272.6  | 1100       | 100   | KFAD         | Phoenix, Ariz.        |
| 261    | 1150       | 500   | WMAZ         | Macon, Ga.              | 272.6  | 1100       | 250   | KFIO         | Spokane, Wash.        |
| 261    | 1150       | 100   | WSSH         | Boston, Mass.           | 272.6  | 1100       | 500   | KUT          | Austin, Tex.          |
| 261    | 1150       | 100   | WTAR         | Norfolk, Va.            | 272.6  | 1100       | 1000  | WEBJ         | New York, N. Y.       |
| 261    | 1150       | 15    | WTAZ         | Lambertville, N. J.     | 272.6  | 1100       | 1000  | WHK          | Cleveland, Ohio       |
| 263    | 1140       | 120   | KFJR         | Portland, Oregon        | 272.6  | 1100       | 1000  | WILL         | Urbana, Ill.          |
| 263    | 1140       | 15    | KGFP         | Mitchell, S. Dak.       | 272.6  | 1100       | 500   | WPCH         | New York, N. Y.       |
| 263    | 1140       | 10    | KTAP         | San Antonio, Tex.       | 273    | 1100       | 100   | KFIZ         | Fond du lac, Wis.     |
| 263    | 1140       | 50    | KTBR         | Portland, Oregon        | 273    | 1100       | 50    | KFKA         | Greeley, Colo.        |
| 263    | 1140       | 5     | KTUE         | Houston, Tex.           | 273    | 1100       | 100   | KICK         | Anita, Ia.            |
| 263    | 1140       | Var.  | KWTC         | Santa Ana, Cal.         | 273    | 1100       | 500   | WBAA         | Lafayette, Ind.       |
| 263    | 1140       | 500   | WAAM         | Newark, N. J.           | 273    | 1100       | 500   | WDAE         | Tampa, Fla.           |
| 263    | 1140       | 50    | WABR         | Toledo, Ohio            | 273    | 1100       | 10    | WFAM         | St. Cloud, Minn.      |
| 263    | 1140       | 500   | WCAD         | Canton, N. Y.           | 273    | 1100       | 250   | WIL          | St. Louis, Mo.        |
| 263    | 1140       | 5000  | WCAR         | San Antonio, Texas      | 273    | 1100       | 1000  | WRM          | Urbana, Ill.          |
| 263    | 1140       | 5     | WCBE         | New Orleans, La.        | 273    | 1100       | 250   | WSBF         | St. Louis, Mo.        |
| 263    | 1140       | 100   | WDAG         | Amarillo, Tex.          | 275    | 1090       | 50    | KFBB         | Havre, Mont.          |
| 263    | 1140       | 500   | WDGY         | Minneapolis, Minn.      | 275    | 1090       | 50    | KFDD         | Boise, Idaho          |
| 263    | 1140       | 100   | WRAV         | Yellow Springs, Ohio    | 275    | 1090       | 500   | KFKU         | Lawrence, Kans.       |
| 263    | 1140       | 250   | WSDA         | New York, N. Y.         | 275    | 1090       | 500   | KFSG         | Los Angeles, Cal.     |
| 265    | 1130       | 50    | WKBP         | Battle Creek, Mich.     | 275    | 1090       | 500   | KQV          | Pittsburgh, Pa.       |
| 265.3  | 1130       | 100   | KROX         | Seattle, Wash.          | 275    | 1090       | 50    | WABZ         | New Orleans, La.      |
| 265.3  | 1130       | 500   | WCAH         | Columbus, Ohio          | 275    | 1090       | 500   | WBAK         | Harrisburg, Pa.       |
| 265.3  | 1130       | 100   | WCOC         | Columbus, Miss.         | 275    | 1090       | 250   | WBT          | Charlotte, N. C.      |
| 265.3  | 1130       | 50    | WCOT         | Olneyville, R. I.       | 275    | 1090       | 500   | WCAO         | Baltimore, Md.        |
| 266    | 1130       | 500   | KFPY         | Spokane, Wash.          | 275    | 1090       | 150   | WEAU         | Sioux City, Ia.       |
| 266    | 1130       | 500   | WBCN         | Chicago, Ill.           | 275    | 1090       | 500   | WFAV         | Lincoln, Neb.         |
| 266    | 1130       | 100   | WDEL         | Wilmington, Del.        | 275    | 1090       | 500   | WHAD         | Milwaukee, Wis.       |
| 266    | 1130       | 1000  | WENR         | Chicago, Ill.           | 275    | 1090       | 500   | WHAR         | Atlantic City, N. J.  |
| 266    | 1130       | 50    | WLCI         | Ithaca, N. Y.           | 275    | 1090       | 500   | WJAS         | Pittsburgh, Pa.       |
| 266    | 1130       | 1000  | WMAK         | Lockport, N. Y.         | 275    | 1090       | 30    | WLAP         | Louisville, Ky.       |
| 267.7  | 1120       | 50    | KFRC         | San Francisco, Cal.     | 275    | 1090       | 100   | WMAC         | Cazenovia, N. Y.      |
| 267.7  | 1120       | 500   | WBBC         | Brooklyn, N. Y.         | 275    | 1090       | 5000  | WORD         | Batavia, Ill.         |
| 267.7  | 1120       | 100   | WDAH         | El Paso, Texas          | 275    | 1090       | 50    | WPAK         | Fargo, N. D.          |
| 267.7  | 1120       | 100   | WJBO         | New Orleans, La.        | 275    | 1090       | 500   | WSMK         | Dayton, Ohio          |
| 267.7  | 1120       | 500   | WNOX         | Knoxville, Tenn.        | 275    | 1090       | 5000  | WSWS         | Batavia, Ill.         |
| 267.9  | 1120       | 10    | WBBY         | Charleston, S. C.       | 275    | 1090       | 100   | WWL          | New Orleans, La.      |
| 268    | 1120       | 500   | KFEQ         | St. Joseph, Mo.         | 275.1  | 1090       | 500   | WCAC         | Storrs, Conn.         |
| 268    | 1120       | 100   | WDRG         | New Haven, Conn.        | 275.2  | 1090       | 15    | WOCL         | Jamestown, N. Y.      |
| 268    | 1120       | 700   | WEBW         | Beloit, Wis.            | 277.6  | 1080       | 100   | WABO         | Rochester, N. Y.      |
| 268    | 1120       | 250   | WFBM         | Indianapolis, Ind.      | 277.6  | 1080       | 50    | WMBJ         | Monessen, Pa.         |
| 268    | 1120       | 500   | WJAM         | Cedar Rapids, Ia.       | 277.8  | 1080       | 100   | WFBG         | Altoona, Pa.          |

| Meters | Kilocycles | Power | Call Letters | Location             | Meters | Kilocycles | Power  | Call Letters | Location               |
|--------|------------|-------|--------------|----------------------|--------|------------|--------|--------------|------------------------|
| 278    | 1080       | 100   | KFJM         | Grand Forks, N. D.   | 296.9  | 1010       | 250    | WDXL         | Detroit, Mich.         |
| 278    | 1080       | 50    | KGY          | Lacey, Wash.         | 296.9  | 1010       | 250    | WLBI         | East Wenona, Ill.      |
| 278    | 1080       | 1000  | KUSD         | Vermillion, S. D.    | 299    | 1000       | 250    | WLBZ         | Dover-Foxcroft, Me.    |
| 278    | 1080       | 750   | KWWG         | Brownsville, Tex.    | 299.8  | 1000       | 1000   | KFDY         | Brookings, S. Dak.     |
| 278    | 1080       | 500   | WAAF         | Chicago, Ill.        | 299.8  | 1000       | 10     | KFGQ         | Boone, Iowa            |
| 278    | 1080       | 500   | WCAU         | Philadelphia, Pa.    | 299.8  | 1000       | 1000   | KSL          | Salt Lake City, Utah   |
| 278    | 1080       | 100   | WDZ          | Tuscola, Ill.        | 299.8  | 1000       | 750    | KUOA         | Fayetteville, Ark.     |
| 278    | 1080       | 15    | WGBC         | Memphis, Tenn.       | 299.8  | 1000       | 5000   | WPG          | Atlantic City, N. J.   |
| 278    | 1080       | 100   | WHAM         | Rochester, N. Y.     | 300    | 1000       | 100    | WLBJ         | Cleveland, Ohio        |
| 278    | 1080       | 500   | WHDI         | Minneapolis, Minn.   | 300    | 1000       | 100    | WREA         | Shellington, Pa.       |
| 278    | 1080       | 500   | WLB          | Minneapolis, Minn.   | 302.8  | 990        | 1000   | KTAB         | Oakland, Cal.          |
| 278    | 1080       | 750   | WLBL         | Madison, Wis.        | 302.8  | 990        | 500    | WMSG         | New York, N. Y.        |
| 278    | 1080       | 1000  | WOQ          | Kansas City, Mo.     | 303    | 990        | 1000   | WGN          | Chicago, Ill.          |
| 278    | 1080       | 500   | WRBC         | Valparaiso, Ind.     | 303    | 990        | 4000   | WLIB         | Chicago, Ill.          |
| 279    | 1070       | 250   | WMBD         | Peoria Heights, Ill. | 305.9  | 980        | 500    | KOIL         | Council Bluffs, Ia.    |
| 279    | 1070       | 50    | WMBW         | Youngstown, Ohio     | 305.9  | 980        | 1000   | KOMO         | Seattle, Wash.         |
| 280    | 1070       | 5000  | KFAU         | Boise, Idaho         | 309.1  | 970        | Var.   | KDKA         | Pittsburgh, Pa.        |
| 280    | 1070       | 250   | WKBJ         | St. Petersburg, Fla. | 312.3  | 960        | 500    | WAFD         | Detroit, Mich.         |
| 280    | 1070       | 100   | WMBH         | Chicago, Ill.        | 312.6  | 960        | 1000   | KSBA         | Shreveport, La.        |
| 280.2  | 1070       | 5000  | KFOA         | St. Louis, Mo.       | 315    | 950        | 50     | KGRC         | San Antonio, Tex.      |
| 280.2  | 1070       | 15    | KGCA         | Decorah, Iowa        | 315.6  | 950        | 500    | KFDM         | Beaumont, Tex.         |
| 280.2  | 1070       | 5000  | KMOX         | St. Louis, Mo.       | 315.6  | 950        | 500    | KFWM         | Oakland, Cal.          |
| 280.2  | 1070       | 500   | KOAC         | Corvallis, Oregon    | 315.6  | 950        | 1000   | KPSN         | Pasadena, Cal.         |
| 280.2  | 1070       | 500   | WDWM         | Newark, N. J.        | 315.6  | 950        | 500    | WABC         | Richmond Hill, N. Y.   |
| 280.2  | 1070       | 100   | WNAB         | Boston, Mass.        | 315.6  | 950        | 4000   | WEMC         | Berrien Springs, Mich. |
| 280.2  | 1070       | 15    | WTRL         | Midland Park, N. J.  | 315.6  | 950        | 500    | WGBS         | New York, N. Y.        |
| 281    | 1070       | 15    | KGEM         | El Centro, Calif.    | 315.6  | 950        | 500    | WSBT         | South Bend, Ind.       |
| 282.8  | 1060       | 100   | KSMR         | Santa Maria, Cal.    | 316    | 950        | 25     | WNBR         | Memphis, Tenn.         |
| 282.8  | 1060       | 100   | WKBB         | Joliet, Ill.         | 319    | 940        | 1000   | KOIN         | Sylvan, Oregon         |
| 282.8  | 1060       | 500   | WPSC         | State College, Pa.   | 319    | 940        | 750    | WGR          | Buffalo, N. Y.         |
| 282.8  | 1060       | 5000  | WSM          | Nashville, Tenn.     | 319    | 940        | 100    | WPAB         | Norfolk, Va.           |
| 285    | 1050       | 100   | KGDO         | Dallas, Tex.         | 319    | 940        | 500    | WSMB         | New Orleans, La.       |
| 285    | 1050       | 500   | KOWW         | Walla Walla, Wash.   | 321    | 930        | 250    | WLBW         | Oil City, Pa.          |
| 285    | 1050       | 50    | WALK         | Bathayres, Pa.       | 322    | 930        | 1000   | WBNY         | New York, N. Y.        |
| 285    | 1050       | 500   | WICC         | Bridgeport, Conn.    | 322    | 930        | 100    | WSAR         | Fall River, Mass.      |
| 285    | 1050       | 8     | WKBQ         | New York, N. Y.      | 322.4  | 930        | 5000   | KOA          | Denver, Colo.          |
| 285.5  | 1050       | 1000  | WKAR         | East Lansing, Mich.  | 325.9  | 920        | 100    | KGEM         | Long Beach, Calif.     |
| 285.5  | 1050       | 100   | WKBM         | Newburgh, N. Y.      | 325.9  | 920        | 2000   | WKRC         | Cincinnati, Ohio       |
| 285.5  | 1050       | 1000  | WQAM         | Miami, Fla.          | 325.9  | 920        | 5000   | WSAI         | Cincinnati, Ohio       |
| 286    | 1050       | 50    | WMAN         | Columbus, Ohio       | 327    | 920        | 50     | WDBK         | Cleveland, Ohio        |
| 286    | 1050       | 500   | WREO         | Lansing, Mich.       | 329.8  | 910        | 10,000 | WJAZ         | Chicago, Ill.          |
| 288.3  | 1040       | 5000  | KFKX         | Hastings, Neb.       | 330    | 910        | 50     | KGEQ         | Minneapolis, Minn.     |
| 288.3  | 1040       | 500   | WMBI         | Chicago, Ill.        | 331    | 900        | 100    | KGCB         | Oklahoma City, Okla.   |
| 288.3  | 1040       | 1500  | WSBC         | Chicago, Ill.        | 332.3  | 900        | 100    | WLBG         | Petersburg, Va.        |
| 288.3  | 1040       | 100   | WSOM         | Woodhaven, N. Y.     | 333.1  | 900        | 100    | KGBZ         | York, Nebr.            |
| 290    | 1030       | 250   | KGCU         | Mandan, N. Dak.      | 333.1  | 900        | 500    | KQW          | San Jose, Cal.         |
| 290    | 1030       | 100   | WMAL         | Washington, D. C.    | 333.1  | 900        | Var.   | KTNT         | Muscatine, Iowa        |
| 291.1  | 1030       | 500   | KGDX         | Shreveport, La.      | 333.1  | 900        | 500    | KVOS         | Seattle, Wash.         |
| 291.1  | 1030       | 100   | WBKN         | Brooklyn, N. Y.      | 333.1  | 900        | 5000   | WBZ          | Springfield, Mass.     |
| 291.1  | 1030       | 15    | WMBY         | Bloomington, Ill.    | 333.1  | 900        | 250    | WBZA         | Boston, Mass.          |
| 293.9  | 1020       | 750   | KTBI         | Los Angeles, Cal.    | 335    | 890        | 15     | WLBR         | Belvedere, Ill.        |
| 293.9  | 1020       | 5000  | WAIU         | Columbus, Ohio       | 335    | 890        | 15     | WNBK         | Knoxville, Tenn.       |
| 293.9  | 1020       | 500   | WBMC         | Woodside, N. Y.      | 336.9  | 890        | 500    | KFMX         | Northfield, Minn.      |
| 293.9  | 1020       | 750   | WEAO         | Columbus, Ohio       | 336.9  | 890        | 500    | KNX          | Los Angeles, Cal.      |
| 295    | 1020       | 500   | WARS         | Brooklyn, N. Y.      | 336.9  | 890        | 500    | KRLD         | Dallas, Tex.           |
| 295    | 1020       | 100   | WEPS         | Gloucester, Mass.    | 336.9  | 890        | 500    | WCAL         | Northfield, Minn.      |
| 295    | 1020       | 50    | WRES         | Wollaston, Mass.     | 336.9  | 890        | 1000   | WCAM         | Camden, N. J.          |
| 296    | 1010       | 500   | KWCR         | Cedar Rapids, Ia.    | 336.9  | 890        | 1000   | WJAX         | Jacksonville, Fla.     |
| 296.9  | 1010       | 500   | KPRC         | Houston, Tex.        | 340    | 880        | 1000   | WOKT         | Rochester, N. Y.       |

| Meters | Kilocycles | Power  | Call Letters | Location                  | Meters | Kilocycles | Power  | Call Letters | Location              |
|--------|------------|--------|--------------|---------------------------|--------|------------|--------|--------------|-----------------------|
| 340.7  | 880        | 5000   | KFAB         | Lincoln, Nebr.            | 384.4  | 780        | 500    | WAAW         | Omaha, Neb.           |
| 340.7  | 880        | 20,000 | KGA          | Spokane, Wash.            | 384.4  | 780        | 500    | WGBU         | Fulford, Fla.         |
| 340.7  | 880        | 500    | KSAC         | Manhattan, Kans.          | 384.4  | 780        | 1000   | WGWB         | Milwaukee, Wis.       |
| 340.7  | 880        | 500    | WMCA         | New York, N. Y.           | 384.4  | 780        | 5000   | WLWL         | New York, N. Y.       |
| 342.5  | 870        | 15     | KVI          | Tacoma, Wash.             | 384.4  | 780        | 500    | WMBF         | Miami Beach, Fla.     |
| 344.6  | 870        | 5000   | WCBD         | Zion, Ill.                | 387    | 770        | 500    | KMIC         | Inglewood, Cal.       |
| 345    | 870        | 5000   | WLS          | Chicago, Ill.             | 389.4  | 770        | 1000   | WEAR         | Cleveland, Ohio       |
| 347.8  | 860        | 100    | KGBX         | St. Joseph, Mo.           | 389.4  | 770        | 1000   | WTAM         | Cleveland, Ohio       |
| 348.6  | 860        | 1500   | KOB          | State College, N. Mex.    | 391.5  | 760        | 500    | WODA         | Paterson, N. J.       |
| 348.6  | 860        | 500    | KWSC         | Pullman, Wash.            | 394    | 760        | 100    | WBRS         | Brooklyn, N. Y.       |
| 348.6  | 860        | 500    | WEEI         | Boston, Mass.             | 394.5  | 760        | 1000   | KHQ          | Spokane, Wash.        |
| 348.6  | 860        | 100    | WWVA         | Wheeling, W. Va.          | 394.5  | 760        | 500    | WBET         | Boston, Mass.         |
| 350.6  | 850        | 500    | WCGU         | Lakewood, N. J.           | 394.5  | 760        | 500    | WFI          | Philadelphia, Pa.     |
| 352    | 850        | 100    | KGEZ         | Kalispell, Mont.          | 394.5  | 760        | 500    | WLIT         | Philadelphia, Pa.     |
| 352.5  | 850        | 15     | KUJ          | Seattle, Wash.            | 394.5  | 760        | 5000   | WOAI         | San Antonio, Tex.     |
| 352.7  | 850        | 4000   | KFXB         | Los Angeles, Cal.         | 399.8  | 750        | 1000   | KYA          | San Francisco, Cal.   |
| 352.7  | 850        | 100    | WBMH         | Detroit, Mich.            | 399.8  | 750        | 500    | WHAS         | Louisville, Ky.       |
| 352.7  | 850        | 500    | WJAD         | Waco, Tex.                | 400    | 750        | 500    | KXL          | Portland, Ore.        |
| 352.7  | 850        | 100    | WKY          | Oklahoma City, Okla.      | 400    | 750        | 3500   | WHT          | Chicago, Ill.         |
| 352.7  | 850        | 500    | WNJ          | Newark, N. J.             | 405    | 740        | 500    | WOR          | Newark, N. J.         |
| 352.7  | 850        | 500    | WSYR         | Syracuse, N. Y.           | 405.2  | 740        | 500    | KHJ          | Los Angeles, Cal.     |
| 352.7  | 850        | 1000   | WWJ          | Detroit, Mich.            | 405.2  | 740        | 500    | KSO          | Clarinda, Iowa        |
| 354    | 850        | 250    | WNBK         | Le Roy, N. Y.             | 405.2  | 740        | 500    | WTHO         | Ferndale, Mich.       |
| 355.1  | 840        | 5      | KOLO         | Durango, Colo.            | 410    | 730        | 10     | WMBL         | Lakeland, Fla.        |
| 355.4  | 840        | 500    | WFHH         | Clearwater, Fla.          | 410    | 730        | 15     | WNBQ         | Rochester, N. Y.      |
| 356.4  | 840        | 500    | WOAN         | Lawrenceburg, Tenn.       | 410    | 730        | 20,000 | WOK          | Chicago, Ill.         |
| 356.9  | 840        | 1000   | WFIW         | Hopkinsville, Ky.         | 410.7  | 730        | 500    | WABF         | Kingston, Pa.         |
| 357    | 840        | 10     | WNBI         | Peru, Ill.                | 410.7  | 730        | 1000   | WCRW         | Chicago, Ill.         |
| 360    | 830        | 250    | KSOO         | Sioux Falls, S. D.        | 413    | 730        | 15     | KFCR         | Santa Barbara, Cal.   |
| 360    | 830        | 1000   | WEW          | St. Louis, Mo.            | 416.4  | 720        | 1000   | WBBR         | Rossville, N. Y.      |
| 360    | 830        | 100    | WKBN         | Youngstown, Ohio          | 416.4  | 720        | 5000   | WCCO         | St. Paul-Minn., Minn. |
| 360    | 830        | 10     | WMBK         | Hamilton, Ohio            | 419.3  | 710        | 100    | WJBZ         | Chicago Heights, Ill. |
| 360    | 830        | 500    | WMBS         | Harrisburg, Pa.           | 420    | 710        | 500    | WBRL         | Tilton, N. H.         |
| 360    | 830        | 10     | WRRS         | Racine, Wis.              | 422    | 710        | 100    | KFXF         | Denver, Colo.         |
| 361.2  | 830        | 5000   | KGO          | Oakland, Cal.             | 422.3  | 710        | 2000   | WKRC         | Cincinnati, Ohio      |
| 361.2  | 830        | 1000   | WHN          | New York, N. Y.           | 422.3  | 710        | 5000   | WLW          | Cincinnati, Ohio      |
| 361.2  | 830        | 200    | WKBS         | Galesburg, Ill.           | 428.3  | 700        | 1000   | KPO          | San Francisco, Cal.   |
| 361.2  | 830        | 100    | WPAP         | Cliffside, N.J.           | 428.3  | 700        | 10     | WKDR         | Kenosha, Wis.         |
| 361.2  | 830        | 100    | WQAO         | Cliffside, N. J.          | 428.3  | 700        | 1000   | WSB          | Atlanta, Ga.          |
| 362.5  | 830        | 5000   | WKBW         | Buffalo, N. Y.            | 431    | 690        | 50     | KWLC         | Decorah, Iowa         |
| 365    | 820        | 25     | WRAL         | Ithaca, N. Y.             | 431    | 690        | 1000   | WHAP         | New York, N. Y.       |
| 365.6  | 820        | 1000   | WDAF         | Kansas City, Mo.          | 434    | 690        | 500    | KGCH         | Wayne, Nebr.          |
| 365.6  | 820        | 500    | WHB          | Kansas City, Mo.          | 434.5  | 690        | 1000   | NAA          | Arlington, Va.        |
| 367    | 820        | 500    | WEAN         | Providence, R. I.         | 435.7  | 690        | 1000   | WJAY         | Cleveland, Ohio       |
| 370    | 810        | 2000   | WEBH         | Chicago, Ill.             | 440    | 680        | 250    | KRLO         | Los Angeles, Cal.     |
| 370.2  | 810        | 500    | KMTR         | Los Angeles, Calif.       | 440    | 680        | 1000   | WFLA         | Boca Raton, Fla.      |
| 370.2  | 810        | 1000   | WJJD         | Mooseheart, Ill.          | 440.9  | 680        | 1000   | KLDS         | Kansas City, Mo.      |
| 372    | 810        | 50     | WGM          | Jeanette, Pa.             | 440.9  | 680        | 1000   | KMJP         | Kansas City, Mo.      |
| 374    | 800        | 500    | WRNY         | New York, N. Y.           | 440.9  | 680        | 500    | WDWF-WLSI    | Cranston, R. I.       |
| 374.8  | 800        | 500    | KFBU         | Laramie, Wyo.             | 440.9  | 680        | 1000   | WMAF         | Dartmouth, Mass.      |
| 375    | 800        | 750    | KTHS         | Hot Springs Nat. Pk., Ark | 440.9  | 680        | 500    | WOS          | Jefferson City, Mo.   |
| 375    | 800        | 500    | KVOO         | Bristow, Okla.            | 442.4  | 680        | 1000   | WGL          | New York, N. Y.       |
| 379.5  | 790        | 50,000 | WGY          | Schenectady, N. Y.        | 444    | 680        | 10     | KSCJ         | Sioux City, Iowa      |
| 379.5  | 790        | 1000   | WHAZ         | Troy, N. Y.               | 447    | 670        | 1000   | KEX          | Portland, Ore.        |
| 380    | 790        | 10     | KLIT         | Portland, Ore.            | 447.5  | 670        | 1000   | WMAQ         | Chicago, Ill.         |
| 384    | 780        | 50     | KGFG         | Oklahoma City, Okla.      | 447.5  | 670        | 500    | WNAC         | Boston, Mass.         |
| 384.4  | 780        | 20,000 | KJR          | Seattle, Wash.            | 447.5  | 670        | 1000   | WQJ          | Chicago, Ill.         |
| 384.4  | 780        | 500    | KLZ          | Denver, Colo.             | 450    | 670        | 15     | KGFM         | Yuba City, Cal.       |



| Meters | Kilocycles | Power     | Call Letters | Location           | Meters | Kilocycles | Power | Call Letters | Location            |
|--------|------------|-----------|--------------|--------------------|--------|------------|-------|--------------|---------------------|
| 454.3  | 660        | 1000      | KFOA         | Seattle, Wash.     | 499.7  | 600        | 500   | KFRU         | Columbia, Mo.       |
| 454.3  | 660        | 1500      | KTW          | Seattle, Wash.     | 499.7  | 600        | 500   | WMC          | Memphis, Tenn.      |
| 455    | 660        | 50,000    | WJZ          | New York, N. Y.    | 500    | 600        | 500   | WCSH         | Portland, Me.       |
| 461    | 650        | 1000      | WAPI         | Auburn, Ala.       | 508.2  | 590        | 2500  | KFQB         | Fort Worth, Tex.    |
| 461.3  | 650        | 1000-2500 | KFNF         | Shenandoah, Ia.    | 508.2  | 590        | 500   | KLX          | Oakland, Cal.       |
| 461.3  | 650        | 500       | KMA          | Shenandoah, Ia.    | 508.2  | 590        | 500   | WIP          | Philadelphia, Pa.   |
| 461.3  | 650        | 500       | WCAE         | Pittsburgh, Pa.    | 508.2  | 590        | 500   | WOO          | Philadelphia, Pa.   |
| 467    | 640        | 5000      | KFI          | Los Angeles, Cal.  | 516.9  | 580        | 1000  | KGEF         | Los Angeles, Cal.   |
| 468.5  | 640        | 1000      | WRC          | Washington, D. C.  | 516.9  | 580        | 5000  | WCX          | Pontiac, Mich.      |
| 472.7  | 630        | 1000      | WKBO         | Jersey City, N. J. | 516.9  | 580        | 5000  | WJR          | Detroit, Mich.      |
| 475.9  | 630        | 1500      | WBAP         | Fort Worth, Tex.   | 516.9  | 580        | 250   | WJUG         | New York, N. Y.     |
| 475.9  | 630        | 500       | WFAA         | Dallas, Tex.       | 516.9  | 580        | 500   | WSEA         | Virginia Beach, Va. |
| 475.9  | 630        | 500       | WMVM         | Newark, N. J.      | 521    | 580        | 50    | KPCB         | Seattle, Wash.      |
| 475.9  | 630        | 500       | WTIC         | Hartford, Conn.    | 526    | 570        | 5000  | WHO          | Des Moines, Iowa    |
| 480    | 620        | 50        | WLDM         | Boston, Mass.      | 526    | 570        | 1000  | WNYC         | New York, N. Y.     |
| 483.6  | 620        | 500       | WJAR         | Providence, R. I.  | 526    | 570        | 1000  | WOW          | Omaha, Nebr.        |
| 483.6  | 620        | 5000      | WOC          | Davenport, Ia.     | 535    | 560        | 250   | KELW         | Burbank, Cal.       |
| 484    | 620        | 500       | WSUI         | Iowa City, Ia.     | 535.4  | 560        | 1000  | WHA          | Madison, Wis.       |
| 491.5  | 610        | 1000      | KGW          | Portland, Oregon   | 535.4  | 560        | 3500  | KYW          | Chicago, Ill.       |
| 491.5  | 610        | 1500      | WCFL         | Chicago, Ill.      | 545.1  | 550        | 500   | KFUO         | St. Louis, Mo.      |
| 491.5  | 610        | 5000      | WEAF         | New York, N. Y.    | 545.1  | 550        | 500   | KSD          | St. Louis, Mo.      |
| 495    | 610        | 15        | WNBL         | Bloomington, Ill.  | 545.1  | 550        | 500   | WTAG         | Worcester, Mass.    |
| 499.6  | 600        | 100       | KRSC         | Seattle, Wash.     | 555.2  | 540        | 5     | WOBB         | Chicago, Ill.       |

*This list has been corrected up to and including April 30th, 1927*



GUY LOMBARDO'S  
ROYAL CANADIANS  
WTAM  
CLEVELAND, OHIO



EUNICE HOFFER  
ORGANIST  
WB B M  
CHICAGO, ILL.



NATE CALDWELL  
CHIEF ANNOUNCER  
WB B M  
CHICAGO, ILL.



GEO. JUNKIN  
DIRECTOR-ANNOUNCER  
KMOX  
ST. LOUIS, MO.



ETHEL & JANICE  
SINGERS  
KMOX  
ST. LOUIS, MO.



STEWART  
WARNER  
LIGHT OPERAGO  
WB B M  
CHICAGO, ILL.



J.F. FRENKEL  
ANNOUNCER  
WCOA  
PENSACOLA, FLA

# RADIO BROADCAST STATIONS OF THE UNITED STATES

## By States and Cities

| State and City            | Call Letters | Wave Length | Power | State and City              | Call Letters | Wave Length | Power |
|---------------------------|--------------|-------------|-------|-----------------------------|--------------|-------------|-------|
| <b>ALABAMA</b>            |              |             |       |                             |              |             |       |
| Auburn                    | WAPI         | 461         | 1000  | Oxnard                      | KFYF         | 205.4       | 10    |
| Birmingham                | WBRC         | 248         | 50    | Pasadena                    | KPPC         | 229         | 50    |
| Birmingham                | WKBC         | 225         | 10    | Pasadena                    | KPSN         | 315.6       | 1000  |
| Gadsden                   | WJBY         | 270.1       | 100   | Sacramento                  | KFBK         | 248         | 100   |
| Montgomery                | WIBZ         | 230.6       | 10    | San Bernardino              | KFWC         | 211.1       | 200   |
| <b>ARIZONA</b>            |              |             |       |                             |              |             |       |
| Flagstaff                 | KFXV         | 205.4       | 10    | San Diego                   | KFBC         | 215.7       | 50    |
| Phoenix                   | KFAD         | 272.6       | 100   | San Diego                   | KFSD         | 245.8       | 1000  |
| Phoenix                   | KFCB         | 238         | 125   | San Francisco               | KFRC         | 267.7       | 50    |
| Prescott                  | KPJM         | 215         | 15    | San Francisco               | KGTT         | 207         | 50    |
| Tucson                    | KGAR         | 243.8       | 100   | San Francisco               | KFWI         | 250         | 500   |
| <b>ARKANSAS</b>           |              |             |       |                             |              |             |       |
| Fayetteville              | KUOA         | 299.8       | 750   | San Francisco               | KJBS         | 220         | 5     |
| Hot Springs National Park | KTHS         | 375         | 750   | San Francisco               | KPO          | 428.3       | 1000  |
| Newark                    | KGCG         | 234.2       | 100   | San Francisco               | KYA          | 399.8       | 1000  |
| <b>CALIFORNIA</b>         |              |             |       |                             |              |             |       |
| Alma (Holy City)          | KFQU         | 230.6       | 250   | San Jose                    | KFAF         | 217.3       | 50    |
| Avalon, Catalina Island   | KFWO         | 211.1       | 250   | San Jose                    | KQW          | 333.1       | 500   |
| Berkeley                  | KRE          | 256         | 100   | Santa Ana                   | KWTC         | 263         | Var.  |
| Burbank                   | KELW         | 535         | 250   | Santa Barbara               | KFCR         | 413         | 15    |
| Burlingame                | KFOB         | 226         | 50    | Santa Maria                 | KSMR         | 282.8       | 100   |
| El Centro                 | KGEN         | 281         | 15    | Santa Monica                | KNRC         | 208         | 750   |
| Eureka                    | KFWH         | 254         | 100   | Stockton                    | KGDM         | 217.3       | 5     |
| Fresno                    | KMJ          | 234         | 50    | Stockton                    | KWG          | 248         | 50    |
| Hollywood                 | KFQZ         | 226         | 500   | Venice                      | KFVD         | 208         | 50    |
| Hollywood                 | KFWB         | 252         | 750   | Yuba City                   | KGFM         | 450         | 15    |
| Inglewood                 | KMIC         | 387         | 500   | <b>COLORADO</b>             |              |             |       |
| La Crescenta              | KGFH         | 218.8       | 100   | Colorado Springs            | KFUM         | 239.9       | 100   |
| Long Beach                | KFON         | 233         | 500   | Denver                      | KFEL         | 254         | 250   |
| Long Beach                | KGER         | 325.9       | 100   | Denver                      | KFUP         | 234         | 50    |
| Los Angeles               | KFI          | 467         | 5000  | Denver                      | KFVR         | 244         | 50    |
| Los Angeles               | KFPR         | 231         | 500   | Denver                      | KFXF         | 422         | 100   |
| Los Angeles               | KFSG         | 275         | 500   | Denver                      | KGEY         | 204         | 15    |
| Los Angeles               | KFXB         | 352.7       | 4000  | Denver                      | KLZ          | 384.4       | 500   |
| Los Angeles               | KGEF         | 516.9       | 1000  | Denver                      | KOA          | 322.4       | 5000  |
| Los Angeles               | KGFJ         | 218         | 100   | Durango                     | KOLO         | 355.1       | 5     |
| Los Angeles               | KHJ          | 405.2       | 500   | Edgewater                   | KFXJ         | 215.7       | 15    |
| Los Angeles               | KMTR         | 370.2       | 500   | Ft. Morgan                  | KGEW         | 256         | 10    |
| Los Angeles               | KNX          | 336.9       | 500   | Greeley                     | KFKA         | 273         | 50    |
| Los Angeles               | KRLO         | 440         | 250   | Gunnison                    | KFHA         | 252         | 50    |
| Los Angeles               | KTBI         | 293.9       | 750   | Pueblo                      | KGDP         | 260.7       | 10    |
| Lower Lake                | KFEU         | 222.1       | 50    | Trinidad                    | KFBS         | 238         | 15    |
| Oakland                   | KFUS         | 256         | 50    | Trinidad                    | KGFL         | 222         | 50    |
| Oakland                   | KFWM         | 315.6       | 500   | Yuma                        | KGEK         | 252         | 10    |
| Oakland                   | KGO          | 361.2       | 5000  | <b>CONNECTICUT</b>          |              |             |       |
| Oakland                   | KLS          | 250         | 250   | Bridgeport                  | WICC         | 285         | 500   |
| Oakland                   | KLX          | 508.2       | 500   | Hartford                    | WTIC         | 475.9       | 500   |
| Oakland                   | KTAB         | 302.8       | 1000  | New Haven                   | WDRC         | 268         | 100   |
| Oakland                   | KZM          | 240         | 1000  | Storrs                      | WCAC         | 275.1       | 500   |
|                           |              |             |       | <b>DELAWARE</b>             |              |             |       |
|                           |              |             |       | Wilmington                  |              |             |       |
|                           |              |             |       | <b>DISTRICT OF COLUMBIA</b> |              |             |       |
|                           |              |             |       | Washington                  |              |             |       |

| State and City                   | Call Letters | Wave Length | Power  | State and City  | Call Letters | Wave Length | Power  |
|----------------------------------|--------------|-------------|--------|-----------------|--------------|-------------|--------|
| <b>DISTRICT OF COLUMBIA—Con.</b> |              |             |        |                 |              |             |        |
| Washington                       | WRC          | 468.5       | 1000   | Chicago         | WIBW         | 220         | 100    |
| Washington                       | WRHF         | 256         | 50     | Chicago         | WJAZ         | 329.8       | 10,000 |
| <b>FLORIDA</b>                   |              |             |        | Chicago         | WJBT         | 238         | 10     |
| Boca Raton                       | WFLA         | 440         | 1000   | Chicago         | WKBA         | 209.7       | 200    |
| Clearwater                       | WFHH         | 355.4       | 500    | Chicago         | WKBG         | 215.7       | 100    |
| Fulford                          | WGBU         | 384.4       | 500    | Chicago         | WKBI         | 220.6       | 50     |
| Jacksonville                     | WJAX         | 336.9       | 1000   | Chicago         | WLBN         | 225         | 100    |
| Lakeland                         | WMBL         | 410         | 10     | Chicago         | WLJB         | 303         | 4000   |
| Miami Beach                      | WIOD         | 247.8       | 1000   | Chicago         | WLS          | 345         | 5000   |
| Miami Beach                      | WMBF         | 384.4       | 500    | Chicago         | WLTS         | 258.5       | 100    |
| Miami                            | WQAM         | 285.5       | 1000   | Chicago         | WMAQ         | 447.5       | 1000   |
| Orlando                          | WOCB         | 213         | 250    | Chicago         | WMBB         | 250         | 500    |
| Pensacola                        | WCOA         | 252         | 500    | Chicago         | WMBH         | 280         | 100    |
| St. Petersburg                   | WHBN         | 238         | 10     | Chicago         | WMBI         | 288.3       | 500    |
| St. Petersburg                   | WJBB         | 254         | 250    | Chicago         | WOBB         | 555.2       | 5      |
| St. Petersburg                   | WKBJ         | 280         | 250    | Chicago         | WOK          | 410         | 5000   |
| Tampa                            | WDAE         | 273         | 500    | Chicago         | WPCC         | 258         | 750    |
| Tampa                            | WMBR         | 250         | 100    | Chicago         | WQJ          | 447.5       | 1000   |
| Winter Park                      | WDBO         | 240         | 500    | Chicago         | WSAX         | 268         | 100    |
| <b>GEORGIA</b>                   |              |             |        | Chicago         | WSBC         | 288.3       | 1500   |
| Atlanta                          | WDBE         | 270         | 100    | Chicago         | WWAE         | 241.8       | 500    |
| Atlanta                          | WGST         | 270         | 500    | Chicago Heights | WJBZ         | 419.3       | 100    |
| Atlanta                          | WSB          | 428.3       | 1000   | Decatur         | WBAO         | 270         | 100    |
| Macon                            | WMAZ         | 261         | 500    | Decatur         | WJBL         | 270         | 500    |
| <b>IDAHO</b>                     |              |             |        | East Wenona     | WLBI         | 296.9       | 250    |
| Boise                            | KFAU         | 280         | 5000   | Evanston        | WEHS         | 202.6       | 10     |
| Boise                            | KFDD         | 275         | 50     | Forest Park     | WNBA         | 238         | 500    |
| Kellogg                          | KFEY         | 233         | 10     | Galesburg       | WFBZ         | 254         | 20     |
| Pocatello                        | KSEI         | 260.7       | 500    | Galesburg       | WKBS         | 361.2       | 200    |
| <b>ILLINOIS</b>                  |              |             |        | Galesburg       | WLBO         | 243         | 100    |
| Atwood                           | WLBO         | 230.6       | 25     | Galesburg       | WRAM         | 243.8       | 100    |
| Batavia                          | WORD         | 275         | 5000   | Harrisburg      | WEBQ         | 225.4       | 100    |
| Batavia                          | WSWS         | 275         | 5000   | Joliet          | WCLS         | 214.2       | 150    |
| Belvedere                        | WLBR         | 335         | 15     | Joliet          | WJBA         | 206.8       | 50     |
| Bloomington                      | WMBY         | 291.1       | 15     | Joliet          | WKBB         | 282.8       | 100    |
| Bloomington                      | WNBL         | 495         | 15     | LaSalle         | WJBC         | 234.2       | 100    |
| Carthage                         | WCAZ         | 246         | 50     | Mooseheart      | WJJD         | 370.2       | 1000   |
| Chicago                          | KYW          | 535.4       | 5000   | Peoria Heights  | WMBD         | 279         | 250    |
| Chicago                          | WAAF         | 278         | 500    | Peru            | WNBI         | 357         | 10     |
| Chicago                          | WBBM         | 225.4       | 10,000 | Quincy          | WTAD         | 236         | 50     |
| Chicago                          | WBBZ         | 215.7       | 50     | Rockford        | KFLV         | 229         | 100    |
| Chicago                          | WBCN         | 266         | 500    | Rock Island     | WHBF         | 222         | 100    |
| Chicago                          | WCFL         | 491.5       | 1500   | Streator        | WTAX         | 231         | 50     |
| Chicago                          | WCRW         | 410.7       | 1000   | Tuscola         | WDZ          | 278         | 100    |
| Chicago                          | WEBH         | 370         | 2000   | Urbana          | WILL         | 272.6       | 1000   |
| Chicago                          | WEDC         | 250         | 1000   | Urbana          | WRM          | 273         | 1000   |
| Chicago                          | WENR         | 266         | 1000   | Waukegan        | WPEP         | 212.6       | 500    |
| Chicago                          | WFKB         | 217.3       | 1000   | Zion            | WCBD         | 344.6       | 5000   |
| Chicago                          | WGES         | 250         | 500    | <b>INDIANA</b>  |              |             |        |
| Chicago                          | WGN          | 303         | 1000   | Anderson        | WHBU         | 218.8       | 10     |
| Chicago                          | WHBL         | 215.7       | 100    | Brookville      | WKBV         | 236.1       | 250    |
| Chicago                          | WHBM         | 215.7       | 100    | Crown Point     | WLBT         | 230         | 100    |
| Chicago                          | WHFC         | 258.5       | 150    | Culver          | WCMA         | 258.5       | 500    |
| Chicago                          | WHT          | 400         | 3500   | Evansville      | WGBF         | 236.1       | 500    |
| Chicago                          | WIBJ         | 215.7       | 100    | Fort Wayne      | WCWK         | 234         | 500    |
| Chicago                          | WIBM         | 215.7       | 10     | Fort Wayne      | WOWO         | 227         | 10,000 |
| Chicago                          | WIBO         | 226         | 5000   | Huntington      | WHOG         | 241.8       | 15     |
|                                  |              |             |        | Indianapolis    | WFBM         | 268         | 250    |
|                                  |              |             |        | Indianapolis    | WKBF         | 244         | 500    |

| State and City      | Call Letters | Wave Length | Power     | State and City       | Call Letters | Wave Length | Power |
|---------------------|--------------|-------------|-----------|----------------------|--------------|-------------|-------|
| <b>INDIANA—Con.</b> |              |             |           | <b>Shreveport</b>    |              |             |       |
| Kokomo              | WJAK         | 254         | 50        | Shreveport           | KRAC         | 220         | 500   |
| Lafayette           | WBAA         | 273         | 500       |                      | KSBA         | 312.6       | 1000  |
| Laport              | WRAF         | 223.8       | 100       | <b>MAINE</b>         |              |             |       |
| Muncie              | WLBC         | 223.7       | 5         | Bangor               | WABI         | 239.9       | 100   |
| South Bend          | WSBT         | 315.6       | 500       | Dover-Foxcroft       | WLBZ         | 299         | 250   |
| Valparaiso          | WRBC         | 278         | 500       | Orono                | WGBX         | 234.2       | 500   |
| <b>IOWA</b>         |              |             |           | Portland             | WCSH         | 500         | 500   |
| Ames                | WOI          | 270         | 5000      | <b>MARYLAND</b>      |              |             |       |
| Anita               | KICK         | 273         | 100       | Baltimore            | WBAL         | 246         | 5000  |
| Boone               | KFGQ         | 300         | 10        | Baltimore            | WCAO         | 275         | 500   |
| Burlington          | WIAS         | 254         | 100       | Baltimore            | WCBM         | 229         | 100   |
| Cedar Rapids        | KWCR         | 296         | 500       | Baltimore            | WFBR         | 254         | 100   |
| Cedar Rapids        | WJAM         | 268         | 500       | Tokoma Park          | WBES         | 222         | 100   |
| Clarinda            | KSO          | 405.2       | 500       | <b>MASSACHUSETTS</b> |              |             |       |
| Council Bluffs      | KOIL         | 305.9       | 500       | Boston               | WATT         | 243.8       | 100   |
| Cresco              | KGDJ         | 214.2       | 7¼        | Boston               | WBET         | 394.5       | 500   |
| Davenport           | WOC          | 483.6       | 5000      | Boston               | WBZA         | 333.1       | 250   |
| Decorah             | KGCA         | 280.2       | 15        | Boston               | WEEI         | 348.6       | 500   |
| Decorah             | KWLC         | 431         | 50        | Boston               | WLBM         | 480         | 50    |
| Des Moines          | WHIO         | 526         | 5000      | Boston               | WNAB         | 280.2       | 100   |
| Fort Dodge          | KFJY         | 246         | 100       | Boston               | WNAC         | 447.5       | 500   |
| Iowa City           | KFGB         | 223.7       | 10        | Boston               | WSSH         | 261         | 100   |
| Iowa City           | WSUI         | 484         | 500       | Chelsea              | WRSC         | 270.1       | 15    |
| Le Mars             | KWUC         | 252         | 1500      | Dartmouth            | WMAF         | 440.9       | 1000  |
| Marshalltown        | KFJB         | 248         | 15        | Fall River           | WSAR         | 322         | 100   |
| Muscatine           | KPNP         | 256         | 100       | Gloucester           | WEPS         | 295         | 100   |
| Muscatine           | KTNT         | 333.1       | Var.      | Medford Hillside     | WARC         | 261         | 100   |
| Oskaloosa           | KFHL         | 248         | 10        | New Bedford          | WNBH         | 248         | 250   |
| Shenandoah          | KFNF         | 461.3       | 1000-2500 | Somerville           | WAGS         | 250         | 5     |
| Shenandoah          | KMA          | 461.3       | 500       | Springfield          | WBZ          | 333.1       | 5000  |
| Sioux City          | KFMR         | 261         | 100       | Taunton              | WAIT         | 229         | 10    |
| Sioux City          | KSCJ         | 444         | 10        | Webster              | WKBE         | 270.1       | 100   |
| Sioux City          | WEAU         | 275         | 150       | Wellesley Hills      | WBSO         | 242         | 100   |
| <b>KANSAS</b>       |              |             |           | Wollaston            | WRRES        | 295         | 50    |
| Concordia           | KGCN         | 235         | 50        | Worcester            | WTAG         | 545.1       | 500   |
| Independence        | KFVG         | 236         | 15        | <b>MICHIGAN</b>      |              |             |       |
| Lawrence            | KFKU         | 275         | 500       | Battle Creek         | WKBP         | 265         | 50    |
| Manhattan           | KSAC         | 340.7       | 500       | Bay City             | WSKC         | 260.7       | 500   |
| Milford             | KFKB         | 218.8       | 3500      | Berrien Springs      | WEMC         | 315.6       | 4000  |
| Wichita             | KFH          | 241.8       | 50        | Detroit              | WAFD         | 312.3       | 500   |
| Wichita             | KFOT         | 231         | 50        | Detroit              | WBMH         | 352.7       | 100   |
| <b>KENTUCKY</b>     |              |             |           | Detroit              | WDXL         | 296.9       | 250   |
| Hopkinsville        | WFIW         | 356.9       | 1000      | Detroit              | WJR          | 516.9       | 5000  |
| Louisville          | WHAS         | 399.8       | 500       | Detroit              | WMBC         | 256.4       | 100   |
| Louisville          | WLAP         | 275         | 30        | Detroit              | WWJ          | 352.7       | 1000  |
| <b>LOUISIANA</b>    |              |             |           | East Lansing         | WKAR         | 285.5       | 1000  |
| New Orleans         | WABZ         | 275         | 50        | Escanaba             | WRAK         | 256.3       | 100   |
| New Orleans         | WCBE         | 263         | 5         | Ferndale             | WTHO         | 405.2       | 1000  |
| New Orleans         | WJBO         | 267.7       | 100       | Flint                | WFDF         | 234         | 100   |
| New Orleans         | WJBW         | 270         | 20        | Grand Rapids         | WASH         | 256.4       | 500   |
| New Orleans         | WKBT         | 252         | 50        | Grand Rapids         | WOOD         | 241.8       | 1000  |
| New Orleans         | WSMB         | 319         | 500       | Iron Mountain        | WLBY         | 249.9       | 50    |
| New Orleans         | WWL          | 275         | 100       | Lansing              | WREO         | 286         | 500   |
| Pineville           | KFWU         | 238         | 100       | Lapeer               | WMPC         | 202         | 15    |
| Shreveport          | KFDX         | 236.1       | 100       | Ludington            | WKBZ         | 256         | 15    |
| Shreveport          | KGDX         | 291.1       | 500       | Monroe               | WKBL         | 252         | 15    |
|                     |              |             |           | Mount Clemens        | WABX         | 246         | 500   |

| State and City       | Call Letters | Wave Length | Power | State and City       | Call Letters | Wave Length | Power |
|----------------------|--------------|-------------|-------|----------------------|--------------|-------------|-------|
| <b>MICHIGAN—Con.</b> |              |             |       |                      |              |             |       |
| Mount Clemens        | WGHP         | 270         | 1500  | Missoula             | KUOM         | 244         | 500   |
| Owosso               | WSMH         | 240         | 20    | Vida                 | KG CX        | 240         | 10    |
| Petoskey             | WBBP         | 238         | 100   | <b>NEBRASKA</b>      |              |             |       |
| Pontiac              | WCX          | 516.9       | 5000  | Central City         | KGES         | 205.4       | 10    |
| Royal Oak            | WAGM         | 225.4       | 50    | Clay Center          | KMMJ         | 229         | 1000  |
| Ypsilanti            | WJBK         | 233         | 10    | David City           | KFOR         | 226         | 100   |
| <b>MINNESOTA</b>     |              |             |       | Grand Island         | KGEO         | 271         | 50    |
| Barrett              | KGDE         | 232.4       | 50    | Hastings             | KFKX         | 288.3       | 5000  |
| Collegeville         | WFBJ         | 236         | 100   | Humboldt             | KGDW         | 241.8       | 100   |
| Fairmont             | KFVN         | 227         | 50    | Lincoln              | KFAB         | 340.7       | 5000  |
| Hallock              | KGFK         | 225         | 100   | Lincoln              | WFAV         | 275         | 500   |
| Minneapolis          | KFDZ         | 231         | 10    | Norfolk              | WJAG         | 270         | 200   |
| Minneapolis          | KGEQ         | 330         | 50    | Omaha                | KFOX         | 248         | 100   |
| Minneapolis          | WAMD         | 243.8       | 5000  | Omaha                | KOCH         | 258         | 500   |
| Minneapolis          | WDGY         | 263         | 500   | Omaha                | WAAW         | 384.4       | 500   |
| Minneapolis          | WHDI         | 278         | 500   | Omaha                | WNAL         | 258         | 50    |
| Minneapolis          | WLB          | 278         | 500   | Omaha                | WOW          | 526         | 1000  |
| Minneapolis          | WRHM         | 252         | 1000  | Shelby               | KGBY         | 202.6       | 50    |
| Northfield           | KFMX         | 336.9       | 500   | University Place     | WCAJ         | 254         | 500   |
| Northfield           | WCAL         | 336.9       | 500   | Wayne                | KGCH         | 434         | 500   |
| St. Cloud            | WFAM         | 273         | 10    | York                 | KGBZ         | 333.1       | 100   |
| St. Paul             | KFOY         | 252         | 50    | <b>NEW HAMPSHIRE</b> |              |             |       |
| St. Paul             | WMBE         | 220         | 5     | Laconia              | WKAV         | 223.8       | 100   |
| St. Paul—Minneapolis | WCCO         | 416.4       | 5000  | Tilton               | WBRL         | 420         | 500   |
| <b>MISSISSIPPI</b>   |              |             |       | <b>NEW JERSEY</b>    |              |             |       |
| Columbus             | WCOC         | 265.3       | 100   | Atlantic City        | WHAR         | 275         | 500   |
| Oxford (near)        | WCBH         | 242         | 50    | Atlantic City        | WPG          | 299.8       | 5000  |
| <b>MISSOURI</b>      |              |             |       | Camden               | WCAM         | 336.9       | 1000  |
| Cape Girardeau       | KFVS         | 224         | 50    | Cliffside            | WPAP         | 361.2       | 100   |
| Cartersville         | KFPW         | 258         | 20    | Cliffside            | WQAO         | 361.2       | 100   |
| Columbia             | KFRU         | 499.7       | 500   | Elizabeth            | WIBS         | 202.6       | 10    |
| Jefferson City       | WOS          | 440.9       | 500   | Jersey City          | WAAT         | 235         | 500   |
| Kansas City          | KLDS         | 440.9       | 1000  | Jersey City          | WKBO         | 472.7       | 1000  |
| Kansas City          | KMJP         | 440.9       | 1000  | Lakewood             | WCGU         | 350.6       | 500   |
| Kansas City          | KWKC         | 236         | 100   | Lambertville         | WTAZ         | 261         | 15    |
| Kansas City          | WDAF         | 365.6       | 1000  | Midland Park         | WTRL         | 280.2       | 15    |
| Kansas City          | WHB          | 365.6       | 500   | Newark               | WAAM         | 263         | 500   |
| Kansas City          | WLBF         | 211.1       | 25    | Newark               | WDWM         | 280.2       | 500   |
| Kansas City          | WOQ          | 278         | 1000  | Newark               | WGCP         | 252         | 500   |
| Kirksville           | KFKZ         | 226         | 75    | Newark               | WMVM         | 475.9       | 500   |
| Moberly              | KFFP         | 242         | 50    | Newark               | WNJ          | 352.7       | 500   |
| St. Joseph           | KFEQ         | 268         | 2000  | Newark               | WOR          | 405         | 500   |
| St. Joseph           | KGBX         | 347.8       | 100   | North Plainfield     | WEAM         | 261         | 250   |
| St. Louis            | KFQA         | 280.2       | 5000  | Paterson             | WODA         | 391.5       | 500   |
| St. Louis            | KFUO         | 545.1       | 500   | Red Bank             | WJBI         | 218.8       | 250   |
| St. Louis            | KFVE         | 240         | 5000  | Trenton              | WOAX         | 240         | 500   |
| St. Louis            | KFWF         | 214.2       | 500   | Union City           | WBMS         | 223.7       | 100   |
| St. Louis            | KMOX         | 280.2       | 5000  | <b>NEW MEXICO</b>    |              |             |       |
| St. Louis            | KSD          | 545.1       | 500   | Albuquerque          | KFLR         | 254         | 100   |
| St. Louis            | WEW          | 360         | 1000  | Albuquerque          | KFVY         | 250         | 10    |
| St. Louis            | WIL          | 273         | 250   | State College        | KOB          | 348.6       | 1500  |
| St. Louis            | WMAY         | 248         | 100   | <b>NEW YORK</b>      |              |             |       |
| St. Louis            | WSBF         | 273         | 250   | Auburn               | WMBO         | 238         | 200   |
| <b>MONTANA</b>       |              |             |       | Bay Shore            | WRST         | 215.7       | 150   |
| Havre                | KFBB         | 275         | 50    | Brooklyn             | WARS         | 295         | 500   |
| Kalispell            | KGEZ         | 352         | 100   | Brooklyn             | WBBC         | 267.7       | 500   |
|                      |              |             |       | Brooklyn             | WBKN         | 291.1       | 100   |

| State and City       | Call Letters | Wave Length | Power  | State and City        | Call Letters | Wave Length | Power  |
|----------------------|--------------|-------------|--------|-----------------------|--------------|-------------|--------|
| <b>NEW YORK—Con.</b> |              |             |        | <b>Schenectady</b>    |              |             |        |
| Brooklyn             | WBRS         | 394         | 100    | Syracuse              | WGY          | 379.5       | 50,000 |
| Brooklyn             | WFRL         | 205.4       | 100    | Syracuse              | WFBL         | 252         | 500    |
| Brooklyn             | WLBE         | 230.6       | 100    | Syracuse              | WSYR         | 352.7       | 500    |
| Brooklyn             | WMBQ         | 210         | 100    | Troy                  | WHAZ         | 379.5       | 1000   |
| Brooklyn             | WTRC         | 239.9       | 100    | Utica                 | WIBX         | 234.2       | 150    |
| Buffalo              | WEBR         | 244         | 100    | Woodhaven             | WSOM         | 288.3       | 100    |
| Buffalo              | WGR          | 319         | 750    | Woodside              | WBMC         | 293.9       | 500    |
| Buffalo              | WKBW         | 362.5       | 5000   | Woodside              | WWRL         | 258.5       | 100    |
| Buffalo              | WPDQ         | 205.4       | 100    | <b>NORTH CAROLINA</b> |              |             |        |
| Buffalo              | WSVS         | 219         | 50     | Asheville             | WWNC         | 254         | 1000   |
| Canton               | WCAD         | 263         | 500    | Charlotte             | WBT          | 275         | 250    |
| Cazenovia            | WMAC         | 275         | 100    | Greensboro            | WNRC         | 224         | 500    |
| Endicott             | WNBF         | 205.4       | 50     | Raleigh               | WRCO         | 252         | 250    |
| Farmingdale          | WLBH         | 230         | 30     | <b>NORTH DAKOTA</b>   |              |             |        |
| Flushing             | WIBI         | 218.8       | 50     | Aneta                 | KGFN         | 222.1       | 15     |
| Freeport             | WGBB         | 244         | 100    | Bismarck              | KFYR         | 248         | 250    |
| Ithaca               | WEAI         | 254         | 250    | Devils Lake           | KDLR         | 231         | 5      |
| Ithaca               | WLGI         | 266         | 50     | Fargo                 | WDAY         | 261         | 500    |
| Ithaca               | WRAL         | 365         | 25     | Fargo                 | WPAK         | 275         | 50     |
| Jamaica              | WMRJ         | 227.1       | 10     | Grand Forks           | KFJM         | 278         | 100    |
| Jamestown            | WOCL         | 275.2       | 15     | Jamestown             | KGEL         | 225         | 50     |
| Kingston             | WDBZ         | 233         | 10     | Mandan                | KGCU         | 290         | 250    |
| Le Roy               | WNBK         | 354         | 250    | <b>OHIO</b>           |              |             |        |
| Lockport             | WMAK         | 266         | 1000   | Akron                 | WADC         | 258         | 500    |
| Long Island City     | WLBX         | 230.6       | 250    | Ashland               | WLBP         | 220.4       | 15     |
| Manchester           | WCOM         | 252         | 100    | Ashtabula             | WJPW         | 239.9       | 15     |
| Newburgh             | WKBM         | 285.5       | 100    | Bellefontaine         | WHBD         | 222         | 100    |
| New York             | WBNY         | 322         | 1000   | Cambridge             | WEBE         | 234         | 10     |
| New York             | WEAF         | 491.5       | 5000   | Canton                | WHBC         | 254         | 10     |
| New York             | WEBJ         | 272.6       | 1000   | Cincinnati            | WAAD         | 258         | 25     |
| New York             | WGBS         | 315.6       | 500    | Cincinnati            | WFBE         | 226         | 10     |
| New York             | WGL          | 442.4       | 1000   | Cincinnati            | WHBR         | 215.7       | 300    |
| New York             | WHAP         | 431         | 1000   | Cincinnati            | WKRC         | 325.9       | 2000   |
| New York             | WHN          | 361.2       | 1000   |                       |              | 422.3       |        |
| New York             | WJUG         | 516.9       | 250    | Cincinnati            | WLW          | 422.3       | 5000   |
| New York             | WJZ          | 455         | 50,000 | Cincinnati            | WSAI         | 325.9       | 5000   |
| New York             | WKBQ         | 285         | 8      | Cleveland             | WDBK         | 327         | 50     |
| New York             | WLWL         | 384.4       | 5000   | Cleveland             | WEAR         | 389.4       | 1000   |
| New York             | WMCA         | 340.7       | 500    | Cleveland             | WHK          | 272.6       | 1000   |
| New York             | WMHA         | 230         | 30     | Cleveland             | WJAY         | 435.7       | 1000   |
| New York             | WMSG         | 302.8       | 500    | Cleveland             | WLBK         | 300         | 100    |
| New York             | WNYC         | 526         | 1000   | Cleveland             | WTAM         | 389.4       | 1000   |
| New York             | WPCH         | 272.6       | 500    | Columbus              | WAIU         | 293.9       | 5000   |
| New York             | WRNY         | 374         | 500    | Columbus              | WCAH         | 265.3       | 500    |
| New York             | WSDA         | 263         | 250    | Columbus              | WEAO         | 293.9       | 750    |
| Peekskill            | WOKO         | 233         | 500    | Columbus              | WMAN         | 286         | 50     |
| Richmond Hill        | WABC         | 315.6       | 500    | Dayton                | WSMK         | 275         | 500    |
| Richmond Hill        | WAOK         | 247.8       | 100    | Hamilton              | WMBK         | 360         | 10     |
| Richmond Hill        | WBOQ         | 236         | 100    | Hamilton              | WRK          | 270         | 100    |
| Richmond Hill        | WGMU         | 236         | 100    | Hamilton              | WSRO         | 252         | 100    |
| Richmond Hill        | WRMU         | 236         | 100    | Mansfield             | WLBV         | 230.6       | 50     |
| Rochester            | WABO         | 258         | 100    | Pomeroy               | WSAZ         | 244         | 50     |
| Rochester            | WHAM         | 278         | 100    | Springfield           | WCSO         | 248         | 750    |
| Rochester            | WHEC         | 258         | 500    | Stuebenville          | WIBR         | 246         | 50     |
| Rochester            | WNBQ         | 407.6       | 15     | Toledo                | WABR         | 263         | 50     |
| Rochester            | WOKT         | 340         | 1000   | Toledo                | WTAL         | 252         | 100    |
| Rossville            | WBRR         | 416.4       | 1000   | Wooster               | WABW         | 206.8       | 50     |
|                      |              |             |        | Yellow Springs        | WRAV         | 263         | 100    |

| State and City      | Call Letters | Wave Length | Power | State and City        | Call Letters     | Wave Length | Power |
|---------------------|--------------|-------------|-------|-----------------------|------------------|-------------|-------|
| <b>OHIO—Con.</b>    |              |             |       | <b>Philadelphia</b>   | <b>WFKD</b>      | 249.9       | 10    |
| Youngstown          | WKBN         | 360         | 100   | <b>Philadelphia</b>   | <b>WHBW</b>      | 216         | 100   |
| Youngstown          | WMBW         | 279         | 50    | <b>Philadelphia</b>   | <b>WIAD</b>      | 250         | 100   |
| <b>OKLAHOMA</b>     |              |             |       | <b>Philadelphia</b>   | <b>WIP</b>       | 508.2       | 500   |
| Alva                | KGFF         | 205.4       | 25    | <b>Philadelphia</b>   | <b>WLBA</b>      | 236.1       | 50    |
| Bristow             | KVOO         | 375         | 500   | <b>Philadelphia</b>   | <b>WLIT</b>      | 394.5       | 500   |
| Chickasha           | KOCW         | 270.1       | 200   | <b>Philadelphia</b>   | <b>WNAT</b>      | 250         | 100   |
| Norman              | WNAD         | 254         | 500   | <b>Philadelphia</b>   | <b>WOO</b>       | 508.2       | 500   |
| Oklahoma City       | KFJF         | 261         | 1000  | <b>Philadelphia</b>   | <b>WRAX</b>      | 268         | 500   |
| Oklahoma City       | KFXR         | 214.2       | 15    | <b>Pittsburgh</b>     | <b>KDKA</b>      | 309.1       | Var.  |
| Oklahoma City       | KGCB         | 331         | 100   | <b>Pittsburgh</b>     | <b>KQV</b>       | 275         | 500   |
| Oklahoma City       | KGFG         | 384         | 50    | <b>Pittsburgh</b>     | <b>WCAE</b>      | 461.3       | 500   |
| Oklahoma City       | WKY          | 352.7       | 100   | <b>Pittsburgh</b>     | <b>WJAS</b>      | 275         | 500   |
| Tulsa               | WLAL         | 250         | 100   | <b>Pittsburgh</b>     | <b>WMBU</b>      | 236.1       | 50    |
| <b>OREGON</b>       |              |             |       | <b>Reading</b>        | <b>WRAW</b>      | 238         | 100   |
| Astoria             | KFJI         | 246         | 10    | <b>Scranton</b>       | <b>WGBI</b>      | 240         | 100   |
| Corvallis           | KOAC         | 280.2       | 500   | <b>Scranton</b>       | <b>WQAN</b>      | 250         | 100   |
| Eugene              | KGEH         | 236.1       | 50    | <b>Shellington</b>    | <b>WREA</b>      | 300         | 100   |
| Medford             | KMED         | 250         | 50    | <b>State College</b>  | <b>WPSC</b>      | 282.8       | 500   |
| Portland            | KEX          | 447         | 1000  | <b>Washington</b>     | <b>WNBO</b>      | 215         | 15    |
| Portland            | KFEC         | 252         | 150   | <b>Wilkes-Barre</b>   | <b>WBAX</b>      | 256         | 100   |
| Portland            | KFIF         | 248         | 100   | <b>Wilkes-Barre</b>   | <b>WBRE</b>      | 231         | 100   |
| Portland            | KFJR         | 263         | 120   | <b>RHODE ISLAND</b>   |                  |             |       |
| Portland            | KFWV         | 212.6       | 50    | <b>Cranston</b>       | <b>WLSI-WDWF</b> | 440.9       | 500   |
| Portland            | KGW          | 491.5       | 1000  | <b>Newport</b>        | <b>WMBA</b>      | 249.9       | 100   |
| Portland            | KLIT         | 380         | 10    | <b>Olneyville</b>     | <b>WCOT</b>      | 265.3       | 50    |
| Portland            | KROW         | 231         | 50    | <b>Pawtucket</b>      | <b>WFCI</b>      | 258.5       | 100   |
| Portland            | KTBR         | 263         | 50    | <b>Providence</b>     | <b>WCBR</b>      | 209.7       | 100   |
| Portland            | KWBS         | 200         | 10    | <b>Providence</b>     | <b>WCBS</b>      | 242.5       | 250   |
| Portland            | KXL          | 400         | 500   | <b>Providence</b>     | <b>WEAN</b>      | 367         | 500   |
| Sylvan              | KOIN         | 319         | 1000  | <b>Providence</b>     | <b>WJAR</b>      | 483.6       | 500   |
| <b>PENNSYLVANIA</b> |              |             |       | <b>Providence</b>     | <b>WRAH</b>      | 235         | 450   |
| Allentown           | WCBA         | 254         | 150   | <b>SOUTH CAROLINA</b> |                  |             |       |
| Allentown           | WSAN         | 229         | 100   | <b>Charleston</b>     | <b>WBBY</b>      | 267.9       | 10    |
| Altoona             | WFBG         | 277.8       | 100   | <b>SOUTH DAKOTA</b>   |                  |             |       |
| Bethayres           | WALK         | 285         | 50    | <b>Brookings</b>      | <b>KFDY</b>      | 299.8       | 1000  |
| Danville            | WKBV         | 220         | 100   | <b>Brookings</b>      | <b>KGCR</b>      | 252         | 10    |
| Elkins Park         | WIBG         | 222         | 50    | <b>Dell Rapids</b>    | <b>KGDA</b>      | 254.1       | 15    |
| Grove City          | WSAJ         | 229         | 250   | <b>Oldham</b>         | <b>KGDY</b>      | 210         | 15    |
| Harrisburg          | WABB         | 204         | 10    | <b>Mitchell</b>       | <b>KGFP</b>      | 263         | 15    |
| Harrisburg          | WBAK         | 275         | 500   | <b>Rapid City</b>     | <b>WCAT</b>      | 240         | 50    |
| Harrisburg          | WMBS         | 360         | 500   | <b>Sioux Falls</b>    | <b>KSOO</b>      | 360         | 250   |
| Harrisburg          | WPRC         | 215.6       | 100   | <b>Vermillion</b>     | <b>KUSD</b>      | 278         | 1000  |
| Jeanette            | WGM          | 372         | 50    | <b>Yankton</b>        | <b>WNAX</b>      | 244         | 100   |
| Johnstown           | WHBP         | 256         | 100   | <b>TENNESSEE</b>      |                  |             |       |
| Kingston            | WABF         | 410.7       | 500   | <b>Chattanooga</b>    | <b>WDOD</b>      | 256         | 500   |
| Lancaster           | WGAL         | 248         | 10    | <b>Knoxville</b>      | <b>WFBC</b>      | 250         | 50    |
| Lancaster           | WKJC         | 258         | 50    | <b>Knoxville</b>      | <b>WNBK</b>      | 335         | 15    |
| Lewisburg           | WJBU         | 211.1       | 100   | <b>Knoxville</b>      | <b>WNOX</b>      | 267.7       | 500   |
| Monessen            | WMBJ         | 277.6       | 50    | <b>Lawrenceburg</b>   | <b>WOAN</b>      | 356.4       | 500   |
| New Castle          | WKBU         | 238         | 50    | <b>Memphis</b>        | <b>WGBC</b>      | 278         | 15    |
| Oil City            | WHBA         | 250         | 10    | <b>Memphis</b>        | <b>WHBQ</b>      | 233         | 50    |
| Oil City            | WLBW         | 321         | 250   | <b>Memphis</b>        | <b>WMBM</b>      | 245         | 10    |
| Parkersburg         | WQAA         | 220         | 500   | <b>Memphis</b>        | <b>WMC</b>       | 499.7       | 500   |
| Philadelphia        | WABQ         | 260.7       | 500   | <b>Memphis</b>        | <b>WNBR</b>      | 316         | 25    |
| Philadelphia        | WABY         | 242         | 50    | <b>Nashville</b>      | <b>WBAW</b>      | 236.1       | 100   |
| Philadelphia        | WCAU         | 278         | 500   | <b>Nashville</b>      | <b>WDAD</b>      | 226         | 5000  |
| Philadelphia        | WFI          | 394.5       | 500   | <b>Nashville</b>      | <b>WLAC</b>      | 225.4       | 5000  |



| State and City          | Call Letters | Wave Length | Power | State and City       | Call Letters | Wave Length | Power  |
|-------------------------|--------------|-------------|-------|----------------------|--------------|-------------|--------|
| <b>TENNESSEE—Con.</b>   |              |             |       | <b>Petersburg</b>    |              |             |        |
| Nashville               | WSM          | 282.8       | 5000  | Richmond             | WBBL         | 228.9       | 100    |
| Springfield             | WSIX         | 250         | 150   | Richmond             | WMBG         | 220         | 10     |
| Tulahoma                | WCFT         | 252         | 10    | Richmond             | WRVA         | 256         | 1000   |
| Whitehaven              | WREC         | 254         | 15    | Roanoke              | WDBJ         | 229         | 250    |
| <b>TEXAS</b>            |              |             |       | Virginia Beach       | WSEA         | 516.9       | 500    |
| Amarillo                | KGRS         | 234         | 100   | <b>WASHINGTON</b>    |              |             |        |
| Amarillo                | WDAG         | 263         | 100   | Everett              | KFBL         | 223.7       | 100    |
| Austin                  | KUT          | 272.6       | 500   | Lacey                | KGY          | 278         | 50     |
| Beaumont                | KFDM         | 315.6       | 500   | Pullman              | KWSC         | 348.6       | 500    |
| Beeville                | KFRB         | 248         | 250   | Seattle              | KFOA         | 454.3       | 1000   |
| Brownsville             | KWWG         | 278         | 750   | Seattle              | KQW          | 215.7       | 100    |
| College Station         | WTAW         | 270         | 500   | Seattle              | KFOX         | 210         | 15     |
| Dallas                  | KGDO         | 285         | 100   | Seattle              | KGBS         | 227         | 100    |
| Dallas                  | KRLD         | 336.9       | 500   | Seattle              | KGCL         | 238         | 10     |
| Dallas                  | WFAA         | 475.9       | 500   | Seattle              | KJR          | 384.4       | 20,000 |
| Dallas                  | WRR          | 246         | 500   | Seattle              | KKP          | 260         | 15     |
| Dublin                  | KFPL         | 252         | 20    | Seattle              | KOMO         | 305.9       | 1000   |
| El Paso                 | KFXH         | 242         | 50    | Seattle              | KPCB         | 521         | 50     |
| El Paso                 | WDAH         | 267.7       | 100   | Seattle              | KROX         | 265.3       | 100    |
| Fort Stockton           | KGFI         | 220.4       | 15    | Seattle              | KRSC         | 499.6       | 100    |
| Fort Worth              | KFJZ         | 254.1       | 50    | Seattle              | KTW          | 454.3       | 1500   |
| Fort Worth              | KFQB         | 508.2       | 2500  | Seattle              | KUJ          | 352.5       | 15     |
| Fort Worth              | WBAP         | 475.9       | 1500  | Seattle              | KVOS         | 333.1       | 500    |
| Galveston               | KFLX         | 240         | 250   | Spokane              | KFIO         | 272.6       | 250    |
| Galveston               | KFUL         | 258         | 500   | Spokane              | KFPY         | 266         | 500    |
| Greenville              | KFPM         | 242         | 10    | Spokane              | KGA          | 340.7       | 20,000 |
| Houston                 | KFVI         | 240         | 50    | Spokane              | KHQ          | 394.5       | 1000   |
| Houston                 | KFYJ         | 238         | 10    | Tacoma               | KMO          | 250         | 500    |
| Houston                 | KPRC         | 296.9       | 500   | Tacoma               | KVI          | 342.5       | 15     |
| Houston                 | KTUE         | 263         | 5     | Walla Walla          | KOWW         | 285         | 500    |
| San Antonio             | KGCI         | 239.9       | 15    | Yakima               | KFIQ         | 256         | 500    |
| San Antonio             | KGDR         | 240         | 15    | <b>WEST VIRGINIA</b> |              |             |        |
| San Antonio             | KGRC         | 315         | 50    | Wheeling             | WWVA         | 348.6       | 100    |
| San Antonio             | KTAP         | 263         | 10    | <b>WISCONSIN</b>     |              |             |        |
| San Antonio             | WCAR         | 263         | 5000  | Beloit               | WEBW         | 268         | 700    |
| San Antonio             | WOAI         | 394.5       | 5000  | Camp Lake            | WCLO         | 230.6       | 100    |
| San Benito              | KFLU         | 236         | 20    | Eau Claire           | WTAQ         | 254         | 1000   |
| Waco                    | WJAD         | 352.7       | 500   | Fond du Lac          | KFIZ         | 273         | 100    |
| <b>UTAH</b>             |              |             |       | Kenosha              | WKDR         | 428.3       | 10     |
| Logan                   | KFXD         | 205.4       | 10    | La Crosse            | WKBH         | 250         | 500    |
| Ogden                   | KFUR         | 224         | 50    | Madison              | WHA          | 535.4       | 1000   |
| Salt Lake City          | KDYL         | 246         | 250   | Madison              | WIBA         | 236.1       | 100    |
| Salt Lake City          | KFUT         | 261         | 100   | Madison              | WLBL         | 278         | 750    |
| Salt Lake City          | KSL          | 209.8       | 1000  | Manitowoc            | WOMT         | 254.1       | 50     |
| <b>U. S. (Portable)</b> |              |             |       | Milwaukee            | WGWB         | 384.4       | 1000   |
| Portable                | WEBL         | 226         | 100   | Milwaukee            | WHAD         | 275         | 500    |
| <b>VERMONT</b>          |              |             |       | Milwaukee            | WKAF         | 261         | 750    |
| Burlington              | WCAX         | 252         | 100   | Milwaukee            | WSOE         | 246         | 500    |
| Springfield             | WQAE         | 246         | 50    | Omro                 | WJBR         | 227.1       | 100    |
| <b>VIRGINIA</b>         |              |             |       | Poynette             | WIBU         | 222         | 20     |
| Arlington               | NAA          | 434.5       | 1000  | Racine               | WRRS         | 369         | 10     |
| Norfolk                 | WBBW         | 222         | 50    | Superior             | WEBC         | 242         | 100    |
| Norfolk                 | WPAB         | 319         | 100   | West De Pere         | WHBY         | 250         | 50     |
| Norfolk                 | WTAR         | 261         | 100   | <b>WYOMING</b>       |              |             |        |
|                         |              |             |       | Laramie              | KFBU         | 374.8       | 500    |

*This list has been corrected up to and including April 30st 1927*



M. WEINER  
L. EVANS  
WBAL  
BALTIMORE  
M.D.



F. ISRAEL  
KFWB  
HOLLYWOOD, CAL.



KEYSTONE QUARTET  
KMO  
TACOMA, WASH.



A. LINDEN  
KGO  
OAKLAND, CAL.



W.B. CARTER  
WEBQ  
HARRISBURG, ILL.



THE CORNHUSKERS  
WLS  
CHICAGO, ILL.



FRANK BIBB  
PIANIST  
WBAL BALTIMORE, M.D.

# Canadian Radio Broadcast Stations

## Indexed Alphabetically by Call Letters

| Radio Call Letters | BROADCAST STATIONS<br>Location and Owner  | Power<br>Watts | Wave<br>Length<br>(Meters) | Frequency<br>(Kilocycles) | Time at<br>Station |
|--------------------|---|----------------|----------------------------|---------------------------|--------------------|
| <b>CF</b>          | <b>CFAC—Calgary, Alberta—The Calgary Herald, Herald Bldg.</b> .....   | 500            | 434.5                      | 690                       | Mountain           |
|                    | <b>CFCA—Toronto, Ont.—Star Publishing &amp; Printing Co., S. W. Cor. Yonge St. and St. Clair Ave.</b> .....             | 500            | 356.9                      | 840                       | Eastern            |
|                    | <b>CFCF—Montreal, Que.—Canadian Marconi Co., Canada Cement Bldg., Philipps Sq.</b> .....                                | 1650           | 410.7                      | 730                       | Eastern            |
|                    | <b>CFCH—Iroquois Falls, Ont.—Abitibi Power &amp; Paper Co., Ltd.</b> .....  | 250            | 499.7                      | 600                       | Eastern            |
|                    | <b>CFCK—Edmonton, Alberta—Radio Supply Co., Ltd., Royal George Hotel.</b> .....   | 50             | 516.9                      | 580                       | Mountain           |
|                    | <b>CFCN—Calgary, Alberta—W. W. Grant (Ltd.), 708 Crescent Rd., N. W.</b> .....  | 1800           | 434.5                      | 690                       | Mountain           |
|                    | <b>CFCQ—Vancouver, B. C.—Sprott-Shaw Radio Co., 153 Pender St., W.</b> .....  | 10             | 410.7                      | 730                       | Pacific            |
|                    | <b>CFCT—Victoria, B. C.—G. W. Deaville, 1405 Douglas St.</b> .....  | 500            | 329.5                      | 910                       | Pacific            |
|                    | <b>CFCY—Charlottetown, P. E. Island—Island Radio Co., Upper Hillsboro St.</b> .....                                     | 50             | 312.3                      | 960                       | Atlantic           |
|                    | <b>CFDC—Vancouver, B. C.—A. Holstead &amp; Wm. Hanlon, 1006 Granville St.</b> .....                                     | 10             | 410.7                      | 730                       | Pacific            |
|                    | <b>CFGC—Brantford, Ont.—The Brant Radio Supply Co., 90 Colborne St.</b> .....   | 50             | 296.9                      | 1010                      | Eastern            |
|                    | <b>CFJC—Kamloops, B. C.—N. S. Dalglish &amp; Sons, and Weller &amp; Weller, 186 Victoria St.</b> .....                  | 15             | 267.7                      | 1120                      | Pacific            |
|                    | <b>CFLC—Prescott, Ont.—Radio Assoc. of Prescott, Victoria Hall.</b> .....   | 50             | 296.9                      | 1010                      | Eastern            |
|                    | <b>CFMC—Kingston, Ont.—Monarch Battery Co., Montreal St.</b> .....  | 20             | 267.7                      | 1120                      | Eastern            |
|                    | <b>CFQC—Saskatoon, Sask.—The Electric Shop, Ltd., 1322 Osler St.</b> .....  | 500            | 329.5                      | 910                       | Mountain           |
|                    | <b>CFRB—York Co., Ont.—Standard Radio Mfg. Corp., Ltd., Township of King.</b> .....                                     | 1000           | 291.1                      | 1030                      | Eastern            |
|                    | <b>CFRC—Kingston, Ont.—Queen's University, Dept. of Electrical Engineering, Fleming Hall, Queen's University.</b> ..... | 500            | 267.7                      | 1120                      | Eastern            |
|                    | <b>CFYC—Burnaby, B. C.—International Bible Students Assoc., 2243 Royal Oak Ave.</b> .....                               | 500            | 410.7                      | 730                       | Pacific            |

| Radio Call Letters | BROADCAST STATIONS<br>Location and Owner   | Power<br>Watts | Wave<br>Length<br>(Meters) | Frequency<br>(Kilocycles) | Time at<br>Station |
|--------------------|--|----------------|----------------------------|---------------------------|--------------------|
| <b>CH</b>          | <b>CHCO—Huntsville, Ont.—A. Staples, Ginsburg Blk., Main St.</b> .....   | 5              | 247.8                      | 1210                      | Eastern            |
|                    | <b>CHCS—Hamilton, Ont.—The Hamilton Spectator, Spectator Bldg.</b> .....   | 10             | 340.7                      | 880                       | Eastern            |
|                    | <b>CHCY—Edmonton, Alberta—Int'l Bible Students Assoc., King Edward Park.</b> .....   | 250            | 516.9                      | 580                       | Mountain           |
|                    | <b>CHGS—Summerside, P. E. I.—R. T. Holman, Ltd., Holman Bldg.</b> .....  | 25             | 267.7                      | 1120                      | Atlantic           |
|                    | <b>CHIC—Toronto, Ontario—Northern Electric Co., Ltd., Hillcrest Park. (Uses Station CKNC, Canadian Nat'l Carbon Co., Toronto, Ontario)....</b> | 500            | 356.9                      | 840                       | Eastern            |
|                    | <b>CHNC—Toronto, Ont.—Toronto Radio Research Soc., Hillcrest Park. (Uses Station CKNC, Canadian Nat'l Carbon Co., Toronto, Ont).....</b>       | 500            | 356.9                      | 840                       | Eastern            |
|                    | <b>CHNS—Halifax, N. S.—Northern Elec. Co., Carleton Hotel, Cor. Prince and Argyle Sts.</b> .....   | 100            | 322.4                      | 930                       | Atlantic           |
|                    | <b>CHRC—Quebec, Que.—E. Fountaine, 11 Fifth St.</b> ....   | 5              | 340.7                      | 880                       | Eastern            |
|                    | <b>CHUC—Saskatoon, Sask.—The International Bible Students Assoc., Cor. Ave. D and 36th St.</b> ....  | 500            | 329.5                      | 910                       | Mountain           |
|                    | <b>CHWC—Regina, Sask.—R. H. Williams &amp; Sons, Ltd., Cor. Hamilton St. and 11th Ave.</b> .....   | 15             | 312.3                      | 960                       | Mountain           |
|                    | <b>CHXC—Ottawa, Ont.—J. R. Booth, 28 Range Rd.</b> ....  | 250            | 434.5                      | 690                       | Eastern            |
|                    | <b>CHYC—Montreal, Que.—Northern Electric Co., Ltd., 121 Shearer St.</b> .....  | 750            | 410.7                      | 730                       | Eastern            |
| <b>CJ</b>          | <b>CJBC—Toronto, Ont.—Jarvis St. Baptist Church. (Uses one of the stations in Toronto City or District.)</b>                                   | 500            | 291.1<br>356.9             | 1030<br>840               | Eastern            |
|                    | <b>CJCA—Edmonton, Alberta—The Edmonton Journal, Ltd., Journal Bldg.</b> .....  | 500            | 516.9                      | 580                       | Mountain           |
|                    | <b>CJCF—Kitchener, Ont.—O. Rumpel, 39 S. Cameron St.</b>   | 25             | 247.8                      | 1210                      | Eastern            |
|                    | <b>CJCI—Toronto, Ont.—Loyal Order of Moose.</b> .....  |                | 291.1                      | 1030                      | Eastern            |
|                    | <b>CJCJ—Calgary, Alberta—Radio Service &amp; Repair Shop, 18th Ave. &amp; 7th St. E.</b> .....   | 250            | 434.5                      | 690                       | Mountain           |
|                    | <b>CJCW—Yorkton, Sask.—The Winnipeg Grain Exchange</b>   | 500            | 475.9                      | 630                       | Mountain           |
|                    | <b>CJGC—London, Ont.—London Free Press Printing Co., Ltd. 430 Richmond St.</b> .....   | 500            | 329.5                      | 910                       | Eastern            |
|                    | <b>CJOC—Lethbridge, Alberta—J. E. Palmer, 1235 Fifth Avenue A, South.</b> .....  | 50             | 267.7                      | 1120                      | Mountain           |
|                    | <b>CJOR—Sea Island, B. C.—Geo. C. Chandler.</b> .....  | 50             | 291.1                      | 1030                      | Pacific            |
|                    | <b>CJRM—Moose Jaw, Sask.—Jas. Richardson &amp; Sons, Ltd., 337 Coteau St. W.</b> .....   | 50             | 296.9                      | 1010                      | Mountain           |
|                    | <b>CJSC—Toronto, Ont.—The Evening Telegram. (Uses station CKCL, the Dominion Battery Co., 20 Trinity St., Toronto, Ont.).....</b>              | 500            | 356.9                      | 840                       | Eastern            |
|                    | <b>CJWC—Saskatoon, Sask.—The Wheaton Electric Co., 236 2nd Ave. S.</b> .....   | 250            | 329.5                      | 910                       | Mountain           |
|                    | <b>CJYC—Scarboro Station, Ont.—Universal Radio of Canada, Ltd.</b> .....   | 500            | 291.1                      | 1030                      | Eastern            |
| <b>CK</b>          | <b>CKAC—Montreal, Que.—La Presse Publishing Co., Ltd., Cor. St. James St. &amp; St. Lawrence Blvd.</b>   | 1200           | 410.7                      | 730                       | Eastern            |
|                    | <b>CKCD—Vancouver, B. C.—Vancouver Daily Province, 142 Hastings St. W.</b> .....   | 1000           | 410.7                      | 730                       | Pacific            |
|                    | <b>CKCI—Quebec, Que.—Le "Soleil," Ltd., 120 Dolbeau St.</b>  | 22½            | 340.7                      | 880                       | Eastern            |
|                    | <b>CKCK—Regina, Sask.—Leader Publishing Co., Ltd.</b> ...  | 500            | 312.3                      | 960                       | Mountain           |

| Radio Call Letters | BROADCAST STATIONS<br>Location and Owner   | Power<br>Watts | Wave<br>Length<br>(Meters) | Frequency<br>(Kilocycles) | Time at<br>Station |
|--------------------|--|----------------|----------------------------|---------------------------|--------------------|
| <b>CK</b>          | <b>CKCL—Toronto, Ont.—</b> Dominion Battery Co., Ltd.,<br>20 Trinity Street.....   | 500            | 356.9                      | 840                       | Eastern            |
|                    | <b>CKCO—Ottawa, Ont.—</b> Dr. G. M. Geldert (for Ottawa<br>Radio Assn.), 282 Somerset St. W.....   | 100            | 434.5                      | 690                       | Eastern            |
|                    | <b>CKCR—St. George, Ont.—</b> John Patterson. Main St. . .   | 25             | 267.7                      | 1120                      | Eastern            |
|                    | <b>CKCV—Quebec, Que.—</b> G. A. Vandry, 66 St. Joseph St.  | 50             | 340.7                      | 880                       | Eastern            |
|                    | <b>CKCW—Burketon Jct., Durham Co., Ont.—</b> Canadian<br>Broadcasting Corp.....  | 5000           | 329.5                      | 910                       | Eastern            |
|                    | <b>CKCX—Toronto, Ont.—</b> International Bible Students<br>Assoc. (Uses station CJYC, Universal Radio<br>Co. of Canada, Ltd., Scarboro Station, Ont.).   | 500            | 291.1                      | 1030                      | Eastern            |
|                    | <b>CKFC—Vancouver, B. C.—</b> United Church of Canada,<br>Cor. Thurlow and Pendrell Sts.....   | 50             | 410.7                      | 730                       | Pacific            |
|                    | <b>CKLC—Calgary, Alberta—</b> The Alberta Pacific Grain<br>Co., Ltd.....   | 1000           | 356.9                      | 840                       | Mountain           |
|                    | <b>CKMC—Cobalt, Ont.—</b> R. L. Mac Adam.....  | 5              | 247.8                      | 1210                      | Eastern            |
|                    | <b>CKNC—Toronto, Ont.—</b> Canadian National Carbon Co.,<br>Ltd., Hillcrest Park.....  | 500            | 357                        | 840                       | Eastern            |
|                    | <b>CKOC—Hamilton, Ont.—</b> Wentworth Radio Supply<br>Co., Ltd., Royal Connaught Hotel.....  | 50             | 340.7                      | 880                       | Eastern            |
|                    | <b>CKPC—Preston, Ont.—</b> Wallace Russ, 40 Russ Ave.  | 7½             | 247.8                      | 1210                      | Eastern            |
|                    | <b>CKSH—St. Hyacinthe, Que.—</b> City of St. Hyacinthe,<br>Que., Mondor and Cascades Sts.....  | 50             | 312.3                      | 960                       | Eastern            |
|                    | <b>CKSM—Toronto, Ont.—</b> St. Michael's Cathedral (Uses<br>station CFRB, Standard Radio Mfg. Corp.<br>Ltd.).....  | 1000           | 291.1                      | 1030                      | Eastern            |
|                    | <b>CKY—Winnipeg, Manitoba—</b> Manitoba Telephone Sys-<br>tem, Sherbrooke St.....  | 500            | 384.4                      | 780                       | Central            |
| <b>CN</b>          | <b>CNRA—Moncton, N. B.—</b> Canadian National Railways.  | 500            | 322.4                      | 930                       | Atlantic           |
|                    | <b>CNRC—Calgary, Alberta—</b> Canadian National Railways<br>(Uses station CFAC, Calgary Herald, Calgary,<br>or station CFCN, W. W. Grant, Ltd., Calgary).  | 500            | 434.5                      | 690                       | Mountain           |
|                    | <b>CNRE—Edmonton, Alberta—</b> Canadian National Rail-<br>ways. (Uses station CJCA, Edmonton Jour-<br>nal Ltd., Edmonton, Alberta).....  | 500            | 516.9                      | 580                       | Mountain           |
|                    | <b>CNRM—Montreal, Que.—</b> Canadian National Rail-<br>ways. (Uses station CHYC, Northern Elec.<br>Co., Ltd., Montreal; CKAC, LaPresse Pub.<br>Co., Ltd., Montreal; CFCF, Canadian Marconi<br>Co., Montreal, P. Q.)..... | 1000-<br>1650  | 410.7                      | 730                       | Eastern            |
|                    | <b>CNRO—Ottawa, Ont.—</b> Canadian National Railways..   | 500            | 434.5                      | 690                       | Eastern            |
|                    | <b>CNRR—Regina, Sask.—</b> Canadian National Railways.<br>(Uses station CKCK, Leader Pub. Co., Ltd.,<br>Regina, Sask.....  | 500            | 312.3                      | 960                       | Mountain           |
|                    | <b>CNRS—Saskatoon, Sask.—</b> Canadian National Rail-<br>ways. (Uses station CFQC, Elec. Shop, Ltd.,<br>Saskatoon, Sask.).....   | 500            | 329.5                      | 910                       | Mountain           |
|                    | <b>CNRT—Toronto, Ont.—</b> Canadian National Railways.<br>(Uses station CFCA, Star Printing & Pub. Co.,<br>Toronto, Ont.).....   | 500            | 356.9                      | 840                       | Eastern            |
|                    | <b>CNRV—Vancouver, B. C.—</b> Canadian National Rail-<br>ways, (Transmitter is on Lulu Island, B. C.)....  | 500            | 291.1                      | 1030                      | Pacific            |
|                    | <b>CNRW—Winnipeg, Manitoba—</b> Canadian National<br>Railways. (Uses station CKY, Manitoba Tel.<br>System, Winnipeg, Manitoba.).....   | 500            | 384.4                      | 780                       | Central            |



D.E. KIICHI HORIGE  
JOBK  
OSAKA, JAPAN



ALVARO RIVERA  
CELLIST  
C Z F  
CHIHUAHUA, MEX.



AMALIA ORTEZ  
C Z F  
CHIHUAHUA, MEX.



KYOKUJO OISHI  
JOBK  
OSAKA, JAPAN



H. GUTIERREZ  
VOCALIST  
C Z F  
CHIHUAHUA, MEX.



JOSIE MELVILLE  
3LO  
MELBOURNE, AUSTRALIA



C.R. WHEATON  
CJWC  
SASKATOON, SASK. CANADA



SHAKUHACHI & KOTO DUET  
JOBK  
OSAKA, JAPAN



ZENITH CAFE  
ORCHESTRA  
CJWC  
SASKATOON,  
SASK.  
CANADA



H. VOGT  
ANNOUNCER  
P.F.B.I.  
HILVERSUM, HOLLAND

# Canadian Radio Broadcast Stations

## By Provinces and Cities

| Provinces        | Cities                    | Call Letters | Wave Length (Meters) | Power (Watts) |
|------------------|---------------------------|--------------|----------------------|---------------|
| ALBERTA          | Calgary                   | CFAC         | 434.5                | 500           |
| "                | Calgary                   | CFCN         | 434.5                | 1800          |
| "                | Calgary                   | CJCJ         | 434.5                | 250           |
| "                | Calgary                   | CKLC         | 356.9                | 1000          |
| "                | Calgary                   | CNRC         | 434.5                | 500           |
| "                | Edmonton                  | CFCK         | 516.9                | 50            |
| "                | Edmonton                  | CHCY         | 516.9                | 250           |
| "                | Edmonton                  | CJCA         | 516.9                | 500           |
| "                | Edmonton                  | CNRE         | 516.9                | 500           |
| "                | Lethbridge                | CJOC         | 267.7                | 50            |
| BRITISH COLUMBIA | Burnaby                   | CFYC         | 410.7                | 500           |
| "                | Kamloops                  | CFJC         | 267.7                | 15            |
| "                | Sea Island                | CJOR         | 291.1                | 50            |
| "                | Vancouver                 | CFCQ         | 410.7                | 10            |
| "                | Vancouver                 | CFDC         | 410.7                | 10            |
| "                | Vancouver                 | CKCD         | 410.7                | 1000          |
| "                | Vancouver                 | CKFC         | 410.7                | 50            |
| "                | Vancouver                 | CNRV         | 291.1                | 500           |
| "                | Victoria                  | CFCT         | 329.5                | 500           |
| MANITOBA         | Winnipeg                  | CKY          | 384.4                | 500           |
| "                | Winnipeg                  | CNRW         | 384.4                | 500           |
| NEW BRUNSWICK    | Moncton                   | CNRA         | 322.4                | 500           |
| NOVA SCOTIA      | Halifax                   | CHNS         | 322.4                | 100           |
| ONTARIO          | Brantford                 | CFGC         | 296.9                | 50            |
| "                | Burketon Jct., Durham Co. | CKCW         | 329.5                | 5000          |
| "                | Cobalt                    | CKMC         | 247.8                | 5             |
| "                | Hamilton                  | CHCS         | 340.7                | 10            |
| "                | Hamilton                  | CKOC         | 340.7                | 50            |
| "                | Huntsville                | CHCO         | 247.8                | 5             |
| "                | Iroquois Falls            | CFCH         | 499.7                | 250           |
| "                | Kingston                  | CFMC         | 267.7                | 20            |
| "                | Kingston                  | CFRC         | 267.7                | 500           |
| "                | Kitchener                 | CJCF         | 247.8                | 25            |
| "                | London                    | CJGC         | 329.5                | 500           |
| "                | Ottawa                    | CHXC         | 434.5                | 250           |
| "                | Ottawa                    | CKCO         | 434.5                | 100           |
| "                | Ottawa                    | CNRO         | 434.5                | 500           |
| "                | Prescott                  | CFLC         | 296.9                | 50            |
| "                | Preston                   | CKPC         | 247.8                | 7½            |
| "                | St. George                | CKCR         | 267.7                | 25            |
| "                | Scarboro Station          | CJYC         | 291.1                | 500           |
| "                | Toronto                   | CFCA         | 356.9                | 500           |
| "                | Toronto                   | CHIC         | 356.9                | 500           |
| "                | Toronto                   | CHNC         | 356.9                | 500           |
| "                | Toronto                   | CJBC         | 291.1-356.9          | 500           |
| "                | Toronto                   | CJCI         | 291.1                |               |
| "                | Toronto                   | CJSC         | 356.9                | 500           |
| "                | Toronto                   | CKCL         | 356.9                | 500           |
| "                | Toronto                   | CKCX         | 291.1                | 500           |
| "                | Toronto                   | CKNC         | 357                  | 500           |
| "                | Toronto                   | CKSM         | 291.1                | 1000          |

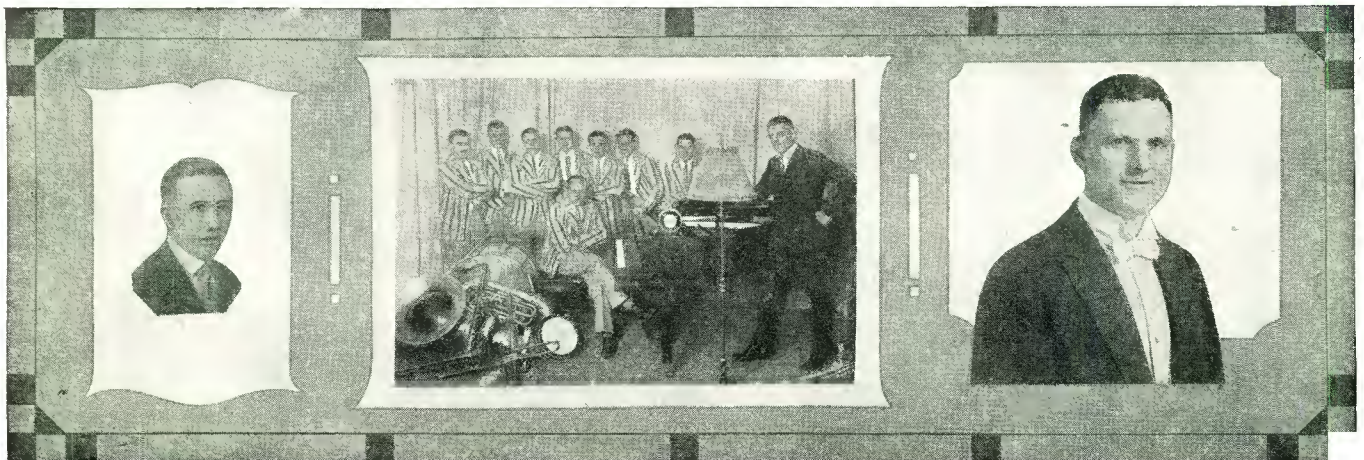
| Provinces           | Cities        | Call Letters | Wave Length (Meters) | Power (Watts) |
|---------------------|---------------|--------------|----------------------|---------------|
| <b>ONTARIO</b>      | Toronto       | <b>CNRT</b>  | 356.9                | 500           |
| "                   | York Co.      | <b>CFRB</b>  | 291.1                | 1000          |
| <b>P. E. ISLAND</b> | Charlottetown | <b>CFCY</b>  | 312.3                | 50            |
| "                   | Summerside    | <b>CHGS</b>  | 267.7                | 25            |
| <b>QUEBEC</b>       | Montreal      | <b>CFCF</b>  | 410.7                | 1650          |
| "                   | Montreal      | <b>CHYC</b>  | 410.7                | 750           |
| "                   | Montreal      | <b>CKAC</b>  | 410.7                | 1200          |
| "                   | Montreal      | <b>CNRM</b>  | 410.7                | 1000-1650     |
| "                   | Quebec        | <b>CHRC</b>  | 340.7                | 5             |
| "                   | Quebec        | <b>CKCI</b>  | 340.7                | 22½           |
| "                   | Quebec        | <b>CKCV</b>  | 340.7                | 50            |
| "                   | St. Hyacinthe | <b>CKSH</b>  | 312.3                | 50            |
| <b>SASKATCHEWAN</b> | Moose Jaw     | <b>CJRM</b>  | 296.9                | 50            |
| "                   | Regina        | <b>CHWC</b>  | 312.3                | 15            |
| "                   | Regina        | <b>CKCK</b>  | 312.3                | 500           |
| "                   | Regina        | <b>CNRR</b>  | 312.3                | 500           |
| "                   | Saskatoon     | <b>CFQC</b>  | 329.5                | 500           |
| "                   | Saskatoon     | <b>CHUC</b>  | 329.5                | 500           |
| "                   | Saskatoon     | <b>CJWC</b>  | 329.5                | 250           |
| "                   | Saskatoon     | <b>CNRS</b>  | 329.5                | 500           |
| "                   | Yorkton       | <b>CJCW</b>  | 475.9                | 500           |

### *Licenses Required for Both Transmitters and Receivers in Canada*

All radio stations, whether used for transmitting or receiving purposes are required to be licensed in Canada. The penalty on summary conviction for operating an unlicensed radio station is a fine not exceeding \$50.00, and on conviction or indictment a fine not exceeding \$500.00, with imprisonment for a term not exceeding 12 months, in addition to forfeiture of all unlicensed apparatus. The different classes of stations for which licenses are issued and their license fees vary from \$1.00 for a private receiving set to \$50.00 for a public commercial station.

The issue of licenses for transmitting stations is limited to British subjects or to companies incorporated under the laws of the Dominion of Canada or its provinces. Licenses for private receiving sets are issued to any person irrespective of nationality. Licenses for receiving sets are obtained from the Postmaster of the larger towns and cities in the Dominion, radio dealers, Royal Canadian Mounted Police, Department of Radio Inspectors, Departmental Agencies or from the Department of Marine and Fisheries. Licenses for all other classes of stations are obtained from the Department of Marine and Fisheries at Ottawa.

### Radio Broadcast Station KMO—Tacoma, Wash.



Technical Supervisor

Hotel Winthrop Orchestra

Herbert C. Ford, Tenor



# Foreign Radio Broadcast Stations

## Including U. S. Possessions

| Countries and Cities | Owner                               | Call Letters | Wave Length (Meters) | Power (Watts) |
|----------------------|-------------------------------------|--------------|----------------------|---------------|
| <b>ALASKA</b>        |                                     |              |                      |               |
| Anchorage            | Anchorage Radio Club                |              | 227.1                | 100           |
| Juneau               | Alaska Elec. Light & Power Co.      | <b>KFIU</b>  | 226                  | 10            |
| Ketchikan            | Alaska Radio & Service Co.          | <b>KGBU</b>  | 229                  | 500           |
| <b>ALGERIA</b>       |                                     |              |                      |               |
| Algiers              | Colin & Fils                        | <b>8DB</b>   | 310                  | 100           |
| <b>ARGENTINE</b>     |                                     |              |                      |               |
| Buenos Aires         | Radio Titanic                       | <b>LON</b>   | 206.9                | 500           |
| " "                  | Radio Prieto                        | <b>LOO</b>   | 252                  | 1500          |
| " "                  | Tomas Torres                        | <b>LOQ</b>   | 206.8                | 1000          |
| " "                  | Diario "Critica"                    | <b>LOR</b>   | 222                  | 1000          |
| " "                  | Municipality of Buenos Aires        | <b>LOS</b>   | 285.7                | 5000          |
| " "                  |                                     | <b>LOT</b>   | 272.7                | 1000          |
| " "                  | Francisco J. Brusa                  | <b>LOV</b>   | 352.9                | 1000          |
| " "                  | Grand Splendid                      | <b>LOW</b>   | 300                  | 1000          |
| " "                  | Radio Cultura                       | <b>LOX</b>   | 375                  | 500           |
| " "                  | Sociedad Radio Nacional             | <b>LOY</b>   | 315.8                | 1000          |
| " "                  | "La Nacion"                         | <b>LOZ</b>   | 330                  | 1800          |
| " "                  | Gino Bocci Hnos.                    | <b>B2</b>    | 275                  | 100           |
| " "                  | Gino Bocci Hnos.                    | <b>A11</b>   |                      |               |
| " "                  | Sociedad Radiotelefonica            | <b>A1</b>    |                      |               |
| " "                  | Francisco J. Brusa                  | <b>B1</b>    |                      | 1000          |
| " "                  | Facultad de Ciencias Medicas        | <b>C1</b>    |                      |               |
| " "                  | Departamento Nacional de Higiene    | <b>C2</b>    |                      |               |
| Cordoba              | Antonio Vanelli                     | <b>H4</b>    | 275                  | 20            |
| " "                  | Sociedad Radio Comercial de Cordoba |              | 381                  | 100           |
| " "                  | Jorge Coen                          | <b>HA8</b>   | 255                  | 50            |
| " "                  | Diario "Los Principios"             | <b>H6</b>    | 250                  | 20            |
| Hurlingham, FCP.     | Felix Gunther                       | <b>DA-1</b>  |                      |               |
| La Plata, FCS.       | Universidad Nacional                | <b>IOP</b>   | 425                  | 1000          |
| Mendoza              | Ministerio de Obras Publicas        | <b>LOU</b>   | 380                  | 500           |
| " "                  | Pedro B. Baldasarre                 | <b>M6</b>    | 348                  | 100           |
| Monte Grande, FCS.   | Argentine Broadcasting Assn.        |              |                      |               |
| Olivos, FCCA.        | Eugenio A. Vautier                  | <b>LOT</b>   | 272.7                | 1000          |
| Rio Cuarto           | Arturo Rodriguez                    | <b>H5</b>    | 275                  | 100           |
| Rosario              | Manuel Fugardo                      | <b>F4</b>    | 260                  | 100           |
| San Fernando, FCCA.  | Americo Liberti                     | <b>D3</b>    | 235.3                | 100           |
| Santa Fe             | Jose Roca Soler                     | <b>F1</b>    | 279                  | 20            |
| " "                  | Sociedad Rural de Cerealistas       | <b>F2</b>    | 270                  | 100           |
| <b>AUSTRALIA</b>     |                                     |              |                      |               |
| Adelaide             | Central Broadcasters Ltd.           | <b>5CL</b>   | 395                  | 5000          |
| " "                  | F. J. Hume                          | <b>5DN</b>   | 313                  | 500           |
| " "                  | Millswood Auto & Radio Co.          | <b>5MA</b>   |                      |               |
| " "                  | Marshall & Co.                      | <b>5MC</b>   | 273                  | 500           |
| Bathurst             | Mockler Bros.                       | <b>2MK</b>   | 250                  | 50            |
| Brighton             |                                     | <b>3PB</b>   |                      |               |
| Brisbane             | Dr. V. McDowell                     | <b>4CM</b>   | 278                  | 250           |
| " "                  | Radio Manufacturers Ltd.            | <b>3MB</b>   | 337                  | 250           |
| " "                  | State Government of Queensland      | <b>4QG</b>   | 385                  | 8000          |
| Hobart               | Tasmanian Broadcasting Pty.         | <b>7ZL</b>   | 535                  | 1500          |
| Melbourne            | Associated Radio Co.                | <b>3AR</b>   | 484                  | 1600          |
| " "                  | Broadcasting Co. of Australia       | <b>3LO</b>   | 371                  | 5000          |

| Countries and Cities  | Owner  | Call Letters | Wave Length (Meters) | Power (Watts) |
|-----------------------|--|--------------|----------------------|---------------|
| <b>AUSTRALIA</b>      |  |              |                      |               |
| Melbourne             | O. J. Nilson & Co.                           | 3UZ          | 319                  | 100           |
| "                     | L. J. Hellier                                | 3WR          | 303                  | 100           |
| Mildura               | R. J. Egge                                   | 3EO          | 286                  | 100           |
| Newcastle             | H. A. Douglas                                | 2HD          | 288                  | 100           |
| Northbridge           | Otto Sandel                                  | 2UW          | 263                  | 500           |
| Perth                 | Westralian Farmers, Ltd.                     | 6WF          | 1250                 | 5000          |
| Rockhampton           | Queensland Government                        | 4RN          | 323                  | 500           |
| Sydney                | The Electrical Utilities Supply Co.          | 2UE          | 297                  | 250           |
| "                     | Burgin Electric Co.                          | 2BE          | 316                  | 100           |
| "                     | Theosophical Broadcasting Service            | 2GB          | 316                  | 1000          |
| "                     | Trades Hall Broadcasting Station             | 2KY          | 280                  | 300           |
| "                     | Farmer & Co., Ltd.                           | 2FC          | 442                  | 10000         |
| "                     |  | 2WA          | 462                  | 100           |
| "                     | Broadcasters Sydney, Ltd.                    | 2BL          | 353                  | 5000          |
| Toowoomba             | Gold Radio Elec. Service                     | 4GR          | 294                  | 100           |
| <b>AUSTRIA</b>        |  |              |                      |               |
| Graz                  | Oesterreichische Radio-verkehrs Gesellschaft |              | 404                  | 500           |
| Vienna                | Oesterreichische Radio-verkehrs Gesellschaft | ORV          | 530                  | 1500          |
| <b>BELGIUM</b>        |  |              |                      |               |
| Brussels              | Radio Belgique Co.                           | BAV          | 805.5                | 1500          |
| "                     | Radio Belgique Co                            | SBR          | 481                  | 1500          |
| <b>BOLIVIA</b>        |  |              |                      |               |
| La Paz                |  |              | 175—300              | 50            |
| Oruro                 | Radio Club Boliviano                         | CPM          | 50—200               | 50            |
| <b>BRAZIL</b>         |  |              |                      |               |
| Bahia                 | Radio Sociedade de Bahia                     |              | 250—450              | 500           |
| Bello Horizonte       | Radio Sociedade de Mina Geraes               |              | 400                  | 500           |
| Ceare                 | Radio Club Cearense                          |              |                      | 50            |
| Curytiba              | Livio Moreira                                |              |                      |               |
| Fortaleza             | Radio Club                                   |              |                      | 300           |
| Goyanna               | Benedicto Ravello                            |              |                      |               |
| Matto Grosso          | Radio Club de Campo Grande                   |              |                      |               |
| Minas Geraes          | Juiz de Fora                                 |              |                      | 100           |
| Para                  | Radio Club de Para                           |              |                      | 100           |
| Parana                |  |              | 370                  | 300           |
| Parahyba              | Radio Sociedade de Parahyba                  |              |                      |               |
| Pelotas               | Radio Sociedade Pelotense                    |              |                      |               |
| Penedo                | A. G. Oliveira                               |              |                      |               |
| Pernambuco            | Radio Club de Pernambuco                     |              | 310                  | 1000          |
| "                     | Cia Radiotelegrafica Brasileira              |              | 250—380              | 500           |
| "                     | Radio Sociedade de Jader de Andrada          |              |                      |               |
| "                     | Radio Sociedade de Garanhuns                 |              |                      |               |
| Petropolis            | Radio Club de Petropolis                     |              |                      |               |
| Porto Alegre          | Radio Sociedade Riograndense                 | RSR          | 381                  | 80            |
| Praia Vermelha        | Radio Club do Brasil                         | SQIB         | 320                  | 500           |
| Rio de Janeiro        | Radio Sociedade de Rio de Janeiro            |              | 381                  | 1000          |
| " " "                 | Radio Club do Brasil                         | SPE          | 312                  | 500           |
| " " "                 | National Telegraph Service                   |              | 450                  | 500           |
| Sao Paulo             | Sociedade Radio Educadora                    |              | 310                  | 1000          |
| " "                   | Sociedade Radio Educadora Paulista           | SQIG         | 450                  | 1000          |
| " "                   | Radio Club de Sao Paulo                      |              | 350                  | 100           |
| " "                   | Radio Bandeirantes                           |              | 370                  | 50            |
| " "                   | Dias Carneiro & Cia.                         |              | 380—420              | 100           |
| <b>CANARY ISLANDS</b> |  |              |                      |               |
| La Laguna             | Servando Ortoll Delmotte                     | EAJ5         | 280                  | 50            |
| Las Palmas            | Canary Islands Radio Club                    |              | 300                  | 6             |
| Teneriffe             | Cervanado Ortoll Delmotte                    | EAR5         | 280                  | 50            |

| Countries and Cities | Owner                               | Call Letters | Wave Length (Meters) | Power (Watts) |
|----------------------|-------------------------------------|--------------|----------------------|---------------|
| <b>CEYLON</b>        |                                     |              |                      |               |
| Colombo              |                                     |              | 800                  | 500           |
| <b>CHILE</b>         |                                     |              |                      |               |
| Antofagasta          | Sr. J. Pedreny                      | CHAO         |                      | 40            |
| "                    | Oficina Jose Santos Ossa            | CLAC         |                      | 50            |
| "                    | Oficina Jose Francisco Vergara      | CLAD         |                      | 50            |
| Iquique              | Gildemeister & Cia.                 | CLAE         |                      | 100           |
| "                    | Oficina San Pedro                   | CLAF         |                      | 100           |
| "                    | Oficina Pena Chica                  | CLAG         |                      | 100           |
| San Eugenio          | Rene Doneaud                        |              | 230                  | 25            |
| Santiago             | Radio Corporation of Chile          | CBC          | 400—600              | 250           |
| "                    | Chilean Radiophone Club             | CHAC         | 300                  | 200           |
| "                    | Ferrocarril Transandino Chileno     | CLAA         |                      | 200           |
| "                    | Carlos Buin Walsen                  | CMAA         | 240                  | 20            |
| "                    | International Machinery Co.         | CMAB         | 480                  | 500           |
| "                    | Castagneto Felli                    | CMAD         | 320                  | 100           |
| "                    | Ministerio de Higiene               | CMAF         | 400                  | 1350          |
| "                    | Sociedad Broadcasting de Chile      | CRC          | 385                  | 350           |
| "                    | "El Mercurio"                       | CMAC         | 360                  | 1000          |
| "                    | Radio Comercial                     | CMAE         | 280                  | 500           |
| "                    | Pedro Arroyo                        | CMAG         | 250                  | 250           |
| "                    | Cia Radio Transandino               | CMAI         | 260                  | 100           |
| "                    | Universidad de Chile                | CMAU         | 440                  | 100           |
| "                    |                                     | ORC          | 430                  |               |
| "                    |                                     | RC           | 350                  | 50            |
| "                    | Harvey Diamond                      | CNA A        |                      |               |
| "                    | Jose Bellalta                       | CNAC         |                      |               |
| "                    | Fratelli Castagneto                 |              | 320                  | 100           |
| "                    | Commercial Radio Co.                |              | 350                  | 50            |
| Tacna                | Ministerio de Relaciones Exteriores | CMAT         | 365                  | 1000          |
| "                    | Chilean Government                  | CRCT         | 550                  | 200           |
| Valparaiso           | Cia Radio Transandina               | CNAD         | 265                  | 500           |
| "                    | Cia de Salitres de Antofagasta      | CLAB         |                      | 50            |
| Vilna del Mar        | Antonio Cornish Besa                | ACB          | 400                  | 50            |
| " " "                | Antonio Cornish Besa                | CNAB         |                      |               |
| <b>CHINA</b>         |                                     |              |                      |               |
| Shanghai             | Kellogg Switchboard & Supply Co.    | KRC          | 335                  | 150           |
| "                    | Radio Supply Co. of Nanking Road    | RSC          | 235                  | 10            |
| Tientsin             | Gisho Electrc Co.                   | GEC          | 288                  | 50            |
| Victoria (Hongkong)  | Hongkong Radio Society              | 5HK          | 475                  | 150           |
| <b>COSTA RICA</b>    |                                     |              |                      |               |
| San Jose             | Government                          |              |                      |               |
| <b>CUBA</b>          |                                     |              |                      |               |
| Caibarien            | Maria J. Alvarez                    | 6EV          | 250                  | 50            |
| Camaguey             | Pedro Noguerras                     | 7AZ          | 225                  | 20            |
| Camajuani            | Diego Ibarra                        | 6YR          | 200                  | 20            |
| Central Elia         | Salvador Rionda                     | 7SR          | 350                  | 500           |
| Central Tuinicu      | Frank H. Jones                      | 6KW          | 340                  | 100           |
| " "                  | Frank H. Jones                      | 6JK          | 340                  | 100           |
| Ciego de Avila       | Eduardo V. Figueroa                 | 7BY          | 360                  | 100           |
| Cienfuegos           | Jose Ganduxe                        | 6VY          | 260                  | 200           |
| "                    | Antonio T. Figueroa                 | 6CX          | 170                  | 20            |
| "                    | Eduardo Terrv                       | 6DW          | 225                  | 10            |
| "                    | Luis Del Castillo                   | 6GR          | 250                  | 10            |
| "                    | Juan Pablo Ros                      | 6GF          | 190                  | 50            |
| "                    | Eligio Cobelo Ramirez               | 6JQ          | 275                  | 10            |
| "                    | Valentin Ullivarri                  | 16AZ         | 200                  | 20            |
| Havana               | Credito y Construcciones Cia.       | 2HP          | 295                  | 100           |

| Countries and Cities  | Owner                                 | Call Letters | Wave Length (Meters) | Power (Watts) |
|-----------------------|---------------------------------------|--------------|----------------------|---------------|
| <b>CUBA</b>           |                                       |              |                      |               |
| Havana                | Julio Power                           | 2JP          | 270                  | 20            |
| "                     | Frederick W. Borton                   | 2CX          | 320                  | 10            |
| "                     | Alberto S. Bustamante                 | 2AB          | 220                  | 10            |
| "                     | Cuban Telephone Co.                   | PWX          | 400                  | 500           |
| "                     | Jose Leiro                            | 2JL          | 294                  | 5             |
| "                     | Alvara Daza                           | 2K           | 200                  | 20            |
| "                     | E. Sanchez de Fuentes                 | 2KD          | 350                  | 50            |
| "                     | "El Pais"                             | 2EP          | 355                  | 400           |
| "                     | F. W. Borton                          | 2CG          | 260                  | 100           |
| "                     | Bernardo Barrie                       | 2BB          | 250                  | 15            |
| "                     | Frederick W. Borton                   | 2BY          | 260                  | 100           |
| "                     | Julio Power                           | 2HS          | 180                  | 50            |
| "                     | Jose Lara                             | 2LR          | 235                  | 50            |
| "                     | Manuel y Guillermo Salas              | 2MG          | 284                  | 20            |
| "                     | R. B. Waters                          | 2MK          | 85                   | 20            |
| "                     | Maria Garcia Velez                    | 2OK          | 360                  | 100           |
| "                     | Oscar Collado                         | 2OL          | 257                  | 100           |
| "                     | Roberto E. Ramirez                    | 2TW          | 230                  | 20            |
| "                     | Benito Veita Ferro                    | 2UF          | 275                  | 10            |
| "                     | Raul Karman                           | 2RK          | 315                  | 100           |
| "                     | Raul Karman                           | 2RY          | 275                  | 10            |
| "                     | Homero Sanchez                        | 2SZ          | 180                  | 10            |
| "                     | Amadeo Saenz                          | 2WW          | 210                  | 20            |
| "                     | Antonio A. Ginard                     | 2XX          | 225                  | 5             |
| "                     | Raul Perez Falcon                     | 2JD          | 105                  | 20            |
| "                     | Heraldo de Cuba                       | 2HC          | 275                  | 500           |
| Matanzas              | Leopoldo T. Figueroa                  | 5EV          | 360                  | 5             |
| Nueva Gerona          | Isle of Pines Telephone Co.           | 8JQ          | 225                  | 20            |
| Puerto del Rio        | Antonio Zarazola                      | 1AZ          | 275                  | 30            |
| Sagua la Grande       | Guillermo Polanco                     | 6HS          | 200                  | 20            |
| Santiago              | Alfredo Vinnat                        | 8FU          | 225                  | 15            |
| "                     | Pedro C. Anduz                        | 8DW          | 275                  | 50            |
| "                     | Alfredo Brooks                        | 8AZ          | 240                  | 20            |
| "                     | Ceferino Ramos                        | 8IR          | 190                  | 20            |
| "                     | Alberto Ravelo                        | 8BY          | 250                  | 100           |
| "                     | Guillermo Polanco                     | 8HS          | 200                  | 20            |
| Tuinicu               | Frank H. Jones                        | 6KW          | 368                  | 100           |
| "                     | Short Wave Experimental Station       | 6XJ          | 30 $\frac{1}{2}$     | 100           |
| <b>CZECHOSLOVAKIA</b> |                                       |              |                      |               |
| Bratislava            |                                       | OKR          | 400                  | 500           |
| Brunn                 | Radio Journal                         | OKB          | 750                  | 1000          |
| Prague                | Radio Journal                         | OKP          | 513                  | 5000          |
| <b>DANZIG</b>         |                                       |              |                      |               |
| Danzig                |                                       |              | 272.7                |               |
| <b>DENMARK</b>        |                                       |              |                      |               |
| Copenhagen            | Copenhagen Radio Broadcasting Station |              | 337                  | 500           |
| Soro                  | Ministry of War                       |              | 1150—2400            | 1000          |
| <b>EGYPT</b>          |                                       |              |                      |               |
| Cairo                 |                                       | SRE          | 255                  |               |
| <b>EQUADOR</b>        |                                       |              |                      |               |
| Guayaquil             | J. Puig Verdaguer                     |              |                      |               |
| <b>ESTONIA</b>        |                                       |              |                      |               |
| Tallinn               |                                       |              | 285.7                |               |
| <b>FINLAND</b>        |                                       |              |                      |               |
| Bjorenborg            | Nuoren Voiman Liiton Radiohydistys    |              | 254.2                | 200           |
| Hango                 | Nuoren Voiman Liiton Radiohydistys    |              | 259.6                | 200           |
| Helsingfors           | Civil Guards of Finland               |              | 522                  | 500           |

| Countries and Cities  | Owner                                    | Call Letters | Wave Length (Meters) | Power (Watts) |
|-----------------------|--|--------------|----------------------|---------------|
| <b>FINLAND</b>        |  |              |                      |               |
| Jyvaskyla             | Nuoren Voiman Liiton Radiohydistys       |              | 301.5                | 100           |
| Mikkeli               | Nuoren Voiman Liiton Radiohydistys       |              | 561                  | 100           |
| Pori                  | Nuoren Voiman Liiton Radiohydistys       |              | 255.3                | 100           |
| Skatudden             | Military Station Radio Div.              |              | 318                  | 750           |
| St. Michel            | Nuoren Voiman Liiton Radiohydistys       |              | 561                  | 500           |
| Tammerfors            | Nuoren Voiman Liiton Radiohydistys       | 3NB          | 393                  | 250           |
| Tampere               |  |              | 373                  | 250           |
| Uleaborg              |  |              | 233                  | 100           |
| <b>FRANCE</b>         |  |              |                      |               |
| Agen                  | Dept. of Lot et Garonne                  | 2BD          | 318                  | 250           |
| Grenoble              | Ministry of P. T. T.                     |              | 380                  | 150           |
| Issy-les-Moulineaux   | Ministry of War                          | QGA          | 1800                 | 500           |
| Lyon                  | Ministry of P. T. T.                     | YN           | 476.2                | 1200          |
| "                     | Radio Lyon                               |              | 280                  | 2000          |
| Marseilles            | Ministry of P. T. T.                     |              | 340.1                | 300           |
| Mont-de-Marsen        |  |              | 366                  | 300           |
| Montpellier           | Societe Languedocienne de T. S. F.       |              | 168                  | 100           |
| Paris                 | Ecole Superieure de P. T. T.             | FPTT         | 459.4                | 500           |
| "                     | Eiffel Tower, Army                       | FL           | 2200                 | 4000          |
| "                     | Societe Francaise Radioelectrique        | 8AJ          | 1780                 | 100           |
| "                     | Petit Parisien                           | 5NG          | 333                  | 500           |
| "                     | Cie. Francaise de Radiophone             |              | 1750                 | 4000          |
| Pic du Midi           |  |              | 350                  |               |
| St. Etienne           | Radio Club Forezien                      |              | 220                  | 50            |
| Strasbourg            | Military Station Radio Club              | 8GF          | 222.2                | 15000         |
| Toulouse              | Aerodrome                                | MRD          | 315                  | 2000          |
| "                     | La Radio                                 |              | 389                  | 3000          |
| <b>GERMANY</b>        |  |              |                      |               |
| Berlin                | Koenigswusterhausen Deutsche Welle A. G. | AFP          | 1300                 | 18000         |
| "                     | Koenigswusterhausen Station              | AFT          | 1300                 | 1600          |
| "                     | Vox Haus Funkstunde                      | AB           | 571                  | 2250          |
| "                     | Witzleben Funkstunde A. G.               |              | 504                  |               |
| Bremen                | Nordischer Rundfunk                      | BMN          | 400                  | 1500          |
| Breslau               | Schlessische Funkstunde                  |              | 418                  | 4000          |
| Dortmund              | Westdeutsche Funkstunde                  |              | 283                  |               |
| Dresden               | Mitteldeutscher Rundfunk                 |              | 294                  | 750           |
| Elberfeld             | Westdeutsche Funkstunde                  |              | 259                  |               |
| Frankfort-on-the-Main | Sudwestdeutscher Rundfunkdienst          | LP           | 470.4                | 750           |
| Freiburg im Breisgau  | Suddeutscher Rundfunk                    |              | 577                  | 1500          |
| Gleiwitz              | Schlesischer Funkstunde                  |              | 251                  | 1500          |
| Hamburg               | Nordischer Rundfunk                      | EG           | 392                  | 750           |
| Hanover               | Nordischer Rundfunk                      |              | 297                  | 1500          |
| Kassel                | Sudwestdeutschen Rundfunk                |              | 272.5                | 1500          |
| Kiel                  | Nordischer Rundfunk                      |              | 233                  |               |
| Koenigsberg           | Ostmarken Rundfunk                       |              | 462                  | 750           |
| Leipzig               | Mitteldeutscher Rundfunk                 | MR           | 452                  | 750           |
| Munich                | Deutsche Stunde in Bayern                | WM           | 488                  | 750           |
| Munster               | Westdeutsche Funkstunde                  |              | 412                  | 750           |
| Norddeich             |  | KAV          | 1800                 |               |
| Nuremberg             | Deutsche Stunde in Bayern                |              | 340                  | 750           |
| Stettin               | Funkstunde A. G.                         |              | 241                  |               |
| Stuttgart             | Suddeutscher Rundfunk                    | OKP          | 446                  | 1500          |
| <b>HAITI</b>          |  |              |                      |               |
| Port-au-Prince        | Haitien Government                       | HHK          | 361.2                | 1000          |
| <b>HAWAII</b>         |  |              |                      |               |
| Honolulu              | Honolulu Advertiser                      | KGU          | 270                  | 500           |

| Countries and Cities    | Owner  | Call Letters | Wave Length (Meters) | Power (Watts) |
|-------------------------|--|--------------|----------------------|---------------|
| <b>HUNGARY</b>          |  |              |                      |               |
| Budapest                | Hungarian States' Post and Telegraph           | MTI          | 546                  | 1000          |
| "                       | Magyar Tavirati Iroda                          |              | 1050                 | 2000          |
| "                       | Hungarian Telephone & Radio Co.                |              | 555.6                | 2000          |
| <b>ICELAND</b>          |  |              |                      |               |
| Reykjavik               |  |              | 430                  | 500           |
| <b>INDIA</b>            |  |              |                      |               |
| Bangalore               | Indian Broadcasting Co.                        |              |                      |               |
| Bombay                  | Walter Rogers & Co.                            | 2AX          | 226                  |               |
| "                       | Bombay Presidency Radio Club                   | 2FV          | 387                  | 220           |
| Calcutta                | Radio Club of Bengal                           | 2BZ          | 800                  | 500           |
| "                       | Indian States & Eastern Agency                 | 5AF          | 425                  | 1500          |
| Karachi                 | Karachi Radio Club                             |              | 425                  | 40            |
| Madras                  | Crampton Elec. Co.                             |              | 220                  | 120           |
| Rangoon                 | Radio & Wireless Club of Burma                 |              | 450                  | 40            |
| <b>IRISH FREE STATE</b> |  |              |                      |               |
| Dublin                  | Government                                     | 2RN          | 319.1                | 1500          |
| <b>ITALY</b>            |  |              |                      |               |
| Milan                   | Unione Radiofonica Italiana                    | IMT          | 308                  | 1280          |
| Naples                  | Unione Radiofonica Italiana                    | INA          | 333.3                | 1500          |
| Rome                    | Unione Radiofonica Italiana                    | IRO          | 434                  | 1200          |
| <b>JAPAN</b>            |  |              |                      |               |
| Nagoya                  | Nagoya Radio Broadcasting Co.                  | JOCK         | 360                  | 1000          |
| Osaka                   | Osaka Central Broadcasting Co.                 | JOBK         | 385                  | 1000          |
| Tokyo                   | Tokyo Central Broadcasting Co.                 | JOAK         | 375                  | 1000          |
| <b>JAVA</b>             |  |              |                      |               |
| Batavia                 | Bataviasche Radio Vereeninging                 | JFC          | 220                  | 40            |
| <b>JUGOSLAVIA</b>       |  |              |                      |               |
| Agram (Zagreb)          |  |              | 310                  | 500           |
| <b>KWANTUNG</b>         |  |              |                      |               |
| Dairen                  | Government Bureau of Communications            |              | 390                  | 260           |
| <b>LATVIA</b>           |  |              |                      |               |
| Riga                    |  |              | 480                  | 2000          |
| <b>LITHUANIA</b>        |  |              |                      |               |
| Kovno                   |  |              | 2000                 | 15000         |
| <b>LUXEMBOURG</b>       |  |              |                      |               |
| Luxembourg              |  | LOAA         | 217.4                | 1500          |
| <b>MEXICO</b>           |  |              |                      |               |
| Chihuahua               | Federal Government                             | CZF          | 310                  | 250           |
| "                       | Telefonos Del Gobierno del Estado de Chihuahua | ZCF          | 310                  | 250           |
| "                       | Compania Telefonica                            | XICE         | 500                  | 500           |
| Guadalupe               | Radio Club—Degollado Theatre                   |              | 280                  | 10            |
| "                       | Federal Military Command                       | FAM          | 490                  | 1000          |
| Mazatlan                | Castulo Llamas                                 | CYR          | 475                  | 250           |
| Merida                  | Partido Socialista del Surestan                | CYY          | 549                  | 100           |
| Mexico City             | Efran R. Gomez                                 | CYA          | 300                  | 500           |
| "                       | Jose J. Reynosa (El Buen Tono)                 | CYB          | 275                  | 500           |
| "                       | Miguel S. Castro (La High Life)                | CYH          | 375                  | 100           |
| "                       | General Electric Co.                           | CYJ          | 410                  | 1000          |
| "                       | "El Unıversal"                                 | CYL          | 400                  | 500           |
| "                       | Martinez y Zetina                              | CYO          | 425                  | 100           |
| "                       | Excelsior Compania Editorial                   | CYX          | 260                  | 750           |
| "                       | La Liga del Radio                              | CYZ          | 400                  | 100           |
| "                       | Departamento de Educacion                      | CZE          | 357                  | 1000          |
| "                       | Secretaria de Industria, Comercio y Trabajo    | CZI          | 450-505              | 750           |
| "                       | Fabrica Nacional de Vestuario                  | IJ           |                      | 500           |
| "                       | F. C. Stephenex                                | IR           | 250                  | 100           |
| Monterrey               | Roberto Reyes                                  | CYM          | 275                  | 100           |

| Countries and Cities           | Owner                                     | Call Letters | Wave Length (Meters) | Power (Watts) |
|--------------------------------|---|--------------|----------------------|---------------|
| <b>MEXICO</b>                  |   |              |                      |               |
| Monterrey                      | D. Constantino de Tarnava, Jr.            | CYH          |                      |               |
| "                              | Constantino de Tarnava                    | CYS          | 311                  | 250           |
| Oaxaca                         | Federico Zonilla                          | CYF          | 265                  | 100           |
| Puebla                         | Augustin del P. Saenz                     | CYU          | 312                  | 100           |
| Saltillo                       | Colegio Ateneo Fuente                     |              | 450                  | 135           |
| Tampico                        |   | CYE          | 360                  | 100           |
| Vera Cruz                      | Ministerio de Comunicaciones              | CYC          | 300                  | 500           |
| "                              |   | CYD          | 250                  | 500           |
| <b>MOROCCO</b>                 |   |              |                      |               |
| Casablanca                     | Radio Club de Maroc                       | CNO          | 250                  | 500           |
| <b>NETHERLANDS</b>             |   |              |                      |               |
| Amsterdam                      |   | PCFF         | 2125                 |               |
| Hilversum                      | Nederlandische Seintoellen Fabriek        | PFBI         | 1000                 | 10,000        |
| <b>NETHERLANDS EAST INDIES</b> |   |              |                      |               |
| Soerabaya                      | Radiotelegraph Club                       |              | 90                   |               |
| <b>NEW ZEALAND</b>             |   |              |                      |               |
| Auckland                       | Newcomb (Ltd.)                            | 1YL          | 260                  | 500           |
| "                              | The Radio Broadcasting Co. of New Zealand | 1YA          | 420                  | 200           |
| "                              | La Gloria Gramophone Co.                  | 1YB          | 275                  | 50            |
|                                | L. R. Keith                               | 1ZO          | 330                  | 50            |
| Christchurch                   | Radio Broadcasting Co., of New Zealand    | 3AG          | 240                  | 10            |
| Dunedin                        | Otago University                          | 4XO          | 140                  |               |
| "                              | British Electrical & Engineering Co.      | 4YA          | 310                  | 500           |
| "                              | Radio Supply Co.                          | 4YO          | 370                  | 500           |
| "                              | Radio Broadcasting Co.                    | VLDN         | 380                  | 750           |
| Gisborne                       | Gisborne Radio Co.                        | 2YM          | 260                  | 500           |
| Napier                         | B. C. Spackman                            | 2YL          | 190                  | 100           |
| Wellington                     | Broadcastings Ltd.                        | 2YB          | 275                  | 15            |
| "                              | Radio Broadcasting Co.                    | 2YK          | 295                  | 120           |
| Whangarei                      | N. C. Shepherd                            | 1YC          | 250                  | 15            |
| <b>NORWAY</b>                  |   |              |                      |               |
| Bergen                         | Bergen Broadcasters                       |              | 370.4                | 500           |
| Fredriksstad                   | Broadcasting Co. A. S.                    |              | 384.8                |               |
| Hamar                          | Broadcasting Co. A. S.                    |              | 566                  |               |
| Natodden                       | Broadcasting Co. A. S.                    |              | 447                  |               |
| Porsgrund                      | Broadcasting Co. A. S.                    |              | 500                  | 700           |
| Rjukan                         | Broadcasting Co. A. S.                    |              | 445                  | 50            |
| Tromso                         | Tromso Broadcasters                       |              | 500                  |               |
| Oslo                           | Broadcasting Co. A. S.                    | OSLO         | 461.5                | 1500          |
| <b>PERU</b>                    |   |              |                      |               |
| Arequipa                       | Augusto Gilardi                           | 30A          | 240                  | 10            |
| Lima                           | Peruvian Broadcasting Co.                 | OAX          | 380                  | 1500          |
| "                              | German Gallo                              | 50A          | 250                  | 20            |
| "                              | Enrique Perez                             | 40A          | 250                  | 20            |
| <b>PHILIPPINE ISLANDS</b>      |   |              |                      |               |
| Baguio                         |   | KZUY         | 359.9                | 500           |
| Iloilo                         |   | KPM          | 400                  | 500           |
| Manila                         | I. Beck Inc.                              | KZIB         | 260                  | 10            |
| "                              | Radio Corp. of the Philippines            | KZKZ         | 270                  | 500           |
| "                              | Radio Corp. of the Philippines            | KZRQ         | 400                  | 500           |
| <b>POLAND</b>                  |   |              |                      |               |
| Warsaw                         | Government                                | PTR          | 380                  | 700           |
| <b>PORTO RICO</b>              |   |              |                      |               |
| San Juan                       | Radio Corp. of Porto Rico                 | WKAQ         | 340.7                | 500           |
| <b>PORTUGAL</b>                |   |              |                      |               |
| Lisbon                         | Grandes Armazens do Chiado                | PIAA         | 310                  | 150           |
| Montesanto                     | Government Wireless Station               | CTV          | 2450                 | 1500          |

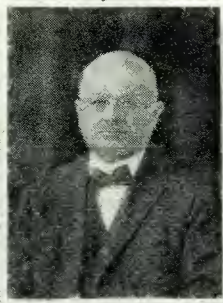
| Countries and Cities         | Owner                             | Call Letters | Wave Length (Meters) | Power (Watts) |
|------------------------------|-----------------------------------|--------------|----------------------|---------------|
| <b>SAN SALVADOR</b>          |                                   |              |                      |               |
| San Salvador                 | Government of el Salvador         | AQM          | 452                  | 500           |
| <b>SENEGAL</b>               |                                   |              |                      |               |
| St. Louis                    | Senegal Radio Club                |              | 300                  | 100           |
| <b>SPAIN</b>                 |                                   |              |                      |               |
| Barcelona                    | Radio Barcelona (Hotel Colon)     | EAJ1         | 325                  | 1000          |
| <b>SPAIN</b>                 |                                   |              |                      |               |
| "                            | Radio Catalana                    | EAJ13        | 460                  | 1000          |
| Bilbao                       | Radio Club Vizcaina               | EAJ9         | 415                  | 200           |
| "                            | Radio Vizcaya                     | EAJ11        | 418                  | 2000          |
| "                            | Armando de Otera                  |              | 383                  | 200           |
| Cadiz                        | Radio Cadiz                       | EAJ3         | 360                  | 200           |
| "                            | Juan Iaborra-Iahera               | EAJ10        | 330                  | 1000          |
| Cartagena                    | Enrique de Orbe                   | EAJ16        | 335                  | 1000          |
| "                            |                                   | EBX          | 1200                 | 1000          |
| Madrid                       | Radio Espana                      | EAJ2         | 334                  | 300           |
| "                            | Escuela Superior                  | PTT          | 458                  | 1000          |
| "                            | Antonio Castilla                  | EAJ4         | 375                  | 4000          |
| "                            | Radio Iberica                     | EAJ6         | 392                  | 1000          |
| "                            | Union Radio                       | EAJ7         | 375                  | 6000          |
| "                            | Radio Espanola                    | EAJ15        | 490                  | 1000          |
| "                            |                                   | EGC          | 1650-2200            | 2000          |
| Malaga                       | Spanish Telecommunication Co.     | EAJ25        | 325                  | 2000          |
| "                            | Alfonso Villota                   |              | 325                  | 200           |
| Oviedo (Cima)                | Arturo Cima Fernandez             | EAJ19        | 340                  | 1000          |
| "                            |                                   | EAJ12        | 345                  | 1000          |
| Salamanca                    |                                   | EAJ22        | 290                  | 1000          |
| San Sebastian                | Sabino Ucelayeta                  | EAJ8         | 344.6                | 500           |
| Sevilla                      | Manuel Garcia Ballesta            | EAJ17        | 330                  | 100           |
| "                            | Jorge la Riva                     | EAJ21        | 300                  | 1000          |
| "                            | Radio Club Sevillano              | EAJ5         | 350                  | 150           |
| Valencia                     |                                   | EAJ24        | 360                  | 1000          |
| "                            | Jose Lopes Azcar                  | EAJ14        | 400                  | 500           |
| Zaragoza                     |                                   | EAJ23        | 325                  | 1000          |
| <b>STRAIGHTS SETTLEMENTS</b> |                                   |              |                      |               |
| Singapore                    | Malaya Amateur Wireless Society   |              | 330                  | 150           |
| <b>SWEDEN</b>                |                                   |              |                      |               |
| Boden                        | Radiotjanst                       | SASE         | 1350                 | 500           |
| Eskilstuna                   | Radio Club                        | SMUC         | 250                  | 250           |
| Falun                        | Radiotjanst                       | SMZK         | 370                  | 40            |
| Gaeve                        | Radio Club                        | SMXF         | 325                  | 200           |
| Goteborg                     | Radiotjanst                       | SASB         | 290                  | 500           |
| Jonkopings                   | Jonkopings Rundradiostation       | SMZD         | 265                  | 200           |
| Karlsborg                    | Radiotjanst                       | SASF         | 1350                 | 50            |
| Karlskrona                   |                                   |              | 196                  | 200           |
| Karlstad                     | Radio Club of Karlstad            | SMXG         | 221                  | 1000          |
| Linkoeeping                  | Radio Club                        | SMUV         | 467                  | 25            |
| Malmo                        | Radiotjanst                       | SASC         | 270                  | 500           |
| Norrkoeping                  | Radio Club                        | SMVV         | 260                  | 175           |
| Stockholm                    | The Swedish Broadcasting Co.      | SASA         | 454.5                | 1500          |
| Sundsvall                    | Radiotjanst                       | SASD         | 545                  | 500           |
| Trollhattan                  | Trollhattans Rundradiostation     | SMXQ         | 345                  | 50            |
| <b>SWITZERLAND</b>           |                                   |              |                      |               |
| Basle                        |                                   | HB3          | 1000                 | 300           |
| Berne                        | Radio-Genossenschaft              |              | 411                  | 1500          |
| Geneva                       | Radio Broadcasting Soc. of Geneva | HBI          | 760                  | 500           |
| Lausanne                     | Lausanne Radio Society            | HB-2         | 318                  | 500           |
| Zurich                       | Zurich University                 | RGZ          | 515-650              | 500           |



| Countries and Cities   | Owner                                       | Call Letters | Wave Length (Meters) | Power (Watts) |
|--|---|--------------|----------------------|---------------|
| <b>SWITZERLAND</b>   |   |              |                      |               |
| Zurich   | Zurich Radio Genossenschaft                 |              | 514.1                | 500           |
| <b>TUNISIA</b>   |   |              |                      |               |
| Tunis  | French Army                                 | OCTU—TUA     | 1450—45              | 500           |
| <b>UNION OF SO. AFRICA</b>                                   |   |              |                      |               |
| Cape Town  | Cape Peninsula Broadcasting Assn.           |              | 368                  | 6000          |
| Durban   | Town Council                                |              | 400                  | 1500          |
| Johannesburg   | Associated Scientific & Technical Societies |              | 438                  | 1000          |
| <b>UNION OF SOVIET SOCIALIST REPUBLICS (formerly Russia)</b> |   |              |                      |               |
| Moscow   | Sokolniki                                   |              | 1010                 | 2000          |
| "  | Trade Union                                 |              | 450                  | 2000          |
| "  | Lubovitch                                   |              | 365                  |               |
| "  | Union of Soviet Workers                     |              | 675                  |               |
| "  | Comintern                                   | RDW          | 1450                 | 12000         |
| "  | Radio-Peredatcha                            |              | 400                  | 2000          |
| Leningrad  |   |              | 310—240              | 2000          |
| Niji-Novgorod  |   |              | 253                  | 1000          |
| Kiev   |   |              | 1000                 | 2500          |
| <b>UNITED KINGDOM</b>  |   |              |                      |               |
| Aberdeen   | British Broadcasting Co.                    | 2BD          | 500                  | 1500          |
| Belfast  | British Broadcasting Co.                    | 2BE          | 306.1                | 1500          |
| Birmingham   | British Broadcasting Co.                    | 5IT          | 491.8                | 1500          |
| Bournemouth  | British Broadcasting Co.                    | 6BM          | 326.1                | 1500          |
| Cardiff  | British Broadcasting Co.                    | 5WA          | 353                  | 1500          |
| Chelmsford   | British Broadcasting Co.                    | 2BR          |                      |               |
| Daventry   | British Broadcasting Co.                    | 5XX          | 1600                 | 25000         |
| Dundee   | British Broadcasting Co.                    | 2DE          | 288.5                | 200           |
| Edinburgh  | British Broadcasting Co.                    | 2EH          | 294.1                | 200           |
| Glasgow  | British Broadcasting Co.                    | 5SC          | 405.4                | 1500          |
| Hull   | British Broadcasting Co.                    | 6KH          | 288.5                | 200           |
| Leeds-Bradford   | British Broadcasting Co.                    | 2LS          | 277.8—254.2          | 200           |
| Liverpool  | British Broadcasting Co.                    | 6LV          | 297                  | 200           |
| London   | British Broadcasting Co.                    | 2LO          | 361.4                | 3000          |
| Manchester   | British Broadcasting Co.                    | 2ZY          | 384.6                | 1500          |
| Newcastle  | British Broadcasting Co.                    | 5NO          | 312.5                | 1500          |
| Nottingham   | British Broadcasting Co.                    | 5NG          | 275.2                | 200           |
| Plymouth   | British Broadcasting Co.                    | 5PY          | 400                  | 200           |
| Poldhu   | British Broadcasting Co.                    | 2YT          |                      |               |
| Sheffield  | British Broadcasting Co.                    | 6FL          | 272.7                | 200           |
| Stoke-on-Trent   | British Broadcasting Co.                    | 6ST          | 288.5                | 200           |
| Swansea  | British Broadcasting Co.                    | 5SX          | 288.5                | 200           |
| <b>URUGUAY</b>   |   |              |                      |               |
| Montevideo   | Radio Sudamericano                          | CWOZ         | 320                  | 500           |
| "  | Diario "El Dia"                             | CWOR         | 350                  | 500           |
| "  | Danree & Cia                                | CWOF         | 300                  | 200           |
| "  | Templo Metodista                            | CWOG         | 325                  | 100           |
| "  | Instituto Metereologico                     | CWOB         | 290                  | 50            |
| "  | General Electric Co. of Uruguay             | CWOS         |                      | 500           |
| <b>VENEZUELA</b>   |   |              |                      |               |
| Caracas  | Empresa Venezolana de Radiotelefonía        | AYRE         | 375                  | 1000          |
| <b>YUGOSLAVIA</b>  |   |              |                      |               |
| Belgrade   | Cie. Generalle De T. S. F.                  | HFF          | 1650                 | 2000          |



DIRECTOR  
GENERAL  
B M N  
BREMEN, GERMANY.



C. A. NIETO  
DIRECTOR  
C Z F  
CHIHUAHUA, MEX.



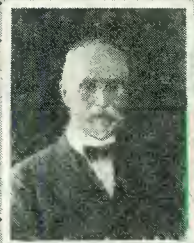
VOCAL SOLO WITH  
MUSICAL ACCOMPANIMENT  
J O A K  
TOKYO, JAPAN.



F. L. CABELLO  
PIANIST  
C Z F  
CHIHUAHUA, MEX.



SECRETARY OF EDUCATION  
C Z E  
MEXICO CITY, MEXICO.



PHILIP BABER  
C Z F  
CHIHUAHUA, MEX.



DR. E. PUNDTER  
B M N  
BREMEN, GERMANY



MISS. M. BOWES  
ANNOUNCER  
C J W C  
SASKATOON, SASK, CANADA



D. BAILEY  
C J W C  
SASKATOON, SASK, CANADA.



**RUSSIAN GRAND OPERA**  
**JOBK**  
OSAKA, JAPAN.



**HUXHAM'S SERENADERS**  
**3 L O**  
MELBOURNE, AUSTRALIA



**F. H. SILVA**  
ASST ANNOUNCER  
**C Z F**  
CHIHUAHUA, MEXICO.



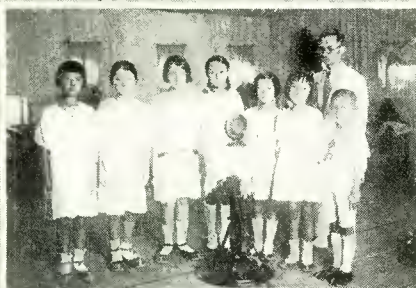
**MUSICAL PRESENTATION**  
**J O A K**  
TOKYO, JAPAN



**P. D. ALVAREZ**  
CHIEF ENGINEER  
**C Z F**  
CHIHUAHUA, MEX.



**MODERN JAZZ.**  
**ORCHESTRA**  
**J O A K**  
TOKYO, JAPAN



**KOBE SEVEN STARS SOCIETY**  
**J O B K**  
OSAKA, JAPAN.



**JAPANESE RADIO PLAYERS**  
**J O B K**  
OSAKA, JAPAN



# Cup W

## 1927 Broadcast Station



**KEITH McLEOD**  
STUDIO MANAGER  
W J Z  
NEW YORK, N.Y.



**J. C. McQUISTON**  
DIRECTOR  
K D K A  
EAST PITTSBURGH, PA.



**KOLIN D. HAGER**  
MANAGER  
W G Y  
SCHENECTADY, N.Y.



**RALPH ATLASS**  
CO-DIRECTOR  
W B B M  
CHICAGO, ILL.



**EDWIN M. SPENCE**  
DIRECTOR  
W P G  
ATLANTIC CITY, N.J.

**T**HE broadcast station popularity contest for 1927, sponsored by the Radio Listeners' Guide and Call Book, is over. The ten silver cup prizes put into competition by the sponsors of the contest will take their proud place in the studios of the ten winning stations. The listening-in public have exercised their first real suffrage to indicate their program preferences.

What significance can be read into the public's choice of the radio broadcasting stations they like best?

Station WJZ, the New York City station of the Radio Corporation of America, jumped into first place in the fans choice at the very start of the contest. When the contest closed on April 16th, Station WJZ was still in the lead, after having held that position throughout the

course of the balloting. This station's final vote was 1541, and was polled from every section of the country.

Second place was not so easily won. Station KDKA, which ended in third place, pre-empted second place in the first week's balloting, and remained there for the first five weeks of the contest. In the sixth week, however, a strong tide of votes for Station W E A F set in, and relegated KDKA into third place. W E A F is operated by the National Broadcasting Company, and is located in New York City. The vote which secured W E A F to second place totalled 1353.

One of the factors in back of W E A F's sixth week strength was a ballot received from the employees of the Standard Oil Co., Newark, New Jersey. This

### THE TEN CUP WINNERS

- 1—Station WJZ...New York City
- 2—Station W E A F. New York City
- 3—Station KDKA...Pittsburgh, Pa.
- 4—Station WLS.....Chicago, Ill.
- 5—Station WGY. Schenectady, N.Y.
- 6—Station WBBM....Chicago, Ill.
- 7—Station WPG. Atlantic City, N.J.
- 8—Station KFI...Los Angeles, Cal.
- 9—Station WBZ. Springfield, Mass.
- 10—Station WOC...Davenport, Iowa

# Winners

## Popularity Contest



PHILLIPS CARLIN  
MANAGER  
WEAF  
NEW YORK, N.Y.



EDGAR L. BILL  
DIRECTOR  
WLS  
CHICAGO, ILL.



DR. FRANK WELLIOTT  
MANAGER  
WOC  
DAVENPORT, IOWA



EARL C. ANTHONY  
OWNER  
KFI  
LOS ANGELES, CAL.



Geo. H. JASPERT  
DIRECTOR  
WBZ  
SPRINGFIELD, MASS.



ballot contained a total of 176 signatures and votes for WEAF. The signers of the ballot also added that their votes were to be counted in favor of Graham McNamee, the station's star announcer, and probably the world's best known microphone man.

Station KDKA, Pittsburgh, Pa., operated by the Westinghouse Electric and Manufacturing Company, firmly affixed itself to third place, after being dropped from second, with a vote of 1336.

Chicago placed its strongest contender in fourth position, when Station WLS, owned by Sears, Roebuck and Company, mustered a ballot count of 1031. On several occasions during the counting of the votes Station WLS forged ahead into third position, contesting with Station WEAF. But in the last week of the poll, WLS was outdistanced by KDKA, by a margin of 300 votes.

There was an almost equal margin, however, between WLS and the fifth station, WGY. This station, operated by the General Electric

Company at Schenectady, New York, moved into fifth place at the first ballot count, and calmly maintained that position, wavering but little. The final vote credited to WGY was 815.

Another Chicago station, WBBM, ran a fine race against odds, and drew steadily up the ladder of the leading ten as the poll wore on. When the last ballot was tabulated, WBBM, which is owned by the Atlas Investment Company, was firmly in sixth place, with more than 300 votes separating it from seventh. The concluding vote for WBBM was 765.

In the seventh position, when the final gong sounded, was Station WPG, the seaside broadcaster operated by the Municipality of Atlantic City, N. J., with a credit of 458 ballots.

Starting late and finishing strong, Station KFI, Los Angeles, California, owned by Earle C. Anthony, Inc., laid a triumphant and successful claim to eighth place; with a ballot credit of 375. Way down in the ruck of the more than 300 stations credited  
(Continued on page 165)

# Prizes Awarded in Radio Set Contest

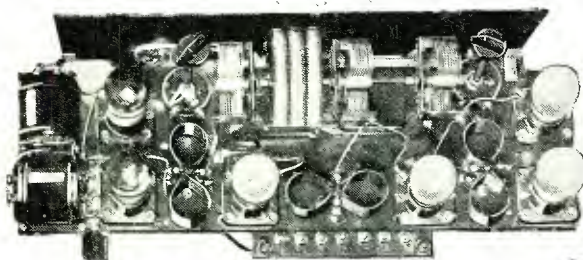
## \$200.00 Set Building Contest Shows Examples of Excellent Workmanship

IN the Winter Edition of the Radio Listeners' Guide and Call Book and Radio Review, the editors announced a \$200 set building contest for readers of this magazine. The winners were to be mentioned in the Spring Edition, but, as announced on page 165 of that

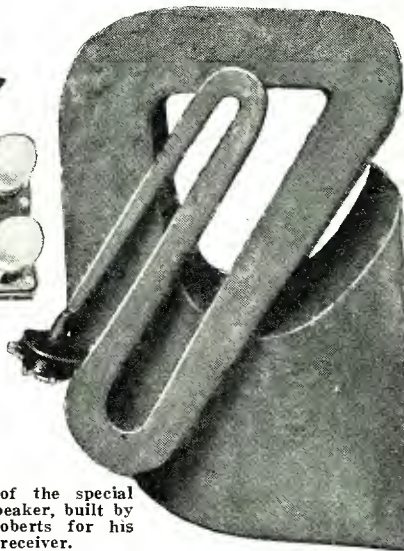
at some future time to use the descriptions given as editorial subject matter for our text.

It is really surprising the great number of readers who sent in good manu-

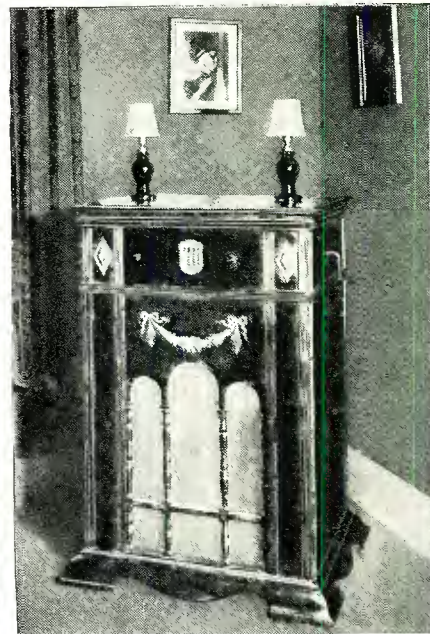
The points which decided the judges in selecting Mr. Roberts' set for first prize were as follows. First, extreme



Interior view of the first prize set as described by its builder Elmer E. Roberts.

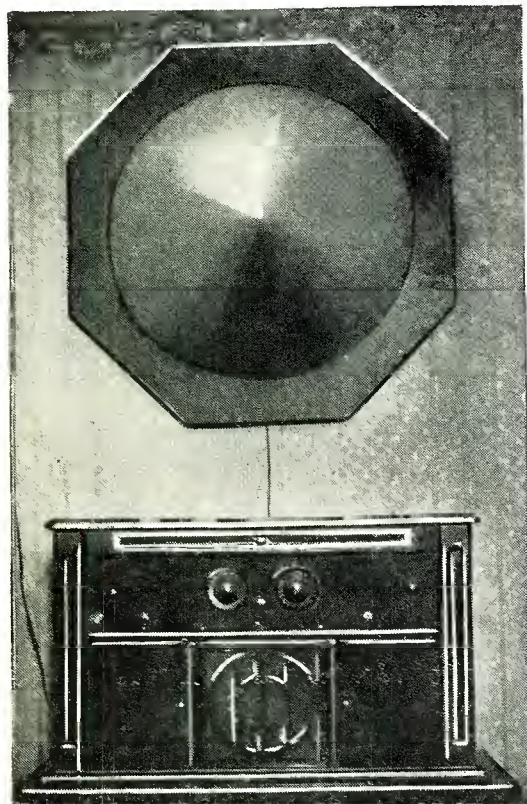


View of the special loud speaker, built by Mr. Roberts for his receiver.



View of the complete first prize receiver in its hand-made console cabinet.

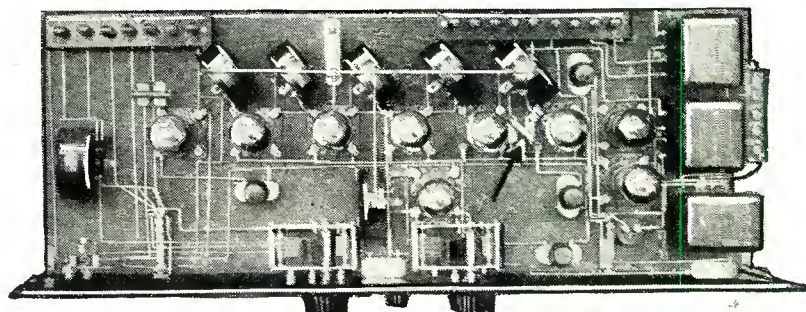
number, the entries received were so multitudinous, and so many of them had great merit, that the editors were unable to make proper selection before going to press. We are therefore pub-



Victoreen Super-Heterodyne constructed by Mr. De Forest which was awarded second prize.

scripts, yet did not follow the rules as set forth. This of course disqualified them from entrance into the contest at once. There were quite a few who described receivers but did not

neatness of work and design. Second, unique construction; Third, beauty of cabinetwork and originality in speaker construction, and last arrangement by which the phonograph is made a component part of the receiver, giving a



Interior view of the second prize winning set.

furnish photographs, simply sending in pencil or ink sketches. Several simply sent in photos without any description at all to guide the editors and a few sent in excellent descriptions without giving their names or addresses.

combination console which from all appearance is a counterpart of very highly priced console combinations sold by many of the prominent phonograph companies today.

Mr. Roberts describes the construction of his receiver as follows:

### First Prize—\$100.00 Award

The set which the editors have selected for first prize was built by Elmer E. Roberts of Syracuse, N. Y. Mr. Roberts used the same circuit utilized by the editors as an example to introduce the contest, namely the Bodine Five-tube TRF circuit.

"The circuit consists of two stages of tuned radio-frequency, detector and two stages of transformer coupled audio-frequency amplification. The difference between this and the ordinary TRF circuit is where the first radio-frequency stage is used as a means of coupling the antenna to the first tube. I have connected the first

lishing the winners in this edition. In all fairness to the great number of our readers who sent in descriptions of their excellent receivers built for this contest and who were not selected for a prize, we wish to say that we plan

coil the same as the other two, each one connected to a variable condenser. The antenna lead is wired to the grid of a type H CeCo tube and also to the terminal of a 100,000 ohm resistance unit. The plate of the same tube is connected to the plate of the first coil. The opposite terminal of the high resistance unit is connected directly to the A battery negative and ground. The filament of this tube is controlled by a fixed resistance. This arrangement effects a noticeable gain of amplification. The selectivity of the set is also greatly improved. The resistance unit

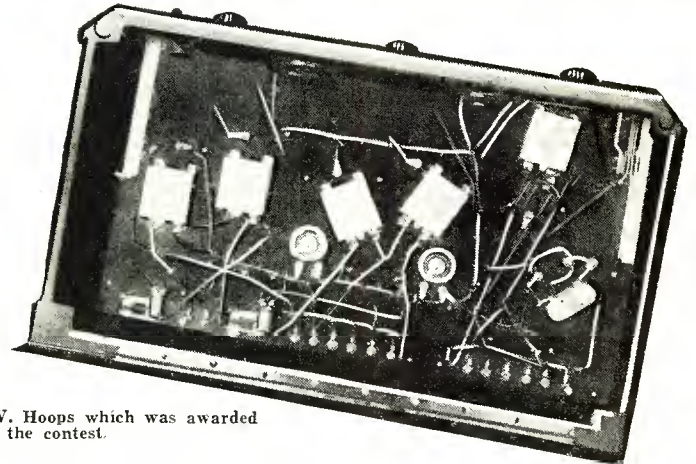
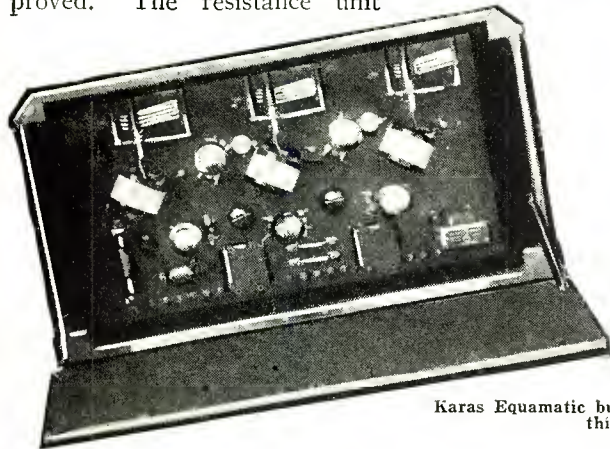
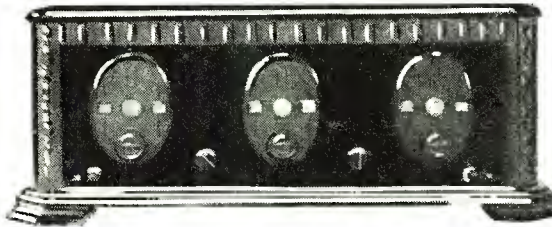
the set. The condensers are modified straight-line frequency type."

"The audio-frequency transformers are Karas Harmonic which have a very uniform amplification over the entire tonal scale. A .002 MFD fixed condenser is used across the primary

two condensers. The frame of the condensers on the left is grounded and connected to the negative A battery. The other condenser is separated from them so as to obtain either a negative or positive return to the grid of the detector tube."

"The radio-frequency and detector tubes are coated with bronze liquid lacquer which is grounded by means of a fine wire placed around the tube and connected to the terminal of the A negative. This is all the shielding used."

"The sub- and front-panels are hard rubber mounted by 3 small angle brackets, one at each end and one in the



Karas Equamatic built by J. W. Hoops which was awarded third prize in the contest.

between the grid, A negative and ground is a help in reducing static and other disturbances."

"The volume control consists of a Yaxley 10 ohm rheostat which controls the filament of the two radio-frequency tubes. Separate rheostat of 10 ohms for the detector tube and a 6 ohm rheostat for the two audio tubes are used."

"The RF coils used are the Bodine Twin '8' Type which have small self-

of the first audio-transformer to reduce the blasting effect which results in distortion."

"A separate C battery of 9 volts is used on the first audio tube, which is a UX112. A 27½ volt grid bias is used on the last audio tube which is a UX171. All tube sockets are mounted on sponge rubber pads in order to absorb shocks."

"The set is wired throughout with flexible wire to eliminate noises produced by jarring the set while tuning. All wiring is done underneath the sub-panel. There are 3 B battery voltage taps, one for the detector, one for the radio-frequency which is also connected to the second audio-transformer, the third connected through a filter to the plate of the last audio tube."

"A 1 MFD by-pass condenser is connected between the negative A and intermediate B battery plus. A .002 fixed condenser across the secondary of the last audio transformer smoothes out and mellows the tone."

"Pacnet rheostats are used on the sub-panel to control the audio and detector tube filaments."

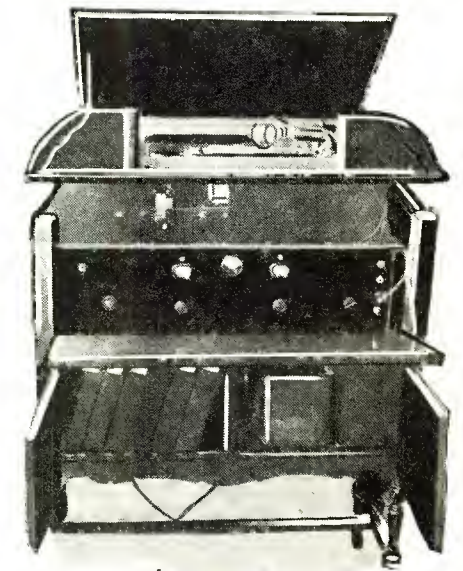
"The 2 radio-frequency tubes are type UX201A. The detector tube is a UX200A."

"A filter transformer is used to keep the high voltage out of the speaker windings. As the set is strictly a speaker set, but one single circuit jack is used."

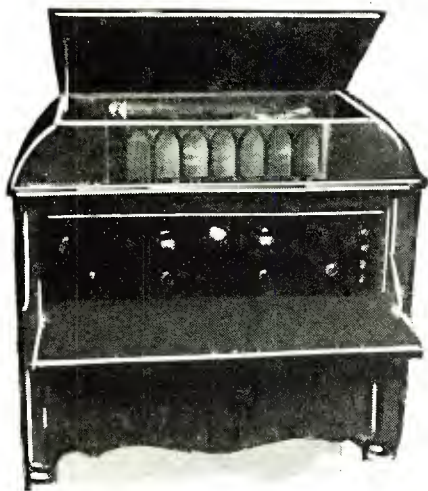
"The frame of the Na-ald control unit is reversed and the single condenser to the right is separated from the other

center. Three legs about ¾ inch long are used on the rear of the sub-panel to hold it up."

"The speaker is of my own make. The design is acoustically correct. It is constructed from heavy gauge sheet metal, the four sides being tightly soldered together at the corners making a square column. The entire speaker is covered with a fibre cement put on about ¼ inch thick, to reduce any



Another view of the combination set, which took fourth prize, showing the phonograph in the top of console.



Phonograph radio console combination built by Mr. Jones for the contest, which was awarded fourth prize.

contained magnetic fields, reducing the chance of intercoupling and uncontrollable oscillation."

"A Na-ald Localized Control Unit of three .00037 MFD condensers tunes

chance of vibration. The length of the air column is about 14 feet graduating from ⅜ of an inch to a 26 inch square bell. The unit I use is an Amplion

Type AR-67, attached by a short flexible rubber coupling. The tone quality and volume compares extremely favorably with the natural deep tone quality

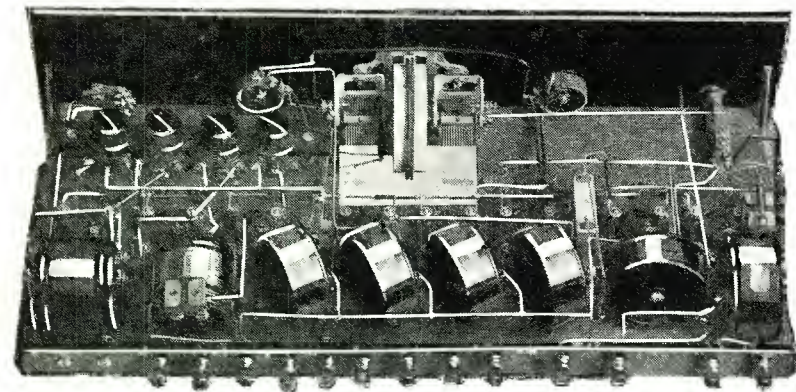
found in the new electric reproducing phonographs." "The cabinet is my own design, and built by myself. It is finished in black and gold sprayed lacquer which is given a clouded effect. The upper part of the cabinet houses the receiver, together with a small portable phonograph which is also connected to the speaker by means of an electrical pick-up. The lower part contains the speaker set in back of a grill work. The A-B battery eliminator which furnishes power is also in the base of the cabinet."

Two views of the glass enclosed Norden-Hauck Super-Ten built by Mr. Fleisshauer and awarded fifth prize.

"With this set I have received sig-

nals from practically every point in the United States from coast to coast and Canada."

nals from practically every point in the United States from coast to coast and Canada."



nals from practically every point in the United States from coast to coast and Canada."

#### Second Prize—\$50.00 Award

The editors award second prize to Mr. C. De Forest of Washington, D. C., who constructed the Victoreen Super-heterodyne as described in the Winter Edition of the Radio Listeners' Guide and Call Book and Radio Review.

The points considered when Mr. De Forest's receiver was awarded the prize were, neatness of construction, originality of design and workmanship.

Mr. De Forest describes the set he constructed as follows: "The set was built according to specifications given in The Radio Listeners' Guide and Call Book, with the following additions. Regeneration was added to the first detector, making the set fully as sensi-

the antenna coupler and connecting the loop direct to the set. At the same time this operation connects plate of detector tube to center of loop, for regeneration."

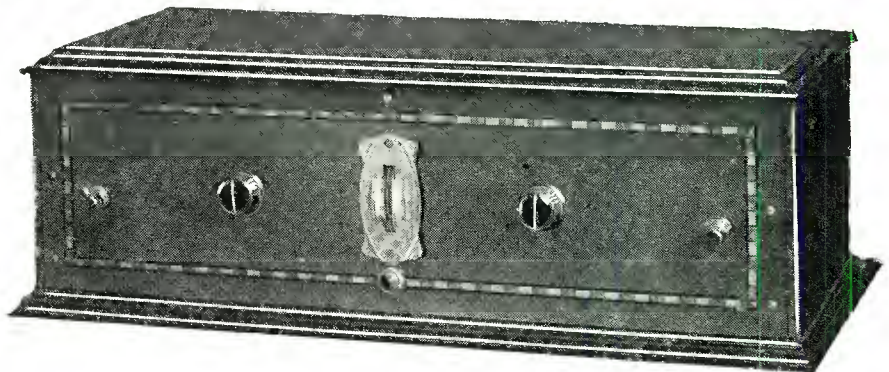
was experienced with the RF currents passing into the AF stages and causing trouble on all but very weak stations. Even then a great amount of trouble was experienced in keeping the tone quality free of hisses and squeals. Since the addition of the RF choke, however, the entire set is as free from extraneous noises as a 'tomb.' The position of this choke in the set is denoted by the arrow in the illustration."

"A great deal of attention was paid to the audio-frequency end of this set, and a number of different systems were tried out before the S-M Impedance amplifier was decided on. This system

is capable of handling—provided proper by-pass condensers are used—a simply tremendous amount of current without distortion. To protect the loudspeaker windings a S-M output transformer is used."

"UX201A tubes are used throughout with the exception of the last stage which uses a UX171. It might be well to mention here to other builders of super-hets that before the tubes used in the set were actually placed in service, a great many were tested out and I can truthfully say that the great amount of DX which I accomplish is due in a large measure to two factors—matched tubes in the I-F stages and

Victoreen Super-Heterodyne built by Mr. Bonham which was awarded sixth prize in the contest.



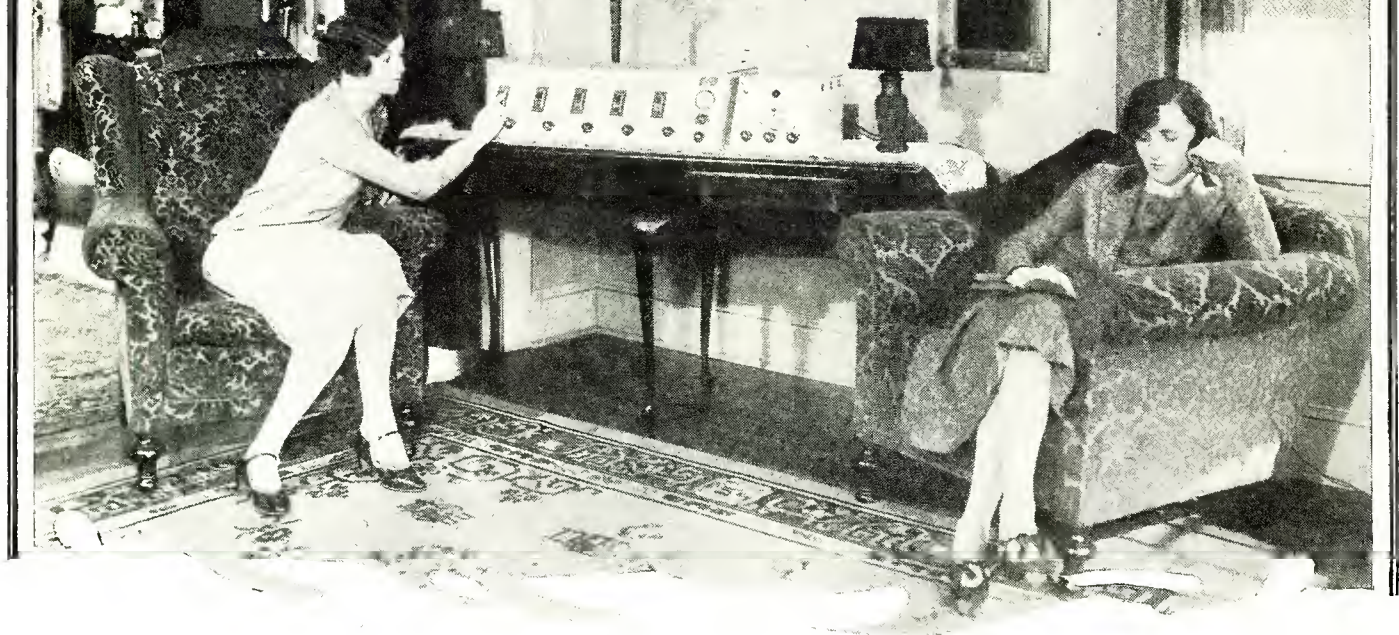
"Another intermediate frequency stage was added which has given this set enormous volume in distance reception. In order to handle this tremendous signal strength it was necessary to place a radio-frequency choke between the detector and audio-frequency amplifier. Before this choke was added trouble

an oscillator which operates at a low plate voltage without tendency toward producing harmonics."

"The cabinet used in the set is home made, being constructed after the panel and set were built. It is constructed of smooth knotless white wood care-  
(Continued on page 142)



# How to Build the Transoceanic "New Phantom" Model ... By Charles R. Leutz



THE assembly and installation of the "New Phantom" model is not nearly as difficult as it would seem from a casual glance at the wiring and layout diagrams. While the set itself is much more elaborate and complete in every detail than any other receiver in its class, the construction is divided into several units, the construction and assembly of each of which is an extremely simple procedure.

If you build it up one unit at a time and then assemble the completed units together, you will have no difficulty in bringing all the component sections together to work harmoniously.

While it is an easy matter to build the set itself, the constructor must bear in mind the fact that the design and construction of the original model was the result of many experiments both from the standpoint of theory of electrical design and mechanical layout. Many changes were necessary before the parts selected as being best suited for operation together were decided upon and the special parts used are the result of careful measurements and accurate construction.

If you feel that you must incorporate special features of your own, have your sling, but if you find the completed receiver does not measure up to your expectations and the claims made for

it, please put the blame where it belongs—on the "improvements" made on the original circuit.

Each 9-tube "New Phantom" constructed in the factory is tested for a minimum range of 2,000 miles from the Long Island City laboratory and the calibrations are included with the receiver. It is also tested for selectivity and must tune in distant stations separated by only 10 to 15 kilocycles from local signals.

There is no reason why a model built by an amateur should not pass the same rigid test. In every instance where the set is built exactly according to instructions, the same efficiency will result. In practically every case, failure to operate successfully has been due to substitutions of parts not suited for this circuit or to the incorporation of detrimental "improvements."

While every effort is made to deliver the component parts to the builder in working condition, accidents in transit, while few and far between are apt to occur so it is best to test the individual parts before mounting them together. Testing the parts before they are assembled is a simple procedure, but testing them after they are wired together is a much more tedious procedure involving unsoldering of connections, removing parts, etc.

The number assigned to each part on the layout diagrams corresponds to the same number given the part in the list of parts so that the type of part to use in each position can be ascertained by consulting the list of parts. Where there are several parts having the same characteristics, the same number has been assigned to each part on the layout diagram, having the same characteristics.

The shielding case of the receiver assembly is made of 1/16" thick Half-hard Sheet Aluminum. It consists of a front panel; a rear panel; a bottom; a hinged top and two ends which form the complete enclosure for the receiver. Five partitions divide the case into individual compartments which shield each section from the others.

The aluminum sheets are furnished cut to size, drilled and bent to shape, and scratch brushed inside and outside to give it the dull attractive finish. Scratch brushing is done by scratching the aluminum with a rapidly revolving wire brush. In doing this the aluminum is backed up by a flat piece of wood the size of the aluminum sheet so as to prevent any bending of the aluminum.

After thoroughly scratch brushing them, the pieces are given a thin coating of Egyptian lacquer, completely covering every surface. The first step

in the assembly is to fasten the two ends and five partitions to the rear panel. Either machine screws and nuts or rivets can be used for fastening the sheets together.

The location of the holes for the sockets and for mounting the parts are given in the full-sized working drawings obtainable from the manufacturer. An arrow should be engraved on the

denser C-9 and its shortcircuiting switch, and the voltage multiplier can then be mounted in place and connected together. In making the soldered connections use only a flux made of powdered rosin and alcohol or use a rosin core solder such as Kester Radio Solder. In using a rosin core solder be careful to follow the manufacturers' instructions regarding its use.

The heavy wires shown can be No. 12 gauge soft drawn copper wire covered with black empire insulating tubing. The smaller wires can be flexible insulated hookup wire.

The next step is to assemble the audio tube shelf. This shelf is a piece of bakelite 9 $\frac{3}{4}$ " long, 3 $\frac{5}{8}$ " wide and  $\frac{1}{4}$ " thick. It can be sanded and finished off in the same way that the radio frequency shelf was finished off with sandpaper and oil. The locations of the holes for sockets, transformers and the other parts which mount on this shelf are given in the full-sized drawings furnished by the manufacturer. Arrows should also be engraved at the tube sockets.

Mount the socket springs resistor clip mountings, blocking condensers and transformers, making the wire connections as you mount the parts. As much of the wiring as possible should be completed between the parts mounted on the unit, as this is much simpler than making such connections later when the unit is mounted in the case.

You can now proceed to mount both the Radio frequency and audio frequency tubes shelves in place in the containing case. The binding posts should be mounted on the binding post strip ST-31, this assembly in turn being mounted in place at the rear of the case.

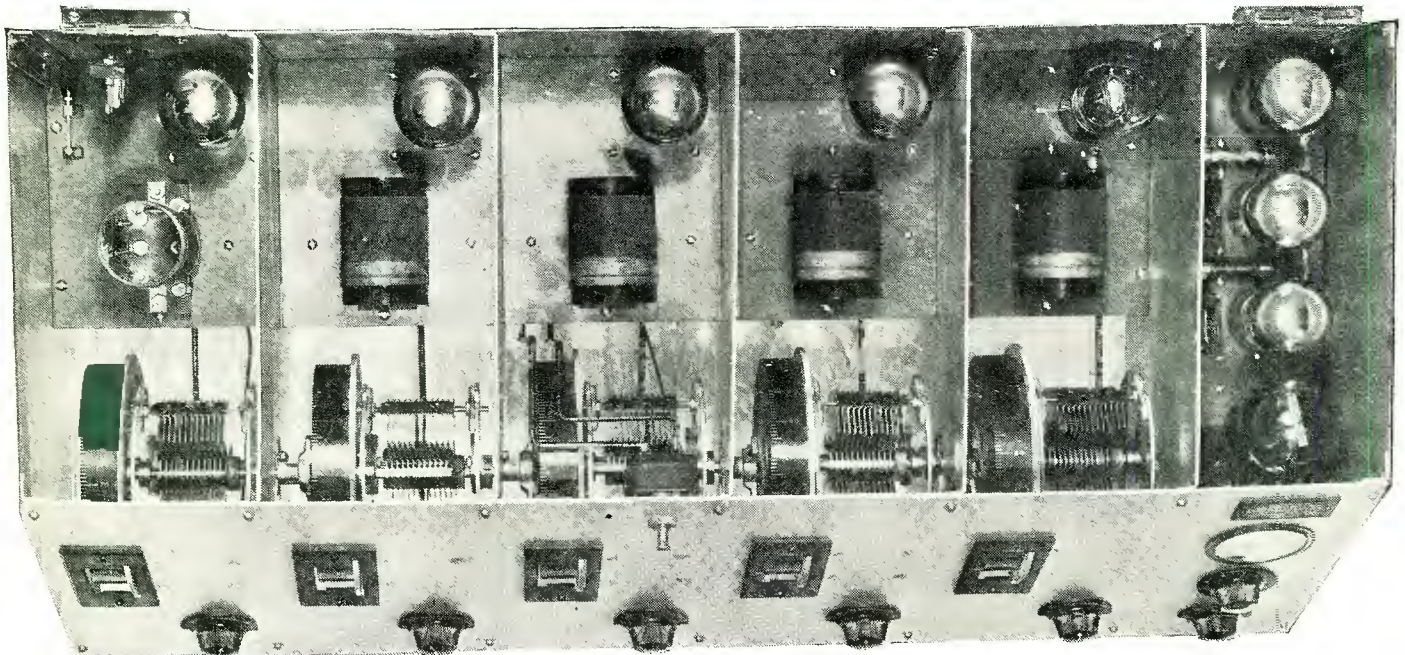
#### LIST OF PARTS REQUIRED FOR TRANSOCEANIC "NEW PHANTOM" MODEL

- |   |   |
|---|---|
| 1 Cabinet, 27 $\frac{5}{8}$ " x 7 $\frac{1}{2}$ " x 13" (ST-1)                              | 1 Fixed condenser in series with antenna, .00025 mfd. (ST-19) |
| 5 Drum name plates, $\frac{1}{8}$ " x 1 $\frac{5}{8}$ " x 3 $\frac{3}{4}$ " Bakelite (ST-2) | 1 Antenna condenser switch (ST-20)                            |
| 6 Knob name plates, $\frac{1}{8}$ " x 1 1/16" diameter (ST-3)                               | 1 R. F. tube shelf assembly (ST-21)                           |
| 1 Meter switch plate, $\frac{1}{8}$ " x 1 $\frac{5}{8}$ " (ST-4)                            | 5 R. F. "A" transformers (ST-22)                              |
| 1 Golden-Leutz name plate, $\frac{1}{8}$ " x 1" x 2" (ST-5)                                 | 1 R. F. shelf bracket (ST-23)                                 |
| 4 Control knobs, bakelite with arrows, $\frac{1}{4}$ " hole (ST-6)                          | 1 Detector grid leak, 2 to 10 meg-ohms (ST-24)                |
| 1 Weston, Type 506 voltmeter (ST-7)   | 10 Grid leak clips (ST-25)                                    |
| 1 Weston, 10-point, Type 506 meter switch (ST-8)  | 1 Audio tube shelf assembly (ST-26)                           |
| 1 Filament switch (ST-9)  | 2 Audio transformers (ST-27)                                  |
| 1 Golden-Leutz loop adapter and leads (ST-10)   | 1 Impedance (ST-28)   |
| 1 Weston, multiplier, high volt (ST-11)   | 2 Blocking condensers, .5 mfd. (ST-29)                        |
| 3 Control knobs, bakelite with arrows, 3/16" hole (ST-12)                                   | 5 Indicator wheels (ST-30)                                    |
| 2 Filament rheostats, 4 ohms (ST-13)  | 1 Binding post strip (ST-31)                                  |
| 3 Vernier condensers (resonators), .00002 mfd. maximum capacity (ST-14)                     | 1 Audio condenser, .002 mfd. (ST-32)                          |
| 1 Variable high resistance, 0-500,000 ohm volume control (ST-15)                            | 2 Audio grid leaks, 30,000 ohms (ST-33)                       |
| 20 Binding posts (ST-16)  | 5 Grid units, 680 ohms (ST-34)                                |
| 5 Variable condensers with mounting brackets, .0005 mfd. (ST-17)                            | 4 Bypass condensers, 1 mfd. (ST-35)                           |
| 4 Universal joints, with leather fittings (ST-18)   | 1 Grid condenser, .00025 mfd. (ST-36)                         |
|   | 1 Audio Bypass condenser, .005 mfd. (ST-37)                   |
|   | 2 Filter condensers, 1 mfd. (ST-38)                           |
|   | 2 Plate Resistors, .025 megohm (ST-39)                        |
|   | 5 Dials, 0-100 (ST-40)  |
|   | 1 Audio transformer bracket (ST-41)                           |
|   | 2 Hinges (ST-42)  |

The next operation consists in drilling the proper holes in the radio frequency tube shelf. This tube shelf is a piece of bakelite 23 $\frac{3}{4}$ " long, 5 $\frac{3}{4}$ " wide and  $\frac{1}{4}$ " thick. While it is not necessary to sand it, you will find that a nice satiny finish can be obtained by sand-

subpanel between the "G" and "P" terminals of the sockets to mark the location of the pin on the tube base when inserting the tube in its socket.

After all the holes are drilled, the socket springs, interchangeable transformer sockets, bypass condensers,



Illustrations by Courtesy of C. R. Leutz, Inc.

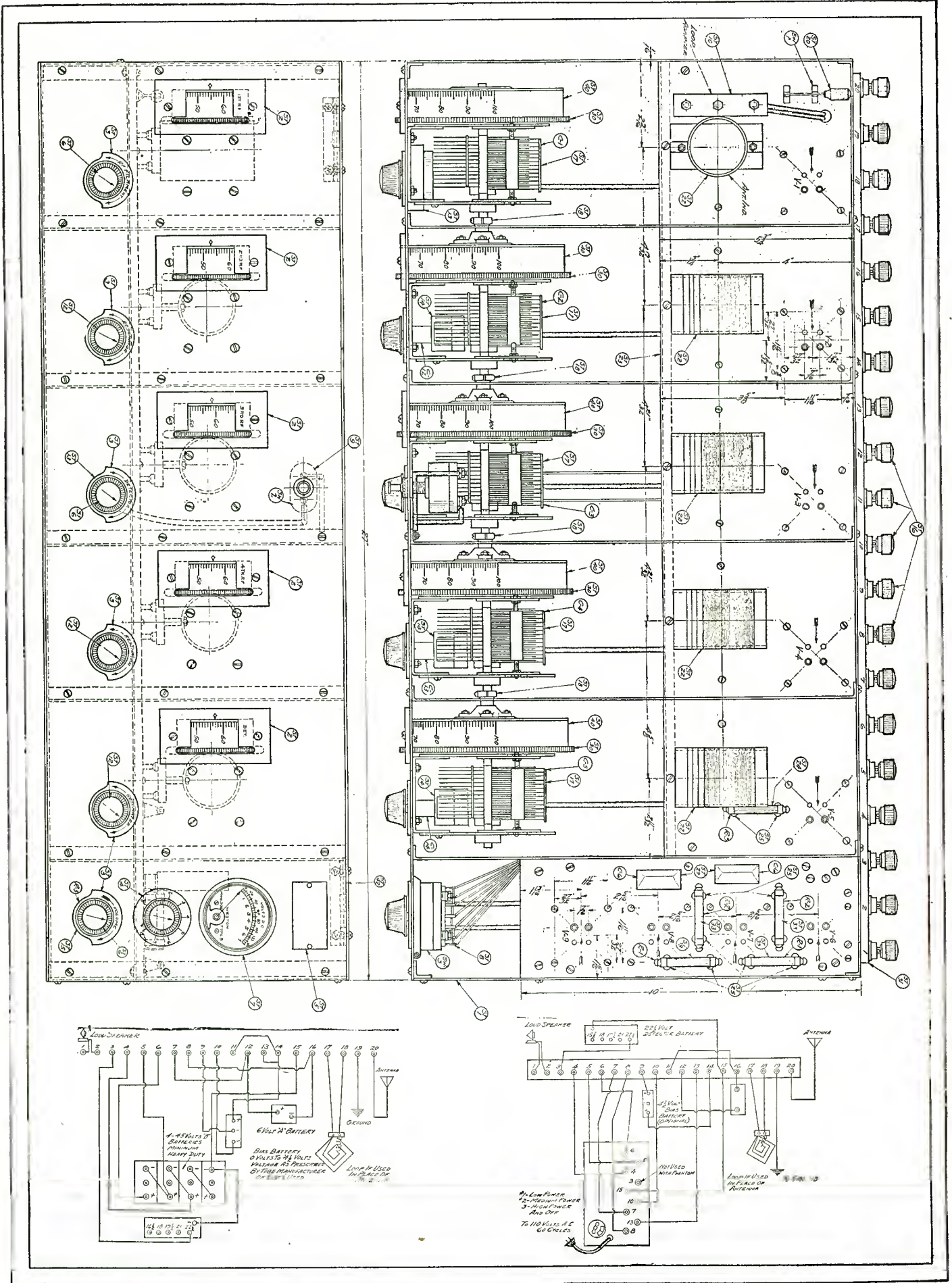
A top view of the Transoceanic "New Phantom" model showing how the parts of each stage are enclosed in their own shielded compartment.

ing the surface of the bakelite with sandpaper and oil.

damping resistances, grid condenser, and grid leak clips, antenna series con-

Next make as many of the connections as possible between the binding

# Layout of the Transoceanic "New Phantom" Model



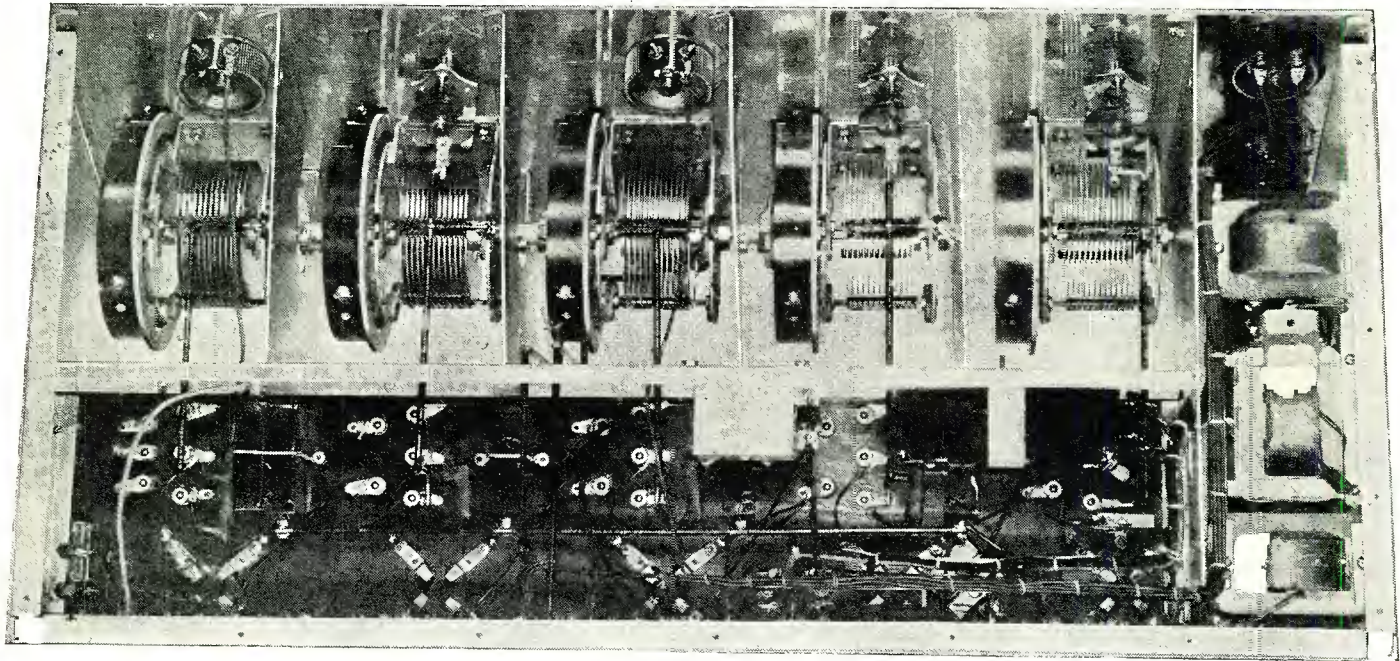
post terminals and the parts on the radio frequency and audio frequency unit shelves.

It will be noted that there is an aluminum strip at the front end of the radio frequency tube shelf, between the tube shelf and the base of the case.

The front panel assembly is the next step in the construction of the receiver. Mount the five variable condensers, with drums and universal joints attached, to the front panel. These should be carefully aligned so as to allow free operation when all are connected to-

the special multiple-reading voltmeter switch are then mounted in place. The volume control is mounted in the lower right hand corner of the front panel. The filament switch is located in the center of the panel, toward the top.

The remaining front panel controls



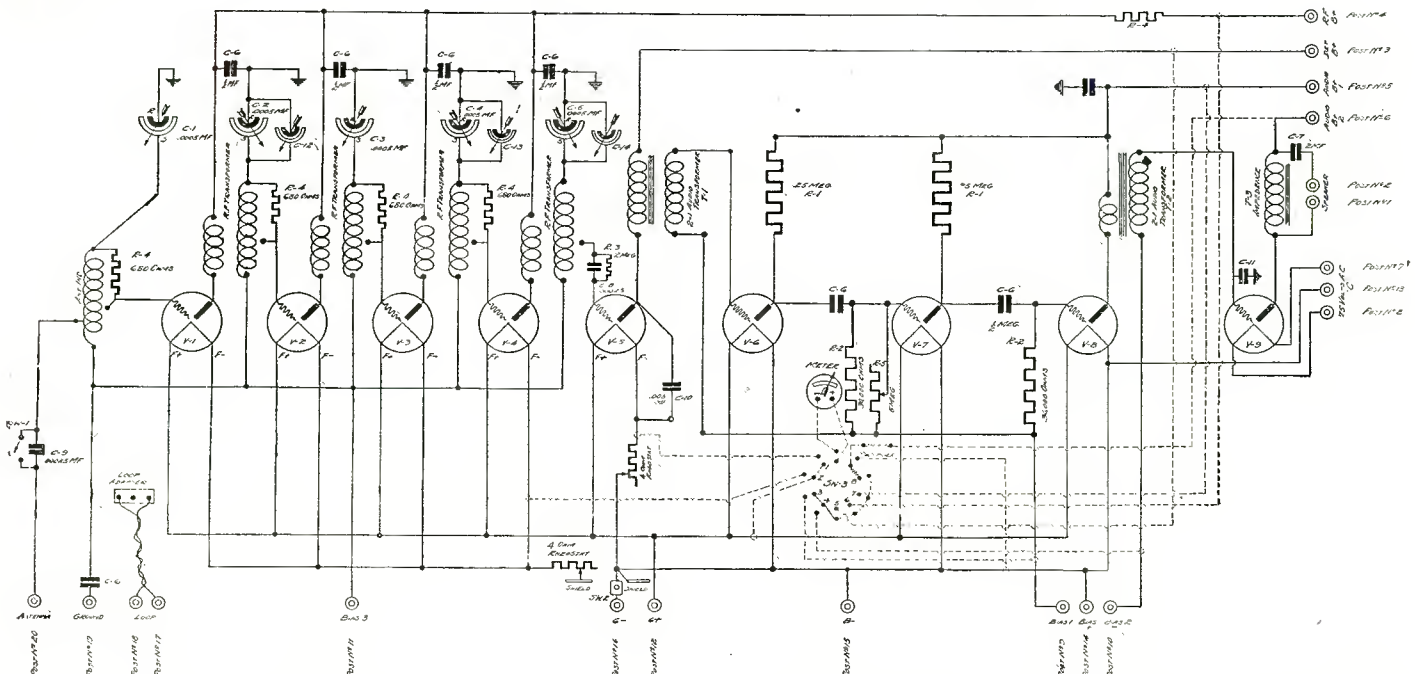
How the completed set appears from the bottom with its base removed. Note the cable of bunched wires running through to the audio compartment.

This supports the tube shelf at the front end and also provides some necessary shielding. This piece can now be put in place. Two wires are run from posts 17 and 18 up thru the radio frequency tube shelf to the loop adapter.

gether with the Universal connecting joints. The universal connecting joints are then disconnected again, as preliminary tests on the receiver are always made with the five dials arranged for individual control.

The five drum plates are then fast-

shown are, left to right, the R. F. filament rheostat, ST-6; Resonator ST-12, Detector rheostat ST-13 and the two additional Resonators ST-12. These resonators are small vernier variable condensers, .00002 mfd. maximum capacity.



A schematic diagram of the set indicating how the parts are wired. Refer to picture diagrams and compare all connections when the wiring is being done.

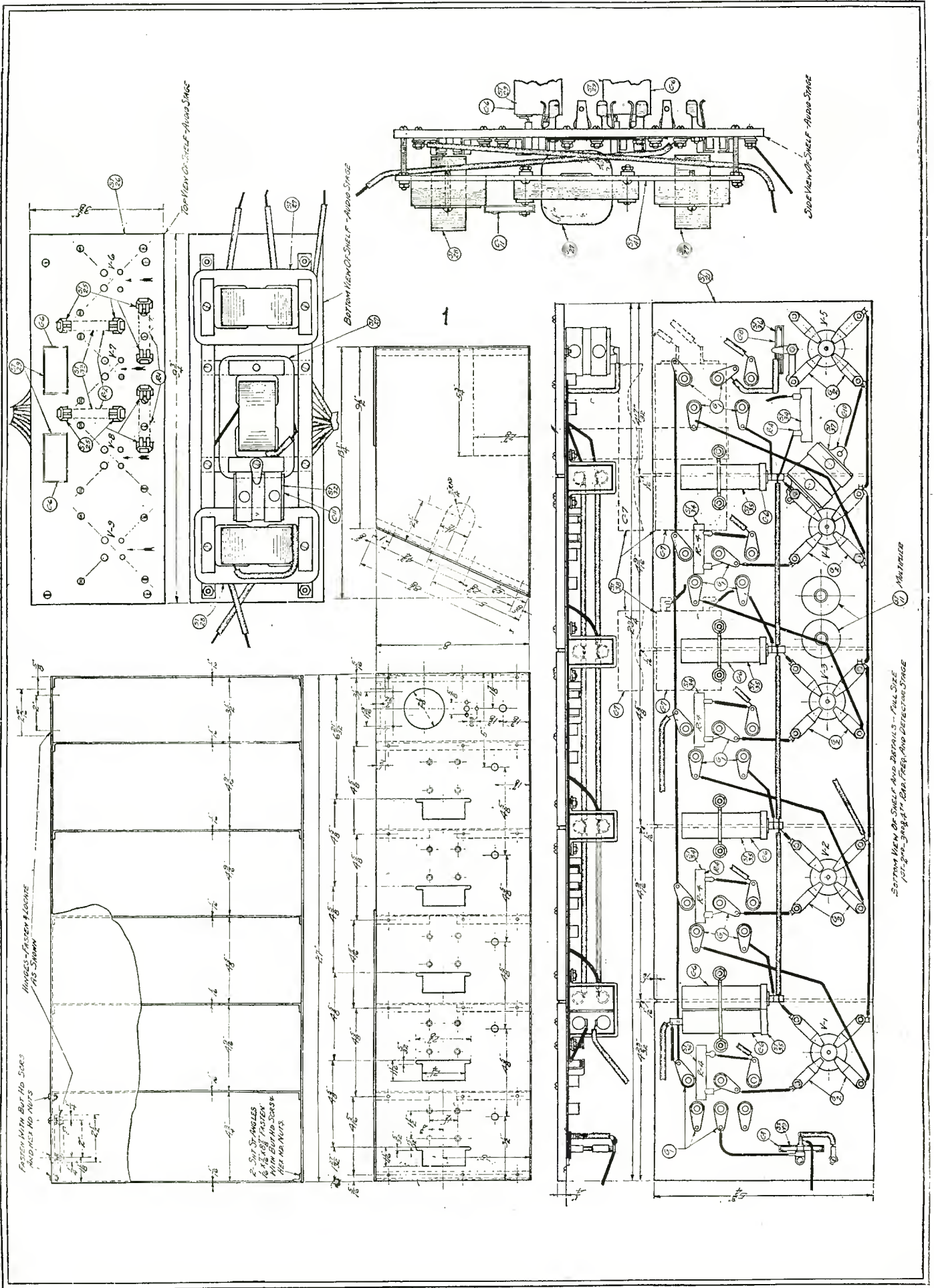
When using a Loop, it is connected to posts 17 and 18 and the Loop adapter is inserted in place of the first radio frequency transformer in the removable socket.

ened to the front panel, aligning them so as to not interfere with the free movement of the control drums in any position.

The Weston 2-scale voltmeter and

All that is necessary to complete the construction is to mount the front panel to the rest of the assembly and complete the wiring. The front panel with all the component parts can now be

# Wiring of the Transoceanic "New Phantom" Model



fastened to the partially assembled receiver. It is screwed to the two ends and five partitions of the case. When this is assembled the rest of the wiring to the variable condensers, resonators, rheostats, meter and meter switch can be put in connecting those parts with the other parts on the socket shelves. After the wiring is completed go over it carefully, checking it against the schematic wiring diagram to be sure that it is correct. The voltmeter and meter switch are tested by temporarily connecting a 22½-volt battery at such points as should give readings during the final operation.

The receiver can be operated either by batteries or by the use of the special battery eliminator for operation with this receiver. The scheme of connections for use with either type of current source are shown in the diagrams. The type of current supply to use is optional with the builder.

It is advisable to have an absolutely constant plate voltage for the detector circuit and for this reason it is desirable to have the detector plate voltage supplied by a separate "B" battery when the battery eliminator is used. Since this "B" battery will be called upon to supply the current for only the detector tube, it will only be necessary to replace it about every nine months.

Before trying to operate the receiver, be sure that all battery connections have been made properly and are tight to prevent any possible damage to tubes and receiver. The tubes should not be inserted in the receiver until all connections have been checked carefully. When using the battery eliminator, the

### Operation

For local reception, a small single wire indoor antenna twenty feet or less is sufficient. Such an antenna can be made by stringing some insulated wire



The current supply unit is designed to match the set and can be placed alongside of it as may be seen in the heading of this article.

behind the picture moulding. For medium range reception up to 1,000 miles, the outdoor antenna should consist of a single wire of at least 150 feet including length of lead-in. For long range work an antenna of from 250 to 350 feet should be used. These antenna lengths are suitable for use under the conditions mentioned with transformers type "A," "B" and "C." For transoceanic reception on the European wavelengths, from 600 to 2,600 meters,

with four feet spacing between each wire. This type of antenna would be practically the equivalent of a single-wire antenna 800 feet long.

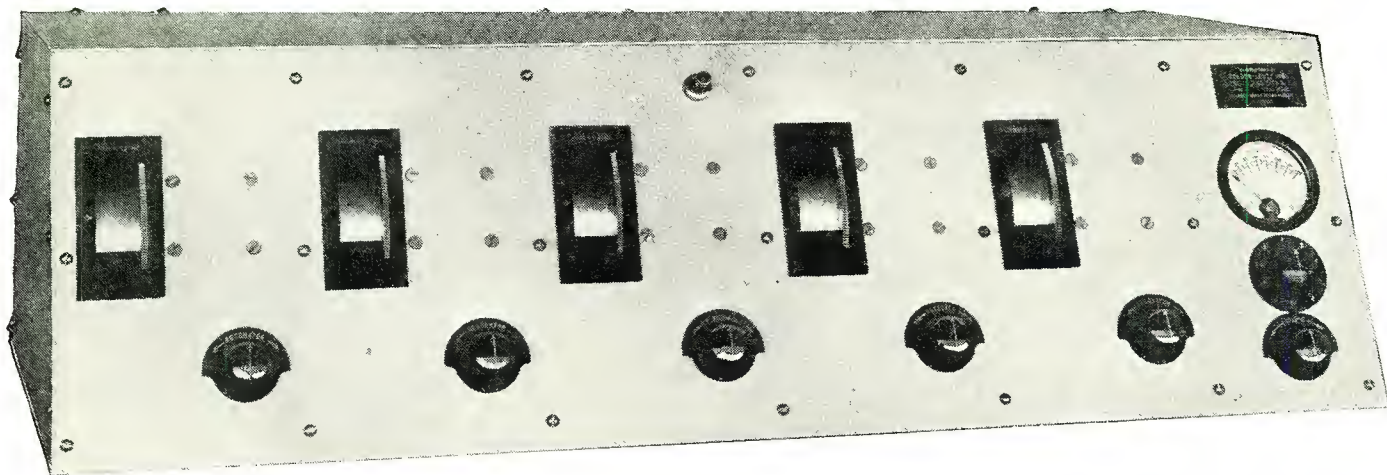
The use of a loop antenna makes it possible to gain the benefits of increased selectivity through the directional properties of the loop.

Remember that the antenna installation is a very important part of any radio installation. Be sure that all connections are good both electrically and mechanically. Solder all connections in both antenna and ground leads and if it is at all possible use a cold water pipe for the ground.

The series condenser in the antenna circuit is used to reduce the fundamental wavelength of the antenna system when tuning in low wavelength stations. When tuning in high wavelength stations it may be shortcircuited. The voltmeter should be used to check up on operating voltages. It should never be left on an active position while operating the receiver but should be returned to the "off" position by means of the switch after the preliminary adjustments and checkings are made.

Any change in the condition of the series antenna condenser will require a slight readjustment of the tuning condenser for the first radio frequency tube.

The proper adjustment of the detector filament voltage and plate voltage is very important if a soft tube of the UX200 type is used in that stage. In such cases a 22½ volt "B" battery tapped at 16½, 18, 19½, 21 and 22½ should be used and various "B" battery voltages should be tried for various adjustments of the filament voltage until



A front panel view of the completed set. The special drum type controlled condensers employed to tune each stage present a handsome appearance on the panel besides being ultra-efficient in the operation of the receiver.

device should be turned "on" and "off" only when the filament switch of the receiver is "on." To start operation turn on the filament switch and then turn on the current supply unit. To stop operation first turn off the current supply unit and then turn off the battery switch.

the antenna should have a combined length of antenna and lead-in of about 1,000 feet. Should such an antenna be impossible because of limitations of location, the next best arrangement is a multiple wire antenna of shorter overall length, such as a four-wire antenna of 250 feet between supports,

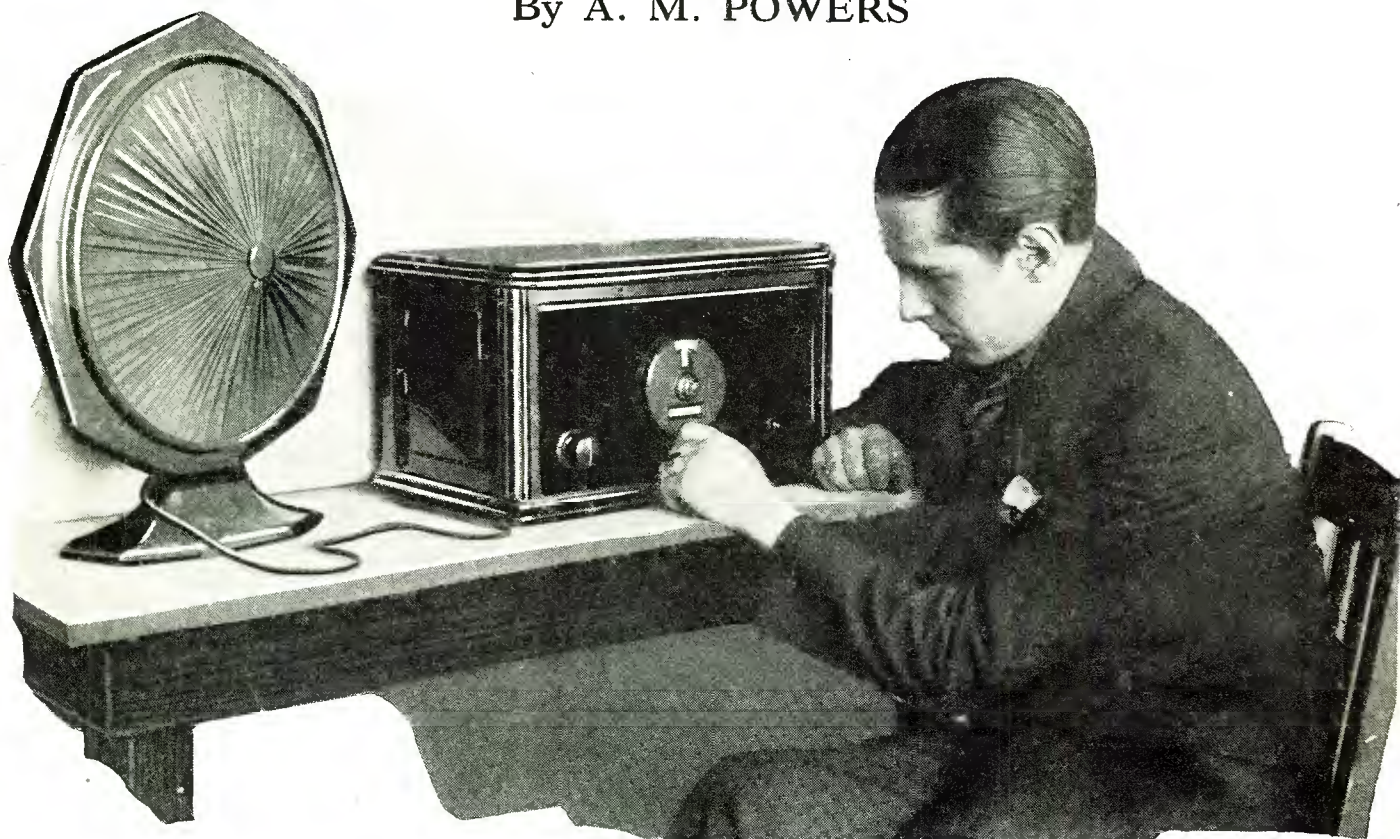
best results are obtained. The most sensitive adjustment is usually the one just below the "hissing" point of the tube.

The 200 or 201A types of tubes can of course be used as detector, but they are not as sensitive as the 200A type.

(Continued on page 138)

# How to Build Sir Oliver Lodge's "N" Circuit Receiver

By A. M. POWERS



**T**HIS season seems to have awakened in radio engineers and scientists a tendency to delve into the past for ideas to improve radio reception.

Grimes resurrected the old Inverse Duplex circuit and found it contained the germ for a really worthwhile receiver that could be made to measure up to every requirement of present-day broadcasting conditions. King produced heretofore unknown efficiency in a standard tuned radio frequency receiver by the simple expedient of providing automatic variation of coupling between the windings of the tuned radio frequency transformers. Loftin and White worked on the standard tuned radio frequency circuit and by combining the effects of inductive and capacitive coupling in a tuned radio frequency transformer they brought forth a worthy addition to the list of efficient radio circuits. Practically all of the developments of late have been made with the tuned radio frequency type of circuit as the starting point.

Sir Oliver Lodge, the man who introduced the idea of tuning into the wireless art, went back to the simple detector type of circuit for a new start in the development of a sensitive, selective and simple modern radio receiver.

To the uninitiated, his circuit seems to be one of the common, ordinary regenerative circuits which were turned out in large numbers by the "new" circuit designers who flourished in the early days of the broadcasting craze.

This however, is far from being the case. When the circuit was first featured in the United States, many engineers and writers pooh-poohed the circuit without so much as giving it a fair trial.

It was only after a few of the circuits were built up and demonstrated that the "Doubting Thomases" pricked up their ears and began to take notice.

Fig. 1 shows the schematic wiring diagram of the "N" circuit. This is fundamentally the circuit introduced by Sir Oliver Lodge with a few minor changes to adapt the circuit to conditions met with in this country. The specifications given in the original English circuit have been followed rigidly with slight changes made only to make it possible to build the circuit with parts readily available in the United States.

The "N" circuit is the result of intensive research, investigation and experimentation by one of the foremost living scientists, a man who is conversant with modern broadcasting con-

ditions. There is a real purpose behind the "N" circuit as there is behind any development produced by a true scientist. In the first place the designer has given us in the "N" circuit, one that is very simple to build and operate. The parts required are easily obtainable at a cost far lower than that required to build any receiver that can compare with it in sensitivity, selectivity and tone quality.

The detector circuit consists of two inductances, "L1" and "L2"; two adjustable fixed condensers, "C2" and "C3"; and one variable condenser, "C1." All the tuning is done with the variable condenser "C1."

With this simple collection of apparatus, Sir Oliver Lodge has given us a circuit which is truly remarkable, combining knife-like selectivity with simple tuning.

The second unique feature of the "N" circuit is uniform sensitivity over the entire wavelength range. This is accomplished primarily by means of the two adjustable fixed condensers, "C2" and "C3," and is worked out by striking a proper capacity balance between the two condensers. If you trace out the circuits in which these condensers are connected you will see the application of the bridge circuit for

eliminating the squeals found in the regenerative circuits whose resemblance to this circuit have caused many so-called critics to label this circuit a simple regenerative circuit.

The adjustment of the capacity values of these adjustable fixed condensers is very simple. It is made after the set is connected with the antenna with which it is to be used. Their adjustment will be described later in the operating instructions. With these condensers are adjusted properly, the set will not oscillate, nor will howls or squeals be caused in tuning. This of course is far from being the case with the ordinary regenerative receivers.

The radio frequency choke coil, "L3" in series with the primary of the first stage audio transformer does not appear in the English "N" circuit. While the circuit will operate without it under certain conditions, it is absolutely necessary with most American made transformers.

Besides eliminating the squealing and howling nuisance, the "N" circuit provides a grade of selectivity and sharp tuning that can only be likened to the best superheterodyne and single-control tuned radio frequency receivers.

#### PARTS NEEDED

- 1 Bakelite or Radion front panel, 7" x 14" x 3/16"
- 1 Wood baseboard, 7" x 13" x 1/2"
- 1 Emerson Multivalve
- 1 Cleartron CTX 112 power tube or equivalent
- 1 Precision Antenna coil (L1)
- 1 Precision "N" coil (L2)
- 1 Precision Type "N", R. F. choke coil (L3)
- 1 Precision Type "N" variable condenser, .00023 mfd. (C1)
- 2 X-L Type G-10 Variodensers (C2; C3)
- 2 Samson Type HW A3 Audio transformers, 2 to 1 ratio (T1; T3)
- 1 Lynch Double resistor mounting (T2)
- 1 Lynch .1 megohm Metallized resistor (R2)
- 1 Lynch .5 megohm Metallized resistor (R3)
- 1 Lynch 5 megohm Metallized resistor (GL)
- 1 Electrad Royalty variable high resistance, Type L, 0-500,000 ohms (R1)
- 1 Electrad battery switch (S)
- 1 Electrad Type GS grid condenser with clips, .00025 mfd. (C4)
- 1 Electrad Type S, .01 mfd. fixed condenser (C5)
- 2 Pacent cushion type UX sockets (1, 2, 3, 4)
- 1 Amperite No. 1A (A1)
- 1 Amperite No. 112 (A2)
- 1 Silver-Marshall Vernier dial
- 8 Fahnestock metal clips for battery terminals
- 1 package Kester Radio Solder
- 1 package Acme or Corwico Flexible hookup wire

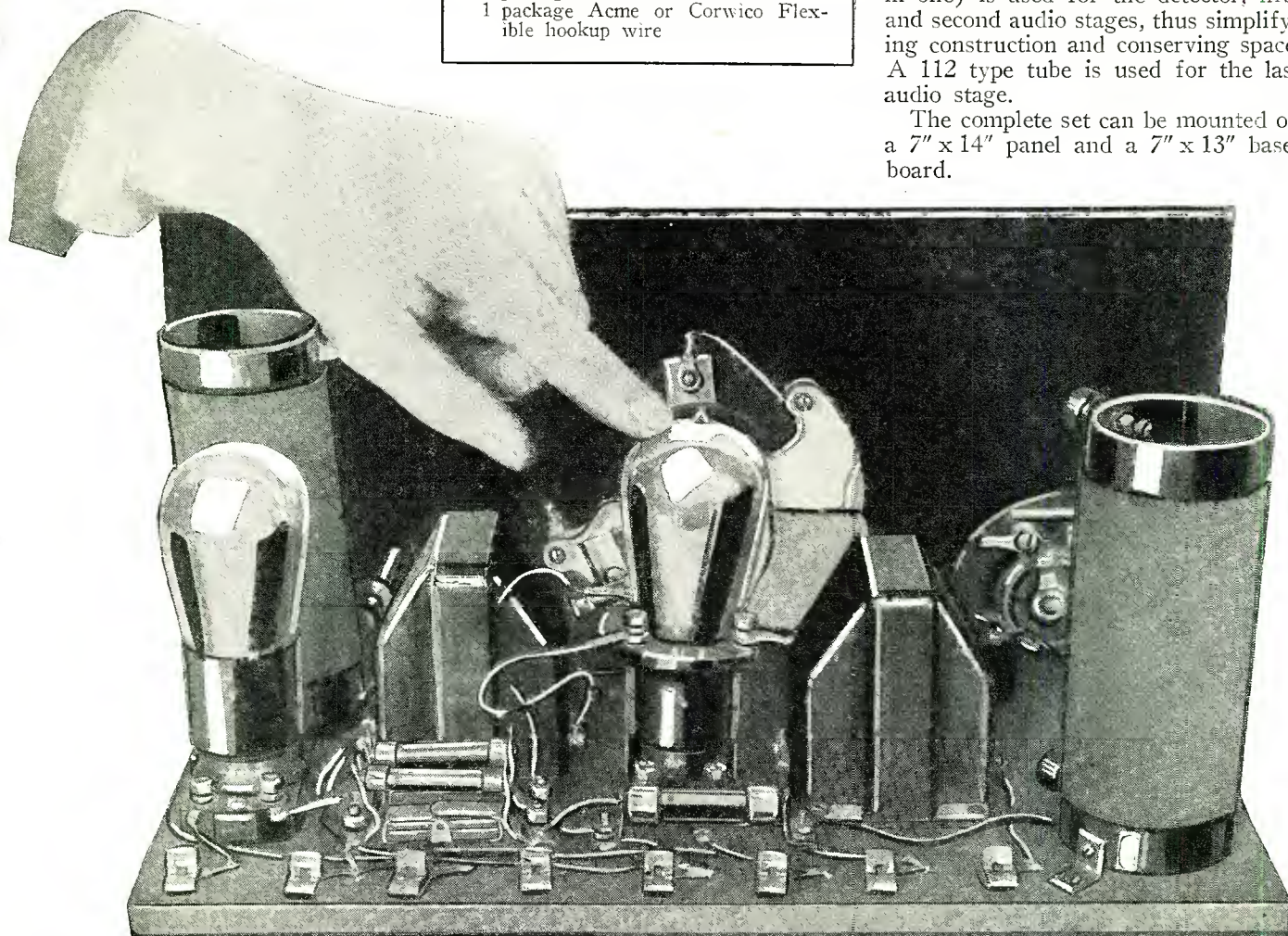
The stations click in and out with precision regularity as the tuning condenser is turned through its range. So sharp is the tuning that a vernier dial must be used on the condenser in spite of the fact that the capacity range of the condenser is only .00023 mfd. and only one tuned circuit is used.

When the "N" circuit has been balanced properly by means of condensers "C2" and "C3," nearly perfect, uniform sharp tuning, plus equal sensitivity over the whole wavelength range is obtained. The actual balancing of the circuit is merely a matter of a few minutes work, and once done, need never be touched, unless the aerial is changed.

One of the most remarkable features of the receiver is the low cost of constructing it. The complete cost of the two-tube model using a Multivalve (3 tubes in one) comes to about thirty-five dollars, about half the price of most of the popular kits now available.

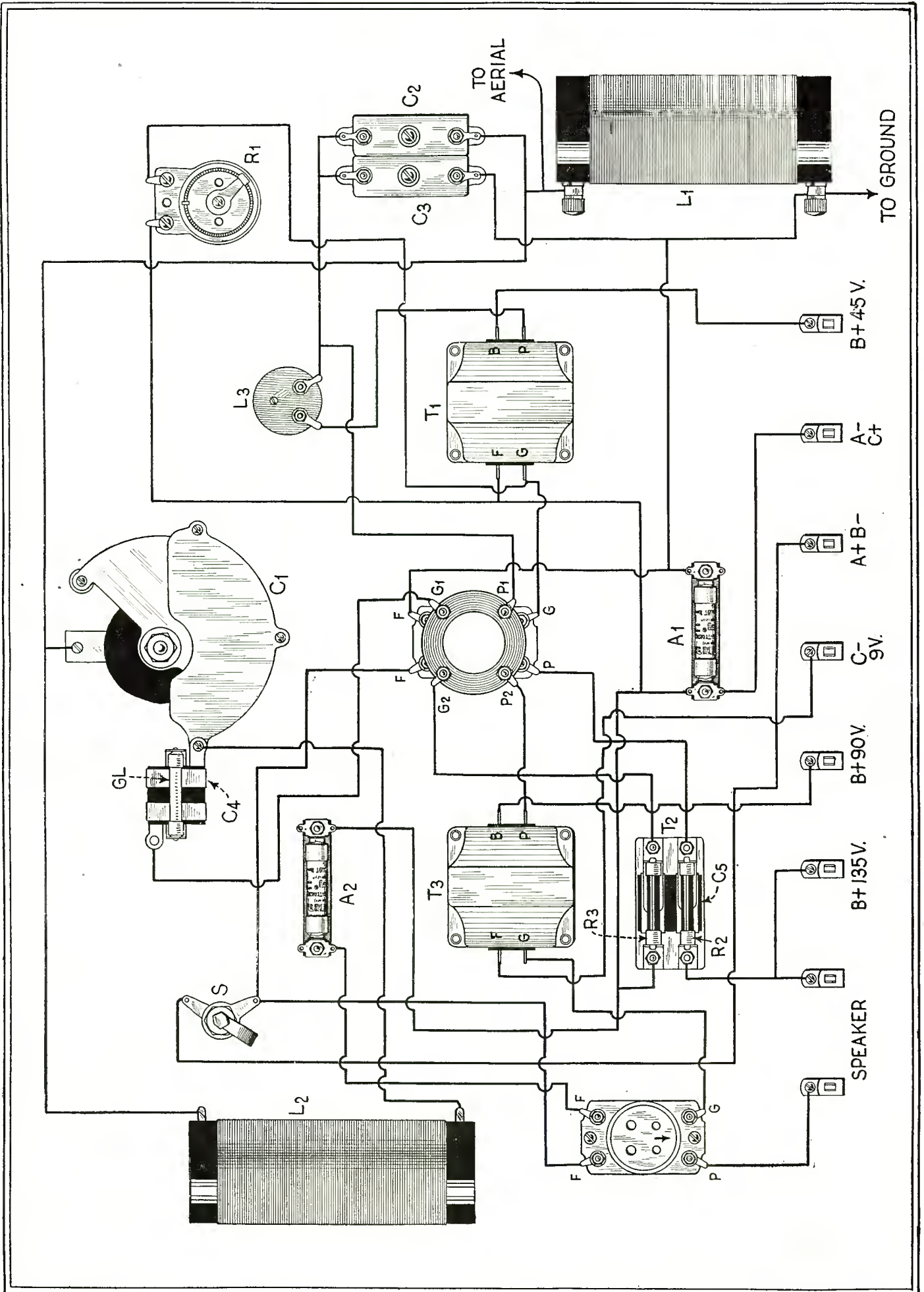
While the "N" circuit described in this article is equal in efficiency to a good four-tube circuit, the job of constructing it is by no means as difficult as it would appear from a casual glance at the wiring diagram. As a matter of fact the construction of the set is no more difficult than most two-tube circuits because a Multivalve (three tubes in one) is used for the detector, first and second audio stages, thus simplifying construction and conserving space. A 112 type tube is used for the last audio stage.

The complete set can be mounted on a 7" x 14" panel and a 7" x 13" baseboard.



This photo shows a rear panel view of the "N" circuit set completely wired. The antenna coil (L1) is at the right and "N" coil (L2) at the left. The hand in the picture points to the Multivalve tube which combines three tubes in one.





In view of the importance of having the proper constants in the tuning circuit of the receiver, no attempt should be made to substitute ordinary coils and condensers for those units. The

at the left. The battery is turned on and off by means of the battery switch knob at the right. The "N" circuit is truly a one control receiver. There are no auxiliary adjusting condensers, os-

parts and still get good results, it is difficult to foresee what effect any change in the location of the parts will have on the operation of the receiver. It is recommended therefore that the

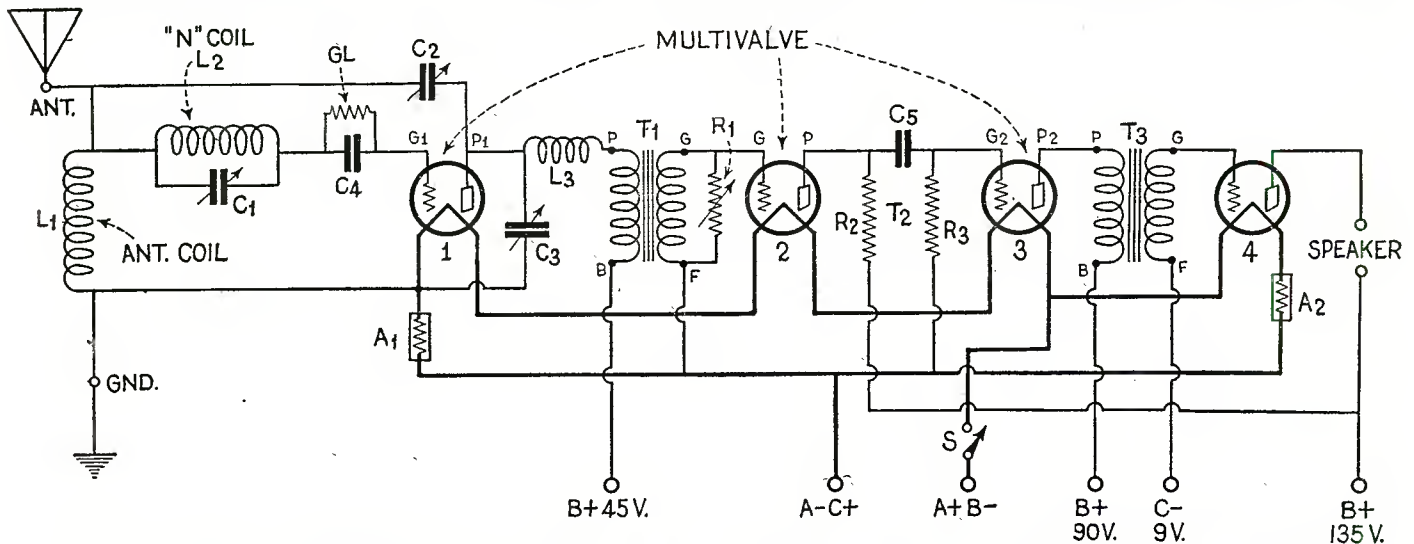


Fig. 1. The schematic wiring diagram of Sir Oliver Lodge's "N" Circuit Receiver. Note that the first three tubes are combined in the one Multivalve tube as indicated.

other parts have been selected for their adaptability, either electrically or mechanically, for use in this circuit.

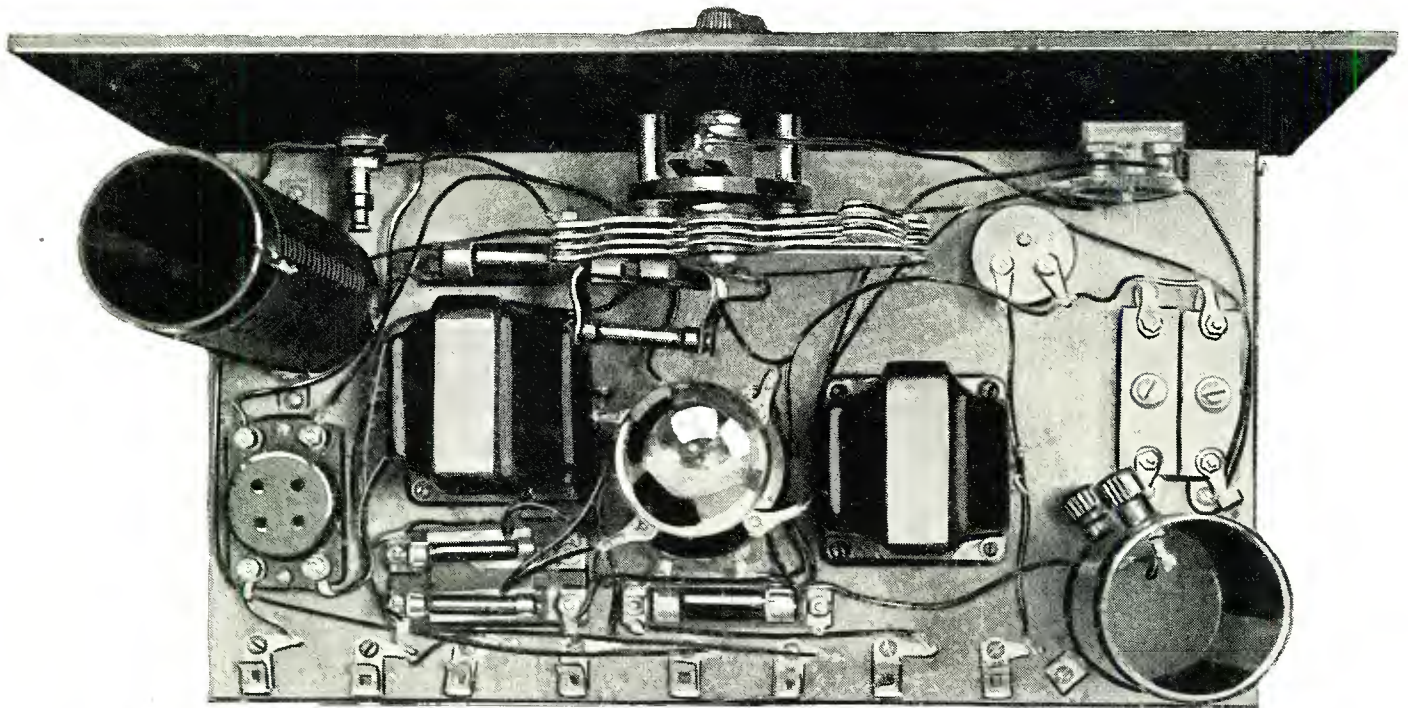
The comparative simplicity of assembly is at once apparent. The wiring is unusually free from complications. Filament control is taken care of automatically by means of two Amperites. The front panel view amply illustrates the extraordinary operating

cillation controls or other compensating adjustments.

There is no particular trick to assembling the parts on the panel and baseboard. The location of each part is shown clearly in the pictorial wiring diagram of the receiver. The variable condenser, variable high resistance and battery switch are mounted on the panel. The grid condenser and

layout as given be followed religiously. Exceptionally good results were obtained with the layout shown so if you make any "improvements" you will have to make them at your own risk.

While the construction of the "N" circuit does not present any great difficulties, it will be worth your while to bear the following points in mind in building it. The connections for the



The "N" circuit set looking down on the baseboard. All wiring is made with flexible hook-up wire and connections made direct from one terminal to another. This method of wiring greatly simplifies the wiring problem for the novice set builder.

simplicity of the circuit. All tuning is done with the vernier dial. Volume control, obtainable by means of a variable high resistance across the secondary winding of the first stage audio transformer, is obtained by the knob

leak is mounted with one terminal fastened to the stator plates terminal of the variable condenser. The other parts are mounted in the relative positions shown on the layout diagram.

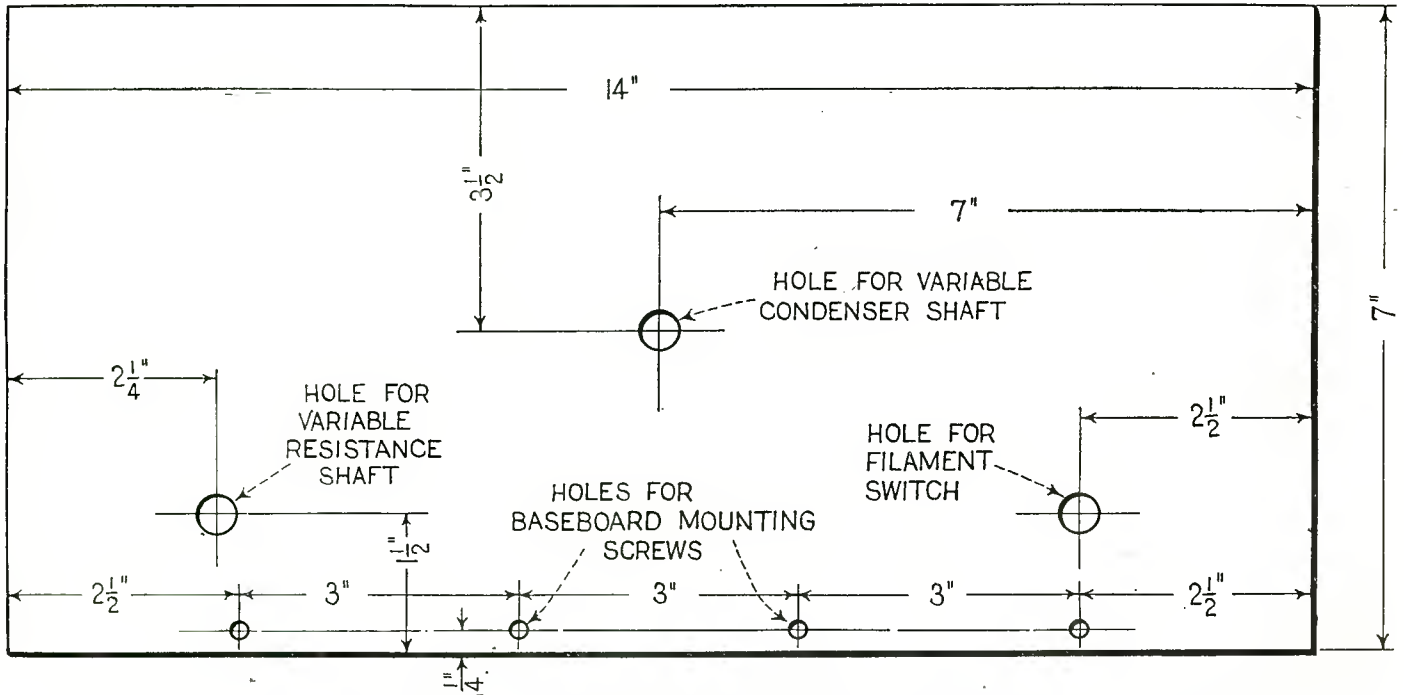
While it is possible to rearrange the

Multivalve are important so be sure to make them properly. The use of this type of tube is not very widespread at present so a little detailed information may be useful. The Multivalve has eight terminals in all. Four of them

are made to prongs sticking thru the base of the tube just as in the ordinary type of tube while the remaining four terminals are mounted on the bakelite ring, molded as a part of the tube base

all that are required for the filament connections. The series connection of the filaments is made inside the tube. The tube socket, and the prongs of the tube which make connections with

first audio tube. The connections for the detector and second audio tube are made to the "G1," "P1," "G2" and "P2" terminals which are mounted on the shelf of the tube base.



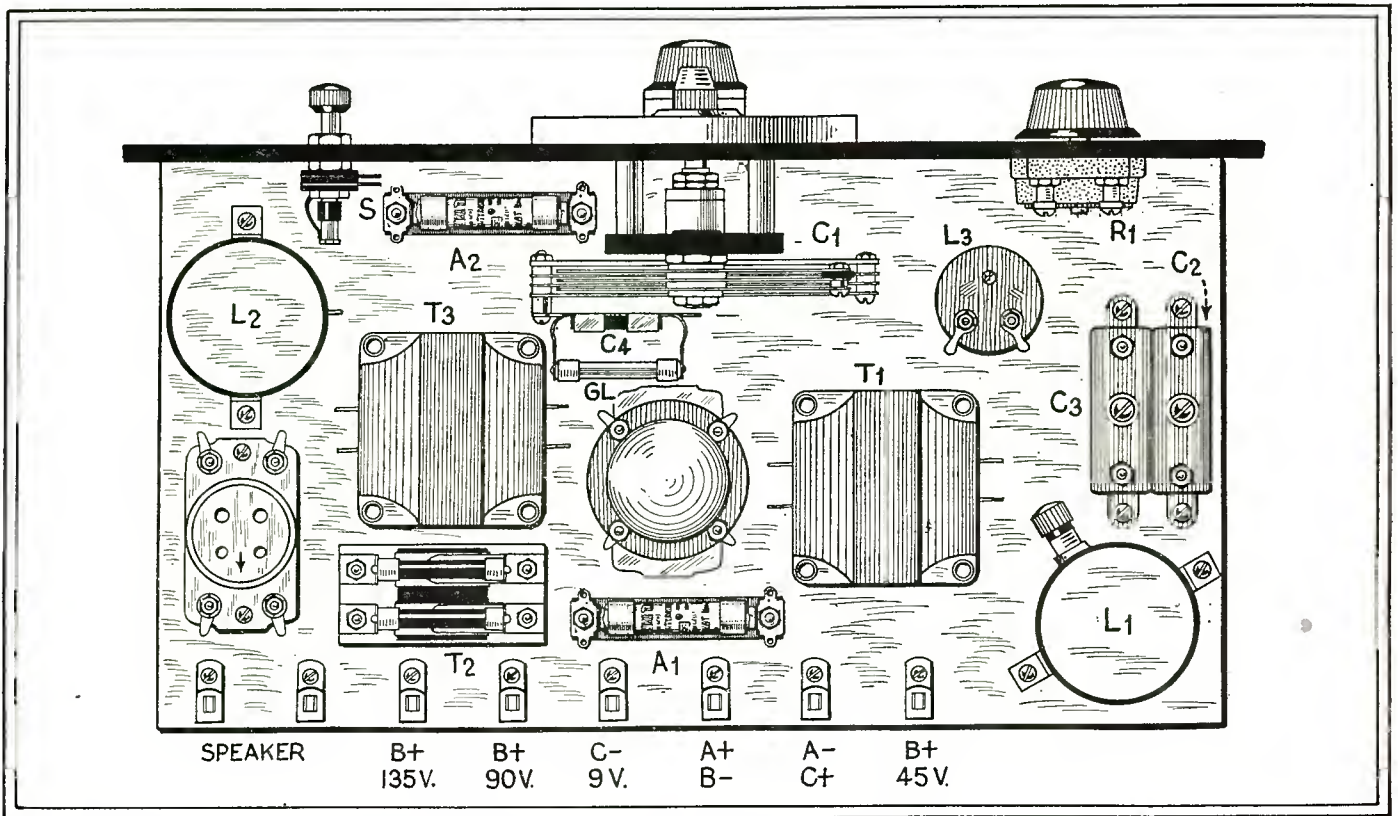
Dimensions for drilling holes in the front panel. Location of the holes for mounting the variable condenser can be determined according to the type of condenser used.

and forming a "shelf" next to the glass portion of the tube.

The four terminals projecting thru the base of the tube provide for the

the springs of the socket, provide the connections for the first stage audio tube in this circuit. The connections to the "G"; "P"; "F-" and "F+" ter-

The "G1" and "P1" terminals are for the detector circuit and the "G2" and "P2" terminals are for the second stage as shown in Fig. 1.



Panel and baseboard layout of parts. All parts are indicated with corresponding reference symbols given in the picture and schematic wiring diagrams.

filament connections and one set of "G" and "P" terminals. Two filament terminals, (a negative and positive) are

terminals of the socket complete the filament connections for the three tubes and the "G" and "P" terminals of the

A sketch showing the location of the Multivalve terminals and their location (Continued on page 156)

# The Phasatrol Receiver

By JOSEPH CALCATERRA



**I**N these days when fans are looking for the ultimate in the way of sensitivity, volume, selectivity, etc., the old, tried and true circuits are apt to be dismissed without due consideration of their good qualities.

To begin with, we must acknowledge our full measure of indebtedness to the standard five-tube tuned radio frequency circuit. It was this circuit which led the radio hosts thru the jungle of wild interference which the older re-

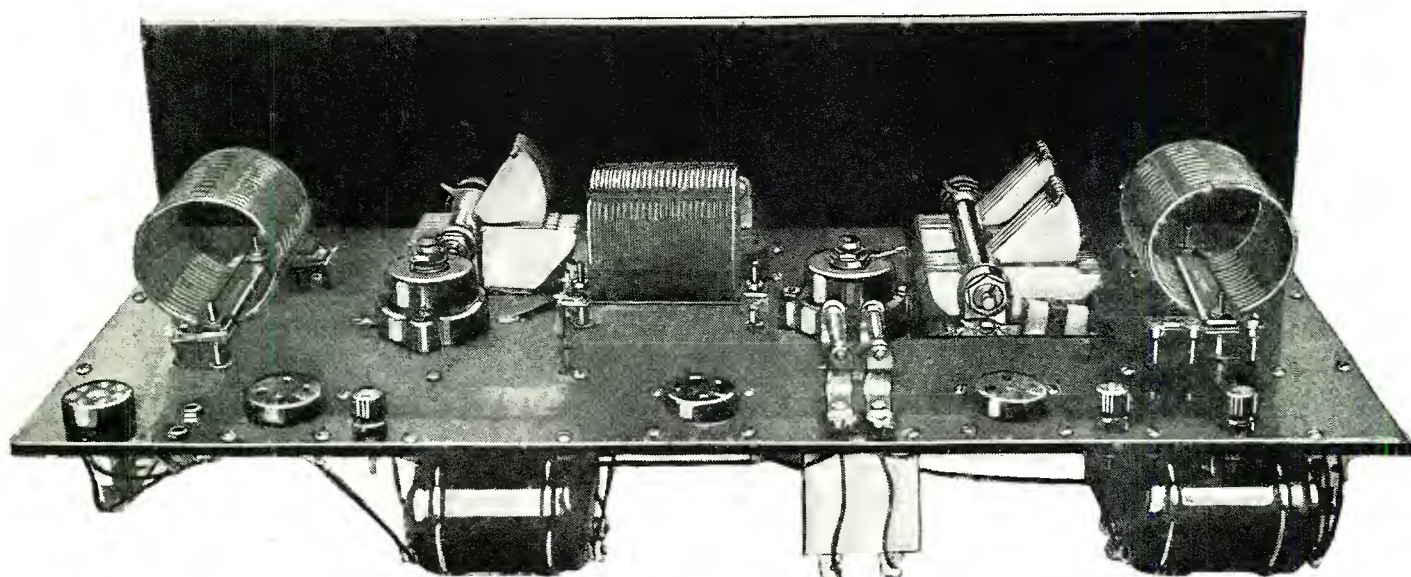
On general principles it was better than the superheterodyne because it was not so critical in its construction, adjustment and operation and thus provided a circuit much better suited for the average fan.

Its greatest fault was its tendency to produce oscillations which were difficult to control. Its second greatest fault was its tendency to play favorites with the lower wavelengths, bringing in lower wavelength stations much more

efficiency to break into oscillation. The Neutrodyne method of neutralizing the tube capacities to prevent feedback; the Deresnadyne method of introducing a high resistance in the plate circuit so as to limit the "B" battery potentials applied and thus regulating its tendency to oscillate and the grid bias method, using a potentiometer in the grid circuit to adjust the bias on the grids of the radio frequency tubes were a few of the methods used to overcome this bad feature of the tuned radio frequency type of circuit.

Many ingenious methods have been devised to overcome the second most troublesome feature of the tuned radio frequency circuit; its tendency towards unequal selectivity and amplification over the wavelength range. Automatic control of regeneration; variable coupling between primary and secondary coils and circuits which combine the features of inductive and capacitive circuits have been used to counteract this tendency of the tuned radio frequency type of circuit.

While many of these methods are ingenious and really worthwhile when properly applied, the care which must be exercised in designing, or selecting the parts; wiring them together and adjusting the receiver when completed takes them out of the class of the amateur builder who wants a set which he can build in jig-time with the assurance that it will work as soon as he



Rear view of the Phasatrol Receiver. This gives a good idea of the placement of the parts.

generative circuits could not penetrate. In its simplest form the tuned radio frequency circuit was much more efficient than any other circuit of the time.

efficiently than the higher wavelength stations.

Many systems were devised to eliminate the first bad feature; its ten-

makes his last connection, inserts his tubes, connects his batteries; loudspeaker, aerial and ground and twirls the dials.

It remained for Mr. John F. Rider to develop a "doojigger" to turn the trick of transforming the ordinary garden variety of tuned radio frequency circuit into a squealless, highly efficient receiver which gives practically equal amplification and selectivity over the whole wavelength range.

The device itself and the manner of its connection is so simple that the average fan is likely to say "old stuff" unless he considers the theoretical and practical aspects of the case, rather seriously.

The Phasatrol unit itself consists of a fixed condenser in combination with an adjustable resistance, connected as shown at "PH1" in the schematic wiring diagram of the receiver, Fig. 1. At first glance this would seem to be a Deresnadyne method of producing oscillation control by means of a variable resistance in the plate circuit, with a fixed condenser to bypass the radio frequency current around the high resistance of the unit. This however is not the case.

The variable resistance in the Phasatrol unit is non-inductive and non-capacitative. Its only function is to feed the direct current of the "B" battery to the plate of the tube and to adjust the potential applied to the best point for efficient operation.

For the time being, entirely disregard the variable high resistance, "R5," connected in the plate circuit and imagine that the "B" terminals of the radio frequency transformers are connected directly with the positive "B" battery terminal.

frequency current passes from the plate of the tube thru the fixed condenser and the primary winding of the transformer to the "B" battery in preference to going thru the high resistance unit of

plate circuit of the second radio frequency tube.

We now come to the function of the variable high resistance in the plate circuit of the radio frequency tubes.

**LIST OF PARTS REQUIRED FOR THE PHASATROL**

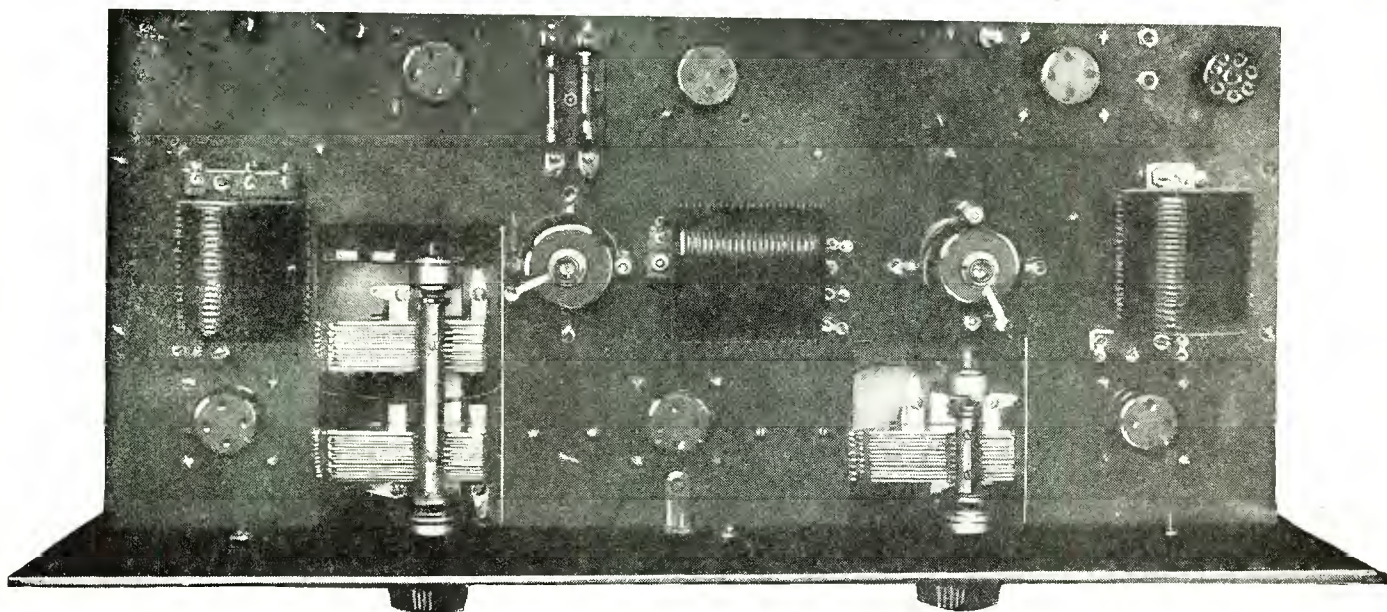
- |   |   |
|---|---|
| 1 Front panel, Lignole, Formica or Radion 7" x 21" x 3/16"                    | 3 Eby binding posts marked "C BAT +"; "4 VOLTS C-"; "9 VOLTS C-" respectively     |
| 1 Subpanel, Formica or Radion, 9" x 20" x 3/16"                               | 2 Electrad Phasatrols (PH1, PH2)  |
| 1 Set of three, Benjamin No. 9010 T. R. F. transformer (T1, T2, T3)           | 1 Electrad, Type E, 0-500,000 ohm Compensator (high resistance potentiometer) (P) |
| 6 Benjamin No. 9044 sockets (1, 2, 3, 4, 5, 6)                                | 1 Elcctrad, Type S, .001 mfd. fixed condenser (C7)                                |
| 1 Pair Benjamin No. 9029 adjustable brackets                                  | 1 Electrad, Type S, .0005 mfd. fixed condenser (C4)                               |
| 1 Hammarlund ML-17, .00035 mfd. Midline variable condenser (C1)               | 1 Electrad, Type S, .00025 mfd. fixed condenser (C6)                              |
| 1 Hammarlund, ML-D-17, .00035 mfd. Dual Midline variable condenser (C2, C3)   | 1 Clarostat, Universal Range Type (R5)  |
| 2 Karas Harmonik audio transformers, all stage ratio (T4, T6)                 | 1 Amperite No. 1A (R2)  |
| 1 Lynch double resistor mounting (T5)   | 3 Amperites No. 112 (R1, R3, R4)  |
| 1 Lynch single resistor mounting with Lynch 2 megohm Metallized resistor (GL) | 1 Carter Imp battery switch (S)   |
| 1 Lynch .1 megohm Metallized resistor (R6)                                    | 2 Carter No. 10 tip jacks (J1, J2)  |
| 1 Lynch .5 megohm Metallized resistor (R7)                                    | 1 Tobe 1 mfd. fixed condenser (C5)  |
| 1 Jones Multiplug   | 1 Tobe .1 mfd. fixed condenser (C8)   |
|   | 2 Marco, No. 192 dials  |
|   | 1 7" x 21" cabinet  |
|   | 1 package Acme or Corvico hookup wire   |
|   | 1 package Kester Radio Solder   |

the Phasatrol. This series connection of the condenser in the plate circuit of the tube changes the time factor of the feed-back impulses so that instead of meeting the signal impulses in phase and building them up, they travel thru the grid-to-plate capacity of the tube and arrive on the grid just after the signal oscillations have gone.

In this way, re-enforcing action, excessive regeneration and undesired os-

This does not form a part of the original Phasatrol circuit but was included as a further refinement. The amplifying characteristics of the radio frequency end of the circuit are so great that on local stations, the signal built up in the radio frequency side of the circuit becomes too great for the detector tube to handle without overloading.

When the detector tube is over-



Top view of completed receiver. Notice the well balanced layout giving an extremely symmetrical appearance to the set.

The function of the fixed condenser of the Phasatrol unit now comes into play. As you can see it breaks the circuit between the "P" terminal of the radio frequency transformer, and the "P" terminal of the tube. The radio

cillation are prevented. Only a small amount of regeneration which is entirely acceptable is obtained because the phase difference is never entirely complete.

The same action takes place in the

loaded, distortion takes place and the low bass notes are lost. By providing a means of limiting the potentials applied to the plates of the radio frequency tubes, amplification can be cut down and the energy delivered to the

detector will be reduced in proportion. In this way the low notes and tone quality are retained without sacrificing volume.

Three stages of audio amplification are used to give all the volume that will ever be required. As a matter of

when transformer stages are connected in cascade. The use of the transformer stages, however, gives tremendous volume when required.

Amperites are used thruout for simplified tuning.

The grid leak is connected directly

The variable condensers which tune the second radio frequency stage and the detector stage have been ganged together as a single unit to simplify operation. These work so closely together that additional compensating condensers are unnecessary.

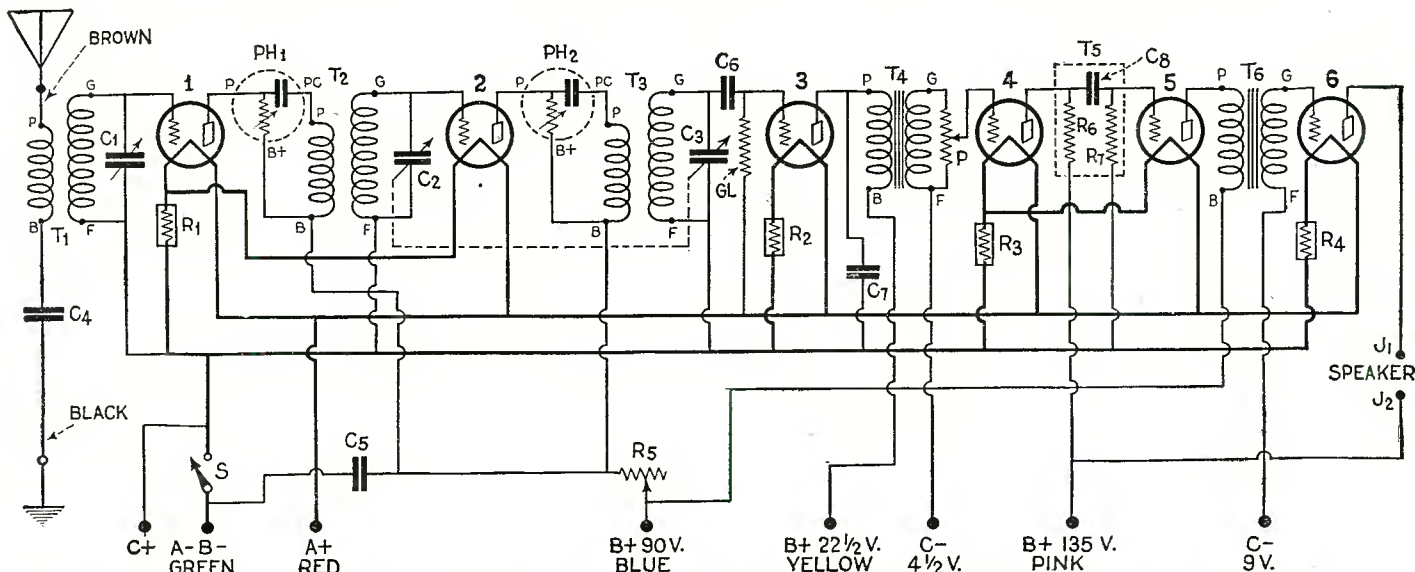


Fig. 1. Schematic diagram of the Phasatrol Receiver. The two Phasatrols are shown encircled in broken lines between tubes 1 and 2 and 2 and 3. Note that grid return in detector circuit is shown connected to positive of "A" battery lead for 201A tube. If 200A type detector tube is used this return should be made to the negative side.

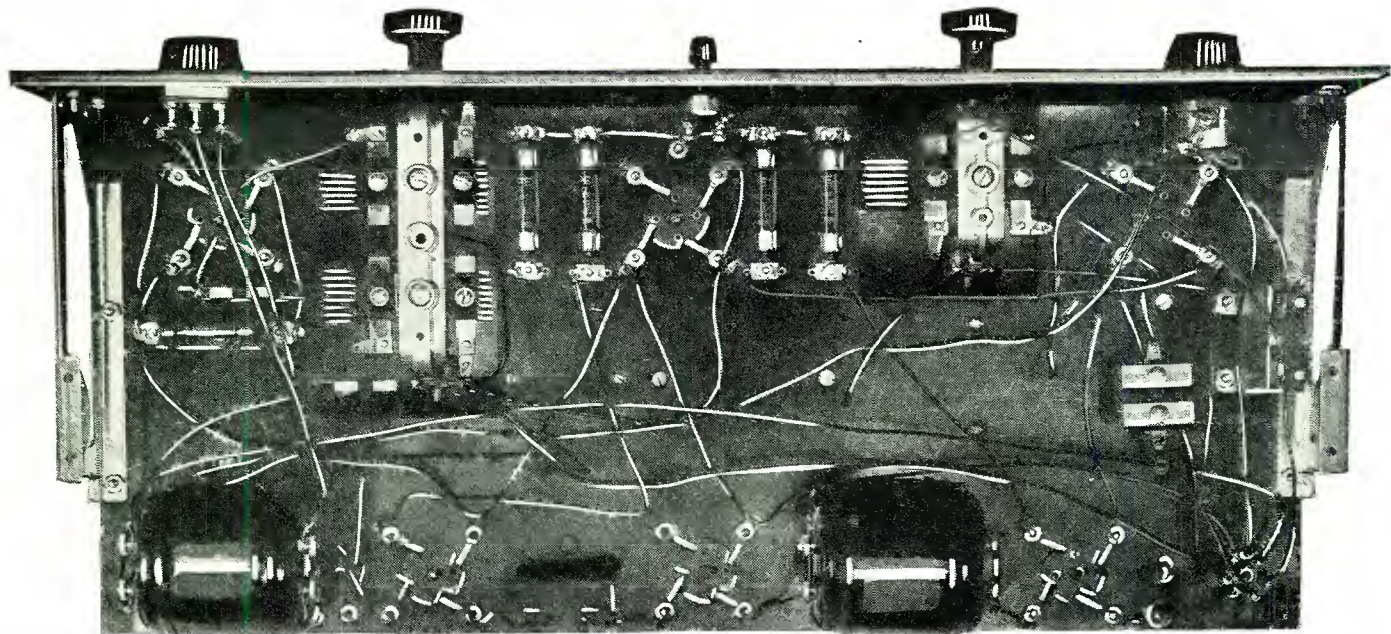
fact few loudspeakers are capable of handling the full volume which the receiver can deliver. The first audio frequency stage is transformer-coupled with the detector stage. Resistance coupling is used between the first and second audio frequency stages and transformer coupling is used between the second and third audio frequency stages.

between the grid and the negative filament terminal of the tube. This is the proper connection when a 200A type of tube is used as the detector. When a 201A type tube is used as the detector, the grid leak should be connected between the grid and positive filament terminal of the socket.

A high resistance potentiometer connected as shown in the grid circuit of

This receiver can be built with the assurance that it will work properly without any necessity for juggling parts and making tricky adjustments.

The construction of the receiver is a comparatively simple matter. All the details of construction have been carefully thought out; the dimensions for locating the holes in both panel and subpanel are shown in the drilling tem-



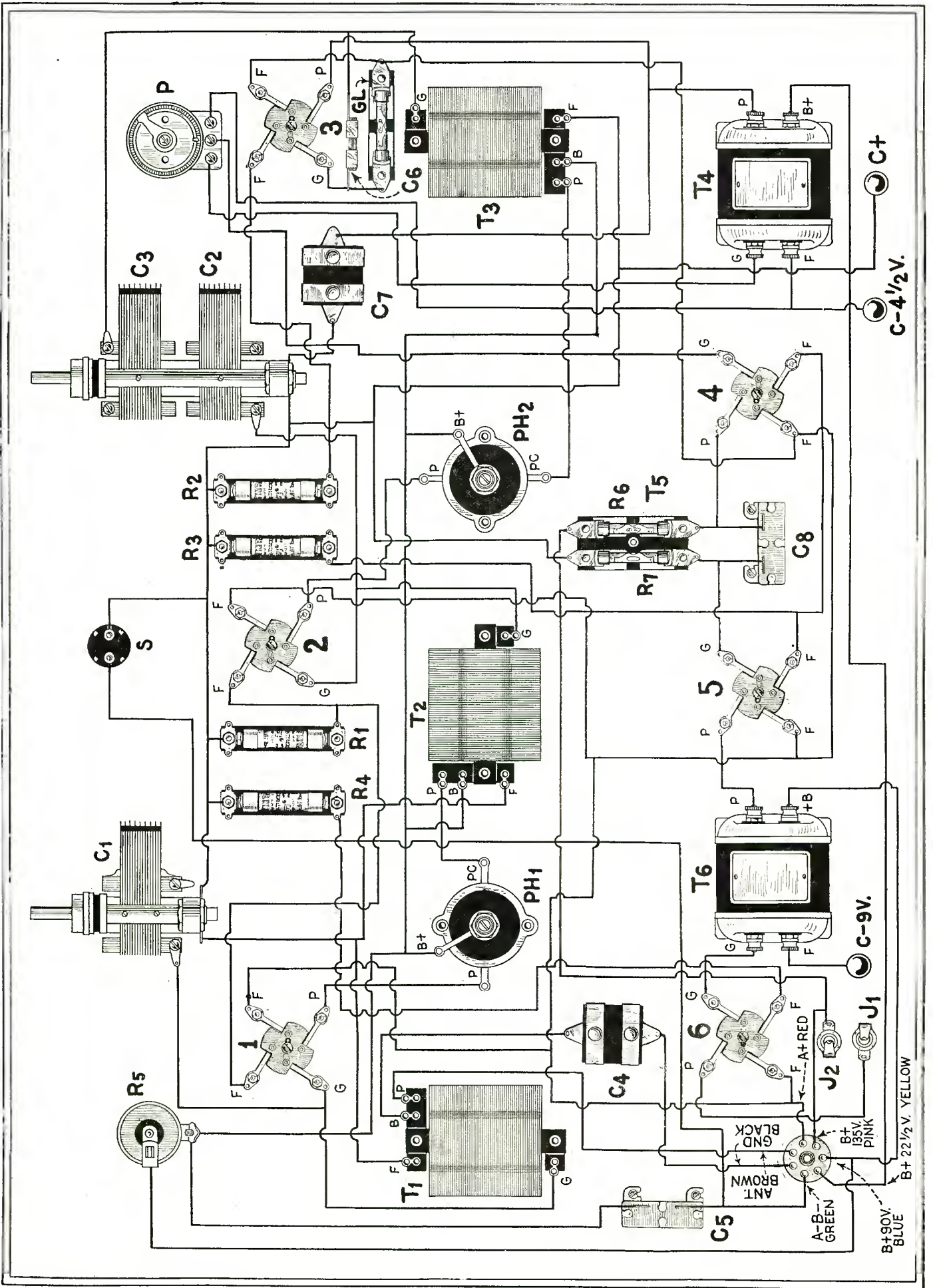
View of bottom of sub-panel. Note that all wiring is done by means of flexible wire in the direct "point-to-point" manner.

The use of the resistance stage between the two transformer-coupled stages prevents resonance howling in the audio circuits as is often the case

the first audio tube serves admirably as a volume control, permitting gradual and easy adjustment from minimum to maximum volume.

plate and no trouble should be experienced in locating and drilling the holes.

After the holes are drilled to the proper size, you can proceed to test the



parts and mount them on the panel and sub-panel. The double deck arrangement of the parts simplifies the mounting and connecting of the parts. This

While all of the parts selected for use in the receiver are made by reliable manufacturers and backed up with guarantees of satisfactory performance,

The first step in assembling the parts is to mount the sub-panel on the brackets. The adjustable feature on the front end of the bracket is not used,

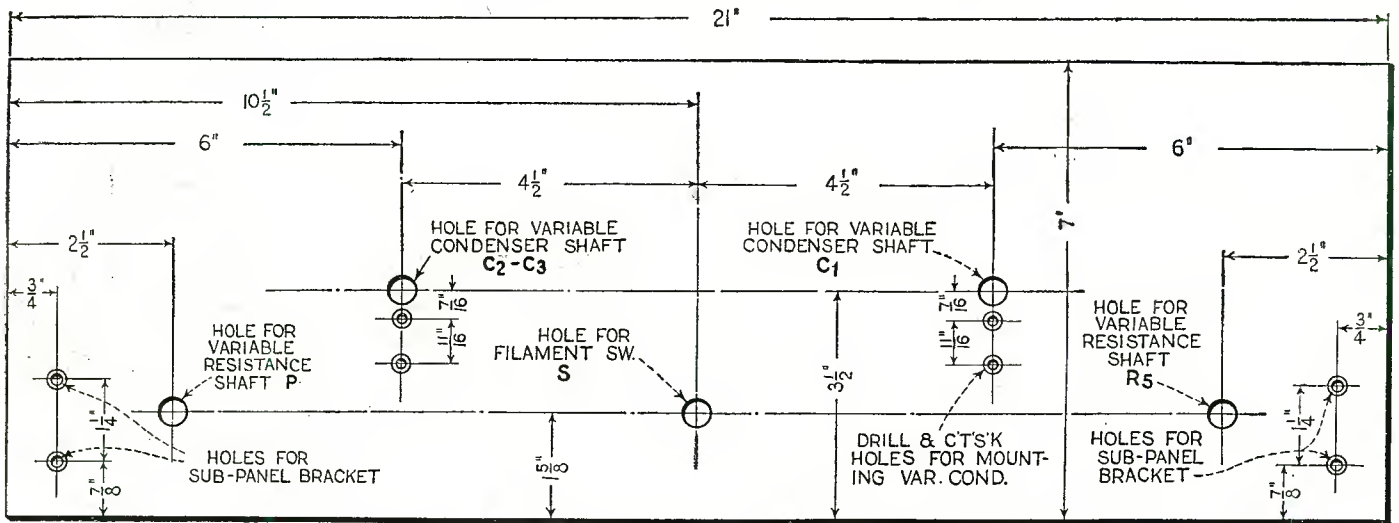


Fig. 2. Panel layout giving measurements and dimensions for the drilling of all holes.

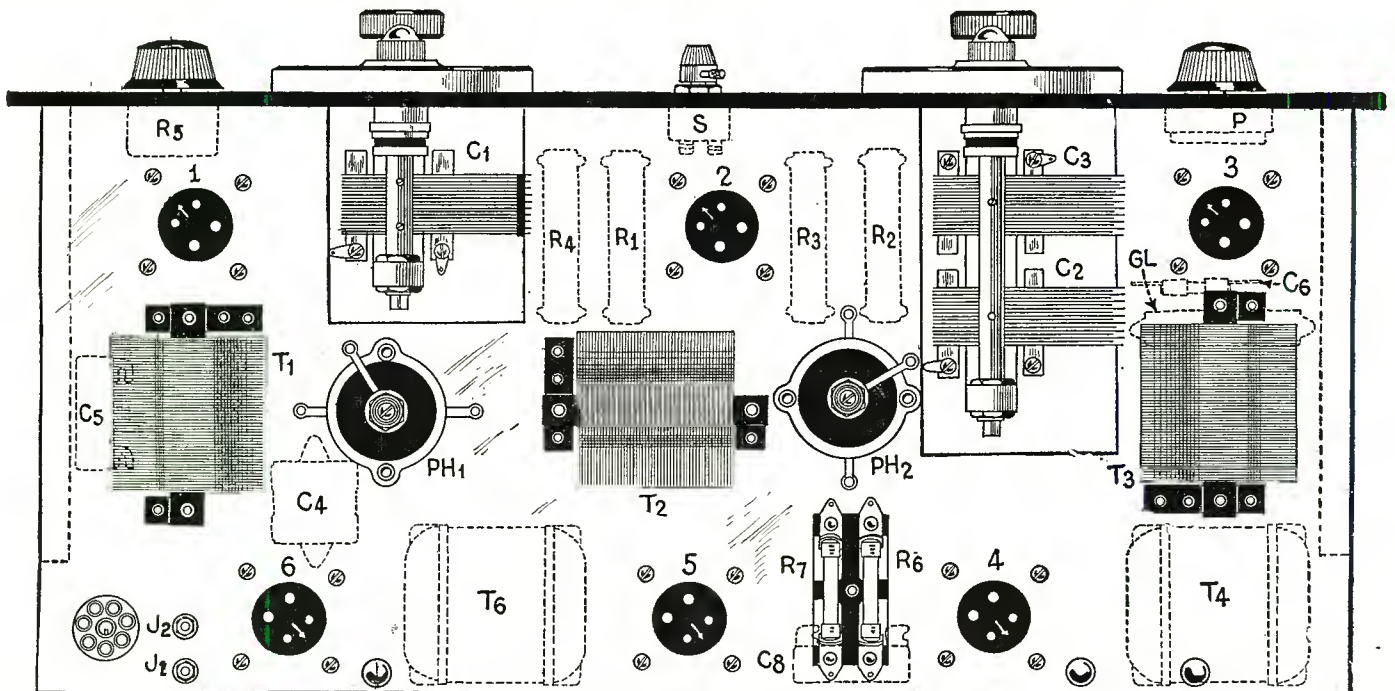
arrangement also serves to increase the distances between such parts as the audio and radio frequency transformers. The majority of the parts terminals are located on the under side of the sub-panel so that connections can be made with flexible wire in direct lines without necessitating special care in their arrangement. Practically all the wiring is done on the under side of the

there is always a chance that they may be damaged in transit. It will be worth your while therefore to test transformers, coils, Amperites, etc., for any open circuits and condensers for short circuits. Testing the parts before they are mounted is a much simpler job than trying to find the defective part after the set has been wired.

so take off the front adjustable piece. The only adjustable feature used in this case is the adjustment for height so as to bring the sub-panel up to a height equal to that of the audio transformers.

In working out the layout of parts,

The next step is to mount all the sockets in the positions shown, being sure to place the terminals as indicated in the layouts. Then mount the 1 and



PARTS SHOWN IN DOTTED LINES ARE MOUNTED ON UNDER-SIDE OF SUB-PANEL

Fig. 3. Mounting layout, showing position of instruments on sub-panel. Reference numbers allow identification of all components and their exact location.

sub-panel so that the top of the sub-panel presents a pleasing appearance. A special effort was made to give a symmetrical appearance both on the top side of the sub-panel and on the front panel.

special attention was given to placing the parts in such a way that with very few exceptions, the parts could be mounted without interfering with the mounting of the parts on the other side of the sub-panel.

.1 mfd. fixed condensers on the bottom side of the sub-panel. The rest of the parts can now be mounted on the sub-panel and panel.

In mounting the variable condensers (Continued on page 148)



# The Phono-Radio Combination Set

Combined Radio and Phonograph Employs New Capacity-Type Pick-Up Device

By G. C. B. ROWE

ABOUT five years ago when radio became a popular indoor sport with the general public, the manufacturers of phonographs set up a great cry to the effect that the radio stations would put them out of business. Those far-seeing gentlemen who were much interested in the new art said that the newcomer in the field of entertainment would aid the other instead of sounding its death knell.

And as matters have turned out, these gentlemen were correct. It would be possible to cite numerous examples of how a certain selection sung over the radio had increased the sales of the phonograph record bearing this selection hundreds of times. There is no doubt that the radio receiver and the phonograph are bound closely together.

This is truer to a greater extent today than it has been heretofore. Sometime last year one of the largest phonograph companies in the country put on the market a radio receiver and phonograph in the same cabinet. However, another step forward has been taken, and this step, by Fred A. Jewell, who has developed a new type of pick-



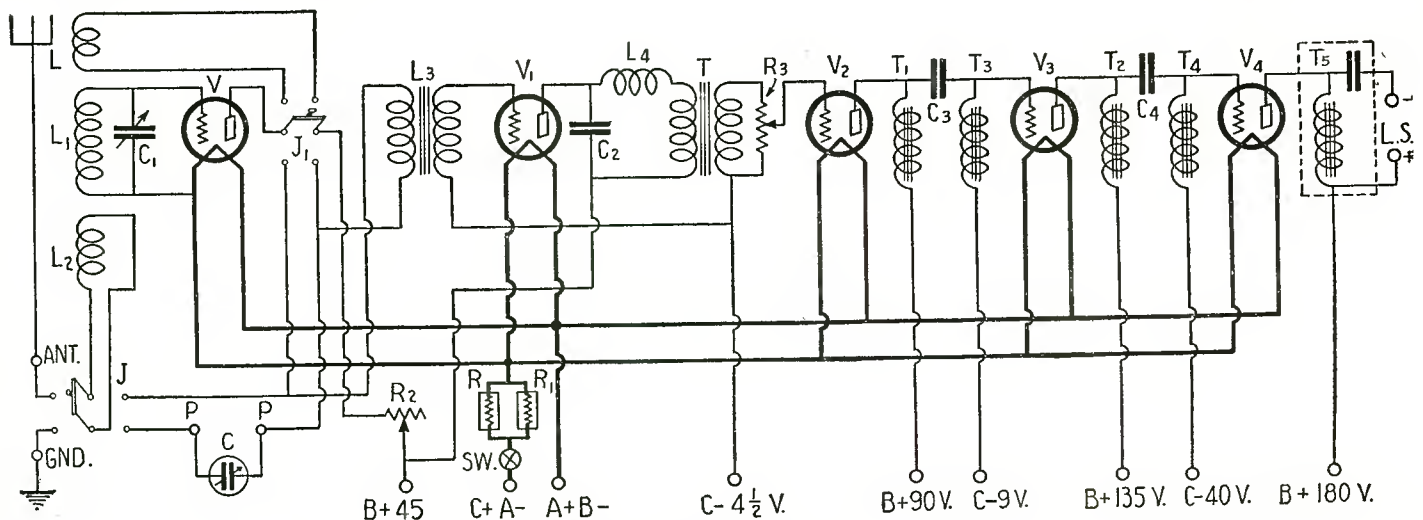
Mr. Jewell, inventor of the capacity-type pick-up device is shown playing a record, reproducing it on the loud speaker at the left.

country thousands of homes in which there are phonographs which we will say were purchased three or four years ago. This was before the improved models were available. With the progress made lately in the phonographic art there is a demand on the part of these owners for better music

to convert your old—or new, for that matter—phonograph into one which will give you quality of reproduction hitherto dreamt of, but not realized.

And this is not all!

It will be noticed that the title of this article mentions a Phono-Radio combination. Not only can this set be



Schematic wiring diagram of the Phono-Radio Combination Set. By throwing the switches, J and J1, either radio or phonograph reproduction may be obtained at will.

up for the phonograph and an amplifier which functions without distortion and brings to the loud speaker all the music just as it was originally sung or played.

Let us consider for a moment just what this means. There are in this

but at the same time they do not care to put much money into a new machine, the idea being, "Oh, well, the old one is good enough."

However, with the El-Fonic capacity type pick-up device and the especially designed amplifier, it is possible

used to reproduce music from phonograph records, but it is easily converted from that into a broadcast receiver for radio programs. And merely by the turning of two switches. It sounds simple and is as easy as it sounds.

Let us start at the heart of the whole matter—the capacity type pick-up device. There have been on the market within the last year several pick-ups, which have been of the magnetic and carbon types. These have

attached an ordinary phonograph needle, which as it runs along in the groove of the record, causes a variation in the amount of capacity, by varying the distance between the two plates.

This capacity is connected in the

It will be noticed that the oscillator coupler has three coils, all of which

#### LIST OF PARTS FOR THE PHONO-RADIO COMBINATION SET

- 1 Interstate Special coupler (L, L1, L2)
- 1 Adams-Sibley R. F. Transformer (Untuned type—300 meter peak) (L3)
- 1 Samson R. F. Choke (85 MH.) (L4)
- 1 Adams-Sibley "El-Fonic" Pick-up (C)
- 1 Hammarlund Variable Condenser (.0005 mf.) (C1)
- 1 Electrad fixed condenser (.001 mf.) (C2)
- 2 Electrad fixed condensers (1.0 mf.) (C3-C4)
- 2 Amperites (5 v. 1 amp.) (R-R1)
- 1 Carter variable resistance (10,000 ohms) (R2)
- 1 Electrad potentiometer (0.5 megohm) (R3)
- 1 Acme A. F. Transformer (Ratio 4½:1) (T)
- 2 Samson plate impedances (200 henries) (T1-T2)
- 2 Interstate grid impedances (2000 henries) (T3-T4)
- 1 Interstate output filter (condenser and impedance in one) (T5)
- 2 Carter jack switches (double pole double throw) (J-J1)
- 1 Carter filament switch
- 5 Eby sockets (UX type)
- 15 Eby binding posts
- 1 B.M.S. vernier dial
- 1 Formica or Radion panel (7 x 21 x 3/16)
- 1 wooden sub-base (9½ x 20 x 1½")
- 5 vacuum tubes (3 201-As, 1 112 and 1 171) C. E. Mfg. Co. (Ceco)
- 1 Formica or Radion Binding Post strip (13½ x 1 x 3/16")
- Acme or Corwico Hook-up wire, mounting screws, etc.
- 1 Package of Kester Radio Solder.

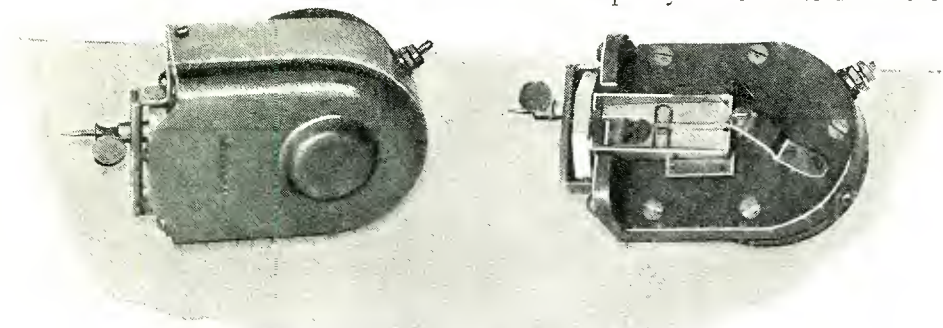


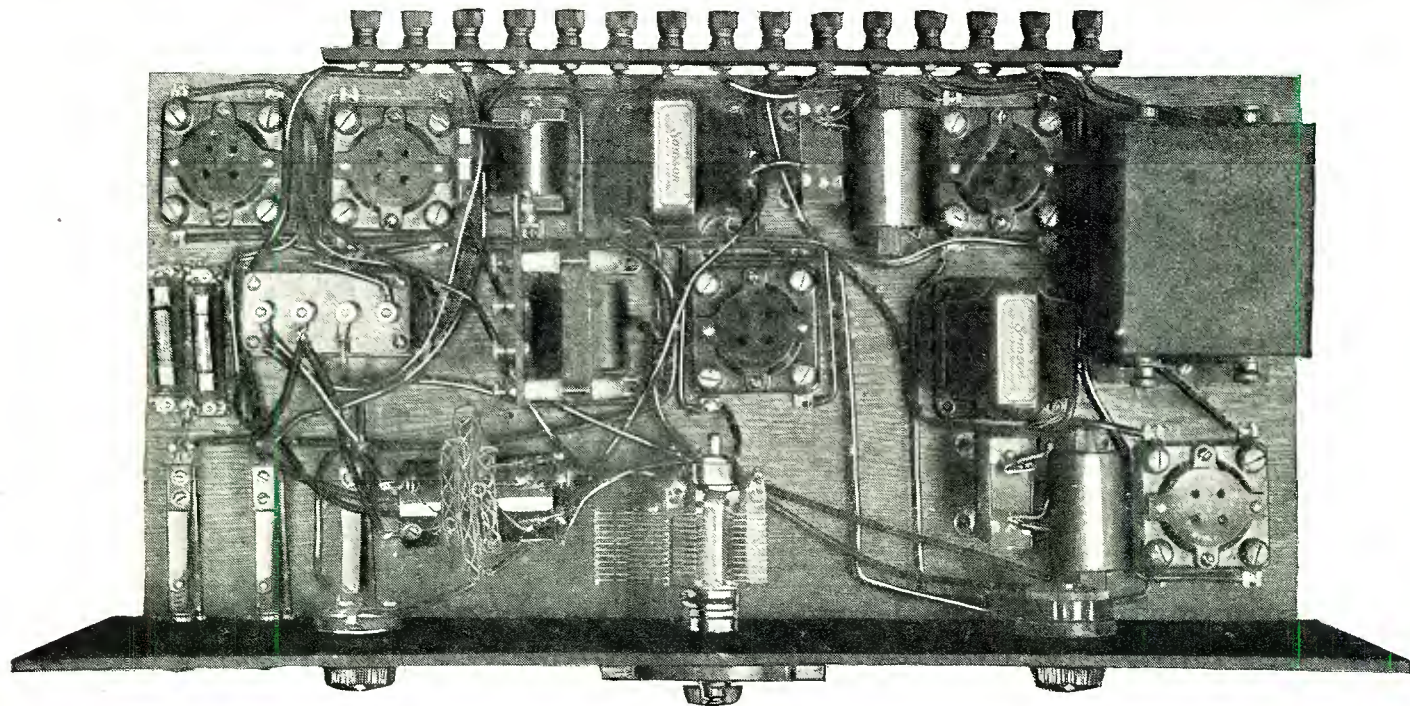
Photo by courtesy of Adams-Sibley Development Corp.

Above shows a close-up of the new capacity pick-up device. At the right the unit is seen with the cover removed displaying its construction.

serious disadvantages. For instance, in the magnetic type there is a relatively heavy iron armature, held by a stiff spring whose inertia must be overcome by the mechanical energy picked up by the phonograph needle from the variations in the groove of the record. Naturally much of this energy is lost and the resulting music therefore not all it should be. In the carbon type, the granules of carbon are unstable and soon become packed tightly together, which causes a peculiar blowing sound in the loud speaker.

As can be seen readily from the illustrations there are no heavy parts in the El-Fonic pick-up and no carbon

circuit as is shown in the schematic wiring diagram. It is in series with the primary of an untuned radio-frequency transformer and the coil, L2, which is a pick-up coil from the oscillator coupler, L-L1. What really happens is that there is a constant radio-frequency being generated in the tube and oscillating circuit and by inductive coupling this high-frequency current is transferred to the coil, L2. Now by varying the capacity of the pick-up condenser this constant frequency's amplitude is varied, so that after it is fed to the radio-frequency transformer, it passes through the rest of the circuit in the same way

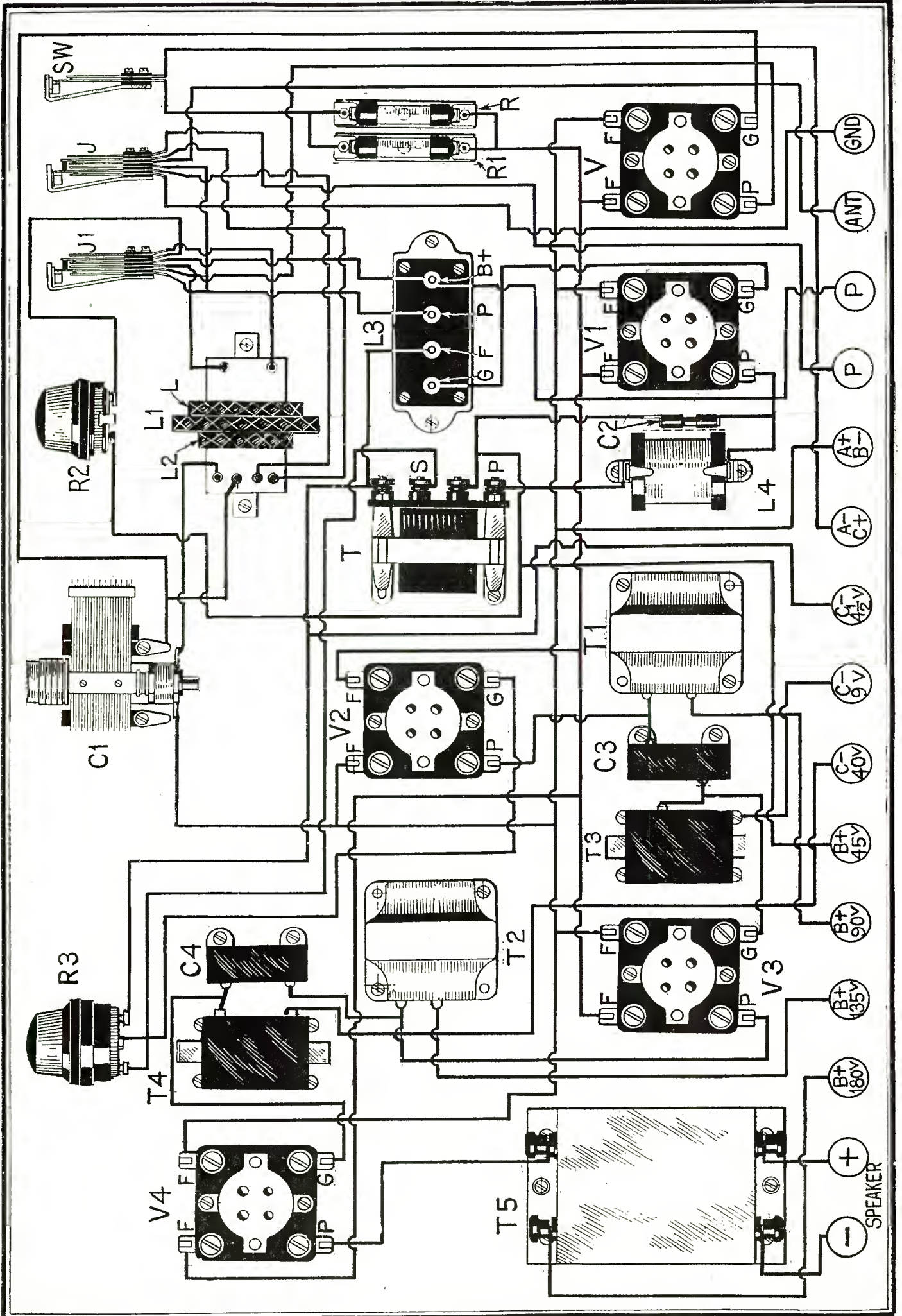


A top view of the Phono-Radio Combination Set. All wiring is made with flexible hook-up wire. Complete layout of the parts is given in an accompanying sketch.

grains. The whole device consists of two plates, one of brass and the other of aluminum, which form the two plates of a small capacity variable condenser. To the aluminum plate is

that a R.F. current passes through an ordinary broadcast receiver, i. e., it is detected by tube V1, and then amplified by the rest of the circuit, going at last to the loud speaker.

are used when the set is reproducing phonographic music. However, when the two jack switches are thrown to the left, the antenna and ground are connected to the coil, L2; the coil, L,



is entirely cut out of the circuit and the coil, L1, acts as a secondary across which is shunted a .0005 mfd. variable condenser, for adjusting the wave length of the receiver. The tubes, other than the first one, V, which now functions as a radio-frequency amplifier, perform the same duties as in the former case.

It was mentioned previously that the audio-frequency amplifier was especially designed in order that the full value of the music both in the phonograph and from the broadcast station could be reproduced in the loud speaker. The type of coupling used, called the double impedance, and which has been described in the April and May issues of *Radio News*, has been found to give the most perfect

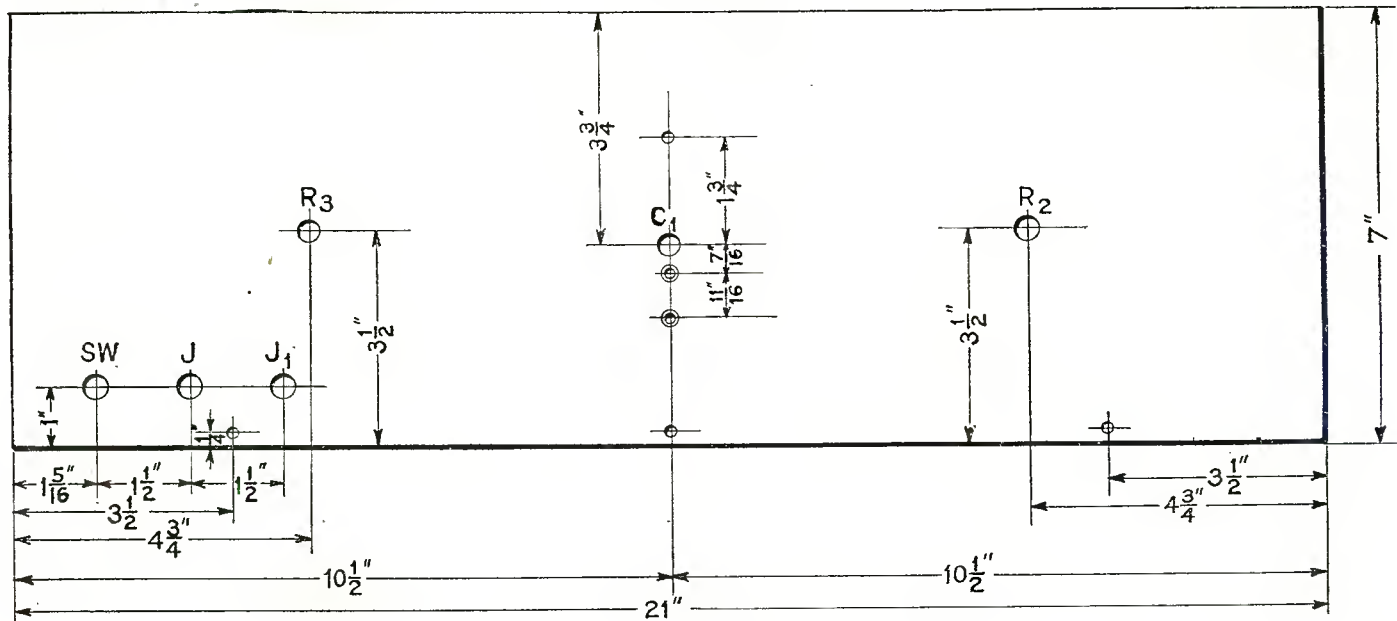
requirements for an oscillating circuit and the result is generally an audio-frequency howl. However, when the differences are great, as in the amplifier in this set, audio howls are a thing of the past.

It might be thought that in order to get the high impedance of 2000 henries it would be necessary to use a large amount of wire, thus increasing the D.C. resistance enormously. This, however, is not the case. The high impedance is gained from using a closed iron core upon which is wound the coil and although the resistance is higher than it would be ordinarily, there is nowhere near the amount of wire used with this method that would be necessary if an open core was employed. This is an important factor

control, not only when the set is used for receiving broadcast signals, but also when it is being used to play phonograph records.

Now, as we mentioned before, there are two switches used to convert the set from a radio receiver to a phonograph reproducer. These are indicated in the diagram as J and J1. Let us see how these switches function.

When the switch, J, is thrown to the left the antenna and the ground are connected to the coil, L2, which becomes the primary of the coupler. At the same time J1 is thrown down, connecting the plate of the tube, V, in series with the primary of the radio-frequency transformer, L3, and plus 45 volts "B" battery. The set is ready to receive broadcast signals. It



Layout of the front panel with dimensions for drilling holes.

reproduction. In order to get this high quality of music from the loud speaker, it is necessary to use only high grade apparatus and to see that it is wired up strictly in accordance with the accompanying diagrams.

The grid impedances, T3 and T4, have a value of 2000 henries. This may not sound very radical to the average fan, but if he will stop to consider that the impedance in the usual amplifier has an average value between 100 and 200 henries he will see that here is a great difference. Why is this size choke necessary? For two reasons: first, there is no chance for audio-frequency oscillations and in the second place, the amplifier will not "motor-boat" when used with a socket power supply.

The main cause for audio-frequency oscillations being set-up in an audio amplifier of the double impedance type is that the chokes in the grid and plate circuits are so nearly alike in value (generally about 100-200 henries). Now with two impedances so nearly similar there are all the re-

for due to this relatively low resistance of the coil it is impossible for any appreciable charge to accumulate on the grid of the tube. Also this permits the use of a comparatively high value of coupling condenser—in this amplifier 1 mf.—which is seen to be an obvious advantage.

It will be noticed from the schematic diagram that there is a radio-frequency choke coil, L4, and a by-pass condenser, C2, in the plate circuit of the detector tube, V1. These are incorporated in the circuit in order to keep any radio-frequency currents from entering the primary of the audio-frequency transformer, T. In the output circuit of the last tube of the amplifier there is a similar system. This one is employed to keep the high voltage necessary for the proper functioning of the power tube, out of the windings of the loud speaker. Shunted across the secondary of the audio-frequency transformer, T, there is a variable resistance, R3. This is a potentiometer having a resistance of 500,000 ohms and is employed as a volume

will be noticed that with the switches in these positions the coil, L, is not in the circuit. Across the coil, L1, which functions as the secondary, there is shunted a variable condenser, C1, having a value of 0.0005 mf., which is the only tuning control in the set. The variable resistance, R2, controls the regeneration by varying the voltage that is impressed on the plate of the tube, V.

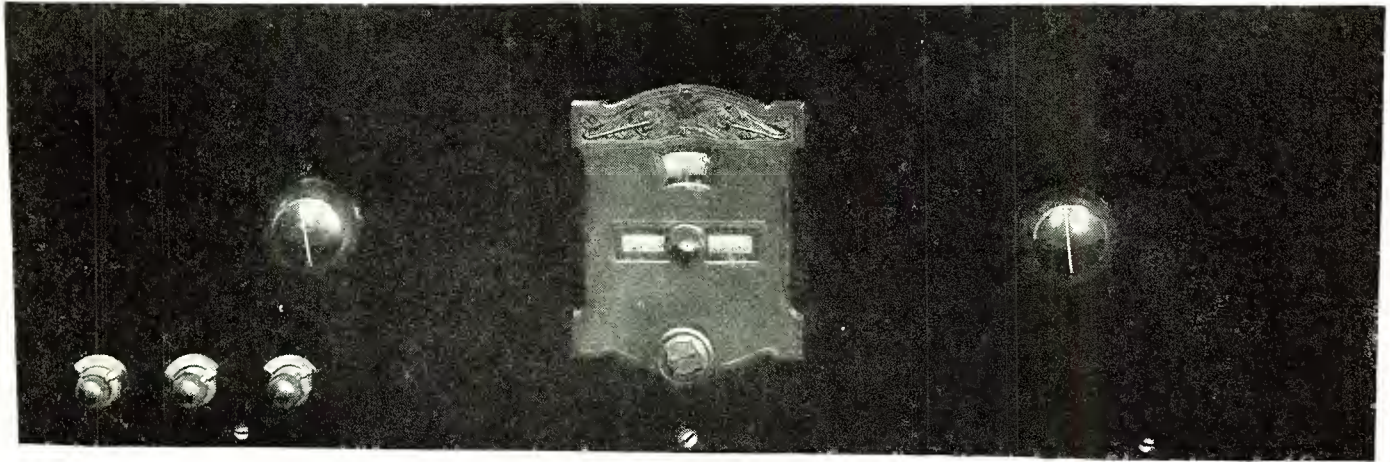
When it is desired to reproduce the music from the phonograph the switch J is thrown to the right and the other switch is put in the up position. The coil, L2, is now in series with the pick-up device, C, and the primary of the untuned radio-frequency transformer, L3. The coil, L, is now connected in the plate circuit of the tube, V, by the throwing of the switch, J1. This coil, L, becomes the tickler; L1, the oscillator coil and L2 becomes the pick-up coil. Now the resistance, R2, is turned so that it is entirely out of circuit and the condenser, C1, is so adjusted that the oscillating circuit is operating at the most efficient fre-

quency for which the untuned radio-frequency transformer is designed. Once this point on the variable condenser is found it will remain the same whenever the set is used to reproduce phonograph music.

same direction. Two strips of fairly heavy brass can be bent into the required shape for mounting the whole oscillator coupler on the baseboard.

In order to get away from all unnecessary controls the filaments of the

there is an absence of grid leak and condenser in the grid circuit of the detector tube. However, there is a grid bias supplied having a value of minus  $4\frac{1}{2}$  volts, which makes the tube operate at the best place on its char-



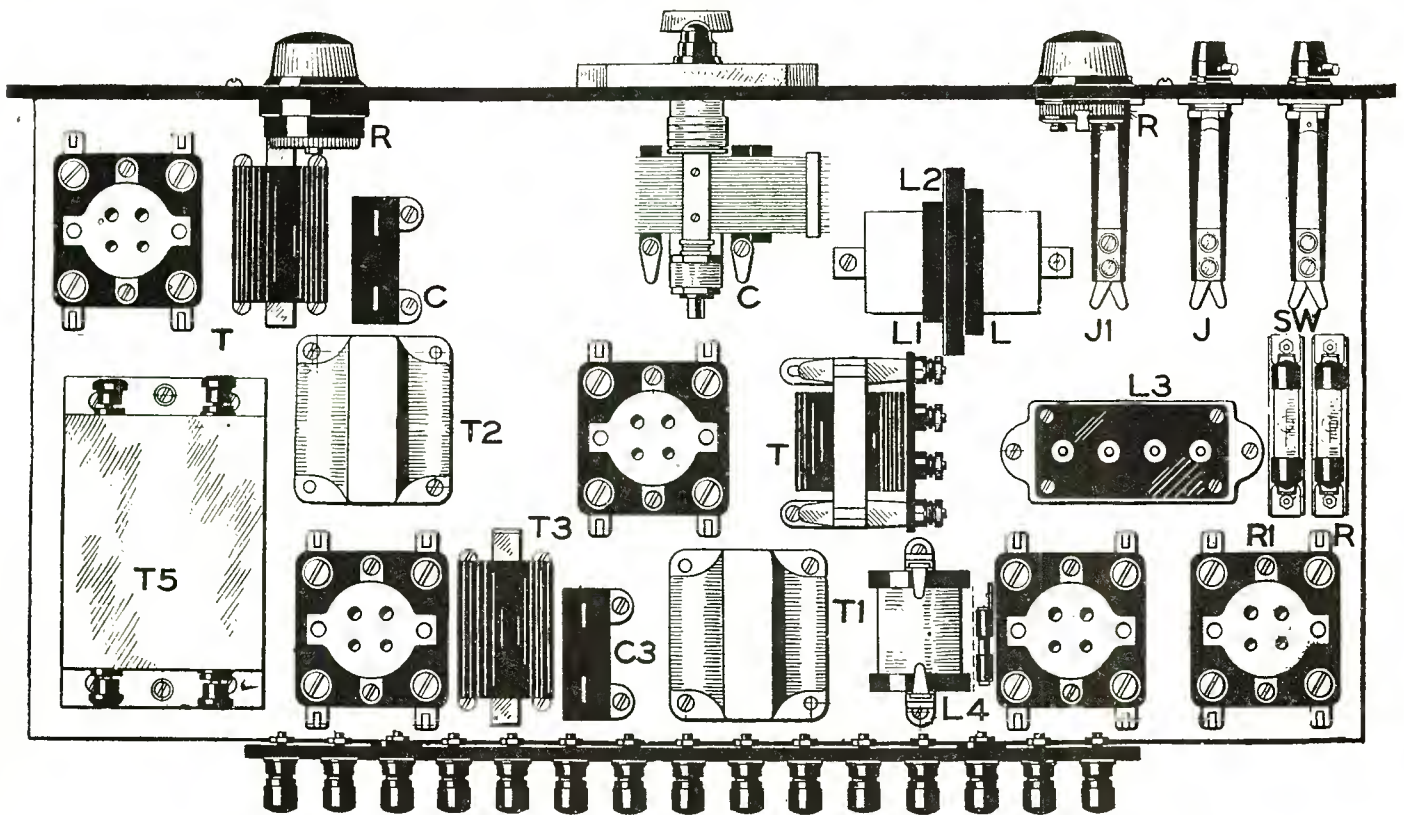
How the front panel appears when the dial and other parts are mounted.

The oscillator coupler, L, L1 and L2, is one of the most important pieces of apparatus in the whole circuit, and great care should be exercised in its construction if the builder winds it himself. It would be well to first wind the three coils. They have an internal diameter of  $1\frac{1}{2}$  inches and are of the basket weave type. Using No. 24 D.S.C. wire, L has 25 turns; L1 has 52 turns and L2 has 10 turns. These three coils are then mounted on

vacuum tubes are controlled by filament ballast resistances. Only two of these are used and they are connected in parallel, supplying sufficient current for the five tubes. The vacuum tubes that are employed are as follows: tubes V, V1 and V2 are 201-A type; tube V3 is a semi-power tube, (type 112) and the last tube, V4, is a power tube (type 171). It might be noted that the amount of current that is given to these tubes is far from

acteristic curve and thereby give excellent service.

It may be seen from the illustration how the apparatus is laid out on the baseboard and panel. However, it might be mentioned that there are many different ways of doing this job and a great deal may be left to the judgment of the constructor. For instance, we will suppose that someone wishes to take his phonograph away

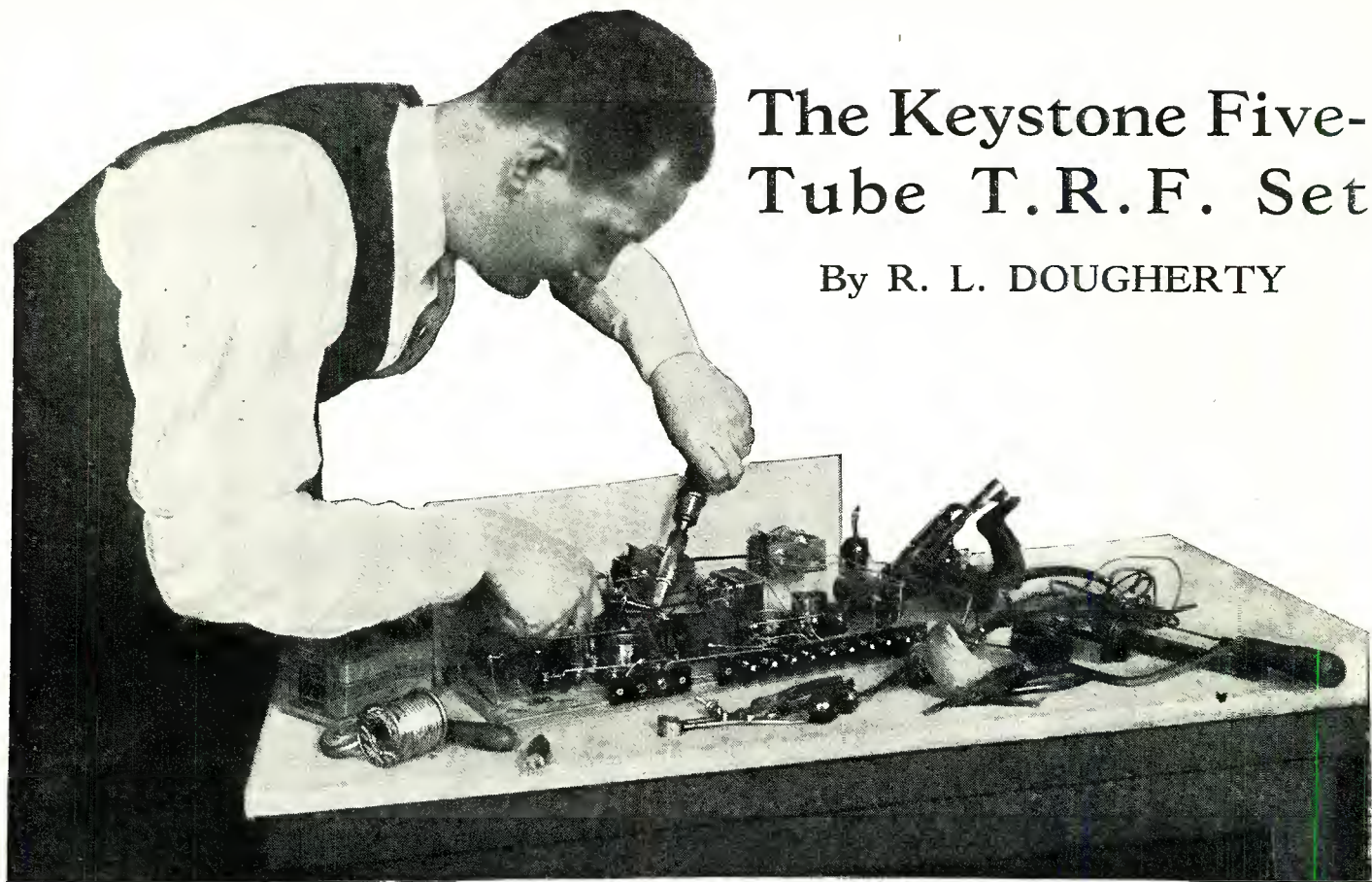


The layout of parts on panel and baseboard showing their relative locations designated in reference symbols.

a cardboard tube and the leads brought out to soldering lugs as indicated in the illustrations. It is important that all these coils should be wound in the

being critical, as the amplifier will function when the current is as low as 1.25 amperes and as high as 2 amperes. It will also be noticed that

with him to the seashore for the summer. He does not wish to take along his expensive instrument and  
(Continued on page 133)



# The Keystone Five-Tube T.R.F. Set

By R. L. DOUGHERTY

ONE of the misunderstandings that has been connected with radio for a long time is that unless a set costs \$100 or more, it is inferior. Therefore, the purpose of this article is to describe a standard five tube circuit which may be built — not including the accessories—for a sum under \$25.00. The specific set shown in this article was built at a cost of \$17.75—by careful shopping in regard to the smaller parts. The aggregate cost, however, when built by a fan who does not have the facility of utilizing the radio shopping sections of the larger cities should not in any case exceed the higher figure.

The circuit employed has come to be recognized as a standard in radio practice of today. It consists of two stages of condenser tuned radio frequency, tube detector and two stages of good grade transformer coupled audio-frequency—the set mounted on either a metal or bakelite panel, as suits the desires of the builder. The set shown in the illustrations makes use of the shielding effects of a metal panel, besides taking into consideration the highly decorative effect of same.

The efficiency of the set is very high. Tuning is extremely sharp, stations outside of New York being received almost nightly from the author's home, located on top of the Jersey Palisades, less than five miles from some of the most powerful stations in the city. Due to the loggability of the set there is no trouble locating the stations once they

have been logged, and under good operating conditions WMBF (Miami Beach, Florida) and PWX (Havana, Cuba) can be brought in on the loud-

Care in building and strict adherence to a few simple rules of set building make this receiver which the owner will be proud to own and use.

When the parts are being purchased, care should be taken to ascertain that each part is perfect. Inspect the condensers very carefully for mechanical defects such as imperfect connection between the rotor and frame, short circuit between the plates and see that the shaft turns true and smooth. The coils should be inspected for electrical defects such as loose connections, short circuited turns and sturdy construction. The sockets, switch and rheostats should also be scrutinized most carefully for minor mechanical defects such as loose contact.

The transformers should be tested very carefully by means of an ammeter and battery. This precaution is very necessary, the old test with a battery and phones being not at all reliable. The manner of testing audio frequency transformers with an ammeter is as follows: Connect the battery, ammeter and primary of one of the transformers in series. Note the deflection of the needle. Do the same with the second transformer and compare the readings. If there is a decided difference (more than a point or two) the two transformers are not the same, and the one with the higher reading should be further tested in an audio circuit.

Do the same with the secondaries of both transformers. If both are of the same ratio the readings should be

## LIST OF PARTS FOR KEYSTONE 5-TUBE SET

- 1 Panel, Metal or Bakelite
  - 3 .00035 Mfd. Variable Condensers, SLF or Modified SLF (C1-2-3)
  - 3 Bakelite Pointer Knobs (Dials if Bakelite panel is used)
  - 1 Filament Switch (F)
  - 1 Wood Base Board
  - 5 UX Sockets (V1-V2-V3-V4-V5)
  - 1 Binding post strip
  - 3 Keystone Radio Frequency Coils (L1-L2-L3)
  - 2 Rheostats (1 10-ohm and 1 25-ohm) (R and R1)
  - 2 4-ohm resistance strips (RI and RO)
  - 1 Grid leak and condenser (Grid-ensers may be used)
  - 2 Keystone Audio Frequency Transformers (A1 and A2)
  - 1 Walnut or Mahogany Cabinet
  - 1 .0002 Fixed Condenser (CF)
- Several lengths of bus wire or Celatsite for connections, miscellaneous screws and lugs for connections.
- Note: If metal panel is used a supply of fibre washers will be necessary to prevent short circuiting of parts on panel.

speaker right through local interference when there is no other station operating on the same wave. As a matter of fact the set has been thoroughly tested and has conclusively proven that it gives as good results when carefully built, as sets costing upwards of \$100.

identical. When this test is completed to the satisfaction of the builder, and not until then, should the thought of laying out the panel or base be attempted.

These few cautions are mentioned for the purpose of assuring the builder that when the set is assembled it will work. It is better to spend two hours

binding post strip, grid leak and condenser should be securely fastened to the base by means of round head nickel-plated screws, and the preliminary wiring can be done, before the panel is put in place. This is the quickest and easiest manner of wiring the set up. If the builder does not desire to use bus wire in connecting the vari-

screws and the three condensers and two rheostats fastened to it and wired into the circuit.

**Testing the Set**

When this is completed the circuit is ready to test, before being placed into service. Place a tube in the first socket and attach the "A" battery to the

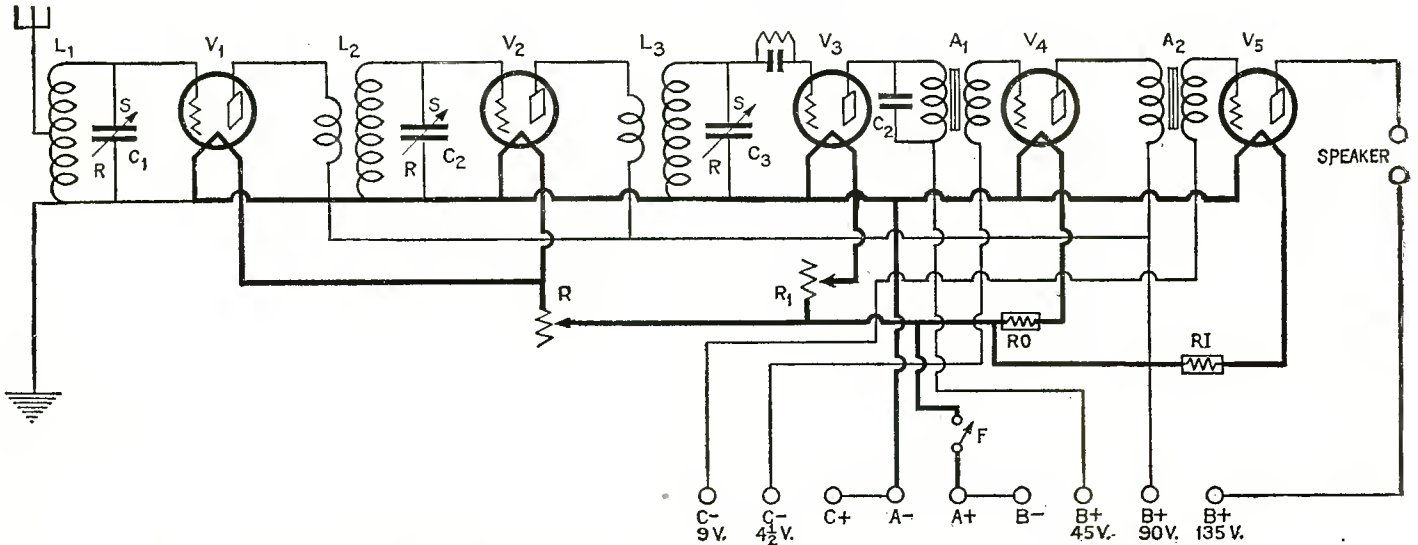


Fig. 1. Schematic diagram of receiver described. Parts are numbered according to list on opposite page.

carefully testing the apparatus before assembly (as is the strict rule in all laboratories) than it is to spend an entire evening "hunting for trouble" the first evening the set is in work. The old saying "an ounce of precaution is worth a pound of cure" is well applied to radio set building.

**Construction**

The actual building of the set is not at all difficult, provided that the plans

ous instruments, flexible hookup wire should be used and connections run in the straightest lines, using the least possible amount of wire. Incidentally, the set constructed for this article was wired in that fashion, bus wire being used, but little attention paid to neat right angle bends in fastening the wire.

It is wisest to first wire up the filament side of all sockets, then wiring the audio frequency side of the circuit,

posts marked A- and A+. Pull out the switch and the tube should gradually light up as the first rheostat is turned from off to maximum on. Then place the tube in each of the other sockets and test it out in a like manner. When this test is completed, replace the tube in the first socket and detaching the plus side of the "A" battery with the rheostat turned all the way on touch the plus wire to all the "B" plus wires. If the tube lights when any post on the

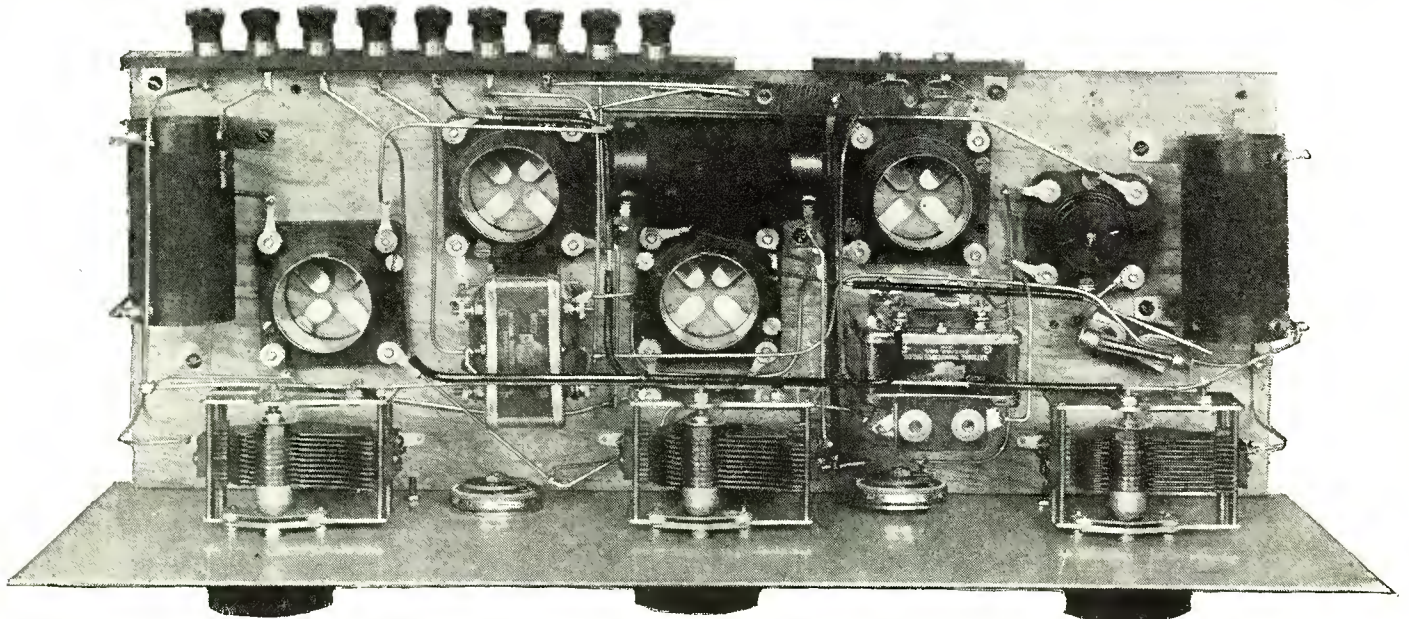
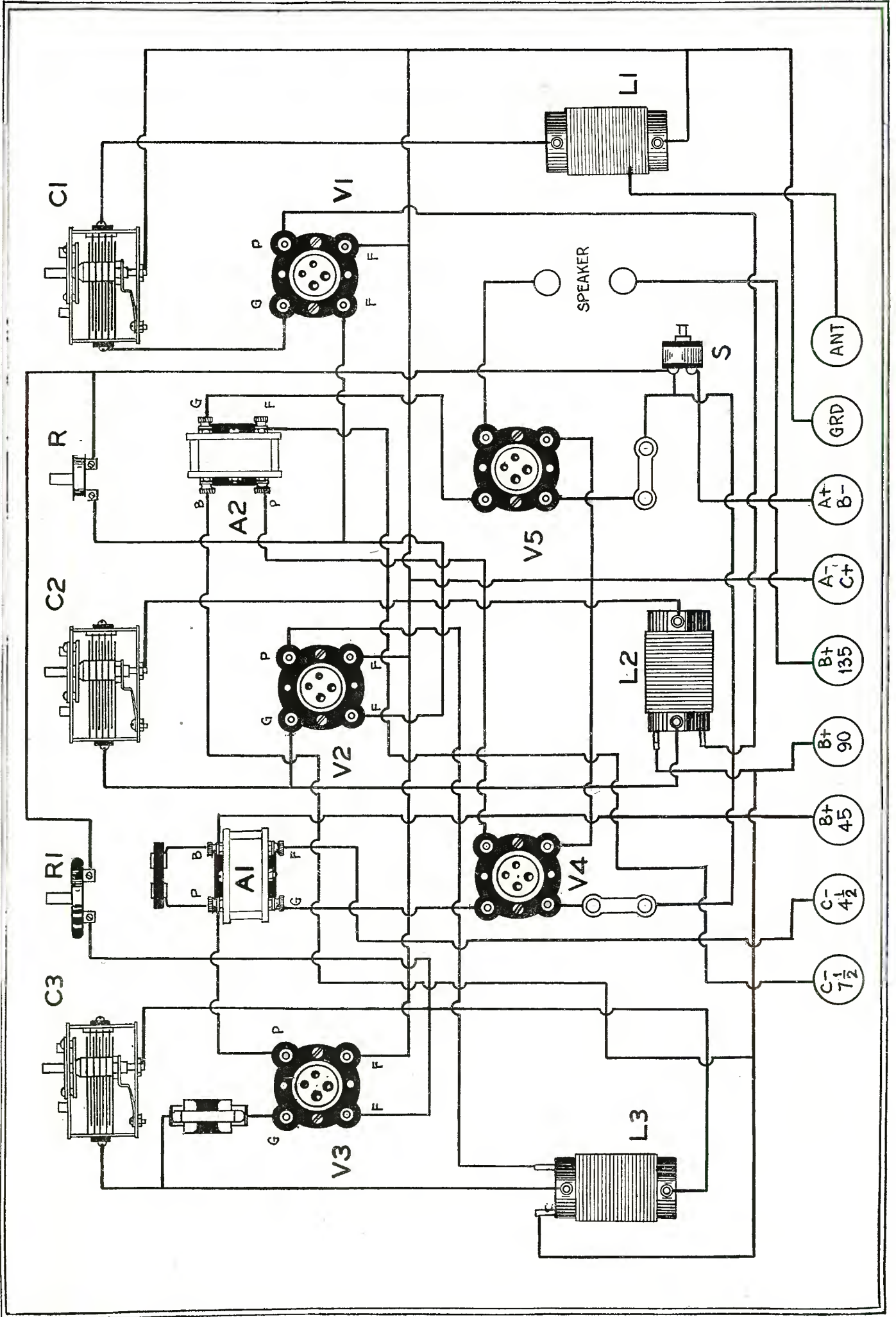


Illustration of completed receiver showing the arrangement of the components.

and diagrams are followed. Fig. 3 gives a graphic layout showing how the various instruments should be laid out on the base board. The sockets, transformers (both audio and radio),

working back from the last tube up to the detector. When all the wiring it is possible to do on the baseboard is completed, the panel should be mounted by means of four heavy round head

"B" side is touched (except the minus "B," which is common with the plus "A"), there is a short circuit and the circuit should be traced until it is found.

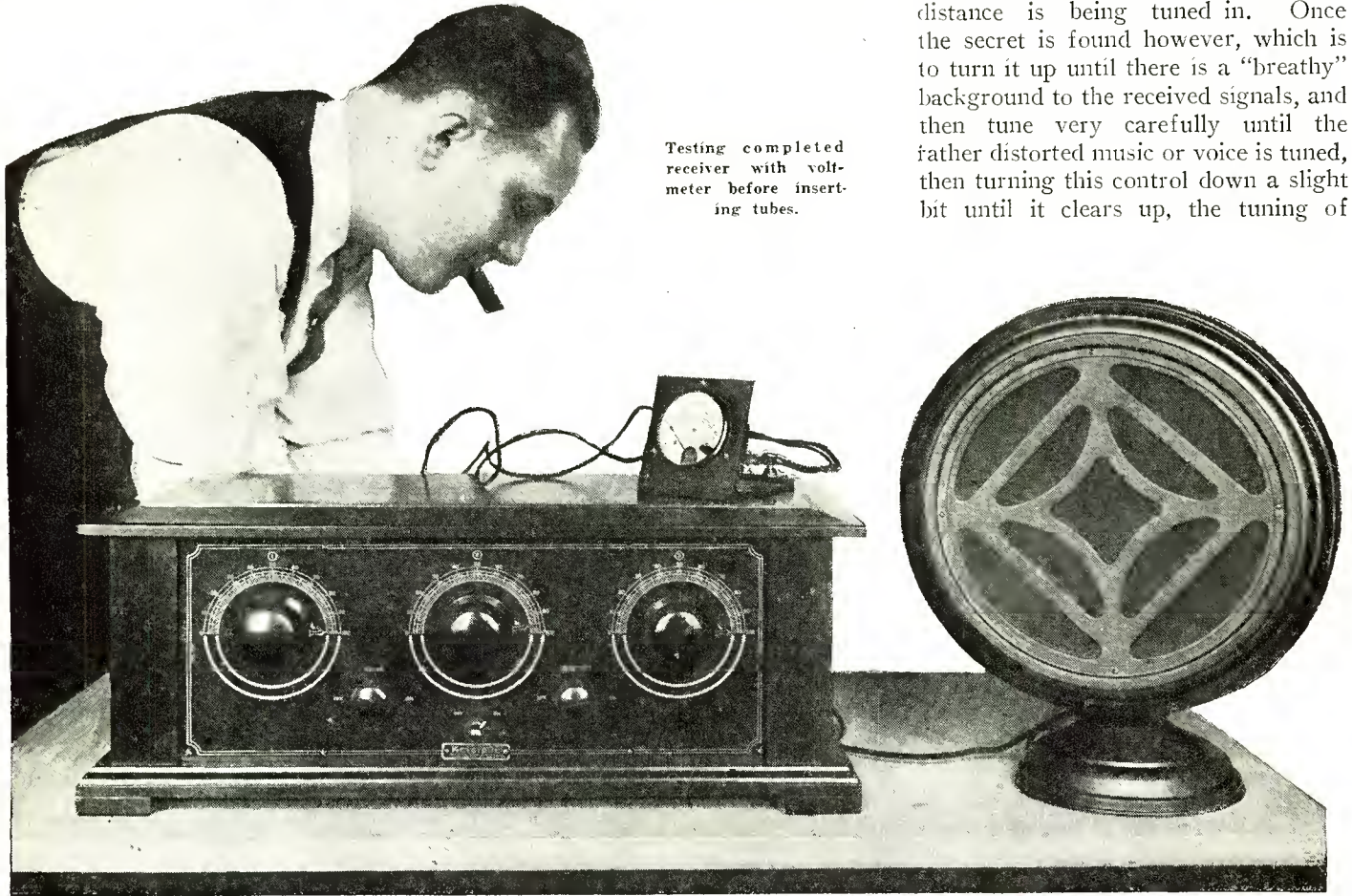




When all connections have been traced and receiver has been given a

is very simple to tune, extremely sharp and that the loggable feature allows

circuit, it will probably take a little while before the user becomes accustomed to operating this control when distance is being tuned in. Once the secret is found however, which is to turn it up until there is a "breathy" background to the received signals, and then tune very carefully until the rather distorted music or voice is tuned, then turning this control down a slight bit until it clears up, the tuning of



Testing completed receiver with voltmeter before inserting tubes.

thorough mechanical test, to see if all the soldered connections are tight, the

any station to be located once it has been tuned in. Due to the fact that the

distant signals will be found far easier than with the ordinary receiver.

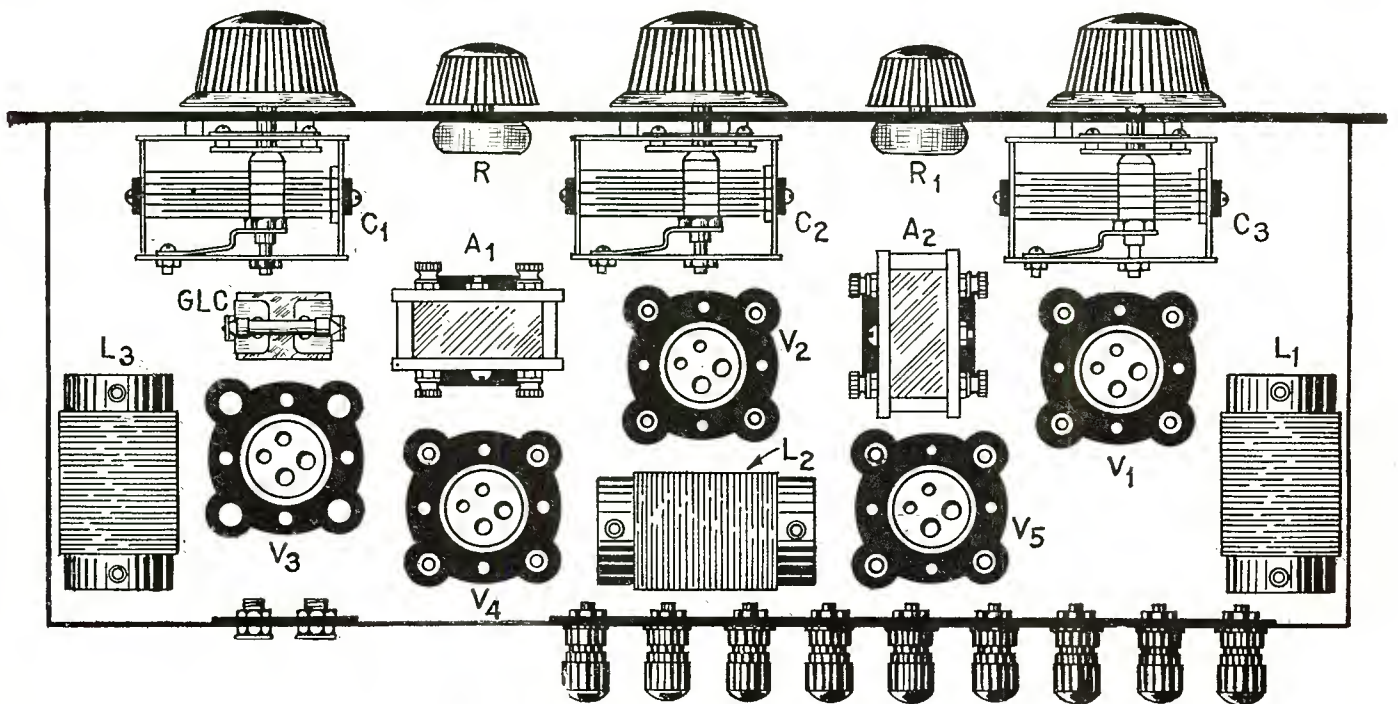


Fig. 3. Layout of apparatus on baseboard.

receiver is complete and should be placed in the cabinet.

It will be found that this receiver

sensitivity is controlled to a great extent by the position of the ten ohm rheostat located in the first radio

The actual method of tuning the receiver is simplicity itself. The three  
(Continued on page 155)

# How to Build the S-C II

## A New Receiver Embodying Good Selectivity with Life-like Reproduction of Voice and Music

By CHARLES H. CALLIES

**D**URING the past few seasons many excellent receivers have been developed for home construction. Until at the present time there are so many excellent receivers that the fan might build, that he is confronted with the difficult task of deciding just which one is best suited for his requirements.

It was with a realization of these conditions that Lawrence M. Cockaday and McMurdo Silver undertook the design of the S-C II. In planning it the belief that the average radio fan's standards of what constituted an excellent receiver had changed within the last few years and that distance was not the only goal to be aimed for, was considered. The set described is an excellent distance-getter and will bring in out-of-town stations in a most satisfactory fashion, yet the points of its design which have been given most attention are simplicity of operation, perfect tone quality, and sturdy mechanical structure.

Practically all the manufacturers of good receivers have taken advantage of the tremendous strides made in radio frequency amplifier design as a result of the application of sound engineering principles to proper shielding. Not only are coils and condensers shielded, but, in most cases, the actual structure of the receiver itself is of metal and practically all of the better receivers employ steel or aluminum chasses. The designers of the S-C II first carefully worked out the mechanical assembly of the receiver with absolutely no regard to the availability of steel chasses.

This having been done, arrangements were then made with a large manufacturer to produce the panel and chassis required for the S-C II receiver

duction possible. The all-metal assembly, the complete shielding of sensitive circuits, the absolutely perfect quality of reproduction, and the surprising

simplicity of the rugged and substantial assembly make the S-C II a receiver which will give satisfaction for years to come.

The first R. F. stage consists of a low-loss antenna coupler, the secondary of which is wound upon a moulded, ribbed bakelite form and is practically an air-supported, space-wound coil of extremely high electrical efficiency. The primary of this coil is provided with a tap, for the use of long or short antenna. The space-wound secondary is tuned by a variable condenser which is a compromise between straight-line frequency and straight-line wavelength types. The second stage is identical to the first except the primary of the R. F. transformer is space-wound over the full length of the secondary.

This method of primary placement results in maximum magnetic coupling between primary and secondary with a minimum of primary inductance, which is very desirable. Due to ample spacing between primary and secondary, the capacitive coupling is very low. The second stage, completely shielded in an aluminum housing, in turn feeds into the detector stage, identical with the second stage except that the detector tube operates with a  $4\frac{1}{2}$ -volt negative grid bias to permit rectification.

The choice of a grid biased detector rather than one employing grid-condenser-leak was made because many



Miss Mary McCormick, famous star of the Chicago Civic Opera Co., listening in on the S-C II.

and to market them through regular dealers so that the radio fan at his home laboratory might assemble the receiver with all of the refinements of sturdy metal assembly.

### Circuit Design

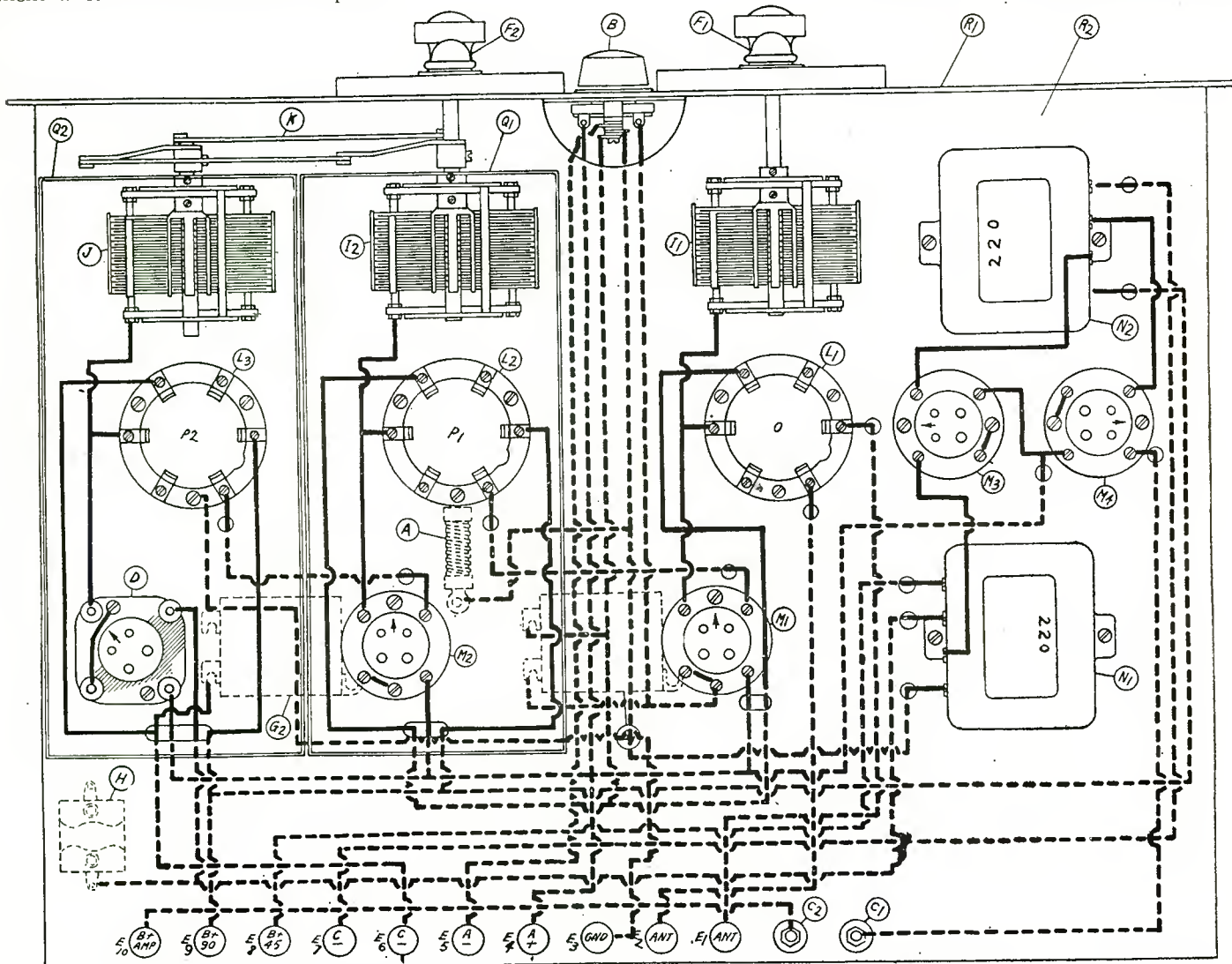
The circuit used is a standard five-tube R. F. amplifier. The two tubes used as tuned radio frequency amplifiers provide all the sensitivity and selectivity that is required for enjoyable reception in even the most congested broadcasting centers. The audio frequency portion of the receiver was designed for the most perfect repro-

stations will be received with volume sufficient to overload a grid-condenser-leak detector. On such strong signals, the grid biased detector does not introduce distortion such as would be certain to result from the use of a condenser-leak combination.

In the R. F. amplifier, advantage is taken of every possible method of obtaining sensitivity and selectivity by means of a manual sensitivity adjustment which allows the R. F. amplifier

careful thought in designing the receiver and gives uniform amplification over the frequency range of 30 to 5,000 cycles. It has been shown definitely by many research laboratories that frequencies above 5,000 cycles do not contribute to the fidelity of reproduction, since the highest musical note is 4,192 cycles, which is seldom used.

socket "L-2," condenser "I-2" and tube "M-2" is housed in a complete aluminum box "Q-1" effectively preventing transfer of undesired energy between the stage and any other portion of the receiver and also eliminating the pick-up of extraneous interference upon the coils, condensers, and wiring of the stage itself. This second stage leads into the detector stage, similarly designed and constructed, and housed in the second aluminum shield "Q-2."



A combined layout and wiring diagram of the S-C II is given above. All connections above the metal sub-panel are clearly shown in heavy lines. Wiring beneath sub-panel is shown in dotted lines.

to be adjusted to its most efficient point of operation—just on the verge of oscillation. The selectivity of the R. F. amplifier is such that the ten kilocycle transmission band allowed by the Department of Commerce for each broadcasting station will be received and amplified without distortion but that little amplification will be given to outside frequencies.

Due to the accurate design of the radio frequency circuits, it is possible to operate the second R. F. and detector stages from the same control, so the two variable condensers for these stages are connected by means of a mechanical link and both controlled from a single dial. The audio frequency amplifier was given the most

### Operation Explained

For the benefit of those fans who desire to trace the functioning of the various parts of the receiver by means of a schematic diagram, the following explanation of operation is given.

The first radio frequency amplifier consists of an antenna coil, "O," tuned by a variable condenser "I-1," designed to cover the wavelength range of 200 to 550 meters. This first R. F. stage includes a UX201A tube, the plate circuit of which is connected to the second radio frequency transformer "P-1," the secondary of which is tuned by a second variable condenser "I-2." This second R. F. stage, consisting of transformer "P-1" with its

The sensitivity and volume of the radio frequency amplifier is controlled by means of a 200-ohm potentiometer "B," integral with which is an on-off switch which completely turns the receiver on and off.

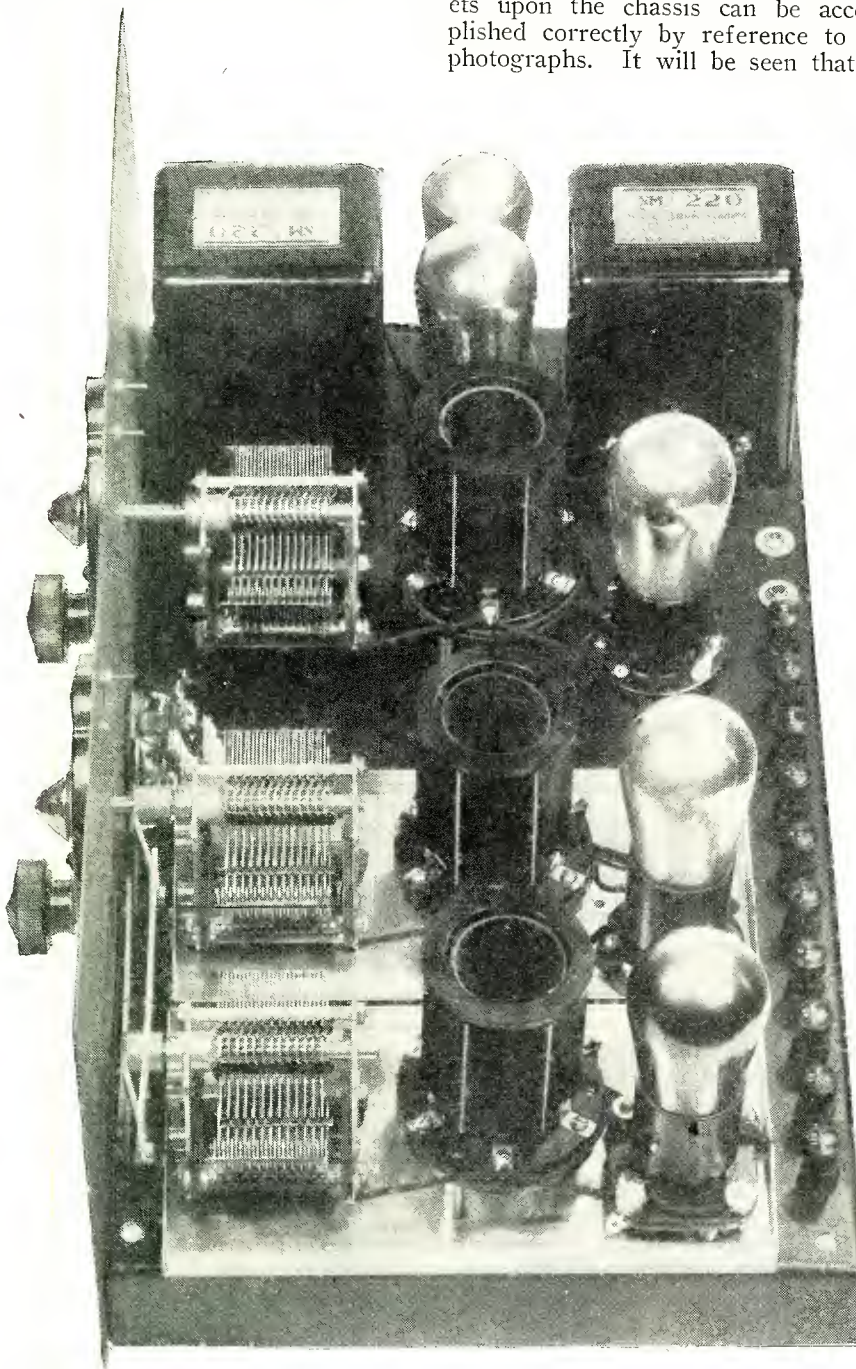
The output of the detector tube is fed into an audio amplifier consisting of two audio transformers "N-1" and "N2," a CX301A and a CX371 tube.

The receiver is designed for operation with either batteries or battery eliminators and will be found quite satisfactory when so used. It may not satisfactorily be used with dry cell tubes, for the volume obtained, as well as the quality, will not be comparable with that obtained with standard CX301A and CX371 tubes.

The construction of the S-C II receiver is simple, for all parts specified for it can be procured from any dealer. The assembly itself can be completed in a very short time, for the steel

chassis. Insulating washers should be used on the binding posts and tipjacks to prevent short-circuiting. The mounting of the audio transformers, coil sockets, condensers, and tube sockets upon the chassis can be accomplished correctly by reference to the photographs. It will be seen that on

side of the chassis the two bypass condensers "G1" and "G2" are fastened using the mounting screws of tube sockets "M1" and "M2." The small mica condenser "H" is held to the chassis by means of the fastening screw of detector tube socket "D," with a nut between it and the chassis. The one-half ohm resistance "A" is mounted in the same fashion using the rear mounting screw of coil socket "E."



An end view of the set looking down on the parts mounted on sub-panel. The two condensers in the foreground are connected together with the link motion mechanism.

chassis and panel are pierced to receive all instruments in exactly their proper position and so it becomes practically impossible to put parts together improperly. It is suggested that no endeavor be made to substitute any other items than those listed, as the design and results of the receiver will suffer if this is done.

The receiver may be assembled (with the exception of the front panel and dials) before any wiring is started. All binding posts and the two tipjacks should be mounted, as seen in the photographs, in the holes provided for them in the back edge of the steel

the right-hand side of the chassis the two shield pans are placed under the variable condensers, tube sockets, and coil sockets. Coil sockets are supported away from the chassis by means of  $\frac{3}{4}$ " hollow studs provided with the chassis. One mounting screw in the case of the tube socket is used to make the connection between the minus terminal of the socket and the steel chassis itself which serves as the "A—," "B—," and "C+" wiring of the receiver. At the point where the nuts of these fastening screws make any contact with the chassis, it should be scraped free of enamel. On the under

#### LIST OF PARTS

- 1 Carter Resistor (A)
- 1 Carter M-200-S potentiometer (B)
- 2 Carter tipjacks (C1-C2)
- 1 Benjamin No. 9040 UX spring socket (D)
- 10 Eby binding posts (Ant., Ant., Gnd., A+, A-, C-, C+, 45+, 90+, Amp+) (E1-E10)
- 2 National B vernier dials, clockwise (F1-F2)
- 2 Polymet 1 mf. condensers (G1-G2)
- 1 Polymet .002 condenser (H)
- 2 Silver-Marshall 316B condensers (I1-I2)
- 1 Silver-Marshall 316A condenser (J)
- 1 Silver-Marshall 637 link motion (K)
- 3 Silver-Marshall 515 coil sockets (L1-L3)
- 4 Silver-Marshall 511 tube sockets (M1-M4)
- 2 Silver-Marshall 220 transformers (N1-N2)
- 1 Silver-Marshall 116A coil (O)
- 2 Silver-Marshall 118A coils (P1-P2)
- 2 Silver-Marshall 631 stage shields (Q1-Q2)
- 1 Van Doorn S-C chassis unit (R1-R2)

There will also be necessary 31 6/32 nuts, 22 6/32 x  $\frac{3}{4}$ " RHNP screws, 9 6/32 x  $1\frac{1}{2}$ " RHNP screws, 9 collars  $\frac{3}{4}$  x  $\frac{1}{4}$ ", 20 soldering lugs, 20 binding post insulating washers, 4 tip-jack insulating washers, 3 potentiometer-switch insulating washers.

The wiring can be done very simply using insulated hook-up wire. The builder should have no difficulty in this operation if he will simply refer to the pictorial diagram of the receiver which shows the exact placement of every wire with regard to the various instruments.

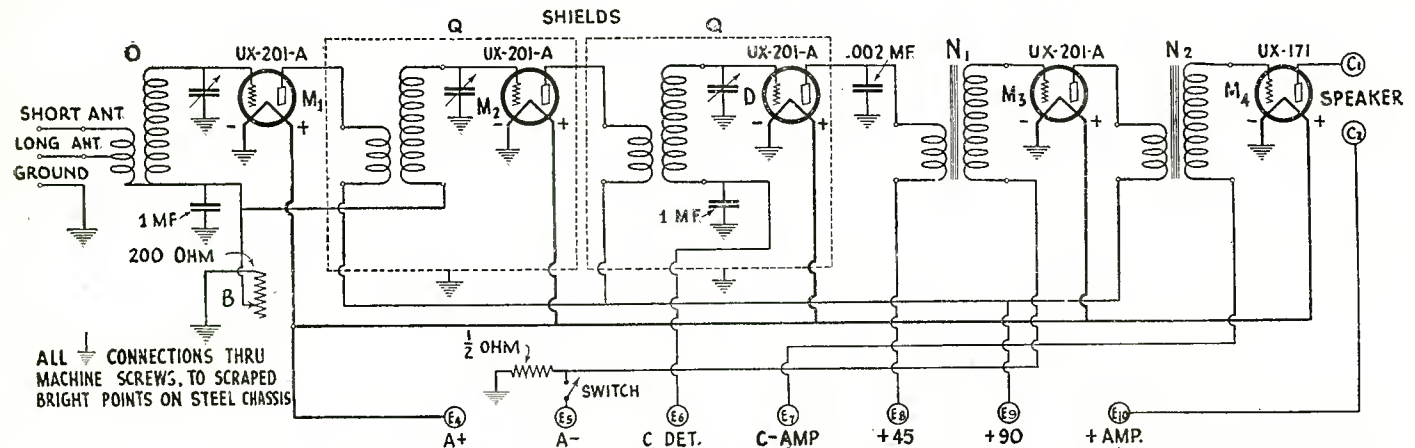
The link motion "K" should be slipped over the shafts of the two right-hand condensers "I-2" and "J" and fastened to them in such a fashion that they both rotate in synchronism. The front panel may then be fastened to the chassis by means of two machine screws and nuts and the bushing of the potentiometer switch. The National dials can then be slipped over the condenser shaft, and the set screws tightened up. After a careful check of the wiring and assembly, the receiver may be considered ready for preliminary testing after the coils have been inserted in their proper sockets.

**Testing the Circuit**

The first step in testing is to connect the "A" battery to binding posts "E4" and "E5." The plus or red

terminal of the six-volt storage battery should be connected to the binding post "E4," marked "A BAT.+"; while the black, or negative terminal, of the storage battery should be connected to the binding post "E5,"

marked "A BAT.+" should now be removed and connected successively to



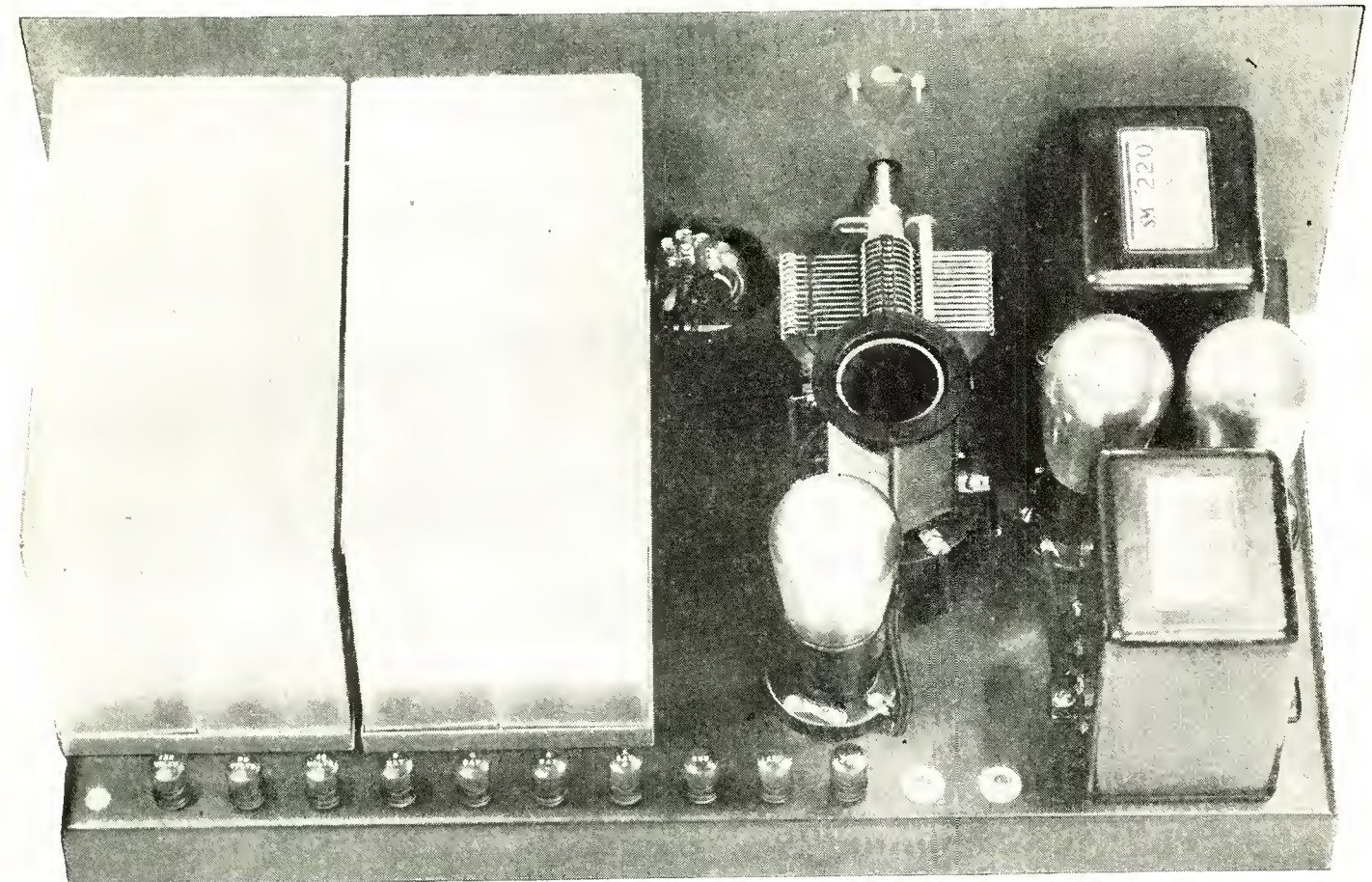
Schematic wiring diagram of the receiver showing the two shielded stages outlined in dotted lines.

terminal of the six-volt storage battery should be connected to the binding post "E4," marked "A BAT.+"; while the black, or negative terminal, of the storage battery should be connected to the binding post "E5,"

the switch on unit "B" is not functioning satisfactorily.

The tube should then be moved successively to all sockets, starting with "M3" and progressing through "M1," "M2," and "D." In each socket it

binding post "E8," "E9," and "E10," marked respectively "45+," "90+," and AMP.+" The tubes absolutely should not light with any of these connections. If they do, it indicates that the receiver has either been incorrectly



Rear view of the set with the aluminum shields placed over the parts of the second and third stages.

marked "A BAT.—." A single tube should then be inserted in tube socket "M4" and the volume control knob turned from the "OFF" position all the way to the right. Just as it leaves the "OFF" position, the tube in socket "M4" should light and should remain at exactly the same brilliancy through-

should light and it should be extinguished when the volume control knob is turned to the "OFF" position. The remaining four tubes may then be inserted in the sockets in the receiver, making sure to place the CX371 power tube in socket "M4" while UX201A tubes should go in all other sockets.

wired or a short-circuit has developed which must be located. If they do not light, the lead from the positive post of the storage battery may be re-connected to its proper binding post, "E4."

The above tests having been very carefully gone through, the balance of

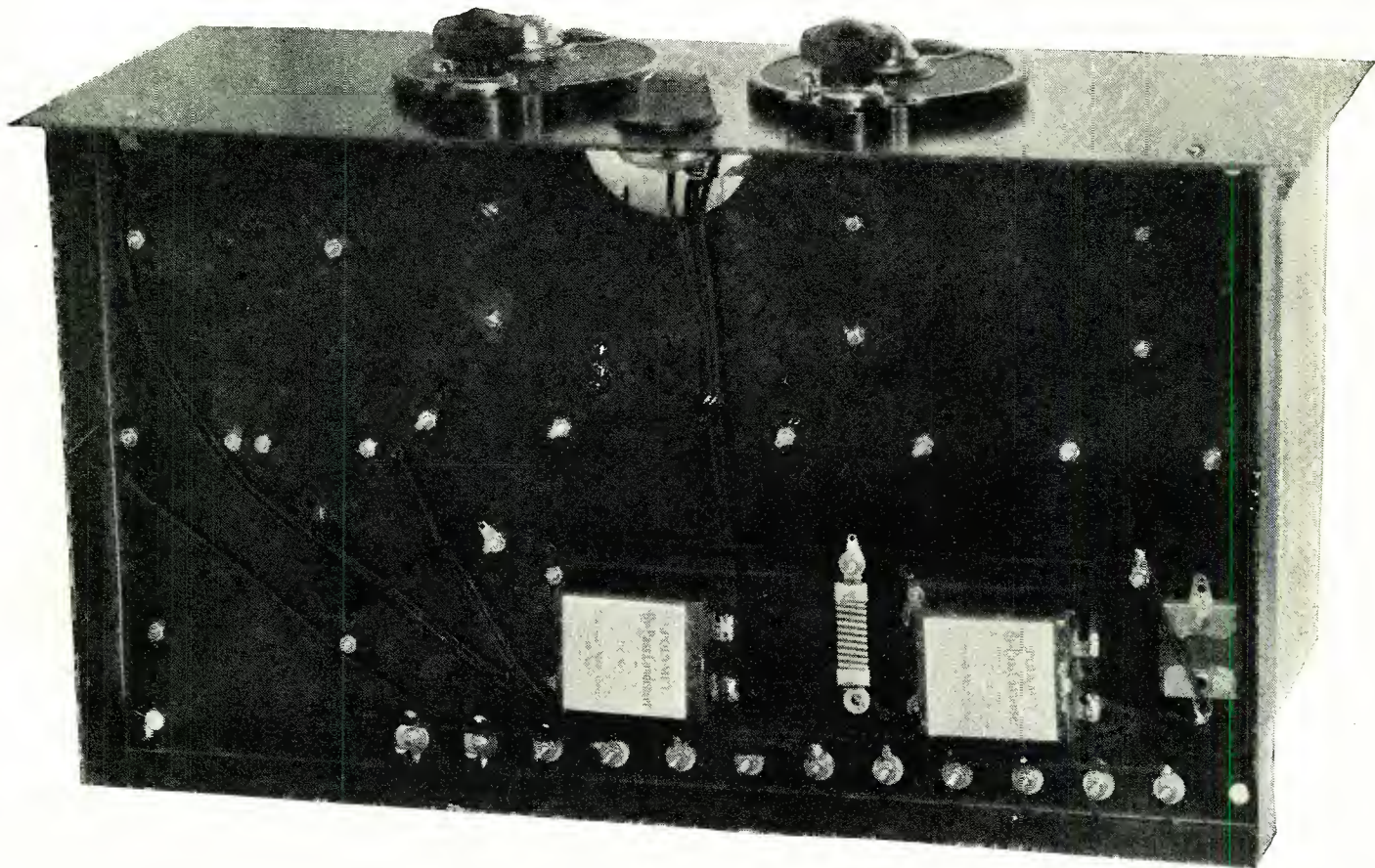
batteries may be connected to the receiver. One 45-volt "B" battery should have its minus terminal connected directly to the minus, or black, terminal of the 6-volt storage battery. A wire from binding post "E8," marked "45+," should be connected to the positive terminal of this first "B" battery and also to the negative terminal of a second 45-volt "B" battery. A wire from binding post "E9," marked "90+," should be connected to the positive terminal of this second "B" battery and also to the negative ter-

and "Q2" should be dropped down over the parts contained in the shield pans and their edges allowed to fall inside the turned up edges of the shield pans.

The volume control should be turned just up from the "OFF" position so that all five tubes light. As this is done, a "plunk" will be heard in the loud speaker, indicating that the set has been turned on and current is flowing through it. The two dials, "F1" and "F2" always both read approximately alike. To properly tune in any station, the two dials "F1" and

the matter of "B" eliminators, the S-C II receiver is somewhat critical. Eliminators which will operate ordinary receivers will fail to function satisfactorily with the S-C II, for its low note reproduction is of the finest order.

If a standard storage "A" battery with trickle charger is used, it is a very simple matter to obviate all switching or turning on and off of the trickle charger or battery through the use of an automatic relay. Such an automatic relay will allow a receiver, used in conjunction with a "B" bat-



Bottom view of the set showing the placement of condensers, fixed resistance and wiring beneath the sub-panel.

terminal of the third "B" battery. A wire from binding post "E10," marked "AMP.+", should be connected to the positive terminal of the third and last "B" battery.

Assuming a CX371 tube to be used with 135 volts maximum "B" voltage, the positive side of a 22½-volt "C" battery should be connected to the black, or minus, terminal of the storage battery. A binding post upon this battery marked "—4½" should be connected to binding post "E6" marked "C—." The binding post marked "—22½" upon this same "B" battery should be connected to post "E7," marked "C—," of the receiver.

#### Operation of the Set

The above connections having been made as outlined, antenna and ground connected, the receiver is ready to be operated. The two shield tops "Q1" "F2" should be adjusted for maximum

volume, after which the volume knob should be turned slowly to the right. As this is done, the volume of the received signal will increase up to a point where, as the volume knob is turned further to the right, the signal suddenly becomes distorted, and, if weak to begin with, will turn into a squeal.

The S-C II is designed for operation with an antenna, but it may be operated with a standard loop designed for a .00035 mfd. condenser if the loop is connected to terminals No. 3 and 6 of coil socket "L1." On a loop the receiver will be quite satisfactory for local operation, but volume on distant stations will probably be insufficient for adequate loud speaker operation.

The S-C II receiver may be used with battery eliminators, if desired. The simplest and most dependable "A" battery supply would consist of storage battery and trickle charger. In

tery eliminator, an "A" battery and a trickle charger, to be turned on and off at will, with no other control than the "VOLUME" knob on the front panel. At the same time when the receiver is turned off, the "A" battery is automatically connected to the trickle charger.

A very constant "B" supply unit is being described in another part of this issue, under the title of "A Constant Voltage B Eliminator." This will be found on page 123. The eliminator was designed to give constant voltage and is so designed that the bane of B eliminators "motor-boating" or "putting" is impossible. Due to the excellent voltage regulation of this unit and its careful electrical design, resulting in low terminal reactance, it will give wonderful results when used with any receiver—and especially so when used with the S-C II, for which it was really designed.

# How to Build the Standard Browning-Drake Receiver

By GLENN H. BROWNING

TO the serious investigator in the field of radio, it is very apparent that few fundamental changes have been made in radio circuits during the past three or four years. Refinements on basic circuits have been made almost constantly in adapting radio to present electrical and reproducing standards.

The greatest changes, however, have been made in simplifying the operation; obtaining more life-like reproduction;

tedious measurements were taken by Mr. Richardson under the direction of the writer, as part of a thesis for the Massachusetts Institute of Technology. Other refinements have been added during the past two years.

In view of the uncertainty which exists in the minds of the fans as to which design to follow in constructing a Browning-Drake, it was thought advisable at this time to design a standard

The circuit commonly known as the "Browning-Drake" is built around an efficient tuned radio frequency transformer<sup>1</sup> developed from mathematical considerations.

This transformer was used by the writer in a number of circuits with great satisfaction. It was found, however, that one stage of tuned radio frequency amplification balanced by some method, together with a regen-



Front panel view of the completed Standard Browning-Drake Receiver.

eliminating batteries for the operation of the receiver, and increasing the inherent selectivity of the receivers so that the owner may without trouble tune out unwanted stations and obtain programs to his liking without interference.

These improvements as they really might be classified under that very broad heading have not been over-night changes. They have been the objective of radio engineers for several years.

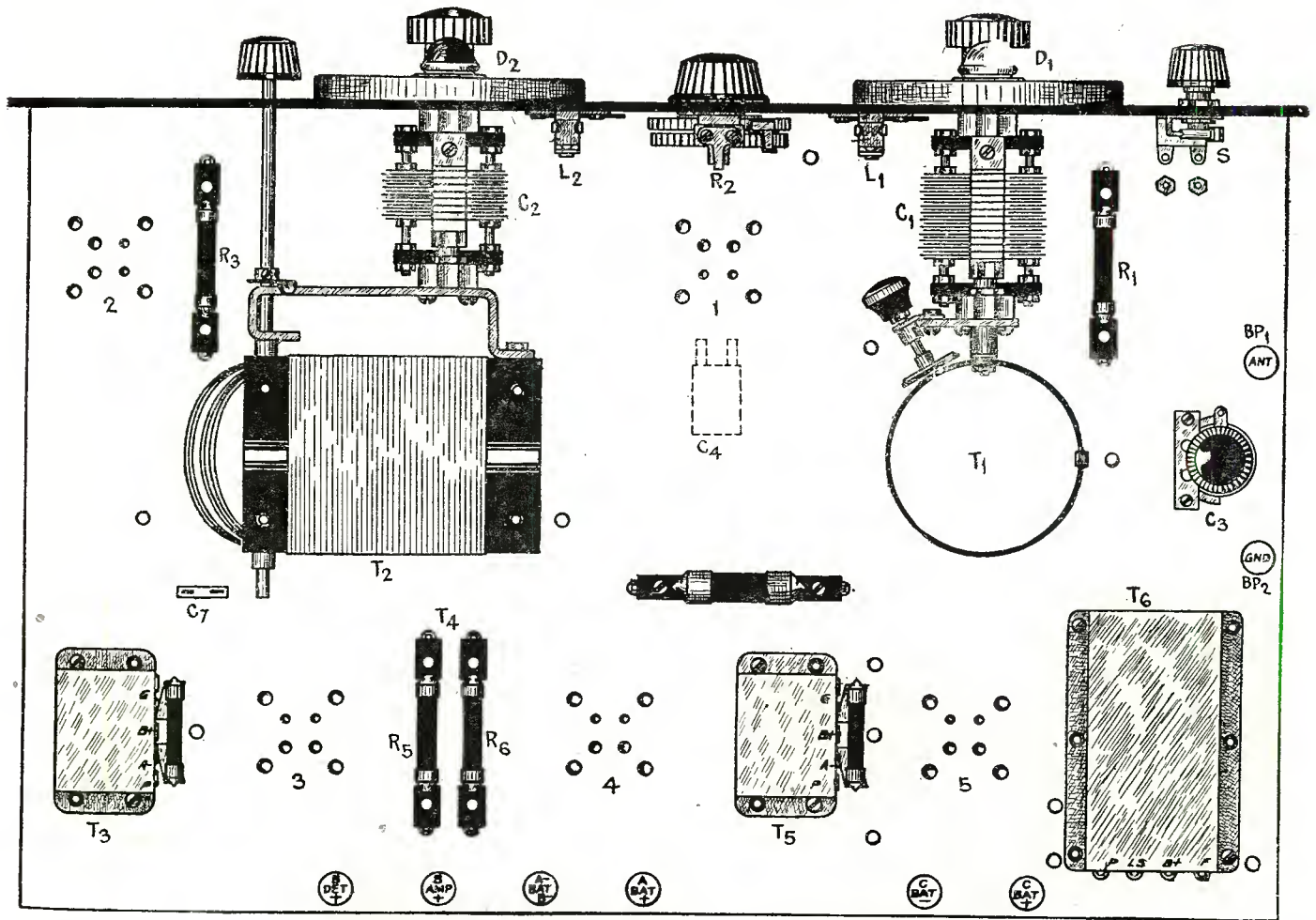
The writer has written very little about the circuit built around the tuned radio frequency transformer which Dr. F. H. Drake and he designed from theoretical considerations at Cruft Laboratory, Harvard University, for the reason that there were no particular improvements which were sufficiently developed to bring to the attention of the radio public. Of course, the apparatus put out for the receiver has been improved at various times. For instance, the coils were wound with enamelled wire, spaced one-half its diameter, a spacing which Mr. E. I. Richardson found to be the correct amount for minimum resistance. These

set which could be built with assurance of satisfactory operation. The set is believed to be up-to-date from an appearance standpoint and incorporates all changes and improvements which contribute to its efficiency. The same principles which were used two years ago are employed today. Progress in the radio industry has rather been made in the appearance of sets and in improving the electrical characteristics of the component apparatus which goes toward making up the whole; neither is there any indication that any radical changes will take place in the future. Of course, now and then it is rumored around that someone has invented a set without tubes, a receiver which eliminates static, or does a number of other phenomenal things. The receiver, however, never appears and lives only in the realm of dreams. Thus, the industry is beginning to settle down, having gone through much the same evolution as the automotive industry and the manufacturers and circuits which are built on a solid foundation are surviving.

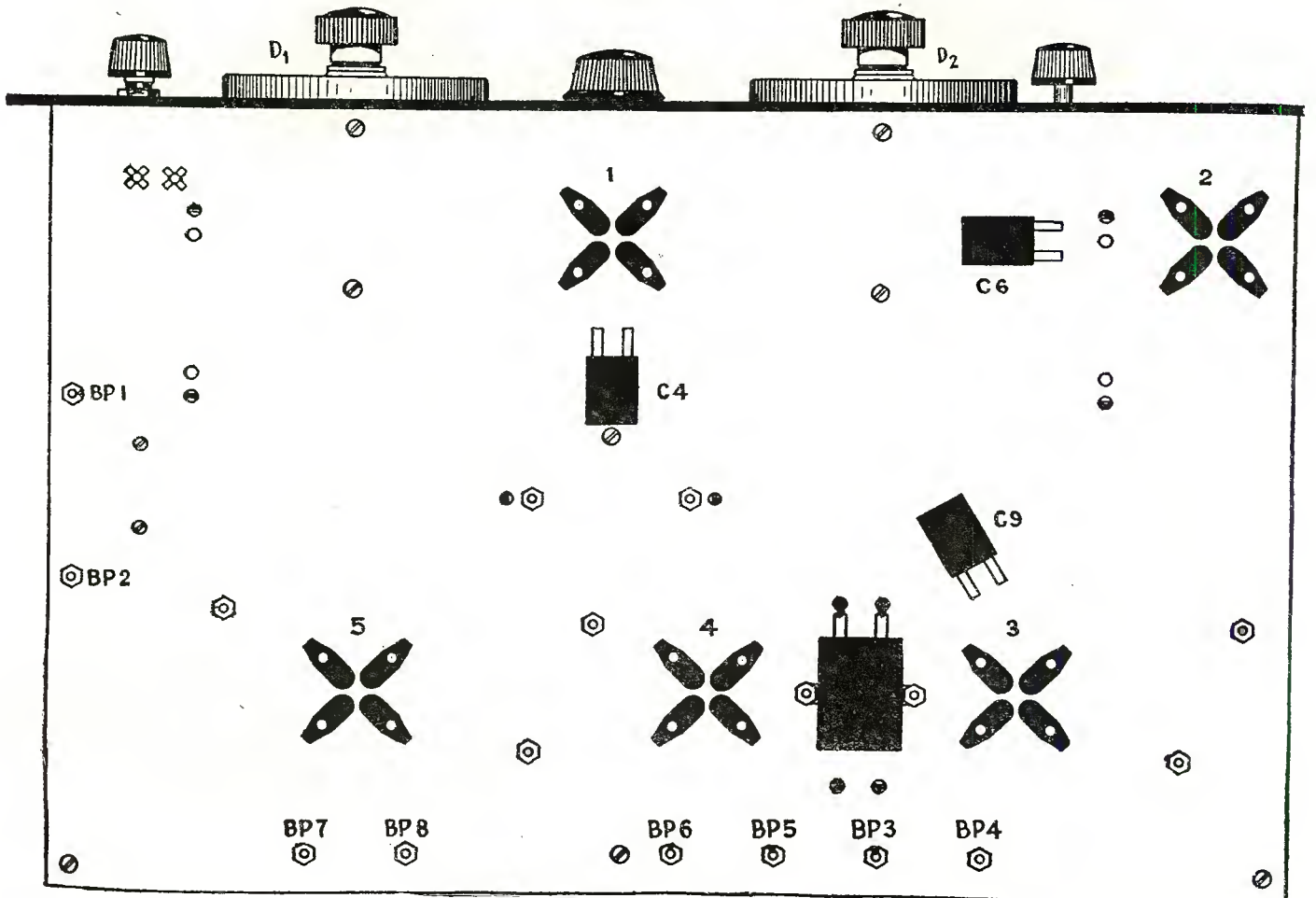
erative detector made a combination which was easy to build and operate, besides being extremely sensitive and sufficiently selective to tune out local stations. In fact, since the above circuit was first featured by Volney Hurd in the Christian Science Monitor, constant experimental work has been done to find, if possible, some better combination which would not be too complicated for the home constructor. At times it would seem that this has been accomplished, but upon careful comparison it was always found that one stage of radio frequency with regenerative detector has not as yet been improved upon.

The time thus spent in experimental work was useful, however, in the development of minor refinements. The apparatus used is considerably more efficient than that of two years past. The losses in the coils and condensers

<sup>1</sup> Those interested in the mathematics of the transformer are referred to the "Proceedings of the Institute of Radio Engineers," December, 1926.



Layout of the Standard Browning-Drake set as seen from the top of sub-panel.



Location of parts on the bottom of sub-panel.



are about as low as they can be made<sup>2</sup>.

The condensers used were developed at the National Company by Mr. W. A. Ready. Their characteristics lie between the straightline frequency and straightline wavelength type and have

metallic objects, placed so close to a coil that the resistance in the oscillatory circuit is increased several times and, consequently, the receiver tunes broad, even though the best apparatus is used. The present assembly is far

the antenna coil, as is shown, is used.

The audio frequency amplifier has been changed as it was desired to have the receiver operate satisfactorily on "B" eliminators—a condition which was not met, with either resistance or

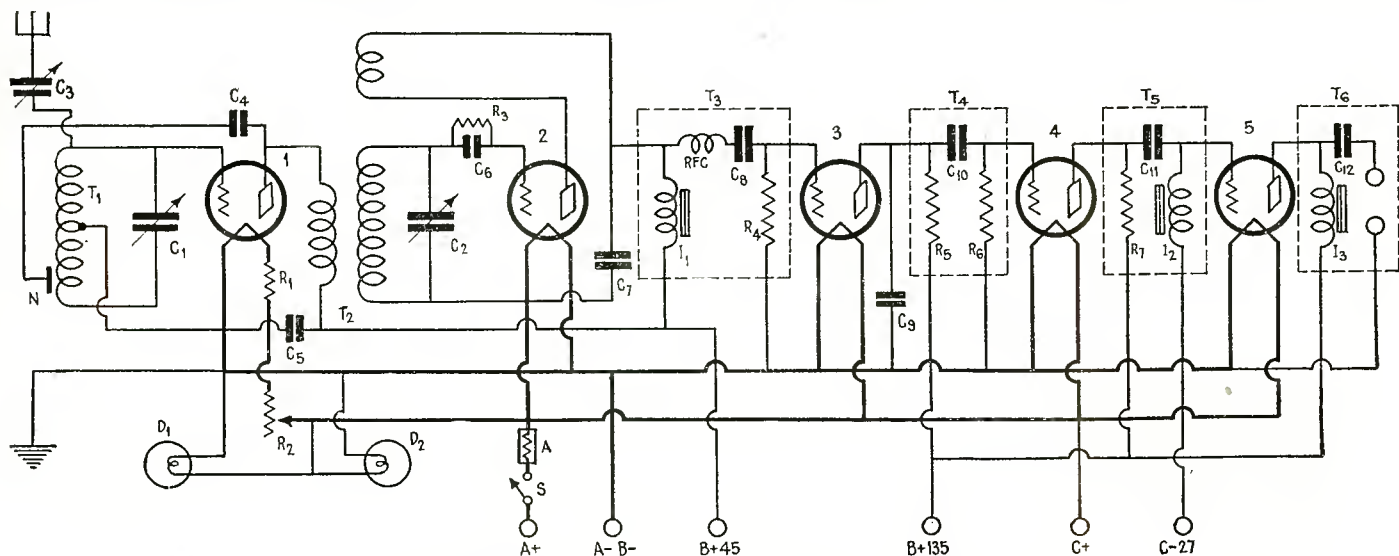
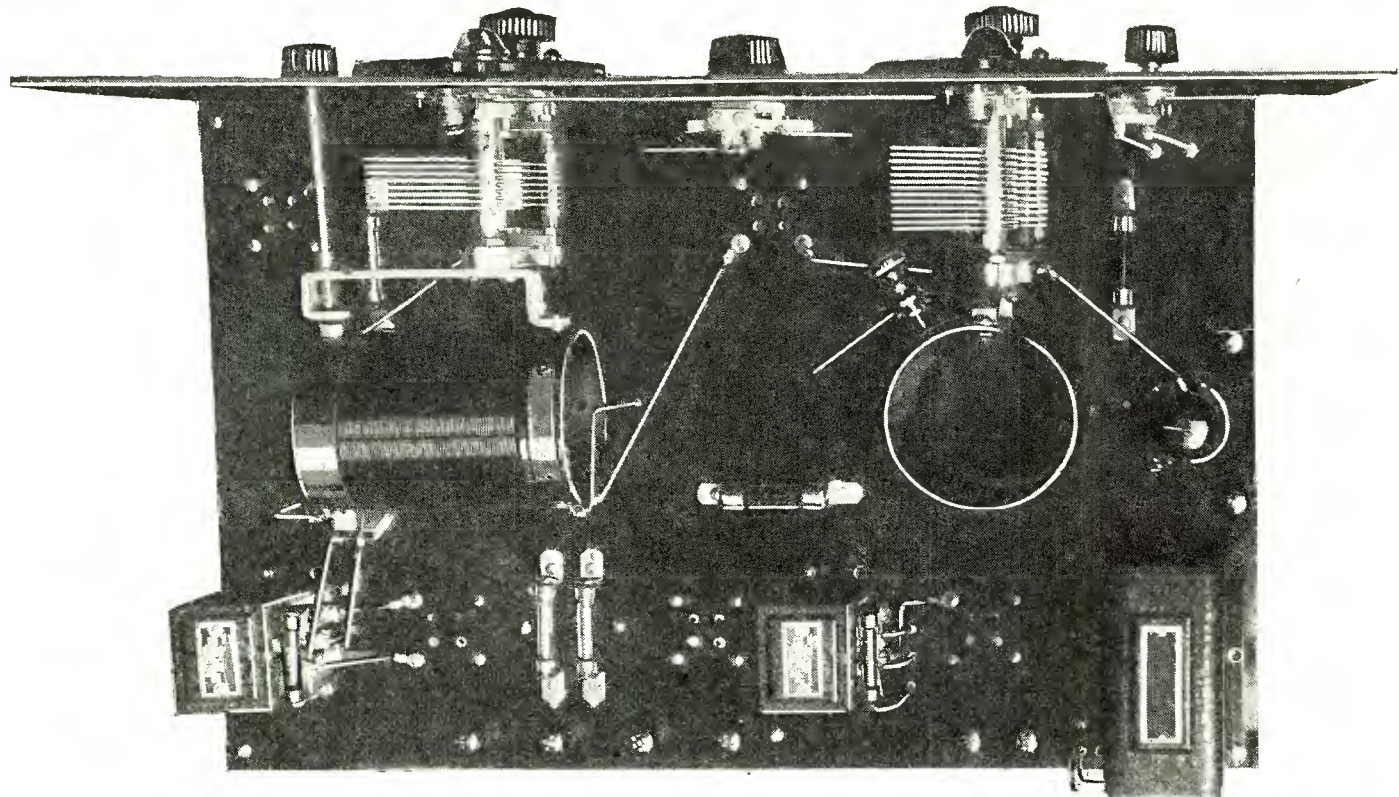


Fig. 1. Schematic diagram of the newly improved Standard Browning-Drake Receiver.

an extremely low minimum capacity as well as almost negligible high frequency resistance. This apparatus was then placed in the layout shown, so that the electrical efficiency would in no way be impaired and, at the same time, the

more selective than other Browning-Drakes previously described. In fact, the selectivity has been increased as much as possible without cutting off side bands which would spoil the quality, due to the fact that the higher

impedance coupling. Consequently, after some experimenting, it was suggested that a combination of resistance and impedance might be the solution of the problem and, at the same time, give the quality of reproduction obtain-



Top view of receiver, showing placing of components on sub-base.

important connections would be as short as possible. Too often is apparatus, such as transformers or other

<sup>2</sup> The coils might be made slightly better by using a form 5 or 6 inches in diameter. This is readily seen to be undesirable as the gain would be slight.

audible frequencies would not be sufficiently amplified. A balancing system is employed which is more nearly constant over the wave band from 200 to 550 meters. The connections are also more convenient when this method, consisting of a disc in proximity to

able with either resistance or impedance. The system was tried out and found to be a step in the right direction. Thus, an audio amplifier, consisting of one stage of impedance, one stage of resistance and a resistance with an impedance leak, is recommended. An im-

provement even in this combination is made by using a radio frequency choke coil and an extra by-pass condenser. This effectually keeps the radio frequency current from entering the audio amplifier.

It will be noted, from the circuit diagram, that a .00007 grid condenser is employed. This was discovered to give about double the signal strength obtainable with the .00025 mfd. condenser which has been customarily used. The mathematical work on the theory of detection leading to this conclusion is a story in itself and will appear in the near future. The mathematical result obtained by Dr. Chaffee and the writer

connections from the tube sockets to their connecting terminals on coils, transformers, condensers etc.

These wires should be made as short as possible, working on the principle that a straight line is the shortest distance between two points.

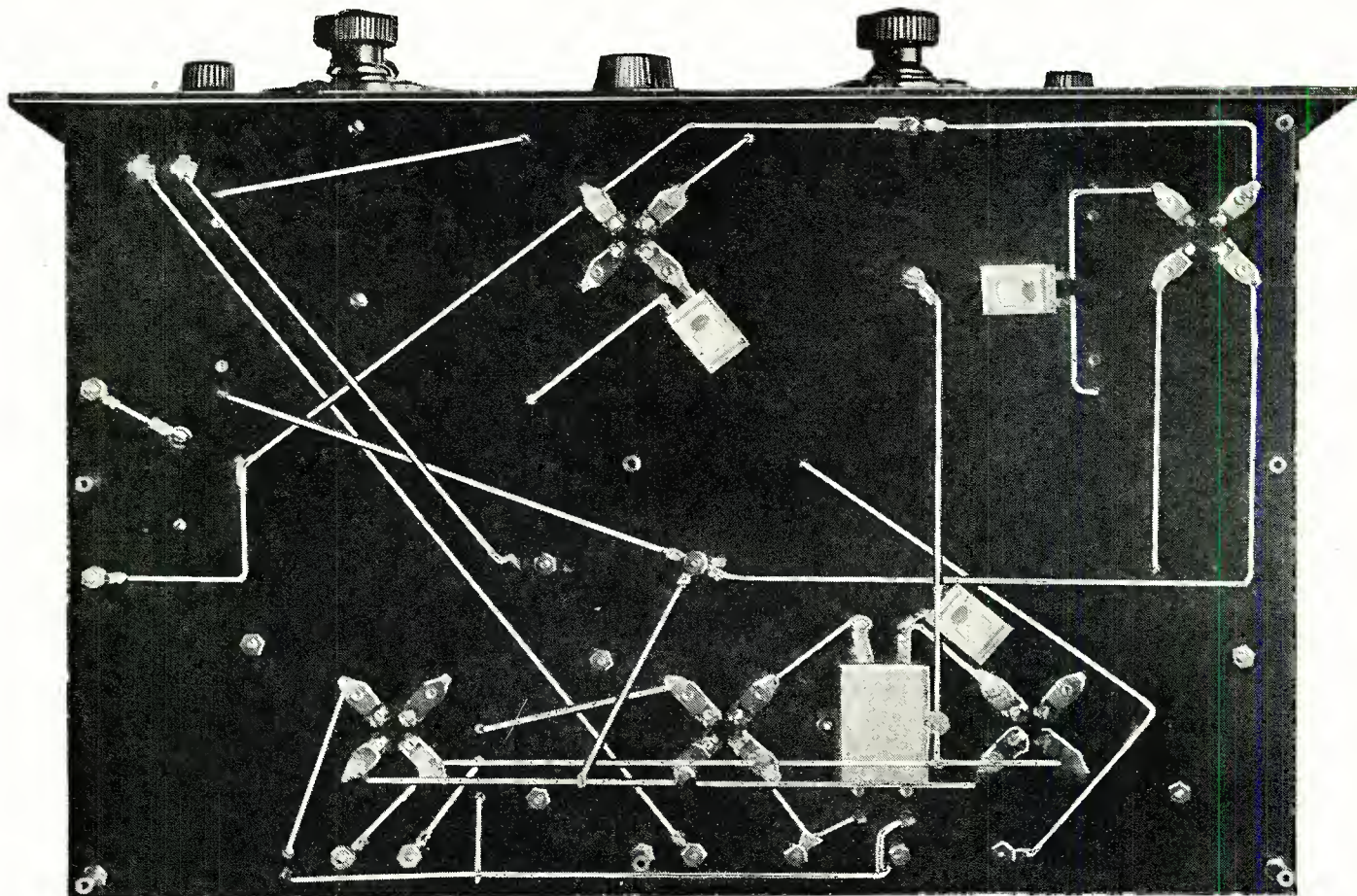
The rest of the wiring for the battery circuits and other parts can then be connected in, following the schematic and the pictorial wiring diagrams.

The receiver is designed for operation with a 6-volt storage battery and either "B" batteries or "B" battery eliminators.

All the tubes except the radio frequency amplifier tube No. 1 are 5-volt

using a CX 300A or CeCo type H tube as the detector. If a 301A type tube is used as a detector, the grid return lead of the detector circuit should be connected with the positive "A" battery lead instead of with the negative side as shown.

With the combination impedance and resistance audio frequency amplification used in this receiver, best results will be attained if the new high mu type tubes such as the CX 340 or CeCo type G tubes are used in the first and second audio stage. A power tube such as the CX 371 or CeCo type J-71 should be used in the last stage. At least 135 volts of "B" battery with



Bottom view of sub-base. Note minimum amount of wire used as well as point-to-point method of connecting.

has been checked by Dr. Drake at Cruft Laboratory.

If the Browning-Drake foundation unit and the other parts specified are used, the construction of the receiver resolves itself into a very simple task.

The panel and sub-panel are furnished already drilled and engraved and with some of the parts such as sockets, resistor clips etc. already mounted. All that is necessary is to mount the remainder of the parts, assemble the panel and sub-panel together and make the connections between the various terminals.

The layout of parts has been taken care of so as to give due regard to the fields of the coils and transformers.

The first step in wiring the receiver should be to make all the grid and plate

tubes. The radio frequency tube used in this receiver is a CX299 tube. This tube has been found to be most desirable in this position because of its overall efficiency as a radio frequency amplifier and also because of the ease with which neutralization may be effected when this type of tube is used. A high filament resistance of 33 ohms is used in its filament circuit to make it possible to operate it on the same "A" battery as the rest of the tubes of the receiver.

An additional rheostat is used in its filament circuit to permit accurate adjustment of the filament temperature of this tube for best results on distant stations, and also to serve as an efficient volume control.

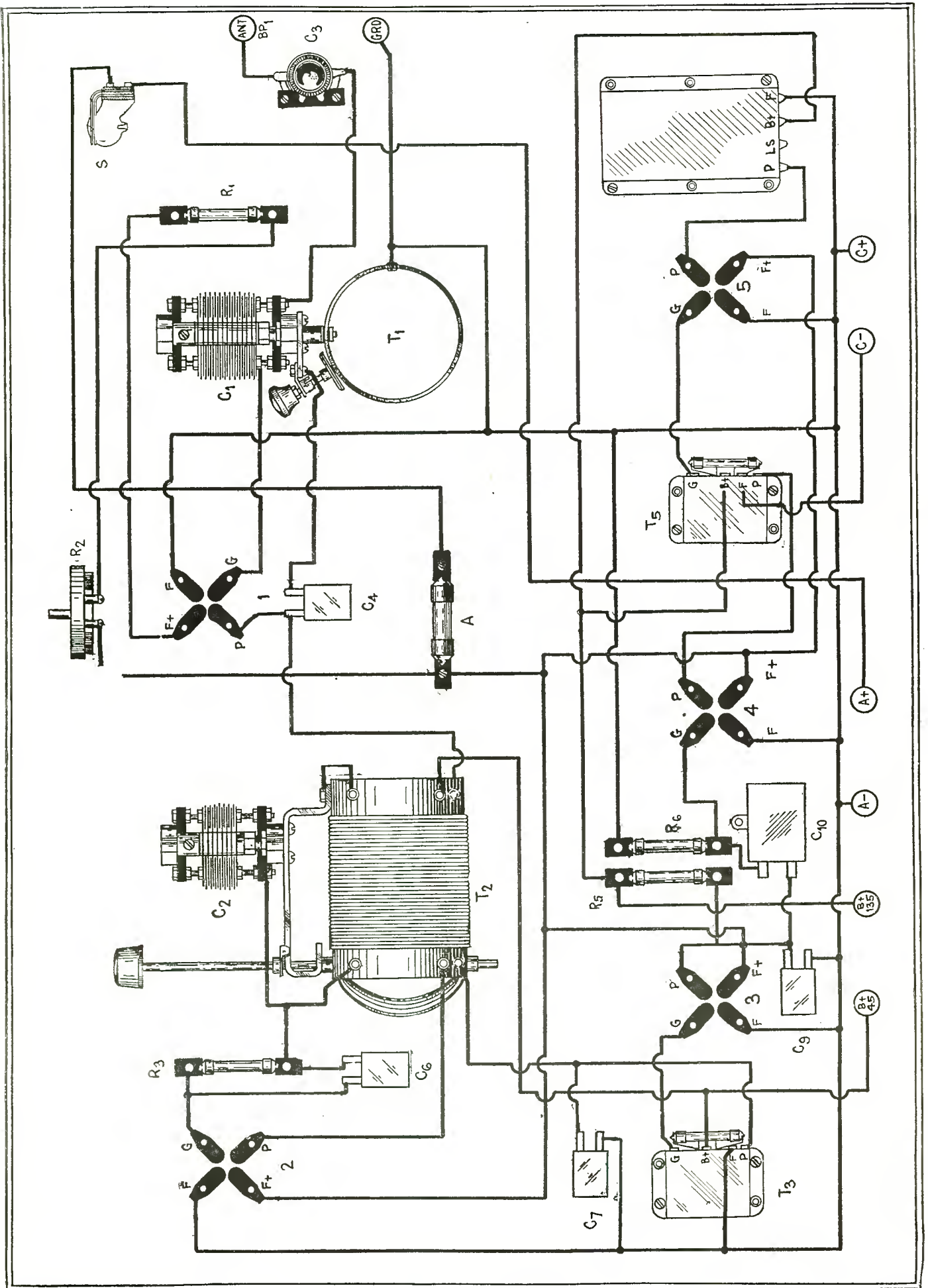
The circuit as shown is designed for

a corresponding "C" battery negative bias of 27 volts should be used with this type of tube. Greater volume can be obtained by increasing the "B" battery up to 180 volts with a corresponding increase of negative "C" bias up to 40½ volts.

When voltages above 135 volts are used, the tone filter, T6, shown in the diagrams is absolutely necessary to protect the loudspeaker windings and to give really faithful reproduction.

While a CX112 type of tube without any tone filter can be used in the last stage, its use is not recommended in view of the better results obtainable with the CX371 type tube.

Any tendency toward "motor-boating" when using the receiver with a "B" battery eliminator may in most



cases be eliminated by using a separate "B" battery to supply the current for the detector tube or by using one high mu and one regular CX 301A tube in the first and second audio stages, changing them around till best results are obtained.

frequency tube, in socket No. 1. To do this, tune in a loud local station and then turn the rheostat off completely, thus turning off the radio frequency tube in socket No. 1. If the station is a powerful local one, it will still be heard in spite of the fact that the radio

intensity of the signal will be affected by a change in setting of dial "D1".

Tuning of the set is a very simple procedure. The first step is to rotate the tickler coil to its maximum position by turning the knob to the right of dial "D2: Then adjust dial "D2" until a whistle is heard. This whistle is caused by the beat note produced by the interaction of the oscillation produced in the detector circuit of the receiver and the incoming carrier wave.

Then turn the rotor back until the whistle disappears and at the same time turn the left-hand dial, "D1" until the signals come in loudest. The two dials and the tickler coil should then be re-adjusted until satisfactory quality and volume is obtained. Effective volume control is obtained by use of the rheostat knob. This controls volume from minimum to maximum without affecting tone quality.

Control of volume by detuning, that is by turning the variable condensers from their best positions causes distortion and loss of quality. It is best therefore to make all adjustments for volume with the rheostat or tickler coil.

This new standardized Browning-Drake receiver is much more selective than any other Browning-Drake receiver ever produced. Its adjustment is therefore slightly more critical than that of previous models and care must be taken in tuning it if best results are to be attained.

While the receiver will give very satisfactory operation on a short indoor or outdoor antenna, best results can only be obtained if a good outdoor antenna having a total length of

**LIST OF PARTS REQUIRED FOR STANDARD BROWNING-DRAKE RECEIVER**

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>1 Browning-Drake antenna coil (T1)</li> <li>1 National .0005 mfd. Equitune Condenser (C1)</li> <li>1 Browning-Drake R. F. transformer (T2)</li> <li>1 National .00025 mfd. Equitune Condenser (C2)</li> <li>2 Illuminated Velvet Vernier Dials, including dial lights (D1; D2; L1; L2)</li> </ul> <p><i>The above parts are contained in the Browning-Drake kit or the National tuning units</i></p> <ul style="list-style-type: none"> <li>1 Browning-Drake drilled and engraved front panel</li> <li>1 Browning-Drake drilled sub-panel, equipped with sockets, resistor clips, soldering lugs, etc.</li> <li>5 Tube sockets (part of sub-panel assembly) (1; 2; 3; 4; 5)</li> </ul> <p><i>The above parts are contained in the Browning-Drake foundation unit</i></p> <ul style="list-style-type: none"> <li>1 Browning-Drake 33 ohm Resistance cartridge (R1)</li> <li>1 Browning-Drake Balancing or Neutralizing Device (N)</li> <li>1 National first stage Impedformer equipped with special R. F. Choke</li> </ul> | <ul style="list-style-type: none"> <li>coil, Impedance, Lynch resistor and fixed condenser (T3)</li> <li>1 National third stage Impedformer equipped with Impedance, fixed condenser, and Lynch resistor (T5)</li> <li>1 National Tone Filter, equipped with choke and fixed condenser (T6)</li> <li>1 Precise midget variable condenser, .0001 mfd. (C3)</li> <li>1 Yaxley battery switch (S)</li> <li>1 Yaxley 30-ohm rheostat (R2)</li> <li>1 Amperite No. 5A (A)</li> <li>3 Tiny Tobe .001 mfd. fixed condensers (C4; C7; C9)</li> <li>1 Tiny Tobe .00007 mfd. fixed condenser (C6)</li> <li>1 Tobe, 1 mfd. bypass condenser (optional; not shown on layout) (C5)</li> <li>1 Tobe special .1 mfd. fixed condenser (C10)</li> <li>8 Eby binding posts, marked respectively: "ANT"; "GND"; "B AMP+"; "B DET+"; "-A BAT -B"; "A BAT+"; "C BAT+"; "C BAT-" (BP1; BP2; BP3; BP4; BP5; BP6; BP7; BP8)</li> <li>1 Electrad, 8-megohm resistor (R3)</li> <li>1 Electrad, .1-megohm resistor (R5)</li> <li>1 Electrad, .25 megohm resistor (R6)</li> </ul> |
|--|---|

After the set is completely wired, the first step should be to check over the wiring carefully to make sure that there are no mistakes in the connections. No matter how careful you have been in wiring the receiver, you will find it to your advantage to check the set over and play safe.

Then you can connect up aerial, ground, batteries and loudspeaker. Turn on the battery switch and test across the socket filament terminals to make sure that the voltage applied across the filament terminals is six volts or lower. It is easier to do this than to replace a whole set of tubes.

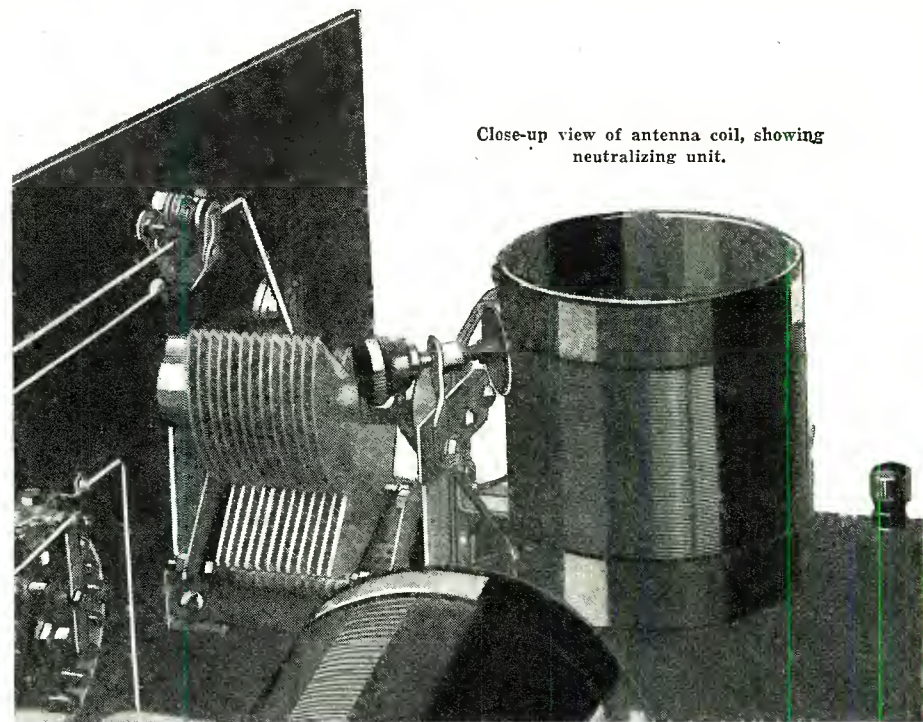
You can then proceed to insert the tubes in their sockets. The CX 299 tube should be inserted in socket No. 1; the CX 300A or CeCo type H, in socket No. 2; the CX 340 or CeCo type "G" in sockets numbers 3 and 4 and the CX 371 or CeCo type J-71 in socket 5.

With the battery switch and rheostat turned on, and the tickler coil turned all the way up, a "plop" should be heard on touching the grid terminal of transformer "T2" with your finger. This is a test for oscillation in the secondary of the radio frequency transformer. With the tickler coil set in this position, whistles should be heard as dial "D2" is turned through its range, provided of course that a station within range is broadcasting.

The next step is to balance the radio

frequency tube is turned completely off.

The balancing condenser, "N", should then be adjusted until a point is reached when the signal is at its



Close-up view of antenna coil, showing neutralizing unit.

faintest. When this is accomplished, a change of setting in dial "D1" should not affect the pitch of the whistle obtained in detector circuit although the

about seventy feet or more is used.

DX reception over distances of more than 1,000 miles cannot be expected  
(Continued on page 151)

# Building the Loftin-White Constant-Coupling Receiver

By JOSEPH CALCATERRA

EVER since the tuned radio frequency type of radio receiver came to the fore several years ago, determined efforts have been made to eliminate some of its troublesome features and develop it to the nearest approach to perfection in the line of radio receivers.

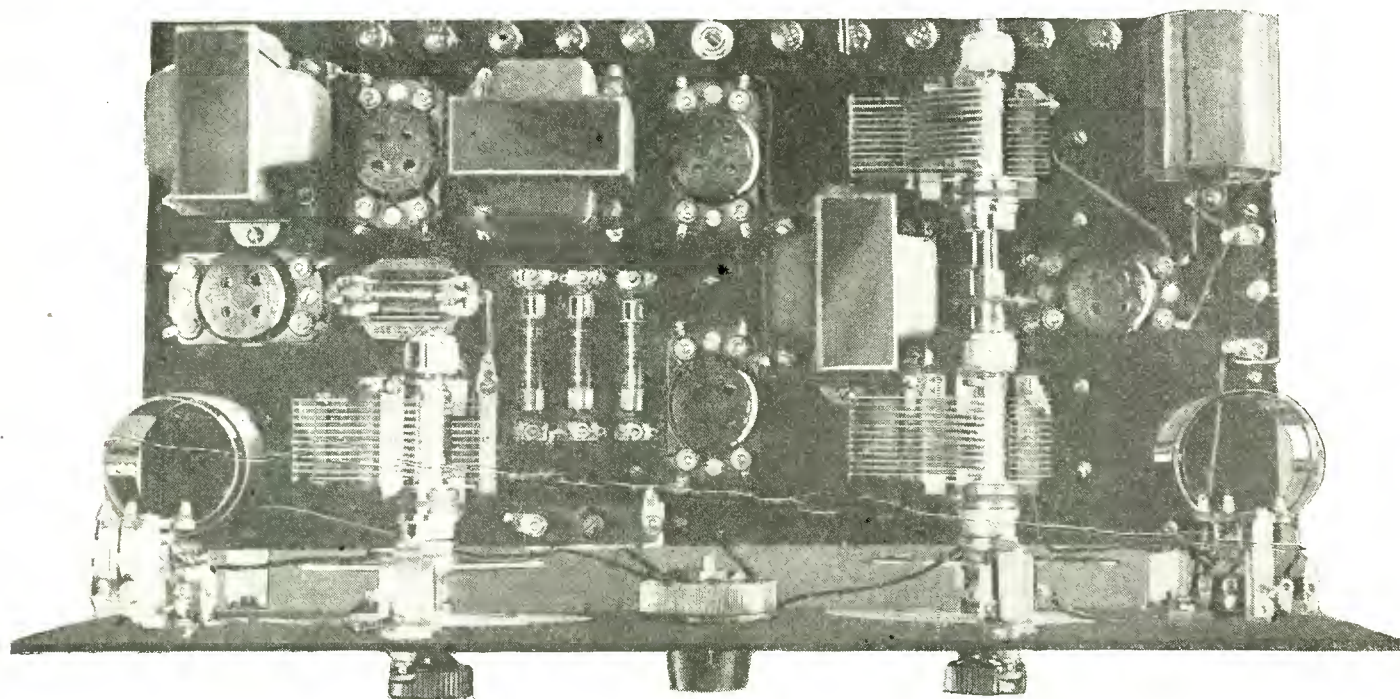
With the possible exceptions of the regenerative type of receiver and the super-heterodyne no other general group of circuits have ever enjoyed the

popularity of the tuned radio frequency type of circuit. They did not, however, really solve the problem of producing equal amplification over the whole wavelength range without distortion caused by operating the receiver too close to the oscillation point.

Many methods have been tried to overcome this regrettable tendency of the tuned radio frequency circuit to

activity drop off as the wavelength is increased so that by the time the higher wavelengths (lower frequencies) are reached the amplification (sensitivity) and selectivity is far from satisfactory, although it still remains better than was obtainable with the ordinary detector and regenerative types of detectors previously used.

In considering the practicability and desirability of a home-built receiver from the standpoint of the constructor and operator, it is well to keep in mind, the characteristics which such a receiver should possess.



View looking down upon the Loftin-White Receiver, showing harmonious arrangement of components.

popularity of the tuned radio frequency type of circuit.

Both the regenerative circuit and the super-heterodyne circuit are all right in their way, but neither can compare with the tuned radio frequency type of receiver for general all-around results, selectivity, high amplification, ease of operation and ease of assembly.

The greatest difficulty with which radio engineers have had to cope in designing a really efficient type of tuned radio frequency receiver has been the tendency of this circuit to operate more efficiently at one end of the broadcast wavelength band than at the other end. It has been found that while this type of receiver will operate very efficiently at the lower waves, between 200 and 250 meters, its amplification and selec-

tion drop off as the wavelength is increased so that by the time the higher wavelengths (lower frequencies) are reached the amplification (sensitivity) and selectivity is far from satisfactory, although it still remains better than was obtainable with the ordinary detector and regenerative types of detectors previously used.

The various means adopted, such as the use of potentiometers in the grid circuits of the receiver; high resistances in the plate circuits to reduce the "B" battery voltage at the lower wavelengths; variation of coupling between the primary and secondary coils of the radio frequency transformers to reduce the coupling at the lower wavelengths and increase it at the high wavelengths; neutralization of tube capacities, etc., all helped in their way and improved the original, simple tuned radio fre-

quency circuit. They did not, however, really solve the problem of producing equal amplification over the whole wavelength range without distortion caused by operating the receiver too close to the oscillation point.

From the standpoint of the builder and operator, a receiver that requires special apparatus to build and adjust it and which requires considerable skill to operate it, is certainly out of the picture, no matter how efficient it may be when once it is in proper working condition.

The present conditions of broadcasting with its crowding of stations make it imperative that a receiver be extremely selective, but not at the expense of sacrificing quality by reducing coupling between primary and secondary windings or by using so much regeneration that the sidebands necessary to produce quality are eliminated.

The wide broadcast wavelength band of from 200 to 550 meters must be covered in such a way as give equal

amplification and selectivity over the whole wavelength range so that full advantage may be taken of the high quality programs broadcast alike from

To this task, Mr. Edward H. Loftin brought many years of experience in the practical and theoretical aspects of radio, backed with his knowledge of

tively, transfer of energy will be greatest at the lower wavelengths and least at the higher wavelengths.

This can be demonstrated very clear-

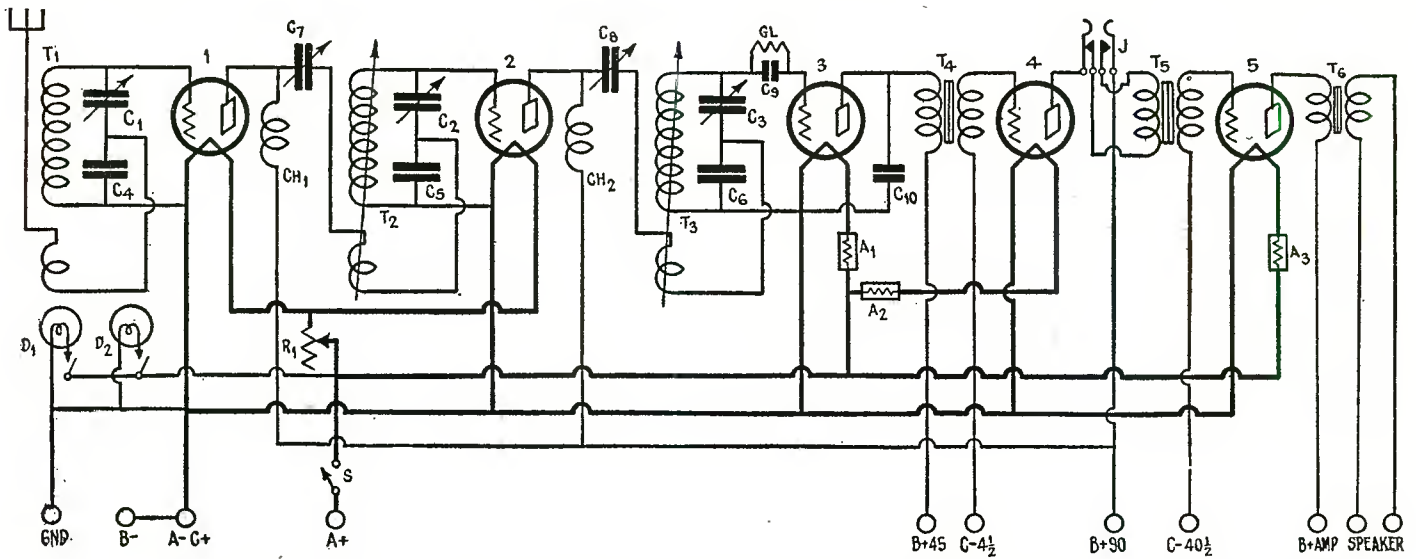


Fig. 1. Schematic diagram of the Loftin-White Receiver. Despite the apparent complexity of this circuit, it is easy to build and simple to operate. It is a very efficient circuit.

both high wavelength and low wavelength stations.

Real quality reproduction with even, accurate control of volume from a whisper to a shout must be provided

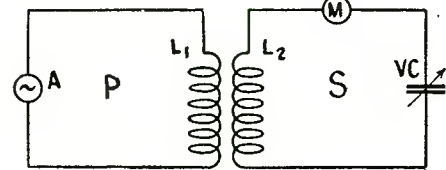


FIG. 2

to fit the volume to the room and mood. Provision for the use of headphones, or power amplifier is desirable but

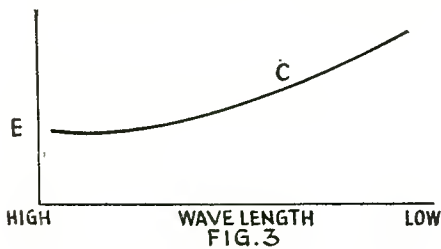


FIG. 3

means must be provided to connect the loudspeaker for maximum volume with suitable volume regulation without having to move the speaker connection from stage to stage.

These are the characteristics which Messrs. Loftin and White kept in mind in their search for the solution to the problem of a circuit which would be easy to build and operate and which would combine with these characteristics, circuit principles which would give true tone quality and equal amplification over the whole wavelength range.

circuits and patents while acting as officer in charge of the radio patent and research section of the United States Navy and later as a consulting engineer, in private practice.

Mr. S. Young White, who collaborated with Mr. Loftin in the design of this really remarkable receiver has been intimately connected with the develop-

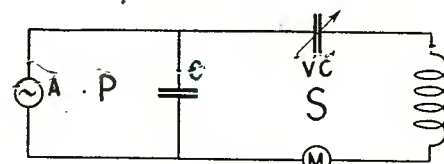


FIG. 4

ment and application of radio theories for the past fifteen years and has done much in the development of component parts of radio receivers to perfect an assembly to work together in perfect harmony.

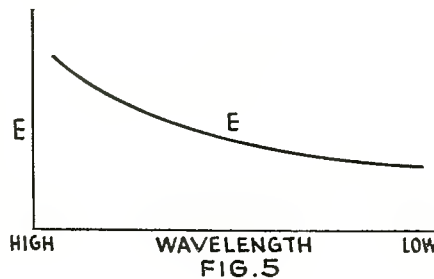


FIG. 5

A glance at the schematic wiring diagram of the receiver Fig. 1 will show the difference between this type of circuit and the ordinary type of tuned radio frequency receiver.

It is a well-known fact that when two circuits are coupled together induc-

ly experimentally by setting up a simple inductively coupled system such as that shown in Fig. 2. This arrangement consists of a primary circuit "P" with a source of high frequency current "A"

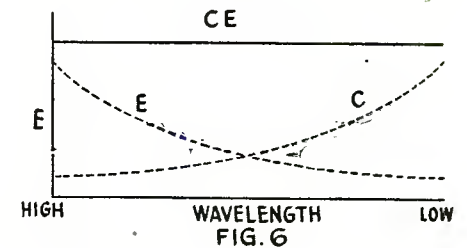


FIG. 6

provided by an oscillator. The secondary circuit "S" is tuned to the frequency or wavelength of the current in the primary circuit "P" by means of a variable condenser "VC." A measuring instrument "M" is used to record

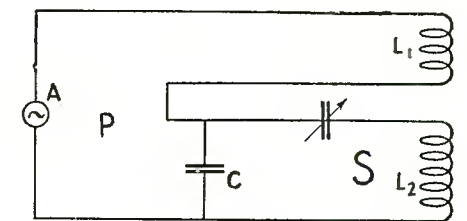


FIG. 7

the energy in the secondary circuit at various wavelengths or frequencies.

The results of the measurements are used to make the chart shown in Fig. 3 which gives the relative energy transfer for the inductively-coupled system from low to high wavelengths. It is easily seen that the response is comparatively great at the low wavelengths and decreases as the wavelength is increased.

When a capacitively-coupled system, such as shown in Fig. 4 is used, the effects obtained are just the opposite to those obtained with the inductively-coupled system. In the case of the capacitively-coupled system, the en-

evolved which will add the two effects, thus obtaining equal energy transfer or amplification over the whole wavelength range. By combining the two curves of Figs. 3 and 5 as shown in Fig. 6 we get a curve "CE" which is

to obtain the effect shown graphically in Fig. 6. The result of research work along this line was the coupling system shown in simplified form in Fig. 7. As can be seen, the system is a combination of inductive and capacitive coupl-

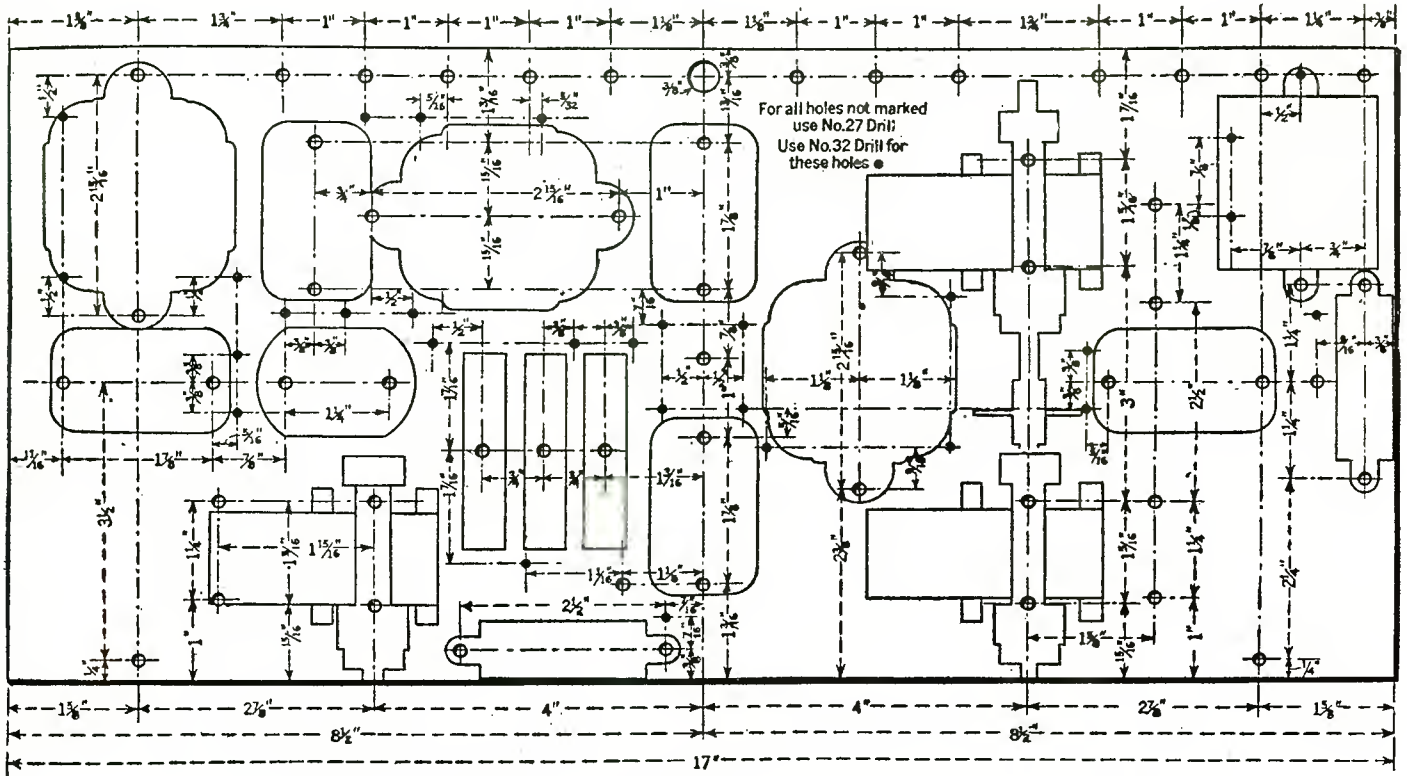


Fig. 8. Sub-panel layout, with dimensions given for drilling mounting holes for all component parts.

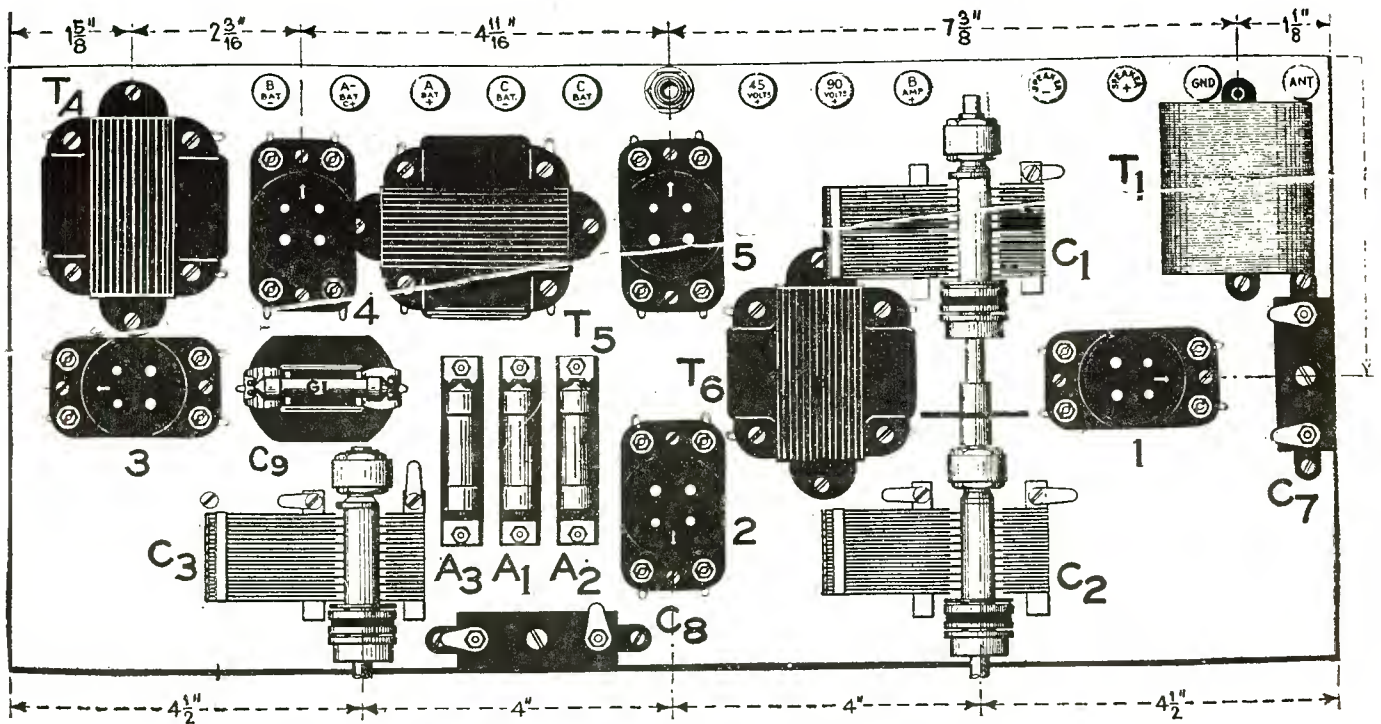


Fig. 9. Top view of sub-panel with all parts mounted in correct places.

ergy transfer is lowest at the low waves and increases to the high point at the high waves.

It is logical to assume that by combining the good qualities of the two coupling systems, a system can be

the sum of the two previous curves, giving a straight line which denotes equal energy transfer or amplification over the whole wavelength range.

The problem then was one of designing a combination coupling system

ing. The inductance coupling between the primary circuit, "P" and the secondary circuit "S" is obtained by placing coils "L1" and "L2" in inductive relationship with each other. The capacitive coupling is obtained by using

the capacity "C" to couple the two circuits together. Tuning is accomplished with the variable condenser.

The next step consisted in applying

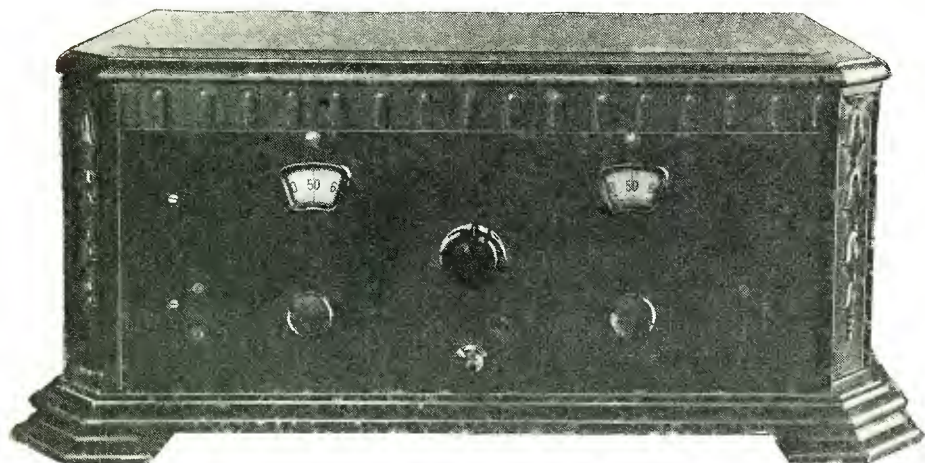
The same coupling arrangement is used between the first and second radio frequency stages and between the second radio frequency and detector stage,

tion; conditions very common in the usual tuned radio frequency circuits.

The coupling system between the second radio frequency stage and the detector is a duplicate of the system used between the first and second radio frequency stages.

The first stage is tuned by means of variable condenser "C1". The second stage is tuned by variable condenser "C2" and the detector stage is tuned by variable condenser "C3." Condensers "C1" and "C2" are ganged together. Due to the fact that they must be insulated from each other because of the circuit characteristics, a two-gang condenser of the type having a common rotor cannot be used. Two individual condensers are used and the shafts are connected together by a flexible insulating coupling.

The controls for operating the receiver are very simple. They consist merely of two tuning dials and a rheostat knob. The rheostat, "R" adjusts the sensitivity and volume. The use of a rheostat for controlling volume gives very good results in the radio frequency circuits but should never be used for controlling volume by reducing the cur-

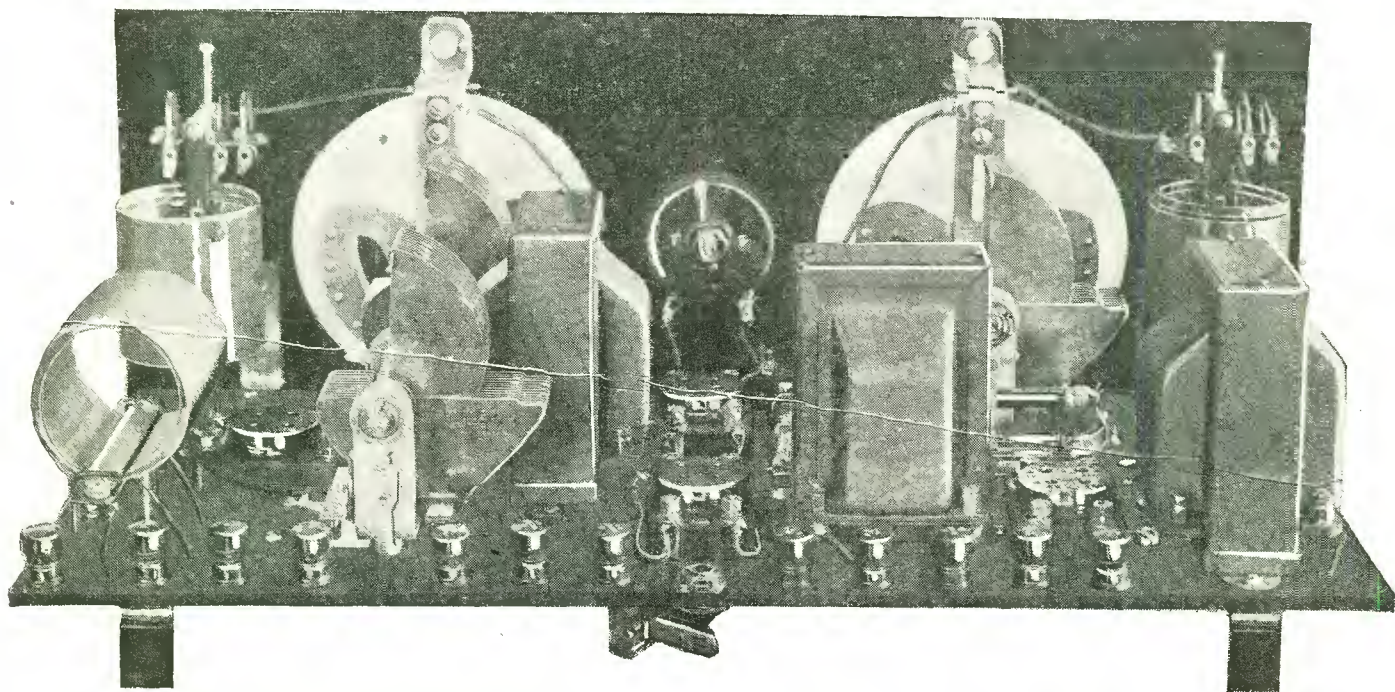


Front view of completed receiver. Note extreme simplicity of panel.

this coupling system to a tuned radio frequency type of circuit.

The similarity between the circuit shown in Fig. 7 and the antenna circuit of the schematic wiring diagram

except that here we have two other important features; the use of a choke, "CH1" for placing the proper positive "B" potential on the plate and the use of a phase-shifting condenser "C7" to



Rear view of the receiver. The out-put transformer is on the right, between the stators of the two ganged condensers.

is easy to see. In the schematic wiring diagram, oscillating energy is present in the circuit in the form of intercepted radio waves. The primary coil of transformer "T1" corresponds to primary coil "L1" of Fig. 7; the secondary coil corresponds to coil "L2" of Fig. 7; the coupling condenser "C4" corresponds to coupling condenser "C" in Fig. 7 while the variable tuning condenser "C1" corresponds to the variable tuning condenser of Fig. 7.

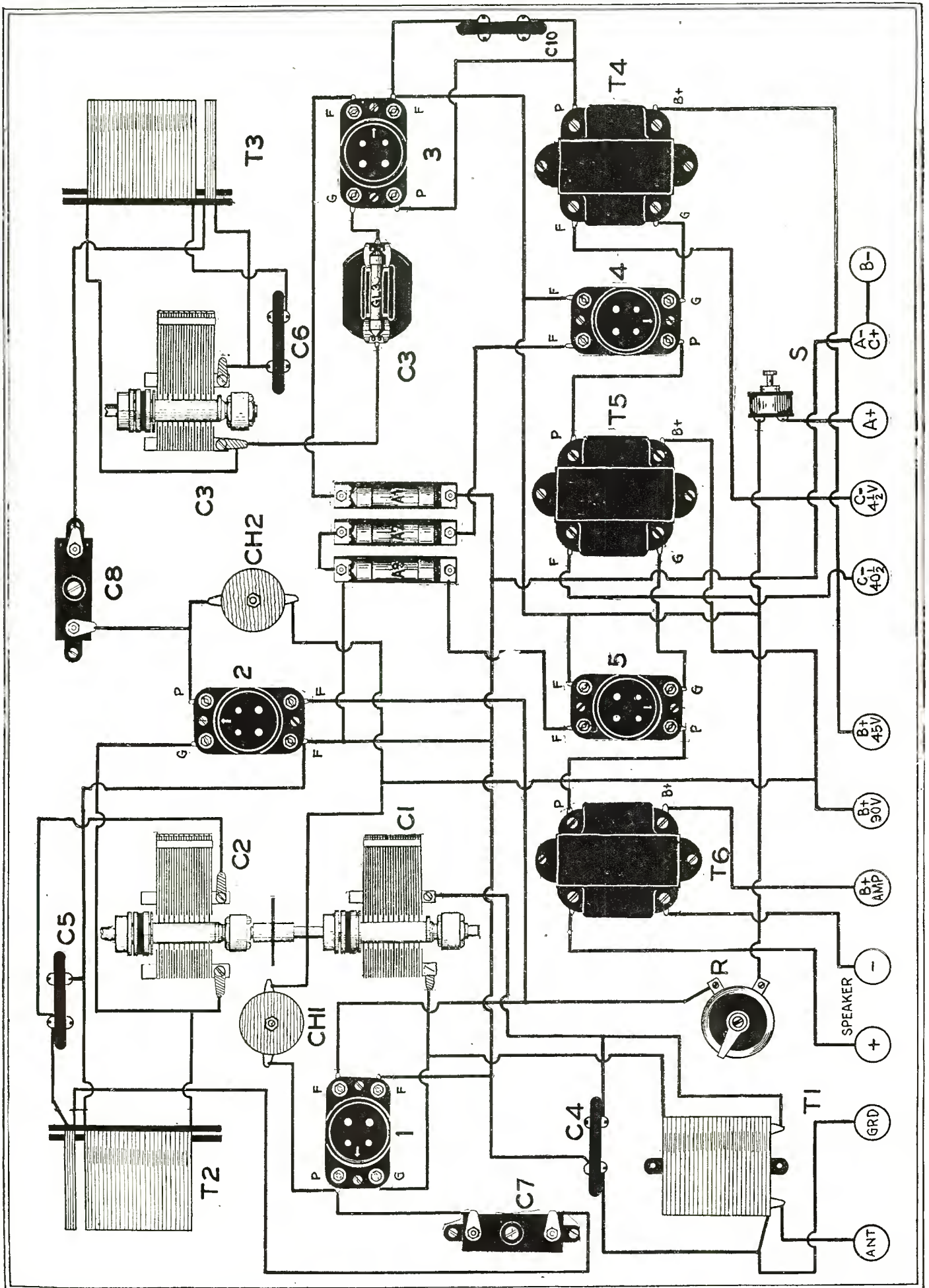
shift the phase of the radio-frequency alternating current in the plate circuit, so that any feedback that may occur from the plate, to the grid circuit of that tube, will be out of phase with the same frequency in that grid circuit. When sufficiently out of phase, it will not add itself to the grid frequency to build up an amplitude out of proportion to the other broadcast frequencies in the grid circuit. It thus effectively prevents signal distortion and oscilla-

rent flow thru the filaments of the detector or audio frequency tubes.

Amperites are used in the filament circuits of the detector and audio tubes and serve to keep those tubes operating at maximum efficiency without any necessity for manual control.

"DL1" and "DL2" are the dial lights which serve to illuminate the tuning dials. The switches for these lights are self-contained in the dial assembly.





A jack "J" is provided in the plate circuit of the first stage audio tube so that a pair of phones, loudspeaker or power amplifier can be connected in this stage if desired. An output transformer "T6" is used to couple the loudspeaker to the output of the last

Before assembling the parts, it is a good plan to check up each part for possible mechanical defects, short circuits or open circuits. It takes but a short time to make this preliminary inspection and will save much time later.

After this is done mount the two variodensers (variable small capacity condensers). Also mount the three Amperites on the sub-panel. Next mount the jack, and the binding posts as indicated.

Remove the single hole mounting

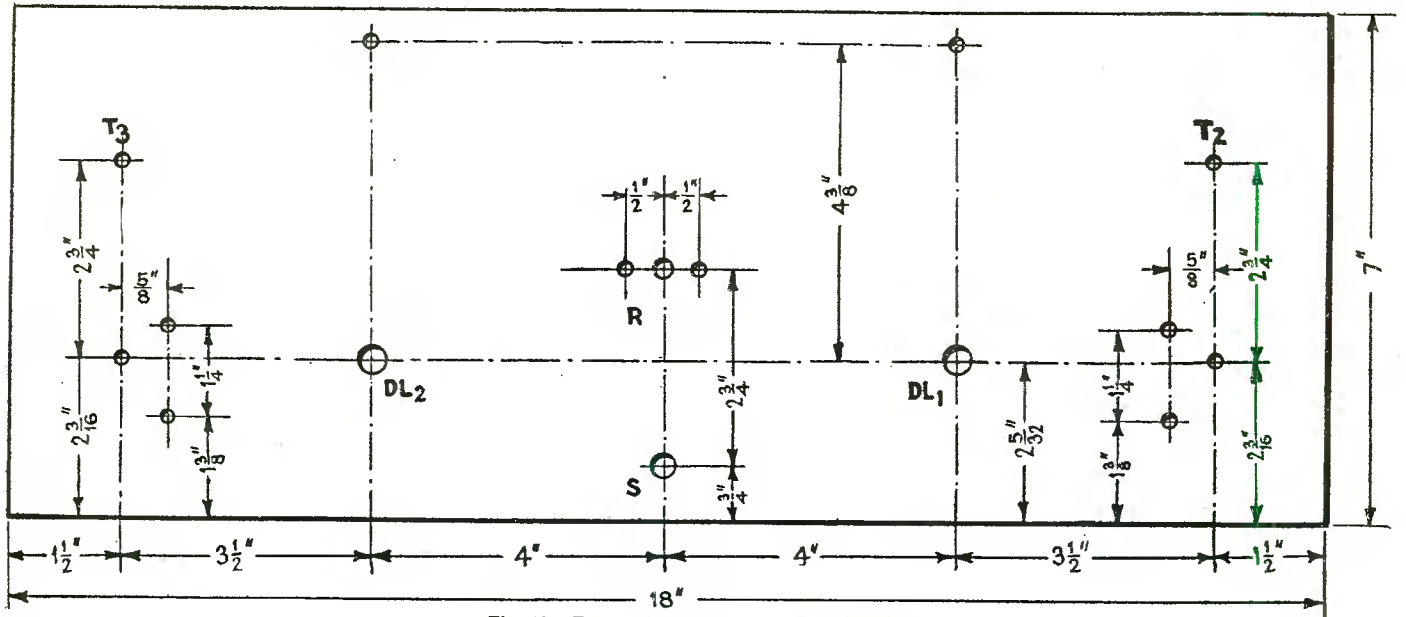


Fig. 10. Front panel layout drilling template.

audio stage. This output transformer prevents loudspeaker winding burn-outs. The use of a power tube with its corresponding high voltage "B" battery makes the use of this type of output transformer necessary.

The first step in building the receiver is naturally that of obtaining the necessary parts. This need not be a hit or miss procedure, merely selecting the parts haphazardly and trusting to luck

The parts should be mounted on the panel and sub-panel in the following order. If these directions are followed the set will go together without any trouble.

First mount the rheostat. Then mount the battery switch.

Next mount the two illuminated condenser dials. The rear mounting bracket, used with some types of condenser is not necessary in this case and

nuts and the mounting screws from the variable condensers. Mount the single condenser on the back of the dial as shown.

Now continue with the mounting of the two audio transformers.

Next proceed to connect the remaining two variable condensers together with the insulating condenser coupling and mount the condensers in place on the dial and sub-panel.

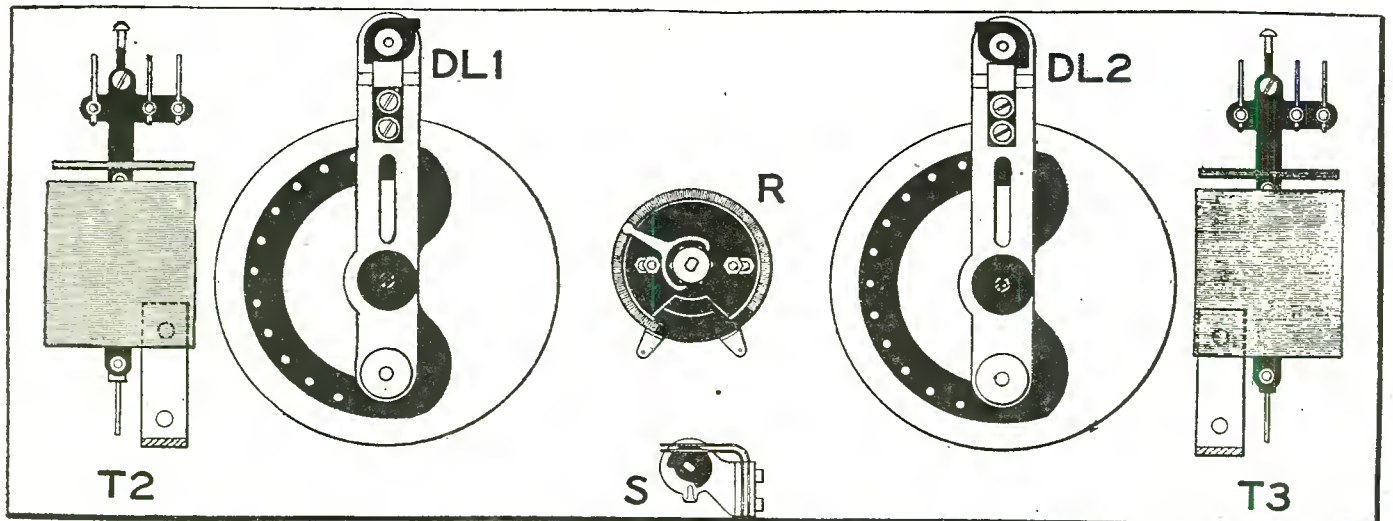


Fig. 11. Diagrammatic layout showing position of coils, condensers, rheostat and filament switch on front panel.

that they will work together. The Loftin-White receiver has been worked up by a group of manufacturers who have manufactured special parts where necessary to form a complete kit which is sure to work right when assembled.

The list of parts actually used in the receiver are given in this article.

should be removed. Complete details for mounting the dials are included in the booklet of instructions furnished with them.

Now mount the sockets in the positions shown being careful to place the socket terminals in the positions shown in the layout.

Then mount the choke coils, and the rest of the small parts such as fixed condensers, grid leaks, etc.

The coils can now be mounted provided very good care is taken not to damage them in wiring the receiver, otherwise it is best to do all the wiring possible before mounting the coils.

(Continued on page 139)

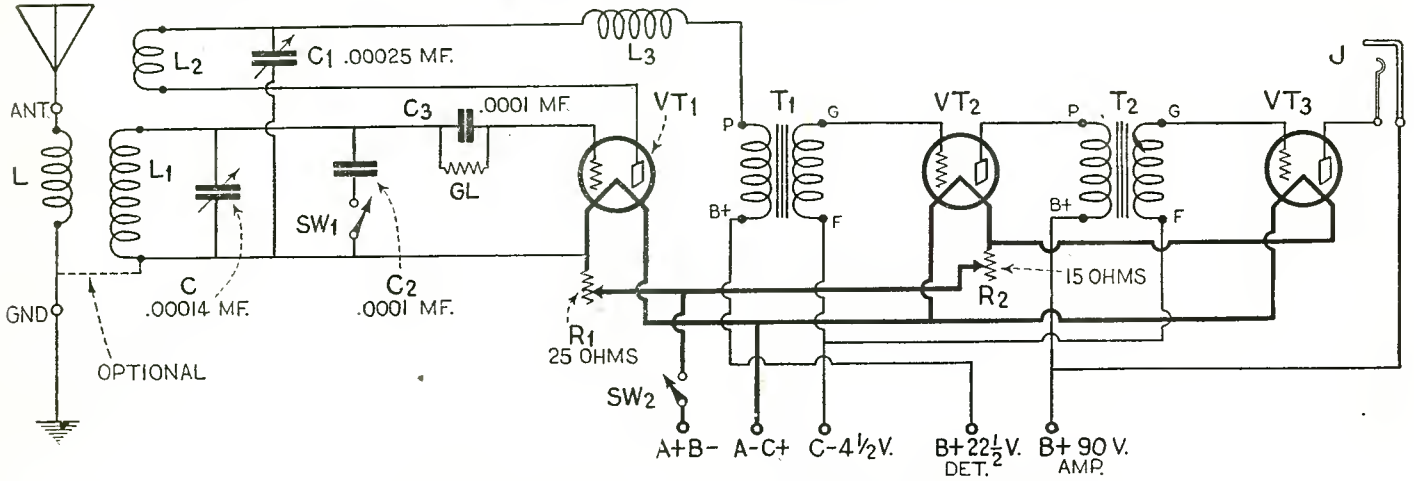
# A 13 to 735 Meter Universal Receiver

## Description of a Three-Tube Set for the Reception of Broadcasting on Both Regular and Short Wavelengths

THERE has lately been a great deal of interest shown on the use of sets built to receive the radio broadcasting on the ultra-short waves of from 13 meters up, but little information relative to receivers of this type can be found in publications devoted to the radio broadcast listener. True,

receiver does not permit of much flexibility as regards wave bands. For this reason the broadcast listener is generally forced to stay up on the band between 220 and 550 meters, and cannot enjoy the freedom from interference and the remarkable clarity of the lower wave signals. Building a re-

ceiver of very efficient electrical design. It covers the entire broadcast band as well as going down to 13 meters. As there are many U. S. and Continental stations which broadcast simultaneously on regular as well as short waves, a set of this type will prove a revelation to the fan who has



Schematic wiring diagram of the 13 to 375 Meter Universal Receiver.

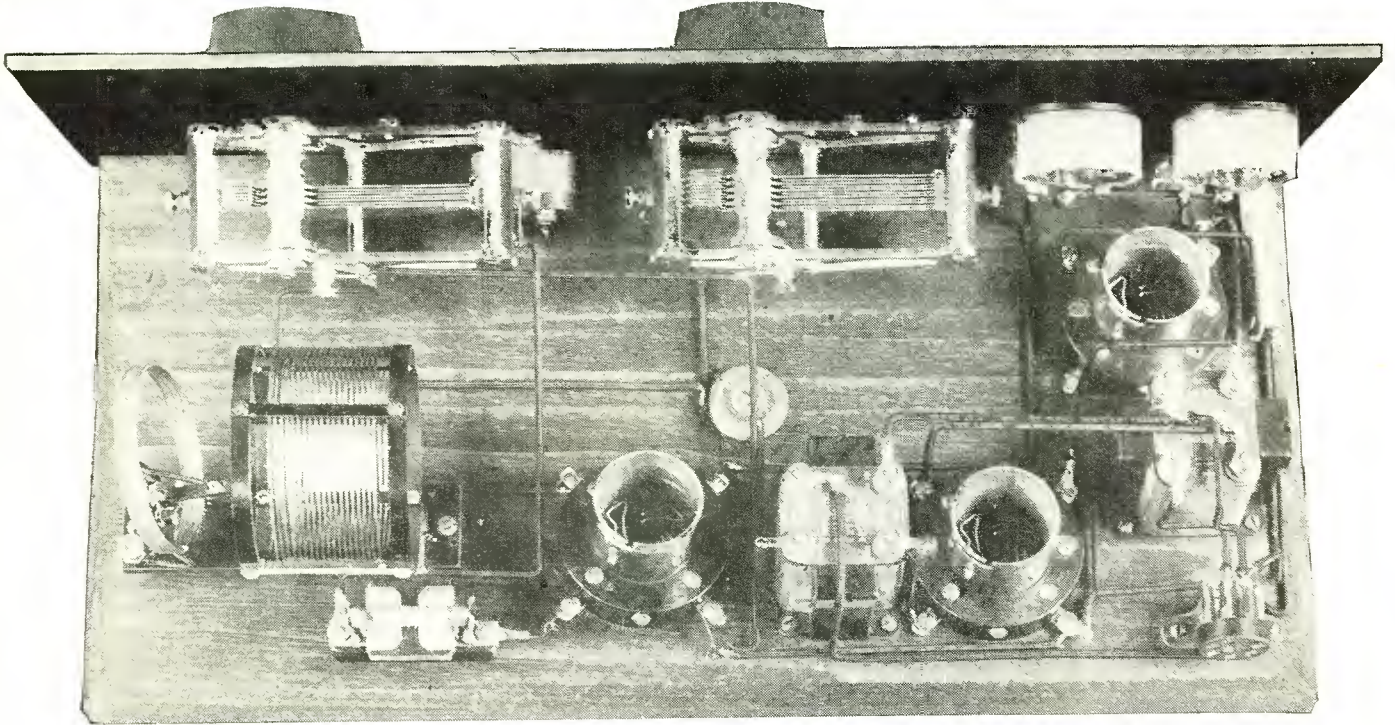
in the more technical publications devoted to amateur radio, sets of the short wave type receive their due share of publicity. This information, however, while available for broadcast

receiver of this kind is not at all difficult, however, contrary to the general belief which exists in that direction.

The circuit used in this receiver is one which has stood the test

to content himself with waiting until nearby locals shut down before going after distance.

The reader is cautioned that any change in the use of parts other than



A top view of the set described herewith. The set photographed above is not provided with the special shaft fixed condenser  $C_2$  for reaching the higher wavelengths with the Aero INT No. 5 coil.

listeners is generally of such a technical nature that it would be incomprehensible to him.

The average radio broadcast re-

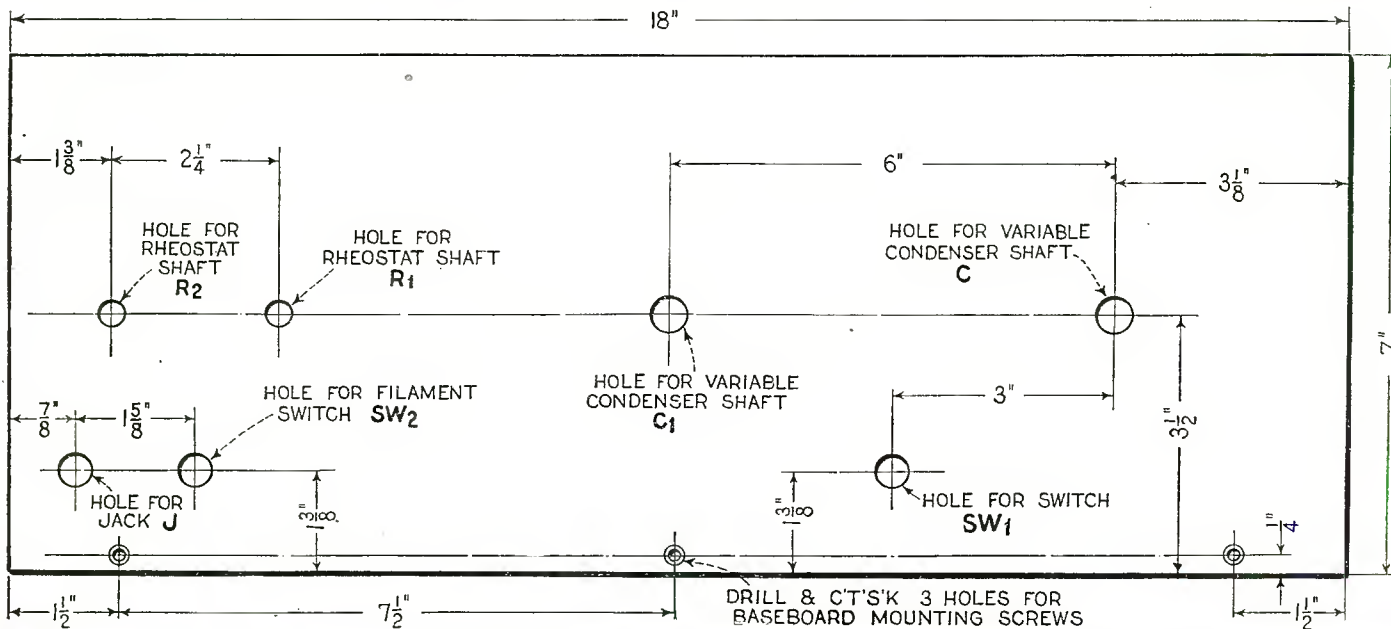
ceiver of this kind is not at all difficult, however, contrary to the general belief which exists in that direction. The circuit used in this receiver is one which has stood the test

those mentioned is at his own risk. Of course, if the builder does not desire to utilize transformer coupled audio frequency and desires to employ

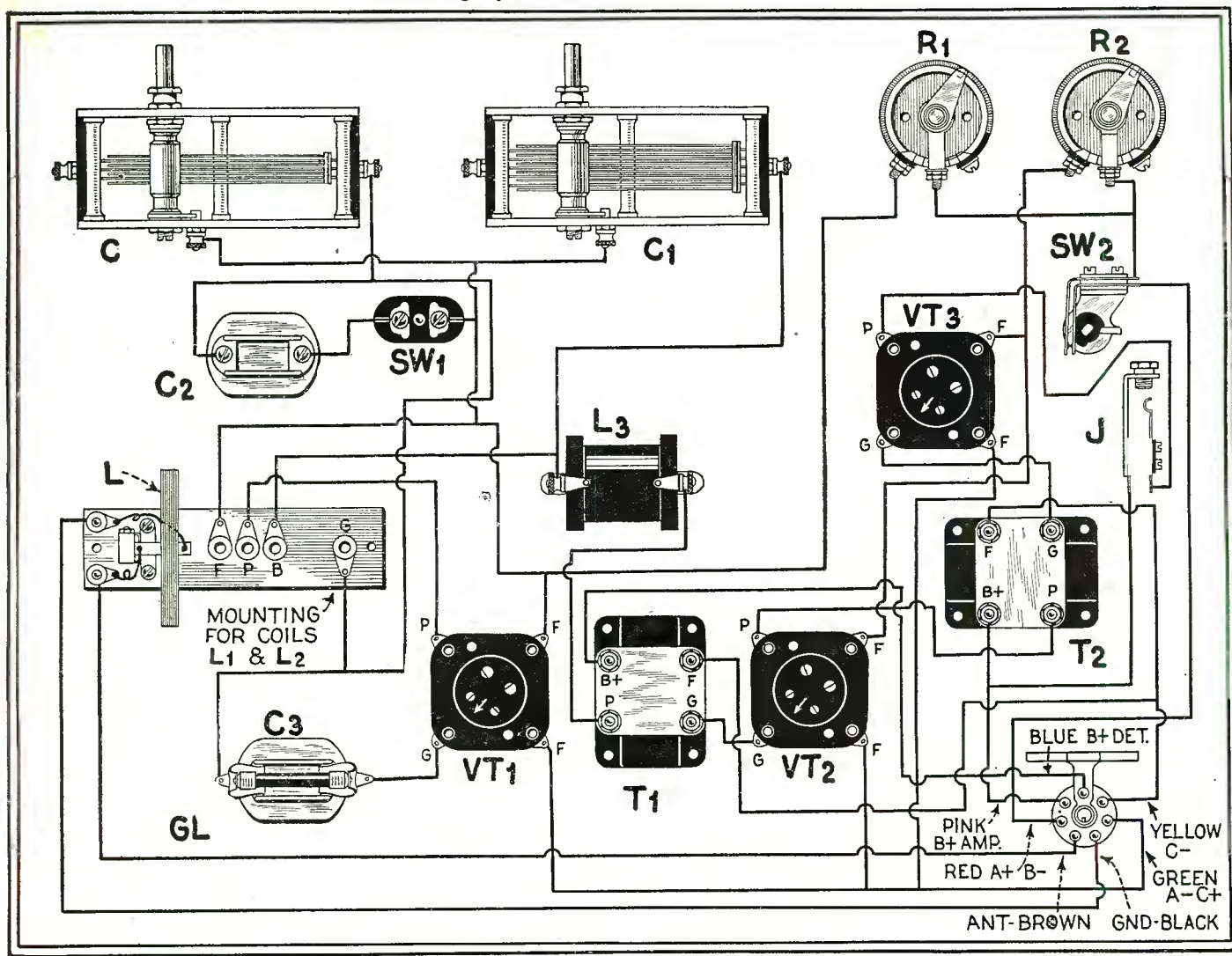
resistance or impedance coupled, that may be done with fair safety, but even that is not to be strongly advised.

It will be noted that in the back account of the microphonic effect due to jarring, which proves very noticeable on the shorter waves. Also, a later improvement, not shown in the

ing the builder to reach the wave band up to 735 meters when using the Aero Int. No. 5 coil. This will allow the builder to get a number of the foreign



Panel drilling layout of the receiver described in this article.



Picture wiring diagram of the 13 to 735 meter Universal set.

panel view of the receiver shown UV sockets were used. It will be found far more desirable to employ standard UX cushion type sockets, however, on

photo, includes the use of a shunt .0001 mfd. fixed condenser across the secondary condenser, enabling the use of fewer sets of coils, as well as allow-

broadcasters operating between the wave bands of 500 and 730 meters. It is important, however, that the con- (Continued on page 174)

# A Constant Voltage "B" Eliminator

Author Gives Data on  
"Motorboating"—How  
to Eliminate It and  
Other Troubles

By McMURDO SILVER

THOUSANDS of "B" power supply units have been put in service within the past year and a half. This thought is interesting, for it indicates the rapidity with which constant "B" power supply units have gained a permanent place in the American radio equipped home.

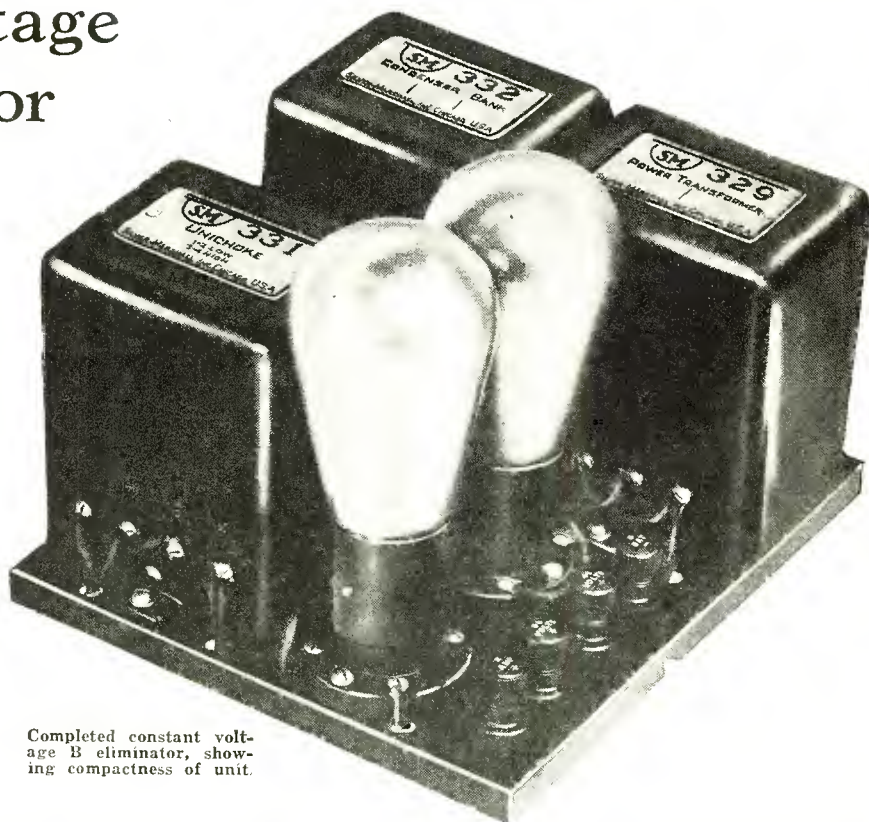
The conventional "B" power supplies in use today, are devices taking power from the ordinary 110-volt, 60-cycle A. C. home lighting circuit, transforming it into a high voltage, direct current suitable for the operation of radio receivers. To accomplish this a step-up transformer is connected to the house lighting line which in turn delivers a higher alternating voltage to a rectifier, transforming it into pulsating direct current. The pulsations of this current being at double the frequency of the original lighting circuit (any rectifier operates as a frequency doubler; hence the output of a rectifier connected to a 60-cycle circuit would have a 120-cycle fundamental component). The current delivered by the rectifier is not suitable for application to a radio receiver because of the hum which would be experienced, it is therefore passed through a filter circuit of choke coil

is to act as storage tanks. Thus, the filter serves to accept from the rectifier power delivered 120 times per second, suppressing the effect of the variations, and allowing continuous direct current to be drawn from it. Following the filter in ordinary "B" power supplies is a voltage regulator, the purpose of which is to reduce the direct current to values suitable for use with a receiver, viz.: 45, 90, 135, 180 volts.

### Effect of Resistance Due to Weak Batteries

In a receiver run by dry-cell "B" batteries, the batteries must be discarded as the voltage runs down, the reason being that the internal resistance of a bat-

teries may cause oscillation and distortion. Considering a "B" power supply from this angle, we find a comparatively high internal resistance unavoidable with standard rectifying devices and we further find a comparatively high resistance is necessary for the mechanical construction of satisfactory filter chokes. The net result is poor voltage regulation; that is, as the current drawn from the "B" supply increases, the voltage does not remain constant as with a battery but, instead, falls off at a rapid rate. (The higher the filter choke resistance, the poorer the voltage regulation; likewise, the higher the internal resistance of the rectifier, the poorer the voltage regu-



Completed constant voltage B eliminator, showing compactness of unit.

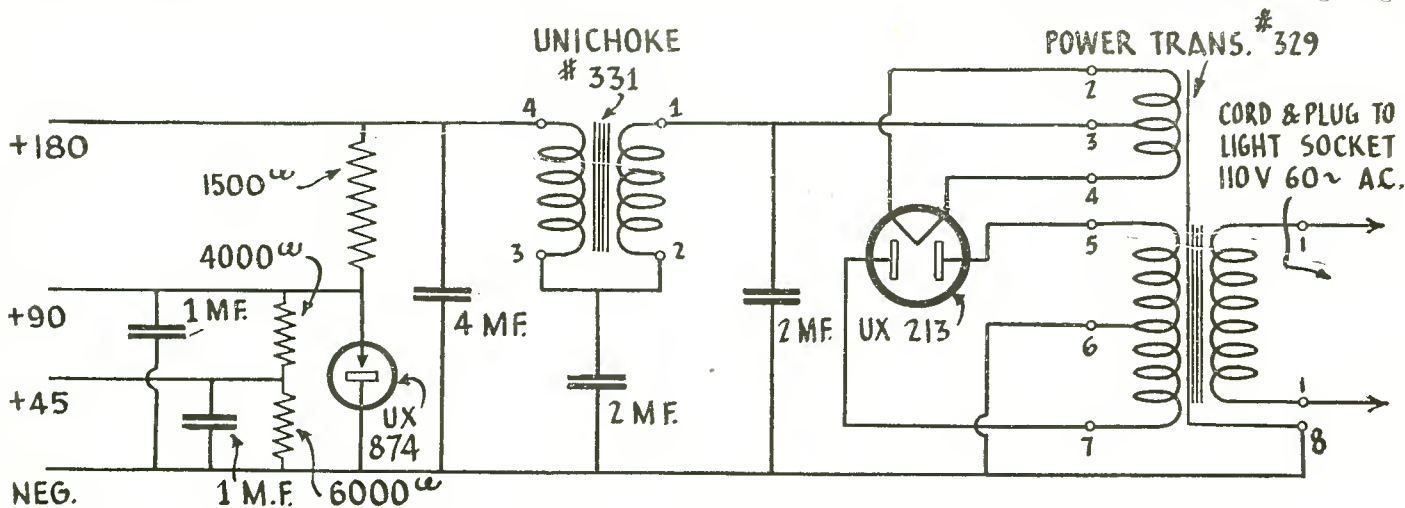


Fig. 1. Schematic diagram of B eliminator as described. Diagram is marked the same as the apparatus mentioned for ease in assembly.

and condensers. The effect of the choke is to oppose sudden changes in current. The effect of the capacities

tery goes up as the voltage drops with the result that this high resistance, being common to the circuits of all the

lation.) In the case of batteries in good condition, the internal resistance being very low, the voltage remains

substantially constant under normal current loads and a regulation curve for a brand new battery is substantially a straight line.

In itself this falling characteristic mentioned above may not at first appear to be a disadvantage but it is a most pronounced one, for it results in poor quality of reproduction and motorboating or "putting" noises in a radio receiver used with the "B" power supply. Let us see why.

greatest possible change in the last amplifier tube connected to the loud speaker, for the change in plate current is the measure of signal strength, in a sense. Thus we can regard a radio receiver, connected to a "B" power supply, as a resistance varying in accordance with an incoming signal and passing more or less current in following the signal variations. Considering the five-tube receiver drawing 40 milliamperes, operating on a strong signal, we

probably fall to 140 or 150 volts. Assuming the figure of 150, we find that the audio voltage variation of the power supply when receiving such a signal may be nearly 100 volts or practically a 50 per cent. change from the mean voltage drawn by the receiver. This accounts for distortion when a "B" supply is used with a receiver of five or more tubes, and also for motorboating or "putting." (This is audio variation—the R. F. variations being handled by the receiver bypass and filter condensers.)

#### Eliminator Resistance Must Be Low

The method of eliminating the condition would be to reduce the internal resistance of the "B" supply, giving practically a straight voltage regulation curve as would a battery. A method of accomplishing this is to reduce the terminal reactance, by the addition of very large condensers. In order to obtain, say, a 50-ohm output resistance at 30 cycles, we find that a condenser of 100 microfarads will be necessary. (A comparison of this value with the average 4 to 10 microfarad found in standard "B" units is an additional indication of why trouble might be experienced.)

The practical solution does not lie in a large condenser but in proper design of the parts of the "B" unit itself with a thought to obtaining low resistance, and the use of a voltage regulator in conjunction with it. (Gaseous voltage regulators serve, in a sense, as very large storage condensers, which give an apparent low internal resistance at speech frequencies.)

The "B" power supply described will supply substantially constant voltage with the greatest current variations to be experienced with standard five, six, or seven tube receivers, and will permit of a quality of reproduction not readily obtainable with usual "B" supply units. It eliminates entirely the possibility of motorboating. In addition, the design is such that it imposes a minimum of strain upon the filter condensers. The design has the valuable feature that the output voltages remain substantially constant over lighting circuit fluctuations of 105 to 120 volts.

#### Output Voltage is Constant

A very important feature of the Reservoir "B" is the fact that it may be connected to any standard receiver drawing normal current with the certainty that the voltages will fall within the required operating limits. In an ordinary "B" unit, variable high resistances are used to control the output voltage. It is seldom that the user has any definite idea what voltages are being applied to his receiver since the voltages may not be measured with an ordinary voltmeter.

(Continued on page 153)

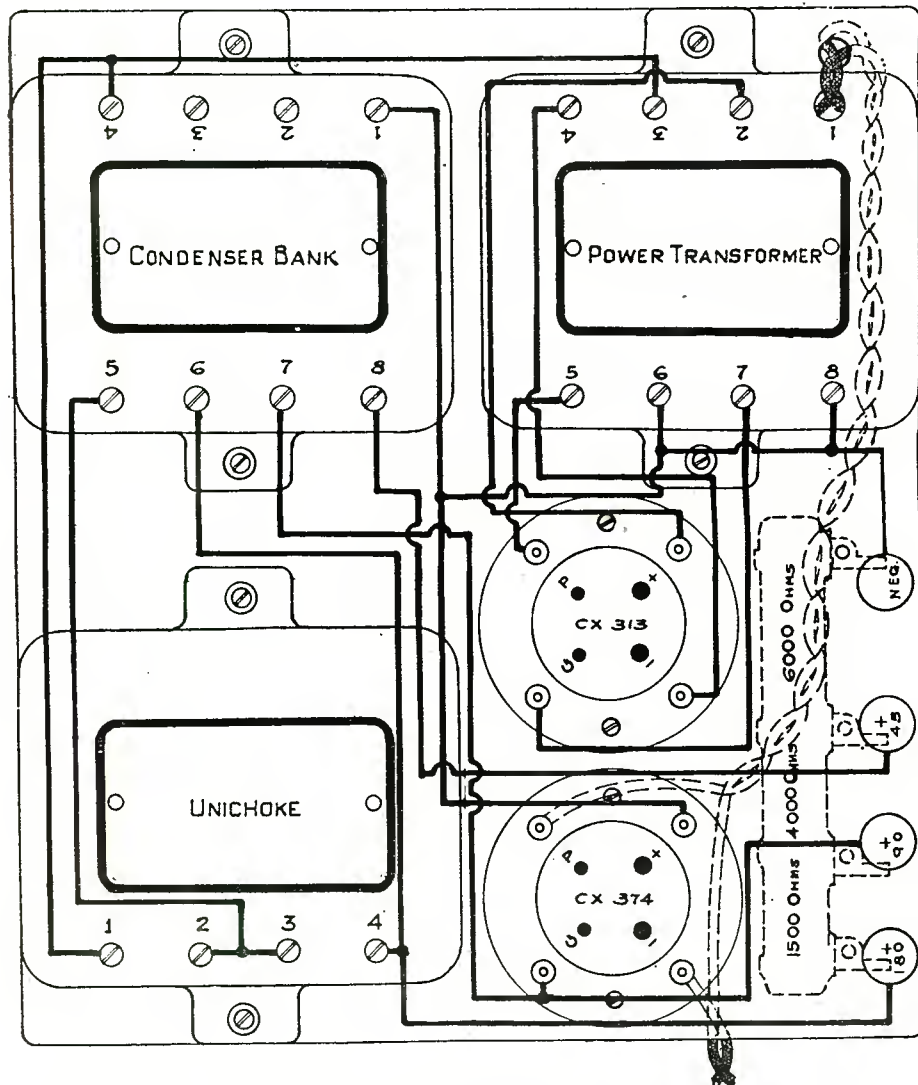


Fig. 2. Pictorial wiring diagram, which may also be used as a guide to the correct layout of apparatus.

A standard five-tube receiver draws approximately 6 milliamperes each for the two R. F. tubes; the detector tube will draw approximately 2 milliamperes; the first audio stage will draw 6 milliamperes; and, if a power tube is used in the last stage, it will draw up to 20 milliamperes. We thus find the total current drain to be 40 milliamperes. An incoming signal causes a change in plate-to-filament resistance of the tubes of the receiver, which results in a change in plate current for each tube. This, in turn, results in an audible signal in a loud speaker. The change in plate current increases progressively in each tube, the purpose of amplification being to permit of the

find that a milliammeter in the common "B" battery circuit will not register appreciable changes, for it cannot follow the instantaneous changes of the signal and registers only the mean current drawn by the receiver. The instantaneous audio current change may be as great as 10 to 40 milliamperes. The over-all current drawn by the receiver may increase by 20 milliamperes and decrease by 20 milliamperes although this will not be apparent upon a plate milliammeter. Assuming this extreme condition of a 40 milliampere change, we find that with a 20 milliampere rise the voltage of a good "B" supply will increase to 238 volts; while with a 20 milliampere decrease it will

# How to Install Power Tubes

## Method of Adding Additional "B" and "C" Battery Voltage Required for Operation of Power Tubes

By J. EARL SIMONDS

**M**ANY splendid and instructive articles have been written about power tubes, still there hasn't been one-half enough said yet as to just what the average set owner must do to properly apply the extra "B" and "C" voltages required by a power tube. Observation of general conditions reveals the interesting fact that many set owners think all they have to do to use a power tube is insert it in their set and then sit back and expect improved reception tone and increased volume. The thought seems to be general that a power tube in a set will increase volume, but this is not strictly so, because a power tube is not intended to increase volume—rather it is intended to handle greater volume without distortion of reception tone. To handle this greater volume without distortion, it is essential that the power tube be supplied with a considerably higher plate and grid voltage than all of the other tubes in the set. Without this increased voltage the power tube will give no improvement in tonal quality.

the proper and best results from a power tube. True, the tube manufacturers send out with their power tubes some information, usually of a general

any of these particular sets decides to use a power tube, and wants to get the proper results, he must choose one of the three following methods of adding the extra "B" and "C" voltages to the power tube:

1. Use a power tube with the new type base, known as the Duplex Base, on it and connect the extra "B" and "C" voltage leads direct to the binding posts on the projecting rim of the base. See Fig. 2.

2. Change the wiring of the last audio socket in order that the additional plate voltage ("B" battery) and the additional grid voltage ("C" battery) can be applied to the power tube alone and in series with the grid and plate voltage already in the set. See Fig. 4 and Fig. 5.

3. Use an adapter as a means of connecting the extra "B" and "C" voltages to the power tube alone. See Fig. 6 and Fig. 7. Fig. 8 shows a close-up of a tube with the Duplex base installed in the last audio stage of set.

While any one of the above methods will provide for adding the extra "B"



Fig. 1. Power tubes with the plain base are intended for use in sets already wired for the addition of extra "B" and "C" battery voltages.

nature about the proper voltage values to apply to the power tube, but in most cases no explicit details are given regarding just how the average set owner can add the proper voltage values to the power tube.

Strange as it may seem, power tubes, with the ordinary plain tubular base, as illustrated in Fig. 1, are not strictly general utility power tubes because of the fact that by far the majority of sets built prior to the 1926-27 season were never wired to provide for adding the extra "B" and "C" voltages required for a power tube. It is the purpose of this article to point out just what a fan must do to add the extra "B" and "C" voltages to a power tube when it is used in a set never wired to accommodate a power tube. From the most reliable estimates obtainable we learn that there are approximately five and one-half million sets in use in the United States alone that were never wired to provide for the convenient addition of the extra "B" and "C" voltages required for a power tube. If the owner of

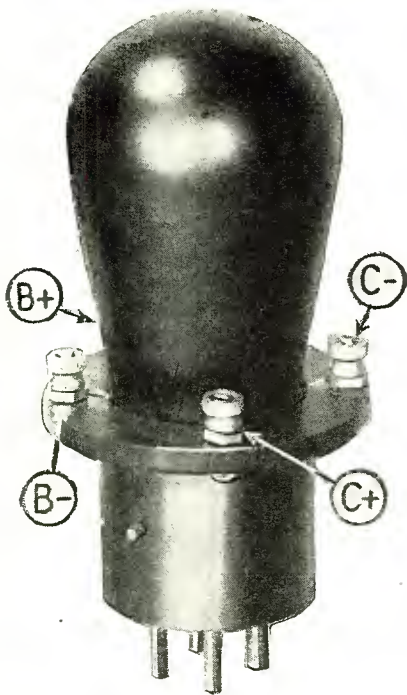


Fig. 2. Additional "B" and "C" battery voltages can be applied to power tubes provided with the Duplex type base.

For some mysterious reason the majority of tube manufacturers have not been very generous in dispensing all of the information needed by the average fan in order that he may enjoy

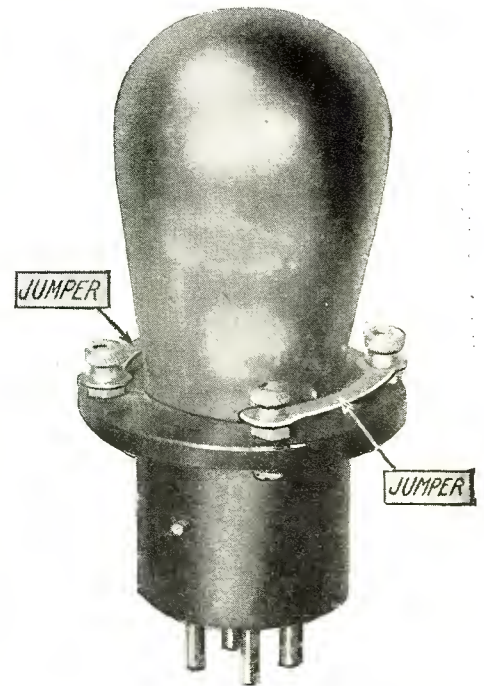


Fig. 3. Two jumpers connected across terminals as shown are used where a set is wired for a power tube.

and "C" voltages to a power tube alone, the first method seems to be the most practical, and surely the most convenient. Fig. 2 illustrates a power tube with the Duplex base on it. This

Duplex Base is not an adapter or connector that can be attached to a tube by the radio fan, rather, it comes al-

on the rim of the base. Each binding post being clearly marked for the proper connection. As an example, let

on it at 135 volts of "B" battery. If the set has been using 90 volts of "B" battery and no "C" battery, the fan secures another 45-volt "B" battery and a "C" battery of at least 9-volt power, and he connects the "B" battery leads direct to the B+ and B- binding posts on the rim of the base and the 9-volt "C" battery leads to the C+ and C- binding posts on the rim of the base. If this particular set had originally been using a "C" battery of say 4½ volts then in using a power tube at 135 volts of "B" battery it would be necessary to add only 4½ volts of "C" battery to the Duplex Base binding posts. It is well to bear in mind that only the *extra* "B" and "C" voltage leads are to be connected to the Duplex Base binding posts. The following table gives the *total* voltage values to use with the type 112 and type 171 power tubes:

112 POWER TUBE

- With 90 V "B" btry. use 6 V "C" btry.
- With 112½V "B" btry. use 7½V "C" btry.
- With 135 V "B" btry. use 9 V "C" btry.
- With 157½V "B" btry. use 10½V "C" btry.

171 POWER TUBE

- With 90 V "B" btry. use 16½V "C" btry.
- With 135 V "B" btry. use 27½V "C" btry.
- With 157½V "B" btry. use 33½V "C" btry.
- With 180 V "B" btry. use 40½V "C" btry.

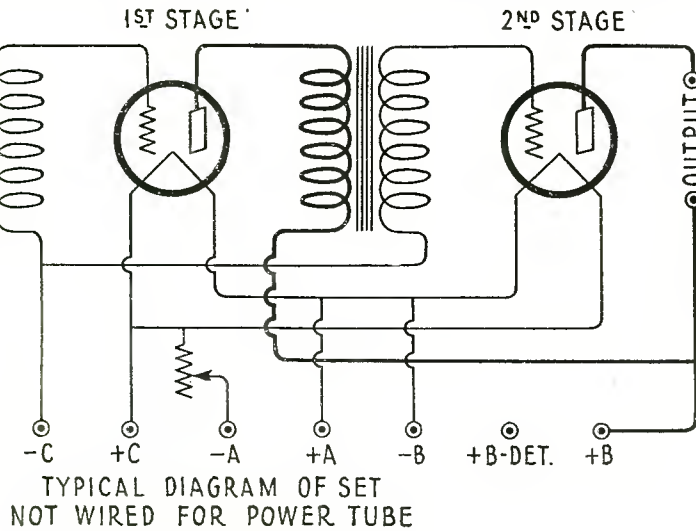


FIG. 4

ready attached to the power tube as it must be cemented to the glass bulb, and the tube elements connected to the base prongs and binding posts by the tube manufacturer. The fan need not concern himself with the connections between the tube elements and the prongs and binding posts of the Duplex Base as these matters are all taken care of by the tube manufacturer. From the illustration, Fig. 2, it will be seen that the Duplex Base has the four conventional prongs in the bottom of the base and in addition has four binding posts attached to the projecting rim, each binding post identified by one of the four characters B+, B-, C+, C-. Power tubes with the Duplex Base on them are particularly convenient for use in sets that were never wired to provide for adding the extra "B" and "C" voltages to the power tube, because all that it is necessary to do when using power tubes with the Duplex Base is to insert

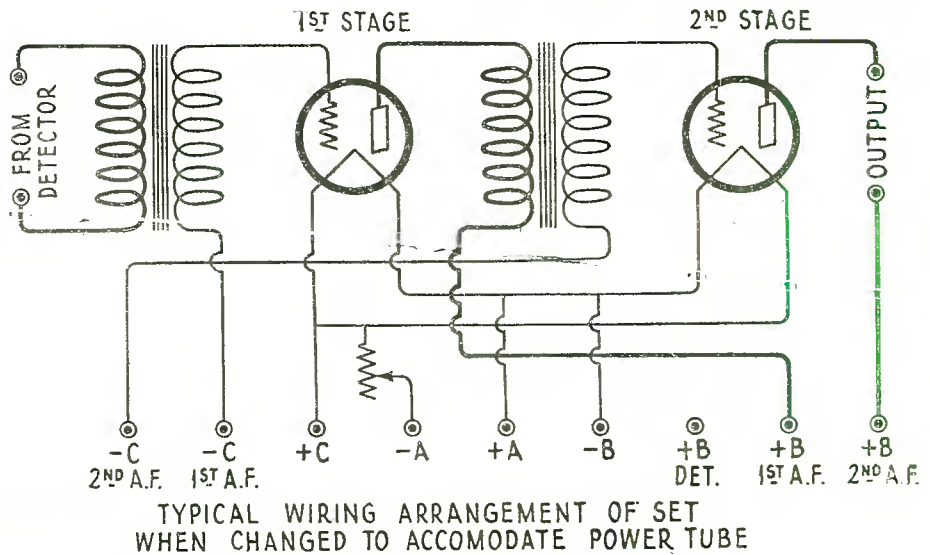


FIG. 5

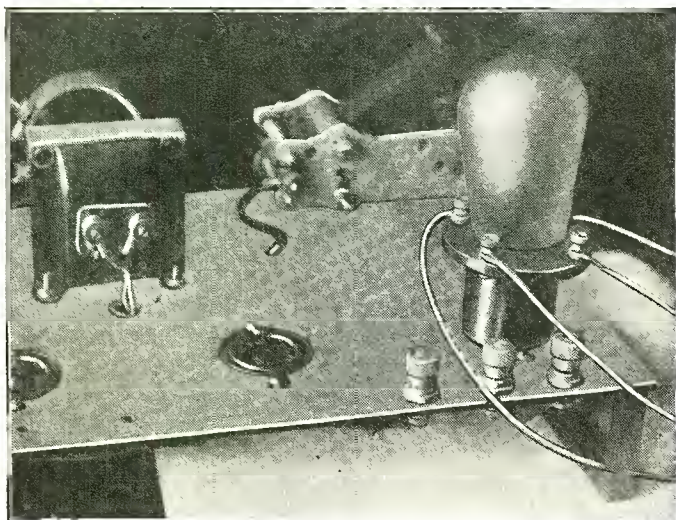


Fig. 8. In sets not wired for a power tube, a tube with a Duplex base will be found very convenient. The tube is shown inserted in the last stage with its leads connected for additional "B" and "C" batteries.

the tube in the last audio socket and connect the extra "B" and "C" voltage leads direct to the binding posts

us assume that a set is not wired for a power tube, and the fan decides to use a power tube with the Duplex Base

Several makes of power tubes with the Duplex Base on them are now on the market and all of them are suitable for use in either the UV or UX types of sockets. All power tubes with the Duplex Base on them are strictly general utility power tubes, because they are just as satisfactory for use in sets which have been wired for a power tube. When using these tubes in a set wired for power tubes the jumpers shown in Fig. 3 should be connected across the B+ and B- and across the C+ and C- binding posts on the Duplex Base, but the extra "B" and "C" voltages in this case should not  
*(Continued on page 145)*



# Some Interesting Experiments with Large Cone Reproducers

Using the Three Foot Cone for Reproducing Phonograph Music, As a Microphone, and for Many Other Interesting Purposes.

By CLYDE J. FITCH

**B**EFORE describing the various interesting experiments that may be performed with large cone reproducers let us first show how to build and operate one, as much of the success of the super-cone depends upon its proper construction and operation. Thousands are now enjoying well-nigh perfect radio reception from large cones of simple construction, yet there are some who have not had such gratifying success simply because some little seemingly unimportant detail in the construction or operation has been neglected.

In all sound recording and reproducing apparatus, the simpler the construction the better the results. Perfectly natural tone quality is only obtained by eliminating superfluous parts. Simplicity is the keynote of success of the speaker about to be described, from the unit illustrated in Fig. 1 to the finished speaker, Fig. 2. The design of the three foot cone has been much improved and simplified since its original appearance on the market.

## Construction of Cone

Keeping in mind simplicity, we select a single virtually free edge cone for the diaphragm. It is cut from a

the finished cone is bent towards the front for stiffening purposes, as illustrated. A small three inch paper cone is glued to the apex of the large cone

dowel sticks, flattened at the ends where the cone is attached. The dimensions are given in the illustration Fig. 4. The unit is mounted on the

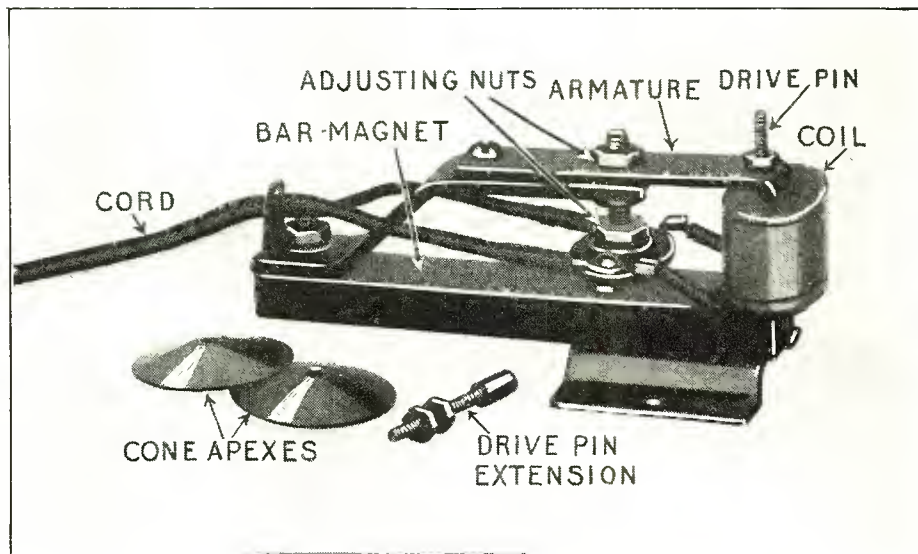


Fig. 1. Cone speaker unit used in experiments described in this article.

to strengthen it. The finished cone will measure 36 inches in diameter.

The frame on which the cone is mounted is also of simple design. It

block with two wood screws, and the cone attached in place, using the metal cone attachments supplied with the unit. Ordinary thumb tacks hold the rim of the cone to the flattened ends of the four spokes. This completes the assembly of the speaker, with the exception for a screw eye for hanging.

## Operation of Super-Cone

The operation of a cone of this size depends largely upon its location in the room. Knowing that practically all of the sound energy emanates from the *concave* side of the cone, it is obviously wrong to hang the cone flat against the wall with the apex towards the front, as is the usual practice. The sound is then cooped up in the air space between the cone and the wall and the reception is impaired. In this position the average pitch of the speaker is raised; the low tones fail to come through. Having a wave length of some thirty feet, the low tones must have a large room or open air space in which to reverberate, and not be confined behind the cone. This is why the single cone with concave side out is superseding the old double cone construction.

As we cannot hang the speaker flat against the wall, and as the wall is the logical place to hang it in many instances, we must use some means of

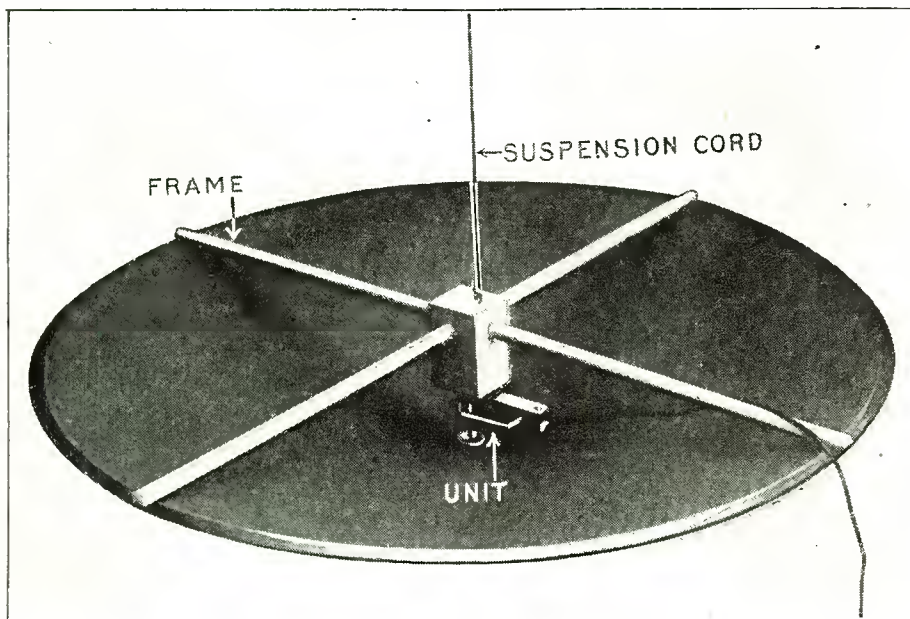


Fig. 2. Method used to suspend cone from ceiling.

square sheet of cone paper (Alhambra Fonotex) according to the dimensions given in Fig. 3, and glued in shape, using any ordinary glue. The rim of

consists of a block of hard wood with four holes in it, in which are placed the four arms like the spokes of a wheel. The arms are made of  $\frac{5}{8}$  inch

spacing it from the wall. The simplest way is to place two wooden feet or spacers on the lower ends of the bottom arms as illustration Fig. 5. These feet should be at least three inches

tube, although 90 volts are sufficient for ordinary requirements.

**Electrifying the Phonograph**

During the past year an unusual

nary phonograph music is obtained. All that is required is a good pick up device and a good audio amplifier. Phonograph music with the volume and depth of tone of a symphony orchestra is possible, under perfect control by the volume control on the amplifier. This combination is ideal for staging dances and entertainments, especially where suitable radio reception cannot be had.

The pick up devices usually have attachments for connecting directly to the radio set, with full directions for using, so further comment seems unnecessary. The illustrations, Figs. 7 and 8, show how the apparatus is used. The writer once used an electro magnetic pick up device and a three stage resistance coupled amplifier with a power tube in the last stage for his experiments. Exceptionally good results were obtained with this combination. On such extreme volume, it was found advisable to fasten a metal weight of several pounds to the back of the speaker frame to reduce vibration. The ceiling mounted cone, hung at least one foot from the ceiling, was found best for this purpose. Many radio dealers in small towns where good broadcasting is not possible find this an ideal method of demonstrating and attracting attention.

The three foot cone speaker used in conjunction with the *Phono-Radio Combination Set* described in this issue makes an ideal outfit for those appreciating unusual tone quality from either the phonograph or radio. Having the speaker in one corner of the room and the set in a remote location is surprisingly practical both from the point of obtaining the best tonal effects and in arrangement with other furnishings in the living room.

**The Three Foot Cone as a Microphone**

It has always been the aim of radio engineers in connection with broadcasting studios to perfect a micro-

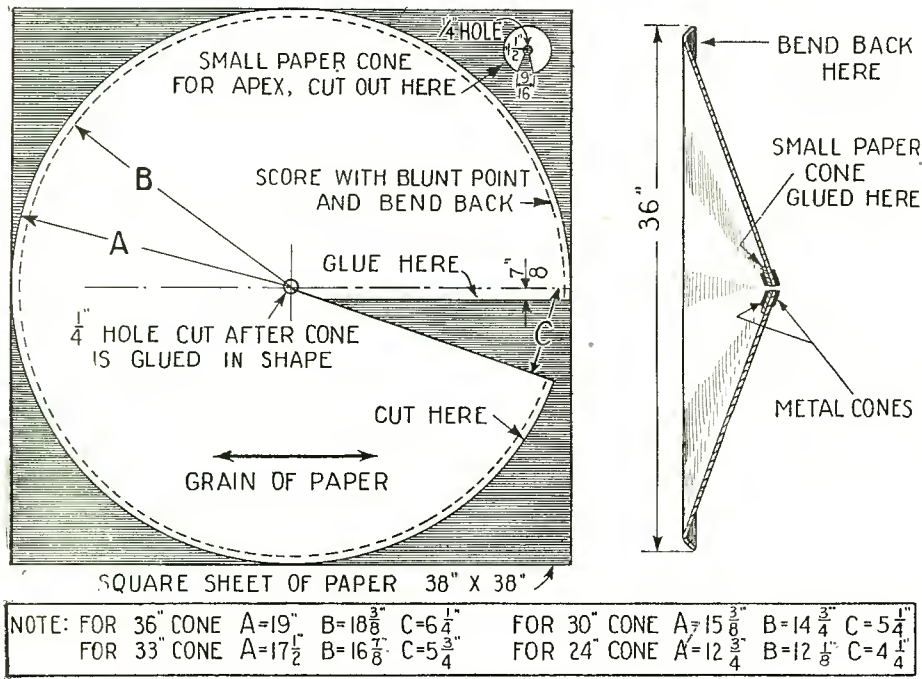


Fig. 3. Details for the cutting and preparation of the special paper cone.

long, preferably longer. This leaves an open air space around the rear of the cone and the sound is not confined. When so mounted, the quality of reception is greatly improved.

It is not always convenient to mount a large cone on the wall, especially in a small room where it would look unsightly and occupy too much space, so we must look for some other place. We don't have far to look, because leaving out the floor as a possible location we only have one place left, the ceiling. There are many advantages in suspending the cone from the ceiling. In the first place you can hang it several inches from the ceiling, which is highly advantageous from an acoustical standpoint, and it will not be noticed. In fact it is more or less decorative and entirely out of the way. In dance halls and auditoriums the ceiling is the ideal place for large cones. We can suspend our speaker from the ceiling by means of a string attached to a screw eye screwed into the center block of the frame. Simply screw it in a place where the speaker balances. It is connected to the radio set with an extension cord. See Fig. 6.

The three foot cone must be operated through a fairly good audio amplifier, otherwise its advantages are lost. It makes no difference how cheaply the set is made; simply replace the audio transformers with two good low ratio ones and startling tone quality will result. Best results are obtained with a 135 volt B battery and the proper C battery for a 112 output

amount of interest has been shown in various methods of electrifying the phonograph. Many "pick up" devices

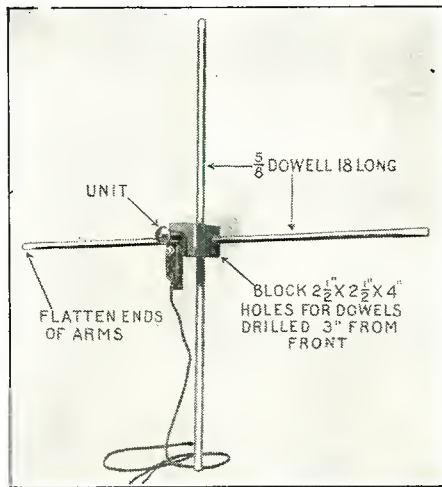


Fig. 4. Special frame used in the cone. Note drive unit mounted on center block.

have been perfected for translating the vibrations from the phonograph record into electrical impulses, which can be passed through the audio amplifier of the radio set and reproduced by the loud speaker. This gives something beyond ordinary phonograph music; but with the average loud speaker, while enormous volume is possible the tone quality is characteristic to that of radio plus the bad effects of the phonograph, in spite of the fact that the newer records are electrically recorded with an emphasis on the bass notes.

Using the three foot cone as a reproducer, music really beyond ordi-

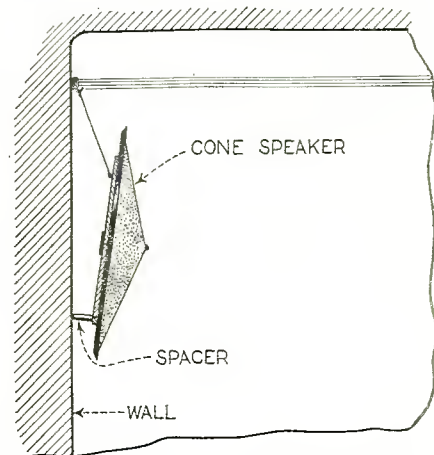


Fig. 5. Correct method of hanging large free edged cones for best tonal results.

phone that would respond to the entire musical range uniformly and at the same time have no inherent

noises. One of the best microphones of this type is the capacity one. This consists of two metal discs spaced a small distance apart. Sound waves strike the discs, causing them to vibrate, which vibration varies the spacing between them and the electrostatic capacity varies likewise. While this microphone produced the desired results, it was very inefficient from a sensitivity standpoint, and the output from it required considerable amplification before it was strong enough to operate the transmitter. For this reason the carbon button type of microphone of special construction is now widely used for broadcasting. As the carbon type depends upon a loose electrical contact for its operation, it produces disturbing noises which are objectionable to good transmission.

The original pick-up device or transmitter used by Bell in his first telephone operated on the electro-dynamic principle. Sound waves strike the soft iron diaphragm, and in ordinary telephone receivers generate an electric current in the winding of the receiver. Of course the efficiency is low, but having no loose electrical contact in the circuit, foreign noises are eliminated,

parent from the fact that it has a wider tonal range when used as a reproducer.

The radio experimenter and amateur will find the three foot cone very

### The Talking Table

Many startling experiments can be performed with the special unit shown in Fig. 1, designed primarily for driv-

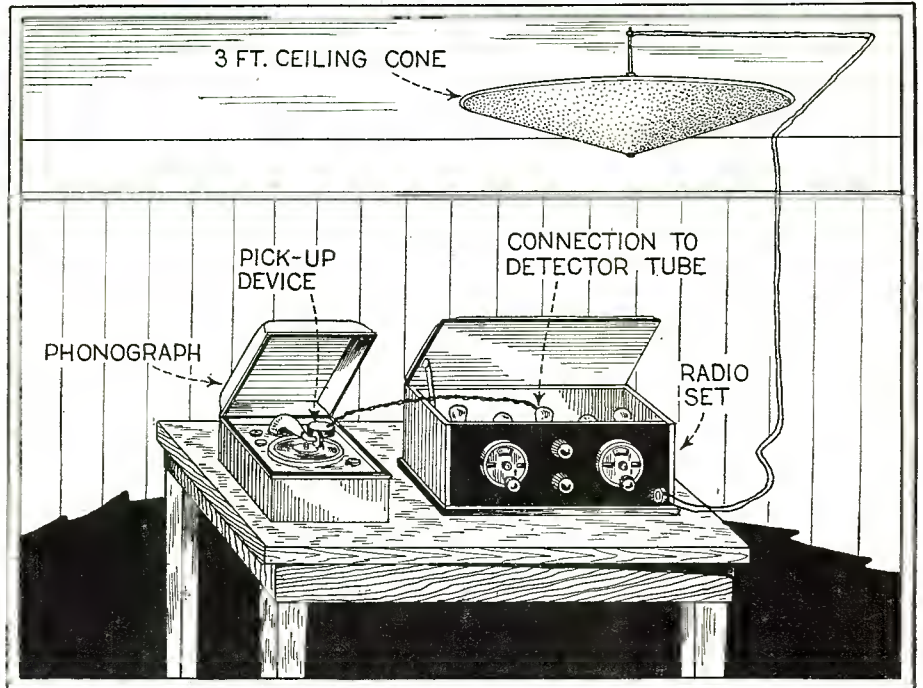


Fig. 7. Showing combination of radio and phonograph, using cone and audio circuit of radio for reproducing records.

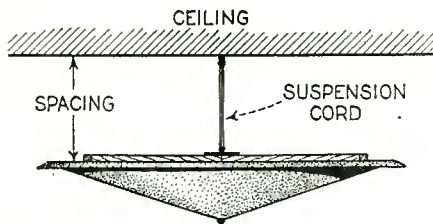


Fig. 6. Ceiling suspension of cone speaker.

The three-foot cone speaker serves as an excellent microphone or pick-up device for broadcasting studios. Having such a large area it is very efficient, because it is acted upon by a greater volume of sound energy. It

interesting for use in the armature transmitter as a microphone. For experimental purposes the terminals of the three foot cone speaker may be connected across the grid and filament of the detector tube of the radio set. It will be found that the audio-frequency current generated in the speaker winding will be amplified by the audio amplifier of the set and reproduced by another loud speaker connected to the output of the set. It is almost impossible to operate the two speakers in the same room as a continuous howl will result, due to a transfer of sound energy from the output speaker to the input one. This

ing a large cone. By attaching the unit underneath a card table, preferably one having a thin top, and mounting it so that the drive pin presses firmly against the center of the table, it will be found that the table talks and makes an excellent loud speaker. Many amusing stunts can be performed at card parties by making the various tables talk and connecting them to the radio set or to a microphone. Of course an audio amplifier has to be connected between the microphone and the talking table. A person concealed in the next room may talk in the microphone and his voice will be reproduced by the table.

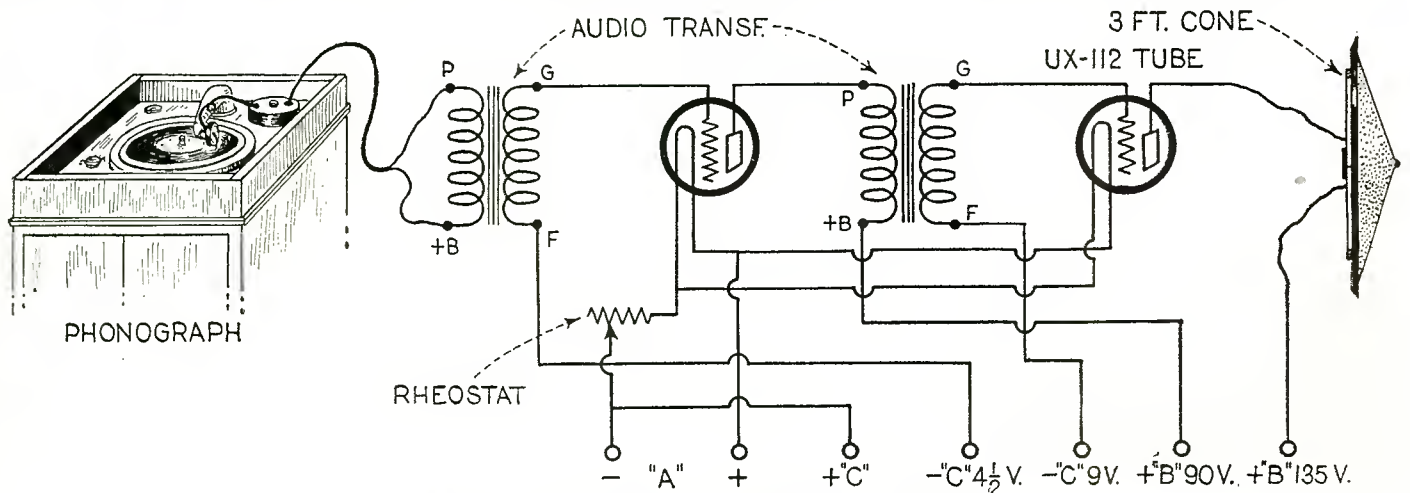


Fig. 8. Schematic diagram of radio-phonograph combination.

covers a much wider tonal range than the ordinary telephone receiver covers for the same reason. This is also ap-

device serves as an excellent detecta-  
phone. The connections are given in the diagram, Fig. 9.

One of the best loud speakers known is the combination of piano and cone unit. Simply mount the unit on

a wooden arm and clamp it to one of the back members of the piano in such a way that the drive pin of the unit presses firmly against the sounding board of the piano and excellent results, both as regards tone quality and volume, will be obtained. In fact the

several places before making the permanent attachment, as it will be found that the tone quality depends largely upon the location of the unit. Any light, thin wood makes a good diaphragm for a speaker, provided it is large enough in area. One of the

contains over 90% of air. This wood is very light in weight. Its main use is for packing food products in cold storage, as the wood is an excellent heat insulator. For loud speaker use, it has an excellent tone quality, which quality depends upon the size of the

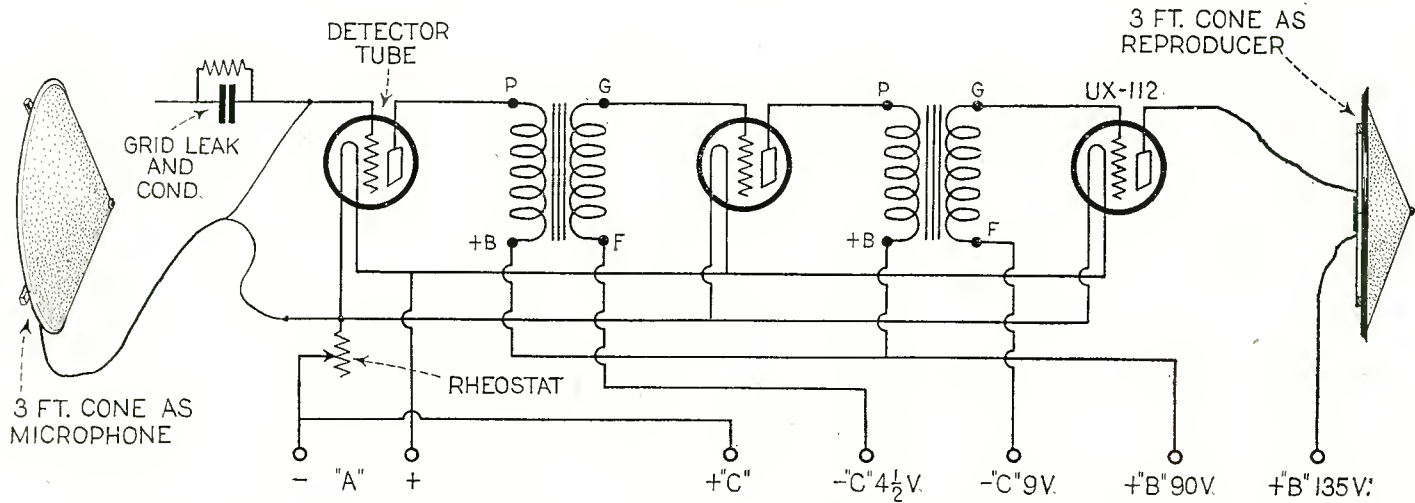


Fig. 9. Schematic diagram showing the use of two cones. One is used as a magnetic driven "pick-up," actuating the grid side of the detector, the other is used as the output or reproducer.

piano sounding board is almost equal to a three foot cone in its reproducing characteristics. The unit should be held against the sounding board in

best woods for this purpose is balsa wood. The balsa tree is grown in the tropics and due to its rapid growth the grain of the wood is very porous. It

sheet of wood and its shape. It cannot be obtained in widths over ten or twelve inches. For this reason it may be necessary to splice it.

## Converting Your Loop Super-Heterodyne Into An Antenna Set for 25c

THE use of super-heterodynes is almost universal, and recent statistics show that fully 50 per cent. of the experimenters interested in radio own,

tenna, the belief being that for real efficiency the outside antenna must be used.

As on the commercial super-heterodynes there are several methods of utilizing antenna and ground, many readers of *The Radio Listeners' Guide* have written in asking how they may convert their receivers into antenna sets without disturbing the wiring of the set.

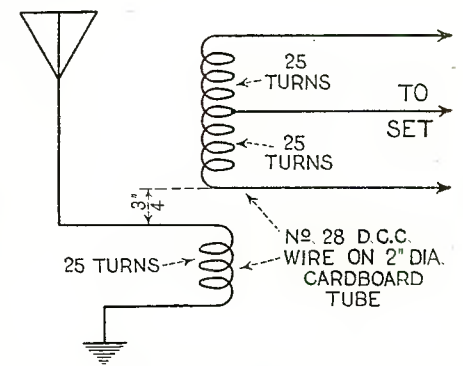
The method and apparatus used is simple and the antenna coupler shown in the picture, which, by the way, was copied from the commercial article sold by one of the largest manufacturers of super-heterodynes used for broadcast reception today, was built for \$24. As shown in the schematic diagram and the photograph it consists of a simple cardboard tube, 2 inches in diameter and 75 turns or 40 feet of 28 D. C. C. wire in two coils of 25 and 50 turns, the larger tapped in the middle so that a center tapped loop set may be used.

The antenna to be used in case of such an installation should be short. A single stretch 40 feet in length is entirely sufficient for all occasions. If a longer wire is used the pick-up of extraneous noises will create such a background that the set will be a nuisance rather than a pleasure. The

commercial articles bear tags stating that no more than 30 feet should be used, with a condenser in series with the ground lead wherever "A" or "B" eliminators are used for the power supply.



Illustration of complete antenna coupler for Super-heterodynes as described.



Schematic diagram showing hookup to set.

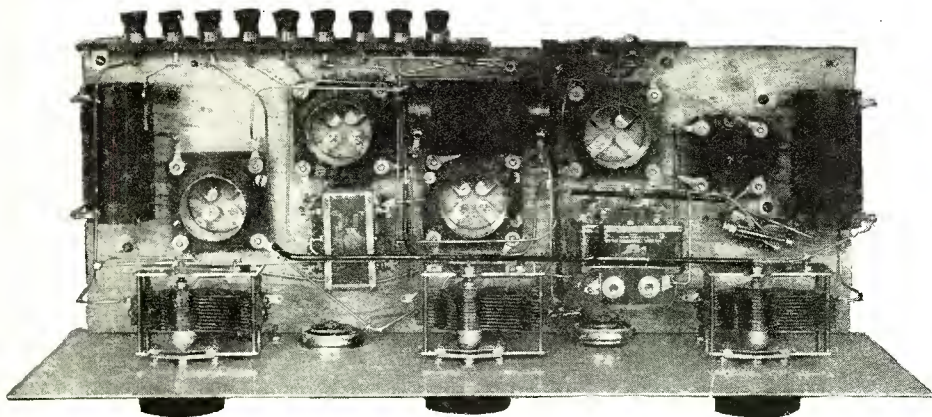
When using an antenna coupler of this type, care should be taken to keep it sufficiently far from the other coils and parts to prevent interaction—especially when the entire three taps of the secondary are used. Mounting it on the back of the set or between the set and the antenna is often possible and is the best manner of using a coupler of this sort.

have, built or intend to build some form of super-heterodyne. Many of the fans, however, deplore the use of loop an-

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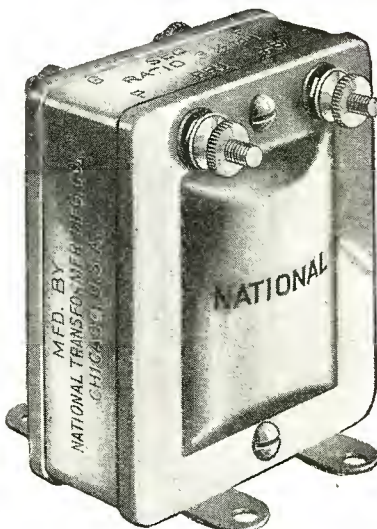
This is the circuit built by thousands of fans. You'll be surprised what an efficient, first-rate set you can build from these parts for very little money—the cost of the genuine Keystone parts as specified being only \$17.65 complete. Think of it! A real opportunity for set builders, fans and those who want a high-grade 5-tube receiver of unusual tone, volume and selectivity.

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| 1 Set Complete Blueprints Assembly Directions..... | Free with order  |
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| 3 Bakelite Pointer Knobs.....                      | .25 " .75        |
| 1 Filament Switch.....                             | .25 " .25        |
| 1 Wood Base Board.....                             | .25 " .25        |
| 5 Sockets.....                                     | 1.25             |
| 1 Complete Set of Binding Posts.....               | .85              |
| 3 R. F. Transformer Coils.....                     | 1.00 " 3.00      |
| 2 Rheostats with Knobs.....                        | .45 " .90        |
| 1 Grid Leak and .00025 Condenser.....              | .30 " .35        |
| 2 4-ohm Fixed Resistances.....                     | .30 " .60        |
| 2 Audio Transformers.....                          | 1.75 " 3.50      |
| Bus Wire.....                                      | .25              |
|  | <hr/>            |
|  | \$17.65          |
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Rip out your old audio transformers. Put these oversize, handsome, 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. Nationals 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 \$1.75.

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Thousands upon thousands of fans have found them to be the final answer to perfect one 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 \$1.75 each. Think! You save \$2.75 on each transformer, or more than \$5.00 on a pair. Money talks! Order now.

The special, low price of \$1.75 will hold only so long as our stock lasts. Thousands who have used Nationals will order as many transformers 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 for your own set, order NOW. Use the coupon. Save money. Order TODAY!

DEALERS AND JOBBERS: Write for special prices on all standard Keystone parts to meet the demand of your customers.

**Keystone Radio Laboratories, Inc.**  
154 Whiting St., Dept. RR, Chicago, Ill.



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Complete Parts for 5-tube R. F. Set, \$17.65

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Individual parts as per list attached  
(Check individual parts on list shown above)

Blueprints of Inexpensive 5-Tube T. R. F. Receiver, 50c.

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I agree to pay postman \$..... plus few cents (add total amt. of order) postage. We pay postage if you send cash with order.

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# When You Take Your Radio Vacationing

compact receivers that are built today, as well as the fact that most of the 6-volt receivers are capable of being operated on dry cells merely by the insertion of the dry cell tubes in the sockets, it is a very common procedure



Fig. 1. Antenna lead should be firmly fastened to tent, as shown. It is advisable to use a small insulator at the point where fastened.

SEVERAL years ago, it was considered quite a novelty to take a radio receiving set on your vacation. You were considered quite daring and



Fig. 3. A good ground lead is always possible near streams and lakes. The end of this ground wire is buried in the moist ground near the edge of the water. Bare wire may be used.

for a person to "pack up" his radio and take it with him. Little has to be said of the advantage of taking the radio set with you, because its entertainment value has become so great that to merely "take a chance" on not

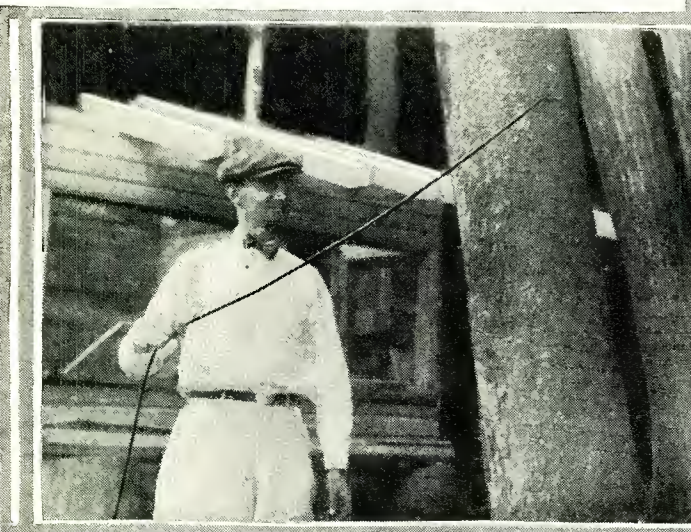


Fig. 2. A tree makes an excellent antenna when used as illustrated. A large nail is driven into tree.

super-technical when such a thing was thought of—much less attempted. Now, however, with the extremely



Fig. 5. Above—A buried tin can makes a good ground.

Fig. 4. Left—A wire wrapped around a water-filled bottle and thrown in the lake also makes a very efficient ground.

having radio programs of some sort available would be unthinkable to most fans.

Realization of the fact that the set is going to work under entirely different conditions, however, must be borne

(Continued on page 138)



# The Phono-Radio Combination Set

(Continued from page 99)

yet he wishes to have phonograph music for dancing and general entertainment. With a very little expense he can build up one of these Phono-Radio combination sets and with a small portable phonograph he will have better music in nine cases out of ten than he did with his larger and more expensive instrument. And not only will he have a good electrical phonograph, but he will have a radio receiver which will give him excellent quality of reproduction and fine selectivity.

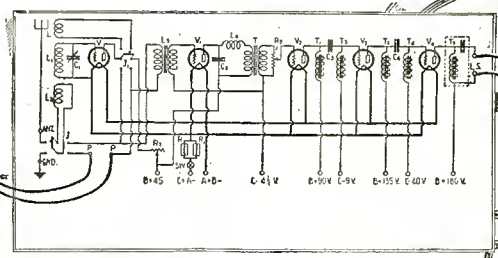
If there are any changes made in the layout of the apparatus it should be borne in mind that the wiring of the set should be strictly followed. As the set is wired now when the switches are thrown to the left the set is ready for the reception of broadcast signals and when they are thrown to the right the set is ready to supply phonograph music.

The El-Fonic pick-up is connected to the two binding posts marked "Phone." There are two leads that are run from these binding posts to the two terminals on the top of the device, which, by the way, is so constructed that it will fit the tone arm of any make of phonograph. The set proper should be placed near the phonograph as these leads from the pick-up to the binding posts should be as short as possible.

As mentioned previously, there are many different combinations that can be employed in this set and different amplifiers may be used, but if transformers are installed, for instance, instead of the Jewell system of audio amplification, the perfect reproduction must not be expected, for this special double-impedance amplifier was designed to bring out all the harmonics and overtones that are now inscribed on the new electrically recorded records.



# EL-FONIC PRODUCTS

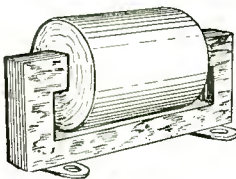


## MODERNIZE

YOUR VICTROLA OR PHONOGRAPH INCLUDING PORTABLE MODELS

You can play all those good old Records and new ones with the

**EL-FONIC CHOKE**  
2,000 HENRIES GRID IMPEDANCE LEAK



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PREVENTS MOTOR BOATING

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*capacity pick up*

—and bring them all back to life right out of your Radio Loud Speaker.

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119 West 63rd St., New York, N. Y.

**PRICE**  
**\$14.50**

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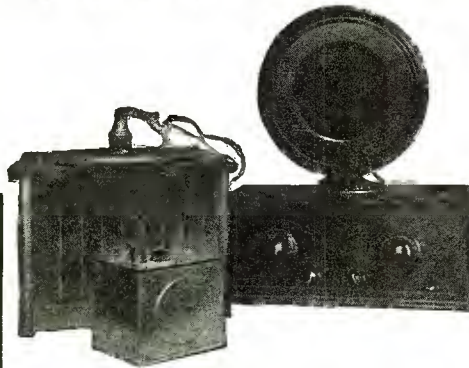
With every El-Fonic Pick-Up a complete set of blueprints and instructions of how to build the Jewell Audio Amplifier. And the El-Fonic Phono-Radio Receiver.

Forwarded by Parcel Post, prepaid, upon receipt of remittance.

# JEWELL EL-FONIC ADAPTER

FOR USE IN CONJUNCTION WITH THE EL-FONIC PICK-UP

**\$12.50**



**Jewell Dual Impedance Audio Amplifier Kit \$35.00**

- 1 Oscillator coil
- 2 2,000 Henries Grid Chokes.
- 3 200 Henries Plate Chokes.
- 1 200-600 Meter Radio Frequency Transformer.
- 1 Audio Transformer.
- 1 Radio Frequency Choke.

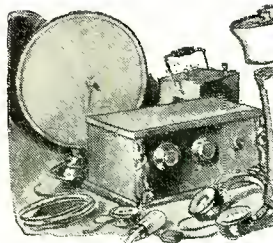
Free — with Every Kit a Complete Set of Blueprints and Instructions.

This adapter when placed between the EL-FONIC capacity pick-up and YOUR RADIO RECEIVER will ELECTRIFY YOUR VICTROLA OR PHONOGRAPH. In other words, it is a miniature Broadcasting Station that is modulated by your Phonograph and played through your Radio Receiver and Loud Speaker.

Parcel Post prepaid on receipt of remittance.

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- El-Fonic Oscillator Coil **\$2.50**
- Jewell Grid Chokes 2,000 Henries **\$6.00**
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# The LISTENERS' ACCESSORY GUIDE

## A Quality Tone Control for the Radio Set

AT the present time many fans attempt to control the "tone" of their receiver by controlling the volume. This in a minor way has some effect as it does to an extent soften clashing harmonics and undertones which predominate when loud signals are present in the speaker, it does in no way, however, actually control the "tonal quality" of reproduction. In order to accomplish this a regulation of the shading and tone characteristics of the various voice frequencies must be resorted to—after the electrical impulses have left the last audio stage and before they reach the reproducer or speaker. The Sprague Tone Con-

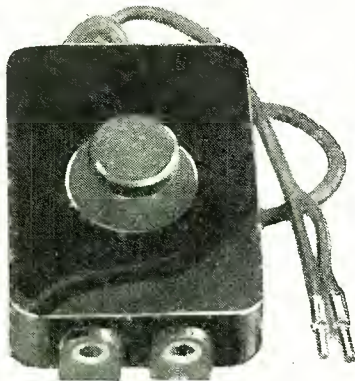


Photo courtesy Sprague Radio Spec. Co.

A tone control which permits of matching the reproducer to the speaker.

control has been devised to accomplish this purpose.

As several manufacturers of receivers have found, control of the tonal quality of the receiver may be accomplished to the best of advantage by the use of variable capacitances in parallel with the loud speaker lines—across the windings of the loud speaker.

If fixed condensers are used across the loud speaker terminals, they tend to reduce the response to high frequencies and thereby accentuate the response to lower frequencies. This type control makes possible the adjustment of the tone of the receiver so as to bring out the high notes or the low notes, as desired.

Another feature of this method is that by use of the proper capacity, the "hiss" or noise produced by transformers which respond strongly to high frequencies can be eliminated.

The adjustable fixed condenser arrangement, shown in Figure 1, is one which permits a variation of capacity

from .005 to .035 mfd. in steps of .005 mfd. by means of a clever arrangement of a fantail or commutator type of switch. Seven different capacities ranging from .005 to .035 mfd. are obtainable.

The arrangement of the capacities and switch are shown diagrammatically.

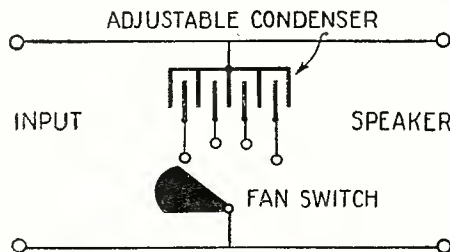


Fig. 1. Schematic diagram of condenser connection in tone control.

The matching of tone by this method gives such excellent results in all cases that it is like comparing the old "tin pan" morning glory phonograph with the electrically recorded and reproduced records of the present day.

## Time Clock Operates Receiver

A LITTLE, handsomely made time keeper is being placed on the radio market for the benefit of those radio fans who desire the "ultra" in radio control, as far as their receiver is concerned.

This accessory, which is a finely made clock, is so constructed that it will start or stop the radio at any predetermined hour, automatically. For instance, it can be set to turn the radio on at 6:45 in the morning to receive

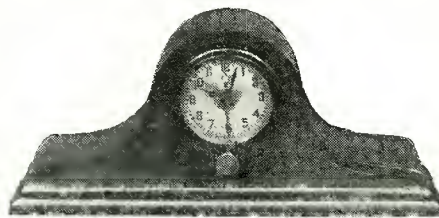


Photo courtesy Timing Appliances Corp.

This clock controls the "A" battery circuit of the radio set.

the setting-up exercises and shut it off at 7:30, without any attention.

It is at the same time a decided convenience as the radio listener may decide that he wants to listen to some dance music before going to sleep, and then go to rest knowing that if he does not wake up to turn the radio

off that the "Radio Timer" will do that for him, and not waste valuable "A" and "B" battery current by playing to "an empty house" all night.

## A New Tone Amplifier

WITH all the improvements made in radio in recent years, engineers are still striving to give tone quality that equals the naturalness of listening by head phones. The head phone listener gets the best possible reproduction because the phones shut out all room noises. He hears best with the volume of his set cut down to what would seem a mere whisper on the loud speaker. At this volume the tubes and transformers of the set and the phones, are working well below



Photo courtesy Central Radio Lab.

The compact power amplifier.

their current saturation or overloading point and a wonderfully true, clear tone quality results.

The best radio reproduction with loud speakers, on the other hand, is made possible by going to the opposite extreme, and increasing the volume of the set by adding power amplification. It is this extra amplification that explains the success of the power speaker. Such power amplification must be added to the average set, however, for best results. Simply putting a power tube in the last stage of the ordinary two-stage amplifier will not do, because while such tubes will handle a large amount of energy, they do not actually amplify as much as the standard type 201-A tube, and volume on all but local stations is reduced rather than increased as expected.

The technically inclined radio fan can build up this extra stage of amplification utilizing a power tube, in any form that goes best with his present



equipment. The tube should be coupled to the set by resistances or a high-grade plate impedance, using a modulator as the grid resistance to provide volume control. The output filter is made up with a 4 mfd. condenser and 30 henry choke coil. A .1 mfd. coupling condenser is needed, while a 4 mfd. bypass condenser is desirable to prevent possible audio oscillation with the third audio stage. A phone cord for attaching to the set, a battery cable, a filament resistance and a case will complete the assembly.

The average set owner, however, will find it much more convenient and economical to buy a factory built amplifier. Central Radio Laboratories have placed such a tone amplifier on the market that has all the essentials of nice appearance, convenience in attaching to any set, moderate cost, and perfected power amplification. Whatever amplifier you select, however, be sure that it is designed for power output as an extra stage, and you can expect results with practically any good speaker.

It is sufficient to state that the use of a power amplifier will prove a revelation to most fans, due to the added "sparkle" and clarity which the addition gives to the reproduction. This of course is due to the fact that the detector and radio frequency stages can be worked well below their "saturation point" for loud signals.

### A Space-Saving Antenna

Due to the congested conditions of apartment house roofs as well as the unsightliness, many fans are somewhat loath to install outside antenna. They therefore content themselves with an inside antenna installation, which, under ordinary conditions, is not nearly as satisfactory or efficient as an outside installation.

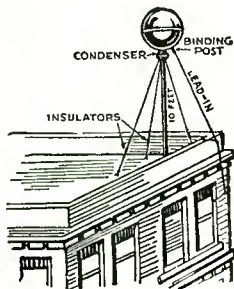


Illustration by courtesy of Yahr-Lange  
How the Super-Ball antenna is installed on a housetop.

Many manufacturers have placed on the market from time to time various devices intended to remedy this condition. The vast majority of these "antenna eliminators" have been condenser arrangements designed to utilize one side of the commercial lighting circuit by being plugged into a light socket.

A prominent mid-west manufacturer realizing this has placed a device on



# Summer Reception

Radio statistics show that with the increase in summer temperature comes a decrease in signal strength. This condition requires greater care in making control and tuning adjustments to obtain reception of winter quality. Then there is the ever present lightning hazard. Lightning protection is most essential for we do not know where it will strike next.

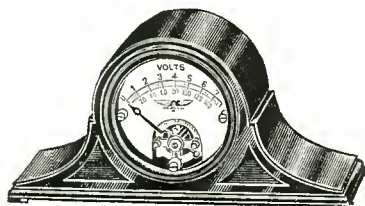
## Lightning Safety

The Jewell lightning arrester is the ideal protection for the radio set. It is small and the case is of glazed brown porcelain. Terminals are brass. It is completely sealed to exclude moisture, making it suitable for indoor or outdoor installation. Its reliability is indicated by Underwriters Laboratories listing which it carries. It is described in our special circular No. 1019.



Jewell Lightning Arrester  
—Listed by Underwriters Laboratories

## Filaments are overloaded easily in summer



Pattern No. 135-C Radio Voltmeter  
"De Luxe"

In radio sets having no voltmeter to assist in regulating filament potential, there is real danger in ruining tubes during the summer months because of the tendency to turn up the filament rheostat until the volume is equal to that regularly obtained in winter. A voltmeter immediately tells when the danger point has been reached.

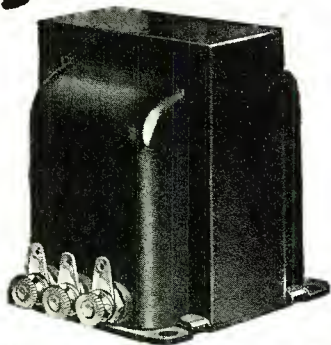
Pattern No. 135-C radio voltmeter in beautiful black bakelite case of miniature mantle clock design will keep filament voltage right. Movement is of the D'Arsonval moving coil type with silvered parts. Scale is silver etched with black characters. Each instrument has a zero adjuster and is furnished with a complete set of test leads.

Write for a copy of our Radio Instrument Catalog No. 15-C

**Jewell Electrical Instrument Co.**  
1650 Walnut St., Chicago

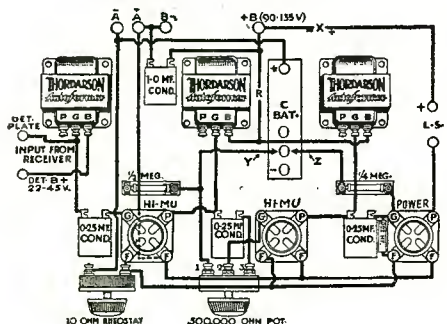
"27 Years Making Good Instruments"

# Ideal for the new Coupling HI-MU tubes



**THORDARSON**  
*Autoformer*  
Trade-Mark Registered

All Frequency Amplifier



The Thordarson Autoformer used as a straight impedance makes an ideal coupling medium for the new Hi Mu tubes UX-240 and CX-340.

The excellent tonal reproduction of the Autoformer combined with the high amplification of the Hi Mu tubes plus a power tube on the output will transform your receiver into a real musical instrument.

The Autoformer is available at all good dealers at a price of \$5.00.

Mail this coupon today for more detailed information.

**THORDARSON ELECTRIC MFG. CO.,**  
500 W. Huron St., Chicago.

Gentlemen:

Please send me more detailed information on the use of the Autoformer with Hi Mu tubes.

Name .....

Address .....

3553-J

the market which allows the efficiency of an outside installation without the serious drawback of the long stretch of unsightly wire. This "Super Ball Antenna" takes the form of a large copper bronze sphere or ball erected on the end of a ten-foot insulated post, guyed by means of three guy wires and tapped by means of a binding post for the lead-in wire. Several of these may be erected within a small radius without any interference being noted and they look much better than a lot of wires running "higgledy piggledy" around a roof.

## Station Selector Unit Sharpens Tuning

A SMALL, compact, non-adjustable device designed to increase the selectivity of the average radio receiver

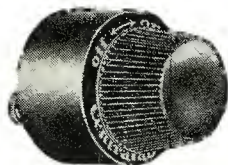


Photo courtesy Central Radio Lab.  
This compact unit sharpens tuning.

ers in the greatly congested broadcasting belt between 220 and 325 meters has been marketed by the Central Radio Laboratories.

The new Station Selector needs no adjustment. It is provided with a switch to cut in or out of the circuit at will. All of the tuning is confined to the regular dials of the set and with the unit in circuit, the set will tune sharply at the shorter wavelengths and stations are readily separated. Local stations are prevented from "coming in all over the dials" and outside stations, reasonably close to the local, come in without interference.

The station selector will not separate stations that send on the same wavelength nor those so close that they heterodyne, because, today, there is no device which will affect such separation known to radio engineers. Yet, the improvement in selectivity of the average radio receiver is so evident, that there is no hesitancy to guarantee complete satisfaction.

The selectors are very simple to attach. They are connected permanently between the antenna and antenna binding post of the receiver. There is also ample room on the shaft to mount it on the panel, if it is so desired.

## Antenna Installation Minimizes Static

Several years ago, at about the time that Major Squier was announcing his "wired wireless" a serious group of scientists in the East headed by Dr.

Rogers were making extensive experiments with antenna buried in the ground. Several very interesting angles developed from these experiments, the most important one of which, at that time was the fact that an antenna installation properly buried under ground had the effect of minimizing static and extraneous noises to a very remarkable degree.

The advance of broadcast radio itself, was so rapid at that time, that but little was attempted or done further along this line—except in an experimental fashion, although these experiments were of such value that they received official recognition by the U. S. Government.

Recently however, a man who was seriously interested in these experiments developed a method and applied it to the broadcast receiver whereby the results obtained in the first tests were even improved. The apparatus, if such it may be called, consists of a pecu-

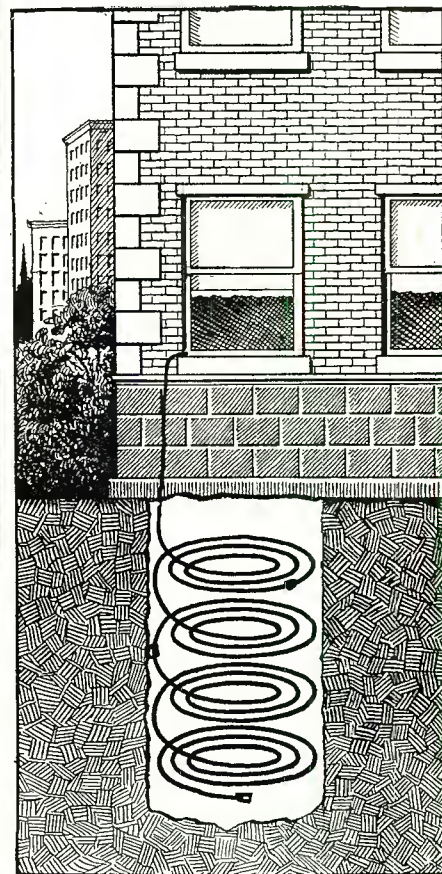


Illustration by courtesy Cloverleaf Mfg. Co.

The coils of the Sub-Antenna may be buried beneath ground.

liarily constructed, specially shielded cable which is to be buried as shown in the illustration, although the cable may be if possible to do so buried in a straight line eighteen or twenty inches under the surface of the ground.

This "Subantenna" as it is named is very suitable for use by persons living in suburban sections where it is possible to dig a hole suitable for its burying, or a trench such as noted above. Most naturally its use in a city, where concrete sidewalks and pavements are used is almost utterly impossible.

### Tube for R. F. Circuits

With the exception of the gaseous content type of tube of the 200 or 200A type, most of the tubes on the market may be considered as "universal," being capable of working as either R. F.—A. F. or detector. Lately tubes have been sold specifically as A. F. Power amplifier tubes, but the manufacturers have paid little attention to the development of tubes for the R. F. side of the circuit despite the real need for such a tube.

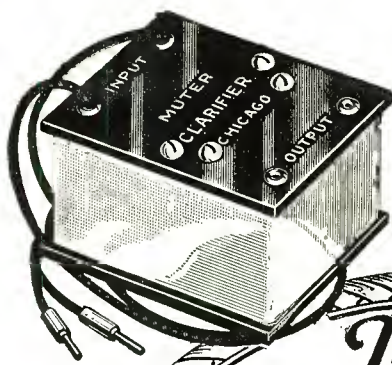


Photo by courtesy of C. E. Manufacturing Co.  
A new vacuum designed for use in Radio frequency amplifier circuits

The Type "K" tube depicted in the illustration was developed specifically for that purpose. It is manufactured for use in the radio frequency side of the "inherently balanced" type of receiver, such as are the vogue today. This tube is designed solely for use in front of the detector. It is not recommended as a R. F. tube in neutrodynes, however, due to the fact that the set will have to be completely re-neutralized whenever it is used in these receivers.

Ratings of these tubes are the same as those in use today, being a .25 ampere filament working at 5 volts and taking a plate voltage of from 67 to 140. The tube allows greater sensitivity with less trouble from noise due to forcing the R. F. tubes. They cannot successfully be used as audio or detector tubes due to their peculiar characteristics.

(Continued on page 158)



# Is Your Loud Speaker Paralyzed?

## The Muter Clarifier

Intercepts  
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Assuring Full Tone, Clarity and Volume

Most speaker units today are partially paralyzed because high voltage "B" current prevents proper response to the output of the set. The Muter Clarifier curbs this shattering current on its way to your otherwise defenseless speaker. The happy result is much greater depth and clarity of tone, with wonderfully improved quality and volume. The Speaker is now allowed to produce its utmost, and fear for the life of its coils and magnet is banished. Fans everywhere are surprising themselves with the vast improvement in reception they are getting with this great little instrument. Many report almost miraculous results.

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CHICAGO'S FAVORITE 4-TUBE SET  
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## Non-Inductive Variable High Resistances

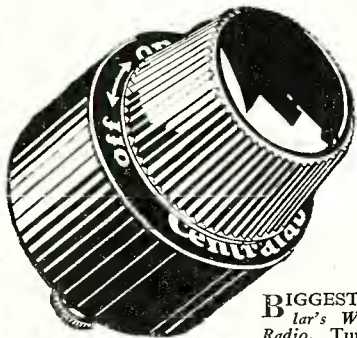
Centralab Radiohms with two terminals, and Modulators or Potentiometers with three terminals, provide gradual, noiseless control of oscillation or volume in any circuit. Specified for the Infradyne, S-C, Samson T-C, Henry Lyford, Universal and many other circuits. Used as standard equipment on a large number of commercial receivers, and by both the U. S. Navy and Signal Corps.

There is a resistance and correct taper for every circuit. The No. 25 M or No. 51 M are ideal oscillation controls when shunted across the tickler coil of short wave receivers.

Bakelite base and knob. Single hole mounting. Resistance of Potentiometers 400 or 2,000 ohms; Modulators 500,000 and 250,000 ohms; Radiohms 2,000, 25,000, 50,000, 100,000, 200,000, 500,000.

\$2.00 at Dealers, or Direct C.O.D.

### Centralab Station Selector

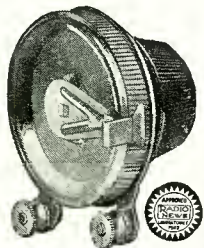


**BIGGEST Dollar's Worth in Radio.** Tunes out short wave interference, increasing selectivity of any set (not using loop) on stations close to local, except same wave length stations. Not a wave trap. No adjustments. Money-Back Guarantee. Satisfaction guaranteed. \$1.00 at dealers, or send us a dollar bill.

reference, increasing selectivity of any set (not using loop) on stations close to local, except same wave length stations. Not a wave trap. No adjustments. Money-Back Guarantee. Satisfaction guaranteed. \$1.00 at dealers, or send us a dollar bill.

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Permanent smooth, noiseless operation. Resistance element firmly clamped between insulated metal discs, immovable and warp proof. Permanent uniformity of windings. Even regulation. No dead spots. Large metal cooling area. Carry heavy current for their size. Wire wound for 1 to 5 tubes, \$1.00. Ribbon wound for 5 to 10 tubes, \$1.25. Bakelite knob. Single hole mounting. Six resistance types.



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# Centralab

## When You Take Your Radio Vacation

(Continued from page 132)

in mind when undertaking the "transplanting" of the radio set, and while under many conditions the location will prove to be even better, the installation many times will be out of the ordinary.

Take, for instance, a man who is going camping out in the mountains, such as depicted in the photographs. Fig. 1 illustrates the fastening of the antenna securely to the corner of the tent, so that wind will not cause unnecessary swaying of the wire with consequent swinging of signals. Fig. 2 illustrates a handy method of securing an antenna when there are too many trees in the neighborhood to allow of erecting a "straight-away" wire. A heavy nail is first driven part way into the trunk, the bare wire wrapped around it securely and then the nail driven home. An installation of this sort, strange as it may seem, forms a very good antenna. When locating a tree which is to be used as an antenna, pick one which has plenty of green leaves and heavy branches. A tree antenna such as this will be a pleasant surprise to the city fan who is used to the efficient action of the outside antenna, as a good solid tree will give as much and sometimes more "pick-up" than two or three hundred feet of wire.

Figs. 3, 4, 5, illustrate several methods of obtaining a good ground for the receiver. The ground utilized in Fig. 3 consists of a length of bare wire fastened to the neck of a bottle, filled with water, and flung out in deep water as far as possible. This constitutes one of the best grounds.

Fig. 4 illustrates another good ground. Here the bare end of the wire is fastened to a tin can filled with earth and buried along the edge of the lake or stream in the wet mud. Fig. 5 shows the method of burying the can. The deeper it is buried in the mud the better the ground.

It will be found that many more opportunities for good grounds and antennae exist in the country than in the city. Many owners of portable receivers who have tried their sets out in the city and then take them to the country are really surprised by the increased distance and power of their sets—provided that they do not pick a vacationing place in a section where the earth is filled with metallic ores—in that case they will be lucky to get any reception at all.

In all cases where a tree is used for an antenna, or where the wire is that is used for antenna runs near or through the trees, a good lightning arrestor should be used, and whenever there is a thunderstorm in the vicinity the set should be turned off and not operated until after the storm has abated. Failure to use a good lightning

arrestor may result in serious damage to the set if any of the trees in the neighborhood are struck by lightning, because lightning seems to have the peculiar habit of "setting up" charges in trees around those which it strikes, and while there is very little danger from an installation where this is taken care of, it is wisest to take the precaution beforehand than to worry about it after.

Remember that a radio set properly protected by means of an arrestor is as good if not better protection than a lightning rod, as it continually dissipates the charge of electricity in the upper air, and does not allow the potential difference which is the cause of lightning to form.

## How to Build the Transoceanic "New Phantom" Model

(Continued from page 84)

The radio frequency control rheostat controls the filaments of the four radio frequency tubes. For loud local signals this control need not be turned on full but may be operated to give the filaments of the radio frequency tubes less than their rated voltage as determined by the meter. When trying for distant stations, the full rated voltage can be applied to the radio frequency tubes by adjusting this rheostat.

Effective volume control is obtained by means of the variable resistance connected across the grid circuit of the second audio tube. Adjustment is made by means of the "Volume" knob on the front panel.

The tuning of the receiver is by no means as difficult as it would appear from the formidable array of tuning dials and controls on the panel. These controls are designed to give the last iota of efficiency from the circuit for tuning in stations over 2,000 miles away but the dials can be ganged together for two-control or one-control operation for comparatively nearby stations.

Since the antenna characteristics are the variable factors, the best arrangement is to use two tuning controls; viz. the variable condenser for the first radio frequency stage and a gang control for the other four tuning condensers.

Before the four tuning condensers can be connected together, they must be brought into exact resonance. To do this set the compensator condensers at their midpoints. Then tune-in a station at about 40 degrees on the dials and when it has been tuned in to best advantage, with the condensers set so as to give best results, tighten the universal joints which connect the condensers together.

This feature of simplified control is very effective for the comparatively long wavelengths above 200 meters but

is not as efficient on the shorter waves down to 35 meters because on the short waves, any slight difference in capacity makes a considerable difference in results.

The four stages of tuned radio frequency amplification, made possible by careful design and placing of parts and by complete shielding, serve to produce a receiver of unparalleled selectivity and sensitivity. Perfect tuning control with delicate individual control for extremely fine tuning and gang control for local or comparatively nearby stations gives remarkable flexibility of operation.

Interchangeable radio frequency transformers provide a receiver capable of tuning in stations of from 35 to 3,600 meters covering the complete range of domestic and foreign stations.

A high quality audio amplifier system, adaptable for use with any type of tube and any arrangement of battery combinations completes list of features used exclusively in this remarkable receiver.

## Building the Loftin White Constant-Coupling Receiver

(Continued from page 120)

You can now proceed to wire the receiver by referring to the schematic and pictorial wiring diagrams. Details for making connections are shown in these diagrams.

The next step is to trace out your battery leads and make sure that they are correct. As a further check after connecting the batteries but before inserting your tubes, it is a good idea to test across the filament terminals of the sockets to make sure that there is no high voltage connected across the filament leads.

If a standard 201A type of amplifier tube is to be used in the last stage, the "B AMP+" binding post should be connected with the 90-volt terminal of the "B" battery. In that case the corresponding "C Bat—" binding posts should be connected with the 4½-volt terminal of the "C" battery.

When a 112 type tube is used in the last stage, the "B AMP+" connection should be made to the 135-volt "B" battery terminal and the "C Bat—" terminal should be connected with the negative 9-volt terminal of the "C" battery.

Best results however are obtained when a 171 type of tube is used in the last stage, with 135 to 180 volts of "B" battery. For 135 volts the negative "C" battery voltage should be 27 volts while for 180 volts a 40-volt "C" battery should be used.

When the batteries, antenna, ground and loudspeaker are connected and the tubes inserted, you can proceed with

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**\$16.75**  
prepaid  
to States Shown

### New Console Radio Table

Your choice of Mahogany or Walnut finish in high-grade Laquer over Genuine Walnut or Mahogany veneers. Ample space for charger and batteries. Abundant knee room. Top 17" x 36". Height 28". Two battery spaces, each 8 in. wide, 9½ in. high, 13 in. deep. Designed for concealed wiring. An exceedingly fine console table to match the most beautiful receiver. These very low prices apply.

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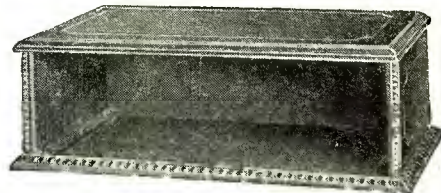
\$16.75 EXPRESS PREPAID to Ala., Del., D. C., Ga., Ky., Md., N. C., Ohio, S. C., Tenn., Va., W. Va.  
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The "BLUERIDGE" \$4.25

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One of our newest cabinets already proven highly popular among radio builders who demand the best in appearance and construction throughout. Made of selected birch wood. Finished in high quality Laquer, Dull Rubbed. Full-length, piano-hinged top. Rubber feet. Baseboard provides for concealed wiring. Your choice of Mahogany or Walnut finish. Sizes as shown.

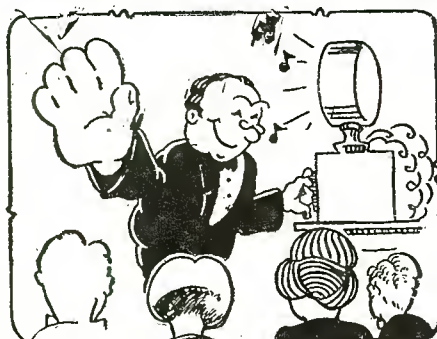
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| 7" x 18" x 10" | \$4.25 |
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Radio Receivers know no rules of etiquette—they cannot be taught to act on best behavior when company and friends are judging them—but they can be made to act properly if the operator understands the few simple factors that effect tuning or the proper adjustment of the Receiver's controls.

The 64 page, illustrated book on How to Tune Your Radio Set (Conrad—25c) is a carefully prepared, yet simplified, instruction book on tuning alone. It will surprise you—Buy a copy today—at the nearest Radio Shop. Only 25c. You'll get three times that value out of it.

"HOW TO TUNE YOUR RADIO SET"—25 cents the Copy

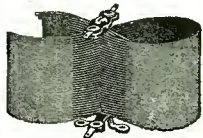
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That's where you'll always find Bodine Twin-Eight Radio Frequency Transformers. Look at the description of the Prize-winning set in Radio Listeners' Guide and Call Book's contest described on another page of this magazine.

Twin-Eight Coils were chosen for the heart of the set because their ability to get distance, their tremendous R. F. amplification, selectivity and remarkable tonal quality has made them the peer of all R. F. transformers. Wherever you find a radio frequency set that has been designed to give the maximum possible results, there, too, you will also find Bodine Twin-Eight Transformers.



Bodine Twin-Eights for all circuits.  
Price each \$2.00

## Use Twin-Eights for Outstanding Results

The scientific design of Twin-Eights assures unusual results. The coils are self-supporting and exact proportioning of coupling between primary and secondary provides tremendous amplification. The closely limited field prevents oscillation due to interaction between adjacent coils.

## Replace Your R.F. Coils with Twin-Eights

Build the prize set described in this issue, or replace your present coils with Twin-Eights, and you will marvel at the enormous gain in amplification, knife-edge selectivity and the deep, mellow tone that only Twin-Eights can produce.

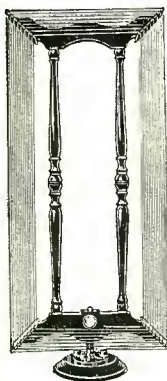
Mail the coupon for free literature describing the construction of the Bodine Twin-Eight Six-tube receiver, using three stages of R.F. amplification, or send \$1.25 for full size blueprints.

## Bodine DeLuxe Loop

Here is a loop that combines remarkable efficiency with sheer beauty. Its solid walnut frame, hand-rubbed to a satin finish and dark brown, silk-covered wire graces any home.

### Mounted in Top of Cabinet

An exclusive Bodine feature is the removable jack mounting. It allows the loop to revolve continuously in either direction without tangling of connecting wires, or, the jack may be mounted inside the cabinet and the loop plugged through a small hole in the cover, concealing all wires. Also provided with wire tighteners so that the wires may be kept taut at all times. Recommended for Madison-Moore, Victoreen, Remler, St. James, Nine-In-Line and Dynafomer Circuits. May also be used with tuned radio frequency circuits or neutrodyne receivers if a slight change in the receiver is made. At your dealer, or sent postpaid upon receipt of price.



Model L-500 for .0005 condensers. Price \$12.00  
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Please send circulars and complete information on Bodine Loops and Coils.

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the adjustment of the receiver. Turn on the switch and the rheostat. The tubes should light up and sounds should be heard from the loudspeaker.

If on tuning the condensers you get good results from your local stations, the job may be complete except for a few slight adjustments to obtain maxi-

### PARTS FOR THE LOFTIN-WHITE SET

- 1 Pacent, Loftin-White Foundation Unit
- 1 Set, Hammarlund, LW3, Loftin-White coils, (T1; T2; T3)
- 3 Hammarlund, ML 23, .0005 mfd. Midline variable condensers, (C1; C2; C3)
- 2 Pacent, No. 27A Input Super-audioformers, (T4; T5)
- 1 Pacent, No. 27B Output Super-audioformer, (T6)
- 1 Pacent, No. 90B, 10-ohm rheostat, (R)
- 5 Pacent, No. 83 Cushion sockets, (1; 2; 3; 4; 5)
- 2 Pacent, Special Loftin-White choke coils included in foundation unit, (CH1; CH2)
- 2 Marco, No. 220 Illuminated dials, insulated type, 0-100
- 1 Durham, 2 megohm resistor, (GL)
- 1 Yaxley, Type No. 704, Junior type, interstage jack, (J)
- 1 Yaxley, No. 10, Midget Battery switch, (S)
- 1 Sangamo condenser kit consisting of:
  - 1 .00025 mfd. with grid leak clips, (C9)
  - 1 .001 mfd., (C10)
  - 3 .004 mfd. (accuracy within 5% important), (C4; C5; C6)
- 2 X-L Radio Laboratories, No. G-5 variodensers, (C7; C8)
- 2 Amperites, No. 1A, (A1; A2)
- 1 Amperite, No. 112, (A3)
- 12 Eby binding posts; one each of the following markings:
  - "ANT"; "GND"; "SPEAKER+"; "SPEAKER-"; "B AMP+"; "90 VOLTS+"; "45 VOLTS+"; "C BAT-"; "C BAT+"; "A BAT+"; "A-BAT C+"; "B BAT-"
- 1 Micarta, Loftin-White drilled and engraved front panel
- 1 Micarta, Loftin-White drilled subpanel

mum efficiency. Before proceeding with these adjustments, the set screws on the two variodensers should be tightened as far down as they will go. The set will now squeal on practically every wavelength from 200 to 550 meters, when the two condensers tuning dials are set to approximately the same reading.

Now adjust the condenser dials so as to tune in a station at about 65 on the dials. Loosen the coupling between the two condensers that are ganged together and adjust the two condensers independently until the squeal comes in loudest. Then tighten the coupling again so that both condensers are controlled by the dial. In determining the position which gives the loudest squeal you may find it necessary to turn down the volume by means of the rheostat to

a point where a slight adjustment in the condensers will produce a noticeable difference in the volume of the squeal. When the volume control is turned on full it is sometimes difficult to notice any change in intensity as you adjust the condensers.

Next adjust the condensers so as to tune in a station at about 15 on the dials with full volume. Next turn the volume control rheostat to the left until the squeal disappears. Now turn back to the squeal near the 90 dial setting of the dials. If there is a squeal there, turn back to 15 and move the primaries into the secondaries until the squeal comes back at the 15 setting. If the squeal is not there at 90, turn the dials back to the 15 setting and turn the volume control to the right until the squeal comes back and no further. Then raise the primaries out of the secondaries slowly until the squeal disappears.

Now turn the volume control all the way to the right leaving the dials on 15. Next take a screwdriver and alternately turn the screws in the two variodensers, one-quarter of a turn to the left until the squealing stops. Now turn the dials slowly across the scale. If no stations squeal, but come in as they should, all the way across the scale, nothing further need be done in that respect. If they do squeal at some point, loosen up on the variodensers alternately, a quarter of a turn at a time, until the squealing stops.

The two variable condensers which are ganged together may now be set more accurately by tuning in a weak station or one that is weakened by turning back the volume control. While this weak station is coming in, loosen the set screw on the coupling and by turning the disc with one hand and the dial with the other, adjust for the loudest signal from that weak station and then tighten the coupling again.

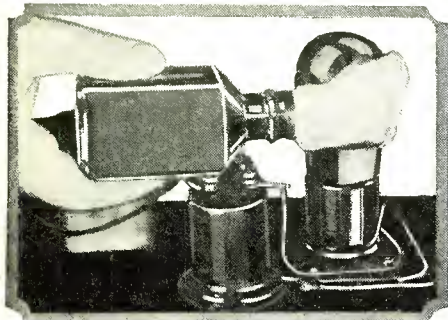
The actual operation after these preliminary adjustments are finished is very simple. Stations are tuned in with the two dials while volume is controlled with the rheostat knob. Signals come booming in as the dials are turned from setting to setting without any squealing and under perfect control of volume with the rheostat.



## Have You a Vacuum Tube Atomizer in Your Room?

One of our readers, a young lady who possesses the distinction which most fastidious people of the "weaker sex" are also prone to, sends us in a little wrinkle which she uses on her set. She describes it as follows:

"I live in a modern apartment house—one of those 'efficiency apartments' which combines the living room with a small dinnette and kitchen. It is natural, of course, that many of the odors

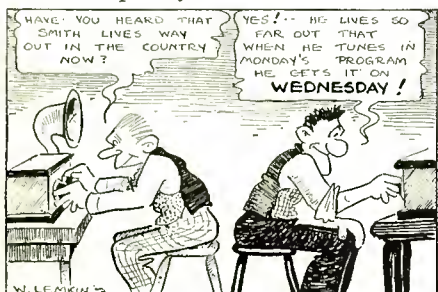


Ordinary cotton is wrapped around the tube and a few drops of perfume is applied.

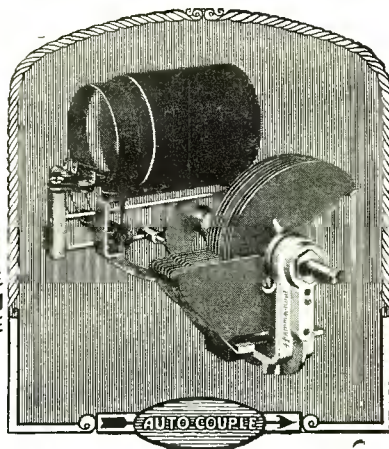
common to preparing a meal invade the living room. I have been in the custom of using a small amount of incense to overcome this cooking odor. Recently, however, I happened to be filling my atomizer near the window, on the sill of which the radio set is located. By accident a drop of the perfume spilled on one of the vacuum tubes. The result was that the entire room was, in a short time, pervaded with the most delightfully fragrant perfumed odor imaginable. The main trouble was that the odor was so entirely short-lived that it would be decidedly expensive to keep the 'vacuum tube atomizer' going long enough to entirely perfume the room."

"I solved the problem, however, by wrapping a piece of absorbent cotton around the tube with thread and then moistening it with the perfume. It is surprising how long the odor will pervade the room when this is done."

We now see where "friend wife" is going to insist that she didn't enjoy the broadcasting of the opera last evening because "the better 'alf" insisted on using QueQue's Sixty-seven Flowers, when he should have used Black Violets on the radio frequency tubes and Jasmine O'dear on the detector and audio frequency.



A scientific union of "Midline" Condenser and Space-wound Coil, providing accurate variable primary coupling at every wave-length.



The "Auto-Couple" greatly improves selectivity, signal strength and control of oscillations on the low waves. Condenser and Coil sold separately.

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And that leadership is due not to clever advertising, not to high-powered salesmanship—but to skillful engineering and conscientious quality in every detail of manufacture.

You can depend on Hammarlund Products because dependability is built into them.

There is a Hammarlund Condenser, coil, shield and equalizer made for every type of radio receiver. Ask your dealer about them.



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We shall be pleased to refer to the proper authorities your inquiries regarding any receiver mentioned above.

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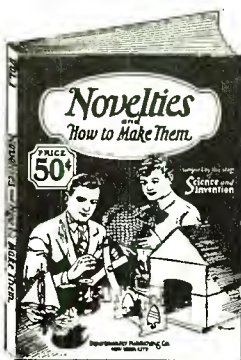
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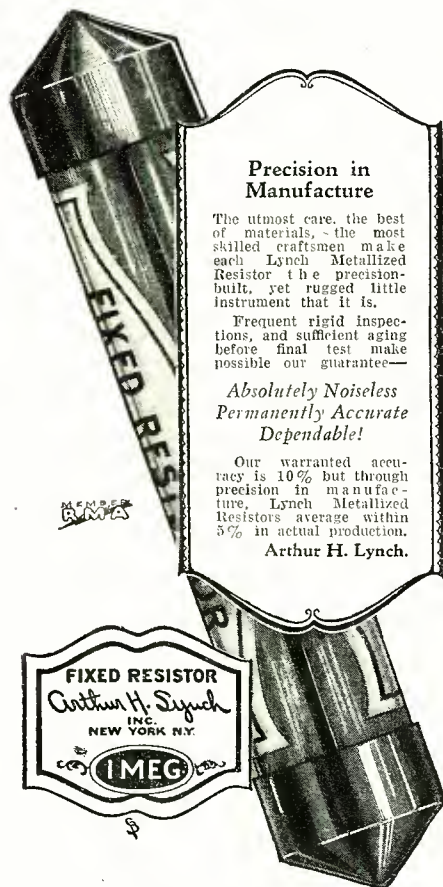
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New York, N. Y.

## \$200 Set Building Contest

(Continued from page 78)

fully stained, rubbed and waxed. The compartment in the center houses a Western Electric unit which for practical purposes handles all the volume necessary. The compartments on either side contain the A and B battery supply units."

"In addition to the Western Electric speaker, the 36-inch cone which hangs directly above the set and which is a recent addition to the equipment enables me to fill the house with wonderfully clear and mellow music. Reception on this receiver is above the ordinary: under conditions which to other sets are just about fair, I am able to bring in the West Coast stations on the cone with enough volume to dance by right through the local interference. Needless to say, however, before this degree of perfection was attained many an evening of testing and re-wiring of the circuit was necessary. I am now content that I have a set which is above the average to a great extent, and have in effect 'locked the door and thrown the key in the sea' which I think is a good practice, when it works right—leave it alone."

There is a great deal of truth in what Mr. De Forest says in the last few sentences of his story. Far too many fans build receivers and then because the set does not operate to perfection right off the bat, blame the circuit or the set. Any receiver, regardless of what type it is, can always be improved *up to a certain extent* by testing and trying out various little schemes to improve it.

Then, too, there are the fans who are always trying to improve their set after it has been put in perfect working order, and are constantly tearing it down and building it up again. They are the fans who should follow the advice in the last few words—"lock the door and throw the key away." When it works to perfect satisfaction, more experimenting is going to harm instead of doing good.

### Third Prize—\$25.00 Award

Third prize went to Mr. J. W. Hoops of Closter, N. J., who used as his choice of a circuit the Karas Equamatic as described in Radio Listeners' Guide and Call Book—Winter Edition.

The award was given in view of the following points which characterize the building of this set by Mr. Hoops. Originality of set design. Uniqueness of placing parts so as to utilize minimum space with regard to interaction between circuits. Extreme care in building up of circuit and strict attention to the high points of good set building.

The building of the set is described for the reader from a short summary supplied by Mr. Hoops, as follows:

"Before deciding on the circuit which was to be used in building a set for the Radio Listeners' Guide and Call Book Set Builders' Contest, I ran the usual gamut of set builders, building five, seven and nine tube sets of all description and comparing them with one another. The one that stood out most distinctly under this test and the one which most nearly approached my ideals was the Karas Equamatic. Therefore I decided to put all my efforts into perfecting this circuit for my own use and entering it in the contest."

"In the matter of construction I can truthfully say the set as described by A. M. Powers followed almost without exception. True, the space of 28 inches did give me a little trouble for a time, but I decided to cut the panel down to 7 by 21 inches and arrange the apparatus according to the best electrical procedure without undue crowding and consequent interaction between parts. How this was accomplished is adequately shown in the photograph. There is a decided difference in the fundamental layout of parts, and I believe that the layout which I am using is an improvement over the original as I have noted much sharper tuning, easier wiring and more stable operation when hunting for DX is the result."

"There are several improvements I incorporated in the set that have improved the operation and results on the set appreciably. Amertran De Luxe transformers with RF and AF chokes and a Pacent Super-audio output transformer make the audio side of this set as near perfect in my estimation as it is humanly possible to make a receiver. The faithfulness of reproduction through a cone loud speaker is so good that it is possible to hear the speaker breathe during pauses and such things as the scuffling of feet during an orchestral or dance music rendition are present in the reception—without the least bit of distortion or back-ground."

"The entire set is wired in the telephone cable style, all wiring being done with flexible cable, bunched, sewn together and varnished in place with a good grade of telephone insulating varnish. Every connection is solidly soldered and all condensers are pig-tailed with braided copper wire."

"A double-pole double-throw Yaxley jack-switch is used to control the filament current. Before installing this I adjusted the contacts so that the filament current is thrown on before the 'B' eliminator is connected through the relay. This eliminates to any extent at all the paralyzation of tubes or the blowing out of transformers due to residual currents existing in the circuits and condensers when the tubes are lit."

"I firmly believe that with a little care in design and building the popular cir-



cuits of today when home built exceed any of the ready factory made sets. Especially when the builder is particular and does not "throw" the set together without first testing and re-testing, building and re-building until the happy medium of good selectivity, quiet volume and excellent reproduction are obtained. When such is done, I for one will match my set and its results against any factory set on the market of equal tubes and circuit. I am a great believer in being careful, and think that the set I have built shows as much, if I can be pardoned for saying so without earning the sobriquet of 'egotist.'

**Fourth Prize—\$10.00 Award**

The judges awarded fourth prize to Mr. Milo Jones of Jacksonville, Florida, who built a phonograph-radio combination, using the well known Ultradyne as his choice of a circuit.

The judges considered the following points in making this award: Neatness of construction and layout; originality of design and uniqueness in combining a radio and phonograph. Mr. Jones described his receiver for Radio Listeners' Guide and Call Book as follows:

"My experience with super-heterodynes began when R. E. Lacault first introduced the Ultradyne principle to the radio public. This was before it was possible to obtain factory-made kits, so naturally the first parts for my L-1 were home made. The transformers, tuners and couplers were laboriously wound with wire obtained from a motor repair shop. This set since first completed, and up until I recently sold it has given excellent service."

"Due to my success with this first circuit, I decided to use the new L-2 when building the contest set. I furthermore decided to build what is now considered the most up to date—the combination console phonograph-radio. How this was accomplished is shown very plainly in the photographs accompanying this set."

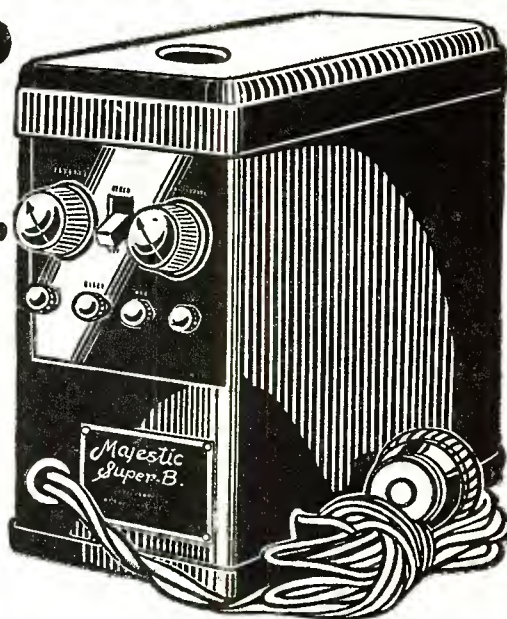
"In constructing it, I used the very best of parts—Formica panel, Hoyt Meter, Marco Illuminated Dials, Centralab Potentiometer, Hammerlund Midline Variable condensers, Sangamo and Duetchman Fixed condensers, Benjamin Sockets, Victoreen Intermediate Transformers and Rauland Lyrics complete the parts used."

"As the circuit has been explained many times in different publications I will not go into details as to its construction. Suffice to say that I found the combination of the Lacault modulation method combined with the Victoreen intermediate transformers a most ideal combination, and one which allows the nightly reception on a loop of KFI, CYJ and CZE with one stage of audio. I seldom find use for more than one stage at any time, and in most cases of stations within a few hundred

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Cabinet finished in rich black crystal enamel. Dimensions: 10 1/4 inches deep by 5 1/2 inches wide by 9 inches high. Weight: 20 pounds net; 25 pounds packed. Bakelite Panel. Complete with extension cord and attachment plug. One RAYTHEON tube with G-G-H protective packing. Packed in individual padded wire-bound wood cases.

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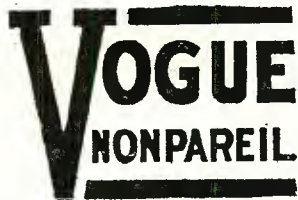
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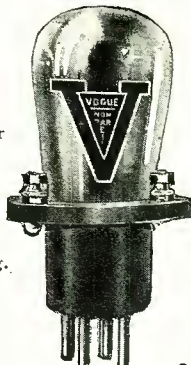
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miles I have too much volume on only one stage.

"The cabinet which houses the set, phonograph, loudspeaker, A and B Eliminator and the phonograph records, is an Excello. The phonograph was picked up at a phonograph store and placed in the upper part of the cabinet, first removing the horn which is furnished with the cabinet and substituting a unit and speaker of my own."

"As Amperites are used throughout, this set is extremely easy to tune and control, the only tuning having to be done on the two dials and the regeneration control, the potentiometer very seldom being touched, due to the very accurate matching of the intermediate transformers and the consequent identical point of oscillation throughout all stages."

"I can recommend this popular circuit to any set builder who desires the utmost in radio receiver construction and reception—provided that the very

crack or spoil a single piece of material.

The set has been finished so recently that its builder has not had time to give it a thorough test. He states however that from all indications the set will by far exceed in reception and tonal quality any set that it has ever been his fortune to hear or operate.

### Sixth Prize—\$5.00 Award

The Sixth prize was given to Mr. E. H. Bonham of Elwood, Ind., who constructed a Victoreen Super-heterodyne as described in Radio Listeners' Guide and Call Book, but who varied from the description to the extent of utilizing a Bruno Unitune Type 2C condenser control.

The award was made on the points of extreme neatness of work, originality of construction and actual results which the receiver now in use has proven it will give.

Mr. Bonham states that although he followed the plans closely he has made the following changes: A Lignole



A top view of the seventh prize set built by Mr. A. D. Winchenbaugh. The set is a Victoreen Super-heterodyne as described in the Winter 1926 edition.

best of parts are used and that the construction is carefully planned and executed."

### Fifth Prize—\$5.00 Award

The Fifth award was given to Mr. J. Fleishauer of Pontiac, Michigan, who constructed a Norden-Hauck Super Circuit. Instead of enclosing it in the usual cabinet and panel he has used plate glass throughout.

The award was made considering the efficiency of the work, the unique manner of winding the coils on glass tubing, and making the sockets from plate glass, as well as the ambitious manner in which the entire set was constructed.

Mr. Fleishauer states that in the construction of the set he did not make any great changes in the circuit wiring, instead following the diagrams closely, but making such adaptation in the layout as might be necessary due to its unique construction. One change that he introduced into the circuit, is the elimination of a rheostat for the audio tubes, the four last tubes being in series with one another and taking their current direct, from the battery without any adjustable unit being used.

In making this receiver it was necessary to drill over 450 holes of varying diameter from one sixteenth up to three quarters of an inch through glass. It took more than 500 hours to accomplish this task, and during the work, Mr. Fleishauer states that he did not

Walnut inlaid front panel. A Universal Light Switch so placed that the light from the miniature bulb illuminates the two drums. A binding post running the full length of the panel to avoid crowding of wires.

Verifications of more than sixty stations, many in Canada, two in Cuba and the rest from the four points of the U. S. have proven that Mr. Bonham is a constructor well deserving of recognition as a contest set builder.

### Seventh Prize—\$5.00 Award

The Seventh prize was given to Mr. A. D. Winchenbaugh of Waldborough, Maine, who constructed a Victoreen Super-heterodyne as described in Radio Listeners' Guide and Call Book, but who varied from the description to the extent of using a glass panel and adding another stage of intermediate frequency.

The award was made on the points of extreme neatness of work, originality of construction and actual results which the receiver, now in use, has proven it will give.

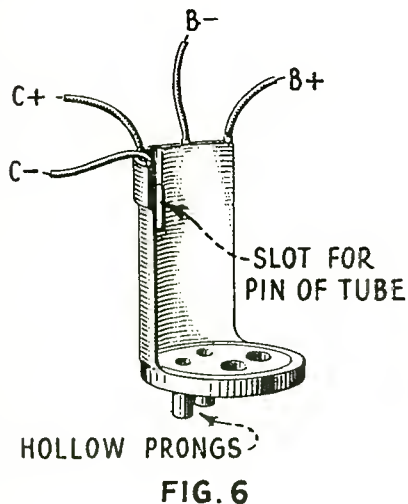
Mr. Winchenbaugh states that, in the construction of the set, he picked the Victoreen as his choice due to his knowledge of the results other builders of the same circuit had obtained. He states that although this is his first attempt at drilling glass for panel material he would not advise others doing likewise unless they possess plenty of patience and can stand the sorrow of seeing a panel crack when drilling the very last hole.

## How to Install Power Tubes

(Continued from page 126)

be connected to these binding posts as these particular sets have binding posts within the set for the extra "B" and "C" voltage connections.

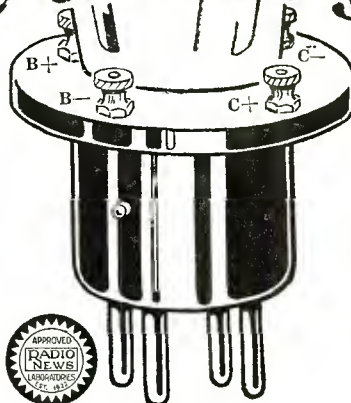
Method Number Two: The changing of the wiring to the last audio socket, seems to be the next most practical method of adding, the extra "B" and "C" voltages to the power tube. Fig. 4 shows diagrammatically a typical wiring arrangement of the last audio stage of a set never wired to provide a power tube with the extra "B" and "C" voltages. If the fan decides to change this wiring in order to use a power tube, then the typical wiring diagram shown in Fig. 5 should be followed. Usually when making this change in wiring some means is provided for the convenient cutting out of the extra "B" and "C" voltages in case the fan ever wants to substitute the ordinary amplifying tube (type 201-A) for the power tube. As might be expected, the average fan probably will object to the bother and annoyance of having his set wiring changed, and probably he is not skilled enough to do the job himself. However, when once done it makes for permanency



and should prove quite satisfactory and usually convenient to the average set owner.

Coming down to the last method (three) of using the adapter, it will be found that there are several limitations in its adaptability to many types and makes of sockets. Because of these limitations the utility of the adapter is rather restricted. The adapter illustrated graphically in Fig. 6 is intended for use only with power tubes having the plain tubular base as illustrated in Fig. 1. The adapter is provided with four wires dangling from the web, these wires intended for making the connec-

**Now!**  
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Buy a Power Tube with the Duplex Base and enjoy real reception.

There are many reliable makes of Power tubes with the Duplex Base. It comes already assembled.

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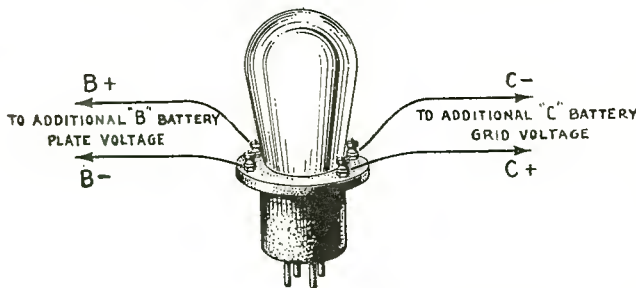
Power tubes with a Duplex Base can be CONVENIENTLY used in any circuit because they are always interchangeable, without any fussing, whether the set is wired for a power tube or not.

No change in set wiring is required. There is no necessity to use misfit adapters. Fits "UV" and "UX" sockets.

When sets are not wired for a power tube simply insert one with a Duplex Base in last audio socket and connect the extra "B" and "C" voltages to the binding posts on the rim of the Duplex Base.

For set already wired for power tube, place the jumpers, furnished with tube, across the B+ and B- and across the C+ and C- binding posts and insert tube in last audio socket. Connect extra "B" and "C" voltages to binding posts which are provided within the set.

If your dealer cannot supply power tubes with a Duplex Base write to the manufacturers listed below, or to us.



Our Mr. John T. Havekost, I.R.E., well known Radio authority, will cheerfully advise you on any radio problems, particularly tube problems.

*The following tube Manufacturers use the Duplex Base on their power tubes:*

- |   |  |
|---|--|
| Allan Mfg. Co. ("Vogue Nonpareil" tubes)<br>206 North Third Street, Harrison, N. J. | Lectrodio Corp. ("Elektron Shielded" tubes)<br>186 Market Street, Lynn, Mass.            |
| C. E. Manufacturing Co. ("CeCo" tubes)<br>702 Eddy Street, Providence, R. I.        | Schickerling Products Corp. ("Schickerling" tubes)<br>401 Mulberry Street, Newark, N. J. |
| Connaway Electric Labs. ("Magnatron" tubes)<br>406 Jefferson Street, Hoboken, N. J. | Sturdy Engineering Co. ("Sturdy" tubes)<br>422 South Clark Street, Chicago, Ill.         |
| K-T Products Company ("KeenTone" tubes)<br>68 William Street, New York, N. Y.       | Sunlight Lamp Co. ("Superior" tubes)<br>Newton Falls, Ohio                               |
|   | The Windsor Co. ("Windsor" tubes)<br>422 South Clark Street, Chicago, Ill.               |

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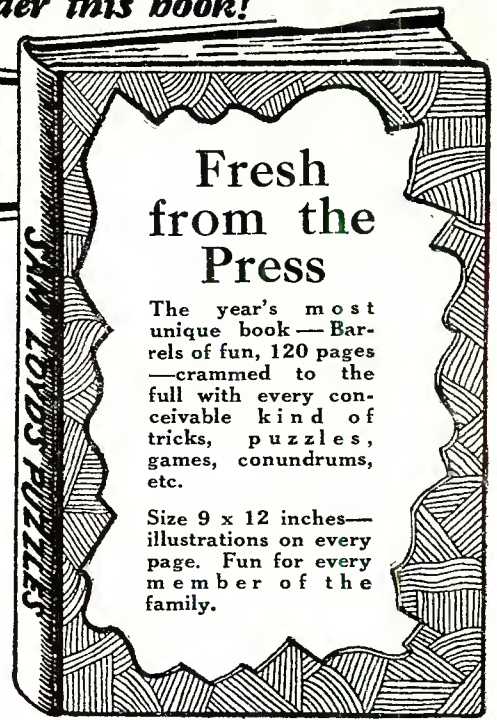
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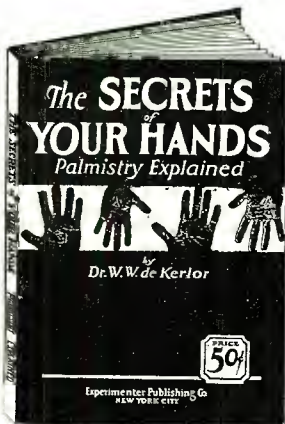
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tions to the extra "B" and "C" batteries required by the power tube. In the base of the adapter are two hollow prongs, insulated on the inside, which open up through the base of the adapter. Two holes also open up through the base. The grid and plate prongs of the plain tubular base power tube are inserted into the hollow prongs of the adapter and the tube filament prongs are inserted through the two holes in the base of the adapter, thus bringing the web up along the side of the tube base as shown in Fig. 7. Owing to the outside diameter of the hollow prongs of the adapter it will be found impossible to insert these hollow prongs through the prong holes in a universal or UX type of socket. Hence the use of the adapter is strictly limited to insertion in the "shell" or tubular (UV type) sockets. The UV type of sockets usually are open in the bottom and have spring contacts for engagement with the tip ends of the tube prongs. In some types of

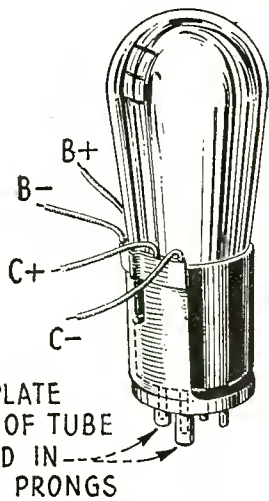


FIG. 7

UV sockets it will be found necessary to bend two of the spring contacts up somewhat when using the adapter. As there are numerous makes and types of "shell" or UV sockets in use, with variations in their inside diameter, it will be found that the adapter when attached to the tube will not go into some of these sockets without either increasing the inside diameter of the socket or decreasing the diameter of the tube base.

Whenever using the type 171 power tube in the last audio stage, particularly with 180 volts of "B" battery, it is always advisable to couple either a transformer or a choke coil and fixed condenser between the loud speaker and the last audio stage.

From the foregoing it can be readily understood that in order to employ a power tube it is necessary to learn whether or not a set is wired for same. But in any case a tube provided with a Duplex type base can be used very conveniently.

# Improve Reception with this Tube



## Keen Tone Power Tubes Now Equipped With the Popular DUPLEX BASE

No Rewiring or Adapters Necessary

The Keen Tone power tube, with the latest Radio achievement—the Duplex Base—enables you to use this tube without rewiring set—or without using makeshift adapters.

nothing could be simpler. Full instructions come with each tube.

Sold only by mail with guarantee of money back if not satisfied. Packed in special carton to insure safety.

Get our attractive offer on group purchase plan. Our 213 and 216 rectifier tubes for "B" Eliminator will soon be ready. Ask us about them.

Just insert the tube in the last audio socket and connect the extra "B" battery and the extra "C" battery leads direct to the binding posts on the Duplex Base—

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| <input type="checkbox"/> X-171 Power tube with Duplex base..\$3.50  | <input type="checkbox"/> X-201-A Amplifying tube.....\$1.25         |
| <input type="checkbox"/> X-112 Power tube with regular base..\$3.25 | <input type="checkbox"/> X-199 Amplifying tube.....\$1.50           |
| <input type="checkbox"/> X-171 Power tube with regular base..\$3.25 | <input type="checkbox"/> V-199 Amplifying tube.....\$1.50           |

Name .....

Address..... City. State.....

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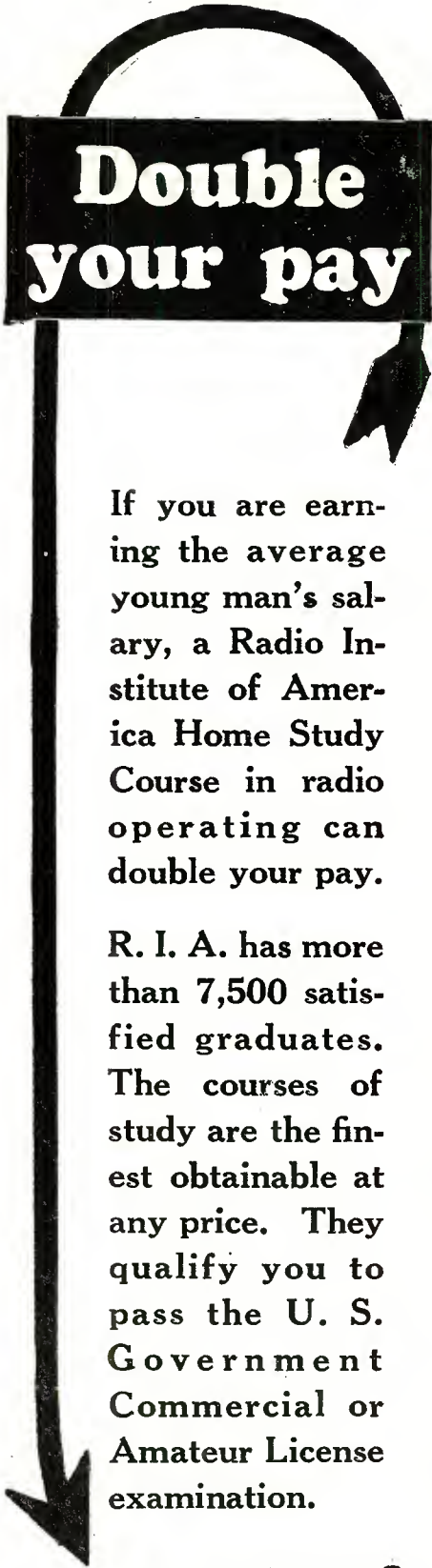
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## The Phasatrol Receiver

(Continued from page 94)

on the panel, the single hole mounting nut should be discarded and only the two mounting screws should be used. Before mounting the condensers, it is best to screw in the set pin of the dial. In this case, the use of a nut on the back of the panel would interfere with the mounting of the condenser so that instead of inserting the set pin thru the hole and fastening it in place with a nut on the back of the panel, the hole should be threaded with a 6/32 tap and the screw screwed in and cut off flush with the back of the panel. The condensers can then be mounted without any interference from the dial set pin.

The condenser tuning dials should be set at 100 when the condenser plates are all in mesh. The arrows on the knobs of the variable high resistance and of the compensator should be set to point to the top of the panel when they are turned as far as they will go in a counter-clockwise direction.

Be sure that you have the proper size Amperites in the positions indicated. Transformers should be mounted with the terminals in the relative positions shown.

You can then start to wire up the receiver. With this type of receiver, the wiring is a very simple proposition. Practically all the wiring is done on the under side of the sub-panel and where a few wires need to go thru the sub-panel to terminals on the top side of the sub-panel, holes have been provided thru which to pass the wires.

In wiring the receiver, be careful not to damage the radio frequency coils by resting the receiver on them when wiring the bottom of the set. It is a good idea to insert the three rear tubes in their sockets and use them as rests.

In wiring, it is a good plan to first make all the grid and plate connections to the tubes and transformers. Then connect in the "A" battery leads and finally work around to the other connections.

A separate grid leak mounting and leak has been used as shown so that it can be connected directly between the grid terminal of the detector tube socket and the filament lead. If a 201A type of tube is used as a detector, the connections should be made as shown. If a 200A type of tube is used, however, the filament end of the grid leak mounting should be connected with the negative terminal of the detector socket instead of as shown.

The battery connections indicated are for a 112 type tube in the last stage, a 201A tube as the detector and 201A type tubes in the other positions. When a standard 201A tube is used in the last stage, the "B" battery voltage should be 90 volts with a corresponding "C" battery voltage of 4½ volts. When a 171 type tube is used in the last stage,

135 volts should be used for the "B" battery voltage with a corresponding "C" battery voltage of 27 volts. No more than 135 volts should be used for the last stage unless an output transformer or output choke system is used to prevent excessive current flow thru the loudspeaker windings.

Before inserting your tubes in the sockets, ready for operation, it is a good idea to hook up your batteries and test across the filament terminals of the sockets with a voltmeter to make sure that you have not made any error, such as connecting a high voltage across the filament terminals. Such an error has cost many fans the price of replacing a full set of tubes.

When the batteries, antenna, ground and loudspeaker have been connected and the tubes inserted, you are ready to make the minor adjustments necessary to get the set into operating condition. Turn on your battery switch, turn the variable high resistance knob as far as it will go in a clockwise direction and the compensator knob to about the two o'clock position and tune in a low wavelength station somewhere about 15 on the dials. Turn the adjusting screws on the Phasatrols as far as they will go in a clockwise direction and then turn them back as far as they will go in a counterclockwise direction to a point where movement of the condenser tuning dials will snap a station in and out without causing any squealing. If you find it impossible to get this adjustment without the squealing, turn the variable high resistance back slightly in a counterclockwise direction and try again, making slight additional readjustments of the variable high resistance until you can tune stations in and out without any squealing or howling.

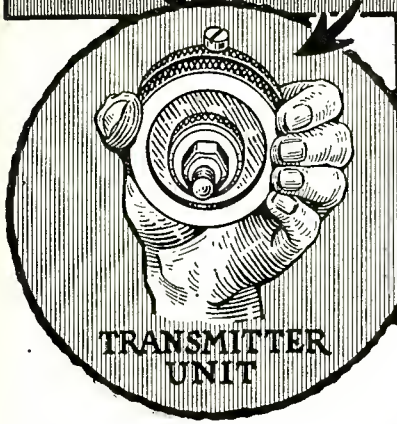
Adjustment of the first Phasatrol, connected in the plate circuit of the first radio frequency tube affects the operation of the first tuning condenser connected in the grid circuit of the first radio frequency tube.

Adjustment of the second Phasatrol, connected in the plate circuit of the second radio frequency tube affects the operation of the gang condenser.

This adjustment is a very simple one although you can experiment with the set for several evenings, varying the Phasatrol adjustment until you get best results. Volume is controlled by the compensator knob. Sensitivity by the variable high resistance knob. The best setting for the variable high resistance knob is approximately that at which tuning can be done without any squealing but a slight readjustment will often bring in an elusive station.

The two tuning condensers move along very closely in step and stations can be tuned in with ease by varying one condenser a little at a time and varying the other condenser a short distance one way or the other.

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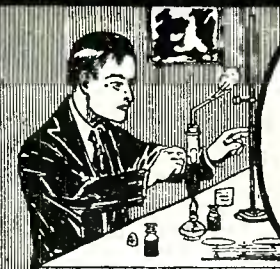
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|--------------------------------------|---|---|
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| <p>~GRID LEAK~</p>                   | <p>TO HEADSET OR LOUD SPEAKER ~AMPLIFIER~</p> | <p>PIANO TELEPHONE ~AMPLIFIER~</p>                            |
| <p>~ONE STAGE AMPLIFICATION~</p>     | <p>~RADIO AMPLIFIER~</p>                      | <p>~TWO STAGE AMPLIFICATION~</p>                              |
| <p>~TALKING LIGHT~</p>               | <p>~DETECTOR~</p>                             | <p>~ELECTRIC STETHOSCOPE~</p>                                 |
| <p>~CODE PRACTICING DEVICE~</p>      | <p>~BALDWIN PHONE AMPLIFIER~</p>              | <p>~TELEPHONE~</p>  |
| <p>~PHONOGRAPH AMPLIFIER~</p>        | <p>~AMPLIFIER~</p>                            | <p>~HAND MICROPHONE~</p>                                      |

The above and innumerable other interesting experiments are possible with these amplifiers. Every amateur should have at least one or two in his "Lab" or workshop. An eight-page instruction pamphlet is sent with every unit showing scores of experiments.




# Dr. T. O'Conor Sloane

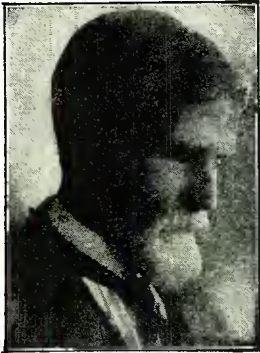
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RLG-June 27



# How to Build the Standard Browning-Drake Receiver

(Continued from page 114)

under all conditions. Powerful local interference, static and poor receiving conditions must be reckoned with.

If the set is properly built and operated however, unusual distance reception can be accomplished.

Total shielding of the receiver, using a metal panel and metal-lined cabinet will help to cut through powerful local interference. When such shielding is used however, great care must be taken to prevent shortcircuits of wiring. The necessary parts must be insulated from the metal panel.

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Of the Ownership, Management, Circulation, Etc., Required by the Act of Congress of August 24, 1912, of RADIO LISTENERS' GUIDE AND CALL BOOK combined with RADIO REVIEW, published quarterly at New York, N. Y., for April 1, 1927.

State of New York, }  
County of New York, } ss.

Before me, a notary public in and for the State and county aforesaid, personally appeared S. Gernsback, who, having been duly sworn according to law, deposes and says that he is the Editor of the RADIO LISTENERS' GUIDE AND CALL BOOK combined with RADIO REVIEW, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, The Conrard Co., Inc., 230 Fifth Avenue; Editor, Sidney Gernsback, 230 Fifth Avenue; Managing Editor, W. G. Many, 230 Fifth Avenue; Business Manager, R. W. DeMott, 230 Fifth Avenue.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) The Conrard Co., Inc., 230 Fifth Avenue; Hugo Gernsback, President, 230 Fifth Avenue; Sidney Gernsback, Vice-President, 230 Fifth Avenue; R. W. DeMott, Business Manager, 230 Fifth Avenue.

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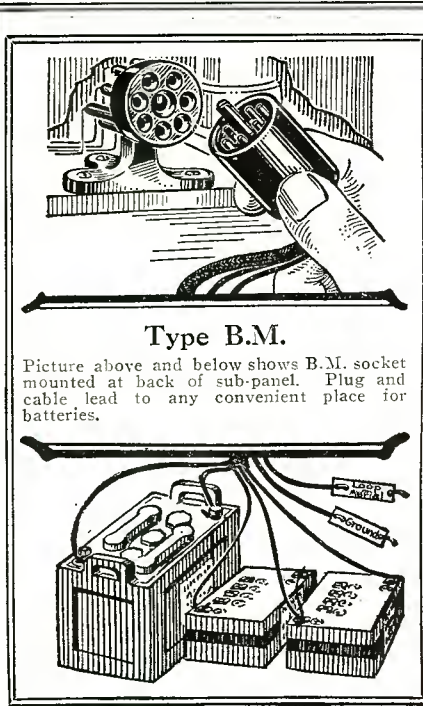
S. GERNSBACK, Editor.

Sworn to and subscribed before me this 22nd day of March, 1927.

[SEAL.]

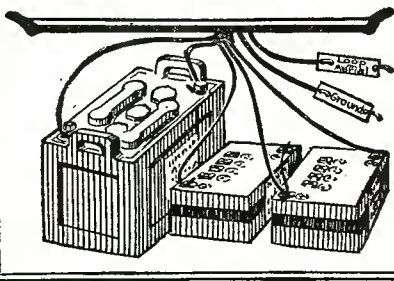
JOSEPH H. KRAUS.

Notary Public, Queens County Register's No. 4523, New York County Register's No. 7364, New York County Clerk's No. 481. (My commission expires March 30, 1927.)



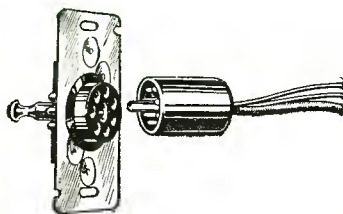
Type B.M.

Picture above and below shows B.M. socket mounted at back of sub-panel. Plug and cable lead to any convenient place for batteries.



Type P.M.

Same as Type B.M.—but without bracket. Mounted right in sub-panel. With 4 ft. cable.



Type W.B.

Adaptable to any set. Cable leads to plug from binding posts; socket is the popular Jones Radio Wall Socket which permits you to have your batteries, ground and aerial in basement or adjoining room. Radio socket conforms in size and shape with electrical socket. With 4 ft. cable.



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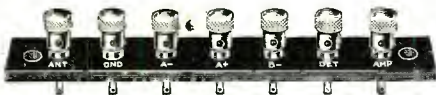
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## A Substitute for Ground Clamp

It often happens that ground clamps are not always available for making good ground connections. In a case of this sort a good substitute can be made in a few moments' time by employing the method shown in the illustration.



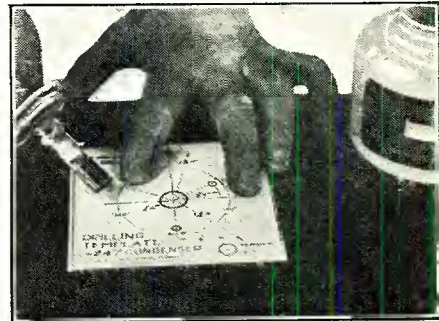
This makes a handy ground clamp.

A loop of bare wire is made around the pipe to be used as a ground, with about an inch and a half slack in it. Then a wedge of wood is fitted in this loop and tightened around pipe by forcing the wedge tight with a hammer.

## Using Templates for Drilling Panels

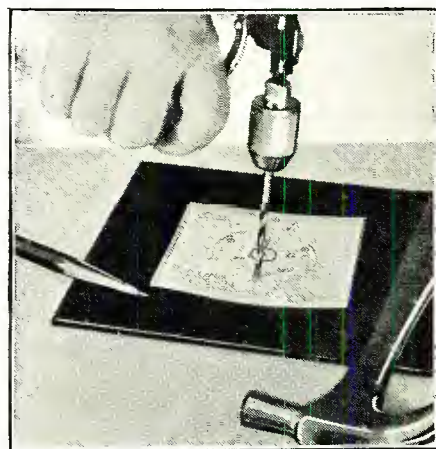
Many fans, especially those who are making their first attempt in the building of a set will, if they are not careful, spoil the panels by drilling holes out of alignment. In order to prevent this occurrence the manufacturers of condensers, coils, etc., have furnished templates for the drilling of the holes.

The proper method of using these templates is to first cut them to size, then place a film of photo paste on the reverse side, pasting them on the panel in the proper position when dry, drilling through these holes.



Template should be pasted down on panel after being properly adjusted in place.

This method will prevent the possibility of holes being drilled off center



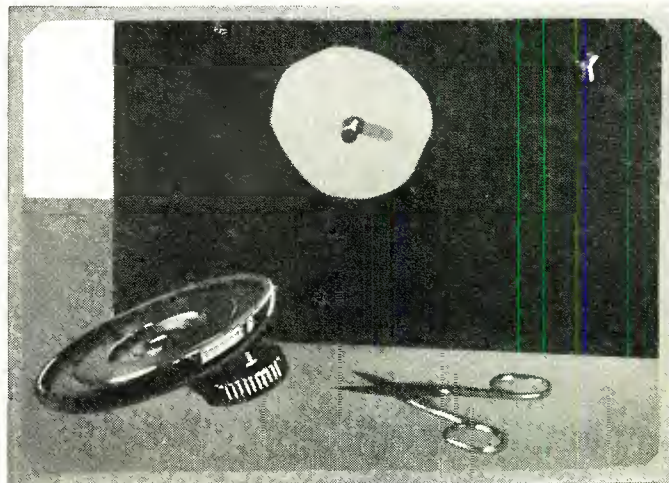
Drill right through pasted template.

and consequent misalignment of apparatus when mounting.

## Preventing Dials from Scratching

It sometimes happens that due to a shaft not being turned even or true, or a panel being warped slightly, that a dial will rub on a panel. This is annoying, as it prevents accurate tuning, especially where "hairline" tuning must be done.

To prevent this, a piece of fairly thick writing paper or thin blotting paper is cut slightly smaller than the dial and fitted over the shaft—under the dial. When the dial is now replaced on the shaft it will



This simple remedy is a sure cure for scratching of dials.

be found that it turns smoothly and does not rub at any point.

## A Constant Voltage "B" Eliminator

(Continued from page 124)

While no apparent difference in signal strength may be noticed over wide ranges of voltage adjustment, a danger is present since all users are inclined to turn the voltage controls on their "B" power units up as far as possible to obtain strong signals. Many detector tubes will therefore be found operating on from 90 to 150 volts, and many R. F. amplifiers as high as 180 volts. The result is rapid deterioration of tubes as well as damage to receiver bypass condensers.

The voltage regulation of the "Reservoir" "B" is obtained by the choice of a low resistance rectifier tube of known and dependable characteristics producing substantially a sine wave, which is easy to filter by achieving low filter resistance, and through the use of a glow tube voltage regulator. The filter system itself differs from the more conventional "brute-force" filters in that a selective section is used to eliminate the 120-cycle fundamental of the

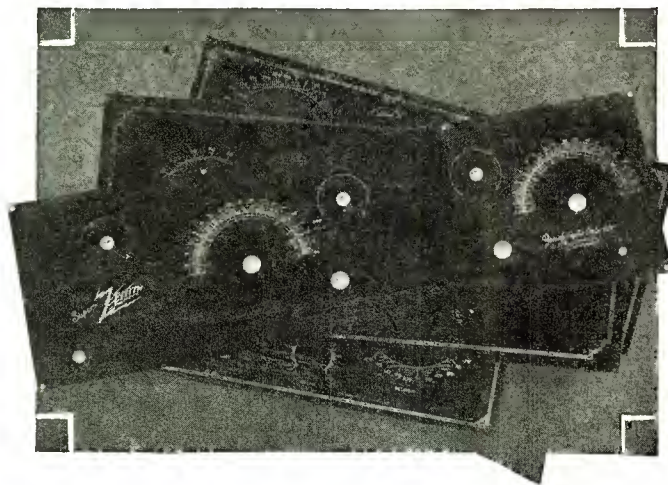
### PARTS FOR THE CONSTANT VOLTAGE "B" ELIMINATOR

- 1 Cunningham CX313 rectifier tube
- 1 Cunningham CX374 glow tube
- 1 S-M 329 power transformer with 5-volt balanced filament winding, two 200-volt secondaries, and electrostatic shield
- 1 S-M 331 Unichoke for selective filter circuit
- 1 S-M 332 condenser bank
- 2 S-M 511 tube socket
- 1 S-M 653 Resistor
- 4 Binding posts and
- 1 6½ by 7½ steel base with screws and 15 ft. Acme or Corwico insulated hook-up wire

rectified current; while the weaker harmonics are removed by the ordinary "brute-force" action. The advantages are—a far less bulky filter can be built with much lower internal resistance, and fewer filter condensers may be used; which is an advantage since filter condensers have been known to break down in more than a few instances. Needless to say, the filtration of the selective system is about one and one-half times better than a standard two-section "brute-force" filter.

The parts necessary to build a "B" unit of this sort are listed below. It is suggested that the parts specified be employed since the excellent regulation is dependent upon the low resistance of the choke and transformer, and the proper selection of rectifier and glow tubes.

The construction of the unit is simple. Upon the 6½" by 7½" steel chassis are mounted at the right rear



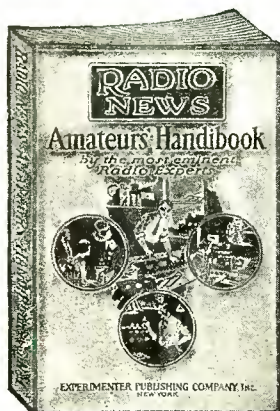
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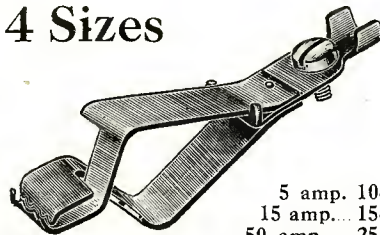
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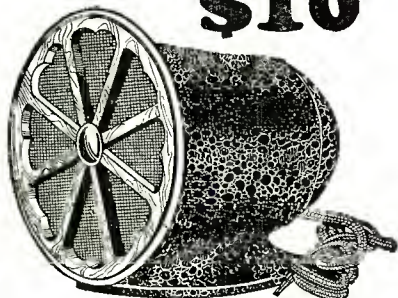
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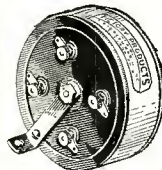
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the 329 power transformer; at the left rear the 332 condenser bank; at the left front the 331 Unichoke; and to the right the two tube sockets and the four binding posts. Care should be taken to see that the binding posts are insulated from the steel chassis by means of bakelite or fibre insulating washers. The resistance unit is soldered directly to the binding posts on the under side of the sub-base, by means of small soldering lugs. It will be noticed that the spaces between the terminals on the resistance are unequal and in mounting the resistance it should be fastened to the binding posts in such a fashion that the shortest section of the resistance falls between the "+90" and "+AMP" posts, while the longest section should fall between the minus and "+45" posts. Most wiring can be done without soldering, there being no need to solder wires to the power transformer, Unichoke, or condenser bank. The wire ends may be more easily fastened under the terminal screws. The connections to the four binding posts will probably have to be soldered, however, as will the joints between the binding posts and the terminals of the resistance unit. One important feature is in connection with the connecting cord of the unit. It will be noticed that one side of the twisted cord of the power transformer is cut at a point near where it passes under the socket for the CX374 glow tube. One end of the cord connects to the minus terminal of the socket and the other end to the "P" terminal of the socket. This allows of the operation of two unused (but short-circuited) pins in the base of the UX874 tube as a protective switch, so that if tubes are inserted in their sockets incorrectly or the glow tube is left out, no power will be applied to the unit. This means that the voltage applied to the filter condensers can never run up to the value of 250 or 300, but will always be limited to a maximum of 180 volts. This is valuable in connection with the receiver, for the average receiver bypass condensers are only designed to withstand an operating voltage of approximately 180 and are frequently blown out if connected to an eliminator before the tubes are lit.

In operation, there are practically no precautions to be observed—the unit is foolproof. The four "B" battery leads from the receiver (or three, as the case may be) are simply connected to the similarly marked posts on the "B" unit, the receiver and "B" unit turned on, and reception obtained by tuning the receiver in the usual fashion. The 165 volts at 20 milliamperes, obtainable from the 180-volt tap, will operate a UX171 to perfection. The 90-volt tap will supply up to 45 mills. at this voltage—the 45-volt tap up to

10 mills. There is no danger of damaging tubes and condensers in the receiver due to high voltage surges from the "B" unit since the voltage can never rise above 180 volts.

In use, the two filaments of the CX313 rectifier tube will light and the tube will get rather warm; although at no time should the plates ever become red due to heating. The glow tube will glow with a bluish or purplish glow which may possibly flicker when a very strong signal is being received due to the reciprocating action of the tube. If too great current—over 45 milliamperes—is drawn from the 90-volt tap of the unit, the glow tube may cease to glow. Turning off the receiver will immediately result in the glow tube relighting, after which the set may again be turned on. If over 45 milliamperes is drawn by the 90-volt receiver circuit, it should be examined and some means of reducing the current drain to this value be employed—say, a slight C bias on all amplifier tubes operating on 90 volts. The brilliancy of the glow in the CX374 regulator tube will vary with different loads on the eliminator, which is entirely correct.

### The Keystone Five-Tube T. R. F. Set

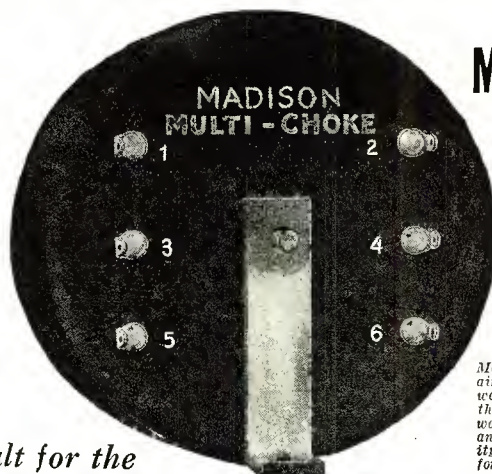
(Continued from page 103)

dials tune approximately in unison, the only possible chance of a big difference being in the first or antenna tuner, if a very short or abnormally long antenna is used.

To tune the set, begin with all dials set at zero and the tubes lit to normal brilliancy, and the loudspeaker plugged into the last stage. Then the dials are turned in unison, a few points at a time, until a station is located. A readjustment of the dials for maximum volume will give the user an idea of just how close each dial setting is to another. Bear in mind that it is practically impossible to make a set at home in which all three dials will register the same, due to the fact that in all tuning circuits there enters slight differences in capacitance and inductance due to the wiring of the circuit.

When several local or near local stations have been tuned in and logged a fair idea of where the various stations are may be gained. For instance if we have tuned in three stations on wavelengths of 325, 340 and 360 meters at 28, 31 and 35 on the dials and want to locate a station at 350, we know that it will be found somewhere in the vicinity of 32-34 on the dials. There is really nothing difficult about the operation, and even the reader who has never built a set before should be able to construct and handle the operation of this set very easily.

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more of the sections, to cover the band of frequencies given in the table enclosed with each Multi-Choke.

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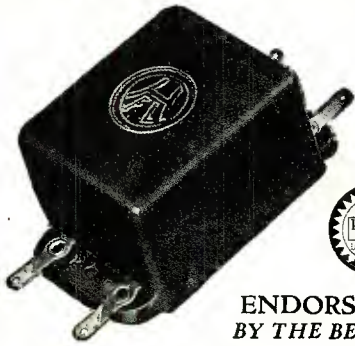
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## How to Build Sir Oliver Lodge's "N" Circuit Receiver

(Continued from page 89)

when the tube prongs are inserted into the tube socket is shown in Fig. 3. The proper connections to the positive and negative filament terminals are important so do not take it for granted that it does not matter which way you make the filament connections. It is also important to wire the Amperites into the negative filament leads of both the Multivalve and last audio tube as shown.

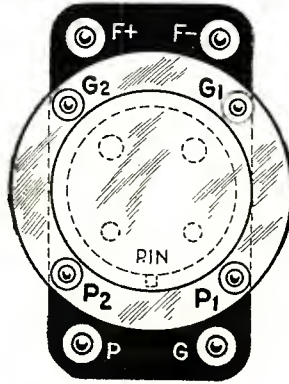


Fig. 3. Sketch of socket showing the location of terminals when multivalve is inserted

No clips are provided for the antenna and ground connections. The aerial and ground wires can be run direct to the binding posts of the antenna coil.

The parts are located with a view to making the wiring as simple as possible. If you use flexible hookup wire, you should be able to complete the wiring job in from two to three hours, depending on your skill in wielding a soldering iron. Make the connections as short as possible, running the wire direct from terminal to terminal on the principle that a straight line is the shortest distance between two points.

Make the connections to the four terminals of the Multivalve shelf last. Do not place either tube in its socket until all the rest of the wiring has been completed, and the wiring checked to make sure that it is correct.

To get best results it is absolutely necessary to use an efficient aerial system. It is impossible to get really good results unless a well-constructed aerial of over sixty feet overall length is used, while best results can only be obtained with an aerial of from eighty to one hundred feet.

When you have checked the wiring carefully and inserted the tubes; made the final connections to the Multivalve terminals and connected up batteries, antenna, ground and loudspeaker, you can proceed to balance the receiver by

means of the adjustable fixed condensers. The values of "B" and "C" batteries shown in the diagrams are for use with a Multivalve using a 112 type tube in the last stage. If a tube of the 171 type is used in the last stage for better volume and quality, it is advisable to use no more than 135 volts of "B" battery, the same as used for the 112 type tube, but the "C" battery voltage should be increased to 27 volts.

Higher "B" and "C" battery voltages should not be used in the last stage unless an output circuit consisting of the standard output choke and condenser or output transformer are employed to prevent the passage of the heavy direct current thru the speaker windings.

It is an easy matter to adjust the balancing condensers, "C2" and "C3." Take a long screwdriver and screw the adjusting screw of condenser "C2" as far as it will go in a clockwise direction to adjust the condenser for maximum capacity. Do not force the screw.

Condenser "C3" should be adjusted to minimum capacity by turning the screw in a counterclockwise direction.

Now set the vernier tuning dial so that the condenser rotor plates are nearly all the way in. In other words adjust it for maximum wavelength. Now when the set is turned on, the detector tube should oscillate. This condition can be recognized by tapping the stator plates of the variable condenser with the finger, when the characteristic click-click of the oscillating circuit will be heard, or by moving the condenser, that is, by tuning down the wavelength range a bit until a whistle is heard, which will occur, of course, as soon as the tuning control reaches the wavelength of a station within range.

Now turn down the adjustment screw, in a clockwise direction until the circuit just stops oscillating. Then turn the tuning condenser, "C1" so that it covers the wavelength range and note whether the circuit comes into oscillation again as you tune down to the lower wavelengths. If it does, and it probably will, it means that the capacity of balancing condenser "C2" is too great. It can be reduced by turning the adjusting screw in a counterclockwise direction until the circuit stops oscillating. Now go back to the high wavelength setting on the tuning condenser and readjust condenser "C3" so that the circuit is just below the oscillating point, and try covering the wavelength band again. Repeat this procedure back and forth, adjusting condensers "C2" and "C3" until the circuit is maintained just below the oscillation point over the entire wavelength band.

It will be noted in making these adjustments that increasing the capacity

of balancing condenser "C2" has a tendency to make the circuit oscillate more and vice versa, adjustment of condenser "C3" has exactly the reverse action. Increasing its capacity has a tendency to stabilize the circuit while decreasing it has a tendency to increase the tendency towards oscillation. The whole secret of the adjustment is to strike a proper balance between the two. If the capacity in the balancing condenser "C2" is too small, the circuit will have a tendency to oscillate on the high waves more than on the low waves whereas if balancing condenser "C2" is adjusted for too great capacity, the reverse will occur and the circuit will oscillate on the low wavelengths more than on the high wavelengths. After these two condensers have been adjusted so that a good balance has been struck and the set is uniformly sensitive without oscillating over the whole wavelength range, make a final adjustment with condenser "C3" screwing it down a bit until the circuit is far enough below the point of oscillation so that no distortion will result.

Once you are satisfied with the adjustment of these condensers you can forget them as long as you use the set on the same aerial installation. Since the constants of the aerial circuit enter into this adjustment it is necessary to operate the set from the same aerial all the time. If you change the aerial or its constants, it will be necessary to re-establish a balance by readjusting condensers.

It is important to note that the constants of the tubes change slightly after they have been in operation a few minutes and have had a chance to warm up. It is desirable therefore to make the balancing adjustments after you have turned on the tubes for a few minutes. To prevent radiating noises, it is best to disconnect aerial and ground during the few minutes that you have the set turned on previous to adjusting the condensers.

The "N" circuit is not designed primarily for distance reception although you will find it as sensitive as any set in its class. Its selectivity on local stations however makes it a very efficient set for use in congested districts, such as New York and Chicago.

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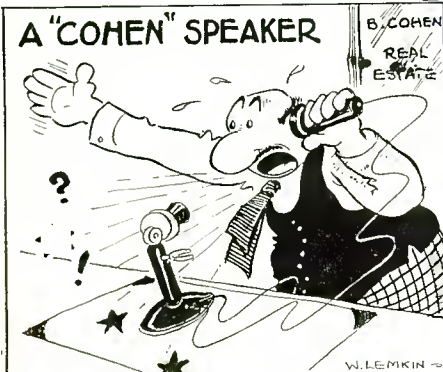
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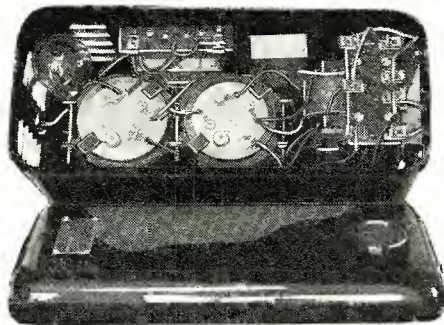
## The Listeners' Accessory Guide

(Continued from page 137)

### B Eliminator Uses Electrolytic Condensers

As has been the experience of many radio fans, it very often occurs that the large capacity filter condensers in the present day eliminators will "blow" under the stress of an extra large drain or line voltage surge.

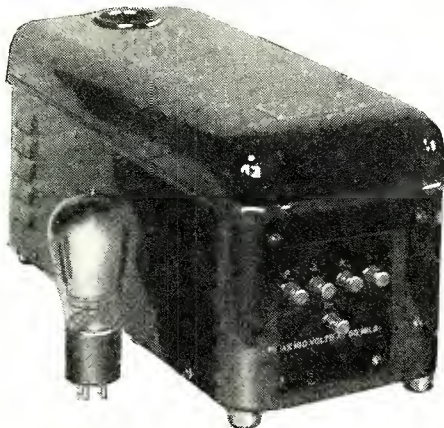
The notable feature of a new B eliminator on the market is the use of filter condensers of the Electrolytic type. These condensers of which there are two are of unusually high capacity, totaling 35-mfd. By the use of condensers of this type the usual breakdown of eliminators is done away with. Condensers of this type are "self-healing" when an unreasonable overload



*Photo by courtesy of Amrad Corp.*  
 Interior view of the new "B" battery eliminator, showing the two high capacity electrolytic condensers in jars at the left.

causes the condensers to blow as there is no insulation of the puncturable type to be restored.

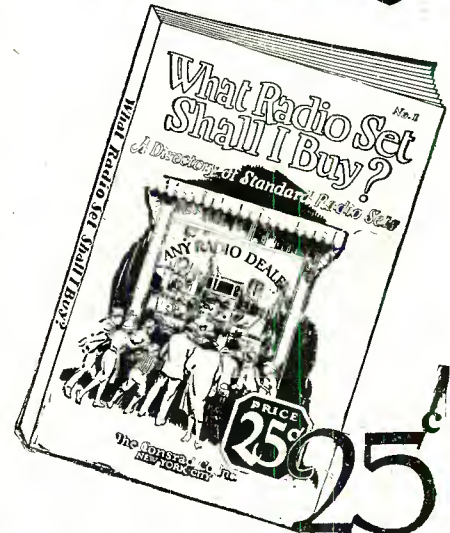
The illustration shows the inside of the instrument as well as the decidedly neat outside appearance. All metal



The eliminator with cover in place. The vacuum tube at the left is the rectifying tube employed in this unit.

construction, compact size and sturdiness in use are the big features. An idea of the size may be gotten by contrasting the size of the unit with that of the rectifier tube standing along side of it.

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## Eliminating "B" Battery Noises

Quite often after a radio fan has built a set or used a ready-made receiver for several months, he decides that in some way the tonal or working qualities of this set may be improved by the addition of several different capacities at various points in the circuit.



Testing the effect of various capacities across the B battery by means of condensers, as explained in the text.

A handy method of testing this theory out without tearing the set apart to find out is depicted in the accompanying illustration. Two or three blocking condensers of .01 or .01 and .005 mfd. and .1 mfd. are bound together with leads soldered on to the tips. Then by simply using the leads and changing them around by connecting different capacities in parallel or series and testing them across the circuits the right capacity for a definite circuit may be determined.

In connection with this use of condensers, say, for instance, the experimenter uses the three condensers mentioned above. In order to determine the correct capacity which a test has shown is necessary, the following formulae or routine should be followed. Where two condensers are hooked in *Series* divide the sum of the two condensers by two and the correct capacity is the result, i. e.: Say, for instance, in order to smooth out a battery crackle it has been found necessary to connect the .1 and .01 mfd. in series between the "A" minus and "B" lead. .1 and .01 is a total of .11 and the actual capacity used is .055 mfd.

Then, say, that in another part of the circuit it has been necessary to put two condensers in parallel to obtain the correct effect. Say, for instance, the .01 and the .005. The correct single capacity to use in this case would be the sum of the two, namely .015 mfd.

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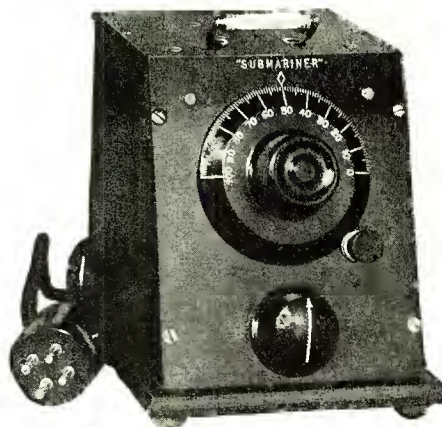
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# Shielding the Set for Efficiency

Home radio set builders generally follow close on the heels of the manufacturers in incorporating the various improvements in their receivers. This was demonstrated in the past in the use of SLF condensers and low loss parts in the sets. At the present time the vogue is in shielding the set. Shielding is an improvement in a receiver that is to be commended most highly, especially in congested areas where there are many stations.

two variable condensers, and grounded to the "A—" side of the circuit, when necessity makes the mounting of these instruments closer than is good radio practice, has the result of widening the distance by several inches. Small shields can also be used between tubes in a super-heterodyne to separate the oscillator from the rest of the set, and will be found, when properly placed, to cut down the interference due to harmonics to a great extent.

It is understood, however, that wherever efficient shielding of entire circuits is to be used that the shielding should be as near one piece as possible.

Fig. 2. The shielding as used to prevent interaction between stages of R. F. Amplification.

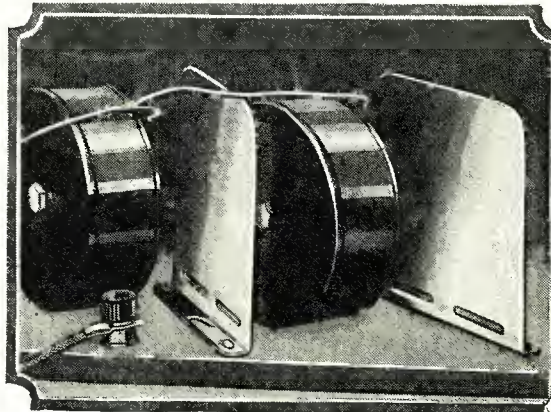
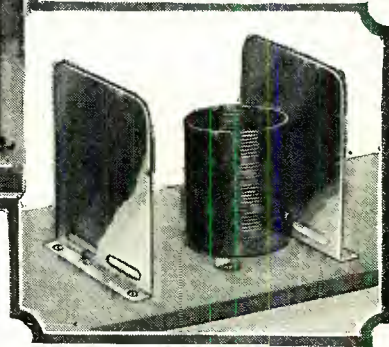


Fig. 1. Shielding used between intermediate stages in a "super" to broaden the peak of the transformer.



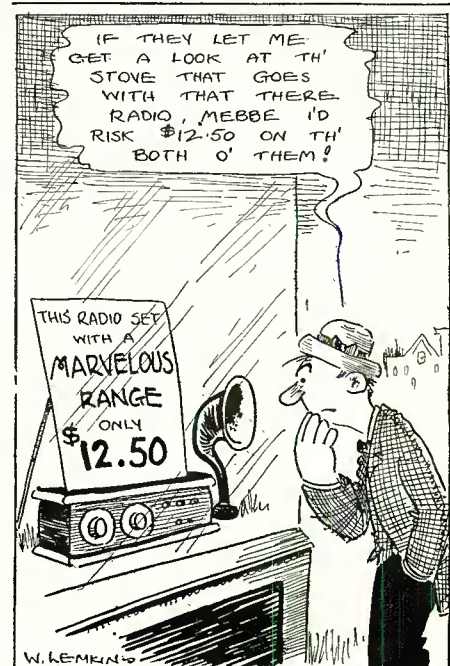
The use of shielding on sets which have been built and are giving good satisfaction, offers a problem to the set owner. He doesn't want to tear the set and wiring of the set apart, yet knows that the use of shielding on the radio frequency side of the receiver will improve the general all-around efficiency of the set.

How shielding of this sort may be done without rebuilding the set is illustrated in Figs. 1 and 2. Figure 1 shows the shielding of a super-heterodyne between intermediate stages to prevent feedback and tendency to howl. It is also true that shielding of this nature, when used on a powerful set such as the super-heterodyne in the illustration will also have the effect of broadening the tuning in the intermediate stages. However, as most of these sets are extremely selective, the use of the shields in this case would be an advantage, as the slight broadening which takes place would improve the tonal quality, by bringing into the detector circuit more of the "side-band frequencies" which carry the over and under harmonic tones. The shields shown in the illustration measure 3½ inches square, which just "fill the picture" to perfection.

Shielding the radio frequency coils of a TRF receiver may be accomplished in much the same manner employing the same type shields. This shielding has the effect of stabilizing and preventing coupling between stages more than the preventing pick-up between interfering outside influences.

A shield of this type, placed between

ble, and the circuit should be shielded on all four sides, top and bottom, with all component sides firmly fastened together. Small shields, however, will prove their value in more than one place in a set where it is not advisable to rebuild the set and shield the entire tube circuit so as to segregate it from the rest. It is almost needless to state that in any case of shielding no magnetic metal should be used. Either aluminum, copper or brass are acceptable, the former being the most practical from a working standpoint.





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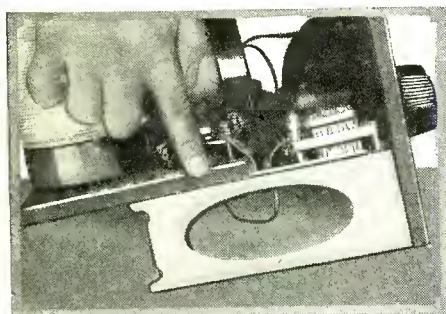
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### A Money Saving Kink for the Builder

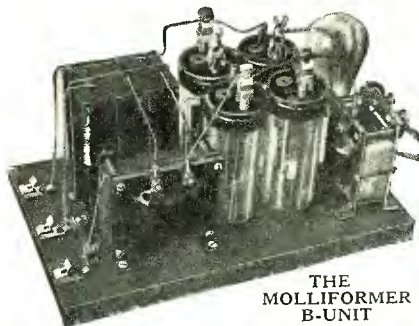
Due to the trend of manufactured receivers, home builders as a rule are incorporating bakelite or hard rubber sub-panels in their sets when they build. That this is expensive goes without saying, as the average sub-base panel must be cut to order being narrower in most cases than the usual 7 or 10 inch standard furnished by the makers of panel material.

One of our readers contributes the idea of using a straight grained piece of well dried wood for this purpose, as illustrated in the accompanying photo. This idea is well worth utilizing, especially when considering the fact that wood is very much easier to work with in drilling than panel material, and presents a neat appearance when properly squared off and stained.



Showing the use of a wooden sub-base panel.

Care should be taken however when fastening to the sub-panel that adequate support is given. Whereas panel material will usually remain sturdily fastened to a bracket with one machine screw, it usually takes two on each side to give the same amount of rigidity when wood is used. Also, make sure when a wood sub-panel is used that a foot or prop is placed in the middle of the back end to support and keep it from warping under the pressure of transformers and apparatus.



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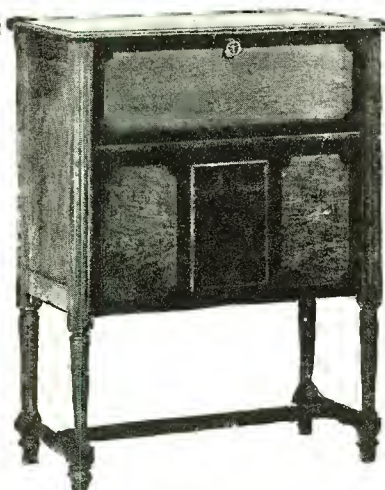
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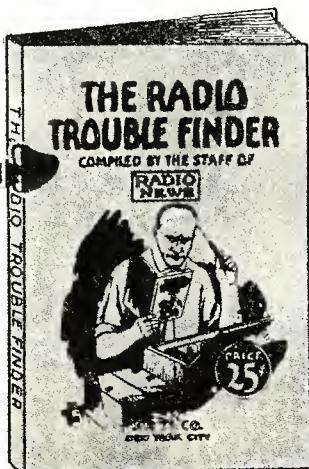
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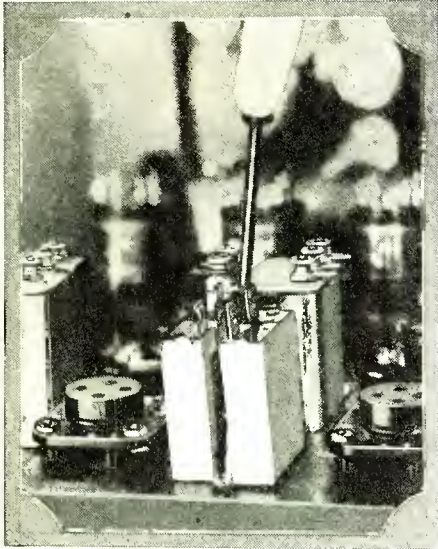
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Many times the set builder, after he has laid out his panel, sub-panel, drilled the holes for his apparatus and mounted it, finds that it would be good practice to include one or more fairly heavy fixed condensers. If the set is built to accommodate a raised sub-panel, all is well and good, for there is generally ample space underneath to accommodate any number of these units. Where a wooden sub-base is used, however, there is no chance to work around in this fashion.



How two large capacity condensers may be accommodated to a small space by standing on end.

However, by bending the fastening loops which are a component part of the back of the case, at right angles to the case with a pair of pliers, two of the units may be fastened in a space not much larger than the side of a transformer. How this is done is illustrated in the photo, which shows two 1 mfd. condensers side by side between two sockets.



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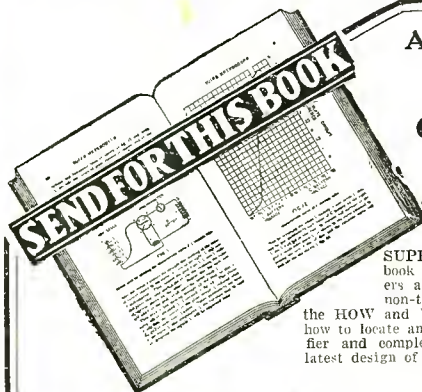
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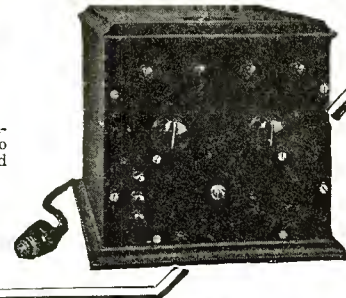
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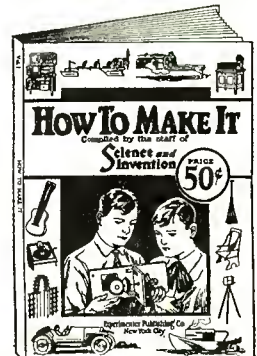
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"Thus far I've pulled in many stations I formerly only read about." Praidel of Ohio.

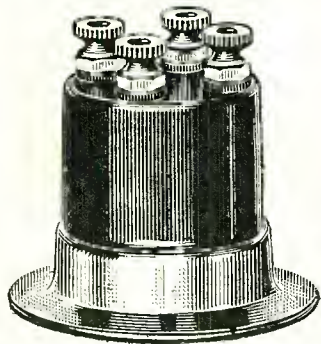
"Showed it to a friend of mine. He tried it in his set and was so well pleased with it that I had to let him keep it. So I am enclosing check for another." Wills, Lyndhurst, N. J.

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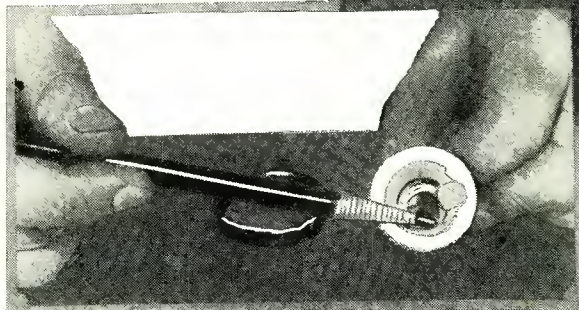
## Use Proper Fuses on Eliminator Lines

When installing a "B" eliminator the inspection of the fuses is very important before placing the unit in operation. In socket fuses, by means of which all commercial lighting companies protect their lines, the rating will be found on the small nib on the bottom of the fuse. A 5 signifies a five ampere capacity fuse, a 10 a ten ampere and so on. Make sure that the fuses used are not too heavy capacity as otherwise the primary of the transformer will be damaged before the fuse blows. The manufacturers of these trans-

formers generally signify in their specifications the correct *safe amperage* that the unit will carry.

Another point of use to the fan unacquainted with fuses is, that just because a fuse looks good does not signify that it is not blown. The little metal fuse strip, generally seen through the window of mica or "isinglass" sometimes blows so near the connecting strip that the break is not visible. Test each fuse

The rating of the fuse will be found on the nib on the bottom.



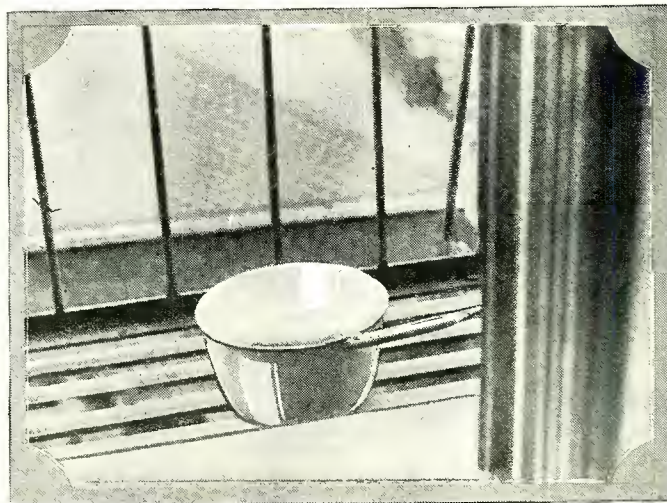
Pencil points to the thin fuse wire showing "blow-out."

for "open circuit" before replacing it in the receptacle.

## Beware of "Rusty" and Dirty Rainwater

A prominent manufacturer of radio "A" batteries makes an interesting comment on the use of rainwater in filling.

However, in the city it is not often possible to gather this water without impurities being present—if the method



Do not collect rain water for batteries on a fire-escape.

shown in the accompanying photograph is used. When collecting water for your battery, be sure that the collection is taken where there is no chance of iron rust or metallic sediment being present. The fan who collects rainwater by putting a pan out on the fire escape will find that after a short period of time his battery will go "west," due to the metallic residue and rust particles

present in the solution. Several instances have come to the attention of this concern where radio fans were collecting rainwater from drippings and using this for the above-mentioned purpose.

The best method is to set a large pan out on the roof and far enough from all metal to prevent any chance of particles of dirt or rust from dropping into the pan.

Pure rainwater forms an ideal liquid, better, in most cases, than the distilled.

## Cup Winners 1927 Broadcast Station Popularity Contest

(Continued from page 75)

with but a few votes each in the first weeks of the competition, KFI grew stronger each week, but at the conclusion of the fifth week's tabulation, was still outside the magic circle of the ten cup winners. In the sixth week, however, a heavy vote was recorded for this West Coast station, and it jumped from fourteenth position clear into eighth place. Because of this strong finish by an outsider, so far as the early five weeks of the contest were concerned, Station WLW, the Crosley Radio Corporation's property in Cincinnati, Ohio, was just barely out from among the cup winners, and finished in eleventh place.

The Westinghouse Electric and Manufacturing Company's broadcaster in Springfield, Mass., Station WBZ, polled a steady vote throughout the balloting, and despite a rather weak finish, especially in the last two weeks, ended in ninth place. The total vote registered for this station was 370.

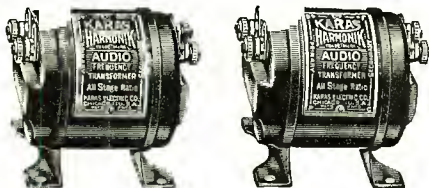
The last of the stations in the cup winning ten was Station WOC, of Davenport, Iowa. This station is run by the Palmer School of Chiropractic, and finished with 367 votes. How close the finish was can be seen when it is noted that Station WLW, in eleventh place, had only 3 votes less, or 364.

The total number of ballots received, including those credited to the first ten and every other station receiving one vote or more, was 26,472. Out of the more than 600 stations holding broadcast licenses in the United States, one or more votes were registered for about half of that number, or 334 stations.

The fifteen stations that followed on the heels of the ten prize winners are as follows:

| Station | Location                        | Votes |
|---------|---------------------------------|-------|
| WLW     | Cincinnati, Ohio                | 364   |
| WTAM    | Cleveland, Ohio                 | 355   |
| KOA     | Denver, Colorado                | 304   |
| WSB     | Atlanta, Georgia                | 279   |
| WCCO    | St. Paul-Minneapolis, Minnesota | 278   |
| WSM     | Nashville, Tennessee            | 261   |
| WGN     | Chicago, Illinois               | 257   |
| KMOX    | St. Louis, Missouri             | 255   |
| KGO     | Oakland, California             | 227   |
| KYW     | Chicago, Illinois               | 217   |
| WABC    | Richmond Hill, N. Y.            | 215   |
| WSAI    | Cincinnati, Ohio                | 212   |
| WHO     | Des Moines, Iowa                | 207   |
| KFAB    | Lincoln, Nebraska               | 204   |
| WOR     | Newark, New Jersey              | 202   |

Station WRNY, of New York, which is operated by the publishers of the Guide and Call Book, was declared ineligible by the publishers themselves in the contest for that reason, to maintain the impartiality of the competition. Radio fans who voted in the poll were



### Karas Harmoniks Specified for the Phasatrol

THE Phasatrol Receiver, featured in Radio Review, utilizes two Karas Harmonik Audio Frequency transformers. The designers specify Harmoniks because they found these superior transformers give a world of volume with absolute freedom from distortion. Harmoniks are all stage ratio transformers possessing extremely high primary impedance and remarkably low distributed capacity. To secure tremendous volume and to obtain the fullest measure of sweet, clear, pure reproduction in your Phasatrol Receiver, install Karas Harmoniks, as specified.

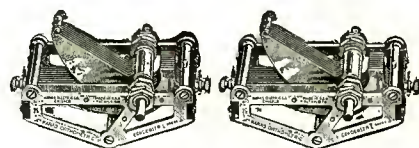


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### Specified in Radio Review's Short Wave Receiver

IN the Short Wave Receiver described in Radio Review two Karas Orthometric .0005 mfd. 23 plate Straight Frequency Line Variable Condensers are specified. These condensers give absolutely straight frequency line tuning—have the lowest losses known—and are the most scientifically designed condensers on the market. Orthometrics are made entirely of fine quality brass, with grounded rotor plates and frame, eliminating body capacity effect. When you build your Short Wave Receiver be sure that Karas Condensers are used.

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| Type | Capacity | Working Volts D. C. | Flash Test Volts D. C. | List Price |
|------|----------|---------------------|------------------------|------------|
| 1037 | 2 Mfd.   | 600                 | 2700                   | \$4.00     |
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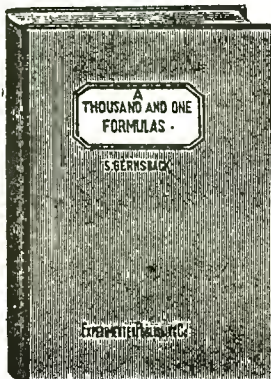
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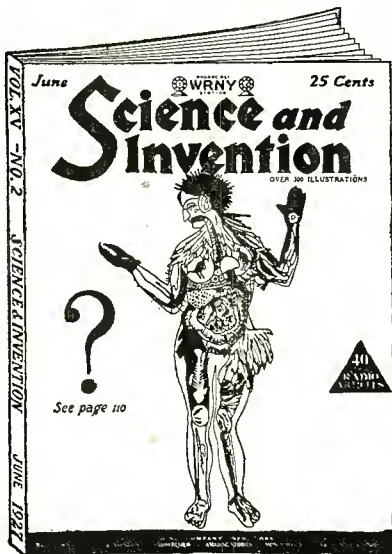
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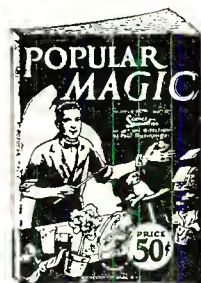


All Scientific fields of endeavor are covered fully. Here is a list of the most important articles in the April issue of Science and Invention:

- The World's Largest Theater.
- Pneumatic Suit Aids Heart.
- The Sun and Its Neighbors.
- An Efficient Single Control (6-Tube) Receiver.
- First Monthly Awards in \$3,000 "Wirecraft" Contest.

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asked to refrain from voting for WRNY.

Fourteen states qualified one or more representative stations in this list of the twenty-five most popular broadcasting stations in the country, namely, California, Colorado, Georgia, Illinois, Iowa, Massachusetts, Minnesota, Missouri, Nebraska, New Jersey, New York, Ohio, Pennsylvania, and Tennessee.

Votes were received in the contest from every state in the union, from Canada and practically every foreign country on the globe. While heavy votes were recorded from the states of New York, Pennsylvania, Illinois, Ohio and New Jersey, because of the large city populations, the vote was proportionately higher from such states as Missouri and similar commonwealths.

Geographically, the contest represented a splendid cross-section of popular opinion and desires in the matter of broadcast programs. The poll was truly national, even international, as 640 votes were recorded from Canada alone. The vote by states was as follows:

|                    |      |
|--------------------|------|
| Alabama            | 86   |
| Arizona            | 59   |
| Arkansas           | 75   |
| California         | 786  |
| Colorado           | 259  |
| Connecticut        | 566  |
| Delaware           | 82   |
| Florida            | 398  |
| Georgia            | 120  |
| Idaho              | 99   |
| Illinois           | 2021 |
| Indiana            | 661  |
| Iowa               | 786  |
| Kansas             | 446  |
| Kentucky           | 111  |
| Louisiana          | 180  |
| Maine              | 866  |
| Maryland           | 396  |
| Massachusetts      | 832  |
| Michigan           | 1210 |
| Minnesota          | 538  |
| Mississippi        | 10   |
| Missouri           | 1011 |
| Montana            | 85   |
| Nebraska           | 153  |
| Nevada             | 11   |
| New Hampshire      | 132  |
| New Jersey         | 1522 |
| New Mexico         | 39   |
| New York           | 3872 |
| North Carolina     | 255  |
| North Dakota       | 122  |
| Ohio               | 1951 |
| Oklahoma           | 139  |
| Oregon             | 116  |
| Pennsylvania       | 3336 |
| Rhode Island       | 81   |
| South Carolina     | 62   |
| South Dakota       | 98   |
| Tennessee          | 180  |
| Texas              | 333  |
| Utah               | 30   |
| Virginia           | 191  |
| Vermont            | 123  |
| Washington (D. C.) | 73   |
| Washington         | 196  |
| West Virginia      | 344  |

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|                               |     |
|-------------------------------|-----|
| Wisconsin .....               | 637 |
| Wyoming .....                 | 91  |
| Canada .....                  | 640 |
| Other foreign countries ..... | 62  |

From the program point of view, the proportion of favor was fairly equally divided between the stations subscribing either permanently or temporarily to the so-called Blue Broadcasting Chain, the Red Broadcasting Chain, and independently arranged programs. Station KFI, eighth in the list of ten cup winners, is listed as associated with the newly organized Orange Chain of West Coast stations.

Stations WJZ, KDKA and WBZ are the three stations among the prize winners associated with the Blue Chain. Stations WEA, WGY, and WOC, three other stations among the contest leaders, are associated for continued or occasional program purposes with the Red Chain. Stations WLS, WBBM and WPG are the three winners that make up their own programs independently.

Crediting WJZ, in number one position among the ten winners, with 10 points: WEA, second prize winner, with 9 points, and so on down the list to WOC, tenth station, with 1 point, the score reckons as follows:

|                    |           |
|--------------------|-----------|
| Blue Chain .....   | 20 points |
| Red Chain .....    | 16 points |
| Independents ..... | 16 points |
| Orange Chain ..... | 3 points  |

It is interesting to note that the independent stations WLS, WBBM and WPG, using the point scoring method, are equal in public favor with the com-

bination representative of the Red Chain, namely, Stations WEA, WGY and WOC. Another interesting sidelight on the voting is the fact that although Pennsylvania registered the second largest number of votes in the count by states, no Philadelphia station was entered in the first ten at any time during the count. Boston also failed to enter a station among the select ten.

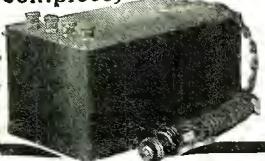
The cups that will be presented to the ten leaders are handsome silver cups designed in the well-known loving cup shape. They stand 17½ inches high, and each cup is engraved with the call letters of the winning station, and a notation that the station was a winner in the 1927 Broadcast Station Popularity Contest sponsored by the Radio Listeners' Guide and Call Book and Radio Review. The cups will be displayed in the studios of the stations to which they were awarded by the franchise of the radio public.

The contest itself, which opened with the publication of the spring edition of the Listeners' Guide and Call Book, was conceived by the publishers with the thought that such a competition would have a stimulating constructive effect on broadcasting, and help to raise to still higher levels the standards of merit and interest already established. Through the exercise of the radio public's franchise in choosing their favorite stations, the sponsors of the contest intended that the awarding of the loving cups should be construed as a token of the listening-in public's appreciation of the public service rendered by the broadcasting stations.

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## Using Old Panels For New Sets

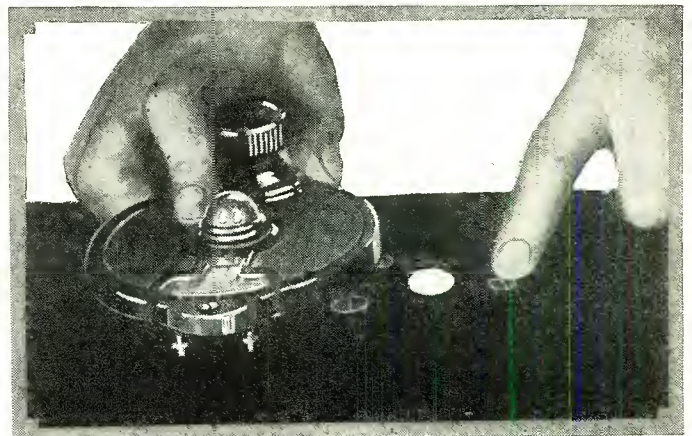
Many times when a set builder designs a new set he purchases a new panel, when, as a matter of fact, the old panel may be used just as well.

Holes are in most cases all drilled for the jacks, rheostats, etc., and the only difficulty lies in covering up the unnecessary holes in the panel due to moving the condenser positions.

By using one of the new large vernier dials, of which there are many on the market, a hole for the condenser may be drilled fully 1 inch on either side of the original hole, and this dial

will cover it. This saves expense, time and labor and makes just as good a job, as the holes are hidden. Where a

mounting hole cannot be covered, a flat-head nickel-plated machine screw can be placed in the hole, tightened by means of a machine nut and will not



Showing how a vernier dial may be used to cover up holes in an old panel. It will be noticed that the shaft hole for a newly installed condenser can be re-drilled fully one inch or more on either side and still the dial will cover the old holes.

look out of place in the least. This idea will be found a money saver in more cases than one.

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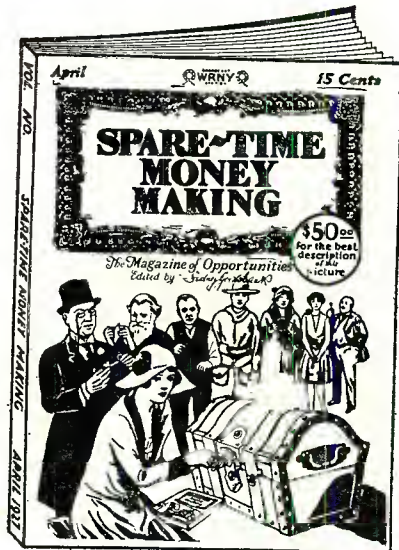
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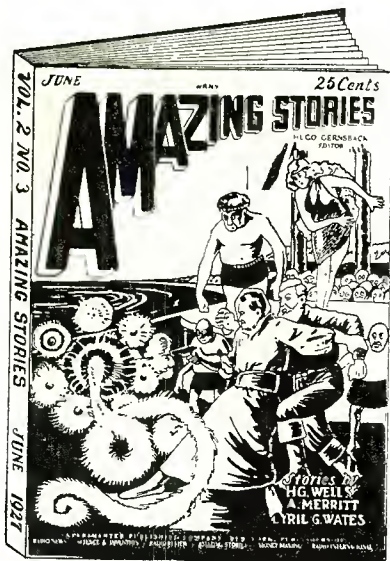
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# Dressing Up the Loud Speaker

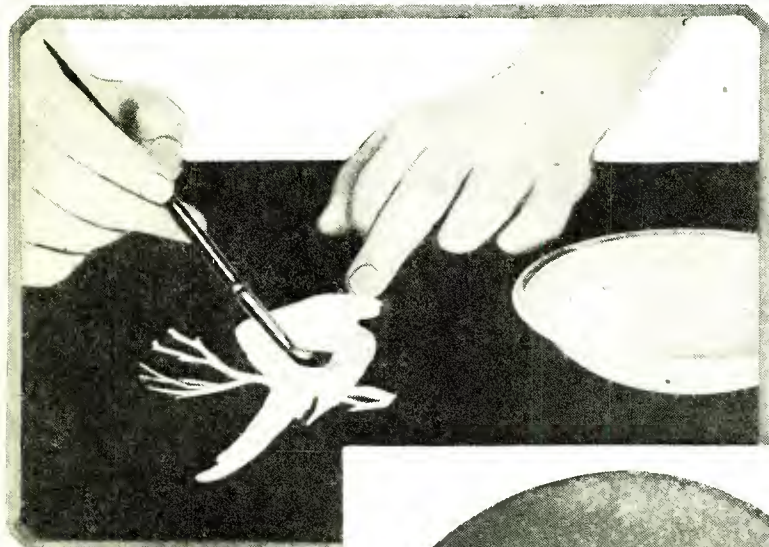
Taken all in all the average cone loud speaker is a pretty drab-looking affair, even though the mottled brown or tan Alhambra paper used in most cases will be found to harmonize with most any furniture. Almost anyone will admit, however, that looking at a blank cone, even though it does give out beautiful music, is tiresome to the eye.

ing of the design and the work a most presentable and attractive effect will be the result.

The same arrangement may be used to decorate the panels of a receiver, only in this case, the black side of the silhouettes is pasted toward the panel and the white side gilded or painted with aluminum or silver paint. The galleon ships or dancing nymphs form

a very attractive decoration for the panel of a receiver as well as being very appropriate.

When working with paste around Alhambra Fonotex,



Preparing the silhouette for the loud speaker. Note that the colored or black face is down, pasting being done on the white side.



How the silhouette should be pasted on the speaker. Make sure that the cut-out is securely pasted, otherwise a peculiar buzzing sound may result when the loud speaker is in operation.

A cone speaker, can, however, be made fully as artistic as some of the parchment lamp shades found in most homes—and by the same general process that most of these necessities are made artistic, by decorating them. The two photographs show how this should be done.

First obtain a number of small silhouettes, such as are sold in the various art stores. Be sure that you obtain the ones which do not have glue on the white side, as this will spoil the entire process. Select the ones that you wish to decorate the speaker with and place on a smooth flat surface with the black side down. Coat the back with a film of a good photo paste, or, if none is available, a paste made of equal parts of starch and flour moistened with water to form a paste, will do.

Allow the paste to partly dry, or become very "tacky" and then apply it to the desired place on the speaker. When it is thoroughly dried, it may be further decorated by attractively gilding it or using metallic paints to shade it with. If care is taken in the choos-

from which most cone speaker diaphragms are made, be very careful not to get finger-prints on the cone, as this paper has a surface which spots very easily and once dirtied is impossible to clean. Rubber cement, if carefully applied over the entire surface of the silhouette in a very thin layer will eliminate this danger, as it will rub off when dry if a spot is by chance put on the paper.

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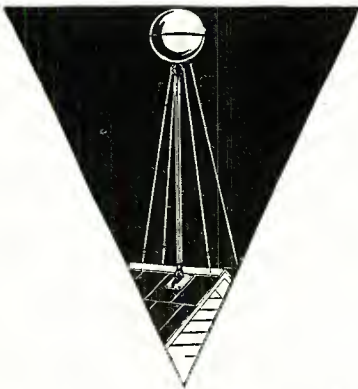
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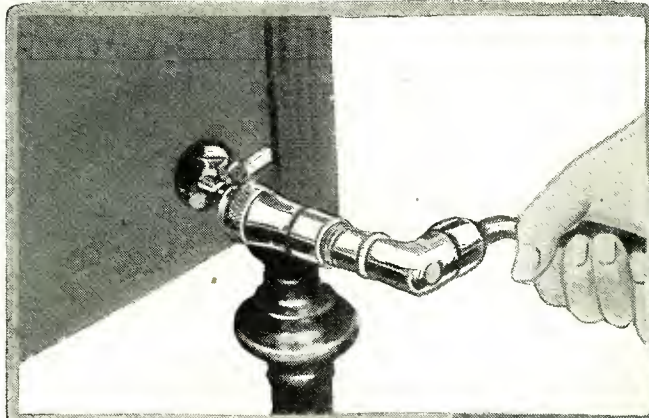
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**Protecting the Electrified Receiver**

**A** VERY handy stunt to employ when "A" and "B" eliminators are placed in console cabinets, is to use a

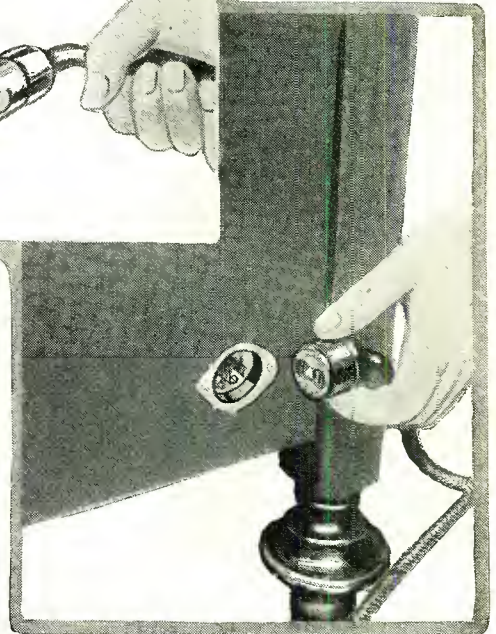
the outside rim of the female socket, by means of an expansion bit and brace, as shown. Then fasten this securely to the back of the cabinet by means of the screws furnished with the socket. Wire direct from this receptacle, on



Cutting the hole for the female outlet plug end with an expansion bit and brace. Hole should be made slightly larger than the outside diameter of the receptacle.

socket and plug connection from the light source to the back of the cabinet. The illustration shows how this should be done, the female socket being fastened to the cabinet, and all necessary wiring being done inside, and the connection to the mains being accomplished by means of a male plug and flexible cord. This will prevent any liability of short-circuiting, as the wiring inside the console can then be done rigidly and the power lines fastened by means of insulating "cleats," to the series of instruments on the inside of the cabinet, something that is impossible if the flexible lead is just run through the back of the cabinet from the transformer, direct to the alternating current outlet in the room.

First cut a hole slightly larger than

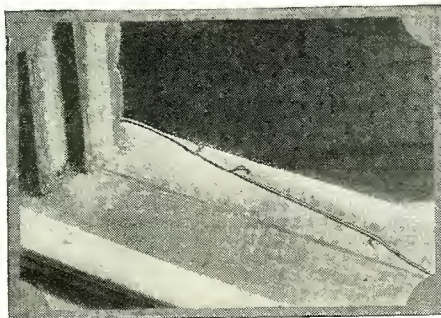


Finished job, showing how the connection is made. It is much easier to move the console around without damage to the wires by utilizing this method of connecting the current.

the inside with heavy insulated wire, using either baby cleats or heavily insulated staples. It goes without saying that this is by far a handier as well as safer method of bringing the lighting current into the set, as the connection may be broken from the outside without disturbing the connections in the cabinet.

**Inspect Your Lead-in When Reception is Poor**

The accompanying illustration is an actual photograph of an occurrence which caused a listener a great deal



Note the broken insulation on lead-in wire.

of trouble and poor reception, and is something that should be guarded against in every case where an outside installation of an antenna is made.

As shown in the photo, the lead-in from the antenna was simply run under the window, along the window sill without adequate protection by means of insulators. The constant swinging of the wire, and the banging up and down of the window, caused the insulation to break through exposing the wire and shorting it on the brick-work of the building. The dust and dirt present formed a good conductor for the weak currents, with the result that the reception was so poor that the set was overhauled before the real cause of the trouble was found.

Always bring the antenna in to the set through porcelain insulator tubes, or an adequate insulator lead-in, and see that the wire does not at any place come in contact with the bare brick of the house.

# Darkened Room Aids DX Reception

**I**F you are a DX fan and stay up nights nursing dials in an effort to fill your log book with the call letters of distant stations, take a tip from the transmitting amateurs and use a small, opaquely shaded bulb as the only source of illumination in the room.

Turn out all the overhead clusters and wall brackets, then set the lamp on or near the radio table, so that it is below the level of your eyes and casts a glow only strong enough to make the dial readings on the receiver discernible. A more effective expedient in easing the reception of the elusive DX-ers you have never found.

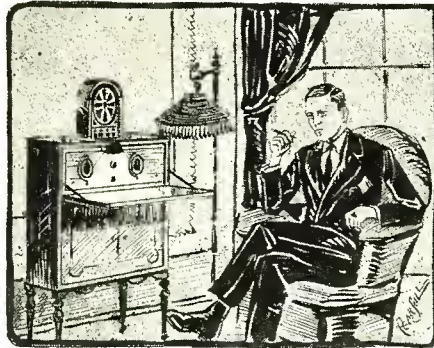
The weakness of the light has no electrical effect on the receiver, to increase the latter's sensitivity; but it has a marked effect on your physical and mental condition, that directly facilitates reception.

With a dull light in the room you unconsciously relax your muscles, put yourself at ease, and rest your eyes. You sit back comfortably, and the inactivity of your other senses tends to sharpen those of hearing and feeling. You are not distracted by a strong light, but feel only the soothing effect of a soft and indirect one. You are able to concentrate, fully and completely, with only your ears and fingers active.

You know that a blind man's sense of hearing is most acute and this is the very reason. Likewise, when you go to bed in a darkened room, sounds which would not "register" on your sense of hearing in the light seem predominantly loud.

When you turn the dials you are now scarcely aware of their presence, or of the presence of anything else in the room. You merely listen and decipher the sounds the earphones impress on your brain.

It seems incredible that the mere darkening of the room can so influence the mind, but the effect is really marked. Radio operators, who sit at a receiving set for hours at a time and must frequently "read" code signals



of heart-breaking weakness, often turn out all light and listen in total darkness.

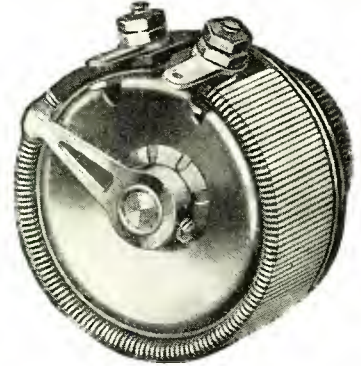
By relieving their sensitive eyes of all strain, and keeping only their ears "alive," they are able to retain whole messages in their heads, and to write them down later on paper without a mistake. In many radio "shacks" the sole illumination is furnished by a lonely 10-watt lamp, hidden inside a blued reflector and hung, a little to the side of the receiving set.

Incidentally it might be stated that this idea is used in every theatre and movie house, for the same purpose. The next time you go to the "movies" note the effect that bringing up the lights during the intermission has. Immediately everyone tenses-up, starts in to talk and look around, and passages of music that are being played during this time are not "registered" with nearly as great a force as when the house is in darkness and the picture is playing.

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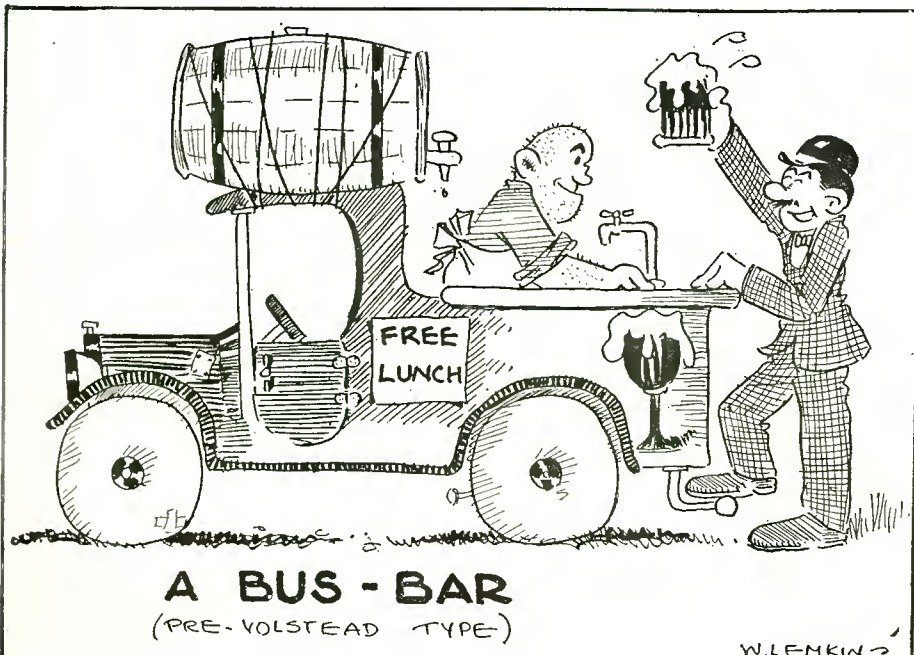
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**RADIO ENCYCLOPEDIA**  
is now complete—  
See Page 6

# A 13 to 735 Meter Receiver

(Continued from page 122)

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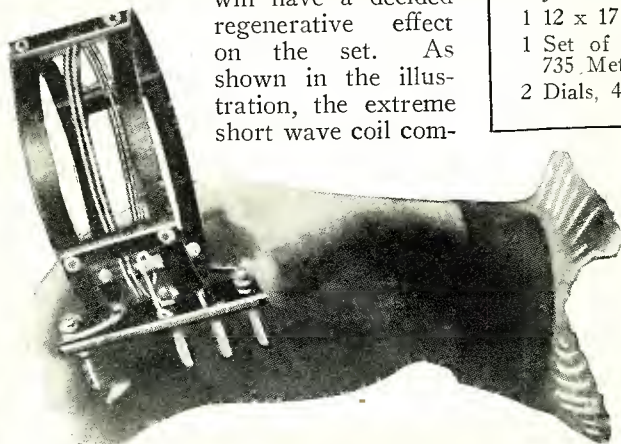
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 Set builders!—here's your best bet—a complete folder of twenty, selected Radio Diagrams, each complete and ready to be constructed.  
**PRICE 50c**  
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 230 Fifth Ave. New York

denser which shunts the secondary be no larger than that specified, if the real low waves are desired, as if a larger condenser is used, the tuning will be so sharp that it will be almost an impossibility to operate the set.

The circuit used is the usual "fixed tickler," the adjustment of which is made by means of condenser C1. Smooth, even regeneration is the result of this method, with a minimum of readjustment due to tuning of C across the secondary. Little need be said concerning the construction, as by conning the picture and schematic diagrams a very good idea of the manner in which the set is to be constructed will be had.

Care should be taken to keep the grid and plate wires in the detector circuit spaced as far as possible, as when receiving on short-waves the slightest capacity effect between these circuits will have a decided regenerative effect on the set. As shown in the illustration, the extreme short wave coil com-



The interchangeable coil used to cover the ultra-short wave lengths. This coil consists of two air-spaced windings of two turns each.

prises but four turns of wire, two for the tickler and two for the secondary. It is easily seen therefore that any additional coupling between the grid and plate circuits would have a marked effect in the circuit.

Another very important point to take note of is that fixed condensers of the very best make should be used. Those specified in the list of parts are specifically recommended by the manufacturers of many parts which go into the making of short wave receivers.

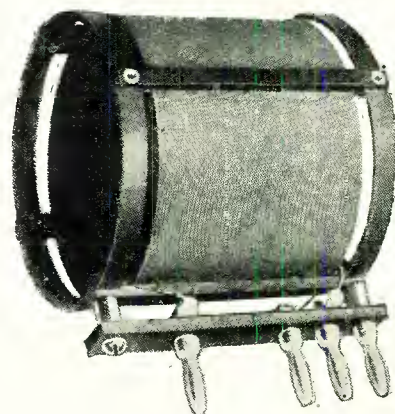
The operation of the set, when built, is simplicity itself. The condenser C controls the wave length, the condenser C1 the regeneration. The tuning is much the same as the old three circuit regenerator. The antenna coupling coil, which is by the way fixed to the mounting, can be moved through an arc, to loosen or tighten the coupling. This coil should be set after the receiver is tested, in such a manner that sharp tuning with good volume is possible over the entire range of frequencies.

In the matter of short wave work, it might be stated that there are no less than seventy-five international radio-

## LIST OF PARTS FOR A 13 TO 735 METER UNIVERSAL RECEIVER

- 1 7 x 18 x 3/16" Radion or Lignola Panel
- 2 Karas SLF Variable Condensers, .00014 (C) and .00025 (C1) mfd.
- 2 Thordarson Transformers, 2 to 1 ratio (T1-T2)
- 3 Benjamin Cushion Sockets (VT1-VT2-VT3)
- 1 Samson Choke Coil No. 85 (L3)
- 2 General Radio Rheostats, 15 and 25 ohms (R1 and R2)
- 1 Sangamo Grid Leak Mounting Condenser, .0001 mfd. (C3)
- 1 Sangamo Condenser, .0001 mfd. (C2)
- 1 Durham Grid Leak, 5 meg. (GL)
- 1 Yaxley Single Circuit Jack (J)
- 2 Yaxley Push Pull Panel Switches (SW1-SW2)
- 1 Jones Multi-plug
- 1 12 x 17 x 1/2" Sub-base Panel
- 1 Set of Aero Plug-in Coils, 13 to 735 Meters, with mounting
- 2 Dials, 4" diameter

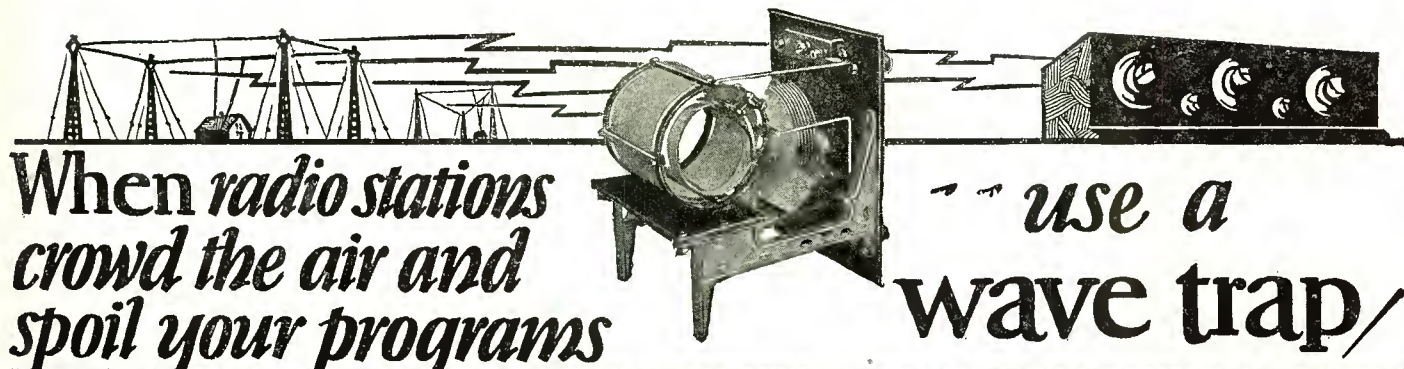
phone broadcasting stations working on waves under 150 meters. KDKA can be heard almost every night working on a wave-length of 64.1 meters.



The Aero interchangeable coil INT No. 5, when used with a Sangamo .0001 mfd. across condenser, covers wave length range up to 735 meters.

WGY broadcasts many programs on waves between 105 and 15 meters. Many stations in England, Ireland, Germany, France, Holland and Italy, broadcast on these ultra-short waves.





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Yes, it is now possible. Loud, clean, clear, crisp distant reception right through raging summer static! Imagine listening to beautiful music, thinking it is from a local station, then hearing the announcer clearly speak the call letters of a station a thousand miles away. Imagine the pleasure of bringing in amazingly pure DX with tremendous volume on the same set which with an old type aerial, gets mostly rasping noise! No wonder SUBANTENNA is acclaimed one of the greatest new things in Radio! No wonder we can make a daring offer to let you test SUBANTENNA for 10 days and nights, entirely at our risk!



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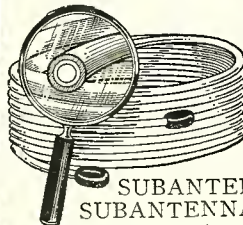
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 "I have received the Subantenna. My grandson installed it. STATIC IS NO MORE. Am well satisfied. I can tune in stations I never could coax out of the air even though I had a long aerial."—A. E. F., Kans.

**Much Clearer**  
 "We are all very much pleased with the way this underground aerial works. We find that the stations come in much clearer, and there is practically no static. It has been a great novelty in our neighborhood."—A. T. S., Chicago.

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 "It has always been impossible for me to eliminate the Drake Hotel. I was told that Subantenna would enable me to do this. Although skeptical, in view of many similar claims made by other manufacturers of radio accessories, I had one of the Subantennas installed. The results have been most satisfactory, in that I have not only been able to get every station in Chicago of any consequence, when the Drake was on the air, but out-of-town stations as well. In addition I am able to report that static which was a source of much annoyance before, has been entirely eliminated so far as I am able to observe."—R. L. P., Chicago.

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**Filters Out So Much STATIC and Noise You Never Know They Exist**



SUBANTENNA is a proved success. Fans in all parts of the country write glowing letters in praise of it. Read in the adjoining left column what several users say about SUBANTENNA. Others write that SUBANTENNA has completely rid them of interference nuisances that had always spoiled even their local reception. Not only static, but arc-light sputters, leaky power line crackles and a host of other disturbing noises. So much sweeter—so much better—does SUBANTENNA make local as well as distant reception; such a tremendous improvement does it make in both the winter and summer performance of any radio set, that no one, once he has used SUBANTENNA, would ever go back to the old style aerial again.

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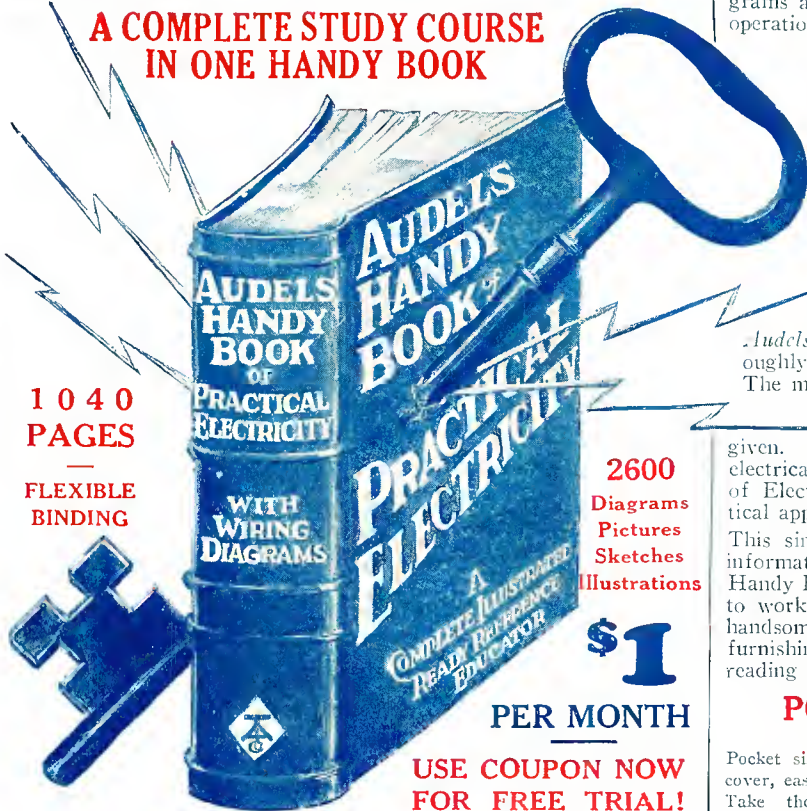
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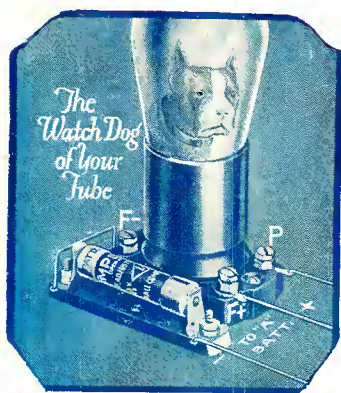
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