Spring Edition

Fifty Cents

1928

# Radio Listeners' Guide and Call Book

Edited by S.Gernsback

*A Quarterly Magazine*

Devora Nadworney
Station W J Z

# $10 "Try this on your piano" $10

# Here it Is!

only only

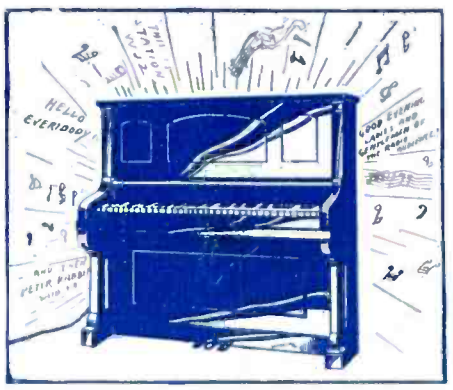
## *The Loudspeaker Sensation of 1928*

of course

## *it's an* Ensco *product*

**Simply attach the ENSCO piano unit to your piano and the cord to your radio set---it only takes a minute---and you have a marvelous, resonant loudspeaker.**

This wonderful device makes use of the perfect sound-reproducing qualities of the piano soundboard. It took years to develop the piano to its present state of perfection, and you can now enjoy perfect radio reproduction by using this soundboard.

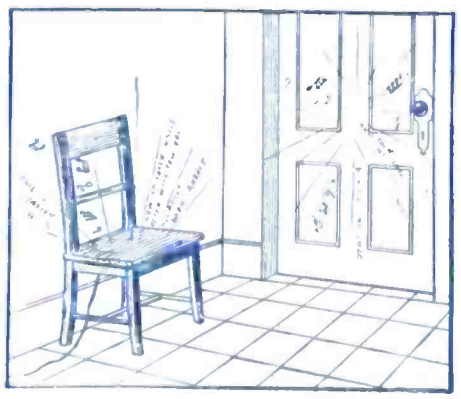


It doesn't show—it does not mar the piano in any way or interfere with its use as a piano. Fits any piano, grand or upright, and works on *any* radio set.

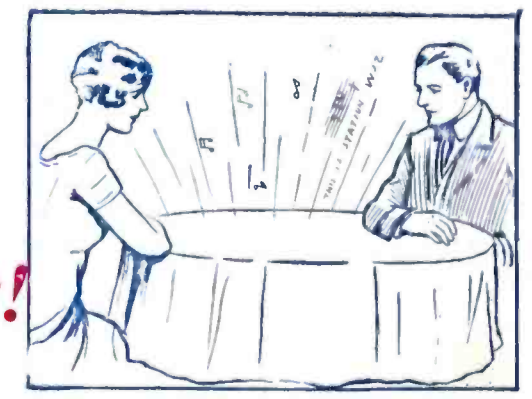
The reproduction is simply marvelous. The sonorous bass notes, the rolling notes of the middle register, and the thin, sharp tones of the upper treble—all perfect—and the voice sounds *natural* The famous ENSCO drive mechanism—the rugged direct-drive, distortionless unit developed by Clyde J. Fitch, makes this possible. It is *new* and the results will surely astound you.

## MANY NOVEL APPLICATIONS

Musical furniture is now a reality. Imagine the dinner table, surrounded by guests, bursting forth into glorious song, a chair or bridge table telling a bedtime story, or a door or panel singing a baritone solo! All this is made possible by the ENSCO piano unit. It is made by the makers of the famous ENSCO cone speaker kits under U. S. Patent No. 1630199 and others pending.



## *The Best $10 You Ever Spent!*



If you do not have a piano, use it on the table or a panel, or door. It works!

Sold under money-back guarantee. You must be satisfied or your money will be refunded. Price only $10.00. Complete with 20-foot cord. Ask your dealer or send order to our nearest office. Shipped prepaid on receipt of check or money order or C. O. D. with postage added.

Price in Canada—$11.50

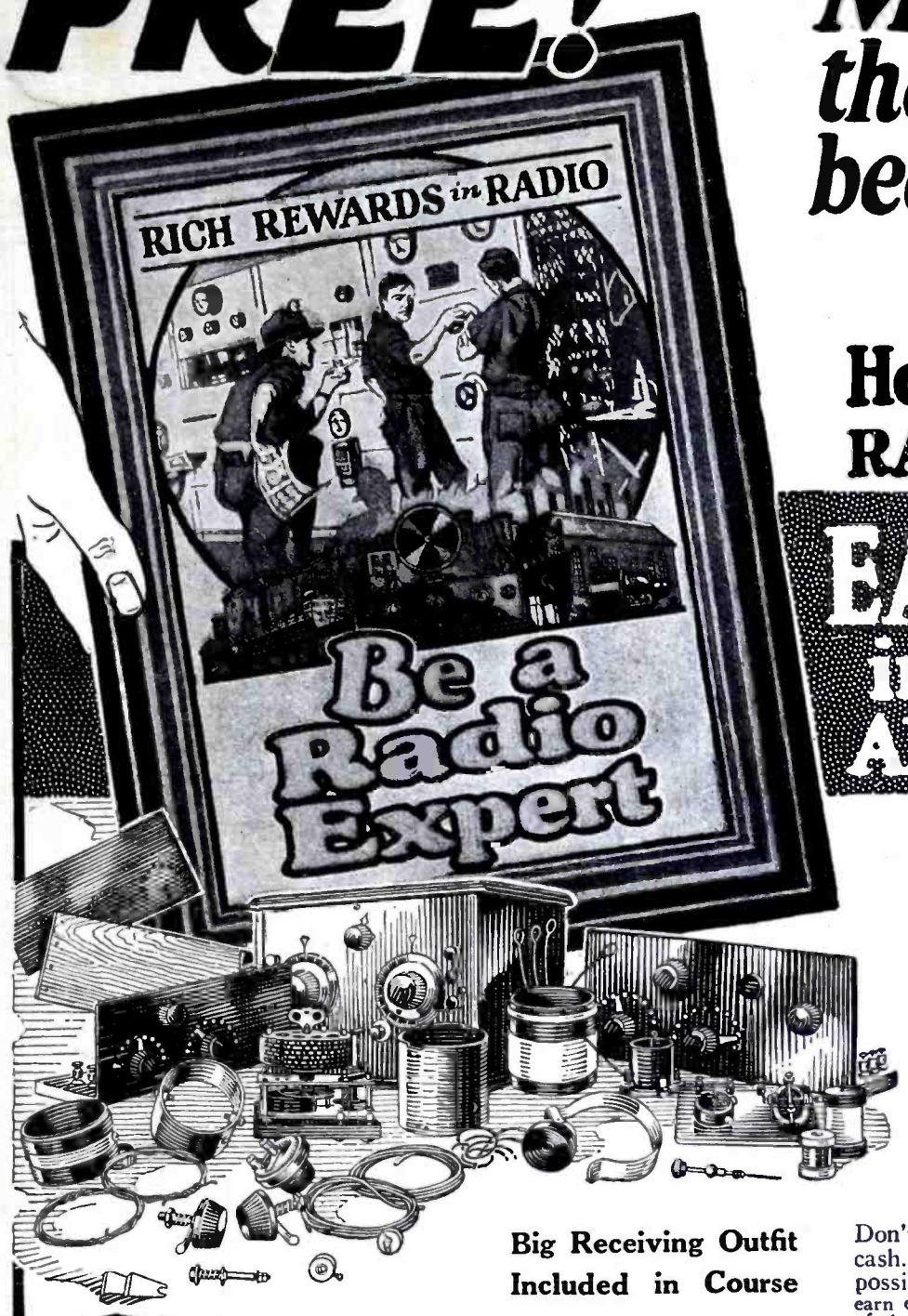
Main Office
25 CHURCH STREET
NEW YORK

ENGINEERS' SERVICE COMPANY
28 E. JACKSON BLVD.
CHICAGO, ILL.

331 BAY STREET
TORONTO, ONT.

RMA Radio Manufacturers Association Member

# FREE!




## "MEN! Here's the 'dope' you've been looking for-

## HOW TO GET INTO THE RADIO BUSINESS"

J.E.S.

## EARN BIG MONEY in Work That is Almost Romance

If you're earning a penny less than $50 a week, clip coupon now for FREE BOOK! New 64-page book, profusely illustrated, tells all about the Radio Profession, thousands of opportunities—**in work that is almost romance!** YOU can learn quickly and easily at home, through our tested, improved methods, to take advantage of these great opportunities! Why go along at $25 or $35 or $45 a week, when you can pleasantly and in a comparatively short time learn to be a Radio Expert, capable of holding the big pay jobs?

### CLIP COUPON FOR FREE BOOK

Don't envy the other fellow who's pulling down the big cash. Our proven home-study training methods make it possible for you, too, to get ready for a better job, to earn enough money so you can enoy the good things of life. One of the most valuable books ever written on Radio tells how—interesting facts about this great field, and how we can prepare you, quickly and easily in your spare time at home, to step into a big-pay Radio job. You can do what others have done through our training. GET THIS NEW FREE BOOK. SEND COUPON TODAY.

**J. E. SMITH, President**
**NATIONAL RADIO INSTITUTE**
**WASHINGTON, D. C., Dept. 3-Q.**

### Big Receiving Outfit Included in Course

Instruments shown here and others sent to our students free of extra cost.

**Clip coupon now**—find out all about this big unequaled offer while you still have time to take advantage of it. Our training is intensely practical—these instruments help you learn to do the practical work. Receiving sets, from simplest kind to thousand-mile receiver. Many other big features.

**J. E. SMITH**
**President**

### My Radio Training Is the Famous "Course That Pays for Itself"

Spare time earnings are easy in Radio when you know it the way we teach you. Increase your income almost from the start of your course through practical knowledge we give you. We show you how to hold the job, then our Employment Department helps you get one. Free Book "Rich Rewards in Radio" tells how.

Howard B. Luce of Friedens, Pa., made $320 in 7 weeks during his spare time. D. H. Suitt of Newport. Ark., writes. "While taking the course I earned in spare time work approximately $900." Earl Wright of Omaha reports making $400 in a short time while taking his course—working at Radio in his spare time only. Sylvester Senso, 207 Elm Street, Kaukauna, Wis., made $500.

And when your training is completed you're ready to step into a real big Radio job like C. C. Gielow, Chief Operator of the Great Lakes Radio Telegraph Company; E. W. Novy, Chief Operator of Station WRNY; Edward Stanko, Chief Operator of Station WGR; and hundreds of other N. R. I. Trained men. The National Radio Institute, originators of Radio Home-Study Training, established 1914, today offers you the same opportunities these men had, under a contract that pledges you full satisfaction or money refunded on completing our training. It's your big chance to get into Radio—mail coupon for FREE Book and proof.

**Coupon Brings FREE Book! Mail It NOW!**

**Radio Needs Trained Men**

**National Radio Institute, Dept. 3-Q Washington, D. C.**

Dear Mr. Smith:

Without obligating me in any way, send me your FREE BOOK, "Rich Rewards in Radio" and all information about your practical, home-study, Radio Course.

NAME.....

ADDRESS.....

TOWN..... STATE .....

OCCUPATION .....

**SEND THIS COUPON TODAY**

# Radio Listeners' Guide and Call Book

*A Quarterly Magazine*

**Volume III** **Number 4**

**SPRING, 1928**

## Contents of This Issue



**RADIO LISTENERS' GUIDE AND CALL BOOK**

*A Quarterly Magazine*

**VOL. III, No. 4** **SPRING, 1928**

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When subscribing to RADIO LISTENERS' GUIDE AND CALL BOOK, send your name and remittance to The Consrad Company, Inc., 230 Fifth Ave., New York, N. Y. Mention that you desire to subscribe to same. We also publish and distribute CONSRAD PATTERNS, E. I. COMPANY BOOKS, etc. Write clearly.

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# The New Excello Consoles for

**RADIOLA-17**
**ATWATER KENT**
**CROSLEY**
**FREED-EISEMANN**
**and other Standard A.C. Receivers**

Style R-37
Closed

Style R-37
Open

Style R-36 Closed

## BEAUTIFY *your set!*

As the new A.C. receivers represent the ultimate in reception, so the new Excello line embodies the ultimate in radio consoles. Adds to the appearance of your home as well as to the enjoyment of your set.

The cabinet work of Excello consoles is of the highest quality: doors of 5-ply matched butt walnut; rich piano finish.

*See the new Excello console at your dealer's or write us for descriptive catalog*

EXCELLO
*Radio Consoles*

***Dealers and Distributors—write for interesting franchise offer.***

## Excello Products Corporation

**4821-29 West 16th Street, Cicero, Illinois** (Suburb of Chicago)

# INDEX TO ADVERTISERS


# EARN $75.00 a week in Your Spare Time

JOINING the Radio Association enables you to cash in on Radio *now!* Follow its success-proven plans and you can earn $3 an hour, in your spare time, from the very first. Over $600,000,000 is being spent yearly for sets, supplies, service. You can get your share of this business and, at the same time, fit yourself for the big-pay opportunities in Radio.

### Founded on a New Idea

Members of the Association do not wait for months before they make money out of Radio. Without quitting their jobs, our members are earning $25 to $75 a week spare time by building "tailored" radio sets, serving as "radio doctors," selling ready built sets and accessories, or following one of the many profit-making plans of the Association.

### Earned $500 in Spare Hours

Hundreds earn $3 an hour as "radio doctors." Lyle Follick, Lansing, Mich., has already made $500 in spare time. Werner Eichler, Rochester, N. Y., is earning $50 a week for spare time. F. J. Buckley, Sedalia, Mo., is earning as much in spare time as he receives from his employer.

*We will start you in business.* Our cooperative plan gives the ambitious man his opportunity to establish himself. Many have followed this plan and established radio stores. Membership in the Association has increased the salaries of many. Scores are now connected with big radio organizations. Others have prosperous stores.

A year ago Claude De Grave knew nothing about Radio. Today he is on the staff of a famous radio manufacturer and an associate member of the Institute of Radio Engineers. He attributes his success to joining the Association. His income now is 350% more than when he joined.

**WHAT A MEMBERSHIP CAN DO FOR YOU**

1—*Enable you to earn $3 an hour upwards in your spare time.*

2—*Train you to install, repair and build all kinds of sets.*

3—*Start you in business without capital, or finance an invention.*

4—*Train you for the $3,000 to $10,000 big-pay radio positions.*

5—*Help secure a better position at bigger pay for you.*

6—*Give you the backing of the Radio Association.*

**A MEMBERSHIP NEED NOT COST YOU A SINGLE CENT**

### Doubled Income in Six Months

"I attribute my success entirely to the Radio Association," writes W. E. Thon, Chicago, who was clerk in a hardware store before joining. We helped him secure the managership of a large store at a 220% increased salary.

"In 1922 I was a clerk," writes K. O. Benzing, McGregor, Ia., when I enrolled. Since then I have built hundreds of sets—from 1-tube Regenerative to Superheterodynes. I am now operating my own store and my income is 200% greater than when I joined the Association. My entire success is due to the splendid help it gave."

### Easiest Way Into Radio

If ambitious to become a Radio Engineer, to fit yourself for the $3,000 to $10,000 opportunities in Radio, join the Association. It gives you a comprehensive, practical and theoretical training and the benefit of our Employment Service. You earn while you learn. You have the privilege of buying radio supplies at wholesale. You have the Association behind you in carrying out your ambitions.

### ACT NOW—If you wish Special Membership Plan

To a limited number of ambitious men, we will give Special Memberships that may not—need not—cost you a cent. To secure one, write today. We will send you details and also our book, "Your Opportunity in the Radio Industry." It will open your eyes to the money-making possibilities of Radio. Write today.

RADIO ASSOCIATION OF AMERICA
4513 Ravenswood Ave.,
Chicago, Ill. Dept. RR-3

Gentlemen:
Please send me by return mail full details of your Special Membership Plan and also copy of your book, "Your Opportunity in the Radio Industry."

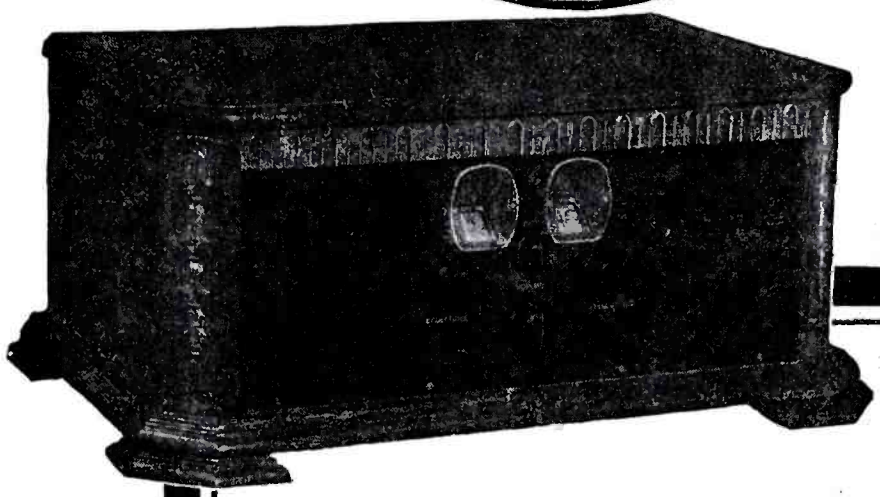
Name. .....

Address .....

City ..... State .....

# SM

# New! All-Wave Tuners and Unipacs



LOOK at it—the prettiest little tuner you ever laid eyes on, to go with any two stage power amplifier, or Unipac, all light-socket operated, and costing only $31.50 for the complete kit. The S-M 642-AC Universal All-Wave Tuner is a two tube A.C. receiver, using interchangeable coils to cover all waves from 18 to 3,000 meters at will, and is equipped with illuminated drum dials, beautifully decorated metal panel, and all modern refinements. The circuit is the popular and efficient one stage of RF amplification and regenerative detector, and its DX range 500 to 1,500 miles or more. A 642-AC Universal All-Wave Tuner and one of the new 682-210 two stage push-pull 210 Unipacs, (power amplifier and ABC power plant) is the finest medium range receiver money can buy, with tone absolutely unequalled. The 642-AC kit, complete to the last screw and lug, is priced at $31.50, for use with any two-stage audio amplifier at all.

The Universal All-Wave Tuners are a series of the neatest, snappiest sets you can build, low in cost but great in dependable performance and real value. Model 642 is a two tube battery operated tuner at $29.50; Model 644 the same tuner plus two audio stages, making a "wow" of a four tube set with 1,500 mile loud speaker range at $42.50, complete. Model 644-AC is a four tube socket powered all wave tuner priced at $54.00, driving all power from the 684 ABC power unit kit at $32.50—just $86.50 for a complete four tube all wave set with ABC power unit included that will give sweeter results than any of the popular six tube, one dial sets.

Or if you want, you can build the three tube model Universal Tuner to precede all standard high quality one stage power amplifiers—or you can build the new screen grid tube into any of these tuners.

Complete blueprints and instructions for all models, 25c.

## S-M Unipacs

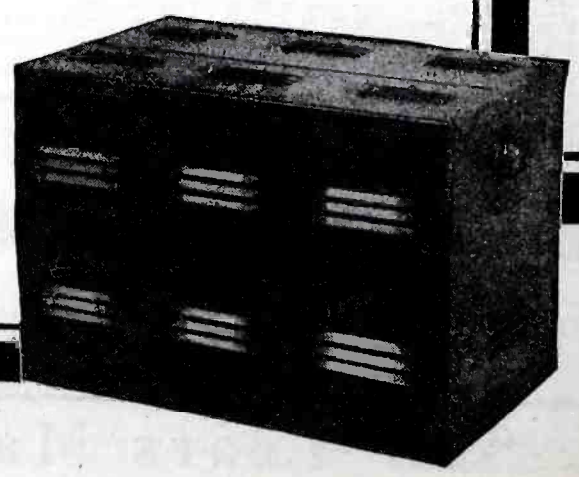
### Socket Powered Amplifiers

New Unipac amplifiers are just being released—power amplifiers for every need, giving the finest quality of reproduction you can possibly demand. Each model contains the famous push-pull 210 amplifier stage first introduced by Silver-Marshall, as well as its own complete ABC power plant operating from any 110 volt, 60 cycle lamp socket.

Model 681-210 is a single stage push-pull amplifier using two UX-210 tubes with an undistorted power output of over 5,000 milliwatts—up to several hundred times clearer than that of ordinary receivers. It can be used with any set equipped with at least one stage of AF amplification to boost volume, eliminate B batteries and give finer quality than you can get from any other power amplifier or receiver on the market. Type 681-210 has a self-contained power supply using one or two UX-281 rectifier tubes at will and a UX-874 voltage regulator tube to hold receiver B voltages, supplied by the Unipac, absolutely constant.

The new Unipac case is 17¼" long, 10¼" high, and 9¾"wide—large enough to accommodate the Unipac and an extra audio stage if desired, as well as an A power transformer to enable the 681-210 to supply receiver ABC power when A.C. tubes are used. Price, 681-210 KIT, ready to assemble, $83.25; or 681-210 WIRED Unipac, ready to use, $93.25.

Model 682-210 is a complete two stage amplifier for phonograph or radio containing the 210 push-pull output amplifier stage of the 681-210 plus a first audio stage using a UX-226 tube and a S-M 220 transformer. Type 682-210 will furnish A, B and C power to an A.C.-tube-equipped receiver as well as complete audio amplification of the finest imaginable quality. Price, in same case as 681-210, $97.75 for 682-210 KIT, or $107.75 for 682-210 WIRED Unipac, ready to use.



# SM New! Shielded Grid Six

"IF it will do only a quarter of what you claim, it's the set of sets," said a prospective builder of one of the first of the new Shielded Grid Six receivers. Then he built the set, came back the next day, and gave his opinion: "Any set that will bring in East and West Coast stations with a five foot wire for an antenna, that will give ten to fifteen kilocycles separation from locals and get all distant stations with local volume and tone quality—that's my idea of some set. And if this same set will get me over fifty stations on my first evening, as the Shielded Grid six did—well, that's the receiver for me!"

The new Shielded Grid Six receivers, using three stages of tuned RF amplification with screen grid tubes, followed by a super sensitive detector and the famous S-M two stage audio amplifier, are just about the finest receivers you can build. They have consistently "trimmed" every receiver against which they have been tested, even new screen grid superheterodynes, yet they're so simple and easy to build, so sure and positive in their operation—with no tricky adjustment—that you'll simply fall in love with them after your first five minutes of tuning. And the Shielded Grid Six offer all the refinements of two and three hundred dollar factory sets, in shielding, all-metal assembly, bronze front panel, dual control vernier dials and appearance that is a joy to the eye of the connoisseur or the engineer alike—a beauty that creates instantaneously the desire to own the finest of sets—a Shielded Grid Six.

## Unconditional Guarantee

So truly remarkable is the performance of the Shielded Grid Sixes, with their superheterodyne selectivity, marvelous tone, and uncanny DX ability, that they are offered in kit form, ready to put together using only screw-driver, pliers, and soldering iron, with the following guarantee.

If they don't give equal or better performance, to your absolute satisfaction, than any other set you've ever used, just rebox and send back the parts and get your money back!

Could anything be fairer—and has any other set ever been offered to you that impressed its makers as being good enough to justify such a guarantee?

Don't waste time—get your Shielded Grid Six now and learn what 1928 radio reception really is—as far ahead of anything you've known as the new Ford is ahead of the old.

Two models of the Shielded Grid Six receivers using screen grid tubes are available, type 630-SG and 630-LSG.

The 630-SG receiver is a six tube TRF set employing three stages of screen grid RF amplification, a super-sensitive detector, and two audio stages with a wavelength range of 200 to 550 meters with coils furnished, or up to 3,000 meters with other standard plug-in coils. It is designed for antenna operation with a 15 or 30 foot antenna indoor or outdoor, or with a loop, if desired, upon removal of antenna coil. The complete kit, including every nut, screw and lug required, down to the last part, is priced at $97.00 with complete building instructions and blueprints.

The 630-LSG receiver is exactly the same as the 630-SG model except that it is intended for loop antenna operation only, using any standard .00035 loop. The complete kit, including all parts, is priced at $91.50.

## New 440-SG Three Stage 112 Kilocycle Screen Grid Amplifier

The S-M 440 Time Signal Amplifier—the popular copper and brass 112 K.C. shielded RF amplifier is now available in a new model for screen grid tubes, far more sensitive even than is the original 440. Model 440-SG Jewelers Time Signal Amplifier uses three RF amplifier stages with UX-222 or equivalent screen grid tubes and a super-sensitive detector, with the most tremendous amplification obtainable from any known long wave amplifier. Ready to operate, laboratory tested and calibrated, price $40.00, unconditionally guaranteed superior to any long wave amplifier constructed of individual parts.

## SILVER-MARSHALL, Inc.

**866 West Jackson Blvd. Chicago, Ill.**

**SILVER-MARSHALL, INC.**
**866 W. Jackson Blvd., Chicago**

Please send me the following data:

.....Complete Shielded Grid Six blueprints and instructions for which I enclose 25c.

.....Complete Unipac instructions, for which I enclose 25c.

.....Complete Universal All Wave Tuner blueprints and instructions, for which I enclose 25c.

.....All circulars upon new S-M developments in A. C. operation, power amplification, audio quality. RF amplification, and short wave fields, for which I enclose 6c postage.

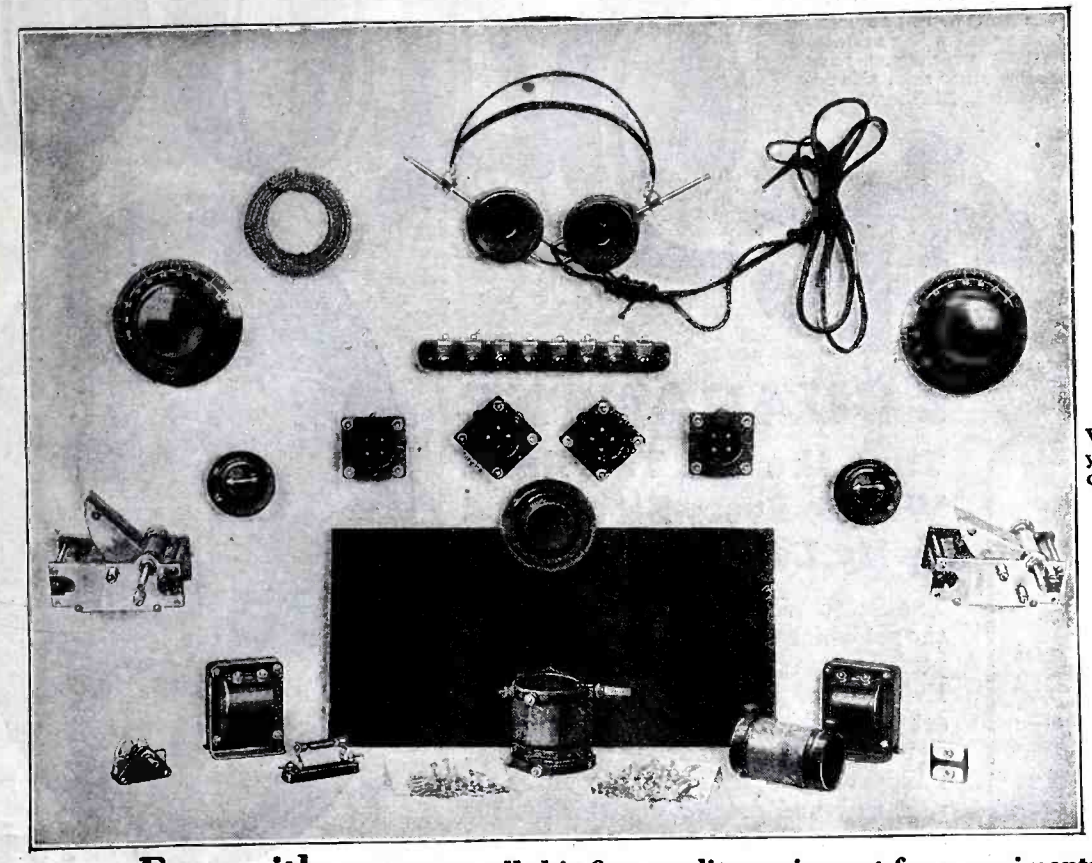
Name .....

Address .....

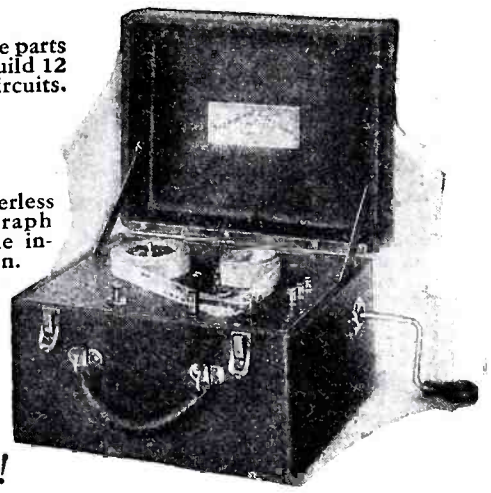
City .....

# LEARN RADIO and find

**Good Pay from the Start**
**Rapid Advancement,**
**Glorious Adventure and**
**Phenomenal Success in**
**A Life Profession of**
**Fascinating Brain-work.**



With these parts you can build 12 different circuits.



The Peerless Signagraph for code instruction.

**Free with course, all this first-quality equipment for experimental work!**

## *You can learn at home!*

R. L. DUNCAN, Director, Radio Institute of America. Author of several volumes on radio

Here is your big opportunity! Radio pays hundreds of millions in salaries each year. In a few years the industry has progressed from almost nothing to one of the most important in the world. And the big demand for trained men continues in all the branches of radio. *Are you going to plod along at a thirty-five dollar a week job when REAL MONEY is waiting for you in radio?*

Our graduates are earning big money as radio designers, as executives with large radio organizations, in broadcasting work, as skilled mechanics, assemblers, servicemen and radio dealers. We have trained thousands of men to become successful radio operators on ships traveling to far corners of the globe where they meet excitement and adventure—to become radio operators in shore stations, sending and receiving radio traffic with countries across the two oceans. And now Opportunity is knocking at your door.

### *A Brand-new Course Offered by the World's Oldest Radio School*

After years of experience the Radio Institute of America has evolved a new radio course—the most up-to-date of any offered today. It starts with the fundamentals of radio and carries you through the most advanced knowledge available. The work has been prepared in simplified form by men who have written many volumes on radio.

### *Radio Institute of America backed by RCA, G-E and Westinghouse*

Conducted by the Radio Corporation of America and enjoying the advantages of RCA's associates, General Electric and Westinghouse, the Radio Institute of America is equipped to give—and does give—the finest radio instruction obtainable anywhere in the world.

### *Home Study Course*

Moreover you need not sacrifice your present employment for you can STUDY AT HOME during your evenings and other spare time. Thousands have successfully completed RIA training and have advanced to important radio positions. So can you with this new course.


### *Just Off the Press*

This new catalog describing the course is just coming off the press. If you want to learn more about the lucrative and fascinating profession of radio send the coupon now for your copy.

RADIO INSTITUTE OF AMERICA
Dept. CP-3 326 Broadway, New York City

RADIO INSTITUTE OF AMERICA, Dept. CP-3
326 Broadway, New York City

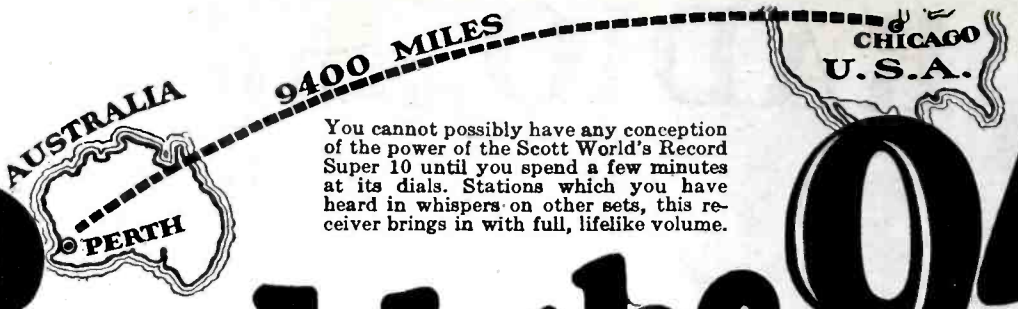
Dear Mr. Duncan :

Please send me your new catalog. I want to know more about your new radio course.

*Name*.....

*Address*.....

.....




You cannot possibly have any conception of the power of the Scott World's Record Super 10 until you spend a few minutes at its dials. Stations which you have heard in whispers on other sets, this receiver brings in with full, lifelike volume.

# Build the 9400

## Read What Builders of This Set Say

"I can tune in nearly any station in Canada or any place in the United States consistently and at will, without interference from other stations."—Adrien Goulet, Montreal.

"The tone is beautiful and for DX reception no other Super I have built or heard can compare with it."—Dr. Louis Schulze, Chicago.

"Received 6. W. F. of Perth, Australia, June 25th with plenty of volume. Also have received J. O. C. K., Japan."—Virgil C. Zeis, Chicago.

"Tone is wonderful; volume enough to rattle the windows on DX like K. F. I., K. G. W., etc. The whole city is talking about it." Albert K. Saylor, Monessen, Pa.

"I can tune in station K. F. I. every evening after 9:30 p. m. having no interference from local stations and with volume equal to local stations."—W. H. Hollister, Chicago.

## VERIFIED RECORDS

**8,375 Miles**

1. On March 17th World's Record for loop aerial reception—8,375 miles with Loud Speaker Volume.

**9,400 Miles**

2. On June 25th Scott World's Record Super, located in Chicago received 6.W.F., PERTH, Australia, 9,400 miles away.

**6,000 Miles**

3. On March 29th established new World's Record with reception of six foreign stations distant 6,000 miles or more.

**6,000 Miles**

4. Established new World's Record for greatest number of broadcasting stations heard, located 6,000 or more miles away.

**6,000 Miles**

5. Established new World's Record for most consistent reception of stations 6,000 miles or more distant—117 programmes from 19 different Foreign Stations, between December 27th and April 10th.

## I GUARANTEE

### That the Set You Build Will Be Every Bit as Good as My Laboratory Model

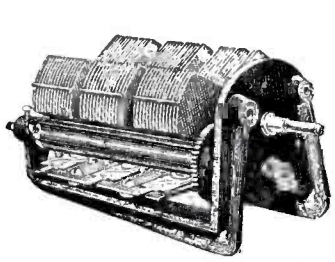
The Scott World's Record Super 10—the set which eclipsed all previous radio performance standards was not a freak. Evidence of this—and proof that the set you build will do every bit as much as my laboratory model, is the fact that builders in all parts of the country report new and greater distance records every day. Every Scott World's Record Super 10 *should* be as good as my laboratory model, because the vital parts of each kit are all matched to the laboratory standard, and the plans I furnish are so complete, precise and so easily understood that error is practically impossible.

Build the Scott World's Record Super 10 and you will have a receiver which is years ahead of the present day commercial conception of radio. Build this set and be the proud owner of the very finest receiver in your community. Real Distance—real Selectivity—and the tonal advantages of high voltage power tube amplification will all be yours in a combination that no other receiver can even approximately approach. Mail the coupon right now for the whole story of the Scott World's Record Super 10.

MR. E. H. SCOTT

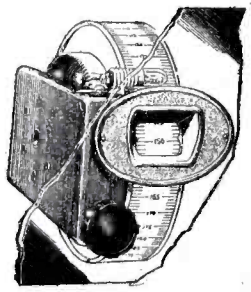
# The SCOTT WORLD'S

## MADE AVAILABLE TO YOU THRU THE COOPERATION



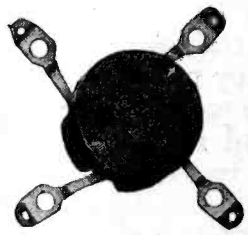
### REMLER 3-IN-LINE

Mechanically, and from the standpoint of efficiency in the handling of radio frequency currents, the REMLER 3-IN-LINE is the last word in gang condenser construction. Staggered connection of plates shields each stator section, one from the other. Balancing condensers are integral with the main unit and are easily and quickly adjusted.



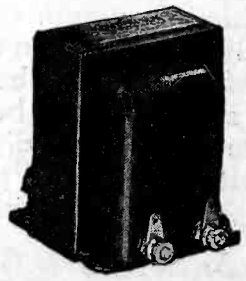
### REMLER DRUM DIAL

A precision product in every sense, reflecting in each detail of construction, the best in engineering and manufacturing practice. So designed that it is easily and quickly attached to any standard condenser, providing very smooth condenser control. Calibrated from 0 to 200 over the whole of its 360 degree surface. Handsome bronze panel face plate furnished with each unit.



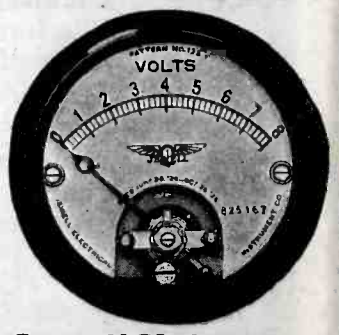
### BENJAMIN SOCKET

Spring cushioned, and hence completely shock-absorbing. Eliminates much tube noise and microphonic howl. Also greatly increases tube life by preventing jarring and consequent cracking of hot filaments. Made of genuine bakelite, and so fashioned that tube contacts are positive at all times.



### Thordarson R-200 Audio

Every test reveals the undisputed supremacy of Thordarson amplifying transformers. The pair of R-200 Thordarson's which are called for in the specifications of the Scott World's Record Super 10, will correctly amplify throughout the whole musical range, every audible frequency which the broadcasting station itself is able to register. To the "tweet" of the highest flute note and the "zoom" of the cello, the Thordarson R-200 instantly responds. A Thordarson R-76 out-put transformer is also specified.




### Jewell Voltmeter

In the careful selection of parts and accessories for the New World's Record Super 10, it is quite natural that a Jewell Pattern No. 135 Radio Voltmeter should be chosen. The black enameled case encloses a fine, D'Arsonval, moving coil type movement, having silvered parts and equipped with a zero adjuster. The scale is silver etched with black characters.

# Mile Receiver!

## *The* First Set to *really* Combine Extreme Distance ~ *actual* 10 Kilocycle Selectivity and *absolute realism* in Reproduction

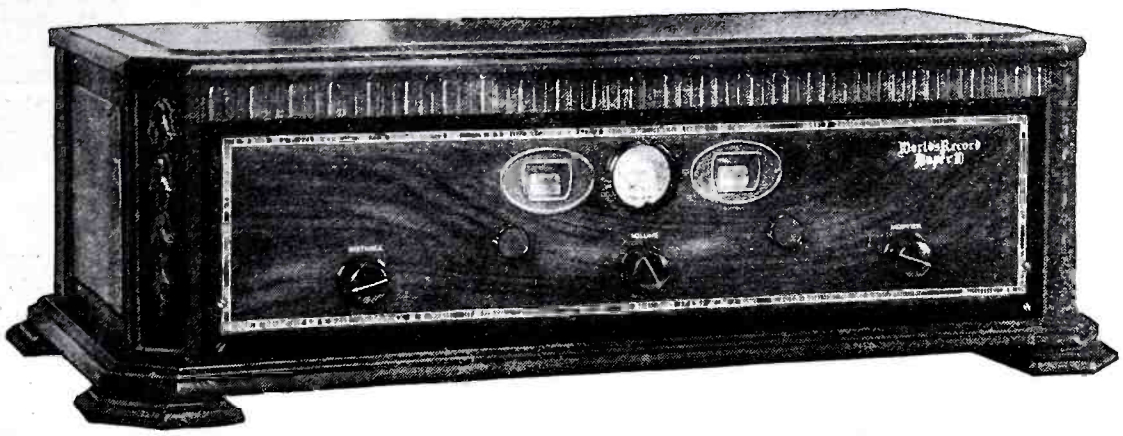
The Scott World's Record Super 10 exceeds all present day standards of receiver performance. Positively nothing else is like it. Distance? The whole world seems to be on its dials! Volume? More than enough to fill a concert hall! Tone? Absolute realism—full, round, natural!

Beyond all doubt, this receiver has been the subject of more enthusiastic interest than any other ever built. It made its first bid for fame by establishing the world's long distance record for loop aerial reception—6357 miles. Since then it has piled up a host of records which would be unbelievable were it not for the authentic verifications at hand.

And for much the same reason, this amazing receiver provides actual 10 Kilocycle selectivity no matter where it is located. The intermediate amplifier is peaked to pass only a 10 Kilocycle band, and the two tuned stages which feed it, pre-sharpen the signal to a point well within the 10 Kilocycle limit irrespective of the signal's strength at the time of input. Indeed, there has never before been such a receiver as the Scott World's Record 10—never before such power—never before such sensitivity. No wonder it is the favorite in districts where broadcasting is congested. No wonder it is the favorite with those who feel that nowhere in the world is there a station too far away to get!

### Easy to Build in a Few Hours

The completeness of the Scott World's Record Super 10 is the main reason for its extreme efficiency. There is a great deal to this receiver. It embodies every known facility for conserving and using the bits of energy that other receivers waste. Complete though it is—complicated as it may appear, it nevertheless is so simple to build that the most inexperienced novice can put it together quickly—and with assurance of results beyond his fondest expectations.



### Super Power Audio

Most naturally nothing less capable than power audio amplification could handle the second detector output of the Scott World's Record Super 10. This was a foregone conclusion at the time this receiver was designed, and it was found, that not only was a power tube necessary, but that a 210 power tube—and only a 210 would handle all that this receiver could feed to it. Result! Clear, pure undistorted volume limited only by the size and capability of the speaker used.

### Two Stages of Tuned R. F. for Correctly Amplified Input and Additional Selectivity—and Three Stages of Long Wave R. F. for Power and Extreme Sensitivity

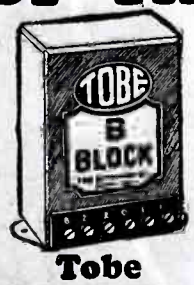
Most superheterodyne receivers depend solely upon the intermediate amplifier for radio frequency amplification. The Scott World's Record Super 10 has two stages of high-gain tuned radio frequency amplification preceding its intermediate amplifier. Hence, the signal fed into its intermediate amplifier, instead of being merely the weak impulse picked up by the loop, is as strong as the output signal of a highly efficient 5 tube tuned radio frequency set. The signal is then tremendously amplified in the long wave amplifier, the output of which, therefore, is most naturally many, many times greater than usually obtained from other types of superheterodyne receivers. Power? Signals bearly audible are built up to terrific volume by the amplification system of the Scott World's Record Super 10.

### FREE CIRCUIT DIAGRAM and Full Particulars

The far superior performance of the Scott World Record Super 10 is not happenstance. It is the direct result of coordinating many new and advanced engineering features in circuit and vital-part construction. Hence, the whole detailed story of the Scott World's Record Super 10 is one of the most enlightening radio stories ever written—and of vital, intense interest to you, whether you have a radio or not. Mail the coupon and we will send you absolutely FREE, complete circuit diagram and full constructional information. Mail the coupon Now. No Obligation.

# RECORD SUPER 10

## OF THESE LEADING PARTS MANUFACTURERS—

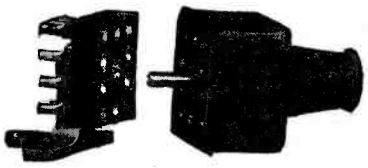



### Tobe Condensers

The quality of by-pass condensers is of far more importance than the average set builder thinks. Too often, troubles which the builder cannot locate are to be found in the by-pass condensers. Hence, to insure year after year of quiet, efficient condenser performance in the Scott World's Record Super 10, TOBE Condensers were specified. These condensers, being better designed and better made of better materials, are certain in their action.


### Carter Rheostats

Chosen for their unmistakable quality, smooth operation and compactness. The Carter Rheostat is an engineering masterpiece. It fits snugly up against the panel. Its sliding arm moves so smoothly and its contact is so positive that filament temperature variation is accomplished without even the slightest suggestion of attendant noise. Air cooled.



### Jones Multi-Plug and Cord

The Jones 10 Contact Multi-Plug and Cord is, beyond all doubt, the finest way to connect batteries to a set, that has ever been devised. Easier and quicker than binding posts to install; all the lead wires are in one compact, neat looking braid covered cable; contacts are always tight and all the batteries can be instantly disconnected from the set by merely pulling the plug. The cable and the unit which mounts onto the set are color coded to prevent mistakes, and the plug is keyed so it can go in the right way only.


### Selectone Transformers

SCOTT Selectone Long Wave Transformers are, as laboratory tests reveal, the most efficient units of their type ever produced. They afford maximum selectivity and amplification and at the same time pass the full musical band, thereby assuring perfect tonal reproduction. Laboratory matched into kits and guaranteed to hold their ideal characteristics against time.

### MAIL COUPON NOW

SCOTT TRANSFORMER CO.
7620 Eastlake Terrace
Chicago, Ill.

Send me FREE Circuit Diagram and full particulars of the Scott World's Record Super 10.

*Name*.....

*Street*.....

*City*.....

*State*.....

STATION WMBI
CHICAGO, ILL.
WMBI BRASS ENSEMBLE

STATION WEAO
COLUMBUS, OHIO
DOROTHY HUMPHREYS
SOPRANO

STATION WLS
CHICAGO, ILL.
MAURIE SHERMAN AND
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STATION WGBS
NEW YORK, N.Y.
TERESE ROSE NAGEL
PROGRAM MANAGER

STATION WPG
ATLANTIC CITY, N.J.
NORMAN BROKENSHIRE

STATION WGES
CHICAGO, ILL.
GEORGE FLYNN
IRISH TENOR

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

FLUX 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 atmmosphere; the chlorides of pastes and fluids will. *Moisture plus carbon particles defeat the best insulations produced. Moisture plus chlorides direct a slow but determined corrosive attack upon supporting metal.* 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.,
4252 Wrightwood Ave., Chicago, U. S. A.

Gentlemen: Please send me a test sample of Kester Radio Solder, together with descriptive literature without any obligation whatsoever.

Name .....
Address .....
City ..... State.....
Dealer .....

# COMMUNITY AND PROFESSIONAL SET BUILDERS

## THE GREAT ~ SUPER ~ HILODYNE IS NOW READY ~POPULAR~ DEMAND IS BEHIND IT! NOW IS THE ~TIME TO~ MAKE MONEY.

The activity and growth of the latest circuit has proven a revelation both in performance and appearance, and which has aroused a national appeal and consumer demand due to its immediate recognition and acclaim by the greatest editors and authorities on improved Radio reception.

The SUPER HILODYNE has been featured editorially by leading radio newspapers and fan publications throughout the universe. It is making rapid strides in establishing itself as the most popular and up-to-date receiver that has ever been introduced to the Radio Public.

# JOIN OUR FORCE

My dear Business Builder:

Each and everyone of you Radio Fans are responsible for the growth of the Radio Industry.

It was YOU that made the Crystal Circuit, the Neutrodyne, the Tuned Radio Frequency and the Super-Heterodyne Circuits popular in their time.

It is years since a new circuit has been devised that is not merely a modification of the aforesaid circuits. Did YOU, Mr. Radio Fan, profit from the enthusiastic labors you put into the Industry popularizing the aforesaid past Radio triumphs? Are you getting any of the profit your enthusiasm and labor created?

I believe that you individually and collectively are the mainspring of the Radio Industry. When you believe in a new development your enthusiastic praise is worth thousands of dollars in advertising, and it is my intention to compensate you for the assistance you are able to give.

One of you Fans, namely, Mr. Fred A. Jewell, a master Radio Fan, who over a period of five years indefatigably experimented with more than 2,000 radio circuits and modifications thereof, has discovered the GREATEST ACHIEVEMENT SINCE THE INCEPTION OF THE INDUSTRY. Particulars of this achievement, namely, his new circuit, appears elsewhere in this Issue.

Mr. Jewell, without attempting in any way to evade the Patent Situation, has consistently labored towards the creation of the ideal Radio Receiving circuit, and because of his constant application to his subject has not only created this ideal Receiving circuit, but, remarkable as it may seem, has actually created a new circuit that in no way infringes on existing circuits, and in no way resembles in function or performance anything heretofore accomplished.

Because of the foregoing I have contracted to pay Mr. Jewell a minimum of $170,000 for his creation, and sincerely believe that he will earn many times that much with me.

I want to keep YOU interested in Radio and to enlist your cooperation in putting this circuit across. It will be the means of your earning a substantial income in your entire or spare time while you are playing with it, and, who knows, you may be able to make some improvement or duplicate Jewell's achievement, through your cooperation.

While cooperating with me in your entire or spare time you will earn the wherewithal to enable you to continue your experimentation, and a great deal more.

Let me send you details. I want your assistance in putting this startling new development in Radio circuits across in a BIG way, and have a plan which will enable you to earn money without interfering with your present occupation, while you are giving this assistance. Thousands of sincere young men have made money with me in the Radio Industry. I want YOU to join the RANKS with a view to accomplishing mutually greater things.

Don't hesitate—fill in the coupon. Get the full details. I know you will become one of us.

LEO POTTER, Pres.
Potter Products Corp.

THIS COUPON FOR FURTHER INFORMATION

POTTER PRODUCTS CORP.,
15-17 West 18th St., New York

Gentlemen: Kindly send me full details of your plan to help me make big profits. I understand there is no obligation connected with this request.

Name .....

Address .....

City, State .....

# SUPER-HILODYNE

## AN ENTIRELY NEW CIRCUIT

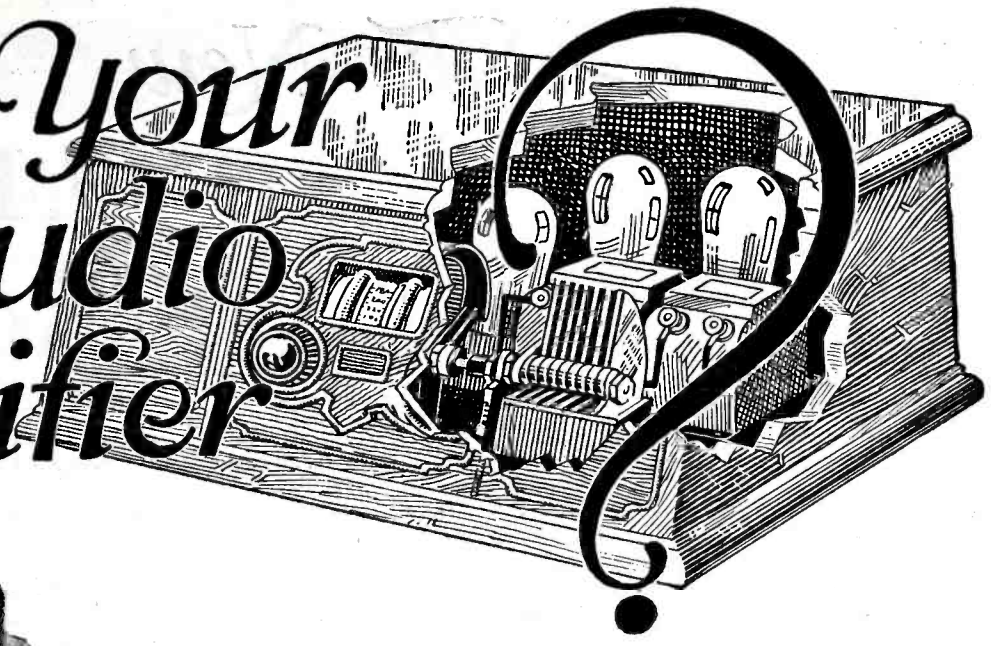
The Super-Hilodyne absolutely free from all patent infringement embodying a new method of vario frequency or static reduction. Unrivalled distance getter. Tremendous power, unheard of selectivity with unequalled tone quality and faithful reproduction, with real single control operation.

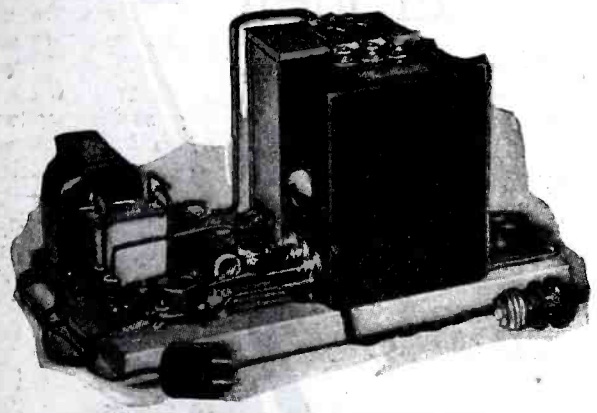
We Need Demonstrators—Local Service Representatives—and Boosters—If You have Some Radio Experience and Want to Become One of Our Staff—

*Write or fill in the Coupon and mail to us at once.*

**POTTER PRODUCTS CORP., 15-17 West 18th St., New York**

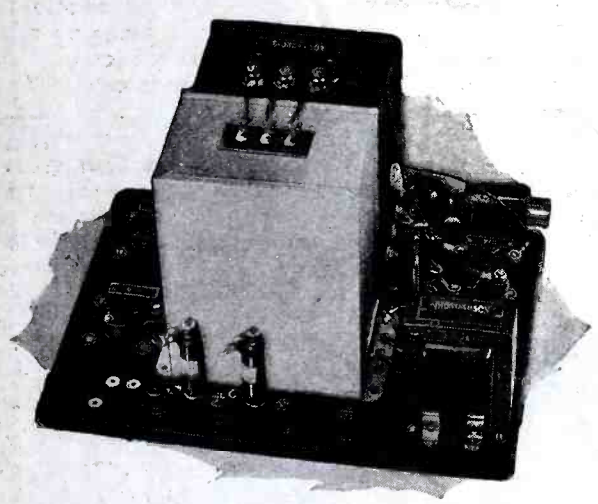
# How's Your Old Audio Amplifier?





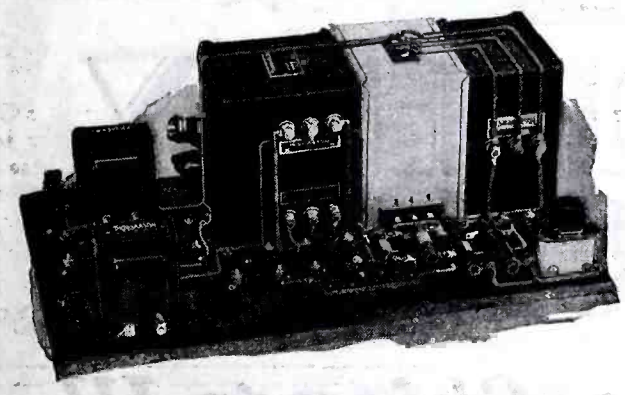
**THORDARSON 171 TYPE POWER AMPLIFIER**

*Built around the Thordarson Power Compact R-171, this power amplifier supplies "A," "B," and "C" current for one UX-171 power tube and B-voltage for the receiver. Employs Raytheon B. H. rectifier.*



**THORDARSON 210 TYPE POWER AMPLIFIER**

*This amplifier, mounted on a special metal chassis, uses the Thordarson Power Compact R-210. Provides "A," "B," and "C" current for one UX-210 power tube and "B" voltage for the receiver. Employs one 216-B or 281 rectifier.*



**THORDARSON 210 PUSH-PULL POWER AMPLIFIER**

*This heavy duty power amplifier operates two 210 power tubes in push-pull and has an ample reserve of power for "B" supply for the heaviest drain receivers. Built with Thordarson Power Transformer T-2098, and Double Choke Unit T-2099.*

## A Home Assembled Thordarson Power Amplifier Will Make Your Receiver

## *A Real Musical Instrument*

IMPROVEMENTS in the newer model receiving sets are all centered around the audio amplifier. There is no reason, however, why you cannot bring your present receiver up to 1928 standards of tone quality by building your own Thordarson Power Amplifier.

With a screw driver, a pair of pliers and a soldering iron you can build any Thordarson Power Amplifier in an evening's time in your own home. Complete, simple pictorial diagrams are furnished with every power transformer.

The fact that Thordarson power transformers are used by such leading manufacturers as Victor, Brunswick, Federal, Philco and Willard insures you of unquestionable quality and performance.

Give your radio set a chance to reproduce real music. Build a Thordarson Power Amplifier.

Write today for complete constructional booklets sent free on request.

**THORDARSON**

3572

**THORDARSON ELECTRIC MANUFACTURING CO.**
*Transformer Specialists Since 1895*
**WORLD'S OLDEST AND LARGEST EXCLUSIVE TRANSFORMER MAKERS**
*Huron and Kingsbury Streets — Chicago, Ill. U.S.A.*

# Selected The New Model 28-H. F. L. NINE-IN-LINE Receiver

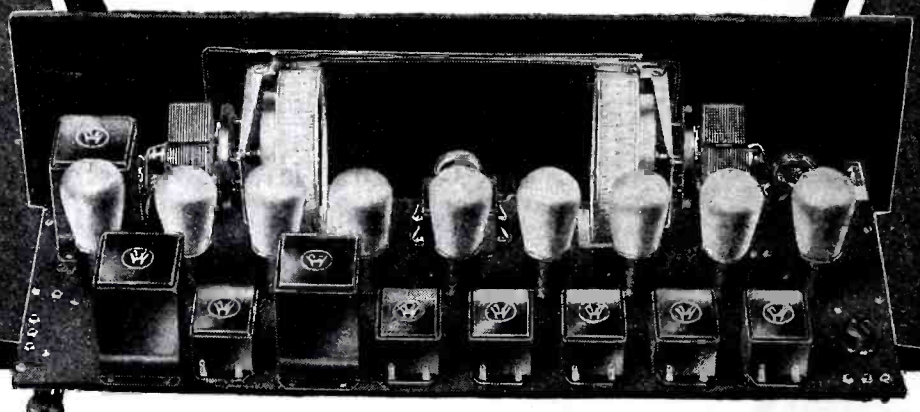
On November twentieth, a committee of broadcast listeners met to select an ideal receiver for the listening public.

After testing six nationally famous receivers (all having nine or more tubes) their unanimous choice was the 1928

## NINE-IN-LINE

**6200 Miles—Los Angeles to Berlin with A. C. TUBES**

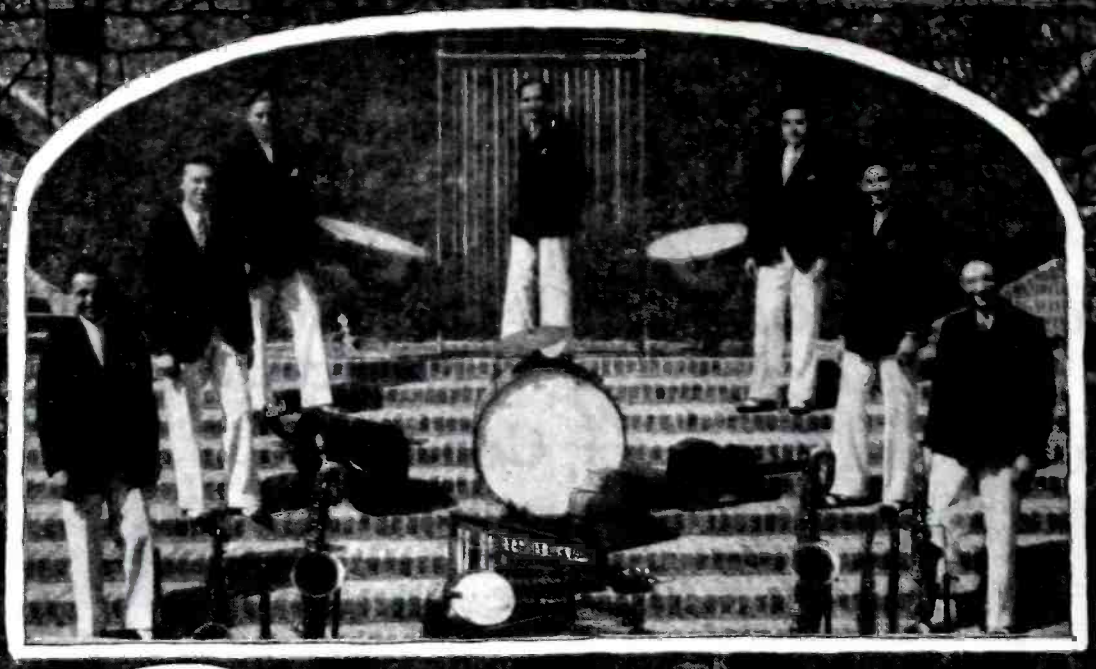
*Designed for operation with standard battery equipment — or direct from the light socket.*



# The HIGH FREQUENCY LABORATORIES

## 28 No. Sheldon St. ~ Chicago, Ill.

**LISTENERS - JOBBERS - DEALERS - Write for Information Etc.**

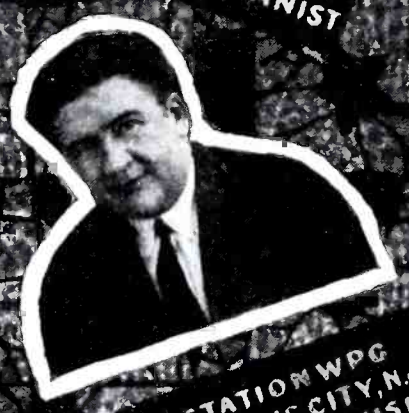


STATION WSEA
VIRGINIA BEACH, VA.
BEN BERNIE'S CAVALIER
HOTEL ORCHESTRA

STATION KFJF
OKLAHOMA CITY,
OKLAHOMA
PEARL DYER, PIANIST

J. ANDREW WHITE
PRESIDENT
COLUMBIA BROADCASTING
SYSTEM

STATION KVOO
TULSA, OKLA
BILLY THOMPSON ANNOUNCER
DOROTHY H REEDY, PIANIST



STATION WPG
ATLANTIC CITY, N.J.
JUDSON HOUSE
TENOR

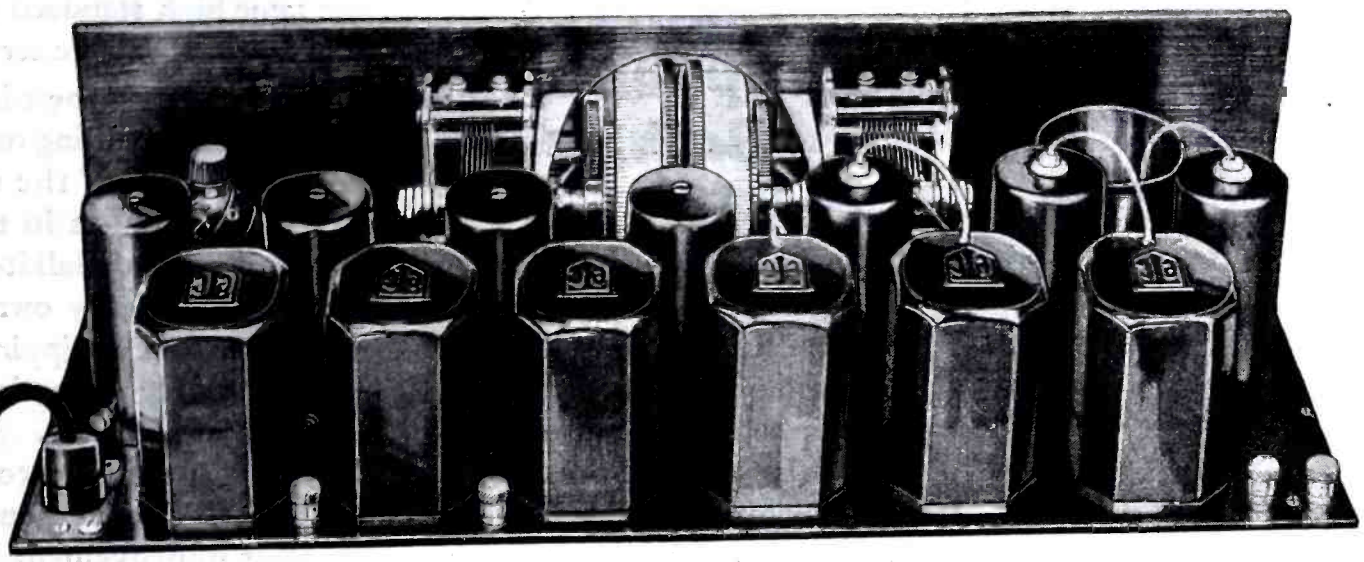
HELEN O'NEILL
PROGRAM DIRECTOR OF
KFRC
SAN FRANCISCO, CALIF.

# Tyrman "70"

## Shielded Grid Amplimax

*Using Type SP122 Tubes*

# for A-C or Battery Operation



**WEBSTER "70"**

**A Real Companion for the Tyrman "70"**

**Webster "10" ("A" Power Unit). Operates any set from 4 to 10 tubes.**

Until now all claims for distance, selectivity, volume and tone quality have been based upon number of tubes employed.

Now greater results are obtained through Tyrman Laboratories by the development of the Tyrman "70" without distortion or oscillation.

Build this new receiver and be the first to benefit by this revolutionary improvement.

## Brings in JAPAN-AUSTRALIA with VOLUME and QUALITY

POSTAL TELEGRAPH – COMMERCIAL CABLES

CLARENCE H. MACKAY, PRESIDENT

RECEIVED AT 124 SO. LA SALLE ST. CHICAGO

STANDARD TIME INDICATED ON THIS MESSAGE

TELEGRAMS TO ALL AMERICA

CABLEGRAMS TO ALL THE WORLD

This is a full-rate Telegram or Cablegram unless otherwise indicated by symbol in the check or in the address.

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|---|---|
| BLUE | DAY LETTER |
| NL | NIGHT LETTER |
| NITE | NIGHT TELEGRAM |
| LCO | DEFERRED |
| CLT | CABLE LETTER |
| WLT | WEEK END LETTER |

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GS LOSANGELES CALIF 21

TYRMAN ELEC CORP 1806

141 WEST AUSTIN AVE CHICAGO ILLS

CONGRATULATIONS TYRMAN SEVENTY RECEIVED BRISBANE AUSTRALIA SIDNEY AUSTRALIA WITH VOLUME AND QUALITY OF LOCAL STATIONS ALSO ALL THREE JAPANESE STATIONS VERY CLEAR STOP SIMPLICITY OF TUNING REMARKABLE STOP STATIONS WERE TUNED IN AS EASILY AS AMERICAN BROADCASTERS

H G WILLIAMS WILLIAMS AND KLENTZ CO.

## Mail Coupon Today!

TYRMAN ELECTRIC CORP.
Dept. RL, 141 W. Austin Ave.
Chicago, Illinois

Gentlemen:

Kindly send me, gratis, special literature describing the Tyrman "70" Shielded Grid Amplimax in detail.

Name.....

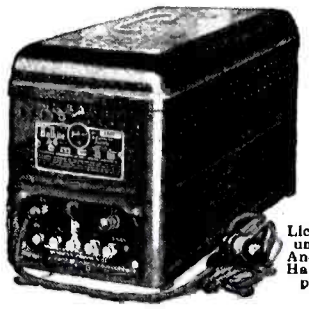
Address.....

City..... State.....

## Tyrman Electric Corp.

**141 West Austin Avenue, Chicago, Ill.**

# The clearest and truest Electric Radio



Licensed under Andrews-Hammond patent

**Balkite "A"** *Contains no battery.* The same as Balkite "AB" but for the "A" circuit only. Not a battery and charger but a perfected light socket "A" power supply. One of the most remarkable developments in the entire radio field. Price $35.

**Balkite "B"** *One of the longest lived devices in radio.* The accepted tried and proved light socket "B" power supply. The first Balkite "B," after 5 years, is still rendering satisfactory service. Over 300,000 in use. Three models: "B"-W, 67-90 volts, $22.50; "B"-135,* 135 volts, $35; "B"-180, 180 volts, $42.50. Balkite now costs no more than the ordinary "B" eliminator.

**Balkite Chargers**

*Standard for "A" batteries.* Noiseless. Can be used during reception. Prices drastically reduced. Model "J,"* rates 2.5 and .5 amperes, for both rapid and trickle charging, $17.50. Model "N"* Trickle Charger, rate .5 and .8 amperes, $9.50. Model "K" Trickle Charger, $7.50.

**Special models for 25-40 cycles at slightly higher prices*

*Prices are higher West of the Rockies and in Canada*

## *Is a standard radio set equipped with Balkite Electric "AB"*

Of course you want an AC electric receiver. For its convenience. Now you can have it, and yet use only tried and proved apparatus.

Simply by adding Balkite *Electric* "AB" to your present radio set. Balkite *Electric* "AB" replaces both "A" and "B" batteries and supplies radio power from the light socket. It contains no battery in any form.

It operates only during reception. It makes any receiver an electric set.

This method makes possible the use in electric reception of standard type sets and tubes. Both are tried and proved, and give by far the clearest and truest reproduction—the same high standard of reception to which you are accustomed.

In this method there is nothing experimental, nothing untried. It consists of two of the most dependable products in radio—a standard set and Balkite. And if you should already own a radio set, the cost of equipping it with Balkite is only a fraction of the cost of a new receiver.

By all means go to AC reception. Its convenience is the greatest improvement in radio. But be as critical of an AC receiver as you would of any other.

Let your AC receiver be a standard set equipped with Balkite *Electric* "AB." Then it will be as clear and faithful in reproduction as any receiver you can buy.

Your dealer will recommend the Balkite equipment you need for your set.

Licensed under Andrews-Hammond Patent

**Balkite "AB"** *Contains no battery*

A complete unit, replacing both "A" and "B" batteries and supplying radio current directly from the light socket. Contains no battery in any form. Operates only while the set is in use. Two models: "AB" 6-135,* 135 volts "B" current, $64.50; "AB" 6-180, 180 volts, $74.50.

FANSTEEL PRODUCTS COMPANY, INC., NORTH CHICAGO, ILLINOIS

*Licensees for Germany:*
Siemens & Halske, A. G. Wernerwerk M
Siemensstadt, Berlin

*Sole Licensees in the United Kingdom:*
Messrs. Radio Accessories Ltd., 9-13 Hythe Rd.
Willesden, London, N. W. 10

FANSTEEL

# Balkite Radio Power Units

# RADIO LISTENERS' GUIDE and CALL BOOK

*A Quarterly Magazine*

*Sidney Gernsback, Editor* — *W. G. Many, Managing Editor*


## RADIO BROADCAST STATIONS OF THE UNITED STATES

### Indexed Alphabetically by Call Letters

| Radio Call Letters | BROADCAST STATIONS Location and Owner | Power (Watts) | Wave Length (Meters) | Frequency (Kilocycles) | Time at Station |
|---|---|---|---|---|---|
| **KDKA** | **E. Pittsburgh, Pa.** —Westinghouse Elec. & Mfg. Co. | 50000 | 315.6 | 950 | Eastern |
| **KDRL** | **Devils Lake, N. Dak.**— Radio Elec. Co. | 15 | 230.6 | 1300 | Central |
| **KDYL** | **Salt Lake City, Utah** — Intermountain Broadcasting Corp., 1009 Ezra Thompson Bldg. | 100 | 258.5 | 1160 | Mountain |
| **KELW** | **Burbank, Calif.**— Earl L. White, 3702 Magnolia Ave. (Divides time with KPPC) (1000 watts Daytime) | 500 | 228.9 | 1310 | Pacific |
| **KEX** | **Portland, Ore.**—Western Broadcasting Co. | 2500 | 239.9 | 1250 | Pacific |
| **KFAB** | **Lincoln, Nebr.**—Nebraska Buick Auto Co. (Divides time with KOIL) | 5000 | 319 | 940 | Central |
| **KFAD** | **Phoenix, Ariz.** — Electrical Equipment Co. | 500 | 272.6 | 1100 | Mountain |
| **KFAU** | **Boise, Idaho**—Independent School, Dist. of Boise (4000 watts Daytime) | 2000 | 285.5 | 1050 | Mountain |
| **KFBB** | **Havre, Mont.**—F. A. Buttrey Co. | 50 | 275.1 | 1090 | Mountain |
| **KFBC** | **San Diego, Calif.**—Dr. A. W. Yale, Electric Bldg. | 100 | 247.8 | 1210 | Pacific |
| **KFBK** | **Sacramento, Calif.**— Kimball-Upson Co., 610 California St. | 100 | 535.4 | 560 | Pacific |
| **KFBL** | **Everett, Wash.**—Leese Bros., 2814 Rucker Ave. | 100 | 223.7 | 1340 | Pacific |
| **KFBU** | **Laramie, Wyo.**—St. Mathews Cathedral, Bishop N. S. Thomas. | 500 | 483.6 | 620 | Mountain |
| **KFCB** | **Phoenix, Ariz.** — Nielson Radio & Sporting Goods Co., Central Ave. at Pierce. | 125 | 243.8 | 1230 | Mountain |
| **KFCR** | **Santa Barbara, Cal.** —Santa Barbara Broadcasting Co., 1200 Anacapa St. | 50 | 211.1 | 1420 | Pacific |
| **KFDM** | **Beaumont, Tex.** — Magnolia Petroleum Co. | 500 | 483.6 | 620 | Central |
| **KFDX** | **Shreveport, La.** — 1st Baptish Church | 250 | 236.1 | 1270 | Central |
| **KFDY** | **Brookings, S. Dak.**— South Dakota State College (Divides time with WDAY) | 500 | 545.1 | 550 | Central |
| **KFDZ** | **Minneapolis, Minn.**— H. O. Iverson, 2510 Thomas Ave., South. | 10 | 215.7 | 1390 | Central |
| **KFEC** | **Portland, Ore.**—Meier & Frank Co. (Divides time with KFIF). | 50 | 214.2 | 1400 | Pacific |
| **KFEL** | **Denver, Colo.**—Eugene P. O'Fallon, Argonaut Hotel. | 250 | 247.8 | 1210 | Mountain |
| **KFEQ** | **St. Joseph, Mo.** — Scroggin & Co. Bank, Hotel Robidoux (2000 watts Daytime). | 1000 | 230.6 | 1300 | Central |
| **KFEY** | **Kellogg, Idaho**—Bunker Hill & Sullivan Mining and Concentrating Co., 834 McKinley Ave. | 10 | 232.4 | 1290 | Pacific |
| **KFGQ** | **Boone, Iowa** — Boone Biblical College, 924 W. Second St. | 10 | 209.7 | 1430 | Central |
| **KFH** | **Wichita, Kans.**—Rigby-Gray Hotel Co., Hotel Lassen, First and Market Sts. | 500 | 245.8 | 1220 | Central |
| **KFHA** | **Gunnison, Colo.** — Western State College of Colorado. | 50 | 254.1 | 1180 | Mountain |
| **KFHL** | **Oskaloosa, Iowa** — Penn College. | 10 | 212.6 | 1410 | Central |
| **KFI** | **Los Angeles, Calif.** — Earle C. Anthony, Inc., 1000 So. Hope St. | 5000 | 468.5 | 640 | Pacific |

| Radio Call Letters | BROADCAST STATIONS Location and Owner | Power (Watts) | Wave Length (Meters) | Frequency (Kilocycles) | Time at Station |
|---|---|---|---|---|---|
| **KFIF** | **— Portland, Ore.** — Benson Polytechnic School (Divides time with KFEC). | 50 | 214.2 | 1400 | Pacific |
| **KFIO** | **—Spokane, Wash.** — North Central High School (Divides time with KFPY). | 100 | 245.8 | 1220 | Pacific |
| **KFIZ** | **—Fond du Lac, Wis.**— Fond du Lac Commonwealth Reporter, 22 Forest Ave. | 100 | 267.7 | 1120 | Central |
| **KFJB** | **—Marshalltown, Iowa**— Marshalltown Electric Co., 1603 W. Main St. (250 watts Daytime). | 100 | 247.8 | 1210 | Central |
| **KFJF** | **—Oklahoma City, Okla.** —National Radio Mfg. Co., Security Bldg. (1000 watts Daytime). | 750 | 272.6 | 1100 | Central |
| **KFJI** | **—Astoria, Ore.** — Liberty Theatre (E. E. Marsh) (Divides time with KMED). | 15 | 249.9 | 1200 | Pacific |
| **KFJM** | **—Grand Forks, N. D.**— University of North Dakota. | 100 | 333.1 | 900 | Central |
| **KFJR** | **—Portland, Ore.**—Ashley C. Dixon & Son, Fifth and Stark, Lumbermen's Bldg. | 100 | 282.8 | 1060 | Pacific |
| **KFJY** | **—Fort Dodge, Iowa** — Tunwall Radio Co., 1004 Central (Divides time with KFMR). | 100 | 232.4 | 1290 | Central |
| **KFJZ** | **—Fort Worth, Tex.**—W. E. Branch, 3rd and Main St. | 50 | 249.9 | 1200 | Central |
| **KFKA** | **—Greeley, Colo.**—Colorado State Teachers College. | 200 | 249.9 | 1200 | Mountain |
| **KFKB** | **—Milford, Kans.**—J. R. Brinkley, M.D. (2500 watts Daytime). | 1500 | 241.8 | 1240 | Central |
| **KFKU** | **—Lawrence, Kans.** — University of Kansas (Divides time with WREN). | 500 | 254.1 | 1180 | Central |
| **KFKX** | **—Chicago, Ill.** —Westinghouse Elec. & Mfg. Co., 508 Michigan Ave. (Divides time with KYW) (5000 watts after 10 P.M.). | 2500 | 526 | 570 | Central |
| **KFKZ** | **—Kirksville, Mo.**—State Teachers College. | 15 | 225.4 | 1330 | Central |
| **KFLV** | **—Rockford, Ill.**—Swedish Evangelical Mission Church. | 100 | 267.7 | 1120 | Central |
| **KFLX** | **—Galveston, Tex.**—Geo. R. Clough, 3327 Avenue P. | 100 | 270.1 | 1110 | Central |
| **KFMR** | **—Sioux City, Iowa** — Morningside College (Divides time with KFJY). | 100 | 232.4 | 1290 | Central |
| **KFMX** | **—Northfield, Minn.** — Carleton College. | 500 | 236.1 | 1270 | Central |
| **KFNF** | **—Shenandoah, Iowa** — Henry Field Seed & Nursery Co. | 2000 | 461.3 | 650 | Central |
| **KFOA** | **—Seattle, Wash.** — Rhodes Department Store. | 1000 | 447.5 | 670 | Pacific |
| **KFON** | **—Long Beach, Calif.** — Nichols & Warinner, Inc., Jergins Trust Bldg. | 500 | 241.8 | 1240 | Pacific |
| **KFOR** | **—Lincoln, Nebr.**—Howard A. Shuman. | 100 | 217.3 | 1380 | Central |
| **KFOX** | **— Omaha, Nebr.** — Board of Education, Technical High School. | 100 | 258.5 | 1160 | Central |
| **KFPL** | **—Dublin, Tex.**—C. C. Baxter, 205 Grafton St. | 15 | 275.1 | 1090 | Central |
| **KFPM** | **—Greenville, Tex.**—The New Furniture Co. | 15 | 230.6 | 1300 | Central |
| **KFPR** | **—Los Angeles, Calif.** — Los Angeles County Forestry Dept. (Divides time with KFQZ). | 250 | 232.4 | 1290 | Pacific |
| **KFPW** | **—Carterville, Mo.** — St. Johns M. E. Church, 120 W. Main St. | 50 | 263 | 1140 | Central |
| **KFPY** | **—Spokane, Wash.**—Symons Investment Co. (Divides time with KFIO). | 250 | 245.8 | 1220 | Pacific |
| **KFQA** | **—St. Louis, Mo.**—The Principia, 5539 Page Ave. (Divides time with WMAY and KWK). | 1000 | 234.2 | 1280 | Central |
| **KFQB** | **—Fort Worth, Tex.**—W. B. Fishborn, Inc., 205 Worth Bldg. | 1000 | 333.1 | 900 | Central |
| **KFQU** | **—Holy City, Calif.**—W. E. Riker. | 100 | 249.9 | 1200 | Pacific |
| **KFQW** | **—Seattle, Wash.** — KFQW Inc., Continental Hotel. | 100 | 217.3 | 1380 | Pacific |
| **KFQZ** | **—Hollywood, Calif.** — Taft Radio & Broadcasting Co., Inc., 1641 N. Argyle (Divides time with KFPR). | 100 | 232.4 | 1290 | Pacific |
| **KFRC** | **—San Francisco, Calif.** —Don Lee, Inc. | 1000 | 454.3 | 660 | Pacific |
| **KFRU** | **—Columbia, Mo.** — Stephens College, Administration Bldg. | 500 | 249.9 | 1200 | Central |
| **KFSD** | **—San Diego, Calif.**—Airfan Radio Corp., U. S. Grant Hotel. | 500 | 440.9 | 680 | Pacific |
| **KFSG** | **—Los Angeles, Calif.**— Echo Park Evangelistic Ass'n, Angelus Temple. | 500 | 275.1 | 1090 | Pacific |
| **KFUL** | **—Galveston, Tex.**—Thos. Goggan & Bro. Music Co., 2126 Market St. | 500 | 258.5 | 1160 | Central |
| **KFUM** | **—Colorado Springs, Colo.**—Corley Mountain Highway, Mining Exchange Bldg. | 1000 | 282.8 | 1060 | Mountain |
| **KFUO** | **—St. Louis, Mo.**—(Transmitter in Clayton)—Lutheran Church of the Missouri Synod, Concordia Theological Seminary (Divides time with KSD) (1500 watts Daytime). | 1000 | 545.1 | 550 | Central |
| **KFUP** | **—Denver, Colo.** — Fitzsimons General Hospital, Red Cross Bldg., Educational and Recreational Dept., U. S. Army. | 100 | 227.1 | 1320 | Mountain |
| **KFUR** | **—Ogden, Utah** — Transmitter in Farmington (near) —Peery Building Co., 420 Twenty-fifth St. | 500 | 225.4 | 1330 | Pacific |

| Radio Call Letters | BROADCAST STATIONS Location and Owner | Power (Watts) | Wave Length (Meters) | Frequency (Kilocycles) | Time at Station |
|---|---|---|---|---|---|
| **KFUS** | **Oakland, Cal.**—Louis L. Sherman, 529 Twenty-eighth St. (Divides time with KRE). | 50 | 256.3 | 1170 | Pacific |
| KFUT | **Salt Lake City, Utah**—University of Utah. | 50 | 249.9 | 1200 | Mountain |
| KFVD | **Venice, Calif.** — McWhinnie Elec. Co., 1825 So. Pacific Ave. (Divides time with KGFJ). | 250 | 208.2 | 1440 | Pacific |
| KFVG | **Independence, Kans.**—First Methodist Episcopal Church. | 50 | 225.4 | 1330 | Central |
| KFVI | **Houston, Tex.**—Headquarters Troop 56th Cavalry. | 50 | 238 | 1260 | Central |
| KFVS | **Cape Girardeau, Mo.**—Hirsch Battery & Radio Co., 312 S. Frederick St. | 50 | 223.7 | 1340 | Central |
| KFWB | **Los Angeles, Calif.**—Warner Bros. Pictures (Inc.), 5842 Sunset Blvd. | 500 | 361.2 | 830 | Pacific |
| KFWC | **San Bernardino, Calif.**—L. E. Wall. | 100 | 222.1 | 1350 | Pacific |
| KFWF | **St. Louis, Mo.**—St. Louis Truth Center, 4030 Lindell Blvd. | 250 | 214.2 | 1400 | Central |
| KFWI | **San Francisco, Calif.**—(Transmitter in So. San Francisco)—Radio Entertainments, Inc., 1182 Market St. | 500 | 267.7 | 1120 | Pacific |
| KFWM | **Oakland, Calif.** — Oakland Educational Society, 1520—8th Ave. (1000 watts Daytime). | 500 | 236.1 | 1270 | Pacific |
| KFWO | **Avalon, Catalina Island, Calif.**—Major Lawrence Mott, Signal Corps, U. S. Army. | 250 | 299.8 | 1000 | Pacific |
| KFXD | **Jerome, Idaho** — The Service Radio Co., Main St. (50 watts Daytime). | 15 | 204 | 1470 | Mountain |
| KFXF | **Denver, Colo.** — Pikes Peak Broadcasting Co., Brown Palace Hotel. | 250 | 282.8 | 1060 | Mountain |
| KFXJ | **Edgewater, Colo.**—R. G. Howell. | 50 | 215.7 | 1390 | Mountain |
| KFXR | **Oklahoma City, Okla.**—Exchange Avenue Baptist Church, 416 W. Grand St. | 50 | 223.7 | 1340 | Central |
| KFXY | **Flagstaff, Ariz.**—Mary M. Costigan, Orpheum Theater. | 25 | 205.4 | 1460 | Mountain |
| KFYO | **Breckenridge, Tex.** — Kirksey Bros. Battery, Electric & Radio Service. | 15 | 211.1 | 1420 | Central |
| KFYR | **Bismarck, N. Dak.**—Hoskins Meyer, Inc., 200 Fourth St. (500 watts Daytime). | 250 | 249.9 | 1200 | Central |
| **KGA** | **Spokane, Wash.** — Northwest Radio Service Co., 325 E. Rowan Ave. | 2000 | 260.7 | 1150 | Pacific |
| KGAR | **Tucson, Ariz.**—Tucson Citizen, 80 South Stone St. | 100 | 234.2 | 1280 | Mountain |
| KGBX | **St. Joseph, Mo.**—Foster-Hall Tire Co., 1221 Fred. Av. | 100 | 288.3 | 1040 | Central |
| **KGBY** | **Shelby, Nebr.** — (Transmitter in Columbus) — Dunning & Taddiken. | 50 | 222.1 | 1350 | Central |
| KGBZ | **York, Nebr.** — Federal Live Stock Remedy Co., 715 Grand Ave. | 250 | 212.6 | 1410 | Central |
| KGCA | **Decorah, Iowa**—Chas. W. Greenley (Divides time with KWLC). | 10 | 247.8 | 1210 | Central |
| KGCB | **Oklahoma City, Okla.**—Wallace Radio Inst., 103 W. 13th St. (Divides time with KGFG). | 50 | 215.7 | 1390 | Central |
| KGCH | **Wayne, Nebr.**—Wayne Hospital. | 250 | 293.9 | 1020 | Central |
| KGCI | **San Antonio, Tex.**—Liberto Radio Sales, 409 So. Flores St. (Divides time with KGRC). | 100 | 220.4 | 1360 | Central |
| KGCL | **Seattle, Wash.**—Louis Wasmer and Archie Taft, 1107 2nd Ave. (Divides time with KPCB). | 50 | 230.6 | 1300 | Pacific |
| KGCN | **Concordia, Kans.** — Concordia Broadcasting Co., 105 E. 5th St. | 50 | 208.2 | 1440 | Central |
| KGCR | **Brookings, S. Dak.**—Cutler's Radio Broadcasting Service (Inc.), 415 Main St. | 15 | 208.2 | 1440 | Central |
| KGCU | **Mandan, N. Dak.** — Mandan Radio Association, 320 Main Street. | 100 | 239.9 | 1250 | Mountain |
| KGCX | **Vida, Mont.** — First State Bank of Vida. | 10 | 243.8 | 1230 | Mountain |
| KGDA | **Dell Rapids, S. Dak.**—Home Auto Co. (Daytime only). | 15 | 254.1 | 1180 | Central |
| KGDE | **Barrett, Minn.**—Jaren Drug Co. | 50 | 205.4 | 1460 | Central |
| KGDM | **Stockton, Calif.** — E. F. Peffer, 42 S. California St. | 10 | 217.3 | 1380 | Pacific |
| KGDR | **San Antonio, Tex.**—Joe B. McShane (30 watts Daytime). | 15 | 206.8 | 1450 | Central |
| KGDW | **Humboldt, Nebr.** — Frank J. Rist. | 100 | 293.9 | 1020 | Central |
| KGDX | **Shreveport, La.**—Wm. Erwin Anthony (Divides time with KGGH). | 250 | 212.6 | 1410 | Central |
| KGDY | **Oldham, S. Dak.**—J. Albert Loesch. | 15 | 206.8 | 1450 | Central |
| KGEF | **Los Angeles, Calif.**—Trinity Methodist Church, 1201 So. Flower St. | 500 | 263 | 1140 | Pacific |
| KGEH | **Eugene, Ore.**—Eugene Broadcasting Station, 432 W. E. Miner Bldg. | 50 | 201.2 | 1490 | Pacific |
| KGEK | **Yuma, Colo.**—Beehler Electrical Equipment Co., 109 W. Second Ave. | 10 | 263 | 1140 | Mountain |

| Radio Call Letters | BROADCAST STATIONS Location and Owner | Power (Watts) | Wave Length (Meters) | Frequency (Kilocycles) | Time at Station |
|---|---|---|---|---|---|
| **KGEN** | **El Centro, Cal.**—E. R. Irey & F. M. Bowels, Chamber of Commerce Bldg. | 15 | 225.4 | 1330 | Pacific |
| KGEO | **Grand Island, Nebr.**—Hotel Yancey, 116 N. Locust St. | 100 | 205.4 | 1460 | Central |
| KGEQ | **Minneapolis, Minn.**—Fred W. Herrmann, 920 Fifth Ave., N. | 50 | 204 | 1470 | Central |
| KGER | **Long Beach, Calif.**—C. Merwin Dobyns, 435 Pine Ave., (Divides time with KRLO). | 100 | 215.7 | 1390 | Pacific |
| KGES | **Central City, Nebr.**—Central Radio Elec. Co. | 10 | 204 | 1470 | Central |
| KGEW | **Fort Morgan, Colo.**—City of Fort Morgan, City Hall Bldg. (200 watts Daytime). | 100 | 218.8 | 1370 | Mountain |
| KGEY | **Denver, Colo.**—J. W. Deitz, 1631 California St. | 15 | 201.2 | 1490 | Mountain |
| KGEZ | **Kalispell, Mont.**—Flathead Broadcasting Assoc. | 100 | 293.9 | 1020 | Mountain |
| KGFB | **Iowa City, Iowa**—A. C. Dunckle. | 10 | 223.7 | 1340 | Central |
| KGFF | **Alva, Okla.**—Earl E. Hampshire, 718—5th St. | 25 | 205.4 | 1460 | Central |
| KGFG | **Oklahoma City, Okla.**—Full Gospel Church (Divides time with KGCB). | 50 | 215.7 | 1390 | Central |
| KGFH | **La Crescenta, Calif.**—Frederick Robinson, Box 163 (Divides time with KMIC). | 250 | 223.7 | 1340 | Pacific |
| KGFI | **San Angelo, Tex.**—Ragsdale Auto Co., 20 W. Concho Ave. | 15 | 220.4 | 1360 | Central |
| KGFJ | **Los Angeles, Calif.**—Ben S. McGlashan, 2333 W. Twenty-first St. (Divides time with KFVD). | 100 | 208.2 | 1440 | Pacific |
| KGFK | **Hallock, Minn.**—Kittson County Enterprise. | 50 | 223.7 | 1340 | Central |
| KGFL | **Trinidad, Colo.**—Transmitter in Raton, N. M.—Norbert L. Cotter, 219 W. Main St. | 50 | 222.1 | 1350 | Mountain |
| KGFN | **Aneta, N. Dak.**—Haraldson & Thingstad. | 15 | 199.9 | 1500 | Central |
| KGFO | **Terre Haute, Ind.**—Brandt Radio Power Co. | 100 | 204 | 1470 | Central |
| KGFP | **Mitchell, S. Dak.**—Mitchell Broadcast Co., 113 W. Fourth Ave. | 10 | 212.6 | 1410 | Central |
| KGFW | **Ravenna, Nebr.**—Otto F. Sothman, 318 Grand Ave. | 10 | 296.9 | 1010 | Central |
| KGFX | **Pierre, S. Dak.**—Dana McNeil, 510 Summit Ave. | 200 | 254.1 | 1180 | Central |
| **KGGF** | **Picher, Okla.**—Dr. D. L. Connell. | 100 | 206.8 | 1450 | Central |
| KGGH | **Cedar Grove, La.**—Bates Radio & Elec. Co. | 50 | 212.6 | 1410 | Central |
| KGGM | **Inglewood, Calif.**—(Portable)—Jay Peters. | 100 | 204 | 1470 | |
| KGHC | **Slayton, Minn.**—Hegsted Radio Co. | 15 | 209.7 | 1430 | Central |
| KGHF | **Pueblo, Colo.**—Philip G. Lasky & J. H. Albert. | 250 | 209.7 | 1430 | Mountain |
| KGHP | **Hardin, Mont.**—Hardin Post No. 8 American Legion. | 50 | 263 | 1140 | Mountain |
| KGO | **Oakland, Calif.**—General Electric Co. | 5000 | 384.4 | 780 | Pacific |
| KGRC | **San Antonio, Tex.**—Paramount Radio Co., 103 San Pedro Ave. (Divides time with KGCI). | 100 | 220.4 | 1360 | Central |
| KGRS | **Amarillo, Tex.**—Gish Radio Service, 108 E. 8th St. (500 watts Daytime). | 250 | 243.8 | 1230 | Central |
| KGTT | **San Francisco, Calif.** Glad Tidings Temple and Bible Inst. | 50 | 206.8 | 1450 | Pacific |
| KGW | **Portland, Ore.**—The Oregonian Pub. Co., 806 Oregonian Bldg. | 1000 | 491.5 | 610 | Pacific |
| KGY | **Lacey, Wash.**—St. Martin's College. | 50 | 243.8 | 1230 | Pacific |
| **KHAC** | **San Francisco, Calif.**—(Airplane) Flying Broadcasters, Inc., 6138 Fulton St. | 50 | 204 | 1470 | Pacific |
| KHJ | **Los Angeles, Cal.**—Done Lee (Inc.). | 500 | 405.2 | 740 | Pacific |
| KHMC | **Harlingen, Tex.**—Harlingen Music Co. | 100 | 236.1 | 1270 | Central |
| KHQ | **Spokane, Wash.**—Louis Wasmer, Davenport Hotel. | 1000 | 370.2 | 810 | Pacific |
| **K ICK** | **Atlantic, Iowa**—(Transmitter in Red Oak)—Atlantic Automobile Co. (Divides time with WIAS) (Daytime only). | 100 | 322.4 | 930 | Central |
| **KJBS** | **San Francisco, Calif.**—Julius Brunton & Sons Co., 1380 Bush St. | 50 | 220.4 | 1360 | Pacific |
| KJR | **Seattle, Wash.**—Northwest Radio Service Co., 604 Home Savings Bldg. | 2500 | 348.6 | 860 | Pacific |
| **KKP** | **Seattle, Wash.**—City of Seattle, Harbor Dept. | 15 | 265.3 | 1130 | Pacific |
| **KLCN** | **Blytheville, Ark.**—Daily Courier News. | 50 | 285 | 1050 | Central |
| KLDS | **Independence, Mo.**—Reorganized Church of Jesus Christ of Latter Day Saints. | 1500 | 270.1 | 1110 | Central |

| Radio Call Letters | BROADCAST STATIONS Location and Owner | Power (Watts) | Wave Length (Meters) | Frequency (Kilocycles) | Time at Station |
|---|---|---|---|---|---|
| **KLIT** | **Portland, Ore.**—Lewis I. Thompson, 475 Twenty-first St. | 10 | 206.8 | 1450 | Pacific |
| **KLS** | **Oakland, Calif.**—Warner Bros. Radio Supplies Co., 2201 Telegraph Ave. (Divides time with KZM). | 250 | 245.8 | 1220 | Pacific |
| **KLX** | **Oakland, Calif.** — The Oakland Tribune. | 500 | 508.2 | 590 | Pacific |
| **KLZ** | **Denver, Colo.**—Reynolds Radio Co., Shirley Savoy Hotel (1000 watts Daytime). | 750 | 296.9 | 1010 | Mountain |
| **KMA** | **Shenandoah, Ia.** — May Seed & Nursery Co. (Divides time with KWKH). | 1000 | 395.4 | 760 | Central |
| **KMBC** | **Kansas City, Mo.**—Midland Broadcasting Co. | 1500 | 270.1 | 1110 | Central |
| **KMED** | **Medford, Ore.**—W. J. Virgin (Divides time with KFJI). | 50 | 249.9 | 1200 | Pacific |
| **KMIC** | **Inglewood, Calif.** —J. R. Fouch, 217 N. Market St. (Divides time with KGFH). | 250 | 223.7 | 1340 | Pacific |
| **KMJ** | **Fresno, Calif.** — Fresno Bee. | 50 | 365.6 | 820 | Pacific |
| **KMMJ** | **Clay Center, Nebr.**—M. M. Johnson Co. (Divides time with WCAJ). | 500 | 379.5 | 790 | Central |
| **KMO** | **Tacoma, Wash.**—KMO, Inc., Hotel Winthrop. | 250 | 254.1 | 1180 | Pacific |
| **KMOX** | **St. Louis, Mo.** — Transmitter in Kirkwood—The Voice of St. Louis, Inc., Mayfair Hotel. | 5000 | 299.8 | 1000 | Central |
| **KMTR** | **Hollywood, Calif.** — KMTR Radio Corp., 1025 N. Highland Ave. | 500 | 526 | 570 | Pacific |
| **KNRC** | **Santa Monica, Calif.**—C. B. Juneau. | 500 | 374.8 | 800 | Pacific |
| **KNX** | **Los Angeles, Calif.**—Los Angeles Evening Express, 6116 Hollywood Blvd. | 500 | 336.9 | 890 | Pacific |
| **KOA** | **Denver, Colo.** — General Electric Co., 1370 Krameria St. (500 watts until 8 P.M.). | 2500 | 325.9 | 920 | Mountain |
| **KOAC** | **Corvallis, Ore.** — Oregon Agricultural College. | 500 | 270.1 | 1110 | Pacific |
| **KOB** | **State College, N. Mex.** —New Mexico College of Agriculture and Mechanic Arts (Divides time with KWSC and KTW). (7500 watts Daytime). | 5000 | 394.5 | 760 | Mountain |
| **KOCH** | **Omaha, Nebr.**—C. H. Thompson. | 250 | 258.5 | 1160 | Central |
| **KOCW** | **Chickasha, Okla.** — Oklahoma College for Women. | 250 | 252 | 1190 | Central |
| **KOIL** | **Council Bluffs, Iowa**—Mona Motor Oil Co. (Divides time with KFAB). | 5000 | 319 | 940 | Central |
| **KOIN** | **Portland, Ore.** — Transmitter in Sylvan—KOIN, Inc. | 1000 | 319 | 940 | Pacific |
| **KOMO** | **Seattle, Wash.**—Fisher's Blend Station, Inc., Metropolitan Center. | 1000 | 305.9 | 980 | Pacific |
| **KOW** | **Denver, Colo.**—Associated Industries, Inc., 1429 Champa St. | 250 | 247.8 | 1210 | Mountain |
| **KPCB** | **Seattle, Wash.**—Pacific Coast Biscuit Co., 505 Central Bldg. (Divides time with KGCL). | 50 | 230.6 | 1300 | Pacific |
| **KPJM** | **Prescott, Ariz.**—Frank Wilburn, Journal Miner Bldg. | 15 | 214.2 | 1400 | Mountain |
| **KPLA** | **Los Angeles, Calif.**—Pacific Development Radio Co. | 500 | 252 | 1190 | Pacific |
| **KPNP** | **Muscatine, Iowa** — Central Radio Co., East Second St. | 100 | 211.1 | 1420 | Central |
| **KPO** | **San Francisco, Calif.**—Hale Bros. and the San Francisco Chronicle. | 1000 | 422.3 | 710 | Pacific |
| **KPPC** | **Pasadena, Calif.**—Pasadena Presbyterian Church (Divides time with KELW). | 50 | 228.9 | 1310 | Pacific |
| **KPRC** | **Houston, Tex.**—Houston Post Dispatch. | 500 | 293.9 | 1020 | Central |
| **KPSN** | **Pasadena, Calif.**—The Star-News. | 1000 | 315.6 | 950 | Pacific |
| **KQV** | **Pittsburgh, Pa.** — Doubleday-Hill Electric Co., 719 Liberty Ave. (Divides time with WJAS). | 500 | 270.1 | 1110 | Eastern |
| **KQW** | **San Jose, Calif.**—Fred J. Hart, 3rd and San Antonio St. | 500 | 296.9 | 1010 | Pacific |
| **KRAC** | **Shreveport, La.** — Caddo Radio Club, Fair Grounds. | 50 | 220.4 | 1360 | Central |
| **KRE** | **Berkeley, Calif.** — First Congregational Church of Berkeley and Pacific School of Religion (Divides time with KFUS). | 100 | 256.3 | 1170 | Pacific |
| **KRLD** | **Dallas, Tex.** — Dallas Radio Laboratories, 208 North St. Paul Street. | 500 | 461.3 | 650 | Central |
| **KRLO** | **Los Angeles, Calif.**—Freeman Lang & A. B. Scott, 218 N. Larchmont Blvd. (Divides time with KGER). | 250 | 215.7 | 1390 | Pacific |
| **KRSC** | **Seattle, Wash.**—Radio Sales Corporation, 1202 Fifth Avenue. | 50 | 211.1 | 1420 | Pacific |
| **KSAC** | **Manhattan, Kans.** —Kansas State Agricultural College. | 500 | 333.1 | 900 | Central |
| **KSBA** | **Shreveport, La.** — Shreveport Broadcasting Corp | 1000 | 267.7 | 1120 | Central |

| Radio Call Letters | BROADCAST STATIONS Location and Owner | Power (Watts) | Wave Length (Meters) | Frequency (Kilocycles) | Time at Station |
|---|---|---|---|---|---|
| **KSCJ** | **Sioux City, Iowa**—Perkin Bros. Co. (Divides time with KWUC) (1000 watts Daytime). | 500 | 243.8 | 1230 | Central |
| **KSD** | **St. Louis, Mo.**—Pulitzer Publishing Co., 12th and Olive Sts. | 500 | 545.1 | 550 | Central |
| **KSEI** | **Pocatello, Idaho**—KSEI Broadcasting Association. | 250 | 333.1 | 900 | Mountain |
| **KSL** | **Salt Lake City, Utah**—Radio Service Corp. of Utah, Vermont Bldg. | 1000 | 302.8 | 990 | Mountain |
| **KSMR** | **Santa Maria, Calif.**—Santa Maria Valley R. R. Co. | 100 | 272.6 | 1100 | Pacific |
| **KSO** | **Clarinda, Iowa** — Berry Seed Co. | 500 | 227.1 | 1320 | Central |
| **KSOO** | **Sioux Falls, S. Dak.**—Sioux Falls Broadcast Assoc., 609 Minnehaha Bldg. (500 watts Daytime). | 250 | 209.7 | 1430 | Central |
| **KTAB** | **Oakland, Calif.** — The Associated Broadcasters, 1410 Tenth Ave. | 500 | 280.2 | 1070 | Pacific |
| **KTAP** | **San Antonio, Tex.**—Alamo Broadcasting Co., Robert B. Bridge, 822 W. Mulberry St. | 20 | 228.9 | 1310 | Central |
| **KTBI** | **Los Angeles, Calif.** — Bible Institute of Los Angeles, 536 So. Hope St. | 500 | 288.3 | 1040 | Pacific |
| **KTBR** | **Portland, Ore.**—M. E. Brown, 525 Morrison St. (Divides time with KFJR). | 50 | 282.8 | 1060 | Pacific |
| **KTHS** | **Hot Springs National Park, Ark.**—Arlington Hotel Co. | 1000 | 384.4 | 780 | Central |
| **KTNT** | **Muscatine, Iowa** — Norman Baker. | 2000 | 256.3 | 1170 | Central |
| **KTSA** | **San Antonio, Tex.**—Alamo Broadcasting Co. | 2000 | 265.3 | 1130 | Central |
| **KTUE** | **Houston, Tex.**—Uhalt Electric Co., 614 Fannin St. | 5 | 212.6 | 1410 | Central |
| **KTW** | **Seattle, Wash.** — The First Presbyterian Church of Seattle. | 1000 | 394.5 | 760 | Pacific |
| **KUJ** | **Seattle, Wash.**—Puget Sound Radio Broadcasting Co., 5811 Fifth Ave., N. E. | 10 | 199.9 | 1500 | Pacific |
| **KUOA** | **Fayetteville, Ark.** — University of Arkansas. | 500 | 296.9 | 1010 | Central |
| **KUOM** | **Missoula, Mont.** — State University of Montana. | 500 | 461.3 | 650 | Mountain |
| **KUSD** | **Vermillion, S. Dak.**—University of South Dakota. | 250 | 483.6 | 620 | Central |
| **KUT** | **Austin, Tex.**—University of Texas. | 500 | 232.4 | 1290 | Central |
| **KVI** | **Tacoma, Wash.**—Puget Sound Radio Broadcasting Co., 15 No. Tacoma Ave. | 50 | 234.2 | 1280 | Pacific |
| **KVL** | **Seattle, Wash.**—A. C. Dailey, 844 East 58th St. | 100 | 202.6 | 1480 | Pacific |
| **KVOO** | **Tulsa, Okla.** — Southwestern Sales Corp., Tulsa & Bristow. | 1000 | 348.6 | 860 | Central |
| **KVOS** | **Bellingham, Wash.** — L. Kessler, Henry Hotel. | 50 | 209.7 | 1430 | Pacific |
| **KWBS** | **Portland, Ore.** — Schaeffer Manufacturing Co., 226 E. Forty-first St. | 15 | 199.9 | 1500 | Pacific |
| **KWCR** | **Cedar Rapids, Iowa**—H. F. Paar, Cedar Rapids Broadcasting Corp., 1444 Second Ave., E. (Divides time with WJAM). | 250 | 239.9 | 1250 | Central |
| **KWG** | **Stockton, Calif.**—Portable Wireless Telephone Co., Commercial & Savings Bank Bldg. | 50 | 344.6 | 870 | Pacific |
| **KWJJ** | **Portland, Ore.**—Wilbur Jerman, 220 Broadway. | 50 | 228.9 | 1310 | Pacific |
| **KWK** | **St. Louis, Mo.**—Greater St. Louis Broadcasting Co., Hotel Chase (Divides with KFQA and WMAY Sunday Only) (2000 watts Daytime). | 1000 | 234.2 | 1280 | Central |
| **KWKC** | **Kansas City, Mo.**—Wilson Duncan Broadcasting Studios, Werby Building. | 100 | 222.1 | 1350 | Central |
| **KWKH** | **Shreveport, La.**—W. K. Henderson. | 1000 | 394.5 | 760 | Central |
| **KWLC** | **Decorah, Ia.** — Luther College. | 50 | 247.8 | 1210 | Central |
| **KWSC** | **Pullman, Wash.** — State College of Washington, Mechanic Arts Bldg. (Divides time with KTW and KOB). | 500 | 394.5 | 760 | Pacific |
| **KWTC** | **Santa Ana, Calif.** — Dr. John W. Hancock, 1101 North Ross Street (Divides time with KFWC). | 100 | 222.1 | 1350 | Pacific |
| **KWUC** | **Le Mars, Iowa**—Western Union College (Daytime only) (Divides time with KSCJ). | 1500 | 243.8 | 1230 | Central |
| **KWWG** | **Brownsville, Tex.** — Lone Star Broadcast Co., Inc. | 500 | 277.6 | 1080 | Central |
| **KXA** | **Seattle, Wash.** — American Radio Tel. Co. | 500 | 277.6 | 1080 | Pacific |
| **KXL** | **Portland, Ore.** — KXL Broadcasters, 719 Bedell Bldg. | 50 | 220.4 | 1360 | Pacific |
| **KXRO** | **Seattle, Wash.** — Transmitter in Aberdeen — KXRO, Inc., Heron and South H Sts. | 50 | 227.1 | 1320 | Pacific |
| **KYA** | **San Francisco, Calif.** —Pacific Broadcasting Co. | 500 | 309.1 | 970 | Pacific |
| **KYW** | **Chicago, Ill.**—Westinghouse Electric & Mfg. Co., 508 S. Michigan Ave. (Divides time with KFKX) (500 watts after 10 P.M.). | 2500 | 526 | 570 | Central |

| Radio Call Letters | BROADCAST STATIONS Location and Owner | Power (Watts) | Wave Length (Meters) | Frequency (Kilocycles) | Time at Station |
|---|---|---|---|---|---|
| **KZM** | **Oakland, Calif.**—Preston D. Allen, 13th and Harrison Streets (Divides time with KLS). | 100 | 245.8 | 1220 | Pacific |
| **NAA** | **Arlington, Va.**—United States Navy. | 1000 | 434.5 | 690 | Eastern |
| **WAAD** | **Cincinnati, Ohio**—Ohio Mechanics Institute. | 25 | 230.6 | 1300 | Eastern |
| **WAAF** | **Chicago, Ill.**—Chicago Daily Drovers Journal (Divides time with WBBM and WJBT). | 500 | 389.4 | 770 | Central |
| **WAAM** | **Newark, N. J.**—I. R. Nelson, 1 Bond St., Studio at 626 Central Ave., East Orange (Divides time with WNJ and WGCP) (500 watts Daytime). | 250 | 267.7 | 1120 | Eastern |
| **WAAT** | **Jersey City, N. J.**—Bremer Broadcasting Corp., 210 Jackson Ave. (Divides time with WGBB and WSOM). | 500 | 245.8 | 1220 | Eastern |
| **WAAW** | **Omaha, Nebr.**—Omaha Grain Exchange (Before 6 P.M. only). | 500 | 440.9 | 680 | Central |
| **WABC** | **New York, N. Y.**—Atlantic Broadcasting Corp., 113 W. 57th St. (Divides time with WBOQ) (5000 watts Daytime). | 2500 | 309.1 | 970 | Eastern |
| **WABF** | **Kingston, Pa.**—Markle Broadcasting Corp., 294 Wyoming Ave. | 250 | 205.4 | 1460 | Eastern |
| **WABI** | **Bangor, Me.** — First Universalist Church, Park St. | 100 | 389.4 | 770 | Eastern |
| **WABO** | **Rochester, N. Y.**—Hickson Elec. Co. (Divides time with WHEC). | 500 | 254.1 | 1180 | Eastern |
| **WABW** | **Wooster, Ohio**—College of Wooster. | 50 | 247.8 | 1210 | Eastern |
| **WABY** | **Philadelphia, Pa.** — John Magaldi, Jr. | 50 | 247.8 | 1210 | Eastern |
| **WABZ** | **New Orleans, La.** — Colis Place Baptist Church, 1376 Camp St. | 50 | 238 | 1260 | Central |
| **WADC** | **Akron, Ohio**—Allen T. Simmons, Towell-Cadillac Bldg. | 1000 | 238 | 1260 | Eastern |
| **WAFD** | **Detroit, Mich.**—Albert B. Parfet Co., Charlotte St. and Woodward Ave. (Divides time with WRAV). | 100 | 230.6 | 1300 | Eastern |
| **WAGM** | **Royal Oak, Mich.**—Robert L. Miller, 309 So. Main St. | 50 | 225.4 | 1330 | Eastern |
| **WAIT** | **Taunton, Mass.**—A. H. Waite & Co., Inc., 32 Weir St. | 10 | 214.2 | 1400 | Eastern |
| **WAIU** | **Columbus, Ohio**—American Insurance Union, Deshler-Walleck Hotel (Divides time with WEAO). | 5000 | 282.8 | 1060 | Eastern |
| **WAIZ** | **Omro, Wis.**—Transmitter in Appleton—Irving Zuelke Music Studio. | 100 | 227.1 | 1320 | Central |
| **WALK** | **Willow Grove, Pa.**—Albert A. Walker. | 50 | 201.2 | 1490 | Eastern |
| **WAMD** | **St. Paul - Minneapolis, Minn.**—National Battery Broadcasting Co. | 10000 | 220.4 | 1360 | Central |
| **WAPI** | **Auburn, Ala.** — Alabama Polytechnic Institute (Divides time with WJAX). | 1000 | 340.7 | 880 | Central |
| **WASH** | **Grand Rapids, Mich.**—Baxter Laundries, Inc. | 250 | 256.3 | 1170 | Eastern |
| **WATT** | **Boston, Mass.**—(Portable)—Edison Elec. Illuminating Co. | 100 | 201.2 | 1490 | |
| **WBAA** | **West Lafayette, Ind.**—Purdue University (Divides time with WRM). | 500 | 272.6 | 1100 | Central |
| **WBAK** | **Harrisburg, Pa.** — Pennsylvania State Police (Divides time with WPSC) (Daytime only). | 500 | 299.8 | 1000 | Eastern |
| **WBAL** | **Baltimore, Md.**—Transmitter in Glen Morris—Consolidated Gas, Elec. Light & Power Co. | 5000 | 285.5 | 1050 | Eastern |
| **WBAO** | **Decatur, Ill.** — James Millikin University. | 100 | 267.7 | 1120 | Central |
| **WBAP** | **Fort Worth, Tex.** — Carter Publishing Co., Inc. (Divides time with WOAT). | 5000 | 499.7 | 600 | Central |
| **WBAW** | **Nashville, Tenn.** — Waldrum Drug Co. | 500 | 239.9 | 1250 | Central |
| **WBAX** | **Wilkes-Barre, Pa.** — John H. Stenger, Jr., 66 Gildersleeve St. (Divides time with WBRE). | 100 | 249.9 | 1200 | Eastern |
| **WBBC** | **Brooklyn, N. Y.** — Brooklyn Broadcasting Corp., 16 Court St. (Divides time with WARS and WSDA). | 500 | 227.1 | 1320 | Eastern |
| **WBBL** | **Richmond, Va.** — Grace-Covenant Presbyterian Church, 1627 Monument Ave. | 100 | 234.2 | 1280 | Eastern |
| **WBBM** | **Chicago, Ill.**—Transmitter in Glenview—Atlass Investment Co., 728 Kimball Bldg. (Divides time with WJBT and WAAF). | 5000 | 389.4 | 770 | Central |
| **WBBP** | **Petoskey, Mich.**—Petoskey High School. | 100 | 239.9 | 1250 | Central |
| **WBBR** | **Rossville, N. Y.**—Peoples Pulpit Ass'n, 117 Adams St., Brooklyn (Divides time one-half with WLTH-WEBJ). | 1000 | 256.3 | 1170 | Eastern |
| **WBBW** | **Norfolk, Va.**—Ruffner Junior High School. | 100 | 236.1 | 1270 | Eastern |
| **WBBY** | **Charleston, So. Car.**—Washington Light Infantry. | 75 | 249.9 | 1200 | Eastern |
| **WBBZ** | **Chicago, Ill.** — (Portable)—C. L. Carrell, 1506 No. American Bldg. | 100 | 204 | 1470 | |
| **WBCN** | **Chicago, Ill.** — Great Lakes Broadcasting Co., Straus Bldg. (Divides time with WENR). | 250 | 288.3 | 1040 | Central |

| Radio Call Letters | BROADCAST STATIONS Location and Owner | Power (Watts) | Wave Length (Meters) | Frequency (Kilocycles) | Time at Station |
|---|---|---|---|---|---|
| **WBES** | **Takoma Park, Md.**—Bliss Electrical School. | 100 | 296.9 | 1010 | Eastern |
| **WBET** | **Boston, Mass.** — Boston Transcript. | 500 | 288.3 | 1040 | Eastern |
| **WBIS** | **Boston, Mass.** — The Shepard Stores. | 500 | 461.3 | 650 | Eastern |
| **WBKN** | **Brooklyn, N. Y.**—Arthur Faske, 1515 Eastern Parkway (Divides time with WWRL, WIBI and WBMS). | 100 | 199.9 | 1150 | Eastern |
| **WBMH** | **Detroit, Mich.**—Braun's Music House, 13214 East Jefferson Ave. | 100 | 211.1 | 1420 | Central |
| **WBMS** | **Union City, N. J.** — WBMS Broadcasting Corp., 837—34th St. (Divides time with WBKN, WWRL and WIBI). | 100 | 199.9 | 1500 | Eastern |
| **WBNY** | **New York, N. Y.**—Baruchrome Corp., 400 E. 139th St. (Divides time with WHAP and WMSG). | 500 | 236.1 | 1270 | Eastern |
| **WBOQ** | **New York, N. Y.**—Transmitter in Richmond Hill—Atlantic Broadcasting Corp., 113 W. 57th St. (Divides time with WABC). | 500 | 309.1 | 970 | Eastern |
| **WBRC** | **Birmingham, Ala.** — Birmingham Broadcasting Corp., Loew's Temple Theatre. | 250 | 241.8 | 1240 | Central |
| **WBRE** | **Wilkes-Barre, Pa.**—L. G. Baltimore, 16 N. Main St. (Divides time with WBAX). | 100 | 249.9 | 1200 | Eastern |
| **WBRL** | **Tilton, N. H.**—Booth Radio Laboratories, 23 Summer St. | 500 | 461.3 | 650 | Eastern |
| **WBRS** | **Brooklyn, N. Y.**—No. American Broadcasting Corp. (Consolidated with WCDA). | 100 | 211.1 | 1420 | Eastern |
| **WBSO** | **Babson Park, Mass.**—BabsonStatisticalOrganization. | 100 | 384.4 | 780 | Eastern |
| **WBT** | **Charlotte, N. C.**—C. C. Coddington, 500 West Trade St. (1000 watts Daytime). | 750 | 258.5 | 1160 | Eastern |
| **WBZ** | **Springfield, Mass.** — Transmitter in East Springfield—Westinghouse Elec. & Mfg. Co., Hotel Kimball. | 15000 | 333.1 | 900 | Eastern |
| **WBZA** | **Boston, Mass.**—Westinghouse Elec. & Mfg. Co., Hotel Statler. | 500 | 333.1 | 900 | Eastern |
| **WCAC** | **Mansfield, Conn.**—Connecticut Agricultural College (Divides time with WTIC). | 500 | 535.4 | 560 | Eastern |
| **WCAD** | **Canton, N. Y.**—St. Lawrence University (1000 watts Daytime). | 500 | 243.8 | 1230 | Eastern |
| **WCAE** | **Pittsburgh, Pa.** — Kaufmann & Baer Co., Sixth and Smithfield Sts. | 500 | 461.3 | 650 | Eastern |
| **WCAH** | **Columbus, Ohio** — Studio at Fort Hayes Hotel—Entrekin Electric Co., 321 W. Tenth Ave. | 250 | 234.2 | 1280 | Eastern |
| **WCAJ** | **Lincoln, Nebr.**—Nebraska Wesleyan University (Daytime only). | 500 | 379.5 | 790 | Central |
| **WCAL** | **Northfield, Minn.**—St. Olaf College (Divides time with WDGY). | 500 | 285.5 | 1050 | Central |
| **WCAM** | **Camden, N. J.**—City of Camden, Civic Centre. | 500 | 223.7 | 1340 | Eastern |
| **WCAO** | **Baltimore, Md.** — Monumental Radio, Inc., 848 N. Howard St. (Divides time with WFBR). | 250 | 243.8 | 1230 | Eastern |
| **WCAP** | **Asbury Park, N. J.**—Municipality of Asbury Park. | 500 | 239.9 | 1250 | Eastern |
| **WCAT** | **Rapid City, S. Dak.**—South Dakota State School of Mines. | 100 | 247.8 | 1210 | Mountain |
| **WCAU** | **Philadelphia, Pa.** — Universal Broadcasting Co. | 500 | 260.7 | 1150 | Eastern |
| **WCAX** | **Burlington, Vt.**—University of Vermont. | 100 | 254.1 | 1180 | Eastern |
| **WCAZ** | **Carthage, Ill.**—Carthage College. | 50 | 249.9 | 1200 | Central |
| **WCBA** | **Allentown, Pa.**—Chas. W. Heimbach, 1015 Allen St. (Divides time with WSAN). | 100 | 222.1 | 1350 | Eastern |
| **WCBD** | **Zion, Ill.**—Wilbur G. Voliva (Divides time with WLS). | 5000 | 344.6 | 870 | Central |
| **WCBE** | **New Orleans, La.** — Uhalt Bros., Hotel De Soto. | 5 | 227.1 | 1320 | Central |
| **WCBM** | **Baltimore, Md.**—Hotel Chateau, Charles St. and North Ave. | 100 | 225.4 | 1330 | Eastern |
| **WCBR** | **Providence, R. I.** — (Portable)—Chas. H. Messter, 42 Doyle Ave. | 100 | 201.2 | 1490 | |
| **WCBS** | **Springfield, Ill.**—Harold L. Dewing and Charles H. Messter, St. Nicholas Hotel. | 250 | 209.7 | 1430 | Central |
| **WCCO** | **Minneapolis-St. Paul, Minn.**—Transmitter in Anoka—Washburn-Crosby Co. (7500 watts Daytime). | 5000 | 405.2 | 740 | Central |
| **WCDA** | **New York, N. Y.**—Transmitter in Cliffside Park, N. J. — Italian Educational Broadcasting Co., Inc., 27 Cleveland Place (Combined with WBRS). | 250 | 211.1 | 1420 | Eastern |
| **WCFL** | **Chicago, Ill.**—Chicago Federation of Labor, 623 S. Wabash Ave. (Divides time with WLTS). | 1500 | 483.6 | 620 | Central |
| **WCGU** | **New York, N. Y.**—Charles G. Unger, 1587 Broadway (Divides time with WKBO and WKBQ). | 500 | 218.8 | 1370 | Eastern |
| **WCLO** | **Kenosha, Wis.**—C. E. Whitmore. | 100 | 227.1 | 1320 | Central |
| **WCLS** | **Joliet, Ill.**—M. A. Felman Co., 301 E. Jefferson St. (Divides time with WKBB). | 150 | 215.7 | 1390 | Central |

| Radio Call Letters | BROADCAST STATIONS Location and Owner | Power (Watts) | Wave Length (Meters) | Frequency (Kilocycles) | Time at Station |
|---|---|---|---|---|---|
| **WCMA** | **Culver, Ind.**—Culver Military Academy. | 500 | 260.7 | 1150 | Central |
| WCOA | **Pensacola, Fla.**—City of Pensacola, City Hall. | 500 | 249.9 | 1200 | Central |
| WCOC | **Columbus, Miss.** — Crystal Oil Co. | 250 | 230.6 | 1300 | Central |
| WCOT | **Olneyville, R. I.** — Jacob Conn, 1849 Westminster St. | 100 | 225.4 | 1330 | Eastern |
| WCRW | **Chicago, Ill.** — Clinton R. White, 2756 Pine Grove Ave., Embassy Hotel (Divides time with WPCC). | 500 | 223.7 | 1340 | Central |
| WCSH | **Portland, Me.**—Henry P. Rines, Congress Square Hotel Co. | 500 | 365.6 | 820 | Eastern |
| WCSO | **Springfield, Ohio** — Wittenberg College. | 500 | 256.3 | 1170 | Eastern |
| WCWK | **Fort Wayne, Ind.** — Chester W. Keen, 1729 Lafayette St. | 500 | 214.2 | 1400 | Central |
| WCWS | **Danbury, Conn.** — Danbury Broadcasting Co. | 100 | 265.3 | 1130 | Eastern |
| WCX | **Detroit, Mich.**—Transmitter in Pontiac—Detroit Free Press. | 5000 | 440.9 | 680 | Eastern |
| **WDAD** | **Nashville, Tenn.**—Dad's Auto Accessory & Radio Store, 171 Eighth Ave., North | 1000 | 225.4 | 1330 | Central |
| WDAE | **Tampa, Fla.**—Tampa Daily Times. | 500 | 267.7 | 1120 | Eastern |
| WDAF | **Kansas City, Mo.**—Kansas City Star, 18th and Grand Ave. | 1000 | 370.2 | 810 | Central |
| WDAG | **Amarillo, Tex.** — J. Laurance Martin, 605 E. 4th St. | 250 | 263 | 1140 | Central |
| WDAH | **El Paso, Tex.**—Trinity Methodist Church, Cor. Blvd. and Mesa Ave. | 100 | 234.2 | 1280 | Mountain |
| WDAY | **Fargo, N. Dak.**—Radio Equipment Corp., 119 Broadway (Divides time with KFDY) (500 watts Daytime). | 250 | 545.1 | 550 | Central |
| WDBJ | **Roanoke, Va.** — Richardson-Wayland Elec. Corp., 106 Church Ave., S. W. | 250 | 230.6 | 1300 | Eastern |
| WDBO | **Orlando, Fla.**—Orlando Broadcasting Co., Fort Gatlin Hotel (1000 watts Daytime). | 500 | 288.3 | 1040 | Eastern |
| WDEL | **Wilmington, Del.** — Wilmington Elec. Specialty Co., 405 Delaware Ave. | 100 | 296.9 | 1010 | Eastern |
| WDGY | **Minneapolis, Minn.** —Geo. W. Young, Falvey Cross Rd., Superior Blvd., Studio at 217 Loeb Arcade. | 500 | 285.5 | 1050 | Central |
| WDOD | **Chattanooga, Tenn.** —Chattanooga Radio Co., Inc., 615 Market St. | 500 | 243.8 | 1230 | Central |
| WDRC | **New Haven, Conn.**—Doolittle Radio Corporation, 70 College St. (Divides time with WCAC). | 500 | 282.8 | 1060 | Eastern |
| **WDWF** | **Cranston, R. I.**—Dutee W. Flint and Lincoln Studios (Inc.), 335 Westminster St., Providence. | 250 | 260.7 | 1150 | Eastern |
| WDZ | **Tuscola, Ill.**—Jas. L. Bush (Daytime only). | 100 | 277.6 | 1080 | Central |
| **WEAF** | **New York, N. Y.**—Transmitter at Bellmore, L. I. —National Broadcasting Co., Inc., 711—5th Ave. | 50000 | 491.5 | 610 | Eastern |
| WEAM | **North Plainfield, N. J.** —Borough of North Plainfield (Divides time with WJBI). | 250 | 263 | 1140 | Eastern |
| WEAN | **Providence, R. I.**—The Shepard Co., 122 Mathewson St. (Divides time with WNAC). | 500 | 275.1 | 1090 | Eastern |
| WEAO | **Columbus, Ohio**—The Ohio State University (Divides time with WAIU). | 750 | 282.8 | 1060 | Eastern |
| WEAR | **Cleveland, Ohio**—Willard Storage Battery Co., 1100 Chester Ave. (Divides time with WTAM). | 1000 | 399.8 | 750 | Eastern |
| WEBC | **Superior, Wis.**—Head of the Lakes Broadcasting Co. (1000 watts Daytime). | 250 | 241.8 | 1240 | Central |
| WEBE | **Cambridge, Ohio** — Roy W. Waller, 319 Wall Ave. | 10 | 247.8 | 1210 | Eastern |
| WEBH | **Chicago, Ill.** — Edgewater Beach Hotel Co., 5300 Sheridan Rd. (Divides time with WJJD). | 2000 | 365.6 | 820 | Central |
| WEBJ | **New York, N. Y.** — Third Ave. Railway Co., 2396 Third Ave. (Divides time [one-quarter] with WJBI & WBBR). | 500 | 256.3 | 1170 | Eastern |
| WEBQ | **Harrisburg, Ill.**—Tate Radio Co., 1 N. Main St. | 15 | 223.7 | 1340 | Central |
| WEBR | **Buffalo, N. Y.**—Howell Broadcasting Co., Inc., 50 W. Eagle. | 200 | 241.8 | 1240 | Eastern |
| WEBW | **Beloit, Wis.** — Beloit College. | 500 | 258.5 | 1160 | Central |
| WEDC | **Chicago, Ill.** — Emil Denemark Broadcasting Station, 3860 Ogden Avenue (Divides time with WGES). | 500 | 241.8 | 1240 | Central |
| WEEI | **Boston, Mass.** — The Edison Electric Illuminating Co. | 500 | 508.2 | 590 | Eastern |
| WEHS | **Evanston, Ill.**—A. T. Becker, 1318 Elmwood Ave. | 100 | 215.7 | 1390 | Central |
| WEMC | **Berrien Springs, Mich.**—Emmanuel Missionary College (Divides time with WCFL and WLTS). | 1000 | 483.6 | 620 | Central |
| WENR | **Chicago, Ill.** — Great Lakes Radio Broadcasting Co., 310 S. Michigan Ave. (Divides time with WBCN). | 500 | 288.3 | 1040 | Central |
| WEPS | **Gloucester, Mass.** — Matheson Radio Co., 209 Main St. | 100 | 296.9 | 1010 | Eastern |

| Radio Call Letters | BROADCAST STATIONS Location and Owner | Power (Watts) | Wave Length (Meters) | Frequency (Kilocycles) | Time at Station |
|---|---|---|---|---|---|
| **WEVD** | **New York, N. Y.**—Union Course Labs. Debs Memorial Radio Fund (Divides time with WGBB and WAAT). | 500 | 245.8 | 1220 | Eastern |
| **WEW** | **St. Louis, Mo.** — St. Louis University. | 1000 | 352.7 | 850 | Central |
| **WFAA** | **Dallas, Tex.**—Dallas News and Sears, Roebuck & Co., Baker Hotel. | 500 | 545.1 | 550 | Central |
| **WFAM** | **St. Cloud, Minn.** — Times Publishing Co., 18—6th Ave., N. | 10 | 252 | 1190 | Central |
| **WFAN** | **Philadelphia, Pa.** — Keystone Broadcasting Co., Hotel Lorraine. | 500 | 223.7 | 1340 | Eastern |
| **WFBC** | **Knoxville, Tenn.** — First Baptist Church. | 50 | 234.2 | 1280 | Central |
| **WFBE** | **Cincinnati, Ohio** — Park View Hotel. | 250 | 245.8 | 1220 | Eastern |
| **WFBG** | **Altoona, Pa.** — The William F. Gable Co. | 100 | 267.7 | 1120 | Eastern |
| **WFBJ** | **Collegeville, Minn.** — St. John's University. | 100 | 272.6 | 1100 | Central |
| **WFBL** | **Syracuse, N. Y.**—The Onondaga Co. | 750 | 258.5 | 1160 | Eastern |
| **WFBM** | **Indianapolis, Ind.** — Indianapolis Power & Light Co. | 1000 | 275.1 | 1090 | Central |
| **WFBR** | **Baltimore, Md.**—Baltimore Radio Show, Inc., Hoffman and Bolton Sts. | 100 | 243.8 | 1230 | Eastern |
| **WFBZ** | **Galesburg, Ill.** — Knox College (Divides time with WRAM). | 50 | 247.8 | 1210 | Central |
| **WFCI** | **Pawtucket, R. I.** — Frank Crook Inc., 103 Exchange St. | 100 | 241.8 | 1240 | Eastern |
| **WFDF** | **Flint, Mich.** — Frank D. Fallain, 513 So. Saginaw St. | 100 | 272.6 | 1100 | Eastern |
| **WFI** | **Philadelphia, Pa.** — Strawbridge & Clothier (Divides time with WLIT). | 500 | 405.2 | 740 | Eastern |
| **WFIW** | **Hopkinsville, Ky.** — Acme Mills, Inc. (1000 watts Daytime). | 750 | 260.7 | 1150 | Central |
| **WFJC** | **Akron, Ohio**—W. F. Jones Broadcasting, Inc. | 500 | 227.1 | 1320 | Eastern |
| **WFKB** | **Chicago, Ill.**—Francis K. Bridgman, Inc., 4536 Woodlawn Ave. (Divides time with WCRW). | 500 | 223.7 | 1340 | Central |
| **WFKD** | **Philadelphia, Pa.** — Foulkrod Radio Engineering Co. | 10 | 247.8 | 1210 | Eastern |
| **WFLA** | **Clearwater, Fla.** — Transmitter in City Park at Causeway— Chamber of Commerce. | 750 | 516.9 | 580 | Eastern |
| **WGAL** | **Lancaster, Pa.** — Lancaster Elec. Supply & Construction Co., 23 E. Orange St. | 15 | 252 | 1190 | Eastern |
| **WGBB** | **Freeport, N. Y.** — Harry H. Carman, 217 Bedell St. (Divides time with WAAT and WSOM). | 400 | 245.8 | 1220 | Eastern |
| **WGBC** | **Memphis, Tenn.** — First Baptist Church, Linden and Lauderdale Sts. | 15 | 228.9 | 1310 | Central |
| **WGBF** | **Evansville, Ind.** — Finke Furniture Co., 307 South Seventh St. | 250 | 236.1 | 1270 | Central |
| **WGBI** | **Scranton, Pa.**—Scranton Broadcasters, Inc., 318 Adams Ave. (Divides time with WQAN). | 250 | 230.6 | 1300 | Eastern |
| **WGBS** | **New York, N. Y.** — Transmitter in Astoria, L. I.—Gimbel Bros., 33rd St. and Broadway (Divides time with WIP and WOO). | 500 | 348.6 | 860 | Eastern |
| **WGCP** | **Newark, N. J.**—Paramount Broadcasting & Artists' Service, 591 Broad St. (Divides time with WNJ and WAAM). | 250 | 267.7 | 1120 | Eastern |
| **WGES** | **Chicago, Ill.**—Transmitter in Oak Park—Oakleaves Broadcasting Corp., 128 N. Crawford Ave. (Divides time with WEDC). | 500 | 241.8 | 1240 | Central |
| **WGHP** | **Mount Clemens, Mich.**—Geo. H. Phelps, Studio 1408 Moccabee Bldg., Detroit, (Divides time with WKAR). | 750 | 277.6 | 1080 | Eastern |
| **WGL** | **New York, N. Y.** — Transmitter in Secaucus, N. J. International Broadcast Corp., 485—5th Ave. (Divides time with WODA) (1000 watts Daytime). | 500 | 293.9 | 1020 | Eastern |
| **WGM** | **Jeannette, Pa.**—Verne & Elton Spencer, 501 Cowan Ave. | 50 | 208.2 | 1440 | Eastern |
| **WGMU** | **New York, N. Y.**—Transmitter in Richmond Hill—Mobile Station of A. H. Grebe & Co., Inc., 109 West 57th St. | 100 | 201.2 | 1490 | Eastern |
| **WGN** | **Chicago, Ill.**—The Chicago Tribune, Drake Hotel (Divides time with WLIB). | 15000 | 416.4 | 720 | Central |
| **WGOP** | **Flushing, N. Y.** — Frederick B. Zittell, Jr., 369 Amity St. (Divides time with WBKN, WWRL and WBMS). | 100 | 199.9 | 1500 | Eastern |
| **WGR** | **Buffalo, N. Y.**—Federal Radio Corp., Hotel Statler. | 750 | 302.8 | 990 | Eastern |
| **WGST** | **Atlanta, Ga.**—Georgia School of Technology (Divides time with WMAZ). | 500 | 270.1 | 1110 | Central |
| **WGWB** | **Milwaukee, Wis.** — Radiocast Corp. of Wisconsin, 144 Broadway. | 500 | 218.8 | 1370 | Central |
| **WGY** | **So. Schenectady, N. Y.** —General Electric Co. | 50000 | 379.5 | 790 | Eastern |

| Radio Call Letters | BROADCAST STATIONS Location and Owner | Power (Watts) | Wave Length (Meters) | Frequency (Kilocycles) | Time at Station |
|---|---|---|---|---|---|
| **WHA** | **Madison, Wis.**—University of Wisconsin (Divides time with WLBL). | 750 | 333.1 | 900 | Central |
| **WHAD** | **Milwaukee, Wis.** — Marquette University (Divides time with WTMJ). | 500 | 270.1 | 1110 | Central |
| **WHAM** | **Rochester, N. Y.** — Transmitter in Victor Township—Stromberg-Carlson Telephone Mfg. Co. | 5000 | 280.2 | 1070 | Eastern |
| **WHAP** | **New York, N. Y.** — Transmitter in Carlstadt, N. J. —Defenders of Truth Society, Inc., 9 W. 96th St. (Divides time with WBNY and WMSG). | 1000 | 236.1 | 1270 | Eastern |
| **WHAS** | **Louisville, Ky.**—Courier-Journal and Louisville Times, 3rd and Liberty Sts. | 500 | 322.4 | 930 | Central |
| **WHAZ** | **Troy, N. Y.** —Rensselaer Polytechnic Institute (Divides time [Mondays only] with WIBO and WHT). | 500 | 305.9 | 980 | Eastern |
| **WHB** | **Kansas City, Mo.** — Sweeney Automotive & Elec. School, Sweeney Bldg. (Divides time with WOQ). | 500 | 340.7 | 880 | Central |
| **WHBA** | **Oil City, Pa.**—Shaffer Music House. | 10 | 260.7 | 1150 | Eastern |
| **WHBC** | **Canton, Ohio** — St. John's Catholic Church, 627 McKinley Ave., N. W. | 10 | 254.1 | 1180 | Eastern |
| **WHBD** | **Bellefontaine, Ohio**— Chamber of Commerce. | 100 | 222.1 | 1350 | Eastern |
| **WHBF** | **Rock Island, Ill.** — Beardsley Specialty Co., 217 Eighteenth St. | 100 | 222.1 | 1350 | Central |
| **WHBL** | **Chicago, Ill.** — (Portable)—C. L. Carrell, 1506 No. American Bldg. | 100 | 204 | 1470 | |
| **WHBM** | **Chicago, Ill.**—(Portable)—C. L. Carrell, 1506 N. American Bldg. | 100 | 201.2 | 1490 | |
| **WHBN** | **St. Petersburg, Fla.**— —Transmitter in Gainesville— University of Florida. | 10 | 296.9 | 1010 | Eastern |
| **WHBP** | **Johnstown, Pa.** — Johnstown Automobile Co., 101 Main St. (500 watts Daytime). | 250 | 228.9 | 1310 | Eastern |
| **WHBQ** | **Memphis, Tenn.** — WHBQ, Inc., Dermon Bldg. | 100 | 232.4 | 1290 | Central |
| **WHBU** | **Anderson, Ind.**—Citizens Bank, 1101 Meridian St. | 15 | 220.4 | 1360 | Central |
| **WHBW** | **Philadelphia, Pa.** — D. R. Kienzle, 4916 Chestnut St. | 100 | 220.4 | 1360 | Eastern |
| **WHBY** | **West De Pere, Wis.**— St. Norbert's College. | 50 | 249.9 | 1200 | Central |
| **WHDI** | **Minneapolis, Minn.**— Wm. Hood Dunwoody Industrial Inst., 818 Superior Blvd. (Divides time with WLB). | 500 | 245.8 | 1220 | Central |
| **WHEC** | **Rochester, N. Y.**— Hickson Electric Co., 36 South Ave. (Consolidated with WABO, Lake Ave. Baptist Church). | 500 | 254.1 | 1180 | Eastern |
| **WHFC** | **Chicago, Ill.**—Goodson & Wilson, Inc., Hotel Flanders, 4145 Broadway (Divides time with WKBI). | 200 | 215.7 | 1390 | Central |
| **WHK** | **Cleveland, Ohio**—Radio Air Service Corp., 1116 Carnegie Hall, (1000 watts Daytime). | 500 | 265.3 | 1130 | Eastern |
| **WHN** | **New York, N. Y.**—Marcus Loew Booking Agency, Inc., 1540 Broadway (Divides time with WQAO and WPAP). | 500 | 394.5 | 760 | Eastern |
| **WHO** | **Des Moines, Ia.**—Bankers Life Co., 1110 Liberty Bldg. | 5000 | 535.4 | 560 | Central |
| **WHPP** | **New York, N. Y.** — Bronx Broadcasting Co., 958 St. Nicholas Ave. | 10 | 206.8 | 1450 | Eastern |
| **WHT** | **Chicago, Ill.**—Transmitter in Deerfield—Radiophone Broadcasting Corp., 410 N. Michigan Blvd. (Divides time with WIBO and WHAZ). | 5000 | 305.9 | 980 | Central |
| **WIAD** | **Philadelphia, Pa.**— Howard R. Miller, Hotel Vendig (Divides time with WNAT). | 100 | 288.3 | 1040 | Eastern |
| **WIAS** | **Ottumwa, Iowa**—Poling Electric Co., 107 E. 2nd St. | 100 | 475.9 | 630 | Central |
| **WIBA** | **Madison, Wis.**—Capital Times Studio & Strand Theatre Corp., 14 E. Mifflin St. | 100 | 239.9 | 1250 | Central |
| **WIBG** | **Elkins Park, Pa.**—St. Paul's Protestant Episcopal Church (Sunday's, 11 A.M. and 4 P.M.). | 50 | 440.9 | 680 | Eastern |
| **WIBJ** | **Chicago, Ill.** —(Portable)—C. L. Carrell, 1506 No. American Bldg. | 100 | 201.2 | 1490 | |
| **WIBM** | **Chicago, Ill.** — (Portable)—C. L. Carrell, 1506 No. American Bldg. | 100 | 201.2 | 1490 | |
| **WIBO** | **Chicago, Ill.** — Transmitter in Desplaines—WIBO Broadcasters, Inc., 6312 Broadway (Divides time with WHT and WHAZ). | 5000 | 305.9 | 980 | Central |
| **WIBR** | **Steubenville, Ohio** — Thurman A. Owings. | 50 | 249.9 | 1200 | Eastern |
| **WIBS** | **Elizabeth, N. J.**—New Jersey Broadcasting Corp., 80 Broad St. (Divides time with WMBQ and WLBX). | 250 | 204 | 1470 | Eastern |
| **WIBU** | **Poynette, Wis.** — Wisconsin State Journal. | 20 | 217.3 | 1380 | Central |
| **WIBW** | **Topeka, Kans.**—C. L. Carrell, 901 National Reserve Life Ins. Co. Bldg. | 250 | 204 | 1470 | Central |
| **WIBX** | **Utica, N. Y.**—WIBX, Inc., Hotel Utica (300 watts Daytime). | 150 | 238 | 1260 | Eastern |
| **WIBZ** | **Montgomery, Ala.**—A. D. Trum, 217 Catoma St. | 15 | 230.6 | 1300 | Central |

| Radio Call Letters | BROADCAST STATIONS Location and Owner | Power (Watts) | Wave Length (Meters) | Frequency (Kilocycles) | Time at Station |
|---|---|---|---|---|---|
| **WICC** | **Bridgeport, Conn.**—Transmitter in Easton—Bridgeport Broadcasting Co., Inc. | 500 | 265.3 | 1130 | Eastern |
| **WIL** | **St. Louis, Mo.**—Benson Radio Broadcasting Co. (Divides time with WSBF). | 250 | 258.5 | 1160 | Central |
| **WIOD** | **Miami Beach, Fla.** — Carl G. Fisher Company. | 1000 | 247.8 | 1210 | Eastern |
| **WIP** | **Philadelphia, Pa.**—Gimbel Bros., Market St. Bldg. (Divides time with WOO and WGBS). | 500 | 348.6 | 860 | Eastern |
| **WJAD** | **Waco, Tex.** — Frank P. Jackson, 801 Austin Ave. | 500 | 333.1 | 900 | Central |
| **WJAG** | **Norfolk, Nebr.** — Norfolk Daily News, Hotel Norfolk (500 watts Daytime). | 250 | 285.5 | 1050 | Central |
| **WJAK** | **Kokomo, Ind.**—J. A. Kautz, Y. M. C. A. Bldg. | 50 | 234.2 | 1280 | Central |
| **WJAM** | **Cedar Rapids, Ia.** — D. M. Perham, 322 Third Ave., W. (Divides time with KWCR). | 250 | 239.9 | 1250 | Central |
| **WJAR** | **Providence, R. I.**—The Outlet Co. | 500 | 483.6 | 620 | Eastern |
| **WJAS** | **Pittsburgh, Pa.**—M. H. Pickering Furniture Co. (Divides time with KQV). | 500 | 270.1 | 1110 | Eastern |
| **WJAX** | **Jacksonville, Fla.** — City of Jacksonville, Waterworks Park, 1st and Main Sts. (Divides time with WAPI). | 1000 | 340.7 | 880 | Eastern |
| **WJAY** | **Cleveland, Ohio** — Cleveland Radio Broadcasting Corp., Hotel Hollenden. | 500 | 227.1 | 1320 | Eastern |
| **WJAZ** | **Chicago, Ill.** — Transmitter in Mount Prospect — Zenith Radio Corporation, 3620 Iron St. (Divides time with WMBI). | 5000 | 263 | 1140 | Central |
| **WJBA** | **Joliet, Ill.** — D. H. Lentz, Jr., 301 Whitley Ave. | 50 | 247.8 | 1210 | Central |
| **WJBB** | **St. Petersburg, Fla.**—Transmitter in Sarasota—Financial Journal, 126—13th St., N. | 250 | 238 | 1260 | Eastern |
| **WJBC** | **La Salle, Ill.**—Hummer Furniture Co., 2nd and Joliet Sts. | 100 | 227.1 | 1320 | Central |
| **WJBI** | **Red Bank, N. J.**—Robt. S. Johnson, 63 Broad St. | 250 | 263 | 1140 | Eastern |
| **WJBK** | **Ypsilanti, Mich.**—Ernest F. Goodwin, 803 Congress St. | 15 | 220.4 | 1360 | Central |
| **WJBL** | **Decatur, Ill.** — Wm. Gushard Dry Goods Co., 301 N. Water St. | 250 | 212.6 | 1410 | Central |
| **WJBO** | **New Orleans, La.** — Valdemar Jensen, 119 S. St. Patrick St. | 100 | 263 | 1140 | Central |
| **WJBT** | **Chicago, Ill.**—John S. Boyd, Kimball Bldg. (Divides time with WBBM and WAAF). | 500 | 389.4 | 770 | Central |
| **WJBU** | **Lewisburg, Pa.** — Bucknell University, Engineering Bldg. | 100 | 214.2 | 1400 | Eastern |
| **WJBW** | **New Orleans, La.**—C. Carlson, Jr., 2743 Dumaine St. | 30 | 238 | 1260 | Central |
| **WJBY** | **Gadsden, Ala.**—Electric Construction Co., 517 Broad St. | 50 | 234.2 | 1280 | Central |
| **WJBZ** | **Chicago Heights, Ill.**—Roland G. Palmer & A. Coppotelli, 144 East Sixteenth St. | 100 | 208.2 | 1440 | Central |
| **WJJD** | **Mooseheart, Ill.** — Supreme Lodge, Loyal Order of Moose (Divides time with WEBH). | 1000 | 365.6 | 820 | Central |
| **WJKS** | **Gary, Ind.** — Johnson Kennedy Radio Corp., 540 Lake St. | 500 | 232.4 | 1290 | Central |
| **WJPW** | **Ashtabula, Ohio** — J. P. Wilson, 192 Prospect St. | 50 | 208.2 | 1440 | Eastern |
| **WJR** | **Detroit, Mich.** — Transmitter in Pontiac—Good Will Station WJR, Inc. & Detroit Free Press, General Motors Bldg. and Book Cadillac Hotel. | 5000 | 440.9 | 680 | Eastern |
| **WJZ** | **New York, N. Y.** — Transmitter in Bound Brook, N. J.—National Broadcasting Co., 711—5th Ave. | 40000 | 454.3 | 660 | Eastern |
| **WKAR** | **East Lansing, Mich.**—Michigan State College (1000 watts Daytime). | 500 | 277.6 | 1080 | Central |
| **WKAV** | **Laconia, N. H.**—Laconia Radio Club, Auditorium, Public Service Co. of N. H. | 50 | 223.7 | 1340 | Eastern |
| **WKBB** | **Joliet, Ill.** — Sanders Bros., 607 Jefferson St. (Divides time with WCLS). | 150 | 215.7 | 1390 | Central |
| **WKBC** | **Birmingham, Ala.** — H. L. Ansley, 1428 North Twelfth Ave. | 10 | 218.8 | 1370 | Central |
| **WKBE** | **Webster, Mass.**—K. & B. Electric Co., 59 Emerald Ave. | 100 | 228.9 | 1310 | Eastern |
| **WKBF** | **Indianapolis, Ind.** — Noble B. Watson, Hoosier Athletic Club. | 250 | 252 | 1190 | Central |
| **WKBG** | **Chicago, Ill.** — (Portable)—C. L. Carrell, 36 So. State Street. | 100 | 201.2 | 1490 | |
| **WKBH** | **La Crosse, Wis.**—Callaway Music Co., 221 Main St. | 500 | 220.4 | 1360 | Central |
| **WKBI** | **Chicago, Ill.**—Fred L. Schoenwolf, Lincoln Trust & Savings Bank Bldg. (Divides time with WHFC). | 50 | 215.7 | 1390 | Central |
| **WKBL** | **Monroe, Mich.**—Monrona Radio Mfg. Co., 16 S. Monroe St. | 15 | 205.4 | 1460 | Eastern |
| **WKBN** | **Youngstown, Ohio** — Radio Electric Service, Y. M. C. A. (Divides time with WMBW). | 50 | 214.2 | 1400 | Eastern |

| Radio Call Letters | BROADCAST STATIONS Location and Owner | Power (Watts) | Wave Length (Meters) | Frequency (Kilocycles) | Time at Station |
|---|---|---|---|---|---|
| **WKBO** | **Jersey City, N. J.**—Camith Corporation, 2866 Boulevard (Divides time with WKBQ and WCGU). | 500 | 218.8 | 1370 | Eastern |
| WKBP | **Battle Creek, Mich.**—Battle Creek Enquirer & News | 50 | 212.6 | 1410 | Eastern |
| WKBQ | **New York, N. Y.** — Standard Cahill Co., Inc., 1100 East 177th St. (Divides time with WKBO and WCGU). | 500 | 218.8 | 1370 | Eastern |
| WKBS | **Galesburg, Ill.** — P. N. Nelson, 227 Duffield Ave. (Divides time with WLBO). | 100 | 217.3 | 1380 | Central |
| WKBT | **New Orleans, La.** — First Baptist Church. | 50 | 252 | 1190 | Central |
| WKBV | **Brookville, Ind.** — Knox Battery & Electric Co., 1058 Main St. | 100 | 217.3 | 1380 | Central |
| WKBW | **Buffalo, N. Y.** — Churchill Evangelistic Assoc., 1420-1428 Main St. (750 watts Daytime). | 500 | 217.3 | 1380 | Eastern |
| WKBZ | **Ludington, Mich.** — Karl L. Ashbacker & Sons, First National Bank Bldg. | 15 | 199.9 | 1500 | Central |
| WKDR | **Kenosha, Wis.** — Edward A. Dato, 936 N. Michigan Ave., Chicago, Ill. | 15 | 247.8 | 1210 | Central |
| WKEN | **Buffalo, N. Y.**—Transmitter in Amherst—WKEN, Inc., 2 E. Hazeltine Ave. (Divides time with WSVS). | 250 | 204 | 1470 | Eastern |
| WKJC | **Lancaster, Pa.**—Kirk Johnson & Co., 16 West King St. (Divides time with WGAL). | 50 | 252 | 1190 | Eastern |
| WKRC | **Cincinnati, Ohio** — Kodel Radio Corp., 507 E. Pearl St. | 250 | 245.8 | 1220 | Central |
| WKY | **Oklahoma City, Okla.** — WKY Radiophone Co., Huckins Hotel. | 150 | 288.3 | 1040 | Central |
| **WLAC** | **Nashville, Tenn.** — Dad's Auto Accessory & Radio Store and The Life & Casualty Insurance Co. | 1000 | 225.4 | 1330 | Central |
| WLAP | **Louisville, Ky.** — Virginia Avenue Baptist Church, 2600 Virginia Ave. (100 watts Daytime). | 30 | 267.7 | 1120 | Central |
| WLB | **Minneapolis, Minn.** — University of Minnesota (Divides time with WHDI). | 500 | 245.8 | 1220 | Central |
| WLBC | **Muncie, Ind.** — D. A. Burton, 2224 So. Jefferson St. | 50 | 209.7 | 1430 | Central |
| WLBF | **Kansas City, Mo.** — Everett L. Dillard, 32nd and Main Sts. | 50 | 209.7 | 1430 | Central |
| WLBG | **Petersburg, Va.** — R. A. Gamble. | 100 | 214.2 | 1400 | Eastern |
| WLBH | **Farmingdale, N. Y.**—Joseph J. Lombardi. | 30 | 232.4 | 1290 | Eastern |
| WLBI | **Wenona, Ill.**—Wenona Legion Broadcasters, Inc. | 250 | 238 | 1260 | Central |
| **WLBL** | **Stevens Point, Wis.**—Wisconsin Department of Markets (Divides time with WHA). | 2000 | 333.1 | 900 | Central |
| WLBM | **Boston, Mass.** — Browning - Drake Corp., 353 Washington St. | 50 | 230.6 | 1300 | Eastern |
| WLBN | **Chicago, Ill.** — (Portable)—William E. Hiler, 339 S. Homan Ave. | 50 | 204 | 1470 | |
| WLBO | **Galesburg, Ill.**—Frederick Trebbe, Jr. (Divides time with WKBS). | 100 | 217.3 | 1380 | Central |
| WLBQ | **Atwood, Ill.**—E. Dale Trout. | 25 | 218.8 | 1370 | Central |
| WLBR | **Belvidere, Ill.**—Transmitter in Rockford—Rockford Broadcasting Corp. | 15 | 247.8 | 1210 | Central |
| WLBT | **Crown Point, Ind.** — Harold Wendell. | 50 | 247.8 | 1210 | Central |
| WLBV | **Mansfield, Ohio** — Mansfield Broadcasting Assoc., Chamber of Commerce Bldg. | 50 | 206.8 | 1450 | Eastern |
| WLBW | **Oil City, Pa.**—Petroleum Telephone Co. | 500 | 272.6 | 1100 | Eastern |
| WLBX | **Long Island City, N. Y.**—John N. Brahy, 283 Crescent St. (Divides time with WIBS and WMBQ). | 250 | 204 | 1470 | Eastern |
| WLBY | **Iron Mountain, Mich.** —Aimone Electric. | 50 | 209.7 | 1430 | Central |
| WLBZ | **Dover-Foxcroft, Me.** — Thompson L. Guernsey. | 250 | 208.2 | 1440 | Eastern |
| WLCI | **Ithaca, N. Y.**—Lutheran Assoc. of Ithaca. | 50 | 247.8 | 1210 | Eastern |
| WLEX | **Lexington, Mass.**—The Lexington Air Station, 131 Willow Ave. | 50 | 215.7 | 1390 | Eastern |
| WLIB | **Chicago, Ill.** — Liberty Weekly. | 500 | 416.4 | 720 | Central |
| WLIT | **Philadelphia, Pa.**—Lit Bros., 8th and Market Sts. (Divides time with WFI). | 500 | 405.2 | 740 | Eastern |
| WLOE | **Chelsea, Mass.**—New England Broadcasting Co., 56 Washington Ave. | 100 | 211.1 | 1420 | Eastern |
| WLS | **Chicago, Ill.**—Transmitter in Crete—Sears, Roebuck & Co. (Divides time with WCBD). | 5000 | 344.6 | 870 | Central |
| WLSI | **Cranston, R. I.**—Dutee W. Flint and Lincoln Studios, Inc., 335 Westminster St., Providence (Divides time with WBSO). | 250 | 260.7 | 1150 | Eastern |
| WLTH | **Brooklyn, N. Y.** — Flatbush Radio Labs., 1421 E. 10th St. (Divides time with WKDQ and WKBO). | 250 | 256.3 | 1170 | Eastern |
| WLTS | **Chicago, Ill.** — Lane Technical High School (Divides time with WCFL). | 100 | 483.6 | 620 | Central |
| WLW | **Cincinnati, Ohio** — Transmitter in Harrison—Crosley Radio Corp. | 5000 | 428.3 | 700 | Central |
| WLWL | **New York, N. Y.** — Paulist Fathers, 415 W. 59th St. (Divides time with WMCA). | 5000 | 370.2 | 810 | Eastern |

| Radio Call Letters | BROADCAST STATIONS Location and Owner | Power (Watts) | Wave Length (Meters) | Frequency (Kilocycles) | Time at Station |
|---|---|---|---|---|---|
| **WMAC** | **—Cazenovia, N. Y.**— Clive B. Meredith (Divides time with WSYR). | 500 | 225.4 | 1330 | Eastern |
| WMAF | **—South Dartmouth, Mass.** — Round Hills Radio Corp. | 500 | 428.3 | 700 | Eastern |
| WMAK | **—Buffalo, N. Y.,** Transmitter in Tonawanda — WMAK Broadcast Station, | 1000 | 545.1 | 550 | Eastern |
| WMAL | **—Washington, D. C.**— M. A. Leese Radio Co., 720 Eleventh St., N. W. | 500 | 241.8 | 1240 | Eastern |
| WMAN | **—Columbus, Ohio**—W. E. Heskett Radio Station, 507 N. High St. | 50 | 234.2 | 1280 | Eastern |
| WMAQ | **—Chicago, Ill.** — Chicago Daily News, 15 North Wells St. (Divides time with WQJ). | 1000 | 447.5 | 670 | Central |
| WMAY | **—St. Louis, Mo.**—Kings Highway Presbyterian Church (Divides time with KFQA). | 100 | 234.2 | 1280 | Central |
| WMAZ | **—Macon, Ga.** — Mercer University (Divides time with WGST). | 500 | 270.1 | 1110 | Eastern |
| WMBA | **—Newport, R. I.** — (Portable)—LeRoy Joseph Beebe, Weaver Bldg. | 100 | 204 | 1470 | |
| WMBB | **—Chicago, Ill.** — Transmitter in Homewood — American Bond & Mortgage Co., 6201 Cottage Grove Ave. (Divides time with WOK). | 5000 | 252 | 1190 | Central |
| WMBC | **—Detroit, Mich.** — Michigan Broadcasting Co., Savoy Hotel. | 100 | 243.8 | 1230 | Eastern |
| WMBD | **—Peoria Heights, Ill.**— Peoria Heights Radio Laboratory, 107 E. Glen Ave. | 250 | 205.4 | 1460 | Central |
| WMBE | **—St. Paul, Minn.** — Transmitter in White Bear— Dr. C. S. Stevens, 2018 Grand Ave. | 10 | 208.2 | 1440 | Central |
| WMBF | **—Miami Beach, Fla.**— Fleetwood Hotel Corporation, (Divides time with WQAM). | 500 | 384.4 | 780 | Eastern |
| WMBG | **—Richmond, Va.**—Havens & Martin, 914 West Broad St. | 15 | 220.4 | 1360 | Eastern |
| WMBH | **—Joplin, Mo.** — Edwin Dudley Aber, 1526 E. Fifty-third St. | 100 | 204 | 1470 | Central |
| WMBI | **—Chicago, Ill.** — Transmitter in Addison — Moody Bible Institute of Chicago, 153 Institute Place (Divides time with WJAZ). | 5000 | 263 | 1140 | Central |
| WMBJ | **—Monessen, Pa.** — Wm. Roy McShaffrey. | 50 | 232.4 | 1290 | Eastern |
| WMBL | **—Lakeland, Fla.** — Benford Radio Studios, 121 No. Kentucky Ave. | 100 | 228.9 | 1310 | Eastern |
| WMBM | **—Memphis, Tenn.** — Seventh Day Adventist Church. | 10 | 209.7 | 1430 | Central |
| **WMBO** | **—Auburn, N. Y.**— Radio Service Laboratories, 17 South St. | 100 | 220.4 | 1360 | Eastern |
| WMBQ | **—Brooklyn, N. Y.** — Paul J. Gollhofer, 95 Leonard St. (Divides time with WIBS and WLBX). | 100 | 204 | 1470 | Eastern |
| WMBR | **—Tampa, Fla.** — F. J. Reynolds. | 100 | 252 | 1190 | Eastern |
| WMBS | **—Harrisburg, Pa.** — Transmitter in Lemoyne — Mack Battery Co. | 250 | 234.2 | 1280 | Eastern |
| WMBW | **—Youngstown, Ohio**— Youngstown Broadcasting Co., 647 Market St. (Divides time with WKBN). | 50 | 214.2 | 1400 | Eastern |
| WMC | **—Memphis, Tenn.** — Memphis Commercial Appeal, Inc., Commercial Appeal Bldg. | 500 | 516.9 | 580 | Central |
| WMCA | **—New York, N. Y.** — Transmitter in Hoboken, N. J. —Associated Broadcasters, Inc., Hotel McAlpin (Divides time with WLWL). | 500 | 370.2 | 810 | Eastern |
| WMCO | **—Detroit, Mich.** — Transmitter in Saginaw—W. T. Thomas Radio Co., Whittier Hotel (Divides time with WAFD). | 250 | 218.8 | 1370 | Eastern |
| WMES | **—Boston, Mass.**—Educational Society, Barristers Hall. | 100 | 211.1 | 1420 | Eastern |
| WMPC | **—Lapeer, Mich.**—First Methodist Protestant Church. | 30 | 234.2 | 1280 | Eastern |
| WMRJ | **—Jamaica, N. Y.**—Peter J. Prinz, 10 New York Blvd. (Divides time with WTRL and WHPP). | 10 | 206.8 | 1450 | Eastern |
| WMSG | **—New York, N. Y.** — Madison Square Garden Broadcasting Corp., 319 W. 49th St. (Divides time with WBNY and WHAP). | 500 | 236.1 | 1270 | Eastern |
| **WNAC** | **—Boston, Mass.** — The Shepard Stores. | 500 | 352.7 | 850 | Eastern |
| WNAD | **—Norman, Okla.**—University of Oklahoma. | 500 | 239.9 | 1250 | Central |
| WNAL | **—Omaha, Nebr.**— R. J. Rockwell, 5019 Capital Ave. (Divides time with KOCH and KFOX). | 250 | 258.5 | 1160 | Central |
| WNAT | **—Philadelphia, Pa.** — Lennig Bros. Co., Spring Garden and 9th Sts. (Divides time with WIAD). | 100 | 288.3 | 1040 | Eastern |
| WNAX | **—Yankton, S. Dak.** — Gurney Seed and Nursery Co. (Daytime only). | 1000 | 277.6 | 1080 | Central |
| WNBA | **—Forest Park, Ill.**—M. T. Rafferty, 810 Desplaines Ave. | 200 | 208.2 | 1440 | Central |
| WNBF | **—Endicott, N. Y.**—Howitt-Wood Radio Co., Inc., 117 W. Main St., Hotel Frederick. | 50 | 206.8 | 1450 | Eastern |

| Radio Call Letters | BROADCAST STATIONS Location and Owner | Power (Watts) | Wave Length (Meters) | Frequency (Kilocycles) | Time at Station |
|---|---|---|---|---|---|
| **WNBH** | —New Bedford, Mass. —New Bedford Broadcasting Co., New Bedford Hotel. | 250 | 247.8 | 1210 | Eastern |
| **WNBJ** | —Knoxville, Tenn. — Lonsdale Baptist Church, 122 W. Conn. Ave. | 50 | 206.8 | 1450 | Central |
| **WNBO** | —Washington, Pa. — John B. Spriggs, So. Main St. | 15 | 211.1 | 1420 | Eastern |
| **WNBQ** | —Rochester, N. Y. — Gordon P. Brown, 192 S. Goodman St. | 15 | 205.4 | 1460 | Eastern |
| **WNBR** | —Memphis, Tenn. — Popular Radio Shop, 883 Poplar Ave. | 100 | 228.9 | 1310 | Central |
| **WNBW** | —Carbondale, Pa. — Home Cut Glass & China Co., 21 Salem Ave. | 5 | 199.9 | 1500 | Eastern |
| **WNBX** | —Springfield, Vt.—First Congregational Church. | 10 | 241.8 | 1240 | Eastern |
| **WNJ** | —Newark, N. J.—Herman Lubinsky, 89 Lehigh Ave. (Divides time with WGCP and WAAM). | 250 | 267.7 | 1120 | Eastern |
| **WNOX** | —Knoxville, Tenn. — People'sTelephone&Telegraph Co., 313 Commerce Ave. | 1000 | 265.3 | 1130 | Central |
| **WNRC** | —Greensboro, N. C. — Wayne M. Nelson. | 250 | 223.7 | 1340 | Eastern |
| **WNYC** | —New York, N. Y. — Department of Plants and Structures, Municipal Bldg. | 500 | 526 | 570 | Eastern |
| **WOAI** | —San Antonio, Tex. — Southern Equipment Co., 1031 Navarro St. (Divides time with WBAP). | 5000 | 499.7 | 600 | Central |
| **WOAN** | —Lawrenceburg, Tenn. —Church of the Nazarene and Vaughan School of Music. | | | | |
| **WOAX** | —Trenton, N. J. — Franklyn J. Wolff, The Monument Pottery Co. (Divides time with WCAP). | 500 | 239.9 | 1250 | Eastern |
| **WOBT** | —Union City, Tenn. — Tittsworth's Radio & Music Shop, 114 South First St. | 15 | 205.4 | 1460 | Central |
| **WOBU** | —Charleston, W. Va.— Charleston Radio Broadcasting Co., 1026 Quarier St. | 50 | 267.7 | 1120 | Eastern |
| **WOC** | —Davenport, Iowa — The Palmer School of Chiropractic, 1002 Brady St. | 5000 | 374.8 | 800 | Central |
| **WOCL** | —Jamestown, N. Y. — A. E. Newton. | 25 | 223.7 | 1340 | Eastern |
| **WODA** | —Paterson, N. J. — James K. O'Dea, Inc., 115 Ellison St. (Divides time with WGL). | 1000 | 293.9 | 1020 | Eastern |
| **WOI** | —Ames, Iowa—Iowa State College (5000 watts Daytime 6 to 6). | 2500 | 265.3 | 1130 | Central |
| **WOK** | —Chicago, Ill. — Transmitter in Homewood—Trianon, Inc. (Divides time with WMBB). | 5000 | 252 | 1190 | Central |
| **WOKO** | —Peekskill, N. Y.— Harold E. Smith. | 250 | 215.7 | 1390 | Eastern |
| **WOKT** | —Rochester, N. Y. — Titus-Ets. Corp. | 500 | 209.7 | 1430 | Eastern |
| **WOMT** | —Manitowoc, Wis. — Mikadow Theatre. | 50 | 222.1 | 1350 | Central |
| **WOO** | —Philadelphia, Pa. — John Wanamaker (Divides time with WIP and WGBS). | 500 | 348.6 | 860 | Eastern |
| **WOOD** | —Grand Rapids, Mich. Transmitter in Furnwood — Walter B. Stiles, Inc., Hotel Rowe. | 500 | 260.7 | 1150 | Central |
| **WOQ** | —Kansas City, Mo.—Unity School of Christianity (Divides time with WHB). | 500 | 340.7 | 880 | Central |
| **WOR** | —Newark, N. J.—Transmitter in Kearney—L. Bamberger & Co. | 3500 | 422.3 | 710 | Eastern |
| **WORD** | —Chicago, Ill. — Transmitter in Batavia — People's Pulpit Ass'n, 124 Columbia Heights, Brooklyn, N. Y. (Divides time with WHT and WIBO). | 5000 | 252 | 1190 | Central |
| **WOS** | —Jefferson City, Mo. — Missouri State Marketing Bureau (Divides time with WSAI). | 500 | 422.3 | 710 | Central |
| **WOW** | —Omaha, Nebr.—Woodmen of the World Life Insurance Association. | 1000 | 508.2 | 590 | Central |
| **WOWO** | —Fort Wayne, Ind. — The Main Auto Supply Co., 213 West Main St. (5000 watts Daytime). | 2500 | 228.9 | 1310 | Central |
| **WPAP** | —Cliffside, N. J. — Palisades Amusement Park (Divides time with WHN). | 500 | 394.5 | 760 | Eastern |
| **WPCC** | —Chicago, Ill. — North Shore Congregational Church. | 500 | 223.7 | 1340 | Central |
| **WPCH** | —New York, N. Y. — Transmitter in Hoboken, N. J. —Concourse Radio Corp., Hotel McAlpin, B'way and 34th St. (Divides time with WRNY). | 500 | 325.9 | 920 | Eastern |
| **WPEP** | —Waukegan, Ill.—Maurice Mayer, 140 Hazel Court. | 250 | 215.7 | 1390 | Central |
| **WPG** | —Atlantic City, N. J. — Municipality of Atlantic City. | 5000 | 272.6 | 1100 | Eastern |
| **WPRC** | —Harrisburg, Pa.—Wilson Printing & Radio Co., Fifth and Kelker Streets. | 100 | 209.7 | 1430 | Eastern |
| **WPSC** | —State College, Pa. — Pennsylvania State College (Divides time with WBAK) (Daytime only). | 500 | 299.8 | 1000 | Eastern |
| **WPSW** | —Philadelphia, Pa. — Philadelphia School of Wireless Telegraphy, 1533 Pine St. | 50 | 206.8 | 1450 | Eastern |
| **WPTF** | —Raleigh, N. C.—Durham Life Ins. Co., 226½ Fayetteville St. | 500 | 545.1 | 550 | Eastern |

| Radio Call Letters | BROADCAST STATIONS Location and Owner | Power (Watts) | Wave Length (Meters) | Frequency (Kilocycles) | Time at Station |
|---|---|---|---|---|---|
| **WQAM** | **Miami, Fla.**—Electrical Equipment Co., 42 Northwest Fourth St. (Divides time with WMBF). | 750 | 384.4 | 780 | Eastern |
| WQAN | **Scranton, Pa.**—Scranton Times, Penn Ave. and Spruce St. (Divides time with WGBI). | 250 | 230.6 | 1300 | Eastern |
| WQAO | **Cliffside, N. J.**—Calvary Baptist Church, 123 W. 57th St., N. Y. C. (Divides time with WHN). | 500 | 394.5 | 760 | Eastern |
| WQBA | **Tampa, Fla.** — Amroc College. | 250 | 238 | 1260 | Eastern |
| WQBC | **Utica, Miss.** — I. R. Jones. | 100 | 215.7 | 1390 | Central |
| WQBJ | **Clarksburg, W. Va.**—John Raikes, Willow Beach Club. | 65 | 239.9 | 1250 | Eastern |
| WQJ | **Chicago, Ill.**—Calumet Broadcasting Co. (Divides time with WMAQ). | 500 | 447.5 | 670 | Central |
| **WRAF** | **Laport, Ind.** — The Radio Club, Inc., 719 Michigan Ave. | 100 | 208.2 | 1440 | Central |
| WRAH | **Providence, R. I.** — Stanley N. Read, 191 Alabama Ave. | 250 | 199.9 | 1500 | Eastern |
| WRAK | **Escanaba, Mich.** — Economy Light Co., 1105 Ludington St. | 50 | 282.8 | 1060 | Central |
| WRAM | **Galesburg, Ill.**—Lombard College (Divides time with WFBZ). | 50 | 247.8 | 1210 | Central |
| WRAW | **Reading, Pa.** — Avenue Radio & Electric Shop, 460 Schuylkill Ave. | 100 | 238 | 1260 | Eastern |
| WRAX | **Philadelphia, Pa.** — Berachah Church, Inc., 1608 Alleghany Ave. | 250 | 212.6 | 1410 | Eastern |
| WRBC | **Valparaiso, Ind.**—Immanuel Lutheran Church. | 250 | 238 | 1260 | Central |
| WRC | **Washington, D. C.** — Radio Corporation of America. | 500 | 468.5 | 640 | Eastern |
| WRCV | **Norfolk, Va.** — Radio Corp. of Virginia. | 100 | 209.7 | 1430 | Eastern |
| WREC | **Memphis, Tenn.** — WREC, Inc. | 100 | 249.9 | 1200 | Central |
| WREN | **Lawrence, Kans.** — Jenny Wren, Inc. (Divides time with KFKU). | 750 | 254.1 | 1180 | Central |
| WRES | **Quincy, Mass.**—Harry L. Sawyer, 335A Newport Ave. | 50 | 217.3 | 1380 | Eastern |
| WRHF | **Washington, D. C.**—Washington Radio Hospital Fund, Hotel Annapolis (9 A.M. to 7 P.M.). | 150 | 322.4 | 930 | Eastern |
| WRHM | **Minneapolis, Minn.** —Rosedale Hospital Co., Inc., Andrews Hotel. | 1000 | 260.7 | 1150 | Central |
| **WRK** | **Hamilton, Ohio** — Doron Bros. Electrical Co., 325-329 North "B". | 100 | 205.4 | 1460 | Eastern |
| WRM | **Urbana, Ill.**—University of Illinois (Divides time with WBAA) (1000 watts before 6 P.M.). | 500 | 272.6 | 1100 | Central |
| WRMU | **New York, N. Y.** — Transmitter in Richmond Hill —Marine Station of A. H. Grebe & Co., 109 W. 57th St. | 100 | 201.2 | 1490 | Eastern |
| WRNY | **New York, N. Y.** — Transmitter in Coytesville, N. J.—Experimenter Publishing Co., 230—5th Ave. (Divides time with WPCH). | 500 | 325.9 | 920 | Eastern |
| WRPI | **Terre Haute, Ind.** — Rose Polytechnic Inst. Broadcasting Ass'n. | 100 | 208.2 | 1440 | Central |
| WRR | **Dallas, Tex.** — City of Dallas, Police and Fire Signal Department. | 500 | 352.7 | 850 | Central |
| WRRS | **Racine, Wis.**—Racine Broadcasting Corp., Hotel Racine. | 50 | 247.8 | 1210 | Central |
| WRST | **Bay Shore, N. Y.** — Radiotel Mfg. Co., Carleton Hall (Divides time with WCDA and WBRS). | 150 | 211.1 | 1420 | Eastern |
| WRVA | **Richmond, Va.**—Larus & Brother Co., Inc., 22nd and Cary Sts. | 1000 | 254.1 | 1180 | Eastern |
| **WSAI** | **Cincinnati, Ohio** — Transmitter in Mason—United States Playing Card Co. (Divides time with WOS). | 5000 | 361.2 | 830 | Central |
| WSAJ | **Grove City, Pa.** — Grove City College. | 250 | 223.7 | 1340 | Eastern |
| WSAN | **Allentown, Pa.**—Allentown Call Publishing Co. (Divides time with WCBA). | 100 | 222.1 | 1350 | Eastern |
| WSAR | **Portsmouth, R. I.** — Transmitter in Fall River, Mass. —Doughty & Welch Electric Co., 46 N. Main St. | 250 | 212.6 | 1410 | Eastern |
| WSAX | **Chicago, Ill.** — Zenith Radio Corp., 3620 S. Iron St. | 100 | 204 | 1470 | Central |
| WSAZ | **Huntington, W. Va.**—McKellar Elec. Co., 1143—4th Ave. | 100 | 249.9 | 1200 | Eastern |
| WSB | **Atlanta, Ga.** — The Atlanta Journal. | 1000 | 475.9 | 630 | Central |
| WSBC | **Chicago, Ill.** — World Battery Co., 1219 South Wabash Ave. (Divides time with WJKS). | 500 | 232.4 | 1290 | Central |
| WSBF | **St. Louis, Mo.** — Mississippi Valley Broadcasting Co., 6th and Washington Sts. (Divides time with WIL). | 250 | 258.5 | 1160 | Central |
| WSBT | **South Bend, Ind.** — South Bend Tribune, 225 W. Colfax Ave. | 500 | 399.8 | 750 | Central |

| Radio Call Letters | BROADCAST STATIONS Location and Owner | Power (Watts) | Wave Length (Meters) | Frequency (Kilocycles) | Time at Station |
|---|---|---|---|---|---|
| **WSDA** | **Brooklyn, N. Y.** — Amateur Radio Specialty Co., 77 Cortlandt St., N. Y. C. (Divides time with WSGH and WBBC). | 500 | 227.1 | 1320 | Eastern |
| **WSEA** | **Virginia Beach, Va.**— Virginia Beach Broadcasting Co., Cavalier Hotel, Main Studio at Norfolk. | 500 | 263 | 1140 | Eastern |
| **WSGH** | **Brooklyn, N. Y.**—Amateur Radio Specialty Co., 77 Cortlandt St., N. Y. C. (Divides time with WSDA and WBBC). | 500 | 227.1 | 1320 | Eastern |
| **WSIX** | **Springfield, Tenn.** — 638 Tire & Vulcanizing Co. | 150 | 249.9 | 1200 | Central |
| **WSKC** | **Bay City, Mich.** — World's Star Knitting Co. | 250 | 272.6 | 1100 | Eastern |
| **WSM** | **Nashville, Tenn.** — The National Life & Accident Ins. Co., National Bldg. | 5000 | 336.9 | 890 | Central |
| **WSMB** | **New Orleans, La.** — Saenger Amusement Co. and Maison Blanche Co. | 750 | 296.9 | 1010 | Central |
| **WSMK** | **Dayton, Ohio** — S.M.K. Radio Corporation, 39 East Third St. | 200 | 296.9 | 1010 | Eastern |
| **WSOE** | **Milwaukee, Wis.** — Wisconsin News, 115 Michigan St. | 250 | 270.1 | 1110 | Central |
| **WSRO** | **Middletown, Ohio** — Middletown Broadcasting Co., Central and Canal Sts. | 100 | 236.1 | 1270 | Central |
| **WSSH** | **Boston, Mass.** — Tremont Temple Baptist Church. | 100 | 288.3 | 1040 | Eastern |
| **WSUF** | **Suffolk, Va.** — Reliance Elec. Co., 519 W. 21st St. | 500 | 236.1 | 1270 | Eastern |
| **WSUI** | **Iowa City, Iowa**—State University of Iowa. | 500 | 475.9 | 630 | Central |
| **WSUN** | **St. Petersburg, Fla.**— Transmitter in City Hall Park at Causeway — Chamber of Commerce (Divides time with WFLA). | 750 | 516.9 | 580 | Eastern |
| **WSVS** | **Buffalo, N. Y.**—Seneca Vocational School, 666 E. Delavan Ave. (Divides time with WKEN). | 50 | 204 | 1470 | Eastern |
| **WSYR** | **Syracuse, N. Y.**—Clive B. Meredith, Hotel Syracuse (Divides time with WMAC). | 500 | 293.9 | 1020 | Eastern |
| **WTAD** | **Quincy, Ill.** — Illinois Stock Medicine Broadcasting Corp. | 250 | 236.1 | 1270 | Central |
| **WTAG** | **Worcester, Mass.** — Worcester Telegram Pub. Co., 18 Franklin St. | 500 | 516.9 | 580 | Eastern |
| **WTAL** | **Toledo, Ohio**—Toledo Broadcasting Co. | 250 | 239.9 | 1250 | Eastern |
| **WTAM** | **Cleveland, Ohio** — Willard Storage Battery Co., 1100 Chester Ave. (Divides time with WEAR) (5000 watts Daytime). | 3500 | 399.8 | 750 | Eastern |
| **WTAQ** | **Eau Claire, Wis.** — Gillette Rubber Co. | 500 | 254.1 | 1180 | Central |
| **WTAR** | **Norfolk, Va.** — Reliance Electric Co., 519 W. 21st St. | 500 | 236.1 | 1270 | Eastern |
| **WTAS** | **Batavia, Ill.** — Illinois Broadcasting Corp. | 3500 | 275.1 | 1090 | Central |
| **WTAW** | **College Station, Tex.** —Agricultural and Mechanical College of Texas. | 500 | 483.6 | 620 | Central |
| **WTAX** | **Streator, Ill.** — Williams Hardware Co., 115 So. Vermillion St. | 50 | 247.8 | 1210 | Central |
| **WTAZ** | **Richmond, Va.**—Thos. J. McGuire. | 15 | 220.4 | 1360 | Eastern |
| **WTFF** | **Washington, D. C.** — Independent Publishing Co., 339 Pennsylvania Ave., N.W. | 10000 | 202.6 | 1480 | Eastern |
| **WTFI** | **Toccoa Falls, Ga.** — Toccoa Falls Inst. | 250 | 209.7 | 1430 | Eastern |
| **WTHS** | **Atlanta, Ga.**—Atlanta Technological High School. | 200 | 227.1 | 1320 | Central |
| **WTIC** | **Hartford, Conn.** — Travelers Insurance Co. | 500 | 535.4 | 560 | Eastern |
| **WTMJ** | **Milwaukee, Wis.** — Transmitter in Brookfield — Milwaukee Journal. | 1000 | 293.9 | 1020 | Central |
| **WTRL** | **Midland Park, N. J.**— Technical Radio Labs. (Divides time with WMRJ and WHPP). | 15 | 206.8 | 1450 | Eastern |
| **WWAE** | **Chicago, Ill.**—Dr. Geo. F. Courrier, 2024 So. Wabash Ave. (Divides time with WSBC). | 500 | 227.1 | 1320 | Central |
| **WWJ** | **Detroit, Mich.** — Evening News Assoc. | 1000 | 352.7 | 850 | Eastern |
| **WWL** | **New Orleans, La.** — Loyola University. | 500 | 245.8 | 1220 | Central |
| **WWNC** | **Asheville, N. C.** — Asheville Chamber of Commerce, 101 Patton Ave. | 1000 | 296.9 | 1010 | Central |
| **WWRL** | **Woodside, N. Y.** — W. H. Reuman (Divides time with WBKN, WIBI and WBMS). | 100 | 199.9 | 1500 | Eastern |
| **WWVA** | **Wheeling, West Va.**— John C. Stroebel, Jr., 1229 Main St. | 250 | 516.9 | 580 | Eastern |

***This list has been corrected up to and including February 1st, 1928***

STATION WLS
CHICAGO, ILL.
SID TANNER AND FATE NORRIS
VIOLINISTS

STATION WMBB-WOK
CHICAGO, ILL.
NAVARRO SISTERS
SPANISH SONGS

STATION KGCU
MANDAN, NO. DAK.
KGCU
ORCHESTRA

STATION WPG
ATLANTIC CITY, N. J.
THE PLAY GROUND
REVELERS

STATION WCCO
ST PAUL, MINNESOTA
THE WHEATIES QUARTET

# RADIO BROADCAST STATIONS OF THE UNITED STATES

## By Wavelengths and Frequencies

| Meters | Kilocycles | Power | Call Letters | Location |
|---|---|---|---|---|
| 199.9 | 1500 | 15 | KGFN | Aneta, N. Dak. |
| 199.9 | 1500 | 10 | KUJ | Seattle, Wash. |
| 199.9 | 1500 | 15 | KWBS | Portland, Ore. |
| 199.9 | 1500 | 100 | WBKN | Brooklyn, N. Y. |
| 199.9 | 1500 | 100 | WBMS | Union City, N. J. |
| 199.9 | 1500 | 100 | WGOP | Flushing, N. Y. |
| 199.9 | 1500 | 15 | WKBZ | Ludington, Mich. |
| 199.9 | 1500 | 5 | WNBW | Carbondale, Pa. |
| 199.9 | 1500 | 250 | WRAH | Providence, R. I. |
| 199.9 | 1500 | 100 | WWRL | Woodside, N. Y. |
| 201.2 | 1490 | 50 | KGEH | Eugene, Ore. |
| 201.2 | 1490 | 15 | KGEY | Denver, Colo. |
| 201.2 | 1490 | 50 | WALK | Willow Grove, Pa. |
| 201.2 | 1490 | 100 | WATT | Boston, Mass. |
| 201.2 | 1490 | 100 | WCBR | Providence, R. I. |
| 201.2 | 1490 | 100 | WGMU | New York, N. Y. |
| 201.2 | 1490 | 100 | WHBM | Chicago, Ill. |
| 201.2 | 1490 | 100 | WIBJ | Chicago, Ill. |
| 201.2 | 1490 | 100 | WIBM | Chicago, Ill. |
| 201.2 | 1490 | 100 | WKBG | Chicago, Ill. |
| 201.2 | 1490 | 100 | WRMU | New York, N. Y. |
| 202.6 | 1480 | 100 | KVL | Seattle, Wash. |
| 202.6 | 1480 | 10000 | WTFF | Washington, D. C. |
| 204 | 1470 | 15 | KFXD | Jerome, Idaho |
| 204 | 1470 | 50 | KGEQ | Minneapolis, Minn. |
| 204 | 1470 | 10 | KGES | Central City, Nebr. |
| 204 | 1470 | 100 | KGFO | Terre Haute, Ind. |
| 204 | 1470 | 100 | KGGM | Inglewood, Calif. |
| 204 | 1470 | 50 | KHAC | San Francisco, Calif. |
| 204 | 1470 | 100 | WBBZ | Chicago, Ill. |
| 204 | 1470 | 100 | WHBL | Chicago, Ill. |
| 204 | 1470 | 250 | WIBS | Elizabeth, N. J. |
| 204 | 1470 | 250 | WIBW | Topeka, Kans. |
| 204 | 1470 | 250 | WKEN | Buffalo, N. Y. |
| 204 | 1470 | 50 | WLBN | Chicago, Ill. |
| 204 | 1470 | 250 | WLBX | Long Island City, N. Y. |
| 204 | 1470 | 100 | WMBA | Newport, R. I. |
| 204 | 1470 | 100 | WMBH | Joplin, Mo. |
| 204 | 1470 | 100 | WMBQ | Brooklyn, N. Y. |
| 204 | 1470 | 10 | WOBR | Shelby, Ohio |
| 204 | 1470 | 100 | WSAX | Chicago, Ill. |
| 204 | 1470 | 50 | WSVS | Buffalo, N. Y. |
| 205.4 | 1460 | 25 | KFXY | Flagstaff, Ariz. |
| 205.4 | 1460 | 50 | KGDE | Barrett, Minn. |
| 205.4 | 1460 | 100 | KGEO | Grand Island, Nebr. |
| 205.4 | 1460 | 25 | KGFF | Alva, Okla. |
| 205.4 | 1460 | 250 | WABF | Kingston, Pa. |
| 205.4 | 1460 | 15 | WKBL | Monroe, Mich. |
| 205.4 | 1460 | 250 | WMBD | Peoria Heights, Ill. |
| 205.4 | 1460 | 15 | WNBQ | Rochester, N. Y. |
| 205.4 | 1460 | 15 | WOBT | Union City, Tenn. |
| 205.4 | 1460 | 100 | WRK | Hamilton, O. |
| 206.8 | 1450 | 15 | KGDR | San Antonio, Tex. |
| 206.8 | 1450 | 15 | KGDY | Oldham, S. Dak. |
| 206.8 | 1450 | 100 | KGGF | Picher, Okla. |
| 206.8 | 1450 | 50 | KGTT | San Francisco, Cal. |
| 206.8 | 1450 | 10 | KLIT | Portland, Ore. |
| 206.8 | 1450 | 10 | WHPP | New York, N. Y. |
| 206.8 | 1450 | 50 | WLBV | Mansfield, Ohio |
| 206.8 | 1450 | 10 | WMRJ | Jamaica, N. Y. |
| 206.8 | 1450 | 50 | WNBF | Endicott, N. Y. |
| 206.8 | 1450 | 50 | WNBJ | Knoxville, Tenn. |
| 206.8 | 1450 | 50 | WPSW | Philadelphia, Pa. |
| 206.8 | 1450 | 15 | WTRL | Midland Park, N. J. |
| 208.2 | 1440 | 250 | KFVD | Venice, Calif. |
| 208.2 | 1440 | 50 | KGCN | Concordia, Kans. |
| 208.2 | 1440 | 15 | KGCR | Brookings, S. Dak. |
| 208.2 | 1440 | 100 | KGFJ | Los Angeles, Calif. |
| 208.2 | 1440 | 50 | WGM | Jeannette, Pa. |
| 208.2 | 1440 | 100 | WJBZ | Chicago Heights, Ill. |
| 208.2 | 1440 | 50 | WJPW | Ashtabula, Ohio |
| 208.2 | 1440 | 250 | WLBZ | Dover-Foxcroft, Me. |
| 208.2 | 1440 | 10 | WMBE | St. Paul, Minn. |
| 208.2 | 1440 | 200 | WNBA | Forest Park, Ill. |
| 208.2 | 1440 | 100 | WRAF | Laporte, Ind. |
| 208.2 | 1440 | 100 | WRPI | Terre Haute, Ind. |
| 209.7 | 1430 | 10 | KFGQ | Boone, Iowa |
| 209.7 | 1430 | 15 | KGHC | Slayton, Minn. |
| 209.7 | 1430 | 250 | KGHF | Pueblo, Calif. |
| 209.7 | 1430 | 250 | KSOO | Sioux Falls, S. D. |
| 209.7 | 1430 | 50 | KVOS | Bellingham, Wash. |
| 209.7 | 1430 | 250 | WCBS | Springfield, Ill. |
| 209.7 | 1430 | 50 | WLBC | Muncie, Ind. |
| 209.7 | 1430 | 50 | WLBF | Kansas City, Mo. |
| 209.7 | 1430 | 50 | WLBY | Iron Mountain, Mich. |
| 209.7 | 1430 | 10 | WMBM | Memphis, Tenn. |
| 209.7 | 1430 | 500 | WOKT | Rochester, N. Y. |
| 209.7 | 1430 | 100 | WPRC | Harrisburg, Pa. |
| 209.7 | 1430 | 100 | WRCV | Norfolk, Va. |
| 209.7 | 1430 | 250 | WTFI | Toccoa Falls, Ga. |
| 211.1 | 1420 | 50 | KFCR | Santa Barbara, Cal. |
| 211.1 | 1420 | 15 | KFYO | Breckenridge, Tex. |
| 211.1 | 1420 | 100 | KPNP | Muscatine, Iowa |
| 211.1 | 1420 | 50 | KRSC | Seattle, Wash. |
| 211.1 | 1420 | 100 | WBMH | Detroit, Mich. |
| 211.1 | 1420 | 100 | WBRS | Brooklyn, N. Y. |
| 211.1 | 1420 | 250 | WCDA | New York, N. Y. |
| 211.1 | 1420 | 100 | WLOE | Chelsea, Mass. |
| 211.1 | 1420 | 100 | WMES | Boston, Mass. |
| 211.1 | 1420 | 15 | WNBO | Washington, Pa. |
| 211.1 | 1420 | 150 | WRST | Bay Shore, N. Y. |
| 212.6 | 1410 | 10 | KFHL | Oskaloosa, Iowa |
| 212.6 | 1410 | 250 | KGBZ | York, Nebr. |
| 212.6 | 1410 | 250 | KGDX | Shreveport, La. |

| Meters | Kilocycles | Power | Call Letters | Location |
|---|---|---|---|---|
| 212.6 | 1410 | 10 | KGFP | Mitchell, S. Dak. |
| 212.6 | 1410 | 50 | KGGH | Cedar Grove, La. |
| 212.6 | 1410 | 5 | KTUE | Houston, Tex. |
| 212.6 | 1410 | 250 | WJBL | Decatur, Ill. |
| 212.6 | 1410 | 50 | WKBP | Battle Creek, Mich. |
| 212.6 | 1410 | 250 | WRAX | Philadelphia, Pa. |
| 212.6 | 1410 | 250 | WSAR | Portsmouth, R. I. |
| 214.2 | 1400 | 50 | KFEC | Portland, Ore. |
| 214.2 | 1400 | 50 | KFIF | Portland, Ore. |
| 214.2 | 1400 | 250 | KFWF | St. Louis, Mo. |
| 214.2 | 1400 | 15 | KPJM | Prescott, Ariz. |
| 214.2 | 1400 | 10 | WAIT | Taunton, Mass. |
| 214.2 | 1400 | 100 | WJBU | Lewisburg, Pa. |
| 214.2 | 1400 | 50 | WKBN | Youngstown, Ohio |
| 214.2 | 1400 | 100 | WLBG | Petersburg, Va. |
| 214.2 | 1400 | 50 | WMBW | Youngstown, Ohio |
| 215.7 | 1390 | 10 | KFDZ | Minneapolis, Minn. |
| 215.7 | 1390 | 50 | KFXJ | Edgewater, Colo. |
| 215.7 | 1390 | 50 | KGCB | Oklahoma City, Okla. |
| 215.7 | 1390 | 100 | KGER | Long Beach, Calif. |
| 215.7 | 1390 | 50 | KGFG | Oklahoma City, Okla. |
| 215.7 | 1390 | 250 | KRLO | Los Angeles, Calif. |
| 215.7 | 1390 | 150 | WCLS | Joliet, Ill. |
| 215.7 | 1390 | 100 | WEHS | Evanston, Ill. |
| 215.7 | 1390 | 200 | WHFC | Chicago, Ill. |
| 215.7 | 1390 | 150 | WKBB | Joliet, Ill. |
| 215.7 | 1390 | 50 | WKBI | Chicago, Ill. |
| 215.7 | 1390 | 50 | WLEX | Lexington, Mass. |
| 215.7 | 1390 | 250 | WOKO | Peekskill, N. Y. |
| 215.7 | 1390 | 250 | WPEP | Waukegan, Ill. |
| 215.7 | 1390 | 100 | WQBC | Utica, Miss. |
| 217.3 | 1380 | 100 | KFOR | Lincoln, Nebr. |
| 217.3 | 1380 | 100 | KFQW | Seattle, Wash. |
| 217.3 | 1380 | 10 | KGDM | Stockton, Calif. |
| 217.3 | 1380 | 20 | WIBU | Poynette, Wis. |
| 217.3 | 1380 | 100 | WKBS | Galesburg, Ill. |
| 217.3 | 1380 | 100 | WKBV | Brookville, Ind. |
| 217.3 | 1380 | 500 | WKBW | Buffalo, N. Y. |
| 217.3 | 1380 | 100 | WLBO | Galesburg, Ill. |
| 217.3 | 1380 | 50 | WRES | Quincy, Mass. |
| 218.8 | 1370 | 100–200 | KGEW | Fort Morgan, Colo. |
| 218.8 | 1370 | 500 | WCGU | New York N. Y. |
| 218.8 | 1370 | 500 | WGWB | Milwaukee, Wis. |
| 218.8 | 1370 | 10 | WKBC | Birmingham, Ala. |
| 218.8 | 1370 | 500 | WKBO | Jersey City, N. J. |
| 218.8 | 1370 | 500 | WKBQ | New York, N. Y. |
| 218.8 | 1370 | 25 | WLBQ | Atwood, Ill. |
| 218.8 | 1370 | 250 | WMCO | Detroit, Mich. |
| 220.4 | 1360 | 100 | KGCI | San Antonio, Tex. |
| 220.4 | 1360 | 15 | KGFI | San Angelo, Tex. |
| 220.4 | 1360 | 100 | KGRC | San Antonio, Tex. |
| 220.4 | 1360 | 50 | KJBS | San Francisco, Cal. |
| 220.4 | 1360 | 50 | KRAC | Shreveport, La. |
| 220.4 | 1360 | 50 | KXL | Portland, Ore. |
| 220.4 | 1360 | 10000 | WAMD | St. Paul-Minneapolis, Minn. |
| 220.4 | 1360 | 15 | WHBU | Anderson, Ind. |
| 220.4 | 1360 | 100 | WHBW | Philadelphia, Pa. |
| 220.4 | 1360 | 15 | WJBK | Ypsilanti, Mich. |
| 220.4 | 1360 | 500 | WKBH | LaCrosse, Wis. |
| 220.4 | 1360 | 15 | WMBG | Richmond, Va. |
| 220.4 | 1360 | 100 | WMBO | Auburn, N. Y. |
| 220.4 | 1360 | 15 | WTAZ | Lambertville, N. J. |
| 222.1 | 1350 | 100 | KFWC | San Bernardino, Cal. |
| 222.1 | 1350 | 50 | KGBY | Shelby, Nebr. |
| 222.1 | 1350 | 50 | KGFL | Trinidad, Colo. |
| 222.1 | 1350 | 100 | KWKC | Kansas City, Mo. |
| 222.1 | 1350 | 100 | KWTC | Santa Ana, Calif. |
| 222.1 | 1350 | 100 | WCBA | Allentown, Pa. |
| 222.1 | 1350 | 100 | WHBD | Bellefontaine, O. |
| 222.1 | 1350 | 100 | WHBF | Rock Island, Ill. |
| 222.1 | 1350 | 50 | WOMT | Manitowoc, Wis. |
| 222.1 | 1350 | 100 | WSAN | Allentown, Pa. |
| 223.7 | 1340 | 100 | KFBL | Everett, Wash. |
| 223.7 | 1340 | 50 | KFVS | Cape Girardeau, Mo. |
| 223.7 | 1340 | 50 | KFXR | Oklahoma City, Okla. |
| 223.7 | 1340 | 10 | KGDP | Pueblo, Colo. |
| 223.7 | 1340 | 10 | KGFB | Iowa City, Iowa |
| 223.7 | 1340 | 250 | KGFH | La Crescenta, Calif. |
| 223.7 | 1340 | 50 | KGFK | Hallock, Minn. |
| 223.7 | 1340 | 250 | KMIC | Inglewood, Calif. |
| 223.7 | 1340 | 500 | WCAM | Camden, N. J. |
| 223.7 | 1340 | 500 | WCRW | Chicago, Ill. |
| 223.7 | 1340 | 15 | WEBQ | Harrisburg, Ill. |
| 223.7 | 1340 | 500 | WFAN | Philadelphia, Pa. |
| 223.7 | 1340 | 500 | WFKB | Chicago, Ill. |
| 223.7 | 1340 | 50 | WKAV | Laconia, N. H. |
| 223.7 | 1340 | 250 | WNRC | Greensboro, N. C. |
| 223.7 | 1340 | 25 | WOCL | Jamestown, N. Y. |
| 223.7 | 1340 | 500 | WPCC | Chicago, Ill. |
| 223.7 | 1340 | 250 | WSAJ | Grove City, Pa. |
| 225.4 | 1330 | 15 | KFKZ | Kirksville, Mo. |
| 225.4 | 1330 | 500 | KFUR | Ogden, Utah |
| 225.4 | 1330 | 50 | KFVG | Independence, Kans. |
| 225.4 | 1330 | 15 | KGEN | El Centro, Calif. |
| 225.4 | 1330 | 50 | WAGM | Royal Oak, Mich. |
| 225.4 | 1330 | 100 | WCBM | Baltimore, Md. |
| 225.4 | 1330 | 100 | WCOT | Olneyville, R. I. |
| 225.4 | 1330 | 1000 | WDAD | Nashville, Tenn. |
| 225.4 | 1330 | 1000 | WLAC | Nashville, Tenn. |
| 225.4 | 1330 | 500 | WMAC | Cazenovia, N. Y. |
| 227.1 | 1320 | 100 | KFUP | Denver, Colo. |
| 227.1 | 1320 | 500 | KSO | Clarinda, Iowa |
| 227.1 | 1320 | 50 | KXRO | Seattle, Wash |
| 227.1 | 1320 | 100 | WAIZ | Omro, Wis. |
| 227.1 | 1320 | 500 | WBBC | Brooklyn, N. Y. |
| 227.1 | 1320 | 5 | WCBE | New Orleans, La. |
| 227.1 | 1320 | 100 | WCLO | Kenosha, Wis. |
| 227.1 | 1320 | 500 | WFJC | Akron, O. |
| 227.1 | 1320 | 500 | WJAY | Cleveland, Ohio |
| 227.1 | 1320 | 100 | WJBC | LaSalle, Ill. |
| 227.1 | 1320 | 500 | WSDA | Brooklyn, N. Y. |
| 227.1 | 1320 | 500 | WSGH | Brooklyn, N. Y. |
| 227.1 | 1320 | 200 | WTHS | Atlanta, Ga. |
| 227.1 | 1320 | 500 | WWAE | Chicago, Ill. |
| 228.9 | 1310 | 500 | KELW | Burbank, Calif. |
| 228.9 | 1310 | 50 | KPPC | Pasadena, Calif. |
| 228.9 | 1310 | 20 | KTAP | San Antonio, Tex. |

| Meters | Kilocycles | Power | Call Letters | Location |
|---|---|---|---|---|
| 228.9 | 1310 | 50 | KWJJ | Portland, Ore. |
| 228.9 | 1310 | 15 | WGBC | Memphis, Tenn. |
| 228.9 | 1310 | 250 | WHBP | Johnstown, Pa. |
| 228.9 | 1310 | 100 | WKBE | Webster, Mass. |
| 228.9 | 1310 | 100 | WMBL | Lakeland, Fla. |
| 228.9 | 1310 | 100 | WNBR | Memphis, Tenn. |
| 228.9 | 1310 | 2500 | WOWO | Ft. Wayne, Ind. |
| 230.6 | 1300 | 15 | KDLR | Devils Lake, N. D. |
| 230.6 | 1300 | 1000 | KFEQ | St. Joseph, Mo. |
| 230.6 | 1300 | 15 | KFPM | Greenville, Tex. |
| 230.6 | 1300 | 50 | KGCL | Seattle, Wash. |
| 230.6 | 1300 | 50 | KPCB | Seattle, Wash. |
| 230.6 | 1300 | 25 | WAAD | Cincinnati, O. |
| 230.6 | 1300 | 100 | WAFD | Detroit, Mich. |
| 230.6 | 1300 | 250 | WCOC | Columbus, Miss. |
| 230.6 | 1300 | 250 | WDBJ | Roanoke, Va. |
| 230.6 | 1300 | 250 | WGBI | Scranton, Pa. |
| 230.6 | 1300 | 15 | WIBZ | Montgomery, Ala. |
| 230.6 | 1300 | 50 | WLBM | Boston, Mass. |
| 230.6 | 1300 | 250 | WQAN | Scranton, Pa. |
| 232.4 | 1290 | 10 | KFEY | Kellogg, Idaho |
| 232.4 | 1290 | 100 | KFJY | Fort Dodge, Ia. |
| 232.4 | 1290 | 100 | KFMR | Sioux City, Ia. |
| 232.4 | 1290 | 250 | KFPR | Los Angeles, Cal. |
| 232.4 | 1290 | 100 | KFQZ | Hollywood, Cal. |
| 232.4 | 1290 | 500 | KUT | Austin, Tex. |
| 232.4 | 1290 | 100 | WHBQ | Memphis, Tenn. |
| 232.4 | 1290 | 100 | WHEC | Rochester, N. Y. |
| 232.4 | 1290 | 500 | WJKS | Gary, Ind. |
| 232.4 | 1290 | 30 | WLBH | Farmingdale, N. Y. |
| 232.4 | 1290 | 50 | WMBJ | Monessen, Pa. |
| 232.4 | 1290 | 500 | WSBC | Chicago, Ill. |
| 234.2 | 1280 | 1000 | KFQA | St. Louis, Mo. |
| 234.2 | 1280 | 100 | KGAR | Tucson, Ariz. |
| 234.2 | 1280 | 50 | KVI | Tacoma, Wash. |
| 234.2 | 1280 | 1000 | KWK | St. Louis, Mo. |
| 234.2 | 1280 | 100 | WBBL | Richmond, Va. |
| 234.2 | 1280 | 250 | WCAH | Columbus, O. |
| 234.2 | 1280 | 100 | WDAH | El Paso, Tex. |
| 234.2 | 1280 | 50 | WFBC | Knoxville, Tenn. |
| 234.2 | 1280 | 50 | WJAK | Kokomo, Ind. |
| 234.2 | 1280 | 50 | WJBY | Gadsden, Ala. |
| 234.2 | 1280 | 50 | WMAN | Columbus, O. |
| 234.2 | 1280 | 100 | WMAY | St. Louis, Mo. |
| 234.2 | 1280 | 250 | WMBS | Harrisburg, Pa. |
| 234.2 | 1280 | 30 | WMPC | Lapeer, Mich. |
| 236.1 | 1270 | 250 | KFDX | Shreveport, La. |
| 236.1 | 1270 | 500 | KFMX | Northfield, Minn. |
| 236.1 | 1270 | 500 | KFWM | Oakland, Calif. |
| 236.1 | 1270 | 100 | KHMC | Harlingen, Tex. |
| 236.1 | 1270 | 100 | WBBW | Norfolk, Va. |
| 236.1 | 1270 | 500 | WBNY | New York, N. Y. |
| 236.1 | 1270 | 250 | WGBF | Evansville, Ind. |
| 236.1 | 1270 | 1000 | WHAP | New York, N. Y. |
| 236.1 | 1270 | 500 | WMSG | New York, N. Y. |
| 236.1 | 1270 | 100 | WSRO | Middletown, O. |
| 236.1 | 1270 | 500 | WSUF | Suffolk, Va. |
| 236.1 | 1270 | 250 | WTAD | Quincy, Ill. |
| 236.1 | 1270 | 500 | WTAR | Norfolk, Va. |
| 238 | 1260 | 50 | KFVI | Houston, Tex. |
| 238 | 1260 | 50 | WABZ | New Orleans, La. |
| 238 | 1260 | 1000 | WADC | Akron, O. |
| 238 | 1260 | 150 | WIBX | Utica, N. Y. |
| 238 | 1260 | 250 | WJBB | St. Petersburg, Fla. |
| 238 | 1260 | 30 | WJBW | New Orleans, La. |
| 238 | 1260 | 250 | WLBI | Wenona, Ill. |
| 238 | 1260 | 250 | WQBA | Tampa, Fla. |
| 238 | 1260 | 100 | WRAW | Reading, Pa. |
| 238 | 1260 | 250 | WRBC | Valparaiso, Ind. |
| 239.9 | 1250 | 2500 | KEX | Portland, Ore. |
| 239.9 | 1250 | 100 | KGCU | Mandan, N. Dak. |
| 239.9 | 1250 | 250 | KWCR | Cedar Rapids, Ia. |
| 239.9 | 1250 | 500 | WABW | Wooster, O. |
| 239.9 | 1250 | 100 | WBBP | Petoskey, Mich. |
| 239.9 | 1250 | 500 | WCAP | Asbury Park, N. J. |
| 239.9 | 1250 | 100 | WIBA | Madison, Wis. |
| 239.9 | 1250 | 250 | WJAM | Cedar Rapids, Ia. |
| 239.9 | 1250 | 500 | WNAD | Norman, Okla. |
| 239.9 | 1250 | 500 | WOAN | Lawrenceburg, Tenn. |
| 239.9 | 1250 | 500 | WOAX | Trenton, N. J. |
| 239.9 | 1250 | 65 | WQBJ | Clarksburg, W. Va. |
| 239.9 | 1250 | 250 | WTAL | Toledo, Ohio. |
| 241.8 | 1240 | 1500 | KFKB | Milford, Kans. |
| 241.8 | 1240 | 500 | KFON | Long Beach, Calif. |
| 241.8 | 1240 | 100 | KFXH | El Paso, Tex. |
| 241.8 | 1240 | 250 | WBRC | Birmingham, Ala. |
| 241.8 | 1240 | 250 | WEBC | Superior, Wis. |
| 241.8 | 1240 | 200 | WEBR | Buffalo, N. Y. |
| 241.8 | 1240 | 500 | WEDC | Chicago, Ill. |
| 241.8 | 1240 | 100 | WFCI | Pawtucket, R. I. |
| 241.8 | 1240 | 500 | WGES | Chicago, Ill. |
| 241.8 | 1240 | 500 | WMAL | Washington, D. C. |
| 241.8 | 1240 | 10 | WNBX | Springfield, Vt. |
| 243.8 | 1230 | 125 | KFCB | Phoenix, Ariz. |
| 243.8 | 1230 | 10 | KGCX | Vida, Mont. |
| 243.8 | 1230 | 250 | KGRS | Amarillo, Tex. |
| 243.8 | 1230 | 50 | KGY | Lacey, Wash. |
| 243.8 | 1230 | 500 | KSCJ | Sioux City, Iowa |
| 243.8 | 1230 | 1500 | KWUC | Le Mars, Iowa |
| 243.8 | 1230 | 500 | WCAD | Canton, N. Y. |
| 243.8 | 1230 | 250 | WCAO | Baltimore, Md. |
| 243.8 | 1230 | 500 | WDOD | Chattanooga, Tenn. |
| 243.8 | 1230 | 100 | WFBR | Baltimore, Md. |
| 243.8 | 1230 | 100 | WMBC | Detroit, Mich. |
| 245.8 | 1220 | 500 | KFH | Wichita, Kans. |
| 245.8 | 1220 | 100 | KFIO | Spokane, Wash. |
| 245.8 | 1220 | 250 | KFPY | Spokane, Wash. |
| 245.8 | 1220 | 250 | KLS | Oakland, Calif. |
| 245.8 | 1220 | 100 | KZM | Oakland, Calif. |
| 245.8 | 1220 | 500 | WAAT | Jersey City, N. J. |
| 245.8 | 1220 | 500 | WEVD | New York, N. Y. |
| 245.8 | 1220 | 250 | WFBE | Cincinnati, Ohio |
| 245.8 | 1220 | 400 | WGBB | Freeport, N. Y. |
| 245.8 | 1220 | 500 | WHDI | Minneapolis, Minn. |
| 245.8 | 1220 | 250 | WKRC | Cincinnati, Ohio |
| 245.8 | 1220 | 500 | WLB | Minneapolis, Minn. |
| 245.8 | 1220 | 500 | WWL | New Orleans, La. |
| 247.8 | 1210 | 100 | KFBC | San Diego, Cal. |

| Meters | Kilocycles | Power | Call Letters | Location |
|---|---|---|---|---|
| 247.8 | 1210 | 250 | KFEL | Denver, Colo. |
| 247.8 | 1210 | 100 | KFJB | Marshalltown, Ia. |
| 247.8 | 1210 | 10 | KGCA | Decorah, Iowa |
| 247.8 | 1210 | 250 | KOW | Denver, Colo. |
| 247.8 | 1210 | 50 | KWLC | Decorah, Iowa |
| 247.8 | 1210 | 50 | WABY | Philadelphia, Pa. |
| 247.8 | 1210 | 100 | WBAW | Nashville, Tenn. |
| 247.8 | 1210 | 100 | WCAT | Rapid City, S. D. |
| 247.8 | 1210 | 10 | WEBE | Cambridge, Ohio |
| 247.8 | 1210 | 50 | WFBZ | Galesburg, Ill. |
| 247.8 | 1210 | 50 | WFKD | Philadelphia, Pa. |
| 247.8 | 1210 | 1000 | WIOD | Miami Beach, Fla. |
| 247.8 | 1210 | 50 | WJBA | Joliet, Ill. |
| 247.8 | 1210 | 15 | WKDR | Kenosha, Wis. |
| 247.8 | 1210 | 15 | WLBR | Belvidere, Ill. |
| 247.8 | 1210 | 50 | WLBT | Crown Point, Ind. |
| 247.8 | 1210 | 50 | WLCI | Ithaca, N. Y. |
| 247.8 | 1210 | 250 | WNBH | New Bedford, Mass. |
| 247.8 | 1210 | 50 | WRAM | Galesburg, Ill. |
| 247.8 | 1210 | 50 | WRRS | Racine, Wis. |
| 247.8 | 1210 | 50 | WTAX | Streator, Ill. |
| 249.9 | 1200 | 15 | KFJI | Astoria, Ore. |
| 249.9 | 1200 | 50 | KFJZ | Fort Worth, Tex. |
| 249.9 | 1200 | 200 | KFKA | Greeley, Colo. |
| 249.9 | 1200 | 100 | KFQU | Holy City, Calif. |
| 249.9 | 1200 | 500 | KFRU | Columbia, Mo. |
| 249.9 | 1200 | 50 | KFUT | Salt Lake City, Utah |
| 249.9 | 1200 | 250 | KFYR | Bismarck, N. D. |
| 249.9 | 1200 | 50 | KMED | Medford, Ore. |
| 249.9 | 1200 | 100 | WBAX | Wilkes-Barre, Pa. |
| 249.9 | 1200 | 75 | WBBY | Charleston, S. C. |
| 249.9 | 1200 | 100 | WBRE | Wilkes-Barre, Pa. |
| 249.9 | 1200 | 50 | WCAZ | Carthage, Ill. |
| 249.9 | 1200 | 500 | WCOA | Pensacola, Fla. |
| 249.9 | 1200 | 50 | WHBY | West De Pere, Wis. |
| 249.9 | 1200 | 50 | WIBR | Steubenville, Ohio |
| 249.9 | 1200 | 100 | WREC | Memphis, Tenn. |
| 249.9 | 1200 | 100 | WSAZ | Huntington, W. Va. |
| 249.9 | 1200 | 150 | WSIX | Springfield, Tenn. |
| 252 | 1190 | 250 | KOCW | Chickasha, Okla. |
| 252 | 1190 | 500 | KPLA | Los Angeles, Calif. |
| 252 | 1190 | 10 | WFAM | St. Cloud, Minn. |
| 252 | 1190 | 15 | WGAL | Lancaster, Pa. |
| 252 | 1190 | 250 | WKBF | Indianapolis, Ind. |
| 252 | 1190 | 50 | WKBT | New Orleans, La. |
| 252 | 1190 | 50 | WKJC | Lancaster, Pa. |
| 252 | 1190 | 5000 | WMBB | Chicago, Ill. |
| 252 | 1190 | 100 | WMBR | Tampa, Fla. |
| 252 | 1190 | 5000 | WOK | Chicago, Ill. |
| 252 | 1190 | 5000 | WORD | Chicago, Ill. |
| 254.1 | 1180 | 50 | KFHA | Gunnison, Colo. |
| 254.1 | 1180 | 500 | KFKU | Lawrence, Kans. |
| 254.1 | 1180 | 200 | KGFX | Pierre, S. Dak. |
| 254.1 | 1180 | 15 | KGDA | Dell Rapids, S. Dak. |
| 254.1 | 1180 | 250 | KMO | Tacoma, Wash. |
| 254.1 | 1180 | 500 | WABO | Rochester, N. Y. |
| 254.1 | 1180 | 100 | WCAX | Burlington, Vt. |
| 254.1 | 1180 | 10 | WHBC | Canton, O. |
| 254.1 | 1180 | 750 | WREN | Lawrence, Kans. |
| 254.1 | 1180 | 1000 | WRVA | Richmond, Va. |
| 254.1 | 1180 | 500 | WTAQ | Eau Claire, Wis. |
| 256.3 | 1170 | 50 | KFUS | Oakland, Cal. |
| 256.3 | 1170 | 100 | KRE | Berkeley, Cal. |
| 256.3 | 1170 | 2000 | KTNT | Muscatine, Iowa |
| 256.3 | 1170 | 250 | WASH | Grand Rapids, Mich. |
| 256.3 | 1170 | 1000 | WBBR | Rossville, N. Y. |
| 256.3 | 1170 | 500 | WCSO | Springfield, Ohio |
| 256.3 | 1170 | 500 | WEBJ | New York, N. Y. |
| 256.3 | 1170 | 250 | WLTH | Brooklyn, N. Y. |
| 258.5 | 1160 | 100 | KDYL | Salt Lake City, Utah |
| 258.5 | 1160 | 100 | KFOX | Omaha, Neb. |
| 258.5 | 1160 | 500 | KFUL | Galveston, Tex. |
| 258.5 | 1160 | 250 | KOCH | Omaha, Neb. |
| 258.5 | 1160 | 750 | WBT | Charlotte, N. C. |
| 258.5 | 1160 | 500 | WEBW | Beloit, Wis. |
| 258.5 | 1160 | 750 | WFBL | Syracuse, N. Y. |
| 258.5 | 1160 | 250 | WIL | St. Louis, Mo. |
| 258.5 | 1160 | 250 | WNAL | Omaha, Neb. |
| 258.5 | 1160 | 250 | WSBF | St. Louis, Mo. |
| 260.7 | 1150 | 2000 | KGA | Spokane, Wash. |
| 260.7 | 1150 | 500 | WCAU | Philadelphia, Pa. |
| 260.7 | 1150 | 500 | WCMA | Culver, Ind. |
| 260.7 | 1150 | 250 | WDWF | Cranston, R. I. |
| 260.7 | 1150 | 750 | WFIW | Hopkinsville, Ky. |
| 260.7 | 1150 | 10 | WHBA | Oil City, Pa. |
| 260.7 | 1150 | 250 | WLSI | Cranston, R. I. |
| 260.7 | 1150 | 500 | WOOD | Grand Rapids, Mich. |
| 260.7 | 1150 | 1000 | WRHM | Minneapolis, Minn. |
| 263 | 1140 | 50 | KFPW | Carterville, Mo. |
| 263 | 1140 | 500 | KGEF | Los Angeles, Calif. |
| 263 | 1140 | 10 | KGEK | Yuma, Colo. |
| 263 | 1140 | 50 | KGHP | Hardin, Mont. |
| 263 | 1140 | 250 | WDAG | Amarillo, Tex. |
| 263 | 1140 | 250 | WEAM | No. Plainfield, N. J. |
| 263 | 1140 | 5000 | WJAZ | Chicago, Ill. |
| 263 | 1140 | 250 | WJBI | Red Bank, N. J. |
| 263 | 1140 | 100 | WJBO | New Orleans, La. |
| 263 | 1140 | 5000 | WMBI | Chicago, Ill. |
| 263 | 1140 | 500 | WSEA | Virginia Beach, Va. |
| 265.3 | 1130 | 15 | KKP | Seattle, Wash. |
| 265.3 | 1130 | 2000 | KTSA | San Antonio, Tex. |
| 265.3 | 1130 | 100 | WCWS | Danbury, Conn. |
| 265.3 | 1130 | 500 | WHK | Cleveland, Ohio |
| 265.3 | 1130 | 500 | WICC | Bridgeport, Conn. |
| 265.3 | 1130 | 1000 | WNOX | Knoxville, Tenn. |
| 265.3 | 1130 | 2500 | WOI | Ames, Iowa |
| 267.7 | 1120 | 100 | KFIZ | Fond du Lac, Wis. |
| 267.7 | 1120 | 100 | KFLV | Rockford, Ill. |
| 267.7 | 1120 | 500 | KFWI | San Francisco, Calif. |
| 267.7 | 1120 | 1000 | KSBA | Shreveport, La. |
| 267.7 | 1120 | 250 | WAAM | Newark, N. J. |
| 267.7 | 1120 | 100 | WBAO | Decatur, Ill. |
| 267.7 | 1120 | 500 | WDAE | Tampa, Fla. |
| 267.7 | 1120 | 100 | WFBG | Altoona, Pa. |
| 267.7 | 1120 | 250 | WGCP | Newark, N. J. |
| 267.7 | 1120 | 30 | WLAP | Louisville, Ky. |
| 267.7 | 1120 | 250 | WNJ | Newark, N. J. |
| 267.7 | 1120 | 150 | WOBU | Charleston, W. Va. |

| Meters | Kilocycles | Power | Call Letters | Location |
|---|---|---|---|---|
| 270.1 | 1110 | 100 | KFLX | Galveston, Tex. |
| 270.1 | 1110 | 1500 | KLDS | Independence, Mo. |
| 270.1 | 1110 | 500 | KOAC | Corvallis, Ore. |
| 270.1 | 1110 | 500 | KQV | Pittsburgh, Pa. |
| 270.1 | 1110 | 500 | WGST | Atlanta, Ga. |
| 270.1 | 1110 | 500 | WHAD | Milwaukee, Wis. |
| 270.1 | 1110 | 500 | WJAS | Pittsburgh, Pa. |
| 270.1 | 1110 | 500 | WMAZ | Macon, Ga. |
| 270.1 | 1110 | 250 | WSOE | Milwaukee, Wis. |
| 272.6 | 1100 | 750 | KFJF | Oklahoma City, Okla. |
| 272.6 | 1100 | 100 | KSMR | Santa Maria, Cal. |
| 272.6 | 1100 | 500 | WBAA | West Lafayette, Ind. |
| 272.6 | 1100 | 100 | WFBJ | Collegeville, Minn. |
| 272.6 | 1100 | 100 | WFDF | Flint, Mich. |
| 272.6 | 1100 | 500 | WLBW | Oil City, Pa. |
| 272.6 | 1100 | 5000 | WPG | Atlantic City, N. J. |
| 272.6 | 1100 | 500 | WRM | Urbana, Ill. |
| 272.6 | 1100 | 250 | WSKC | Bay City, Mich. |
| 275.1 | 1090 | 50 | KFBB | Havre, Mont. |
| 275.1 | 1090 | 15 | KFPL | Dublin, Tex. |
| 275.1 | 1090 | 500 | KFSG | Los Angeles, Calif. |
| 275.1 | 1090 | 500 | WEAN | Providence, R. I. |
| 275.1 | 1090 | 1000 | WFBM | Indianapolis, Ind. |
| 275.1 | 1090 | 3500 | WTAS | Batavia, Ill. |
| 277.6 | 1080 | 500 | KWWG | Brownsville, Tex. |
| 277.6 | 1080 | 500 | KXA | Seattle, Wash. |
| 277.6 | 1080 | 100 | WDZ | Tuscola, Ill. |
| 277.6 | 1080 | 750 | WGHP | Mt. Clemens, Mich. |
| 277.6 | 1080 | 500 | WKAR | East Lansing, Mich. |
| 277.6 | 1080 | 1000 | WNAX | Yankton, S. D. |
| 280.2 | 1070 | 500 | KTAB | Oakland, Calif. |
| 280.2 | 1070 | 5000 | WHAM | Rochester, N. Y. |
| 282 8 | 1060 | 100 | KFJR | Portland, Ore. |
| 282.8 | 1060 | 1000 | KFUM | Colorado Springs, Colo. |
| 282.8 | 1060 | 250 | KFXF | Denver, Colo. |
| 282 8 | 1060 | 50 | KTBR | Portland, Ore. |
| 282.8 | 1060 | 5000 | WAIU | Columbus, Ohio |
| 282.8 | 1060 | 750 | WEAO | Columbus, Ohio |
| 282.8 | 1060 | 500 | WDRC | New Haven, Conn. |
| 282.8 | 1060 | 50 | WRAK | Escanaba, Mich. |
| 285.5 | 1050 | 2000 | KFAU | Boise, Idaho |
| 285.5 | 1050 | 50 | KLCN | Blytheville, Ark. |
| 285.5 | 1050 | 5000 | WBAL | Baltimore, Md. |
| 285.5 | 1050 | 500 | WCAL | Northfield, Minn. |
| 285.5 | 1050 | 500 | WDGY | Minneapolis, Minn. |
| 285.5 | 1050 | 250 | WJAG | Norfolk, Nebr. |
| 288.3 | 1040 | 100 | KGBX | St. Joseph, Mo. |
| 288.3 | 1040 | 500 | KTBI | Los Angeles, Cal. |
| 288.3 | 1040 | 250 | WBCN | Chicago, Ill. |
| 288.3 | 1040 | 500 | WBET | Boston, Mass. |
| 288.3 | 1040 | 500 | WDBO | Orlando, Fla. |
| 288.3 | 1040 | 500 | WENR | Chicago, Ill. |
| 288.3 | 1040 | 100 | WIAD | Philadelphia, Pa. |
| 288.3 | 1040 | 150 | WKY | Oklahoma City, Okla. |
| 288.3 | 1040 | 100 | WNAT | Philadelphia, Pa. |
| 288.3 | 1040 | 100 | WSSH | Boston, Mass. |
| 293.9 | 1020 | 250 | KGCH | Wayne, Nebr. |
| 293.9 | 1020 | 100 | KGDW | Humboldt, Nebr. |
| 293.9 | 1020 | 100 | KGEZ | Kalispell, Mont. |
| 293.9 | 1020 | 500 | KPRC | Houston, Tex. |
| 293.9 | 1020 | 500 | WGL | New York, N. Y. |
| 293.9 | 1020 | 1000 | WODA | Paterson, N. J. |
| 293.9 | 1020 | 500 | WSYR | Syracuse, N. Y. |
| 293.9 | 1020 | 1000 | WTMJ | Milwaukee, Wis. |
| 296.9 | 1010 | 10 | KGFW | Ravenna, Nebr. |
| 296.9 | 1010 | 750 | KLZ | Denver, Colo. |
| 296.9 | 1010 | 500 | KQW | San Jose, Cal. |
| 296.9 | 1010 | 500 | KUOA | Fayetteville, Ark. |
| 296.9 | 1010 | 100 | WBES | Takoma Park, Md. |
| 296.9 | 1010 | 100 | WDEL | Wilmington, Del. |
| 296.9 | 1010 | 100 | WEPS | Gloucester, Mass. |
| 296.9 | 1010 | 10 | WHBN | St. Petersburg, Fla. |
| 296.9 | 1010 | 750 | WSMB | New Orleans, La. |
| 296.9 | 1010 | 200 | WSMK | Dayton, Ohio |
| 296.9 | 1010 | 1000 | WWNC | Asheville, N. C. |
| 299.8 | 1000 | 250 | KFWO | Avalon, Catalina Is., Cal |
| 299.8 | 1000 | 5000 | KMOX | St. Louis, Mo. |
| 299.8 | 1000 | 500 | WBAK | Harrisburg, Pa. |
| 299.8 | 1000 | 500 | WPSC | State College, Pa. |
| 302.8 | 990 | 1000 | KSL | Salt Lake City, Utah |
| 302.8 | 990 | 750 | WGR | Buffalo, N. Y. |
| 305.9 | 980 | 1000 | KOMO | Seattle, Wash. |
| 305.9 | 980 | 500 | WHAZ | Troy, N. Y. |
| 305.9 | 980 | 5000 | WHT | Chicago, Ill. |
| 305.9 | 980 | 5000 | WIBO | Chicago, Ill. |
| 309.1 | 970 | 500 | KYA | San Francisco, Cal. |
| 309.1 | 970 | 2500 | WABC | New York, N. Y. |
| 309.1 | 970 | 500 | WBOQ | New York, N. Y. |
| 315.6 | 950 | 50000 | KDKA | East Pittsburgh, Pa. |
| 315.6 | 950 | 1000 | KPSN | Pasadena, Cal. |
| 319 | 940 | 5000 | KFAB | Lincoln, Nebr. |
| 319 | 940 | 5000 | KOIL | Council Bluffs, Ia. |
| 319 | 940 | 1000 | KOIN | Portland, Ore. |
| 322.4 | 930 | 500 | WHAS | Louisville, Ky. |
| 322.4 | 930 | 100 | WIAS | Ottumwa, Ia. |
| 322.4 | 930 | 150 | WRHF | Washington, D. C. |
| 325.9 | 920 | 2500 | KOA | Denver, Colo. |
| 325.9 | 920 | 500 | WPCH | New York, N. Y. |
| 325.9 | 920 | 500 | WRNY | New York, N. Y. |
| 333.1 | 900 | 100 | KFJM | Grand Forks, N. D. |
| 333.1 | 900 | 1000 | KFQB | Fort Worth, Tex. |
| 333.1 | 900 | 500 | KSAC | Manhattan, Kans. |
| 333.1 | 900 | 250 | KSEI | Pocatello, Idaho |
| 333.1 | 900 | 15000 | WBZ | Springfield, Mass. |
| 333.1 | 900 | 500 | WBZA | Boston, Mass. |
| 333.1 | 900 | 750 | WHA | Madison, Wis. |
| 333.1 | 900 | 500 | WJAD | Waco, Tex. |
| 333.1 | 900 | 2000 | WLBL | Stevens Point, Wis. |
| 336.9 | 890 | 500 | KNX | Los Angeles, Calif. |
| 336.9 | 890 | 5000 | WSM | Nashville, Tenn. |
| 340.7 | 880 | 1000 | WAPI | Auburn, Ala. |
| 340.7 | 880 | 500 | WHB | Kansas City, Mo. |
| 340.7 | 880 | 1000 | WJAX | Jacksonville, Fla. |
| 340.7 | 880 | 500 | WOQ | Kansas City, Mo. |
| 344.6 | 870 | 50 | KWG | Stockton, Calif. |
| 344.6 | 870 | 5000 | WCBD | Zion, Ill. |
| 344.6 | 870 | 5000 | WLS | Chicago, Ill. |
| 348.6 | 860 | 2500 | KJR | Seattle, Wash. |

| Meters | Kilocycles | Power | Call Letters | Location |
|---|---|---|---|---|
| 348.6 | 860 | 1000 | KVOO | Tulsa, Okla. |
| 348.6 | 860 | 500 | WGBS | New York, N. Y. |
| 348.6 | 860 | 500 | WIP | Philadelphia, Pa. |
| 348.6 | 860 | 500 | WOO | Philadelphia, Pa. |
| 352.7 | 850 | 1000 | WEW | St. Louis, Mo. |
| 352.7 | 850 | 500 | WNAC | Boston, Mass. |
| 352.7 | 850 | 500 | WRR | Dallas, Tex. |
| 352.7 | 850 | 1000 | WWJ | Detroit, Mich. |
| 361.2 | 830 | 500 | KFWB | Los Angeles, Calif. |
| 361.2 | 830 | 5000 | WSAI | Cincinnati, Ohio |
| 365.6 | 820 | 50 | KMJ | Fresno, Calif. |
| 365.6 | 820 | 500 | WCSH | Portland, Me. |
| 365.6 | 820 | 2000 | WEBH | Chicago, Ill. |
| 365.6 | 820 | 1000 | WJJD | Mooseheart, Ill. |
| 370.2 | 810 | 1000 | KHQ | Spokane, Wash. |
| 370.2 | 810 | 1000 | WDAF | Kansas City, Mo. |
| 370.2 | 810 | 5000 | WLWL | New York, N. Y. |
| 370.2 | 810 | 500 | WMCA | New York, N. Y. |
| 374.8 | 800 | 500 | KNRC | Santa Monica, Calif. |
| 374.8 | 800 | 5000 | WOC | Davenport, Iowa |
| 379.5 | 790 | 500 | KMMJ | Clay Center, Nebr. |
| 379.5 | 790 | 500 | WCAJ | Lincoln, Nebr. |
| 379.5 | 790 | 50000 | WGY | So. Schenectady, N. Y. |
| 384.4 | 780 | 5000 | KGO | Oakland, Calif. |
| 384.4 | 780 | 1000 | KTHS | Hot Spgs. Natl. Pk., Ark. |
| 384.4 | 780 | 100 | WBSO | Babson Park, Mass. |
| 384.4 | 780 | 500 | WMBF | Miami Beach, Fla. |
| 384.4 | 780 | 750 | WQAM | Miami, Fla. |
| 389.4 | 770 | 500 | WAAF | Chicago, Ill. |
| 389.4 | 770 | 100 | WABI | Bangor, Me. |
| 389.4 | 770 | 5000 | WBBM | Chicago, Ill. |
| 389.4 | 770 | 500 | WJBT | Chicago, Ill. |
| 394.5 | 760 | 1000 | KMA | Shenandoah, Iowa |
| 394.5 | 760 | 5000 | KOB | State College, N. Mex. |
| 394.5 | 760 | 1000 | KTW | Seattle, Wash. |
| 394.5 | 760 | 1000 | KWKH | Shreveport, La. |
| 394.5 | 760 | 500 | KWSC | Pullman, Wash. |
| 394.5 | 760 | 500 | WHN | New York, N. Y. |
| 394.5 | 760 | 500 | WPAP | Cliffside, N. J. |
| 394.5 | 760 | 500 | WQAO | Cliffside, N. J. |
| 399.8 | 750 | 1000 | WEAR | Cleveland, Ohio |
| 399.8 | 750 | 500 | WSBT | South Bend, Ind. |
| 399.8 | 750 | 3500 | WTAM | Cleveland, Ohio |
| 405.2 | 740 | 500 | KHJ | Los Angeles, Calif. |
| 405.2 | 740 | 5000 | WCCO | Minneap.-St. Paul, Minn. |
| 405.2 | 740 | 500 | WFI | Philadelphia, Pa. |
| 405.2 | 740 | 500 | WLIT | Philadelphia, Pa. |
| 416.4 | 720 | 15000 | WGN | Chicago, Ill. |
| 416.4 | 720 | 500 | WLIB | Chicago, Ill. |
| 422.3 | 710 | 1000 | KPO | San Francisco, Calif. |
| 422.3 | 710 | 3500 | WOR | Newark, N. J. |
| 422.3 | 710 | 500 | WOS | Jefferson City, Mo. |
| 428.3 | 700 | 5000 | WLW | Cincinnati, Ohio |
| 428.3 | 700 | 500 | WMAF | South Dartmouth, Mass. |
| 434.5 | 690 | 1000 | NAA | Arlington, Va. |
| 440.9 | 680 | 500 | KFSD | San Diego, Calif. |
| 440.9 | 680 | 500 | WAAW | Omaha, Nebr. |
| 440.9 | 680 | 5000 | WCX | Pontiac, Mich. |
| 440.9 | 680 | 50 | WIBG | Elkins Park, Pa. |
| 440.9 | 680 | 5000 | WJR | Detroit, Mich. |
| 447.5 | 670 | 1000 | KFOA | Seattle, Wash. |
| 447.5 | 670 | 1000 | WMAQ | Chicago, Ill. |
| 447.5 | 670 | 500 | WQJ | Chicago, Ill. |
| 454.3 | 660 | 1000 | KFRC | San Francisco, Calif. |
| 454.3 | 660 | 40000 | WJZ | New York, N. Y. |
| 461.3 | 650 | 2000 | KFNF | Shenandoah, Iowa |
| 461.3 | 650 | 500 | KRLD | Dallas, Tex. |
| 461.3 | 650 | 500 | KUOM | Missoula, Mont. |
| 461.3 | 650 | 500 | WBIS | Boston, Mass. |
| 461.3 | 650 | 500 | WBRL | Tilton, N. H. |
| 461.3 | 650 | 500 | WCAE | Pittsburgh, Pa. |
| 468.5 | 640 | 5000 | KFI | Los Angeles, Calif. |
| 468.5 | 640 | 500 | WRC | Washington, D. C. |
| 475.9 | 630 | 100 | KICK | Atlantic, Iowa |
| 475.9 | 630 | 1000 | WSB | Atlanta, Ga. |
| 475.9 | 630 | 500 | WSUI | Iowa City, Ia. |
| 483.6 | 620 | 500 | KFBU | Laramie, Wyo. |
| 483.6 | 620 | 500 | KFDM | Beaumont, Tex. |
| 483.6 | 620 | 250 | KUSD | Vermillion, S. D. |
| 483.6 | 620 | 1500 | WCFL | Chicago, Ill. |
| 483.6 | 620 | 1000 | WEMC | Berrien Springs, Mich. |
| 483.6 | 620 | 500 | WJAR | Providence, R. I. |
| 483.6 | 620 | 100 | WLTS | Chicago, Ill. |
| 483.6 | 620 | 500 | WTAW | College Station, Tex. |
| 491.5 | 610 | 1000 | KGW | Portland, Ore. |
| 491.5 | 610 | 50000 | WEAF | New York, N. Y. |
| 499.7 | 600 | 5000 | WBAP | Fort Worth, Tex. |
| 499.7 | 600 | 5000 | WOAI | San Antonio, Tex. |
| 508.2 | 590 | 500 | KLX | Oakland, Calif. |
| 508.2 | 590 | 500 | WEEI | Boston, Mass. |
| 508.2 | 590 | 1000 | WOW | Omaha, Nebr. |
| 516.9 | 580 | 750 | WFLA | Clearwater, Fla. |
| 516.9 | 580 | 500 | WMC | Memphis, Tenn. |
| 516.9 | 580 | 750 | WSUN | St. Petersburg, Fla. |
| 516.9 | 580 | 500 | WTAG | Worcester, Mass. |
| 516.9 | 580 | 250 | WWVA | Wheeling, W. Va. |
| 526 | 570 | 500 | KMTR | Hollywood, Calif. |
| 526 | 570 | 2500 | KYW | Chicago, Ill. |
| 526 | 570 | 500 | WNYC | New York, N. Y. |
| 535.4 | 560 | 100 | KFBK | Sacramento, Calif. |
| 535.4 | 560 | 500 | WCAC | Mansfield, Conn. |
| 535.4 | 560 | 5000 | WHO | Des Moines, Iowa |
| 535.4 | 560 | 500 | WTIC | Hartford, Conn. |
| 545.1 | 550 | 500 | KFDY | Brookings, S. D. |
| 545.1 | 550 | 1000 | KFUO | St. Louis, Mo. |
| 545.1 | 550 | 500 | KSD | St. Louis, Mo. |
| 545.1 | 550 | 250 | WDAY | Fargo, N. D. |
| 545.1 | 550 | 500 | WFAA | Dallas, Tex. |
| 545.1 | 550 | 1000 | WMAK | Buffalo, N. Y. |
| 545.1 | 550 | 500 | WPTF | Raleigh, N. C. |

*This list has been corrected up to and including February 1st, 1928*

# RADIO BROADCAST STATIONS OF THE UNITED STATES

## By States and Cities

| State and City | Call Letters | Wave Length |
|---|---|---|
| **ALABAMA** | | |
| Auburn | WAPI | 340.7 |
| Birmingham | WBRC | 241.8 |
| Birmingham | WKBC | 218.8 |
| Gadsden | WJBY | 234.2 |
| Montgomery | WIBZ | 230.6 |
| **ARIZONA** | | |
| Flagstaff | KFXY | 205.4 |
| Phoenix | KFAD | 272.6 |
| Phoenix | KFCB | 243.8 |
| Prescott | KPJM | 214.2 |
| Tucson | KGAR | 234.2 |
| **ARKANSAS** | | |
| Blytheville | KLCN | 285 |
| Fayetteville | KUOA | 296.9 |
| Hot Springs Nat'l Pk. | KTHS | 384.4 |
| **CALIFORNIA** | | |
| Avalon, Catalina Is. | KFWO | 299.8 |
| Berkeley | KRE | 256.3 |
| Burbank | KELW | 228.9 |
| El Centro | KGEN | 225.4 |
| Fresno | KMJ | 365.6 |
| Hollywood | KFQZ | 232.4 |
| Hollywood | KMTR | 526 |
| Holy City | KFQU | 249.9 |
| Inglewood | KGGM | 204 |
| Inglewood | KMIC | 223.7 |
| La Crescenta | KGFH | 223.7 |
| Long Beach | KFON | 241.8 |
| Long Beach | KGER | 215.7 |
| Los Angeles | KFI | 468.5 |
| Los Angeles | KFPR | 232.4 |
| Los Angeles | KFSG | 275.1 |
| Los Angeles | KFWB | 361.2 |
| Los Angeles | KGEF | 263 |
| Los Angeles | KGFJ | 208.2 |
| Los Angeles | KHJ | 405.2 |
| Los Angeles | KNX | 336.9 |
| Los Angeles | KPLA | 252 |
| Los Angeles | KRLO | 215.7 |
| Los Angeles | KTBI | 288.3 |
| Oakland | KFUS | 256.3 |
| Oakland | KFWM | 236.1 |
| Oakland | KGO | 384.4 |
| Oakland | KLS | 245.8 |
| Oakland | KLX | 508.2 |
| Oakland | KTAB | 280.2 |
| Oakland | KZM | 245.8 |
| Pasadena | KPPC | 228.9 |
| Pasadena | KPSN | 315.6 |
| Sacramento | KFBK | 535.4 |
| San Bernardino | KFWC | 222.1 |
| San Diego | KFBC | 247.8 |
| San Diego | KFSD | 440.9 |
| San Francisco | KFRC | 454.3 |
| San Francisco | KFWI | 267.7 |
| San Francisco | KGTT | 206.8 |
| San Francisco | KHAC | 204 |
| San Francisco | KJBS | 220.4 |
| San Francisco | KPO | 422.3 |
| San Francisco | KYA | 309.1 |
| San Jose | KQW | 296.9 |
| Santa Ana | KWTC | 222.1 |
| Santa Barbara | KFCR | 211.1 |
| Santa Maria | KSMR | 272.6 |
| Santa Monica | KNRC | 374.8 |
| Stockton | KGDM | 217.3 |
| Stockton | KWG | 344.6 |
| Venice | KFVD | 208.2 |
| **COLORADO** | | |
| Colorado Springs | KFUM | 236.1 |
| Denver | KFEL | 247.8 |
| Denver | KFUP | 227.1 |
| Denver | KFXF | 282.8 |
| Denver | KGEY | 201.2 |
| Denver | KLZ | 296.9 |
| Denver | KOA | 325.9 |
| Denver | KOW | 247.8 |
| Edgewater | KFXJ | 215.7 |
| Fort Morgan | KGEW | 218.8 |
| Greeley | KFKA | 249.9 |
| Gunnison | KFHA | 254.1 |
| Pueblo | KGDP | 223.7 |
| Pueblo | KGHF | 209.7 |
| Trinidad | KGFL | 222.1 |
| Yuma | KGEK | 263 |
| **CONNECTICUT** | | |
| Bridgeport | WICC | 265.3 |
| Danbury | WCWS | 265.3 |
| Hartford | WTIC | 535.4 |
| Mansfield | WCAC | 535.4 |
| New Haven | WDRC | 282.8 |
| **DELAWARE** | | |
| Wilmington | WDEL | 296.9 |
| **DIST. OF COLUMBIA** | | |
| Washington | WMAL | 241.8 |
| Washington | WRC | 468.5 |
| Washington | WRHF | 322.4 |
| Washington | WTFF | 202.6 |
| **FLORIDA** | | |
| Clearwater | WFLA | 516.9 |
| Jacksonville | WJAX | 340.7 |
| Lakeland | WMBL | 228.9 |
| Miami | WQAM | 384.4 |
| Miami Beach | WIOD | 247.8 |
| Miami Beach | WMBF | 384.4 |
| Orlando | WDBO | 288.3 |
| Pensacola | WCOA | 249.9 |
| St. Petersburg | WHBN | 296.9 |
| St. Petersburg | WJBB | 238 |
| St. Petersburg | WSUN | 516.9 |
| Tampa | WDAE | 267.7 |
| Tampa | WMBR | 252 |
| Tampa | WQBA | 238 |
| **GEORGIA** | | |
| Atlanta | WGST | 270.1 |
| Atlanta | WSB | 475.9 |
| Atlanta | WTHS | 227.1 |
| Macon | WMAZ | 270.1 |
| Toccoa Falls | WTFI | 209.7 |
| **IDAHO** | | |
| Boise | KFAU | 285.5 |
| Jerome | KFXD | 204 |
| Kellogg | KFEY | 232.4 |
| Pocatello | KSEI | 333.1 |
| **ILLINOIS** | | |
| Atwood | WLBQ | 218.8 |
| Batavia | WTAS | 275.1 |
| Belvidere | WLBR | 247.8 |
| Bloomington | WMBY | 199.9 |
| Carthage | WCAZ | 249.9 |
| Chicago | KYW | 526 |
| Chicago | WAAF | 389.4 |
| Chicago | WBBM | 389.4 |
| Chicago | WBBZ | 204 |
| Chicago | WBCN | 288.3 |
| Chicago | WCFL | 483.6 |
| Chicago | WCRW | 223.7 |
| Chicago | WEBH | 365.6 |
| Chicago | WEDC | 241.8 |
| Chicago | WENR | 288.3 |
| Chicago | WFKB | 223.7 |
| Chicago | WGES | 241.8 |
| Chicago | WGN | 416.4 |
| Chicago | WHBL | 204 |
| Chicago | WHBM | 201.2 |
| Chicago | WHFC | 215.7 |
| Chicago | WHT | 305.9 |
| Chicago | WIBJ | 201.2 |
| Chicago | WIBM | 201.2 |
| Chicago | WIBO | 305.9 |
| Chicago | WJAZ | 263 |
| Chicago | WJBT | 389.4 |
| Chicago | WKBG | 201.2 |
| Chicago | WKBI | 215.7 |
| Chicago | WLBN | 204 |
| Chicago | WLIB | 416.4 |
| Chicago | WLS | 344.6 |
| Chicago | WLTS | 483.6 |
| Chicago | WMAQ | 447.5 |
| Chicago | WMBB | 252 |
| Chicago | WMBI | 266 |
| Chicago | WOK | 252 |
| Chicago | WORD | 252 |
| Chicago | WPCC | 223.7 |
| Chicago | WQJ | 447.5 |
| Chicago | WSAX | 204 |
| Chicago | WSBC | 232.4 |
| Chicago | WWAE | 227.1 |
| Chicago Heights | WJBZ | 208.2 |
| Decatur | WBAO | 267.7 |
| Decatur | WJBL | 212.6 |
| Evanston | WEHS | 215.7 |
| Forest Park | WNBA | 208.2 |
| Galesburg | WFBZ | 247.8 |
| Galesburg | WKBS | 217.3 |
| Galesburg | WLBO | 217.3 |

| State and City | Call Letters | Wave Length |
|---|---|---|
| **ILLINOIS** | | |
| Galesburg | WRAM | 247.8 |
| Harrisburg | WEBQ | 223.7 |
| Joliet | WCLS | 215.7 |
| Joliet | WJBA | 247.8 |
| Joliet | WKBB | 215.7 |
| LaSalle | WJBC | 227.1 |
| Mooseheart | WJJD | 365.6 |
| Peoria Heights | WMBD | 205.4 |
| Quincy | WTAD | 236.1 |
| Rockford | KFLV | 267.7 |
| Rock Island | WHBF | 222.1 |
| Springfield | WCBS | 209.7 |
| Streator | WTAX | 247.8 |
| Tuscola | WDZ | 277.6 |
| Urbana | WRM | 272.6 |
| Waukegan | WPEP | 215.7 |
| Wenona | WLBI | 238 |
| Zion | WCBD | 344.6 |
| **INDIANA** | | |
| Anderson | WHBU | 220.4 |
| Brookville | WKBV | 217.3 |
| Crown Point | WLBT | 247.8 |
| Culver | WCMA | 260.7 |
| Evansville | WGBF | 236.1 |
| Fort Wayne | WCWK | 214.2 |
| Fort Wayne | WOWO | 228.9 |
| Gary | WJKS | 232.4 |
| Indianapolis | WFBM | 275.1 |
| Indianapolis | WKBF | 252 |
| Kokomo | WJAK | 234.2 |
| Lafayette | WBAA | 272.6 |
| Laport | WRAF | 208.2 |
| Muncie | WLBC | 209.7 |
| South Bend | WSBT | 399.8 |
| Terre Haute | KGFO | 204 |
| Terre Haute | WRPI | 208.2 |
| Valparaiso | WRBC | 238 |
| **IOWA** | | |
| Ames | WOI | 265.3 |
| Atlantic | KICK | 322.4 |
| Boone | KFGQ | 209.7 |
| Cedar Rapids | KWCR | 239.9 |
| Cedar Rapids | WJAM | 239.9 |
| Clarinda | KSO | 227.1 |
| Council Bluffs | KOIL | 319 |
| Davenport | WOC | 374.8 |
| Decorah | KGCA | 247.8 |
| Decorah | KWLC | 247.8 |
| Des Moines | WHO | 535.4 |
| Fort Dodge | KFJY | 232.4 |
| Iowa City | KGFB | 223.7 |
| Iowa City | WSUI | 475.9 |
| Le Mars | KWUC | 243.8 |
| Marshalltown | KFJB | 247.8 |
| Muscatine | KPNP | 211.1 |
| Muscatine | KTNT | 256.5 |
| Oskaloosa | KFHL | 212.6 |
| Ottumwa | WIAS | 475.9 |
| Shenandoah | KFNF | 461.3 |
| Shenandoah | KMA | 394.5 |
| Sioux City | KFMR | 232.4 |
| Sioux City | KSCJ | 243.8 |
| **KANSAS** | | |
| Concordia | KGCN | 208.2 |
| Independence | KFVG | 225.4 |
| Lawrence | KFKU | 254.1 |
| Lawrence | WREN | 254.1 |
| Manhattan | KSAC | 333.1 |
| Milford | KFKB | 241.8 |
| Topeka | WIBW | 204 |
| Wichita | KFH | 245.8 |
| **KENTUCKY** | | |
| Hopkinsville | WFIW | 260.7 |
| Louisville | WHAS | 322.4 |
| Louisville | WLAP | 267.7 |
| **LOUISIANA** | | |
| Cedar Grove | KGGH | 212.6 |
| New Orleans | WABZ | 238 |
| New Orleans | WCBE | 227.1 |
| New Orleans | WJBO | 263 |
| New Orleans | WJBW | 238 |
| New Orleans | WKBT | 252 |
| New Orleans | WSMB | 296.9 |
| New Orleans | WWL | 245.8 |
| Shreveport | KFDX | 236.1 |
| Shreveport | KGDX | 212.6 |
| Shreveport | KWKH | 394.5 |
| Shreveport | KRAC | 220.4 |
| Shreveport | KSBA | 267.7 |
| **MAINE** | | |
| Bangor | WABI | 389.4 |
| Dover-Foxcroft | WLBZ | 208.2 |
| Portland | WCSH | 365.6 |
| **MARYLAND** | | |
| Baltimore | WBAL | 285.5 |
| Baltimore | WCAO | 243.8 |
| Baltimore | WCBM | 225.4 |
| Baltimore | WFBR | 253.8 |
| Tokoma Park | WBES | 296.9 |
| **MASSACHUSETTS** | | |
| Babson Park | WBSO | 384.4 |
| Boston | WATT | 201.2 |
| Boston | WBET | 288.3 |
| Boston | WBIS | 461.3 |
| Boston | WBZA | 333.1 |
| Boston | WEEI | 508.2 |
| Boston | WLBM | 230.6 |
| Boston | WMES | 211.1 |
| Boston | WNAC | 352.7 |
| Boston | WSSH | 288.3 |
| Chelsea | WLOE | 211.1 |
| Gloucester | WEPS | 296.9 |
| Lexington | WLEX | 215.7 |
| New Bedford | WNBH | 247.8 |
| South Dartmouth | WMAF | 428.3 |
| Springfield | WBZ | 333.1 |
| Taunton | WAIT | 214.2 |
| Webster | WKBE | 228.9 |
| Wollaston | WRES | 217.3 |
| Worcester | WTAG | 516.9 |
| **MICHIGAN** | | |
| Battle Creek | WKBP | 212.6 |
| Bay City | WSKC | 272.6 |
| Berrien Springs | WEMC | 483.6 |
| Detroit | WAFD | 230.6 |
| Detroit | WBMH | 211.1 |
| Detroit | WJR | 440.9 |
| Detroit | WMBC | 243.8 |
| Detroit | WMCO | 218.8 |
| Detroit | WWJ | 352.7 |
| East Lansing | WKAR | 277.6 |
| Escanaba | WRAK | 282.8 |
| Flint | WFDF | 272.6 |
| Grand Rapids | WASH | 256.3 |
| Grand Rapids | WOOD | 260.7 |
| Iron Mountain | WLBY | 209.7 |
| Lapeer | WMPC | 234.2 |
| Ludington | WKBZ | 199.9 |
| Monroe | WKBL | 205.4 |
| Mt. Clemens | WGHP | 277.6 |
| Petoskey | WBBP | 239.9 |
| Pontiac | WCX | 440.9 |
| Royal Oak | WAGM | 225.4 |
| Ypsilanti | WJBK | 220.4 |
| **MINNESOTA** | | |
| Barrett | KGDE | 205.4 |
| Collegeville | WFBJ | 272.6 |
| Hallock | KGFK | 223.7 |
| Minneapolis | KFDZ | 215.7 |
| Minneapolis | KGEQ | 204 |
| Minneapolis | WDGY | 285.5 |
| Minneapolis | WHDI | 245.8 |
| Minneapolis | WLB | 245.8 |
| Minneapolis | WRHM | 260.7 |
| Minneapolis-St. Paul | WCCO | 405.2 |
| Northfield | KFMX | 236.1 |
| Northfield | WCAL | 285.5 |
| St. Cloud | WFAM | 252 |
| St. Paul-Minneapolis | WAMD | 220.4 |
| St. Paul | WMBE | 208.2 |
| Slayton | KGHC | 209.7 |
| **MISSISSIPPI** | | |
| Columbus | WCOC | 230.6 |
| Utica | WQBC | 215.7 |
| **MISSOURI** | | |
| Cape Girardeau | KFVS | 223.7 |
| Carterville | KFPW | 263 |
| Columbia | KFRU | 249.9 |
| Independence | KLDS | 270.1 |
| Jefferson City | WOS | 422.3 |
| Joplin | WMBH | 204 |
| Kansas City | KMBC | 270.1 |
| Kansas City | KWKC | 222.1 |
| Kansas City | WDAF | 370.2 |
| Kansas City | WHB | 340.7 |
| Kansas City | WLBF | 209.7 |
| Kansas City | WOQ | 340.7 |
| Kirksville | KFKZ | 225.4 |
| St. Joseph | KFEQ | 230.6 |
| St. Joseph | KGBX | 288.3 |
| St. Louis | KFQA | 234.2 |
| St. Louis | KFUO | 234.2 |
| St. Louis | KFWF | 214.2 |
| St. Louis | KMOX | 299.8 |
| St. Louis | KSD | 545.1 |
| St. Louis | KWK | 234.2 |
| St. Louis | WEW | 352.7 |
| St. Louis | WIL | 258.5 |
| St. Louis | WMAY | 234.2 |
| St. Louis | WSBF | 258.5 |
| **MONTANA** | | |
| Hardin | KGHP | 263 |
| Havre | KFBB | 275.1 |
| Kalispell | KGEZ | 293.9 |
| Mlssoula | KUOM | 461.3 |
| Vida | KGCX | 243.8 |

| State and City | Call Letters | Wave Length |
|---|---|---|
| **NEBRASKA** | | |
| Central City | KGES | 204 |
| Clay Center | KMMJ | 379.5 |
| Grand Island | KGEO | 205.4 |
| Humboldt | KGDW | 293.9 |
| Lincoln | KFAB | 319 |
| Lincoln | KFOR | 217.3 |
| Lincoln | WCAJ | 379.5 |
| Norfolk | WJAG | 285.5 |
| Omaha | KFOX | 258.5 |
| Omaha | KOCH | 258.5 |
| Omaha | WAAW | 440.9 |
| Omaha | WNAL | 258.5 |
| Omaha | WOW | 508.2 |
| Ravenna | KGFW | 296.9 |
| Shelby | KGBY | 222.1 |
| Wayne | KGCH | 293.9 |
| York | KGBZ | 212.6 |
| **NEW HAMPSHIRE** | | |
| Laconia | WKAV | 223.7 |
| Tilton | WBRL | 461.3 |
| **NEW JERSEY** | | |
| Asbury Park | WCAP | 239.9 |
| Atlantic City | WPG | 272.6 |
| Camden | WCAM | 223.7 |
| Cliffside | WPAP | 394.5 |
| Cliffside | WQAO | 394.5 |
| Elizabeth | WIBS | 204 |
| Jersey City | WAAT | 245.8 |
| Jersey City | WKBO | 218.8 |
| Midland Park | WTRL | 206.8 |
| Newark | WAAM | 267.7 |
| Newark | WGCP | 267.7 |
| Newark | WNJ | 267.7 |
| Newark | WOR | 422.3 |
| North Plainfield | WEAM | 263 |
| Paterson | WODA | 293.9 |
| Red Bank | WJBI | 263 |
| Trenton | WOAX | 239.9 |
| Union City | WBMS | 199.9 |
| **NEW MEXICO** | | |
| State College | KOB | 394.5 |
| **NEW YORK** | | |
| Auburn | WMBO | 220.4 |
| Bay Shore | WRST | 211.1 |
| Brooklyn | WBBC | 227.1 |
| Brooklyn | WBKN | 199.9 |
| Brooklyn | WBRS | 211.1 |
| Brooklyn | WLTH | 256.3 |
| Brooklyn | WMBQ | 204 |
| Brooklyn | WSDA | 227.1 |
| Brooklyn | WSGH | 227.1 |
| Buffalo | WEBR | 241.8 |
| Buffalo | WGR | 302.8 |
| Buffalo | WKBW | 217.3 |
| Buffalo | WKEN | 204 |
| Buffalo | WMAK | 545.1 |
| Buffalo | WSVS | 204 |
| Canton | WCAD | 243.8 |
| Cazenovia | WMAC | 225.4 |
| Endicott | WNBF | 206.8 |
| Farmingdale | WLBH | 232.4 |
| Flushing | WGOP | 199.9 |
| Freeport | WGBB | 245.8 |
| Ithaca | WLCI | 247.8 |
| Jamaica | WMRJ | 206.8 |
| Jamestown | WOCL | 223.7 |
| Long Island City | WLBX | 204 |
| New York | WABC | 309.1 |
| New York | WBNY | 236.1 |
| New York | WBOQ | 970 |
| New York | WCDA | 211.1 |
| New York | WCGU | 218.8 |
| New York | WEAF | 491.5 |
| New York | WEBJ | 256.3 |
| New York | WEVD | 245.8 |
| New York | WGBS | 348.6 |
| New York | WGL | 293.9 |
| New York | WGMU | 201.2 |
| New York | WHAP | 236.1 |
| New York | WHN | 394.5 |
| New York | WHPP | 206.8 |
| New York | WJZ | 454.3 |
| New York | WKBQ | 218.8 |
| New York | WLWL | 370.2 |
| New York | WMCA | 370.2 |
| New York | WMSG | 236.1 |
| New York | WNYC | 526 |
| New York | WPCH | 325.9 |
| New York | WRMU | 201.2 |
| New York | WRNY | 325.9 |
| Peekskill | WOKO | 215.7 |
| Rochester | WABO | 254.1 |
| Rochester | WHAM | 280.2 |
| Rochester | WHEC | 232.4 |
| Rochester | WNBQ | 205.4 |
| Rochester | WOKT | 209.7 |
| Rossville | WBBR | 256.3 |
| So. Schenectady | WGY | 379.5 |
| Syracuse | WFBL | 258.5 |
| Syracuse | WSYR | 293.9 |
| Troy | WHAZ | 305.9 |
| Utica | WIBX | 238 |
| Woodside | WWRL | 199.9 |
| **NORTH CAROLINA** | | |
| Asheville | WWNC | 296.9 |
| Charlotte | WBT | 258.5 |
| Greensboro | WNRC | 223.7 |
| Raleigh | WPTF | 545.1 |
| **NORTH DAKOTA** | | |
| Aneta | KGFN | 199.9 |
| Bismarck | KFYR | 249.9 |
| Devils Lake | KDLR | 230.6 |
| Fargo | WDAY | 545.1 |
| Grand Forks | KFJM | 333.1 |
| Mandan | KGCU | 239.9 |
| **OHIO** | | |
| Akron | WADC | 238 |
| Akron | WFJC | 227.1 |
| Ashtabula | WJPW | 208.2 |
| Bellefontaine | WHBD | 222.1 |
| Cambridge | WEBE | 247.8 |
| Canton | WHBC | 254.1 |
| Cincinnati | WAAD | 230.6 |
| Cincinnati | WFBE | 245.8 |
| Cincinnati | WKRC | 245.8 |
| Cincinnati | WLW | 428.3 |
| Cincinnati | WSAI | 361.2 |
| Cleveland | WEAR | 399.8 |
| Cleveland | WHK | 265.3 |
| Cleveland | WJAY | 227.1 |
| Columbus | WAIU | 282.8 |
| Columbus | WCAH | 234.2 |
| Columbus | WEAO | 282.8 |
| Columbus | WMAN | 234.2 |
| Dayton | WSMK | 296.9 |
| Hamilton | WRK | 205.4 |
| Mansfield | WLBV | 206.8 |
| Middletown | WSRO | 236.1 |
| Shelby | WOBR | 204 |
| Springfield | WCSO | 256.3 |
| Steubenville | WIBR | 249.9 |
| Toledo | WTAL | 239.9 |
| Wooster | WABW | 247.8 |
| Youngstown | WKBN | 214.2 |
| Youngstown | WMBW | 214.2 |
| **OKLAHOMA** | | |
| Alva | KGFF | 205.4 |
| Chickasha | KOCW | 252 |
| Norman | WNAD | 239.9 |
| Oklahoma City | KFJF | 272.6 |
| Oklahoma City | KFXR | 223.7 |
| Oklahoma City | KGCB | 215.7 |
| Oklahoma City | KGFG | 215.7 |
| Oklahoma City | WKY | 288.3 |
| Picher | KGGF | 206.8 |
| Tulsa | KVOO | 348.6 |
| **OREGON** | | |
| Astoria | KFJI | 249.9 |
| Corvallis | KOAC | 270.1 |
| Eugene | KGEH | 201.2 |
| Medford | KMED | 249.9 |
| Portland | KEX | 239.9 |
| Portland | KFEC | 214.2 |
| Portland | KFIF | 214.2 |
| Portland | KFJR | 282.8 |
| Portland | KGW | 491.5 |
| Portland | KLIT | 206.8 |
| Portland | KOIN | 319 |
| Portland | KTBR | 282.8 |
| Portland | KWBS | 199.9 |
| Portland | KWJJ | 228.9 |
| Portland | KXL | 220.4 |
| **PENNSYLVANIA** | | |
| Allentown | WCBA | 222.1 |
| Allentown | WSAN | 222.1 |
| Altoona | WFBG | 267.7 |
| Bethayres | WALK | 201.2 |
| Carbondale | WNBW | 199.9 |
| E. Pittsburgh | KDKA | 315.6 |
| Elkins Park | WIBG | 440.9 |
| Grove City | WSAJ | 223.7 |
| Harrisburg | WBAK | 299.8 |
| Harrisburg | WMBS | 234.2 |
| Harrisburg | WPRC | 209.7 |
| Jeanette | WGM | 208.2 |
| Johnstown | WHBP | 228.9 |
| Kingston | WABF | 205.4 |
| Lancaster | WGAL | 252 |
| Lancaster | WKJC | 252 |
| Lewisburg | WJBU | 214.2 |
| Monessen | WMBJ | 232.4 |
| Oil City | WHBA | 260.7 |
| Oil City | WLBW | 272.6 |
| Philadelphia | WABY | 247.8 |
| Philadelphia | WCAU | 260.7 |

| State and City | Call Letters | Wave Length |
|---|---|---|
| **PENNSYLVANIA** | | |
| Philadelphia | WFAN | 223.7 |
| Philadelphia | WFI | 405.2 |
| Philadelphia | WFKD | 247.8 |
| Philadelphia | WHBW | 220.4 |
| Philadelphia | WIAD | 288.3 |
| Philadelphia | WIP | 348.6 |
| Philadelphia | WLIT | 405.2 |
| Philadelphia | WNAT | 288.3 |
| Philadelphia | WOO | 348.6 |
| Philadelphia | WPSW | 206.8 |
| Philadelphia | WRAX | 212.6 |
| Pittsburgh | KQV | 270.1 |
| Pittsburgh | WCAE | 461.3 |
| Pittsburgh | WJAS | 270.1 |
| Reading | WRAW | 238 |
| Scranton | WGBI | 230.6 |
| Scranton | WQAN | 230.6 |
| State College | WPSC | 299.8 |
| Washington | WNBO | 211.1 |
| Wilkes-Barre | WBAX | 249.9 |
| Wilkes-Barre | WBRE | 249.9 |
| **RHODE ISLAND** | | |
| Cranston | WDWF | 260.7 |
| Cranston | WLSI | 260.7 |
| Newport | WMBA | 204 |
| Olneyville | WCOT | 225.4 |
| Pawtucket | WFCI | 241.8 |
| Portsmouth | WSAR | 212.6 |
| Providence | WCBR | 201.2 |
| Providence | WEAN | 275.1 |
| Providence | WJAR | 483.6 |
| Providence | WRAH | 199.9 |
| **SOUTH CAROLINA** | | |
| Charleston | WBBY | 249.9 |
| **SOUTH DAKOTA** | | |
| Brookings | KFDY | 545.1 |
| Brookings | KGCR | 208.2 |
| Dell Rapids | KGDA | 254.1 |
| Mitchell | KGFP | 212.6 |
| Oldham | KGDY | 206.8 |
| Pierre | KGFX | 254.1 |
| Rapid City | WCAT | 247.8 |
| Sioux Falls | KSOO | 209.7 |
| Vermillion | KUSD | 483.6 |
| Yankton | WNAX | 277.6 |
| **TENNESSEE** | | |
| Chattanooga | WDOD | 243.8 |
| Knoxville | WFBC | 234.2 |
| Knoxville | WNBJ | 206.8 |
| Knoxville | WNOX | 265.3 |
| Lawrenceburg | WOAN | 239.9 |
| Memphis | WGBC | 228.9 |
| Memphis | WHBQ | 232.4 |
| Memphis | WMBM | 209.7 |
| Memphis | WMC | 516.9 |
| Memphis | WNBR | 228.9 |
| Memphis | WREC | 249.9 |
| Nashville | WBAW | 239.9 |
| Nashville | WDAD | 225.4 |
| Nashville | WLAC | 225.4 |
| Nashville | WSM | 336.9 |
| Springfield | WSIX | 212.6 |
| Union City | WOBT | 205.4 |
| **TEXAS** | | |
| Amarillo | KGRS | 243.8 |
| Amarillo | WDAG | 263 |
| Austin | KUT | 232.4 |
| Beaumont | KFDM | 483.6 |
| Breckenridge | KFYO | 211.1 |
| Brownsville | KWWG | 277.6 |
| College Station | WTAW | 483.6 |
| Dallas | KRLD | 461.3 |
| Dallas | WFAA | 545.1 |
| Dallas | WRR | 352.7 |
| Dublin | KFPL | 275.1 |
| El Paso | KFXH | 241.8 |
| El Paso | WDAH | 234.2 |
| Fort Worth | KFJZ | 249.9 |
| Fort Worth | KFQB | 325.9 |
| Fort Worth | WBAP | 499.7 |
| Galveston | KFLX | 270.1 |
| Galveston | KFUL | 258.5 |
| Greenville | KFPM | 230.6 |
| Harlingen | KHMC | 236.1 |
| Houston | KFVI | 238 |
| Houston | KPRC | 293.9 |
| Houston | KTUE | 212.6 |
| San Angelo | KGFI | 220.4 |
| San Antonio | KGCI | 220.4 |
| San Antonio | KGDR | 206.8 |
| San Antonio | KGRC | 220.4 |
| San Antonio | KTAP | 228.9 |
| San Antonio | KTSA | 265.3 |
| San Antonio | WOAI | 499.7 |
| Waco | WJAD | 333.1 |
| **UTAH** | | |
| Ogden | KFUR | 225.4 |
| Salt Lake City | KDYL | 258.5 |
| Salt Lake City | KFUT | 249.9 |
| Salt Lake City | KSL | 302.8 |
| **VERMONT** | | |
| Burlington | WCAX | 254.1 |
| Springfield | WNBX | 241.8 |
| **VIRGINIA** | | |
| Arlington | NAA | 434.5 |
| Norfolk | WBBW | 236.1 |
| Norfolk | WRCV | 209.7 |
| Norfolk | WTAR | 236.1 |
| Petersburg | WLBG | 214.2 |
| Richmond | WBBL | 234.2 |
| Richmond | WMBG | 220.4 |
| Richmond | WRVA | 220.1 |
| Richmond | WTAZ | 254.4 |
| Roanoke | WDBJ | 230.6 |
| Suffolk | WSUF | 236.1 |
| Virginia Beach | WSEA | 263 |
| **WASHINGTON** | | |
| Bellingham | KVOS | 209.7 |
| Everett | KFBL | 223.7 |
| Lacey | KGY | 243.8 |
| Pullman | KWSC | 394.5 |
| Seattle | KFOA | 447.5 |
| Seattle | KFQW | 217.3 |
| Seattle | KGCL | 230.6 |
| Seattle | KJR | 348.6 |
| Seattle | KKP | 265.3 |
| Seattle | KOMO | 305.9 |
| Seattle | KPCB | 230.6 |
| Seattle | KRSC | 211.1 |
| Seattle | KTW | 394.5 |
| Seattle | KUJ | 199.9 |
| Seattle | KVL | 202.6 |
| Seattle | KXA | 277.6 |
| Seattle | KXRO | 227.1 |
| Spokane | KFIO | 245.8 |
| Spokane | KFPY | 245.8 |
| Spokane | KGA | 260.7 |
| Spokane | KHQ | 370.2 |
| Tacoma | KMO | 254.1 |
| Tacoma | KVI | 234.2 |
| **WEST VIRGINIA** | | |
| Charleston | WOBU | 267.7 |
| Clarksburg | WQBJ | 239.9 |
| Huntington | WSAZ | 249.9 |
| Wheeling | WWVA | 516.9 |
| **WISCONSIN** | | |
| Beloit | WEBW | 258.5 |
| Eau Claire | WTAQ | 254.1 |
| Fond du Lac | KFIZ | 267.7 |
| Kenosha | WCLO | 227.1 |
| Kenosha | WKDR | 247.8 |
| La Crosse | WKBH | 220.4 |
| Madison | WHA | 333.1 |
| Madison | WIBA | 239.9 |
| Manitowoc | WOMT | 222.1 |
| Milwaukee | WGWB | 218.8 |
| Milwaukee | WHAD | 270.1 |
| Milwaukee | WSOE | 270.1 |
| Milwaukee | WTMJ | 293.9 |
| Omro | WAIZ | 227.1 |
| Poinette | WIBU | 217.3 |
| Racine | WRRS | 247.8 |
| Stevens Point | WLBL | 333.1 |
| Superior | WEBC | 241.8 |
| West De Pere | WHBY | 249.9 |
| **WYOMING** | | |
| Laramie | KFBU | 483.6 |

# Canadian Radio Broadcast Stations

## Indexed Alphabetically by Call Letters

| Radio Call Letters | BROADCAST STATIONS Location and Owner | Power (Watts) | Wave Length (Meters) | Frequency (Kilocycles) | Time at Station |
|---|---|---|---|---|---|
| **CFAC** | **Calgary, Alberta** — The Calgary Herald, Herald Bldg. | 500 | 434.5 | 690 | Mountain |
| **CFCA** | **Toronto, Ont.** — Star Publishing & Printing Co., S. W. Cor. Yonge St. and St. Clair Ave. | 500 | 356.9 | 840 | Eastern |
| **CFCF** | **Montreal, Que.**—Canadian Marconi Co., Mount Royal Hotel. | 1650 | 410.7 | 730 | Eastern |
| **CFCH** | **Iroquois Falls, Ont.**—Abitibi Power & Paper Co., Ltd. | 250 | 499.7 | 600 | Eastern |
| **CFCN** | **Calgary, Alberta** — W. W. Grant (Ltd.), 708 Crescent Rd., N. W. | 1800 | 434.5 | 690 | Mountain |
| **CFCQ** | **Vancouver, B. C.** — Sprott-Shaw Radio Co., Room 1604, Bekin Bldg. | 10 | 410.7 | 730 | Pacific |
| **CFCT** | **Victoria, B. C.**—G. W. Deaville, 1405 Douglas St. | 500 | 329.5 | 910 | Pacific |
| **CFCY** | **Charlettetown, P. E. Island**—Island Radio Company, 176 Kent St. | 100 | 312.3 | 960 | Atlantic |
| **CFGC** | **Brantford, Ont.** — The Brant Radio Supply Co., Ltd., 90 Colborne St. | 50 | 296.9 | 1010 | Eastern |
| **CFJC** | **Kamloops, B. C.**—N. S. Dalgleish & Sons and Weller & Weller, 186 Victoria St. | 15 | 267.7 | 1120 | Pacific |
| **CFLC** | **Prescott, Ont.** — Radio Association of Prescott, Victoria Hall. | 50 | 296.9 | 1010 | Eastern |
| **CFMC** | **Kingston, Ont.**—Monarch Battery Co., Montreal St. | 20 | 267.7 | 1120 | Eastern |
| **CFNB** | **Fredericton, N. B.** — James S. Neill & Sons, Limited, 212 Waterloo Row. | 25 | 247.8 | 1210 | Atlantic |
| **CFQC** | **Saskatoon, Sask.**—The Electric Shop, Ltd., 1322 Osler St. | 500 | 329.5 | 910 | Mountain |
| **CFRB** | **York Co., Ont.** — Standard Radio Mfg. Corp., Ltd., Township of King. | 1000 | 291.1 | 1030 | Eastern |
| **CFRC** | **Kingston, Ont.** — Queens University, Dept. of Electrical Engineering, Fleming Hall. | 500 | 267.7 | 1120 | Eastern |
| **CFYC** | **Burnaby, B. C.** — International Bible Students Assoc., 2243 Royal Oak Ave. | 500 | 410.7 | 730 | Pacific |
| **CHCA** | **Calgary, Alberta** — The Albertan Publishing Co., Ltd. (Uses Station CJCJ). | 250 | 434.5 | 690 | Mountain |
| **CHCS** | **Hamilton, Ont.** — The Hamilton Spectator, Spectator Bldg. | 10 | 340.7 | 880 | Eastern |
| **CHCT** | **Red Deer, Alberta**— G. F. Tull & Ardern, Ltd. (Uses Station CKLC). | 1000 | 356.9 | 840 | Mountain |
| **CHCY** | **Edmonton, Alberta**— International Bible Students Assoc., King Edward Park. | 250 | 516.9 | 580 | Mountain |
| **CHGS** | **Summerside, P. E. I.**— R. T. Holman, Ltd., Holman Bldg. | 25 | 267.7 | 1120 | Atlantic |
| **CHIC** | **Toronto, Ont.**—Northern Electric Co., Ltd., Hillcrest Park (Uses Station CKNC). | 500 | 356.9 | 840 | Eastern |
| **CHMA** | **Edmonton, Alberta**— Christian and Missionary Alliance, 9618—106A Ave. | 250 | 516.9 | 580 | Mountain |
| **CHML** | **Mt. Hamilton, Ont.**— Maple Leaf Radio Co., Ltd., Yale Ave. | 50 | 340.7 | 880 | Eastern |
| **CHNC** | **Toronto, Ont.** — Toronto Radio Research Society, Hillcrest Park (Uses Station CKNC). | 500 | 356.9 | 840 | Eastern |
| **CHNS** | **Halifax, Nova Scotia**— Northern Electric Co., Carleton Hotel, Cor. Prince and Argyle Sts. | 100 | 322.4 | 930 | Atlantic |
| **CHPC** | **Vancouver, B. C.** — Central Presbyterian Church (Uses Station CKCD). | 1000 | 410.7 | 730 | Pacific |
| **CHRC** | **Quebec, Que.** — E. Fontaine, 120 Dolbeau St. | 5 | 340.7 | 880 | Eastern |
| **CHSC** | **Unity, Sask.** — H. N. Stovin & Radio Sales, Main St. | 50 | 267.7 | 1120 | Mountain |
| **CHUC** | **Saskatoon, Sask.**—International Bible Students Assoc., Cor. Ave. D and 26th St. | 500 | 329.5 | 910 | Mountain |
| **CHWC** | **Regina, Sask.**—R. H. Williams & Sons, Ltd., Cor. Hamilton St. and 11th Ave. | 15 | 312.3 | 960 | Mountain |
| **CHWK** | **Chilliwack, B. C.** — Chilliwack Broadcasting Co., Ltd., Wellington Ave. | 5 | 247.8 | 1210 | Pacific |
| **CHYC** | **Montreal, Que.** — Northern Electric Co., Ltd., 121 Shearer St. | 750 | 410.7 | 730 | Eastern |
| **CJBC** | **Toronto, Ont.**—Jarvis Street Baptist Church (Uses one of the stations in Toronto City or District). | 500 | 291.1<br>356.9 | 1030<br>840 | Eastern |
| **CJBR** | **Regina, Sask.** — Saskatchewan Co-Operative Wheat Producers, Ltd. (Uses Station CKCK). | 500 | 312.3 | 960 | Mountain |
| **CJCA** | **Edmonton, Alberta** — The Edmonton Journal, Ltd., Journal Bldg. | 500 | 516.9 | 580 | Mountain |

| Radio Call Letters | BROADCAST STATIONS Location and Owner | Power (Watts) | Wave Length (Meters) | Frequency (Kilocycles) | Time at Station |
|---|---|---|---|---|---|
| **CJCJ** | **Calgary, Alberta**—Radio Service and Repair Shop, 18th Ave. and 7th St., E. | 250 | 434.5 | 690 | Mountain |
| CJCR | **Red Deer, Alberta** — The North American Collieries, Ltd. (Uses Station CKLC). | 1000 | 356.9 | 840 | Mountain |
| CJGC | **London, Ont.** — London Free Press Printing Co., Ltd., 430 Richmond St. | 500 | 329.5 | 910 | Eastern |
| CJGX | **Yorkton, Sask.** — The Winnipeg Grain Exchange. | 500 | 475.9 | 630 | Mountain |
| CJOC | **Lethbridge, Alberta** — J. Palmer, 1235—5th Ave. A, South. | 50 | 267.7 | 1120 | Mountain |
| CJOR | **Sea Island, B. C.** — Geo. C. Chandler. | 50 | 291.1 | 1030 | Pacific |
| CJRM | **Moose Jaw, Sask.** — Jas. Richardson & Sons, Ltd., 337 Coteau St., W. | 500 | 296.9 | 1010 | Mountain |
| CJSC | **Toronto, Ont.** — The Evening Telegram (Uses station CKCL). | 500 | 356.9 | 840 | Eastern |
| CJWC | **Saskatoon, Sask.**—The Wheaton Elec. Co., Ltd., 33d St. and Ave. "C", N. | 250 | 329.5 | 910 | Mountain |
| CJYC | **Scarboro Station, Ont.** —Universal Radio of Canada, Ltd. | 500 | 291.1 | 1030 | Eastern |
| **CKAC** | **Montreal, Que.**—La Presse Publishing Co., Ltd., Cor. St. James St. and St. Lawrence Blvd. | 1200 | 410.7 | 730 | Eastern |
| CKCD | **Vancouver, B. C.** — Vancouver Daily Province, 142 Hastings St., W. | 1000 | 410.7 | 730 | Pacific |
| CKCI | **Quebec, Que.** — Le "Soleil", Ltd., 120 Dolbeau St. | 22½ | 340.7 | 880 | Eastern |
| CKCK | **Regina, Sask.** — Leader Publishing Co., Ltd. | 500 | 312.3 | 960 | Mountain |
| CKCL | **Toronto, Ont.** — Dominion Battery Co., Ltd., 20 Trinity St. | 500 | 356.9 | 840 | Eastern |
| CKCO | **Ottawa, Ont.** — Dr. G. M. Geldert (for Ottawa Radio Assoc.), 282 Somerset St., W. | 100 | 434.5 | 690 | Eastern |
| CKCR | **St. George, Ont.** — John Patterson, Main St. | 25 | 257.7 | 1120 | Eastern |
| CKCV | **Quebec, Que.** — G. A. Vandry, 66 St. Joseph St. | 50 | 340.7 | 880 | Eastern |
| CKCX | **Scarboro Station, Ont.**—International Bible Students Assoc. (Uses Station CJYC). | 500 | 291.1 | 1030 | Eastern |
| CKFC | **Vancouver, B. C.** — United Church of Canada, Cor. Thurlow and Pendrell Sts. | 50 | 410.7 | 730 | Pacific |
| CKGW | **Bowmanville, Ont.**— Gooderham & Worts (Under Construction). | 5000 | 312.3 | 960 | Eastern |
| CKLC | **Red Deer, Alberta** — Alberta Pacific Grain Co., Ltd. | 1000 | 356.9 | 840 | Mountain |
| **CKMC** | **Cobalt (East Side), Ont.**—R. L. MacAdam. | 5 | 247.8 | 1210 | Eastern |
| CKNC | **Toronto, Ont.**—Canadian National Carbon Co., Ltd., Hillcrest Park. | 500 | 356.9 | 840 | Eastern |
| CKOC | **Hamilton, Ont.** — Wentworth Radio Supply Co., Ltd., Royal Connaught Hotel. | 100 | 340.7 | 880 | Eastern |
| CKOW | **Scarboro Station, Ont.**—Nestle's Food Co. of Canada. | 500 | 291.1 | 1030 | Eastern |
| CKPC | **Preston, Ont.**—Wallace Russ, 40 Russ Ave. | 7½ | 247.8 | 1210 | Eastern |
| CKPR | **Midland, Ont.**—E. O. Swan. | 50 | 267.7 | 1120 | Eastern |
| CKSH | **St. Hyacintne, Que.**— City of St. Hyacinthe, Que., Mondor and Cascades St. | 50 | 312.3 | 960 | Eastern |
| CKSM | **Toronto, Ont.** — St. Michael's Cathedral (Uses Station CFRB). | 1000 | 291.1 | 1030 | Eastern |
| CKUA | **Edmonton, Alberta** — University of Alberta. | 500 | 516.9 | 580 | Mountain |
| CKWX | **Vancouver, B. C.** — A. Holstead & W. Hanlon, 1220 Seymour St. | 50 | 410.7 | 730 | Pacific |
| CKY | **Winnipeg, Manitoba** — Manitoba Telephone System, Sherbrooke St. | 500 | 384.4 | 780 | Central |
| **CNRA** | **Moncton, N. B.** — Canadian National Railways. | 500 | 322.4 | 930 | Atlantic |
| CNRC | **Calgary, Alberta** — Canadian National Railways (Uses station CFAC). | 500 | 434.5 | 690 | Mountain |
| CNRE | **Edmonton, Alberta** — Canadian National Railways (Uses station CJCA). | 500 | 516.9 | 580 | Mountain |
| CNRM | **Montreal, Que.**—Canadian National Railways (Uses stations, CHYC, CKAC and CFCF). | 1000-1650 | 410.7 | 730 | Eastern |
| CNRO | **Ottawa, Ont.** — Canadian National Railways. | 500 | 434.5 | 690 | Eastern |
| CNRQ | **Quebec, Que.** — Canadian National Railways (Uses station CKCV). | 50 | 340.7 | 880 | Eastern |
| CNRR | **Regina, Sask.** — Canadian National Railways (Uses station CKCK). | 500 | 312.3 | 960 | Mountain |
| CNRS | **Saskatoon, Sask.** — Canadian National Railways (Uses station CFQC). | 500 | 329.5 | 910 | Mountain |
| CNRT | **Toronto, Ont.** — Canadian National Railways (Uses station CFCA). | 500 | 356.9 | 840 | Eastern |
| CNRV | **Vancouver, B. C.** — Transmitter is on Lulu Island, B. C.—Canadian National Railways. | 500 | 291.1 | 1030 | Pacific |
| CNRW | **Winnipeg, Manitoba** —Canadian National Railways (Uses station CKY). | 500 | 384.4 | 780 | Central |

# 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 | CHCA | 434.5 | 250 |
| " | Calgary | CJCJ | 434.5 | 250 |
| " | Calgary | CNRC | 434.5 | 500 |
| " | Edmonton | CHMA | 516.9 | 250 |
| " | Edmonton | CJCA | 516.9 | 500 |
| " | Edmonton | CKUA | 516.9 | 500 |
| " | Edmonton | CNRE | 516.9 | 500 |
| " | Lethbridge | CJCC | 267.7 | 50 |
| " | Red Deer | CHCT | 356.9 | 1000 |
| " | Red Deer | CJCR | 356.9 | 1000 |
| " | Red Deer | CKLC | 356.9 | 1000 |
| BRITISH COLUMBIA | Burnaby | CFYC | 410.7 | 500 |
| " | Chilliwack | CHWK | 247.8 | 5 |
| " | Kamloops | CFJC | 267.7 | 15 |
| " | Sea Island | CJOR | 291.1 | 50 |
| " | Vancouver | CFCQ | 410.7 | 10 |
| " | Vancouver | CHPC | 410.7 | 1000 |
| " | Vancouver | CKCD | 410.7 | 1000 |
| " | Vancouver | CKFC | 410.7 | 50 |
| " | Vancouver | CKWX | 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 | Fredericton | CFNB | 247.8 | 25 |
| " | Moncton | CNRA | 322.4 | 500 |
| NOVA SCOTIA | Halifax | CHNS | 322.4 | 100 |
| ONTARIO | Bowmanville | CKGW | 312.3 | 5000 |
| " | Brantford | CFGC | 296.9 | 50 |
| " | Cobalt | CKMC | 247.8 | 5 |
| " | Hamilton | CHCS | 340.7 | 10 |
| " | Hamilton | CKOC | 340.7 | 100 |
| " | Iroquois Falls | CFCH | 499.7 | 250 |
| " | Kingston | CFMC | 267.7 | 20 |
| " | Kingston | CFRC | 267.7 | 500 |
| " | London | CJGC | 329.5 | 500 |
| " | Midland | CKPR | 267.7 | 50 |
| " | Mt. Hamilton | CHML | 340.7 | 50 |
| " | Ottawa | CKCO | 434.5 | 100 |
| " | Ottawa | CNRO | 434.5 | 500 |
| " | Prescott | CFLC | 296.9 | 50 |
| " | Preston | CKPC | 247.8 | 7½ |
| " | St. George | CKCR | 257.7 | 25 |
| " | Scarboro Station | CJYC | 291.1 | 500 |
| " | Scarboro Station | CKCX | 291.1 | 500 |
| " | Scarboro Station | CKOW | 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 | CJSC | 356.9 | 500 |

| Provinces | Cities | Call Letters | Wave Length (Meters) | Power (Watts) |
|---|---|---|---|---|
| ONTARIO | Toronto | CKCL | 356.9 | 500 |
| " | Toronto | CKNC | 356.9 | 500 |
| " | Toronto | CKSM | 291.1 | 1000 |
| " | Toronto | CNRT | 356.9 | 500 |
| " | York Co. | CFRB | 291.1 | 1000 |
| P. E. ISLAND | Charlottetown | CFCY | 312.3 | 100 |
| " | Summerside | CHGS | 267.7 | 25 |
| QUEBEC | Montreal | CFCF | 410.7 | 1650 |
| " | Montreal | CHYC | 410.7 | 750 |
| " | Montreal | CKAC | 410.7 | 1200 |
| " | Montreal | CNRM | 410.7 | 1000-1650 |
| " | Quebec | CHRC | 340.7 | 5 |
| " | Quebec | CKCI | 340.7 | 22½ |
| " | Quebec | CKCV | 340.7 | 50 |
| " | Quebec | CNRQ | 340.7 | 50 |
| " | St. Hyacinthe | CKSH | 312.3 | 50 |
| SASKATCHEWAN | Moose Jaw | CJRM | 296.9 | 500 |
| " | Regina | CHWC | 312.3 | 15 |
| " | Regina | CJBR | 312.3 | 500 |
| " | Regina | CKCK | 312.3 | 500 |
| " | Regina | CNRR | 312.3 | 500 |
| " | Saskatoon | CFQC | 329.5 | 500 |
| " | Saskatoon | CHUC | 329.5 | 500 |
| " | Saskatoon | CJWC | 329.5 | 250 |
| " | Saskatoon | CNRS | 329.5 | 500 |
| " | Unity | CHSC | 267.7 | 50 |
| " | Yorkton | CJGX | 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.

# Foreign Radio Broadcast Stations

## Including U. S. Possessions

| Countries, Cities and Owners | Call Letters | Wave Length (Meters) | Power (Watts) |
|---|---|---|---|
| **ALASKA** | | | |
| **Anchorage**—Anchorage Radio Club | **KFQD** | 300 | 100 |
| **Juneau**—Alaska Elec. Light & Power Co. | **KFIU** | 226 | 40 |
| **Ketchikan**—Alaska Radio & Service Co. | **KGBU** | 229 | 500 |
| **ALGERIA** | | | |
| **Algiers**—Colin & Fils | **8DB** | 310 | 100 |
| **ARGENTINE** | | | |
| **Buenos Aires**—Enrique Caride | **LOK** | 280.5 | 500 |
| **Buenos Aires**—Radio America | **LOL** | 236 | 500 |
| **Buenos Aires**—Telegrafo de la Provincia | **LOM** | 450 | 1000 |
| **Buenos Aires**—Radio Fenix | **LON** | 210 | 2000 |
| **Buenos Aires**—Radio Prieto | **LOO** | 252 | 1000 |
| **Buenos Aires**—Radio Buenos Aires | **LOQ** | 261 | 500 |
| **Buenos Aires**—Sociedad Radio Argentina | **LOR** | 330 | 1000 |
| **Buenos Aires**—Municipality of Buenos Aires | **LOS** | 291.2 | 5000 |
| **Buenos Aires**—Francisco J. Brusa | **LOV** | 361.5 | 2000 |
| **Buenos Aires**—Grand Splendid | **LOW** | 303 | 2000 |
| **Buenos Aires**—Radio Cultura | **LOX** | 380 | 500 |
| **Buenos Aires**—Sociedad Radio Nacional | **LOY** | 315.8 | 1000 |
| **Buenos Aires**—"La Nacion" | **LOZ** | 330 | 1000 |
| **Buenos Aires**—Gino Bocci y Hno. | **B2** | 215 | 100 |
| **Buenos Aires**—Gino Bocci Hnos. | **A11** | | |
| **Buenos Aires**—Radio Club Argentina | **A1** | | |
| **Buenos Aires**—Francisco J. Brusa | **B1** | | 1000 |
| **Buenos Aires**—Facultad de Ciencias Medicas | **C1** | 229.2 | 100 |
| **Buenos Aires**—Departamento Nacional de Higiene | **C2** | | |
| **Cordoba**—Antonio Vanelli | **H4** | 275 | 20 |
| **Cordoba**—Sociedad Radio Comercial de Cordoba | | 381 | 100 |
| **Cordoba**—Jorge Coen | **HA8** | 255 | 50 |
| **Cordoba**—Diario "Los Principios" | **H6** | 250 | 20 |
| **Hurlingham, FCP**—Felix Gunther | **DA-1** | | |
| **La Plata, FCS.**—Universidad Nacional | **LOP** | 425 | 1000 |
| **Mendoza**—Ministerio de Obras Publicas | **LOU** | 380 | 500 |
| **Mendoza**—Pedro B. Baldasarre | **M6** | 348 | 100 |
| **Monte Grande, FCS.** — Argentine Broadcasting Assn. | | | |
| **Olivos, FCCA.**—Radio Broadcasting | **LOT** | 400 | 1000 |
| **Rio Cuarto**—Arturo Rodriguez | **H5** | 275 | 100 |
| **Rosario**—Manuel Fugardo | **F4** | 260 | 100 |
| **San Fernando, FCCA.**—Americo Liberti | **D3** | 235.3 | 100 |
| **San Luis**—Santoalla | **Q4** | 205.1 | 60 |
| **Santa Fe**—Jose Roca Soler | **F1** | 285.8 | 100 |
| **Santa Fe**—Sociedad Rural de Cerealistas | **F2** | 275 | 100 |
| **Tucunian**—Radio Club | **K4** | 311.8 | 250 |
| **AUSTRALIA** | | | |
| **Adelaide**—Central Broadcasters Ltd. | **5CL** | 395 | 5000 |
| **Adelaide**—5 DN Pty. Ltd. | **5DN** | 313 | 500 |
| **Adelaide**—Sports Radio Broadcasting Station | **5KA** | 250 | 1000 |
| **Adelaide**—Millswood Auto & Radio Co. | **5MA** | | |
| **Adelaide**—Marshall & Co. | **5MC** | 273 | 500 |
| **Bathurst**—Mockler Bros. | **2MK** | 275 | 250 |
| **Brighton** | **3PB** | | |
| **Brisbane**—Dr. V. McDowell | **4CM** | 278 | 250 |
| **Brisbane**—Radio Manufacturers Ltd. | **4MB** | 337 | 250 |
| **Brisbane**—Queensland Radio Service | **4QG** | 385 | 5000 |
| **Hobart**—Tasmanian Broadcasting Pty. | **7ZL** | 516 | 3000 |
| **Melbourne**—Associated Radio Co. | **3AR** | 484 | 1600 |
| **Melbourne**—Druleigh Business & Technical College | **3DB** | 225 | 500 |
| **Melbourne**—Broadcasting Co. Australia | **3LO** | 371 | 5000 |
| **Melbourne**—O. J. Nilson & Co. | **3UZ** | 319 | 100 |
| **Melbourne**—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 | 3000 |
| **Rockhampton**—Queensland Gov't | **4RN** | 323 | 500 |
| **Sydney**—The Electrical Utilities Supply Co. | **2UE** | 293 | 250 |
| **Sydney**—Burgin Electric Co. | **2BE** | 316 | 100 |
| **Sydney**—Theosophical Broadcasting Service | **2GB** | 316 | 3000 |
| **Sydney**—Trades Hall Broadcasting Station | **2KY** | 280 | 1500 |
| **Sydney**—Farmer & Co., Ltd. | **2FC** | 442 | 5000 |
| **Sydney** | **2WA** | 462 | 100 |
| **Sydney**—Broadcasters Sydney, Ltd. | **2BL** | 353 | 5000 |
| **Sydney**—Otto Sandel | **2UW** | 267 | 500 |
| **Toowomba**—Gold Radio Elec. Service | **4GR** | 294 | 100 |
| **Wagga**—Otto Sandel | **2UX** | 300 | 500 |
| **AUSTRIA** | | | |
| **Graz**—Oesterreichische Radio-verkehrs Gesellschaft | | 357.1 | 500 |
| **Innsbruck** | | 294.1 | 500 |
| **Klagenfurt** | | 272.7 | 500 |
| **Vienna**—Oesterreichische Radio-verkehrs Gesellschaft | **ORV** | 577 | 1500 |
| **Vienna** | | 517.2 | 7000 |
| **BELGIUM** | | | |
| **Brussels**—Radio Belgique Co. | **BAV** | 508.5 | 1500 |
| **Brussels**—Radio Belgique Co. | **SBR** | 481 | 1500 |
| **BOLIVIA** | | | |
| **La Paz** | | 175–300 | 50 |
| **Oruro**—Radio Club Boliviano | **CPM** | 50–200 | 50 |
| **BRAZIL** | | | |
| **Bahia**—Radio Sociedade de Bahia | **SQID** | 425 | 50 |
| **Bello Horizonte**—Radio Sociedade de Mina Geraes | | 400 | 500 |
| **Ceare**—Radio Club Cearense | | | 50 |
| **Curytiba**—Livio Moreira | | | |
| **Fortazela**—Radio Club | | | 300 |
| **Goyanna**—Benedicto Ravello | | | |
| **Matto Grosso**—Radio Club de Campo Grande | | | |
| **Minas Geraes**—Luiz 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 |

| Countries, Cities and Owners | Call Letters | Wave Length (Meters) | Power (Watts) |
|---|---|---|---|
| **BRAZIL** | | | |
| **Pernambuco**—Cia Radiotelegrafica Brasileira | | 250–380 | 500 |
| **Pernambuco**—Radio Sociedade de Jader de Andrada | | | |
| **Pernambuco**—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 | SQIA | 400 | 2000 |
| **Rio de Janeiro**—Radio Club do Brasil | SPE | 312 | 500 |
| **Rio de Janeiro**—National Telegraph Service | | 450 | 500 |
| **Sao Paulo**—Sociedade Radio Educadora | | 310 | 1000 |
| **Sao Paulo**—Sociedade Radio Educadora Paulista | SQIG | 360 | 1000 |
| **Sao Paulo**—Radio Club de Sao Paulo | | 350 | 100 |
| **Sao Paulo**—Radio Bandeirantes | | 370 | 50 |
| **Sao Paulo**—Dias Carneiro & Cia | | 380–420 | 100 |
| **CANARY ISLANDS** | | | |
| **La Laguna**—Servando Ortoll Delmotte | EAJ5 | 280 | 50 |
| **Las Palmas**—Canary Islands Radio Club | | 300 | 6 |
| **Teneriffe**—Servando Ortoll Delmotte | EAR5 | 280 | 50 |
| **CEYLON** | | | |
| **Colombo** | | 800 | 1500 |
| **CHILE** | | | |
| **Antofagasta**—Sr. J. Pedreny | CHAO | | 40 |
| **Antofagasta**—Oficina Jose Santos Ossa | CLAC | | 50 |
| **Antofagasta**—Oficina Jose Francisco Vergara | CLAD | | 50 |
| **Iquique**—Gildemeister & Cia | CLAE | | 100 |
| **Iquique**—Oficina San Pedro | CLAF | | 100 |
| **Iquique**—Oficina Pena Chica | CLAG | | 100 |
| **San Eugenio**—Rene Doneaud | | 230 | 25 |
| **Santiago**—Radio Corporation of Chile | CBC | 400–600 | 250 |
| **Santiago**—Chilean Radiophone Club | CMAH | 300 | 100 |
| **Santiago**—Ferrocarril Transandino Chileno | CLAA | | 200 |
| **Santiago**—Carlos Buin Walsen | CMAA | 240 | 20 |
| **Santiago**—International Machinery Co. | CMAB | 480 | 1550 |
| **Santiago**—Castagneto Felli | CMAD | 320 | 100 |
| **Santiago**—Ministerio de Higiene | CMAF | 400 | 1350 |
| **Santiago**—Sociedad Broadcasting de Chile | CRC | 385 | 350 |
| **Santiago**—"El Mercurio" | CMAC | 360 | 1000 |
| **Santiago**—Radio Comercial | CMAE | 280 | 100 |
| **Santiago**—Pedro Arroyo | CMAG | 250 | 250 |
| **Santiago**—Cia Radio Transandino | CMAI | 260 | 100 |
| **Santiago**—Universidad de Chile | CMAU | 440 | 100 |
| **Santiago** | ORC | 430 | |
| **Santiago** | RC | 350 | 50 |
| **Santiago**—Harvey Diamond | CNAA | | |
| **Santiago**—Jose Bellalta | CNAC | | |
| **Santiago**—Commercial Radio Co | | 350 | 50 |
| **Tacna**—Ministerio de Relaciones Exteriores | CMAT | 365 | 1000 |
| **Tacna**—Chilean Government | CRCT | 550 | 200 |
| **Valparaiso**—Cia Radio Transandina | CNAD | 265 | 500 |
| **Valparaiso**—Cia de Salitres de Antofagasta | CLAB | | 50 |
| **Vina del Mar**—Antonio Cornish Besa | ACB | 40 | 50 |
| **Vina del Mar**—Antonio Cornish Besa | CNAB | | |

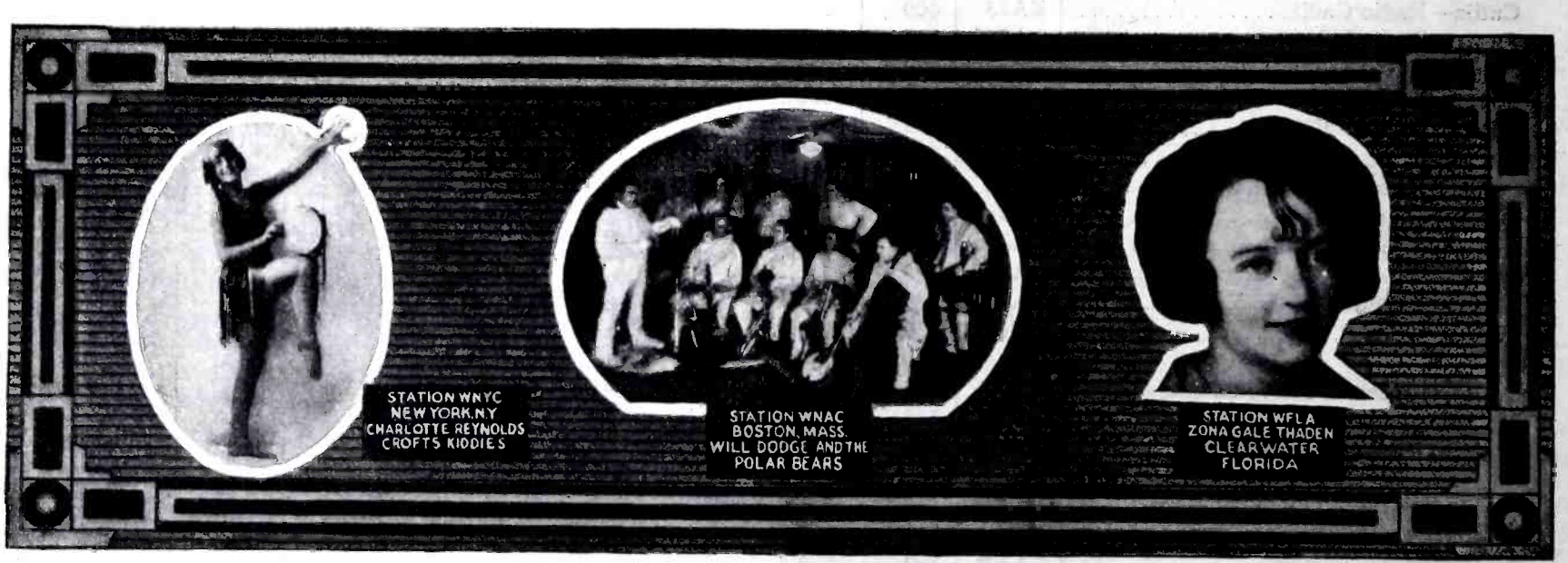
| Countries, Cities and Owners | Call Letters | Wave Length (Meters) | Power (Watts) |
|---|---|---|---|
| **CHINA** | | | |
| **Kharbin**—Eastern Manchurian Broadcasting Station | XOH | 340 | 50 |
| **Shanghai**—Kellogg Switchboard & Supply Co | KRC | 335 | 150 |
| **Shanghai**—The Shanghai Shimbun Ltd. | KSMS | 277 | 50 |
| **Shanghai**—Shinsho Co | NKS | 318 | 50 |
| **Shanghai**—Radio Supply Co. of Nanking Road | RSC | 235 | 10 |
| **Tientsin**—Gisho Electric Co | GEC | 288 | 50 |
| **Tientsin**—Tientsin Broadcasting Station | XOL | 480 | 500 |
| **Victoria (Hongkong)**—Hongkong Radio Society | 5HK | 475 | 150 |
| **COSTA RICA** | | | |
| **San Jose**—Government | | | |
| **CUBA** | | | |
| **Caibarien**—Maria J. Alvarez | 6EV | 250 | 50 |
| **Camaguey**—Pedro Nogueras | 7AZ | 225 | 10 |
| **Camaguey** | 7EV | 190 | 5 |
| **Camaguey** | 7GT | 195 | 5 |
| **Camaguey** | 7LO | 230 | 20 |
| **Camajuani**—Diego Ibarra | 6YR | 200 | 20 |
| **Caney** | 8KP | 180 | 30 |
| **Caney** | 8LC | 300 | 30 |
| **Central Elia**—Salvador Rionda | 7SR | 350 | 500 |
| **Central Tuinucu**—Frank H. Jones | 6KW | 340 | 100 |
| **Central Tuinucu**—Frank H. Jones | 6JK | 272 | 100 |
| **Ciego de Avila**—Eduardo V. Figueroa | 7BY | 235 | 20 |
| **Cienfuegos**—Jose Ganduxe | 6VY | 260 | 200 |
| **Cienfuegos**—Antonio T. Figueroa | 6CX | 170 | 20 |
| **Cienfuegos**—Eduardo Terry | 6DW | 225 | 10 |
| **Cienfuegos**—Luis Del Castillo | 6GR | 253 | 10 |
| **Cienfuegos**—Juan Pablo Ros | 6GF | 190 | 50 |
| **Cienfuegos**—Eligio Cobelo Ramirez | 6JQ | 275 | 10 |
| **Cienfuegos**—Valentin Ullivarri | 16AZ | 200 | 20 |
| **Havana**—Credito y Construcciones Cia | 2HP | 295 | 100 |
| **Havana**—Julio Power | 2JP | 185 | 20 |
| **Havana**—Frederick W. Borton | 2CX | 320 | 10 |
| **Havana**—Alberto S. Bustamente | 2AB | 220 | 10 |
| **Havana**—Cuban Telephone Co | PWX | 400 | 500 |
| **Havana**—Jose Leiro | 2JL | 275 | 5 |
| **Havana**—Alvara Daza | 2K | 200 | 20 |
| **Havana**—E. Sanchez de Fuentes | 2KD | 350 | 50 |
| **Havana**—"El Pais" | 2EP | 355 | 400 |
| **Havana**—F. W. Borton | 2CG | 350 | 15 |
| **Havana**—Bernardo Barrie | 2BB | 250 | 15 |
| **Havana**—Frederick W. Borton | 2BY | 260 | 100 |
| **Havana**—Julio Power | 2HS | 180 | 50 |
| **Havana**—Jose Lara | 2LR | 32 | 50 |
| **Havana**—Manuel y Guillermo Salas | 2MG | 284 | 20 |
| **Havana**—R. B. Waters | 2MK | 85 | 20 |
| **Havana**—Maria Garcia Velez | 2OK | 360 | 100 |
| **Havana**—Oscar Collado | 2OL | 225 | 100 |
| **Havana**—Roberto E. Ramirez | 2TW | 270 | 20 |
| **Havana**—Benito Veita Ferro | 2UF | 265 | 10 |
| **Havana**—Raul Karman | 2RK | 315 | 20 |
| **Havana**—Raul Karman | 2RY | 170 | 5 |
| **Havana**—Homero Sanchez | 2SZ | 418 | 10 |
| **Havana**—Amadeo Saenz | 2WW | 210 | 20 |
| **Havana**—Antonio A. Ginard | 2XX | 150 | 5 |
| **Havana**—Raul Perez Falcon | 2JD | 105 | 20 |
| **Havana**—Heraldo de Cuba | 2HC | 275 | 500 |
| **Matanzas**—Leopoldo T. Figueroa | 5EV | 360 | 5 |
| **Nueva Gerona**—Isle of Pines Telephone Co | 8JQ | 130 | 20 |
| **Puerto del Rio**—Antonio Zarazola | 1AZ | 275 | 5 |
| **Sagua la Grande**—Guillermo Polanco | 6HS | 200 | 10 |

| Countries, Cities and Owners | Call Letters | Wave Length (Meters) | Power (Watts) |
|---|---|---|---|
| **CUBA** | | | |
| **Santiago**—Alfredo Vinnet | **8FU** | 225 | 15 |
| **Santiago**—Pedro C. Anduz | **8DW** | 275 | 50 |
| **Santiago**—Alfredo Brooks | **8AZ** | 240 | 20 |
| **Santiago**—Ceferino Ramos | **8IR** | 190 | 20 |
| **Santiago**—Alberto Ravelo | **8BY** | 250 | 100 |
| **Santiago**—Guillermo Polanco | **8HS** | 200 | 20 |
| **Tuinucu**—Frank H. Jones | **6XJ** | 30½ | 100 |
| **CZECHOSLOVAKIA** | | | |
| **Bratislava** | **OKR** | 300 | 500 |
| **Brunn**—Radio Journal | **OKB** | 441.2 | 2500 |
| **Koszice (Kassa)** | | 1870 | |
| **Prague**—Radio Journal | **OKP** | 348.9 | 5000 |
| **DANZIG** | | | |
| **Danzig** | | 272.7 | |
| **DENMARK** | | | |
| **Copenhagen**—Copenhagen Radio Broadcasting Station | | 337 | 700 |
| **Ryvang** | | 1150 | 1500 |
| **Soro**—Ministry of War | | 1153.8 | 1500 |
| **EGYPT** | | | |
| **Cairo** | **SRE** | 255 | |
| **EQUADOR** | | | |
| **Guayaquil**—J. Puig Verdaguer | | | |
| **ESTONIA** | | | |
| **Tallinn** | | 408 | 500 |
| **Tallinn** | | 1200 | 100 |
| **FINLAND** | | | |
| **Bjorneborg**—Nuoren Voiman Liiton Radiohydistys | | 311 | 200 |
| **Hango**—Nuoren Voiman Liiton Radiohydistys | | 260 | 250 |
| **Helsingfors**—Civil Guards of Finland | | 375 | 2000 |
| **Jacobstad** | | 275.2 | 200 |
| **Jyvaskyla**—Nuoren Voiman Liiton Radiohydistys | | 297 | 250 |
| **Lahtis** | | 318 | 180 |
| **Mikkeli**—Nuoren Voiman Liiton Radiohydistys | | 566 | 250 |
| **Pori**—Nuoren Voiman Liiton Radiohydistys | | 255.3 | 100 |
| **Skatudden**—Military Station Radio-Div. | | 318 | 750 |
| **St. Michel**—Nuoren Voiman Liiton Radiohydistys | | 566 | 250 |
| **Tammerfors**—Nuoren Voiman Liiton Radiohydistys | **3NB** | 393 | 250 |
| **Tampere** | | 373 | 250 |
| **Uleaborg** | | 250 | 250 |
| **Viborg** | | 214.3 | 750 |
| **FRANCE** | | | |
| **Agen**—Dept. of Lot et Garonne | **2BD** | 297 | 250 |
| **Angers**—Radio Anjou | | 275.2 | 500 |
| **Bordeaux** | | 419.5 | 2000 |
| **Dijon** | | 207.5 | 1000 |
| **Grenoble**—Ministry of P. T. T. | | 588.2 | 1500 |
| **Issy-les-Moulineaux**—Ministry of War | **QGA** | 1800 | 500 |
| **Juan-les-Pins** | | 230 | 500 |
| **Lille** | | 287 | 500 |
| **Lyon**—Ministry of P. T. T | **YN** | 476 | 1000 |
| **Lyon**—Radio Lyon | | 291.3 | 1500 |
| **Marseilles**—Ministry of P. T. T. | | 351 | 500 |
| **Mont-de-Marsan**—Radio Club Landrais | | 400 | 500 |
| **Montpelier**—Societe Languedocienne de T. S. F. | | 252.1 | 1000 |
| **Paris**—Ecole Superieure de P. T. T. | **FPTT** | 464 | 500 |
| **Paris**—Eiffel Tower, Army | **FL** | 2650 | 5000 |
| **Paris**—Societe Francaise Radioelectrique | **8AJ** | 1780 | 10( |
| **Paris**—Lucien Levy | | 350 | 250 |
| **Paris**—Petit Parisien | **5NG** | 340.9 | 500 |
| **Paris**—Cie. Francaise de Radiophone | | 1750 | 6000 |
| **Paris**—Radio Paris | **CFR** | 1750 | 3000 |
| **Paris**—Radio Vitus | | 308 | 1000 |
| **Pic du Midi** | | 350 | |
| **Reims** | | 204.1 | 500 |
| **Reziers** | | 178 | 500 |
| **St. Etienne**—Radio Club Forezien | | 220 | 50 |
| **Strasbourg**—Military Station Radio Club | **8GF** | 222.2 | 250 |
| **Toulouse**—Aerodrome | **MRD** | 260 | 1000 |
| **Toulouse**—La Radio | | 391 | 2000 |
| **GERMANY** | | | |
| **Berlin**—Koenigswusterhausen Deutsche Welle A. G. | **AFP** | 4000–2900 | 18000 |
| **Berlin**—Koenigswusterhausen Station | **AFT** | 1250 | 8000 |
| **Berlin**—Vox Haus Funkstunde | **AB** | 566–483.9 | 2000–4000 |
| **Berlin**—Witzleben Funkstunde A. G. | | 483.9 | 4000 |
| **Berlin**—Wolff's Bureau | | 2525 | 5000 |
| **Bremen**—Nordischer Rundfunk | **BMN** | 400 | 1500 |
| **Breslau**—Schlessische Funkstunde | | 322.6 | 5000 |
| **Dortmund**—Westdeutsche Funkstunde | | 283 | 750 |
| **Dresden**—Mitteldeutscher Rundfunk | | 294.1 | 750 |
| **Elberfeld**—Westdeutsche Funkstunde | | 468.8 | 750 |
| **Frankfort-on-the-Main** — Sudwestdeutscher Rundfunkdienst | **LP** | 428.6 | 4000 |
| **Freiburg im Breisgau**—Suddeutscher Rundfunk | | 577 | 9500 |
| **Gleiwitz**—Schlesische Funkstunde | | 250 | 750 |
| **Hamburg**—Nordischer Rundfunk | **EG** | 394.7 | 10000 |
| **Hamburg** | **HA** | 394.7 | 4000 |
| **Hanover**—Nordischer Rundfunk | | 297 | 750 |
| **Kassel**—Sudwestdeutscher Rundfunk | | 272 | 750 |
| **Kiel**—Nordicher Rundfunk | | 254.2 | 750 |
| **Koenigsberg**—Ostmarken Rundfunk | | 329.7 | 4000 |
| **Langenberg** | **LA** | 468.8 | 25000 |
| **Leipzig**—Mitteldeutscher Rundfunk | **MR** | 365.8 | 4000 |
| **Munich**—Deutsche Stunde in Bayern | **WM** | 535.7 | 1500 |
| **Munster**—Westdeutsche Funkstunde | **MS** | 241.9 | 1500 |
| **Norddeich** | **KAV** | 1800 | |
| **Nuremberg**—Deutsche Stunde in Bayern | | 303 | 750 |
| **Stettin**—Funkstunde A. G. | | 236.2 | 500 |
| **Stuttgart**—Suddeutscher Rundfunk | **OKP** | 379.7 | 4000 |
| **HAITI** | | | |
| **Port-au-Prince**—Haitien Government | **HHK** | 361.2 | 1000 |
| **HAWAII** | | | |
| **Honolulu** | **KGHB** | 227 | 250 |
| **Honolulu**—Honolulu Advertiser | **KGU** | 270 | 500 |
| **HUNGARY** | | | |
| **Budapest**—Hungarian States' Post and Telegraph | **MTI** | 555.6 | 1000 |
| **Budapest**—Magyar Tavirati Iroda | | 1050 | 2000 |
| **Budapest**—Hungarian Telephone & Radio Co. | | 555.6 | 2000 |
| **ICELAND** | | | |
| **Reykjavik** | | 333.3 | 500 |

| Countries, Cities and Owners | Call Letters | Wave Length (Meters) | Power (Watts) |
|---|---|---|---|
| **INDIA** | | | |
| **Bangalore**—Indian Broadcasting Co. | | | |
| **Bombay**—Walter Rogers & Co. | 2AX | 226 | |
| **Bombay**—Bombay Residency Radio Club | 2FV | 375 | 220 |
| **Calcutta**—Radio Club of Bengal | 2BZ | 800 | 500 |
| **Calcutta**—Indian States & Eastern Agency | 5AF | 425 | 1500 |
| **Karachi**—Karachi Radio Club | | 425 | 40 |
| **Madras**—Crampton Elec. Co. | | 220 | 120 |
| **Madras**—Madras Presidency Club | 2GR | 400 | 200 |
| **Rangoon**—Radio Club of Burmah | 2HZ | 350 | 40 |
| **IRISH FREE STATE** | | | |
| **Cork** | 6CK | 400 | 1500 |
| **Dublin**—Government | 2RN | 319.1 | 1500 |
| **ITALY** | | | |
| **Milan**—Unione Radiofonica Italiana | IMI | 315.8 | 1500 |
| **Naples**—Unione Radiofonica Italiana | INA | 333.3 | 1500 |
| **Nice** | | 362 | 1000 |
| **Rome**—Unione Radiofonica Italiana | IRO | 450 | 3000 |
| **JAPAN** | | | |
| **Keijo**—Keijo Broadcasting Co. | JODK | 345 | 1000 |
| **Nagoya**—Nagoya Radio Broadcasting Co. | JOCK | 360 | 1000 |
| **Osaka**—Osaka Central Broadcasting Co. | JOBK | 385 | 1000 |
| **Tokyo**—Tokyo Central Broadcasting Co. | JOAK | 375 | 1000 |
| **JAVA** | | | |
| **Batavia**—Bataviasche Radio Vereening-ing | JFC | 220 | 40 |
| **KWANTUNG** | | | |
| **Dairen**—Government Bureau of Communications | JQAK | 395 | 500 |
| **LATVIA** | | | |
| **Riga** | KCX | 526.3 | 2000 |
| **LITHUANIA** | | | |
| **Kovno** | | 2000 | 2000 |
| **LUXEMBURG** | | | |
| **Luxemburg** | LOAA | 217.4 | 250 |
| **MEXICO** | | | |
| **Chihuahua**—Federal Government | CZF | 310 | 250 |
| **Chihuahua**—Telefonos Del Gobierno del Estado de Chihuahua | ZCF | 310 | 250 |
| **Chihuahua**—Compania Telefonica | XICE | 500 | 500 |
| **Guadalajara**—Radio Club — Degollado Theatre | | 280 | 10 |
| **Guadalajara**—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 |
| **Mexico City**—Jose J. Reynosa (El Buen Tono) | CYB | 275 | 500 |
| **Mexico City**—Miguel S. Castro (La High Life) | CYH | 375 | 100 |
| **Mexico City**—General Electric Co. | CYJ | 410 | 1000 |
| **Mexico City**—"El Universal" | CYL | 400 | 500 |
| **Mexico City**—Martinez y Zetina | CYO | 425 | 100 |
| **Mexico City**—Excelsior Compania Editorial | CYX | 260 | 750 |
| **Mexico City**—La Liga del Radio | CYZ | 400 | 100 |
| **Mexico City**—Departamento de Educacio | CZE | 357 | 1000 |
| **Mexico City**—Secretaria de Industria, Comercio y Trabajo | CZI | 450–505 | 750 |
| **Mexico City**—Fabrica Nacional de Vestuario | IJ | | 500 |
| **Mexico City**—F. C. Stephenex | IR | 250 | 100 |
| **Monterrey**—Roberto Reyes | CYM | 275 | 100 |
| **Monterrey**—D. Constantino de Tarnava, Jr. | CYH | | |
| **Monterrey**—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 Comunicacaciones | CYC | 300 | 500 |
| **Vera Cruz** | CYD | 250 | 500 |
| **MOROCCO** | | | |
| **Casablanca**—Radio Club de Moroc | CNO | 250 | 500 |
| **NETHERLANDS** | | | |
| **Amsterdam** | PCFF | 2125 | |
| **Bloemendaal** | | 566 | |
| **De Bilt** | PCFF | 1100 | 1250 |
| **Eindhoven**—Phillips Lamp Works | PCJJ | 30.2 | |
| **Hilversum**—Nederlandische Seintoellen Fabriek | PFBI | 1000 | 10000 |
| **Hilversum** | HDO | 1060 | 5000 |
| **Scheveningen** | | 1950 | 2500 |
| **NETHERLANDS EAST INDIES** | | | |
| **Soe abaya**—Radiotelegraph Club | | 90 | |
| **NEW ZEALAND** | | | |
| **Auckland**—Newcomb (Ltd.) | 1YL | 260 | 500 |
| **Auckland**—The Radio Broadcasting Co. of New Zealand | 1YA | 333 | 500 |
| **Auckland**—La Gloria Gramophone Co. | 1YB | 275 | 50 |
| **Auckland**—L. R. Keith | 1ZO | 330 | 50 |
| **Christchurch**—Radio Broadcasting Co. of New Zealand | 3AC | 240 | 10 |
| **Christchurch**—Radio Broadcasting Co. of New Zealand | 3YA | 306 | 500 |
| **Dunedin**—Otago University | 4XO | 140 | |
| **Dunedin**—Radio Broadcasting Co. of New Zealand | 4YA | 463 | 750 |
| **Dunedin**—Radio Supply Co. | 4YO | 370 | 500 |
| **Dunedin**—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 |
| **Wellington**—Radio Broadcasting Co. of New Zealand | 2YA | 420 | 3000 |
| **Whangerei**—N. C. Shepherd | 1YC | 250 | 15 |
| **NORWAY** | | | |
| **Bergen**—Bergen Broadcasters | | 370.4 | 1500 |
| **Fredrikstad**—Broadcasting Co. A. S. | | 384.8 | 750 |
| **Hamar**—Broadcasting Co. A. S. | | 566 | 750 |
| **Natodden**—Broadcasting Co. A. S. | | 447.8 | |
| **Oslo**—Broadcasting Co. A. S. | OSLO | 461.5 | 1500 |
| **Porsgrund**—Broadcasting Co. A. S. | | 504 | 750 |
| **Rjuken**—Broadcasting Co. A. S. | | 443 | 250 |
| **Stavanger** | | 277.8 | 250 |
| **Tromso**—Tromso Broadcasters | | 500 | |
| **Trondhjem** | | 243.9 | |
| **PARAGUAY** | | | |
| **Asuncion** | | | 12 |

| Countries, Cities and Owners | Call Letters | Wave Length (Meters) | Power (Watts) |
|---|---|---|---|
| **PERU** | | | |
| **Arequipa**—Augusto Gilardi | **3OA** | 240 | 10 |
| **Lima**—Peruvian Broadcasting Co. | **OAX** | 380 | 1500 |
| **Lima**—German Gallo | **5OA** | 250 | 20 |
| **Lima**—Enrique Perez | **4OA** | 250 | 20 |
| **PHILIPPINE ISLANDS** | | | |
| **Baguio** | **KZUY** | 359.9 | 500 |
| **Iloilo** | **KPM** | 400 | 500 |
| **Manila**—Radio Corp. of the Philippines | **KZIB** | 260 | 500 |
| **Manila**—Radio Corp. of the Philippines | **KZKZ** | 270 | 500 |
| **Manila**—Radio Corp. of the Philippines | **KZRM** | 413 | 1000 |
| **Manila**—Radio Corp. of the Philippines | **KZRQ** | 400 | 1000 |
| **POLAND** | | | |
| **Cracow** | | 422 | 1500 |
| **Posen** | | 344.8 | 1500 |
| **Warsaw**—Government | **PTR** | 380 | 700 |
| **Warsaw** | **AXO** | 1111 | 10000 |
| **PORTO RICO** | | | |
| **San Juan**—Radio Corp. of Porto Rico | **WKAQ** | 340.7 | 500 |
| **PORTUGAL** | | | |
| **Lisbon**—Grandes Armazens do Chiado | **PIAA** | 310 | 150 |
| **Montesanto**—Government Wireless Station | **CTV** | 2450 | 1500 |
| **SAN SALVADOR** | | | |
| **San Salvador**—Government of el Salvador | **AQM** | 452 | 500 |
| **SENEGAL** | | | |
| **St. Louis**—Senegal Radio Club | | 300 | 100 |
| **SPAIN** | | | |
| **Barcelona**—Radio Barcelona (Hotel Colon) | **EAJ1** | 344.8 | 1500 |
| **Barcelona**—Radio Catalana | **EAJ13** | 462 | 1000 |
| **Bilbao**—Radio Club Vizcaina | **EAJ9** | 436 | 1000 |
| **Bilbao**—Radio Vizcaya | **EAJ11** | 418 | 2000 |
| **Bilbao**—Armando de Otera | | 383 | 200 |
| **Cadiz**—Radio Cadiz | **EAJ3** | 400 | 500 |
| **Cadiz**—Radio Lahera | **EAJ10** | 297 | 1000 |
| **Cartagena**—Enrique de Orbe | **EAJ16** | 279 | 1000 |
| **Cartagena** | **EBX** | 1200 | 1000 |
| **Madrid**—Radio Espana | **EAJ2** | 393 | 3000 |
| **Madrid**—Escuela Superior | **PTT** | 458 | 1000 |
| **Madrid**—Antonio Castilla | **EAJ4** | 375 | 6000 |
| **Madrid**—Radio Iberica | **EAJ6** | 392 | 1000 |
| **Madrid**—Union Radio | **EAJ7** | 373 | 3000 |
| **Madrid** | **EAJ12** | 306 | 2000 |
| **Madrid**—Radio Espanola | **EAJ15** | 490 | 1000 |
| **Madrid** | **EGC** | 1650–2200 | 2000 |
| **Malaga**—Spanish Telecommunication Co. | **EAJ25** | 325 | 1000 |
| **Malaga**—Alfonso Villota | | 325 | 200 |
| **Oviedo (Cima)**—Arturo Cima Fernandez | **EAJ19** | 340 | 1000 |
| **Salamanca** | **EAJ22** | 402.5 | 500 |
| **San Sebastian**—Sabino Ucelayeta | **EAJ8** | 346 | 2000 |
| **Sevilla**—Manuel Garcia Ballesta | **EAJ17** | 400 | 1000 |
| **Sevilla**—Jorge la Riva | **EAJ21** | 300 | 1000 |
| **Sevilla**—Radio Club Sevillano | **EAJ5** | 344.8 | 1000 |
| **Valencia** | **EAJ24** | 360 | 1000 |
| **Valencia**—Jose Lopez Aznar | **EAJ14** | 500 | 500 |
| **Zaragoza** | **EAJ23** | 325 | 1500 |
| **STRAIGHTS SETTLEMENTS** | | | |
| **Singapore**—Malaya Amateur Wireless Society | | 330 | 150 |
| **SWEDEN** | | | |
| **Boden**—Radiotjanst | **SASE** | 1200 | 1500 |
| **Boras** | **SMBY** | 230.8 | 250 |
| **Eskilstume**—Radio Club | **SMUC** | 250 | 250 |
| **Falun**—Radiotjanst | **SMZK** | 357 | 1500 |
| **Gaevle**—Radio Club | **SMXF** | 204.1 | 260 |
| **Goteborg**—Radiotjanst | **SASB** | 416.7 | 1000 |
| **Halmstad** | **SMSB** | 215.8 | 250 |
| **Helsingborg** | **SMYE** | 229 | 250 |
| **Jonkopings**—Jonkopings Rundradiostation | **SMZD** | 201.3 | 500 |
| **Kalmar** | **SMSW** | 252.1 | 250 |
| **Karlsborg**—Radiotjanst | **SASF** | 1350 | 50 |
| **Karlsborg** | **SAJ** | 1365 | 5000 |
| **Karlskrona** | **SMSM** | 196 | 2000 |
| **Karlstadt**—Radio Club of Karlstad | **SMXG** | 221 | 150 |
| **Karlstadt** | **SMXZ** | 221 | 250 |
| **Kristinehamm** | **SMTY** | 202.7 | 250 |
| **Linkoeping**—Radio Club | **SMUV** | 467 | 25 |
| **Linkoeping** | **SMUW** | 497.5 | 250 |
| **Malmo**—Radiotjanst | **SASC** | 260.9 | 500 |
| **Motala** | | 1320 | 30000 |
| **Norrkoeping**—Radio Club | **SMVV** | 275.2 | 250 |
| **Orebro** | **SMTI** | 218 | 250 |
| **Ostersund** | | 720 | 1000 |
| **Saffle** | **SMTS** | 252.1 | 500 |
| **Stockholm**—The Swedish Broadcasting Co. | **SASA** | 454.5 | 1500 |
| **Sundsvall**—Radiotjanst | **SASD** | 545.6 | 500 |
| **Trodhattan**—Trodhattans Rundradiostation | **SMXQ** | 277.8 | 250 |
| **Uddevalla** | **SMZP** | 294.1 | 250 |
| **Umea** | **SMSN** | 229 | 250 |
| **Varborg** | **SMSO** | 297 | 250 |
| **SWITZERLAND** | | | |
| **Basle** | **HB3** | 1100 | 250 |
| **Berne**—Radio—Genossenschaft | **HBA** | 411 | 5000 |
| **Geneva**—Radio Broadcasting Soc. of Geneva | **HBI** | 760 | 1500 |
| **Lausanne**—Lausanne Radio Society | **HB2** | 318 | 500 |
| **Zurich**—Zurich University | **RGZ** | 515–650 | 500 |
| **Zurich**—Zurich Radio Genossenschaft | **HBZ** | 496 | 1000 |
| **TUNISIA** | | | |
| **Tunis**—French Army | **OCTU–TUA** | 1450–45 | 500 |
| **TURKEY** | | | |
| **Osmanieh**—Broadcasting Co. | | 1200 | 6000 |
| **UNION OF SO. AFRICA** | | | |
| **Cape Town**—African Broadcasting Assn. | **WAMG** | 375 | 1500 |
| **Durban**—Town Council | | 400 | 1500 |
| **Johannesburg**—African Broadcasting Co. | **JB** | 450 | 500 |
| **UNION OF SOVIET SOCIALIST REPUBLICS (formerly Russia)** | | | |
| **Astrakhan** | **RA26** | 700 | 1000 |
| **Baku** | **RA45** | 760 | 1250 |
| **Bogorodsk** | **RA8** | 750 | |
| **Ekaterinburg** | **RA15** | 750 | 250 |
| **Homel** | **RA39** | 925 | 1250 |
| **Irkutsk** | | 1300 | |
| **Ivanovo Voznesensk** | **RA7** | 800 | 1000 |
| **Kharkov** | **RA43** | 640 | 4000 |
| **Kharkov** | **RA24** | 475 | 4000 |
| **Kiev** | **RA5** | 775 | 1000 |

| Countries, Cities and Owners | Call Letters | Wave Length (Meters) | Power (Watts) |
|---|---|---|---|
| **UNION OF SOVIET SOCIALIST REPUBLICS (formerly Russia)** | | | |
| **Kniepropetrovsk** | | 560 | 1000 |
| **Krasnodar** | RA38 | 513 | 1000 |
| **Leningrad** | RA6 | 940 | 2000 |
| **Leningrad** | RA42 | 1000 | 10000 |
| **Minsk** | RA18 | 950 | 1250 |
| **Moscow**—Sokolniki | | 1010 | 2000 |
| **Moscow**—Trade Union | KAZ | 450 | 2000 |
| **Moscow**—Lubovitch | | 365 | |
| **Moscow** | MSK | 650 | 2000 |
| **Moscow**—Union of Soviet Workers | RA4 | 675 | 500 |
| **Moscow**—Kominern | RDW | 1450 | 40000 |
| **Moscow**—Radio-Peredatcha | RAI | 420 | 2000 |
| **Niji-Novgorod** | RA13 | 1400 | 1500 |
| **Novosibirsk** | RA33 | 700 | 4000 |
| **Odessa** | RA40 | 1000 | 1250 |
| **Rostov-on-Don** | RA14 | 820 | 1250 |
| **Saratoff** | | 700 | 1000 |
| **Sevastopol** | RA9 | 800 | 1000 |
| **Stavropol** | RA20 | 655 | 1250 |
| **Tashkent** | RA27 | 800 | 4000 |
| **Tiflis** | | 870 | 4000 |
| **Tver** | RA44 | 965 | 1250 |
| **Ust-Syssolsk** | REG | 1000 | 1250 |
| **Veliky-Ustjuk** | RA16 | 1010 | 1250 |
| **Vladivostok** | RA17 | 456 | 1250 |
| **Vladivostok**—Union of Soviet Worker's Radio Club | RL20 | 480 | 1500 |
| **Voronesh** | RA12 | 950 | 1250 |
| **UNITED KINGDOM** | | | |
| **Aberdeen**—British Broadcasting Co. | 2BD | 500 | 1500 |
| **Belfast**—British Broadcasting Co. | 2BE | 306.1 | 1500 |
| **Birmingham**—British Broadcasting Co. | 5IT | 326.1 | 1500 |
| **Bournemouth**—British Broadcasting Co. | 6BM | 491.8 | 1500 |
| **Cardiff**—British Broadcasting Co. | 5WA | 353 | 1500 |
| **Chelmsford**—British Broadcasting Co. | 2BR | | |
| **Daventry** | 5GB | 491.8 | |
| **Daventry**—British Broadcasting Co. | 5XX | 1604.3 | 5000–10000 |
| **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 | 2000 |
| **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 |
| **URUGUAY** | | | |
| **Montevideo**—Radio Sudamericano | CWOZ | 320 | 500 |
| **Montevideo** | CWOA | | 1000 |
| **Montevideo**—Diario "El Dia" | CWOR | 350 | 500 |
| **Montevideo**—Danree & Cia | CWOF | 300 | 100 |
| **Montevideo**—Templo Metodista | CWOG | 280 | 10 |
| **Montevideo**—Instituto Metereologico | CWOB | 250 | 50 |
| **Montevideo**—General Electric Co. of Uruguay | CWOS | 380 | 500 |
| **VENEZUELA** | | | |
| **Caracas**—Empresa Venezolana de Radio-telefonia | AYRE | 375 | 1000 |
| **YUGOSLAVIA** | | | |
| **Agram (Zagreb)** | | 310 | 1000 |
| **Belgrade**—Cie. Generalle De T.S.F. | HFF | 225.6 | 1000 |



# A NEW SERVICE FOR THE CUSTOM-SETBUILDER

This issue marks the inauguration of a new service to our readers who are building radio sets.

In the next issue of RADIO LISTENERS' GUIDE AND CALL BOOK, we will print a page called

## THE RADIO SET MARKET

in which every reader who is making radio sets for sale, can place his offer before the public *without cost.*

> **No. 655—Setbuilder in Los Angeles, Cal., has 5-tube Hennesey-Atterton sets for sale. Specializes in this kind of set. Can build any make of set to order. Write.**

This is the way each offer will be listed; and any inquiry referring to the code number under which your offer is listed, will be forwarded to you immediately—*without cost.*

We believe this service will be a great boon to the custom-setbuilder.

It will open a national market—help dispose of more sets—and make more money for you.

Besides opening our columns to our readers for this purpose, we have made this service absolutely free and with conditions easy enough for all to live up to:

## CONDITIONS

Not more than fifty words to each advertisement. Each request must be written on a separate sheet of paper, to which the coupon appearing below *must be attached.* No request will be considered without coupon.

**RADIO LISTENERS' GUIDE & CALL BOOK**
**230 5th Ave., N. Y. C.**

**RADIO LISTENERS' GUIDE AND CALL BOOK,**
**230 Fifth Avenue,**
**New York City.**

Gentlemen:

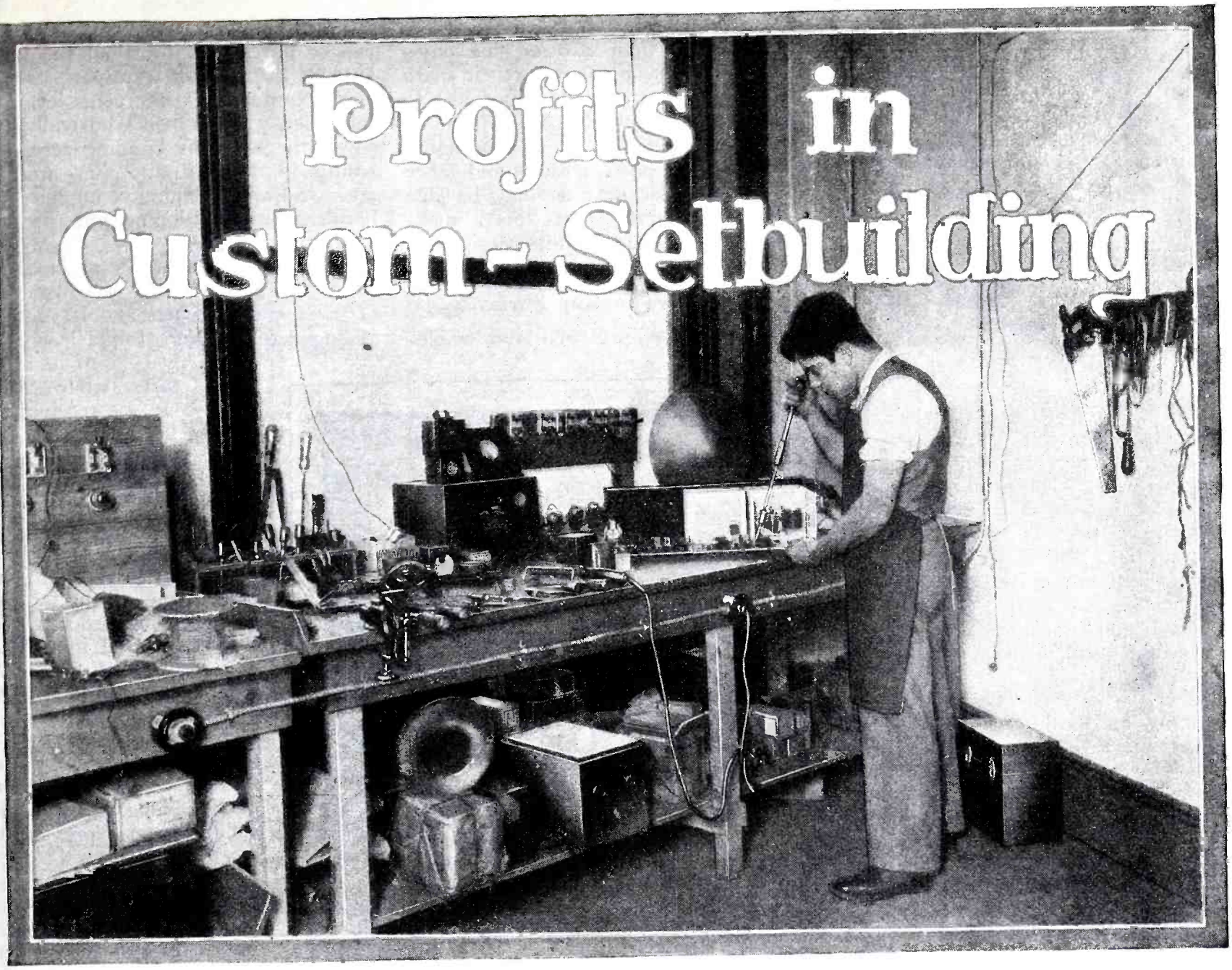
Without cost or obligation to me, kindly insert the attached Custom-Made-Set offer in your next issue.

Name .....

Address .....

City ..... State .....

# Profits in Custom-Setbuilding



COMMUNITY set builders are making good incomes. Manufacturers, jobbers, and dealers who sell parts for radio sets report that men who build radio receivers for sale in their own communities are becoming more and more numerous and that, judging from their purchases, they are doing a good business.

One community set builder recently ordered parts for his one hundred and twelfth set. He sold nearly all of his receivers to farmers. He knew at the start that farmers usually wanted the simplest set that was possible to build, but that they wanted one that would cover good distance and deliver good volume. He designed a set so simple that all the user had to do was to turn a switch and tune in. After the first few sales the orders came in as fast as he could build the sets.

A New York advertising man, who was paying for a home in the country, started building and selling sets and reduced his mortgage. An inventor who needed to try out his radio devices under average conditions built, sold and serviced receivers so that he actually made a profit on experimental work that otherwise would have run up his expense.

A Canadian world war veteran who came home disabled took up set building for his own amusement and developed it into a profitable business. He erected a small broadcasting station in order to provide programs for customers who could not afford sets powerful enough to bring in distant programs. That produced many sales.

A minister who started building a receiver to pass the time while he was sitting up with a sick child kept right on building them when he found out how many of his parishoners wanted them.

One set builder is a salesman who makes several trips to Europe every year. He builds a portable set, demonstrates it during the voyage, takes orders from the passengers, builds their sets on board or after he reaches home, and makes a considerable amount of money besides his income from his regular job. His orders for parts run as high as a thousand dollars at one time.

Another makes the acquaintance of officers and men from the steamships in the harbor, takes orders and builds sets that provide amusement on shipboard during many a long voyage.

Most community set builders, however, are men who enjoy working with tools, who are fascinated by the new science of radio, and who make money because it is just as easy to capitalize their ability as it is to work just for the fun of working.

### Easy to Begin

Anyone can begin building radio sets at any time if he has even a little mechanical ability and a small amount of money to invest.

Many types of receivers can be purchased in the form of kits. Every part is included in the kit, even screws and wire. The price of the kit may be 20% to 40% lower than the regular retail price of the completed set. The man who assembles and sells it makes the difference.

Complete instructions, diagrams and templates are furnished with the kits. Even a novice can read the instructions paragraph by paragraph, trace the circuit on a blue-

print, perform one operation at a time and thus assemble the receiver and make it work successfully. The first set assembled may take several hours, but practice reduces the time required.

One set builder on Long Island assembles a three-tube outfit in fifteen minutes. He and his brother, who started building and selling sets some time ago, are making $100 a week apiece. They have each bought a good car, which enables them to cover more territory and do more business than they could at the start. One assembles most of the sets; the other delivers and installs them, takes orders and collects.

They surprised a radio dealer recently by buying 400 amplifying transformers at one time, and secured them at a bargain price. They work in their own homes and have very little overhead expense.

### Costs Little to Start

A complete kit for a 5-tube radio receiver can be purchased as low as $17.95. This includes a drilled and engraved panel, baseboard, coils, condensers, dials, transformers, rheostat, potentiometer, sockets, jacks, switches, grid leak, binding posts, resistances, screws, angles, blue print and instructions.

A cabinet will cost about $4.00 additional. Aerial equipment, tubes and batteries or battery substitute for such a set can be purchased for less than $30, so the complete outfit, ready to install, costs a little over $50.

Not more than a day is needed to assemble and install the set and if it is sold as low as $65 the builder clears more than $10 on his day's work. Those who use only their spare time for this work add from $10 to $30 to their weekly incomes.

After a set builder is thoroughly familiar with parts, circuits and other details of his work, he may be able to buy separate parts even more cheaply than parts in kits, design his own receivers and make larger profits.

### Where to Buy Parts

Parts can be purchased from wholesalers or jobbers, if ordered in quantity. Many radio dealers, especially in the smaller places, have discontinued lines of parts and are selling only complete receivers. During the past year there has been a great swing from the building of sets in the home for home use, to the purchase of factory-built sets and sets built by community set builders.

The retail prices of receivers have been reduced until a factory-built set can be purchased for about the same amount that the separate parts would cost if purchased at the usual local retail prices. Only men who really enjoyed the work of building receivers continued doing it and they are the ones who are becoming community set builders and developing into professional radio men.

One concern whose total business two or three years ago was made up of 90% sales of parts and 10% sales of complete receivers found last year that only 10% of its sales were parts while 90% were complete receivers.

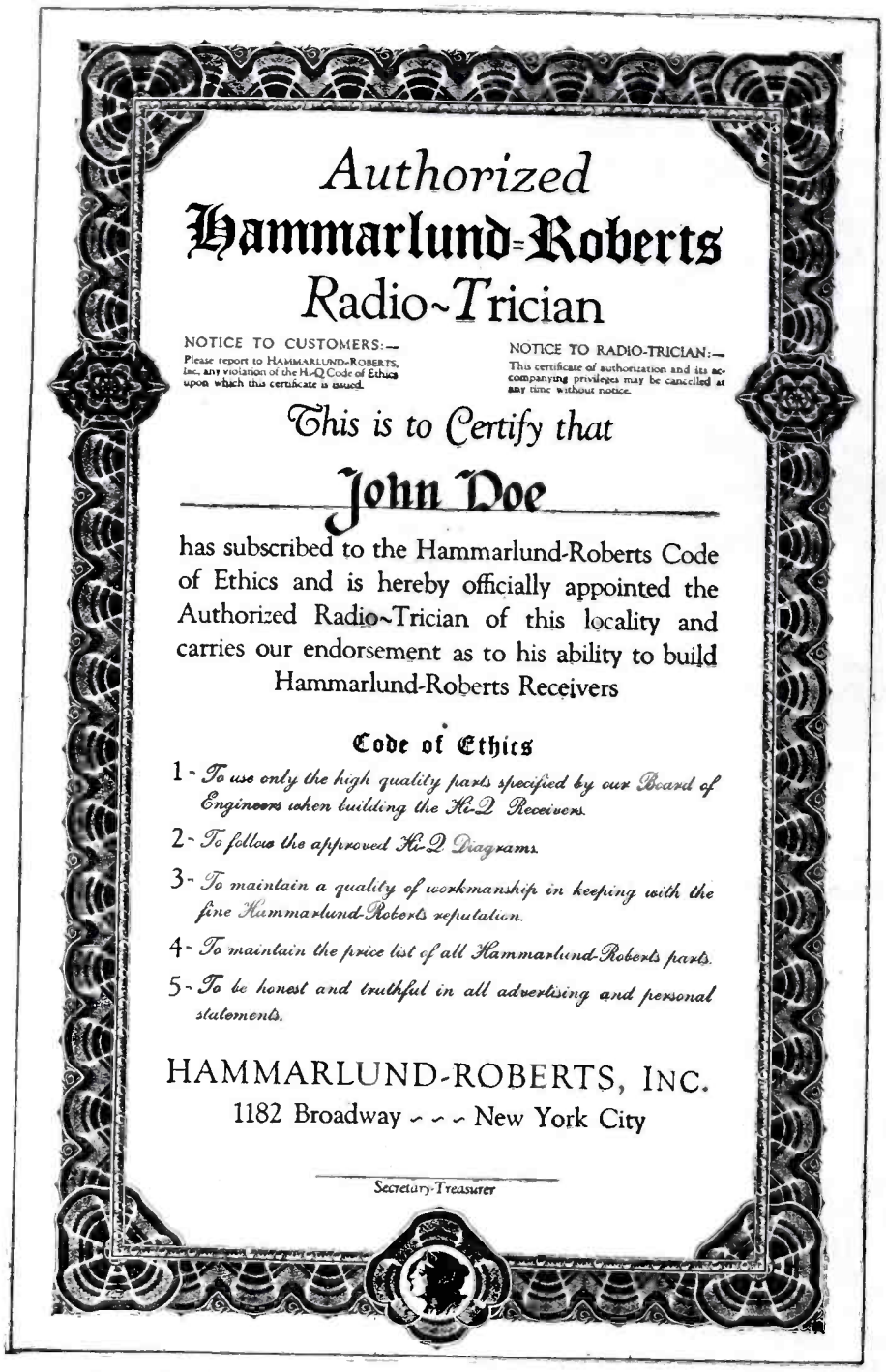
The sale of parts to men who are building sets for their own use or for sale to their neighbors is now handled mainly by a few stores in larger cities and by the mail order jobbers. One of the largest of the mail order radio houses, located in Chicago, states that 30% to 40% of its orders now come from community set builders.

A manufacturer whose service department handles much correspondence from community set builders turns the correspondence over to jobbers. The jobbers list these local set builders as small manufacturers, or as dealers, as soon as the amount of their orders justifies such classification.

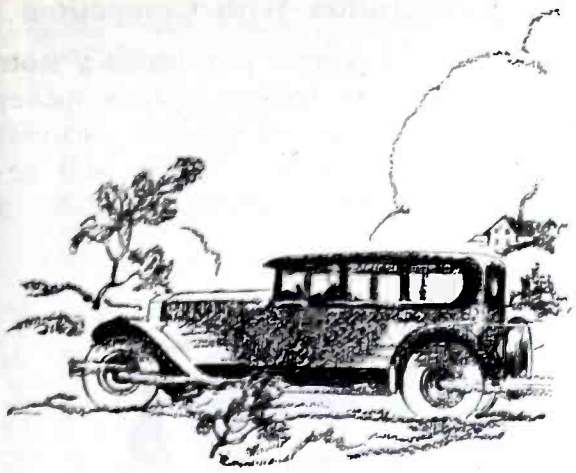
In some cases even a set builder who is just starting can secure wholesale prices by stating that he is opening a business and ordering a very moderate amount of equipment.

### Few Tools Needed

Many sets can be assembled with a screw driver and a pair of pliers. An assortment of screw drivers and pliers may make the work easier. Connections usually are soldered, but there are kits so designed that no




**In order to indicate that the interest of the radio parts manufacturer is behind the fellow who considers custom-setbuilding seriously, the above shows a certificate of authorization, size 11" x 14", issued to the set-builder for display purposes. A system of business operations, such as advertising, direct mailing, etc., is also planned out for him.**



solder or soldering iron are required. A good job of soldering probably improves a set that is to bring in distant stations. In any case, $5 to $10 will purchase all the tools that a beginner needs for assembling simple sets.

The community set builders report that customers are not hard to find. It is natural to believe that the sparsely settled districts, far from radio dealers, would be the best field for the community set builders, but one dealer who handles thousands of accounts

**Below is a view of a professional custom-set builder's laboratory. This business was started by its owners on a small scale and today is one of the largest of its kind in the city.**

**A corner of the assembly room of another prospering professional set builder located in a large city. The owner of this establishment also relates the day when he started in a small way, and asserts that any wide-awake fellow has the same opportunity to start in business.**

states that they are more numerous in the cities where competition is keenest.

Manufacturers, wholesalers and jobbers often say that local radio dealers seldom work their territory thoroughly. Any energetic set builder can take orders regardless of the number of dealers in town.

A dealer usually puts a receiver or two in his window, shoots a loud speaker out of the door and waits for customers to walk in. Receiving conditions often are bad in business locations and loud speakers often scare away more trade than they bring in. They have to make a big noise in order to be heard above the din on the street and often they make harsh and disagreeable noises that drive away music lovers and give discriminating persons a bad impression of radio.

The community set builder, on the other hand, has an opportunity that many of them have been quick to grasp. A set can be built at home and adjusted till it gives good results. Receiving conditions usually are good in residential sections. A few neighbors are invited in to hear the set. Usually someone asks the builder where he can secure such a set. When the builder offers to sell his set, the neighbor takes it as a favor. The builder can install it and make sure that it is working well.

The customer, of course, tells everybody in the neighborhood about his new radio set and invites others to hear it. This is the best advertising in the world and costs nothing. His home becomes a demonstration station for the builder, and those who want to see him about buying a set do not have to wait to go down town the next day but can go right around to his home. One dealer says that a sale can be made much more easily in a home than in a store, because the atmosphere of a home does away with sales resistance and there is nothing to attract the attention of the prospective customer from the one receiver that is demonstrated.

### Public Demonstrations

If it becomes necessary to advertise, the community set builder favors a local school, church or club by installing a receiver and bringing in some outstanding event such as a world series baseball game. Sometimes the institution charges an admission fee for the radio entertainment and thus raises money to buy the receiver. In any case, a successful demonstration usually brings someone to the set builder who wants to buy a receiver of the same kind. This often results in bringing in a whole new group of customers who have been influenced by the demonstration.

One man in a Connecticut town installed a receiver and seven loud speakers in the local high school every two weeks, so that the school could receive the course of instruction in Music Appreciation that was broadcast by WTIC under the auspices of the state board of education. He stated that it was well worth while as advertising.

There are many persons who prefer a hand-made, custom-built article to one that is made in a factory. The community set builders find such customers profitable. Whether kits are purchased and assembled, or separate parts put together, they can give their customers practically any circuit, any cabinet, any type of power supply and any kind of loud speaker that they want. The customer who buys an exclusive receiver, built to his own specifications, often is as proud as a woman with an exclusive Paris hat.

Customers who demand exclusiveness usually expect to pay well for it, but if it is necessary to figure closely, the community set builder can meet any competition that is offered in his territory. As soon as he begins to use parts in any considerable quantity, manufacturers, wholesalers and jobbers are glad to list him as a small manufacturer and give him the lowest prices on parts. He can duplicate almost any type of receiver, add such touches of individuality as will please the customer, sell the set at the same price that the customer would have to pay for it at a retail store and still make a profit. The customer, if he checks up the list of parts used, will think he is getting a bargain because he could not buy the parts for much if any less than he paid for the complete receiver.

There are some customers to whom price is no object and who will not buy anything that seems cheap. For such persons there are factory-made sets priced as high as $2,500. A set builder who is eno gh of an artist to design a cabinet that will harmonize with the interior of the room where it is to be installed has a chance to make sales that the average builder and dealers cannot hope to make.

### Cooperation With Competitor

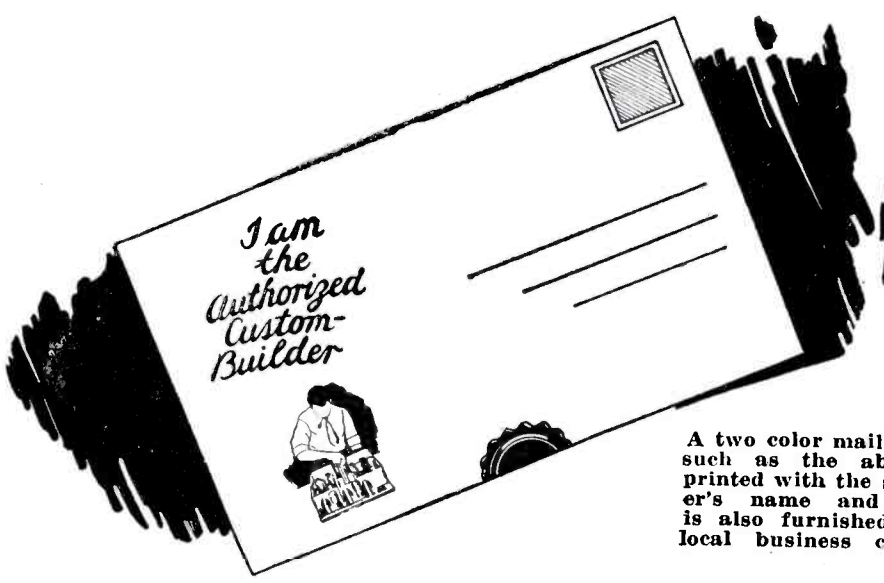
A business man who leases a store in a business section, spends money for advertising and conducts business in the ordinary way, often feels aggrieved when someone else starts a competing business, in his own home, without the usual overhead expense. If there must be any conflict of interests, the community set builder can hold his own because his own neighbors know him and he is so near to his customers that he can make sure that they are satisfied.

In some ways he can work more efficiently than a large organization that must depend upon the average run of employees, some of whom may be careless. The best way, however, is for the community set builder to cooperate with others who are selling

(*Continued on page* 191)


Directly above is shown a double column newspaper ad with space for the setbuilders' name and address as furnished by an organization of cooperative radio manufacturers which is collaborating with the custom-setbuilder.

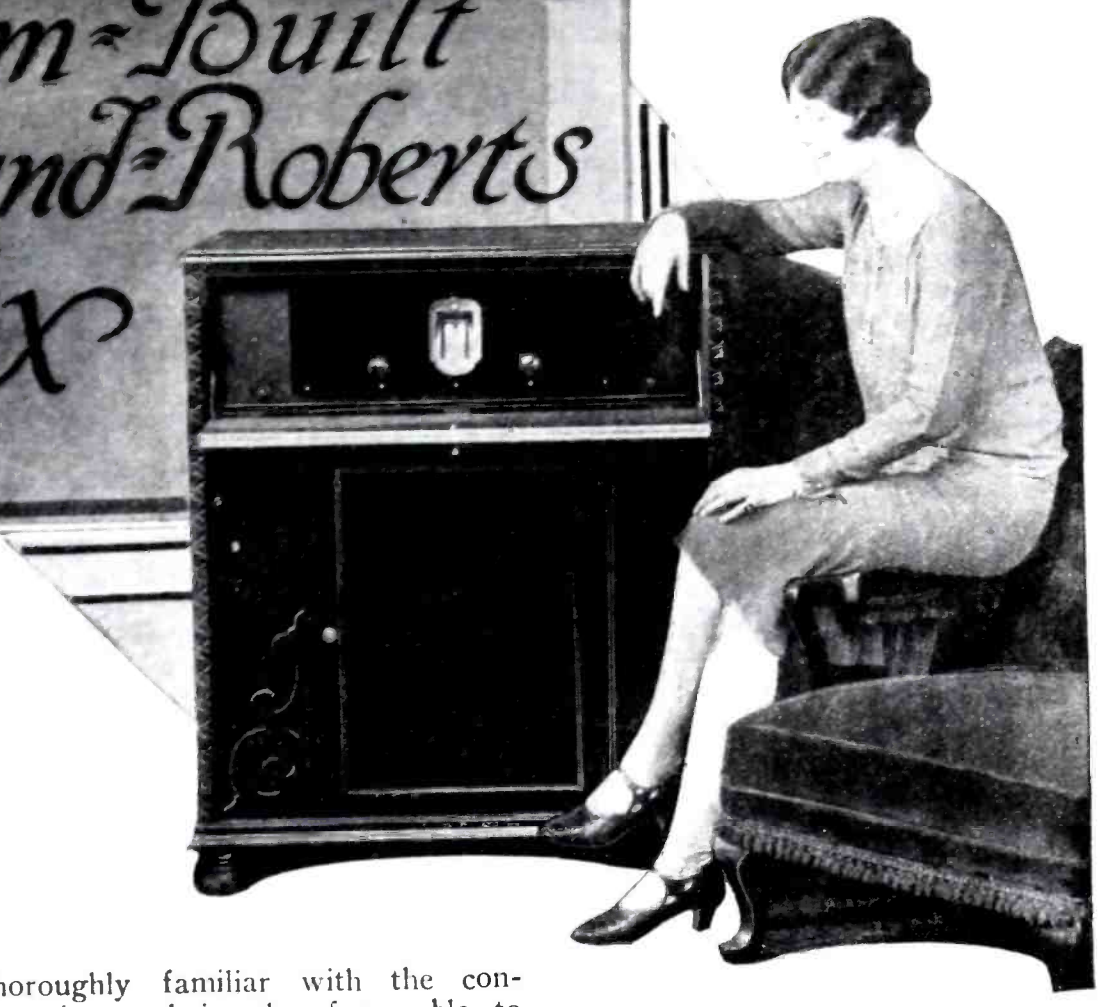

A single column newspaper ad in plate form furnished by Hammarlund-Roberts, Inc. This service indicates the extent to which the manufacturer offers his cooperation to the setbuilder. An ad of this type costs comparatively little in a local newspaper.




A two color mailing folder such as the above, imprinted with the set builder's name and address is also furnished for his local business campaign.


A double postcard for mailing in a setbuilder's local campaign. One section carries his message requesting permission to demonstrate the set. The other section is return card from prospect, making appointment for demonstration.

# The Custom-Built Hammarlund-Roberts Hi-Q Six



WITH radio conditions such as exist in the United States today it is no longer feasible for the amateur set builder to attempt the design of his radio receiver. In order to obtain satisfactory reception in districts which are congested with the signals of super-power broadcasting stations, as in practically the entire eastern and middle western parts of the country, it is necessary to possess a set which has been carefully designed by competent engineers. Then, and then only, does the novice fully experience the pleasure of hearing radio music free from distortion and interference, and only with the best type of receiver is he able to pick-up distant stations without the interference of locals.

Although the wise amateur willingly deprives himself of the pleasure of designing his set, there is no reason why he should forego the experience of building a receiver. For years the manufacturers of radio parts have directed their engineering staffs to concentate their efforts on the development of receiver designs for home construction. These receivers are of all types and many of them, when properly constructed, equal the best factory constructed set in performance and appearance. An added advantage of this system is that many of the designs have been worked out so carefully and the directions are so explicit that the set may be built successfully by anyone regardless of the extent of his previous radio experience.

From the viewpoint of the amateur there are often many reasons why it is desirable to assemble a set at home rather than buy a complete factory product. In the first place, with a given amount of money, it is possible to obtain far greater value in a home built set due to the saving of factory labor. Secondly, he may be assured of the best possible workmanship and that parts of the highest quality are used throughout. Thirdly, he becomes thoroughly familiar with the construction and is, therefore, able to make repairs in the future if they should be required. Fourthly, it satisfies the masculine creative desire in a very enjoyable manner.

For those who plan to build a receiver and who are looking for a set of the highest possible quality, the design described in this article is presented. The set is known as the Custom-Built Hammarlund-Roberts Hi-Q-Six, and possesses all of the most modern electrical and mechanical features known to the radio trade. It is the result of one year's intensive research and development work on the part of engineers of ten of the country's leading radio parts manufacturers, and is described, by the designes, as their conception of a perfect six-tube receiver.

In the electrical circuit of the set the same basic principles, which proved so popular and efficient in last year's design, are still employed, but so many improvements have been made that the new set bears but slight resemblance to the previous model. The set is assembled on a metal chassis of the latest type with all wiring concealed on the under side. Shielding is employed and all apparatus in the tuned circuits is housed in four metal stage shields. Automatic coupling variation is still used and the mechanical arrangement has been greatly improved. The outward appearance of the set has also been improved with illuminated tuning controls of the drum type. The circuit itself has also been changed and improved and a stage of radio

### LIST OF PARTS

1 "Hi-Q Six" Foundation Unit (containing drilled and engraved Micarta panel, four complete aluminum shields, drilled Van Doorn steel chassis, shafts, cams, resistance units (R 1 to 6) wire, screws, nuts, washers and all special hardware required to complete receiver)
1 Samson symphonic transformer, T1
1 Samson transformer, type HW-A3, 3 to 1 ratio, T2
4 Hammarlund .0005 mfd. midline condensers, C1, C2, C3 and C4
4 Hammarlund "Hi-Q Six" autocouple coils, type HQ64, L1, L2, L3, and L4
4 Hammarlund radio frequency chokes, type RFC-85, L5, L6, L7 and L8.
1 Hammarlund illuminated drum dial
6 Benjamin Cla-Ra-Tone sockets, No. 9040.
2 Amperites, No. 1-A, R7 and R8
1 Amperite, No. 112, R9
3 Acme Parvolt ½ mfd. series A bypass condensers, C5, C6 and C7
1 Carter No. 1R-6 "Imp" rheostat, R11
1 Carter No. 2-A "Imp" battery switch, SW
1 Sangamo .00025 mfd. fixed mica condenser, C8
1 Sangamo .001 mfd. fixed mica condenser, C9
1 pair Sangamo grid-leak clips
1 Durham metallized resistor, 2 megohms, R10
1 Yaxley No. 660 cable connector and cable, P
3 Eby engraved binding posts

frequency amplification has been added. In its present form it includes three stages of tuned radio frequency amplification, a non-regenerative detector and two stages of transformer-coupled audio frequency amplification.

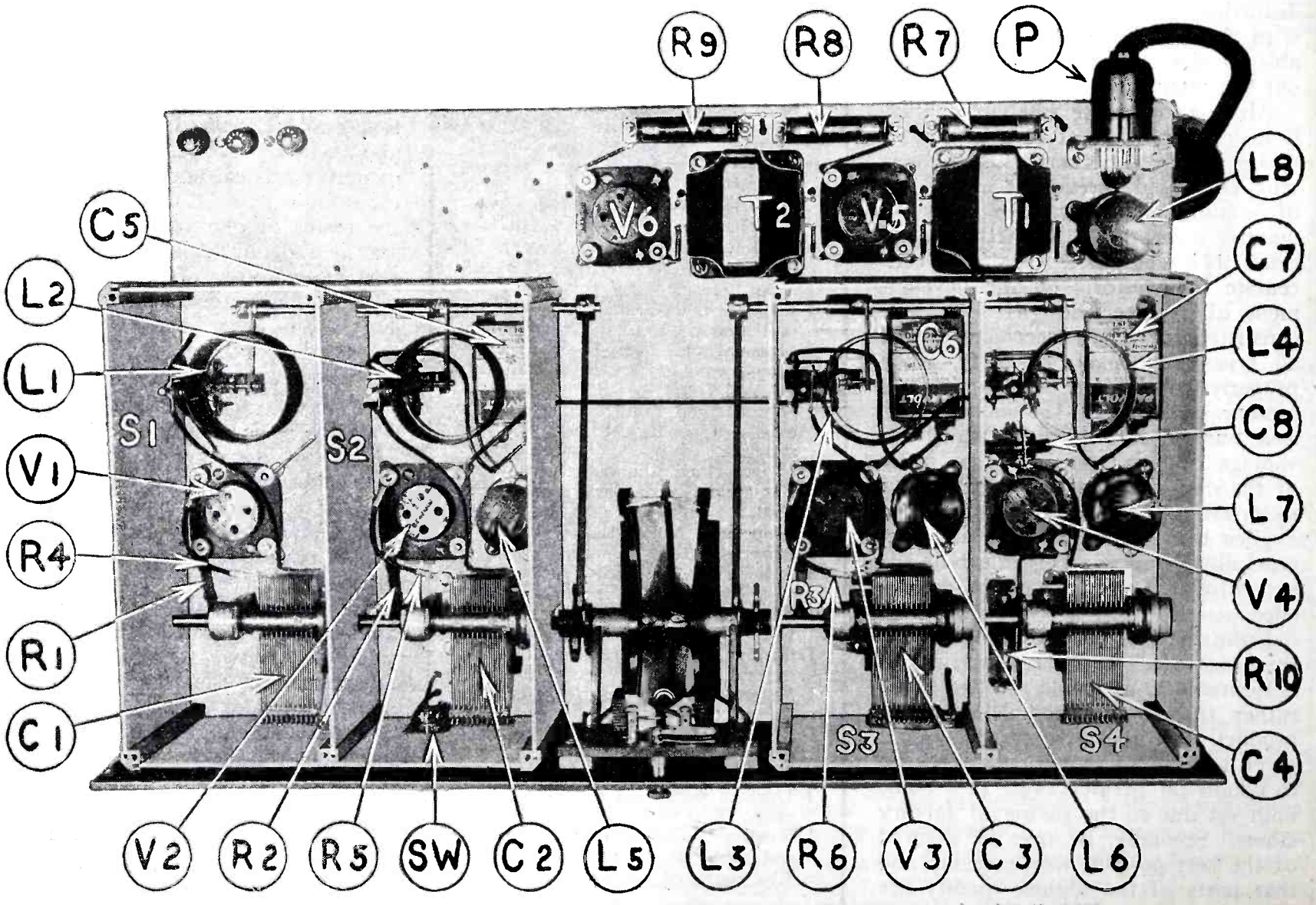
In describing this set the expression 'custom-built' is used, and it should be explained that this term has been selected advisedly. The set may be compared with the custom-built automobile of today which incorporates all the features of the best of the quantity production cars plus many exclusive refinements. This set is the joint creation of ten well-known radio laboratories which have concentrated their engineering skill on the production of a receiver which gives the finest possible results. Each laboratory specialized on perfecting one particular part of the circuit and as a result every feature of the design has received the proper consideration.

Before entering into a description of the construction of the receiver the various electrical and mechanical features and the way in which they have been attained will be considered. In this connection it should be explained that six important claims are made for this receiver. They are: adequate selectivity for all receiving conditions, highest possible sensitivity, excellent tone quality, mechanical perfection, pleasing commercial appearance and ease of construction and adjustment.

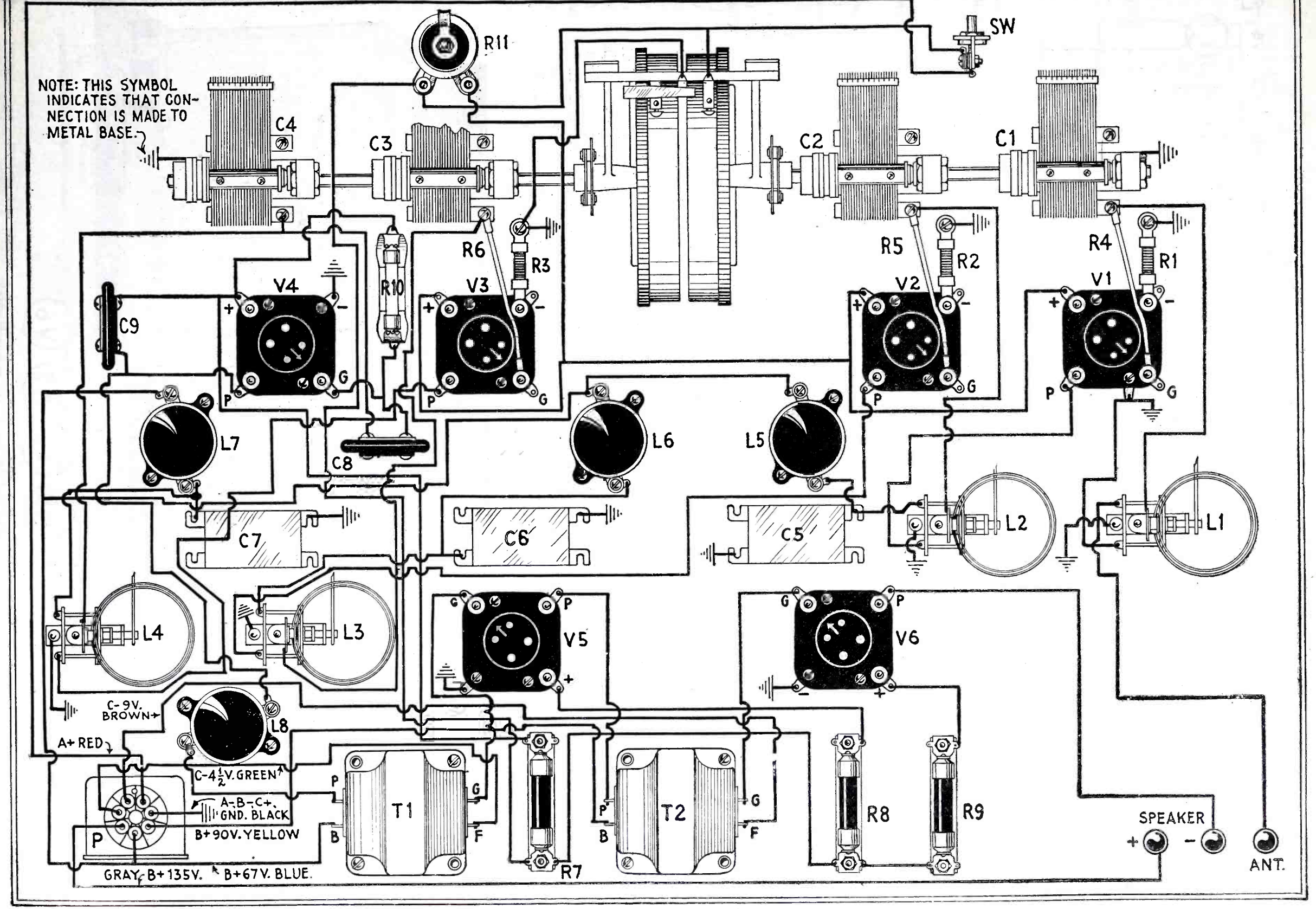
In every radio receiver, obtaining the proper degree of selectivity is by far the most important consideration. Too much selectivity is just as detrimental to reception as the lack of selectivity. Although broadcasting stations are assigned a particular frequency their signals actually cover a band of frequencies approximately 10 kilocycles wide, due to the fact that voice frequencies up to 5,000 cycles are transmitted regularly. Therefore, if a receiver is too selective it will cause distortion of the music by excluding the higher voice frequencies. This phenomena is known as "cutting sidebands." On the other hand, if a set tunes too broad or is lacking in selectivity interference will be experienced from stations operating on adjacent wavebands. In this case the rule which applies is, as the selectivity is increased the sensitivity decreases, and vice versa.

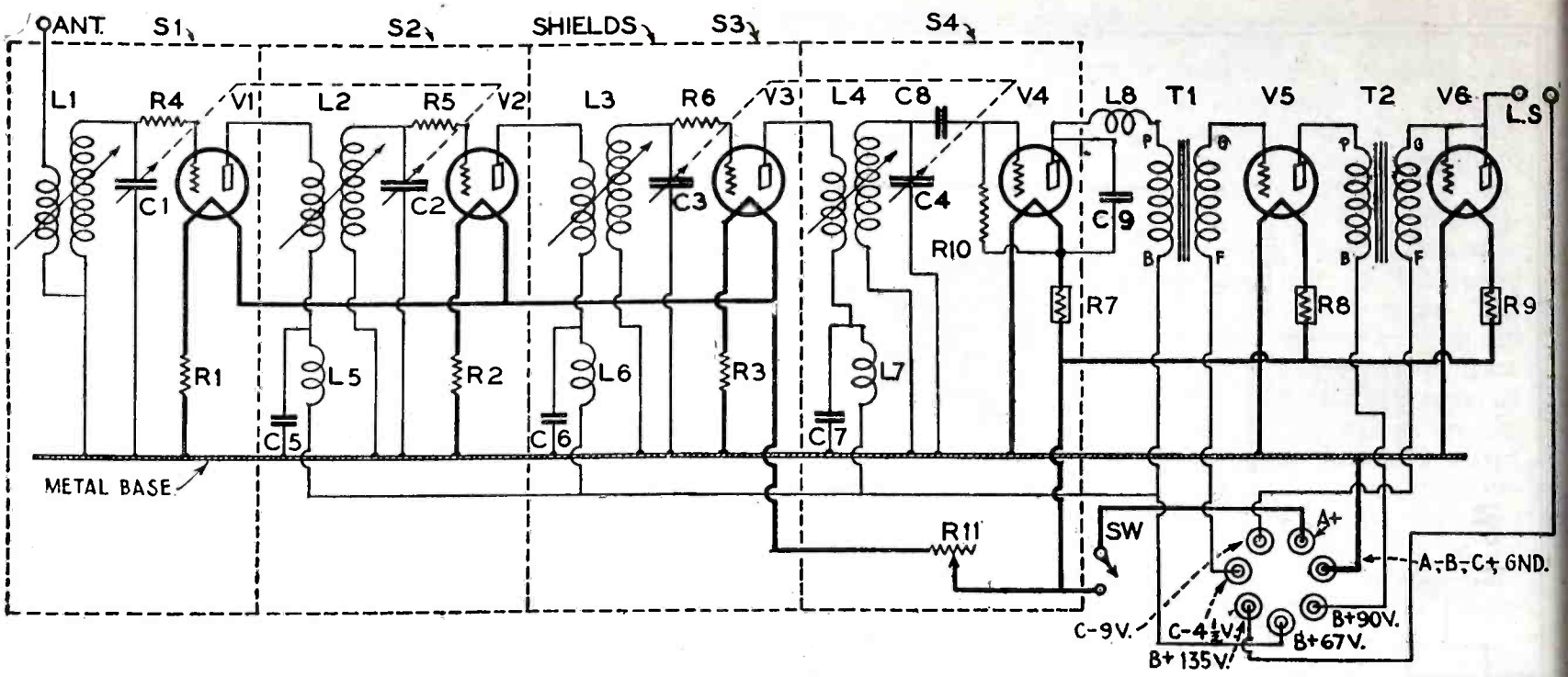
From the above it may be seen that the correct design of the radio frequency circuits determines the three most important characteristics of a receiver,—viz, the selectivity, sensitivity and tone quality, and in the new Hi-Q the greatest care was exercised when developing this part of the set. The use of three totally-shielded correctly designed stages of tuned radio frequency amplification connected in cascade has produced a receiver which has no tendency to cut side bands and which is sharp enough to prevent interference from other stations even in the most congested districts. Three tuned stages also assure ample sensitivity, but an additional feature has been added which has made the sensitivity uniform on all wavelengths within the broadcast waveband. As it is the tendency of all sets to be more sensitive on the short waves than on the high waves a mechanical arrangement has been devised which automatically increases the coupling between the coils as the wavelength is increased which compensates for the normal loss of selectivity.

Best possible tone quality is also assured by the design of the audio circuits of the receiver. Two stages of transformer coupled audio frequency amplification are employed and the best apparatus has been used throughout. The transformers which have been selected are of the highest quality and provide practically distortionless amplification. Use of a power tube in the last audio stage also prevents distortion which might be caused by overloading.




**A top view of the Custom-Built Hammarlund-Roberts Hi-Q Six. Note how the rocker arms are arranged within the shielded compartments, S1, S2, S3, and S4. All other components are clearly indicated with letters and numerals corresponding with diagrams.**





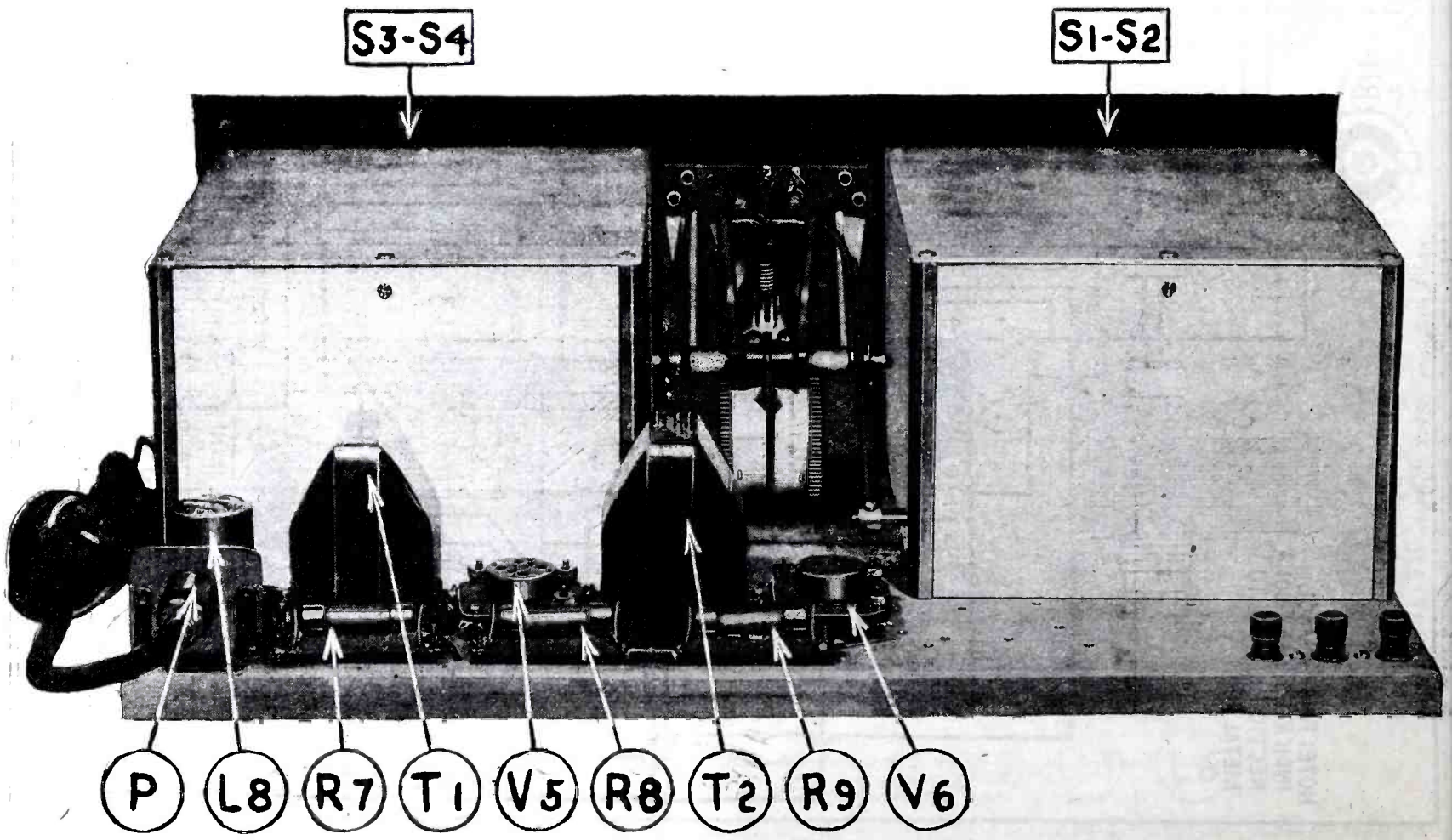

**The schematic wiring diagram of the receiver is shown above. All parts are clearly indicated to correspond with the picture diagram, photos and list of parts.**

The schematic wiring diagram of the Hi-Q receiver will be found in the illustration directly above. First it will be noticed that the three radio frequency stages (S1, S2 and S3) and the detector circuit (S4) are totally shielded. In the diagram the dotted lines which enclose each stage show the apparatus and wiring which is located within each shield compartment.

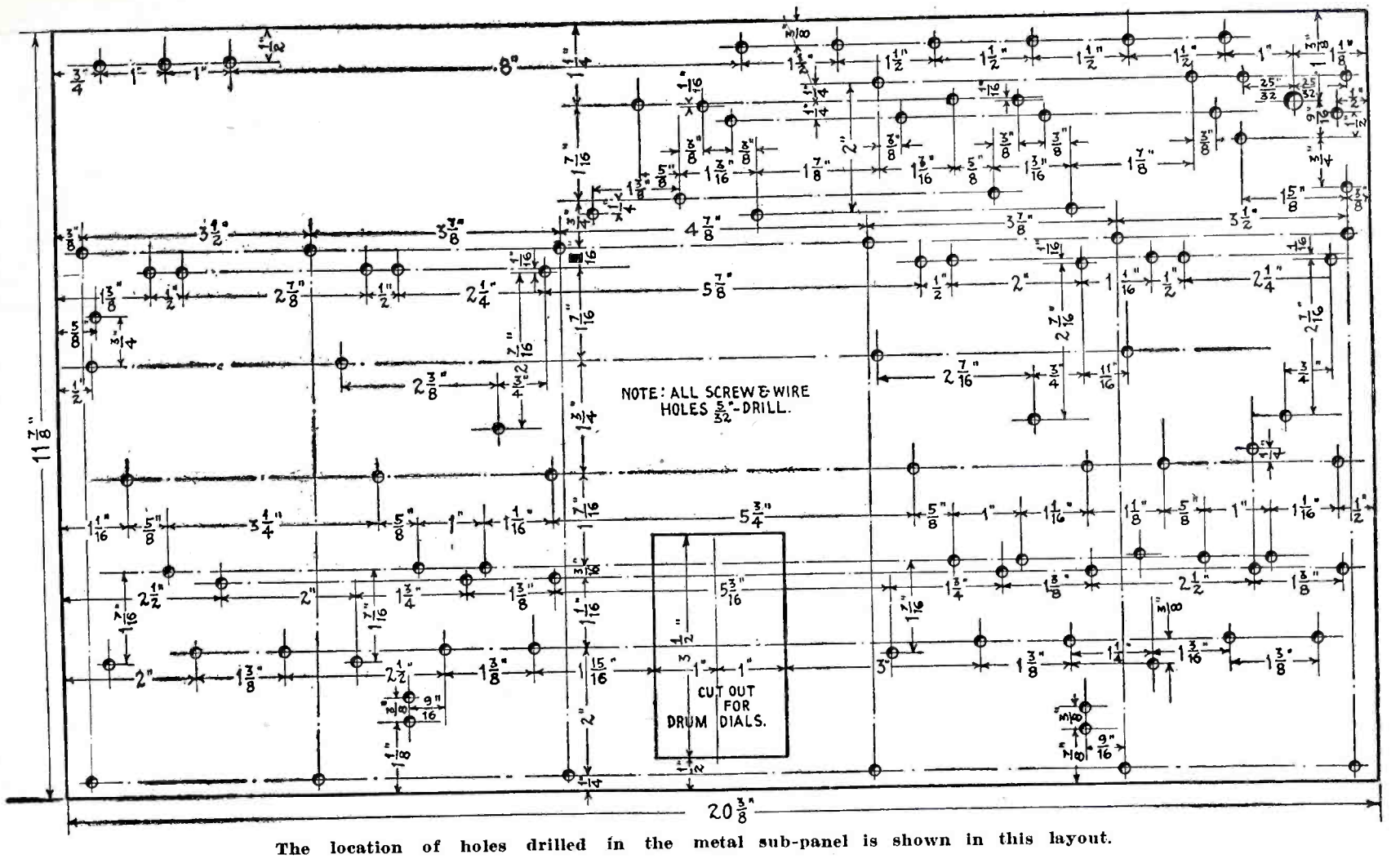
Electrically each of the four tuned circuits are alike in all important respects. The four radio frequency transformers (L1, L2, L3 and L4) of identical characteristics are used as the inductances of the circuits and these are tuned independently with four .0005 mf. variable condensers (C1, C2, C3 and C4). The adjustment of the condensers is controlled by a double drum dial. Condensers C1 and C2 are tuned with the left section of the dial and condensers C3 and C4 are tuned with the right section.

Coupling between the primary and secondary windings of the radio frequency transformers is also varied by adjustment of the drum dial. On the short wavelengths the coupling is very loose and as the wavelength is increased the coupling increases. The variable coupling feature is entirely automatic and is accomplished with cams which are connected with the dial. Therefore, as the condensers are tuned the coupling is adjusted at the same time.

Another interesting refinement in the radio frequency circuits is the use of the three radio frequency choke coils (L5, L6 and L7) connected in the plate supply circuit of tubes V1, V2 and V3, and the three by-pass condensers C5, C6 and C7 connected between the plate winding of the transformers and the filament circuit. The choke coils prevent interstage coupling from taking place in the plate supply wires and in this way



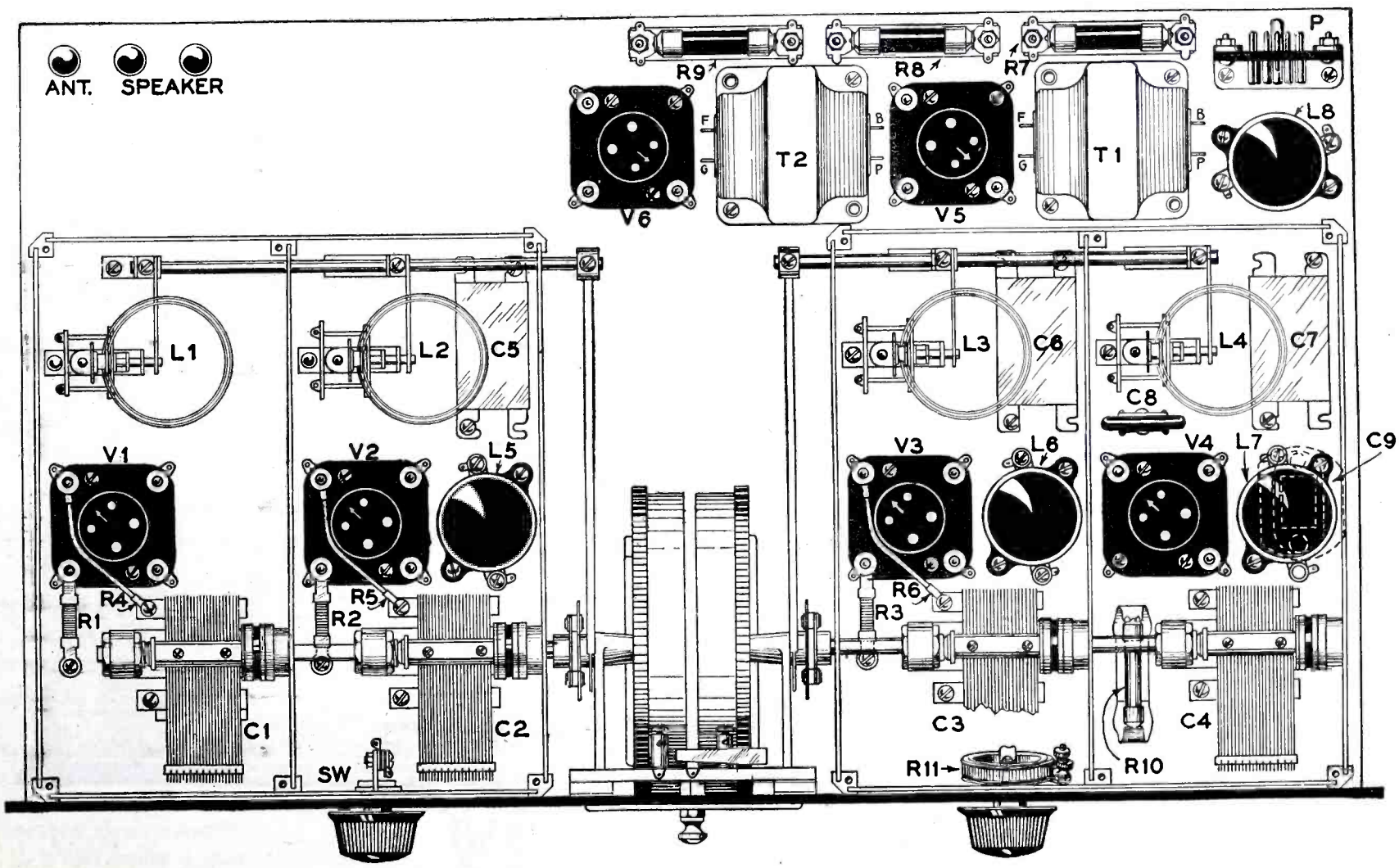

**A rear view of the set with the covers on the shielded compartments. The audio transformers, sockets and amperites are mounted on the rear of the sub-panel outside of the compartments.**



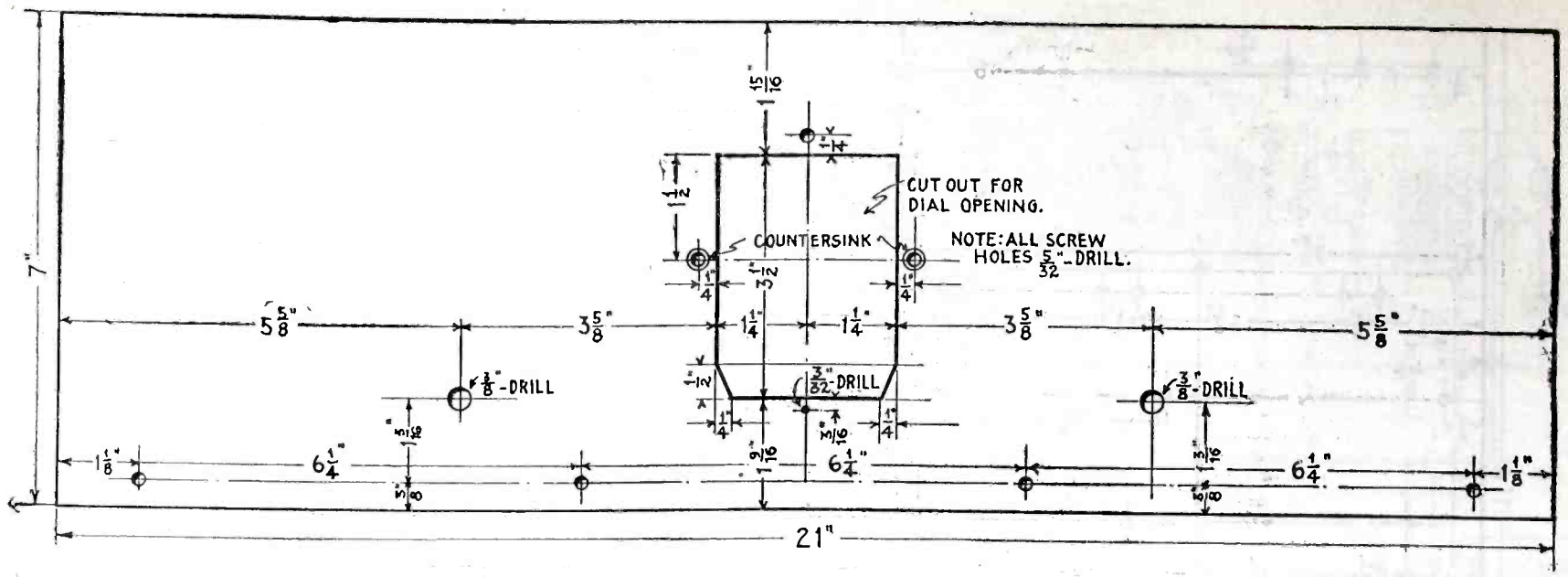

**The location of holes drilled in the metal sub-panel is shown in this layout.**

avoid another form of distortion and the condensers provide a low resistance path between the plate and the filament for the radio frequency currents. The choke coil L8 and the bypass condenser C9 in the detector circuit help prevent distortion by keeping the radio frequency currents out of the audio circuits.

Thre three fixed resistors (R1, R2 and R3), which are wound on small fiber strips, serve two important purposes in the operation of the receiver. In the first place they cause a drop in voltage which is used to bias the grids of the three radio frequency tubes (V1, V2 and V3), and secondly, they limit the filament voltage and prevent the filament from being overloaded if the rheostat is improperly adjusted. Resistors R4, R5 and R6




**The instrument layout as shown above gives the location of all parts. Complete wiring of the set can be followed according to the schematic or picture diagrams.**




**Layout for drilling the front panel. All sizes of holes and dial cut-out are given.**

prevent oscillations in the radio frequency stages. They are wire wound and are connected between the grid and the condenser of each of the radio frequency circuits. In the detector circuit C8 and R10 are the grid condenser and leak, respectively. By connecting the leak between the grid and the filament the output of the tube is increased and another cause of distortion is avoided.

A filament rheostat connected in series with the three radio frequency tubes serves as the volume control of the receiver. This system has the advantage of reducing the volume before the detector and audio circuits and in this way prevents overloading which might cause distortion. In the detector and audio circuits the filament voltage is controlled by automatic rheostats (R7, R8 and R9) which do not require adjustment.

Ease of construction and adjustment is one of the six claims made for this receiver, but after reading the description of the steps which are taken in the construction the truth of the statement will be more fully appreciated. If the parts specified in the accompanying list are used no difficulty of any kind should be experienced. With the exception of the apparatus on the front panel all parts are assembled on a metal chassis which is drilled with holes in the proper position for all mounting screws and wiring. The front panel is made of micarta and this is also drilled with holes for the necessary parts and mounting screws.

When all of the parts have been mounted the chassis and front panel are fastened together and the wiring

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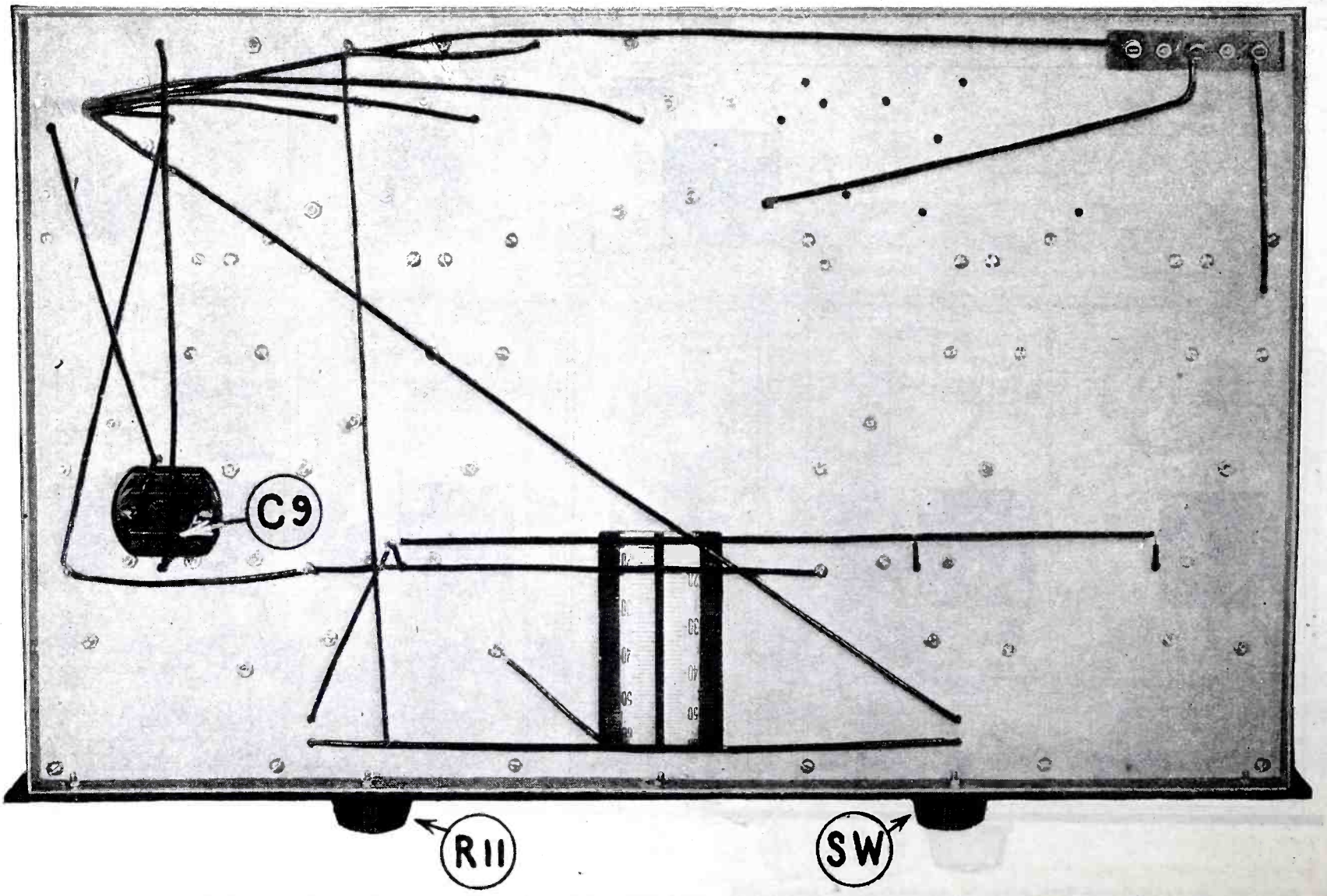
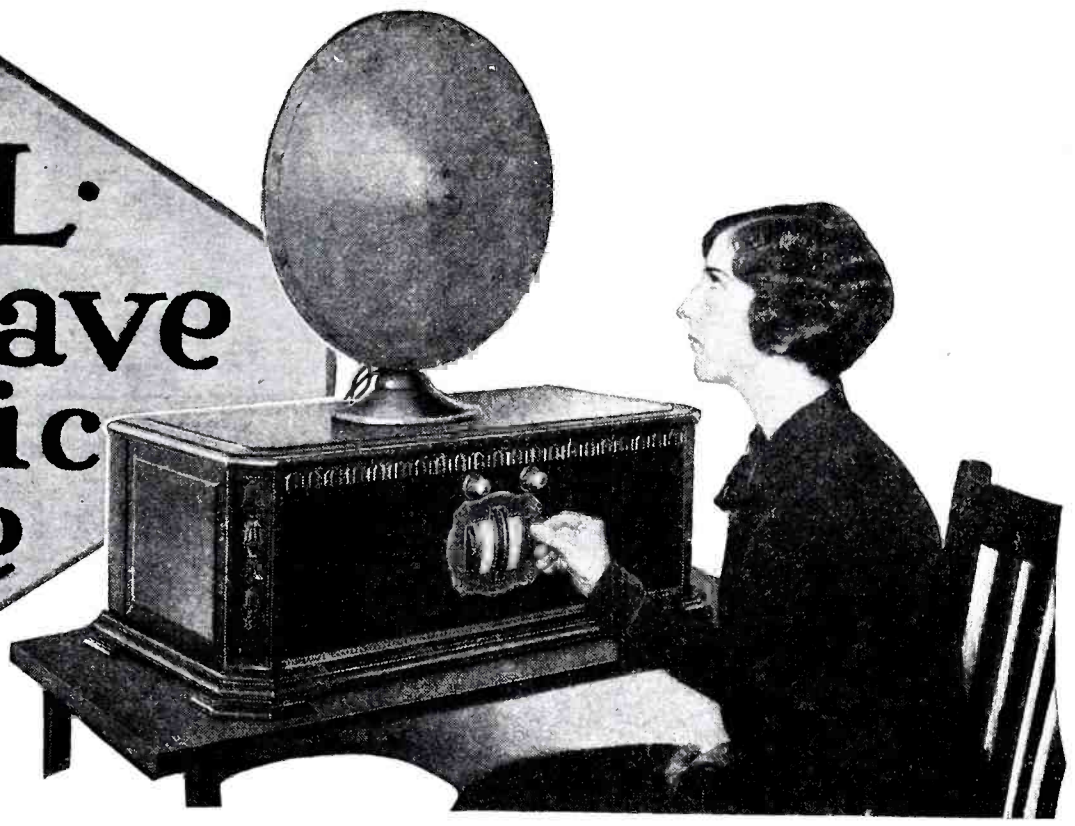



**A bottom view of the set showing the wiring and connections to condenser C9 and binding posts.**

# The R·E·L· All-Wave Electric Nine



EVERY feature and every device that is known to be the best in radio has been used in the design of the R.E.L. All-Wave Electric Nine in order to make it efficient. This receiver is of the most advanced design and should be of interest to those who desire a set which is the last word from every standpoint.

The main features incorporated in the R.E.L. 9 receiver are, first: complete electrification without any hum, and without the use of complicated balancing arrangements in the circuit. Second: great sensitiveness, due to the use of the "modulation" system originated by the author and used in his previous designs. Third: selectivity sufficient to separate stations only 10 kilocycles apart without distortion. The set is capable, for instance, when operated in New York City, of receiving station WSM on 880 kilocycles at the same time that WLS on 870 kilocycles is operating, with WGBS, a local station, on 860 kilocycles going at the same time. Fourth: the sensitiveness is even all along the broadcast - frequency band. Fifth: plug-in coils are used in order to permit the reception of short-wave broadcast or amateur stations on the set proper, without any external adapting devices. The change of wavelength is accomplished by merely changing the coils. Sixth: a high-quality audio amplifier is incorporated into the receiver, producing marvelous quality.

The quality and volume are enhanced by the use of a push-pull amplifier in the second audio stage. This permits the reception of a band or orchestra with full volume and with excellent quality. All those who have witnessed demonstrations of the R.E.L. 9, when using a good loud speaker, were amazed at the truthful reproduction possible with this amplifier arrangement. The power supply and push-pull amplifier are built as a separate unit and may be used with any other receiver; a feature which should be of interest to those owning more than one set. It is possible, by merely plugging the output of the receiver into the input of the power unit, to operate the loud speaker from any set and get the full volume and all the advantages of push-pull amplification, in addition to the necessary "B" and "C" voltages.

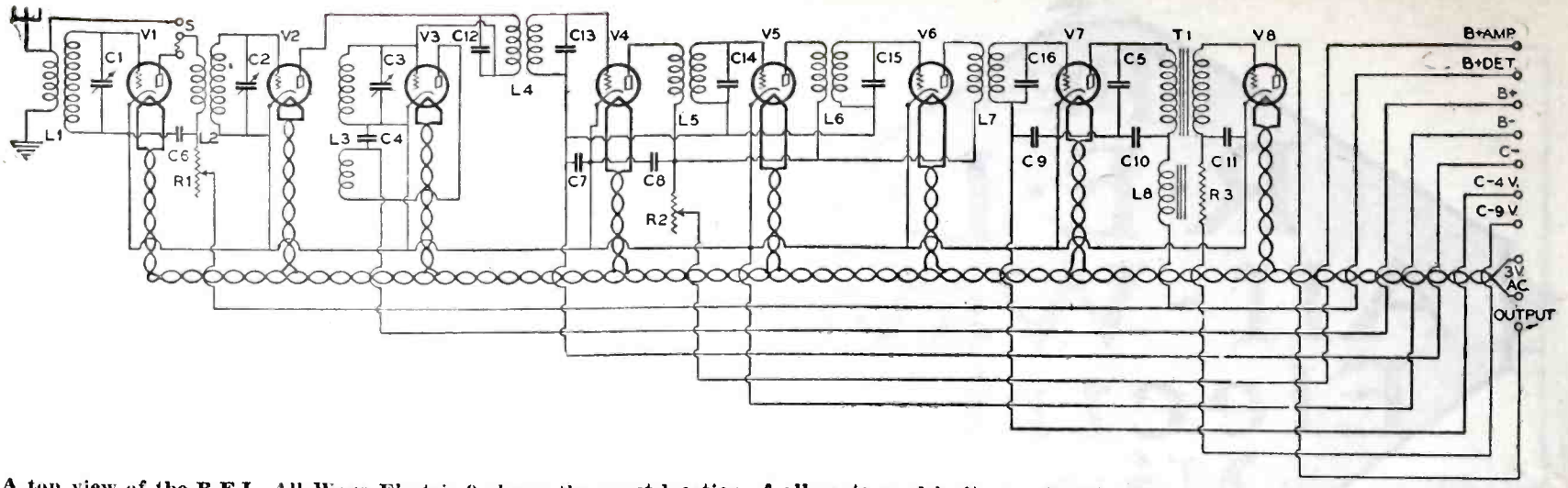
The radio-frequency part of the set is shielded, and drum dials are used for the control of the tuning condensers. The tuning is extremely simple, as only two small knobs are used, in addition to the main tuning dials. One of these is a volume control, and the other a sensitivity control regulating the action of the amplifier. Last, but not least, the set is extremely easy to build and the wiring very simple.

In the ordinary type of superheterodyne, the first tube employed as a frequency changer is connected like a detector; with either a grid condenser and grid leak, or a "C" battery. This detector rectifies the incoming signal after it has been heterodyned, and the variation caused in the plate circuit is amplified through a long-wave radio-frequency amplifier.

In the system to be described a new principle is made use of; this, which has been called the modulation system, causes *the incoming signal to modulate the oscillations produced locally*, in the same way that the speech modulates the output of the oscillator tubes in a radio-telephone transmitter. This system, which is a departure from the conventional detector arrangement, is not only more simple, but produces a greater signal strength, which is more noticeable on weak signals.

### LIST OF PARTS

1 Formica panel, 24x8x¼inches
1 Formica sub-base panel, 25½x12 x¼ inches
2 Alcoa stage shields
1 Tyrman drum dial
3 Hammarlund .0005 mfd. variable condensers, C1, C2, C3
2 Hammarlund extension shafts
8 R.E.L. coil sockets
1 Sangamo audio transformer, 3 to 1 ratio, T1
1 Thordarson audio choke, L8
4 R.E.L. plug-in coils, type F, L4, L5, L6, L7
2 R.E.L. plug-in coils type B1, L1 L2
1 R.E.L. plug-in coil, type B2, L3
5 R.E.L. Matched .00025 mfd. fixed condensers, C12, C13, C14, C15, C16
1 Sangamo .001 mfd. fixed condenser, C4
1 Sangamo .002 mfd. fixed condenser, C5
4 Acme Parvolt .5 mfd. by-pass condensers, 400 volts, C6, C7, C8, C9
2 Acme Parvolt 1 mfd. by-pass condensers, 400 volts, C10, C11
10 Eby binding posts
1 Lynch fixed resistor, 100,000 ohms, R3
1 Lynch grid-leak mounting
2 Clarostats, R1, R2
2 Yaxley tip jacks
2 Yaxley tip plugs
8 Benjamin tube sockets
8 Sovereign AC tubes, V1, V2, V3, V4, V5, V6, V7, V8
1 Formica binding post strip
1 Formica strip for tip jack mounting.
50 feet Belden Colorubber wire
12 feet Belden bus bar wire
1 foot spaghetti
Assortment of screws and spacers




**A top view of the R.E.L. All-Wave Electric 9 shows the exact location of all parts used in its construction. L1 and L2, fi.F. transformers; L3, oscil- on the power unit when the set is placed in operation. The three tip jacks marked "S" are for plugging in coils to change the wavelength range of the set.**

The first tube, which is called the modulator, is connected across the oscillating circuit of the oscillator. Its plate-filament space is acting as a resistor, the value of which is varied by the incoming signal impressed upon the grid. In this arrangement no "B" battery is necessary; for the plate of the modulator tube is supplied by high-frequency current from the oscillating circuit. To receive continuous waves, this arrangement is very efficient; and it has been applied very successfully to the receiver described in this article. Greater sensitivity is obtained, due to the following difference between the two systems.

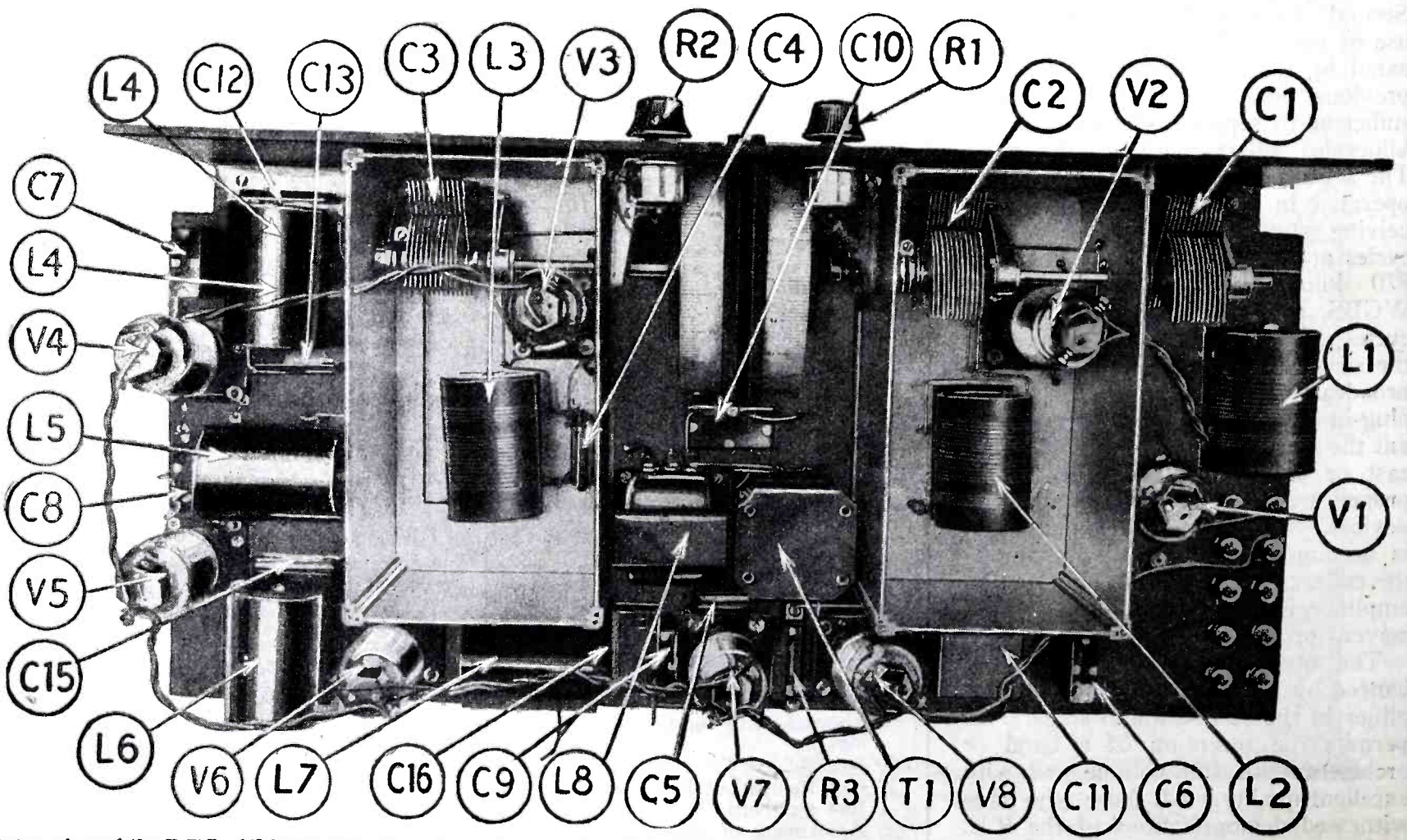
In a detector circuit composed of a tuned circuit, a grid condenser with grid leak and a vacuum tube, the action is as follows: during each half-cycle the current flows up along the coil, through the condenser, and from the grid to the filament. When the grid is negative, however, it cannot pass through the space between the filament and the grid, and the amount of electricity which is stored between the condenser and the grid cannot escape.

During the next half-cycle more current is added to what is stored, and so forth; each impulse making the charge on the condenser greater, and making the grid more and more negative.

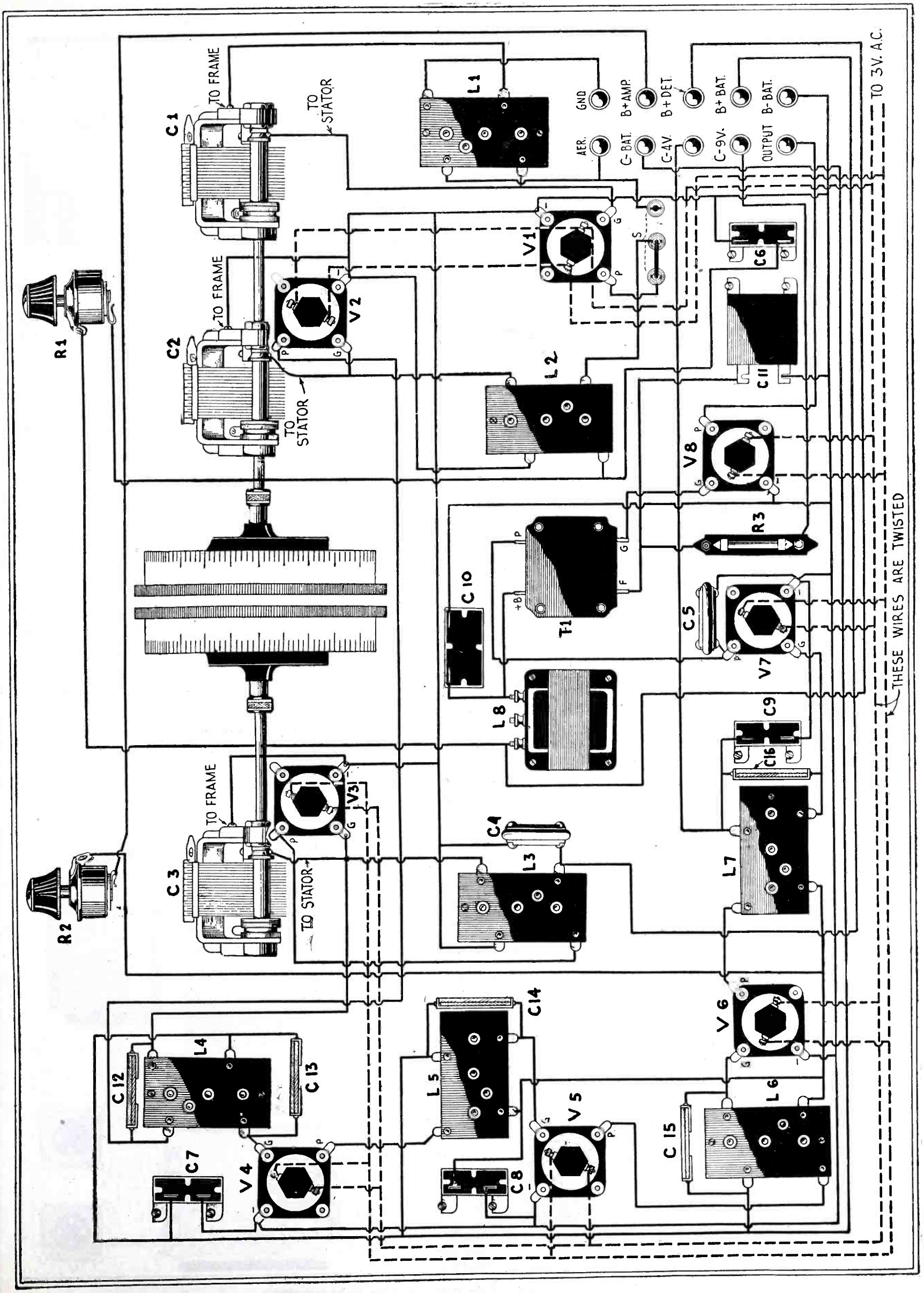
Now the effect of making the grid of a tube negative is to decrease the flow of electrons between plate and filament and, thereby, the "B" battery current flowing through the tube. This is exactly what happens in this case, and after a while the grid may become so negative that the plate current is decreased by steps to zero and no more signals are heard; in other words, the tube "blocks." To avoid this, a high resistance or "grid leak" is used across the grid condenser, to provide a path for the grid charge; part of which leaks through it, and thereby cannot reach the value which cuts down the "B" battery current to zero.

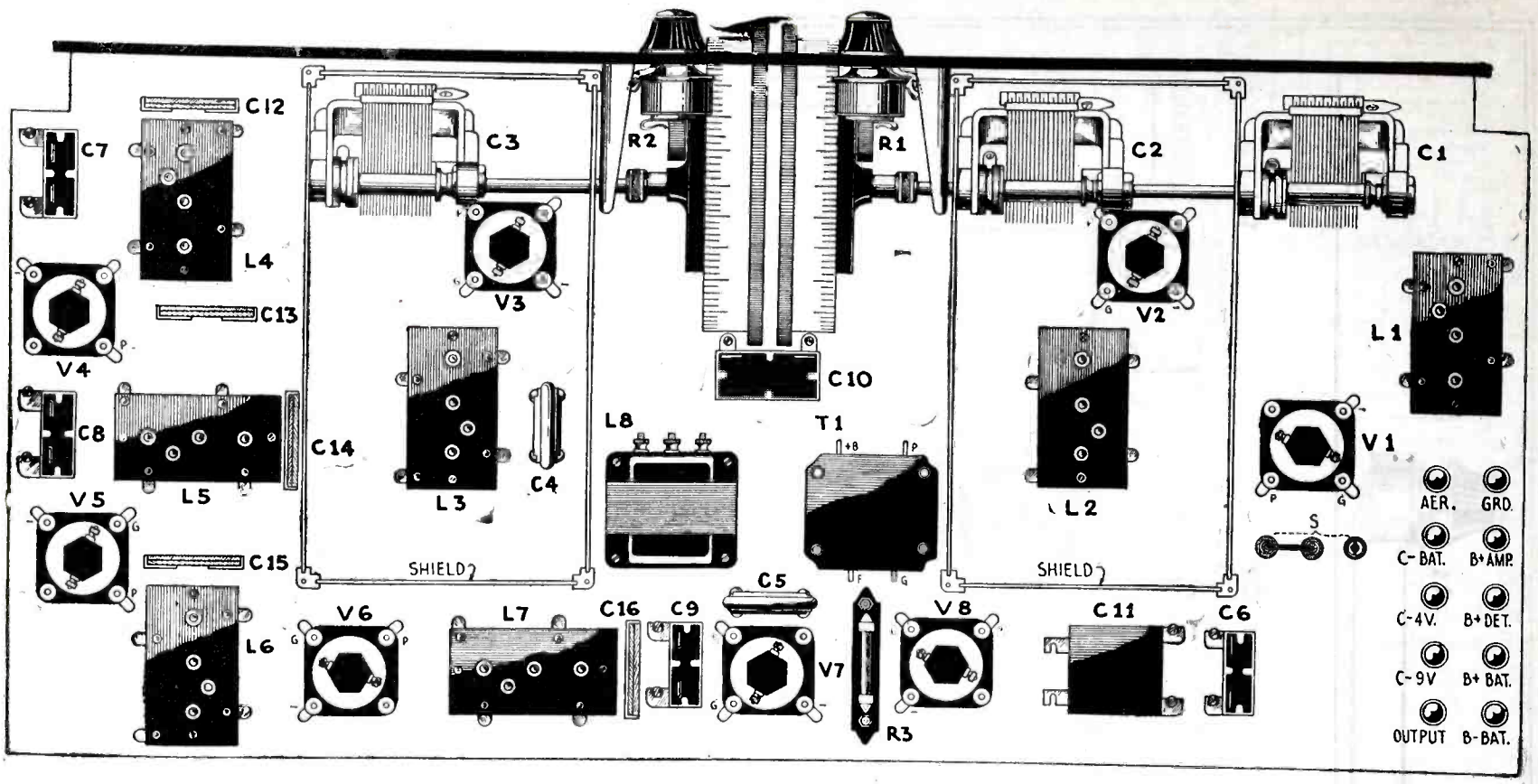
In this system of detection, the response is about equal to the *square of the applied voltage;* which means that, the weaker the signal, the poorer the efficiency. For instance if a signal of value 1 is applied to the detector, the response will be equivalent to the square of 1, which is only 1. If the signal strength is 2, the response will be 4; and, if it is 4, the response will be 16. As one may easily see the sensitivity is not equal for all signals.

In the modulation system the re-




**A top view of the R.E.L. All-Wave Electric 9 shows the exact location of all parts used in its construction. L1 and L2, R.F. transformers; L3, oscillator coupler; L4, L5, L6, and L7, intermediate-frequency transformers; C1, C2, and C3, variable condensers; T1, audio transformer; V1 to V8, A.C. vacuum tubes. The other parts may be identified by referring to the list of parts on the preceding page.**






**The above illustration shows how the parts of the set are arranged on the sub-panel.**

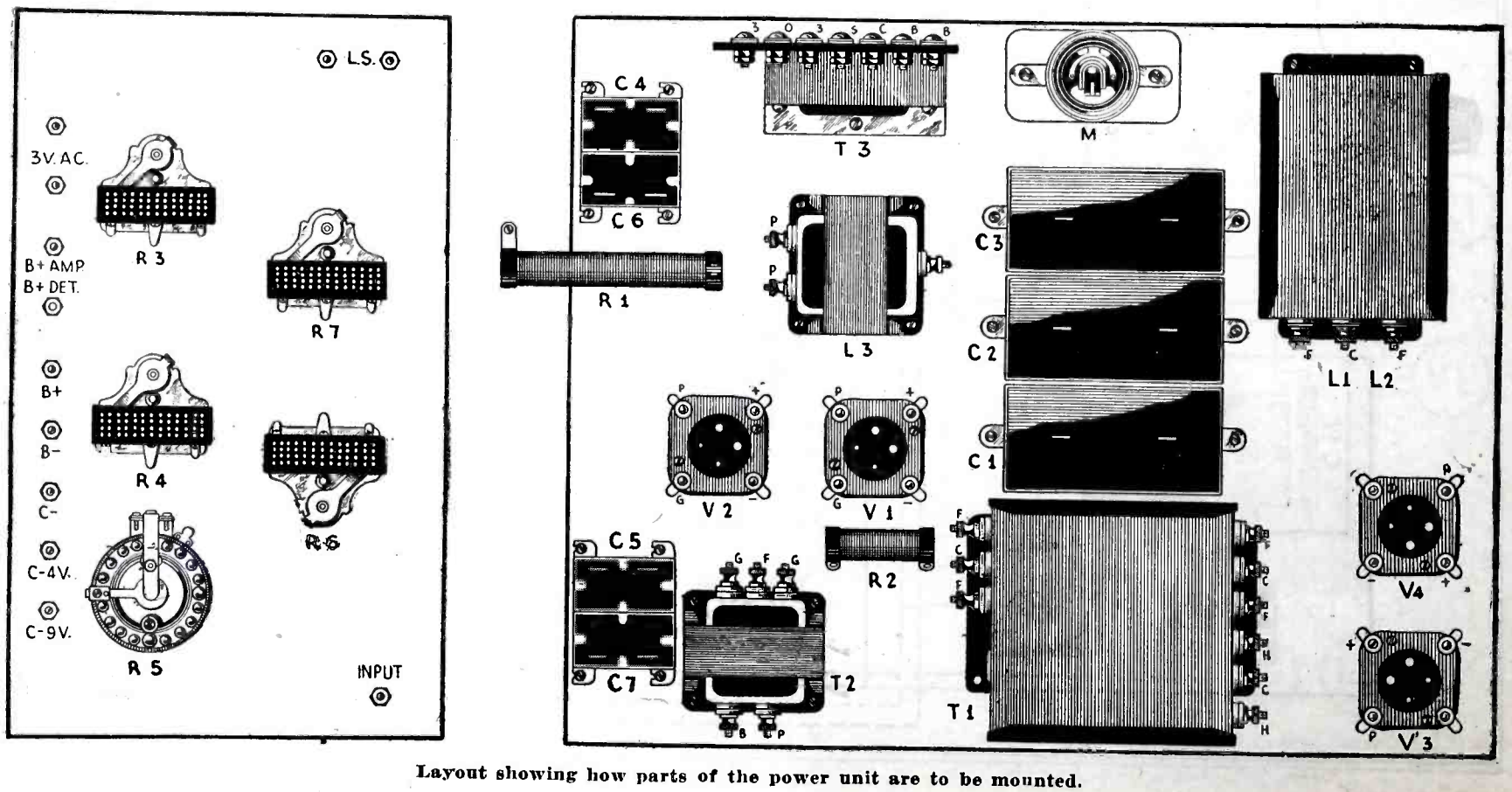
sponse is even, for strong or weak signals, and that is what makes it better. Normally, when the set is in operation but no signals are received, the resistance of the modulator tube maintains its average value; but as soon as a signal is impressed upon the grid, the voltage on this grid varies and this, in turn, varies the internal resistance of the tube within wide limits, causing plate-current variations of a much greater order of magnitude than is the case with a regular detector. At the same time no matter how small the impressed signal, a response in direct ratio to the impressed voltage is obtained.

Another advantage of this circuit is that the tube, operating with high frequency on the plate, produces better rectification; because the modulated plate current increases from zero to a given value during each of the positive half cycles instead of merely varying from an average value in accordance with the square of the applied voltage as explained above.

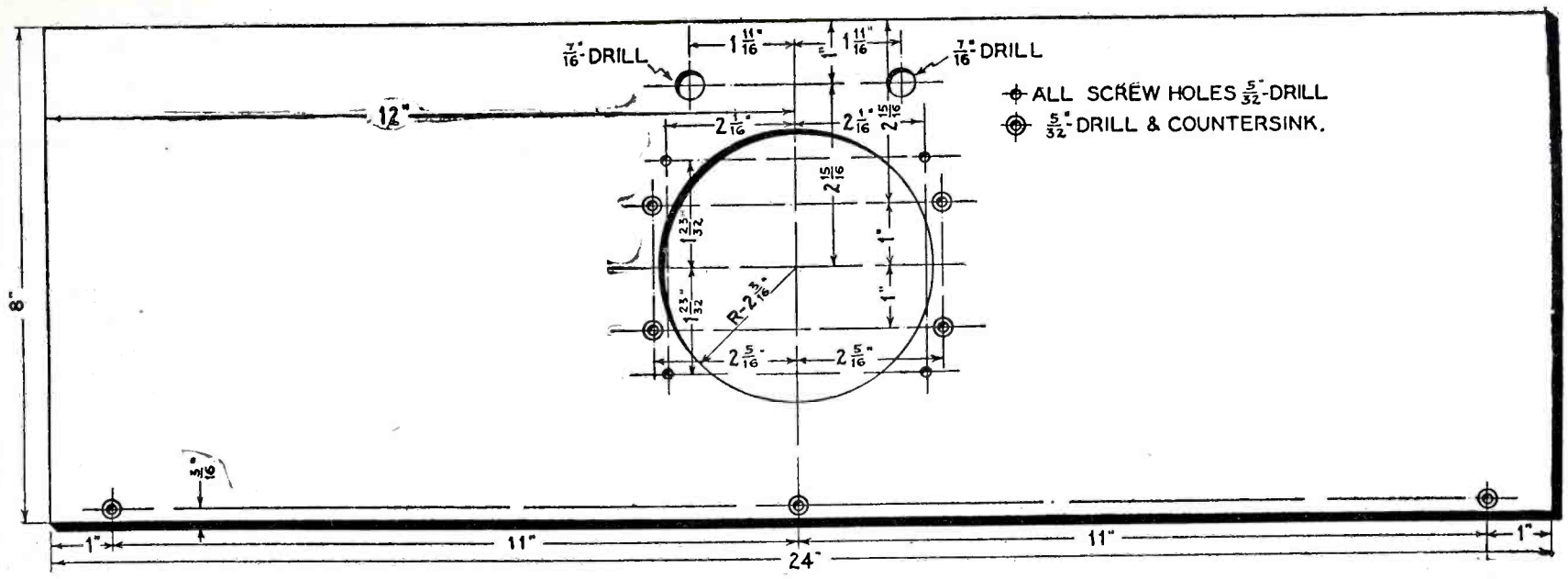
In practice it is found that a very weak signal, which is not heard at all or only faintly when a detector is used, is received with good volume with the modulation arrangement.

The R.E.L. 9 incorporates also ahead of the modulator, a stage of radio frequency, which, in addition to increasing the signal strength, sharpens the tuning and prevents stations from being heard at more than one setting on the dial when the dials are revolved simultaneously — as they should when tuning.

In addition the radio-frequency tube, which is controlled by the left upper knob on the panel, may be made to regenerate the signal—which results in tremendous sensitivity on weak signals. When receiving loud signals from local stations the R.F. tube may




**Layout showing how parts of the power unit are to be mounted.**



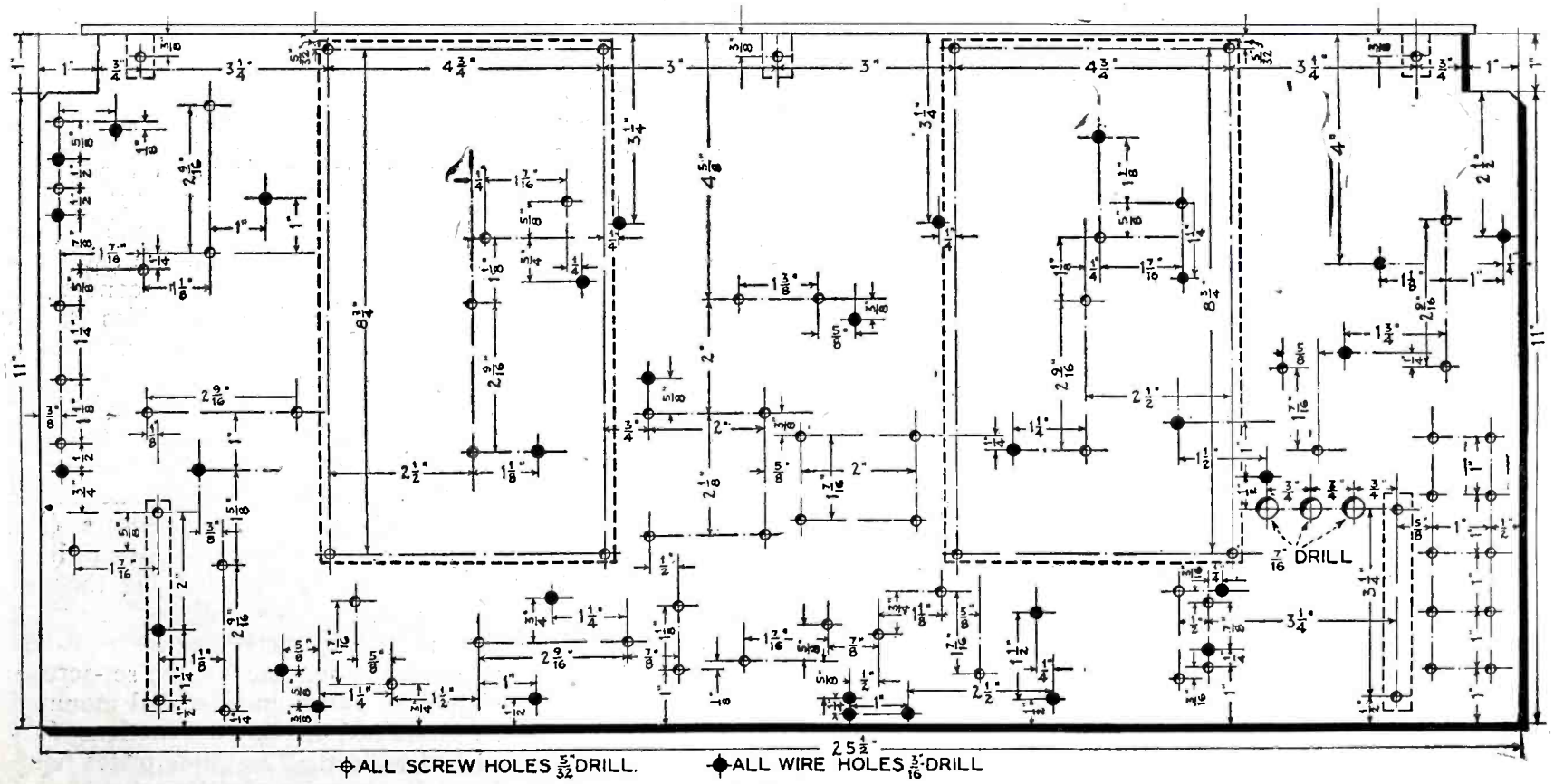

**Details for drilling the front panel. The large hole for the drum dial may be cut by drilling around the circumference of the circle.**

be controlled to act as a volume control, thereby permitting even and gradual amplification on all stations.

The first steps in assembling the R.E.L. 9 are to drill the sides of the aluminum shields, as shown in the drilling layout, to mount the variable condensers on the partitions and to pass the shaft through the sides of these shields. The position of the holes is important, and one should be careful, when tracing the side of the shield, to use an accurate ruler to measure the distances from the side and from the bottom of these aluminum partitions. The exact position of each hole should be marked with a center punch, and drilling to the size indicated in the diagram.

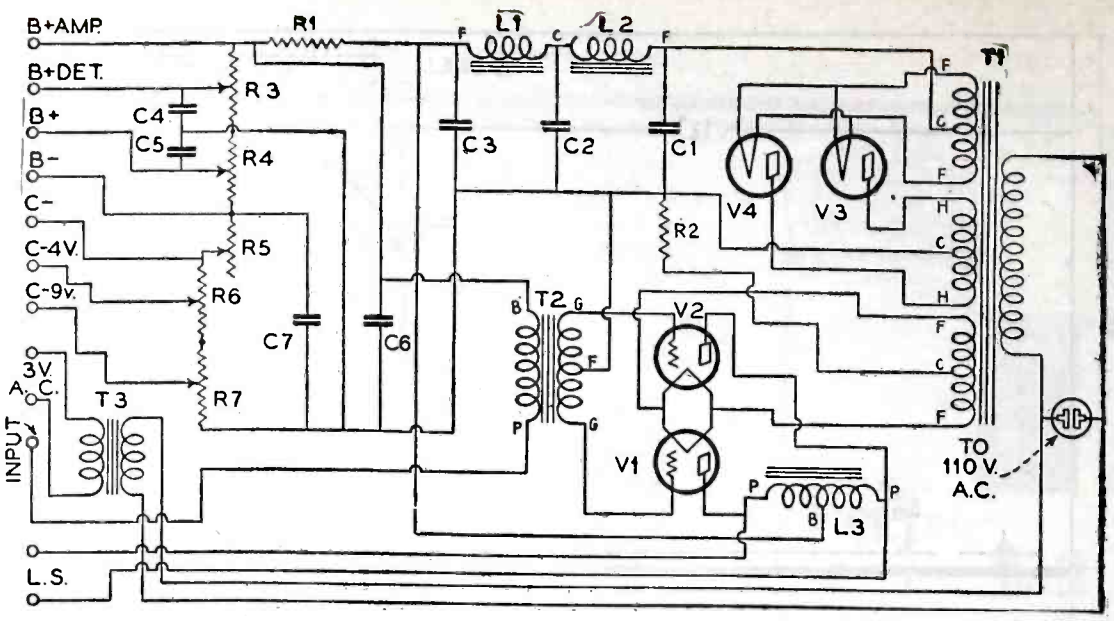
The next step is to drill the front panel; which is comparatively simple, since there are only two mounting holes at the top, three holes for the fastening screws, and one large opening for the drum dials. The latter, if no "fly cutter" is available, may be cut out around a circle which should be traced on the panel. The small spaces remaining between these may be cut out by means of a small saw; the large disk of bakelite will then come out easily, leaving the large opening required for the dial mounting. With a half-round file it is easy to even up the edge of the hole and make a smooth-looking job of the panel drilling. The next step is to lay out the drilling of the sub-base panel. The receiver described in this article uses a formica sub-base; all parts, including the binding posts and tip jacks, are mounted directly on this. However, if desired, a wooden base ½ inch thick may be be used if three precautions are taken; namely, two small formica panels must be used for mounting the binding posts and tip jacks, and the base must be raised with rubber feet in order to make it possible to locate the wiring under the base. Drilling the sub-base may be facilitated by tracing on a piece of paper a full-size template, which later can be applied on the panel. The ready-made full-size drawings, which are available to set builders, may also be used. Each of the holes should be marked accurately with a center punch and drilled. Many of the holes in the drilling layout are for the wires which run from the various parts to the binding post under the sub-base panel. The position of all the parts is shown exactly in the drawings.

The bottom of each shield is held in place on the baseboard by means of a tube socket, which, when fastened with a screw through the shield, holds the shield in place on the sub-base.




**Drilling layout for the sub-panel of the R. E. L. All-Wave Electric Nine.**

Be careful, when fastening the bottom of the shield, to have the front edge even with the edge of the baseboard to avoid gaps between the shield and the panel. It is important to mount these shields straight, in order that the long shaft of the condensers, which runs trough them, shall be exactly parallel with the panel in order to have the drum dial turn true. Before fastening the bottom of a shield on the baseboard by means of the socket, the four corner braces should be




**Schematic wiring diagram of the power amplifier and "B" unit for use in conjunction with the set.**

### PARTS FOR POWER UNIT

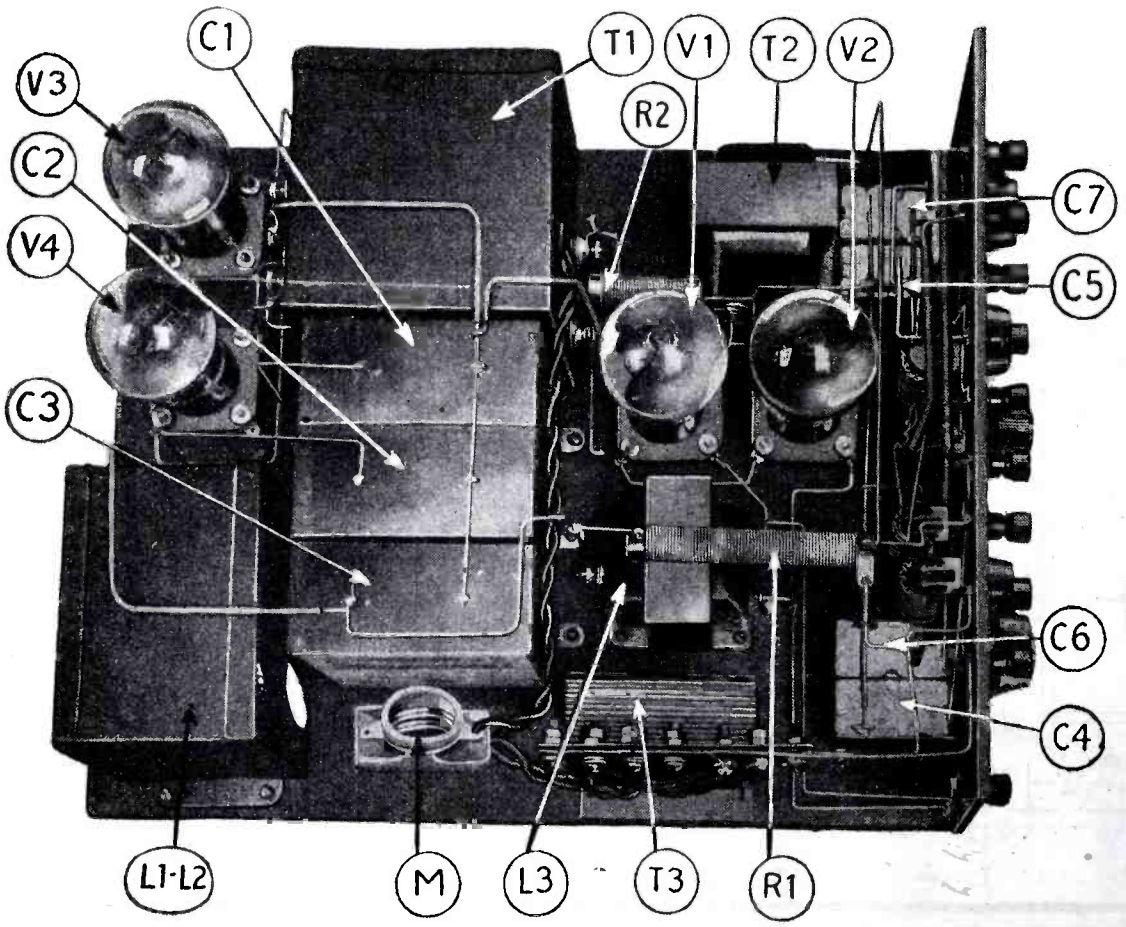
1 Thordarson power transformer, full wave, 210 type, T1
1 Thordarson audio choke unit, L1, L2
1 Thordarson push-pull audio transformer, T2
1 Transformer Corp. of Amer. No. 250, 3 volt secondary filament transformer, T3
1 Thordarson audio choke coil, L3
3 Acme Parvolt 2 mfd., 1000 volt filter condensers, C1, C2, C3
4 Acme Parvolt 1 mfd., 400 volt fixed condensers, C4, V5, V6, V7
4 Benjamin UX type sockets
1 Electrad Truvolt fixed resistor, 4000 ohms, 50 watts, R1
1 Electrad Truvolt fixed resistor, 750 ohms, 25 watts, R2
2 Electrad Truvolt variable resistors, 10,000 ohms, R3, R4
2 Electrad Truvolt variable resistors, 500 ohms, R6, R7
1 Formica front panel, 7x12x3/16 inches
1 Sub-base panel, 15x12x½ inches
1 Yaxley rheostat, 60 ohms, R5
12 Eby binding posts
20 feet Belden insulated hook-up wire
Assortment of screws
2 210 type power tubes, V1, V2
2 281 type rectifier tubes, V3, V4
1 110 Volt receptacle, M

mounted with four ½-inch 6/32 machine screws.

When wiring this receiver the pictorial wiring diagrams which accompany this article will be found a great aid. The drawing at the left shows all of the connections which must be made above the sub-base panel, and the diagram on the opposite page shows the wiring which is located under the sub-base. Holes must be drilled in the base to allow the wires to pass through; and the exact position of every hole is indicated in the drawings. When tracing the wiring, it will be found that corresponding holes in both drawings are marked with the same number and that, where more than one wire passes through the same hole, distinctive letters are used for identifying each wire.

To wire the set flexible rubber-covered wire should be used. If a wooden baseboard is used with a separate binding-post strip, this may be more conveniently left unscrewed from the baseboard in order to make soldering to the lugs easier. The wires run directly from these binding posts through holes in the baseboard to various points where they connect to sockets and other parts. One may start wiring first the "—" circuit, then the "C—" and the "B+" wires in succession. Complete wiring of the receiver is clearly shown and requires no further explanation. Needless to say, all the connections should be carefully soldered to make good contact and to avoid trouble in reception when the set is completed. This necessitates the use of a good soldering iron, some flux and good solder to make the proper connection. Rosin-core solder is recommended for this work.

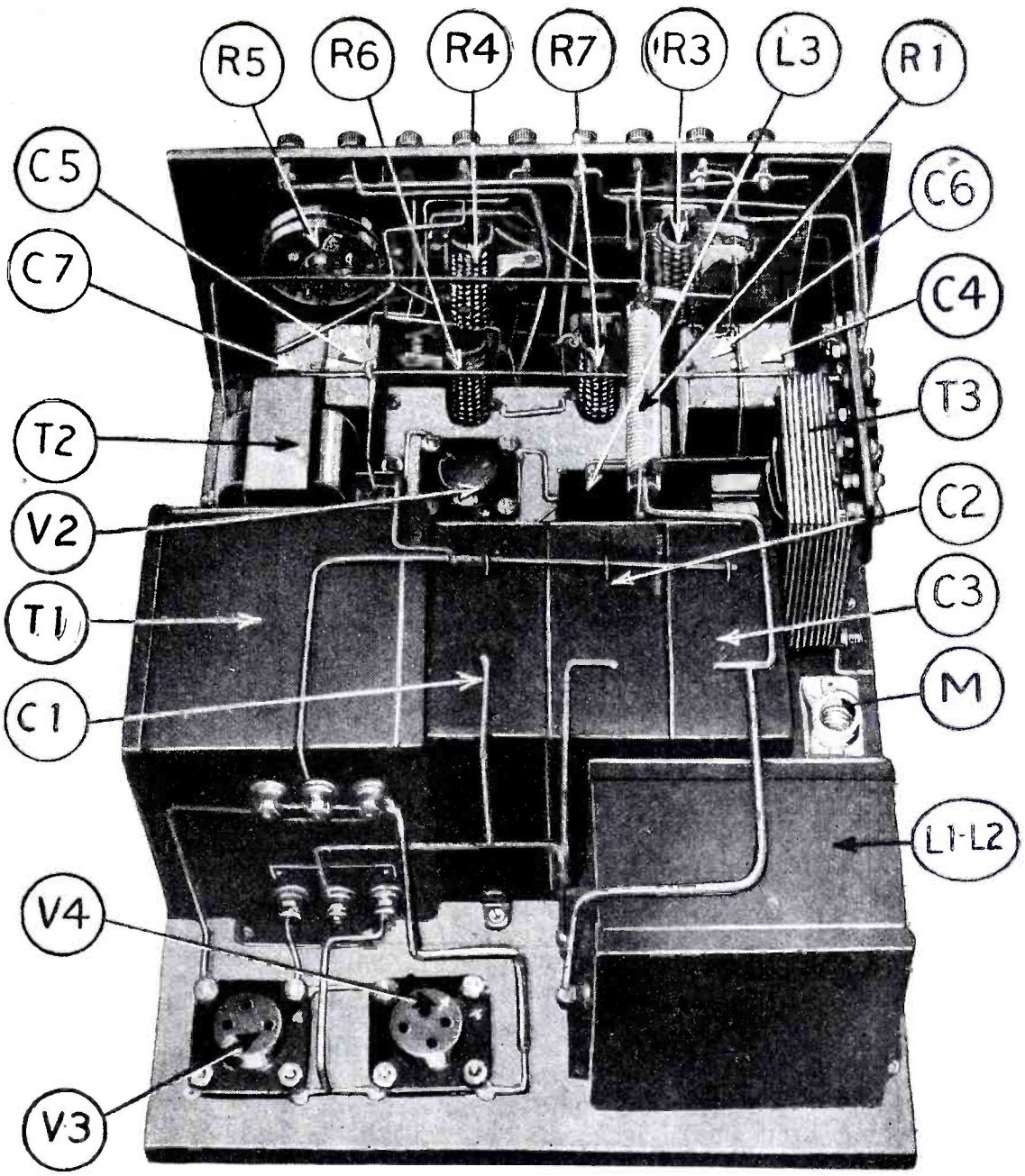
The wiring of parts on the baseboard is now made following the pictorial wiring diagram on page 77. Of course, here again soldering should be carefully done and the bus bar should be covered with spaghetti tubing, where it passes through the side of the shielding, in order to insulate it from the metal, which is connected to the "B—" circuit. Before the parts mounted inside of the shield are wired, the side partitions supporting the condensers should be placed in the slides of the corner braces, and the condensers connected with the sockets and the bases of the coils. To mount the dial, after the panel has been fastened to the sub-base panel, as shown in the drawing, the long extension shaft should be pushed through the condensers (the short shafts furnished with them have been removed by unscrewing the set-screws on the condenser rotors). After the long shaft has been pushed through the condensers, the set-screws should be reset, and the dial mounted as explained in the instructions furnished with it. The guide plates holding the vernier knobs should, of




**Another view of the power unit designed especially for the operation of the Electric Nine Receiver. When operating the power unit the 110-volt receptacle (M) is connected by a cord to a lamp socket, at which the set is turned on and off.**

course, be mounted on the front panel.

The first step in building the power unit and push-pull amplifier is to drill the panel supporting the variable resistors and binding posts, as shown in the accompanying drawings. After it is drilled, the resistors and binding posts are mounted as shown. The whole panel may then be wired before it is mounted against the baseboards, as it is easier to reach the back of the panel and solder the connection to the resistors while the panel is not fastened. After these connections are made with bus bar, the panel should be fastened against the baseboard and the rest of the parts (such as the condensers, power transformers, chokes, sockets, etc.) should be fastened on the wooden baseboard and wired as shown. It is preferable to use bus bar to wire this part of the power unit, because the connections are stiff and remain in place; and, since a rather high voltage is carried by some of these wires, it is better to use this method of wiring. On all the high-voltage wires it is a good precaution to put some spaghetti tubing, to avoid the danger of shock if any of these wires are touched. The connections between the set proper and the power unit are very simple to make, since all the binding posts are similarly marked on the set and the power unit. The output of the set is connected, of course, with the input of the power unit, and the loud speaker is connected with the two binding posts marked "loud speaker" on the left of the panel. The heaters of the A.C. tubes are connected to the A.C. posts on the power unit.



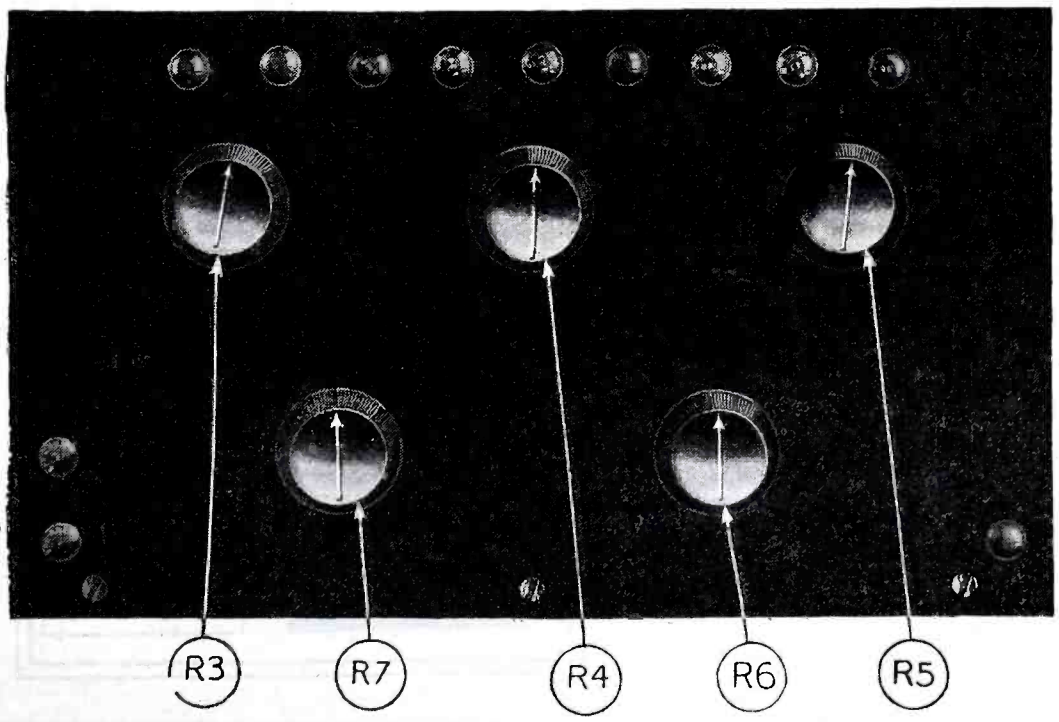

**General view of power unit showing arrangement of apparatus on the baseboard. The letters correspond to those in the circuit diagram on the opposite page and the list of parts.**

In order to tune in the broadcast wavelengths, the type B1 coils should be plugged in the left base on the sub-panel and inside of the left shield, and the type B2 coil in the right shield; the four type-F coils are plugged into the bases which are mounted on the right and back of the right shield. The two "pup plugs" should be connected together with a short peice of wire and plugged into the two left "pup jacks" behind the extreme left variable condensers.

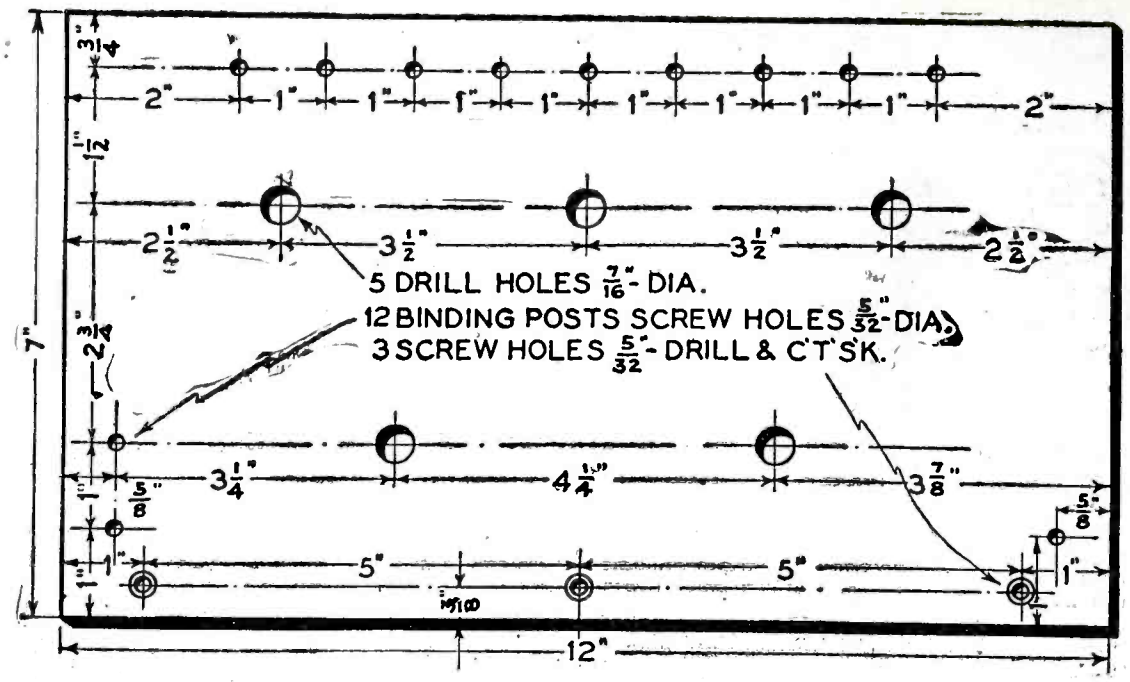
The A.C. tubes should be connected as shown in the diagram, with the supply leads taken in the center so that four tubes are connected on each side of the main leads to even up the distribution of the current along these leads.

To operate the set, adjust all the resistors on the power unit so that the sliding arm is about in the center on each, and set the rheostat so that there is a distance of about one-half inch between the zero position and the slider. This should alow the set to work at first. The resistance should be readjusted, of course, according to the voltage on the line in which the power unit is plugged. This is easily found, if no volt meter is available, by listening to the quality and volume of broadcast music through the loud speaker.

On the set, the upper left knob controls the volume on loud signals and also the sensitivity of the radio-frequency tube in the input circuit. It is of advantage to readjust this knob when receiving weak signals, in order to get the first radio-frequency tube to operate at maximum efficiency.




**View of the control panel of the "A, B and C" power unit used in connection with this receiver. The five knobs control the adjustment of the five variable resistors and the binding posts are connected to the similarly-marked posts in the receiver.**

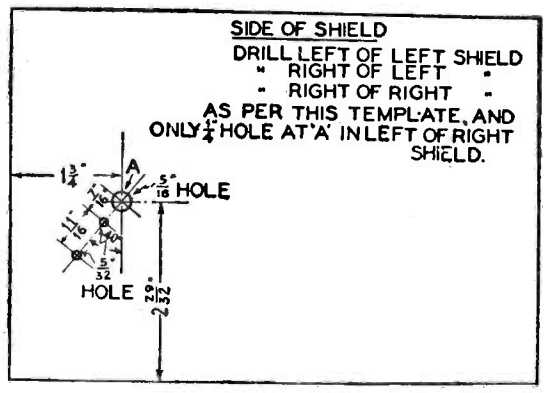



**Panel layout showing the exact location of all required holes in the panel of the power unit.**

The other knob controls the three amplifying tubes and should be adjusted until the signal is loudest and comes in best. The rheostat on the power-unit panel should also be reset for best results. The "B" and "C" voltages on all the taps increase as the knobs are turned to the left. (Anti-clockwise.)

The R.E.L. 9 will operate on any kind of an antenna, either indoor or outdoor; but, of course, for best results and maximum distance reception, a good outdoor aerial should be used. Any single wire about 50 to 120 feet long is ample. The ground connection taken on should be made on either a water pipe or a radiator. Before attempting to operate or even build this receiver, if you have not used other A.C. units before, make sure that the current in your house is 60-cycle alternating crurent. This receive will not operate on anything else.

To receive short wavelengths, it is necessary merely to plug in the pup plugs in the two right pup jacks, and plug in a type-H1 coil in the left shield and a H2-type coil in the right shield. The coil at the extreme left should be taken out, since it is not used in this case. With these coils the wavelength range covered will be from about 40 meters to about 130 meters. The short-wave stations (such as KDKA, WLW and others) are easily received; but, of coure, with their high-frequency carriers, they are much sharper than the regular boadcast stations, and great care should be exercised when turning the dials because the tuning is very sharp. Of course, once the set has been calibrated for the reception of stations it is easy to find them again.

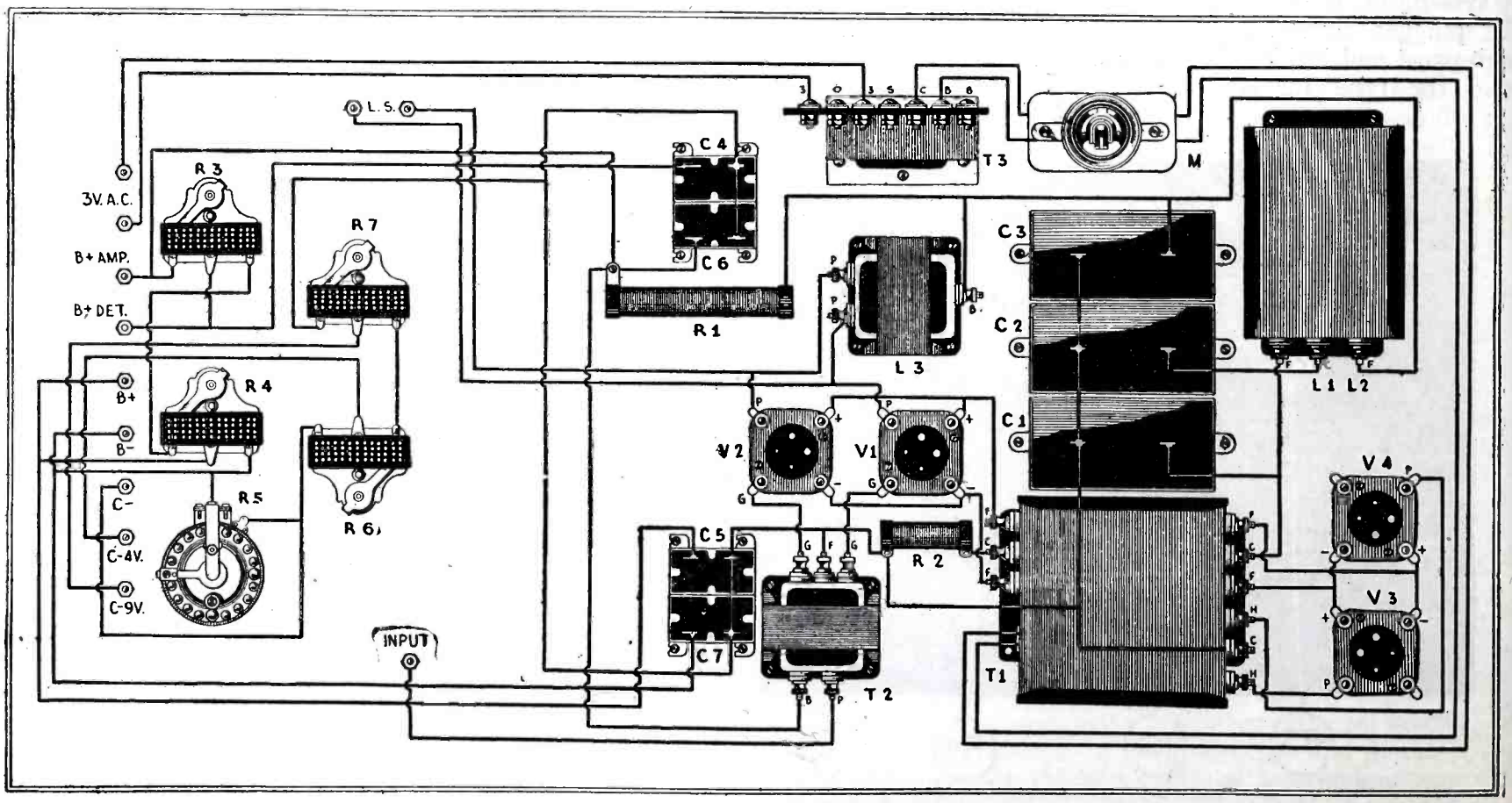



**The above drawing shows the exact position for the condenser mounting holes in the shields of the set.**

In order to get the full benefit of the high-quality audio amplifier and push-pull second stage, a good loud speaker must be used; because quite a few loud speakers will rattle or distort and will not do justice to the quality of the amplifier.

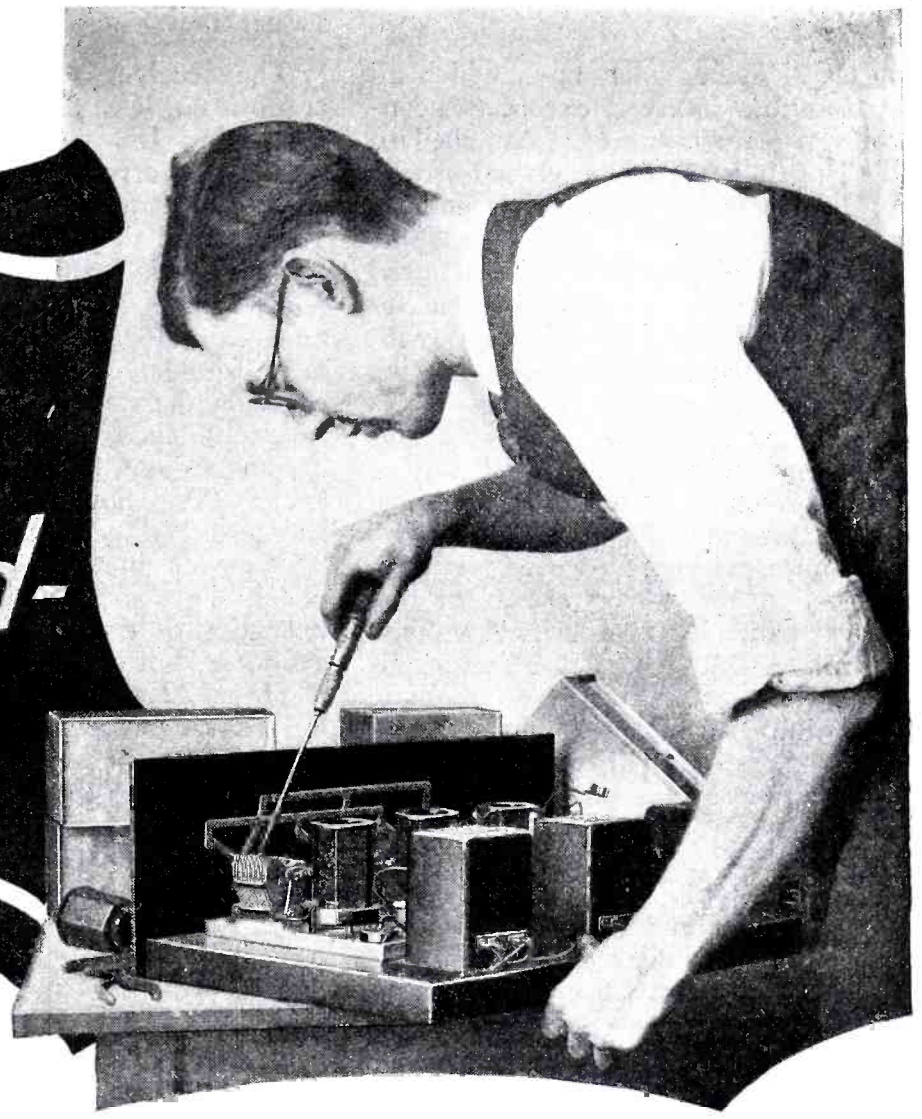
In tests conducted at our laboratory, a Magnavox dynamic type R5 speaker was used which gave exceptionally good results. However, the constructor has a wide variety of good speakers to choose from, but is advised to select a high grade product.

After the set has been entirely completed and tested to the constructor's satisfaction it can be installed in a table type or console cabinet. The latter type of cabinet is preferable. The Excello type R-31 console makes an ideal cabinet for both the set and power unit; besides a speaker such as the Ensco can be assembled in the lower part of the cabinet and the complete set will thus be entirely self contained.




**This diagram shows in pictorial form all necessary connections in the "A, B and C" power unit. The variable resistors and terminals at the extreme left are the parts mounted on the front panel.**

# How to build the Shielded-Grid Six



THE six-tube, shielded-grid receiver to be described is, by comparison with most radio receivers that have gone before, a rather remarkable set; for it possesses a degree of sensitivity to distant stations and selectivity for cutting through local broadcast stations that can be equalled by few other receivers at the present time. So revolutionary (and the word "revolutionary" is used with a full knowledge of its meaning) is the performance of this radio receiver that it can reasonably be said that this set represents the turning-point, from the old era of receiver performance to the new.

In order to appreciate fully the performance of this set, without having heard and tuned it, a wide stretch of the imagination is needed. Imagine, for a moment, a six-tube radio set, upon the front panel of which are the tuning dials and a non-critical volume control—a set that cannot be made to squeal or howl, no matter how it is operated. Imagine sitting down to tune this set in an average American home, with, say, a fifty-foot outdoor antenna and a good cone loud speaker. Imagine, if you can, starting at zero on the dials and slowly tuning them up a degree at a time and hearing station after station for almost every dial degree—sometimes two stations in each degree. Imagine, in Chicago for instance, each one of the fifteen local stations spreading over not more than two to four dial divisions, and most of them tuning in or out in one or two dial divisions. Imagine selectivity so knife-like that, as the dials are tuned, stations do not tune in and out gradually, but literally "plop" in and out with an infinitesimal dial movement.

Picture the log of stations heard at the end of the evening, all with *too great* loudspeaker volume—so loud the set had to be tuned down—picture a log of fifty—even a hundred stations, on the East Coast, on the West Coast, in Canada from Montreal to Vancouver, from Cuba to Texas and Mexico—all tuned in by moving just two dials, and never touching another knob, if you don't mind signals that literally roar in.

The above paragraphs are not a dream of the ideal radio set; they are just a simple explanation of the average performance of the Shielded-Grid six receiver and all with tone quality the equal of that of any other receiver you might build or buy. And this is a set that you can house in any cabinet or console, and that won't be obsolete for years to come. Every one of the thousands of Shielded Sixes that have been built during the past several years can be converted to use the shielded-grid tubes, so thoroughly modern was the design of the original Shielded Six.

The Shielded-Grid Six receiver employing the new 222-type shielded-grid tube, is assembled from a six-tube radio receiver kit composed of the highest quality parts, and is similar in external appearance to the well-known Shielded-Six.

The receiver consists of a heavy pressed-metal chassis, 12 inches deep

### LIST OF PARTS

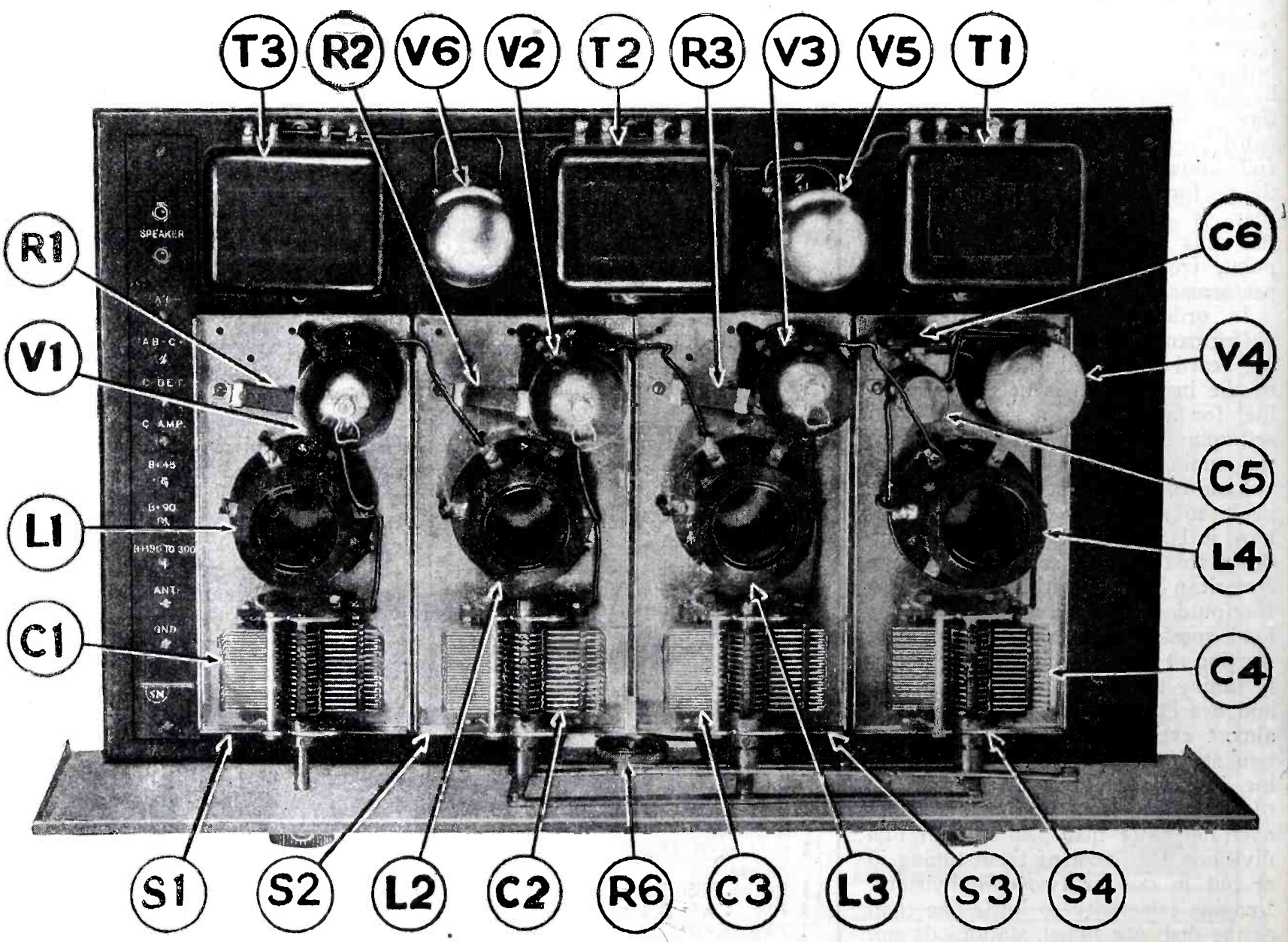
2 S-M variable condensers, .00035 mfd. long shaft, C1, C4
2 S-M variable condensers, .00035 mfd. short shaft, C2, C3
1 S-M antenna coil, L1
3 S-M R. F. transformers, L2, L3, L4
4 S-M coil sockets
4 S-M stage shields, S1, S2, S3, S4
2 S-M audio transformers, T1, T2
1 S-M output transformer, T3
3 Carter fixed resistors, 10 ohms, R1, R2, R3
1 Carter fixed resistor, .57 ohms, R4
1 Carter fixed resistor, 2 ohms, R5
1 Carter rheostat, 20 ohms, R6
1 Carter by-pass condenser, .5 mfd., C5
1 Polymet fixed condenser, .002 mfd., C6
2 Fast by-pass condensers, 1 mfd., C7, C8
3 Shielded-grid tubes, UX222 or SP-122 type, V1, V2, V3
1 UX200A type tube, V4
1 UX112A type tube, V5
1 UX171 type power tube, V6
1 Yaxley battery switch, single pole single throw type, SW1
1 Yaxley antenna switch, single pole double throw type, SW2
6 S-M tube sockets, UX type
1 S-M link motion
2 Carter tip jacks
2 Marco vernier dials
1 S-M terminal strip with nine terminals
1 S-M metal panel, drilled, 7 x 21 inches
1 S-M steel chassis, 12 x 19¼ x 1¼ inches
1 Bodine L350 loop
1 Pkg. Cornish Flexibus wire
1 Pkg. Kester rosin core solder

and 19½ inches long, upon which all parts of the receiver, except the control dials, are mounted. Attached to this base is a handsome etched-bronze control panel, 7 inches high and 21 inches long. On this panel are mounted two vernier-control dials marked *"Station Selector I"* and *"Station Selector II."* All tuning is done with these two dials, the settings of which are varied to tune in stations. The dials "log" absolutely, in that a station once heard at any dial setting may be brought in again at the same dial setting; and the two dials "track" sometimes within a degree of each other. In the lower center of the control panel is a non-critical volume control, which does not affect oscillation, but serves merely to regulate the volume of received signals to a desired level. In the lower right-hand corner of the panel is an *"On-Off"* switch, completely turning on or off all power for the entire receiver by a simple flip of the fingers. In the lower left corner of the panel is a switch of similar appearance, allowing the choice of either selective or non-selective adjustments of the antenna circuit, to accommodate varying lengths of antennas, such as will be encountered in different locations.

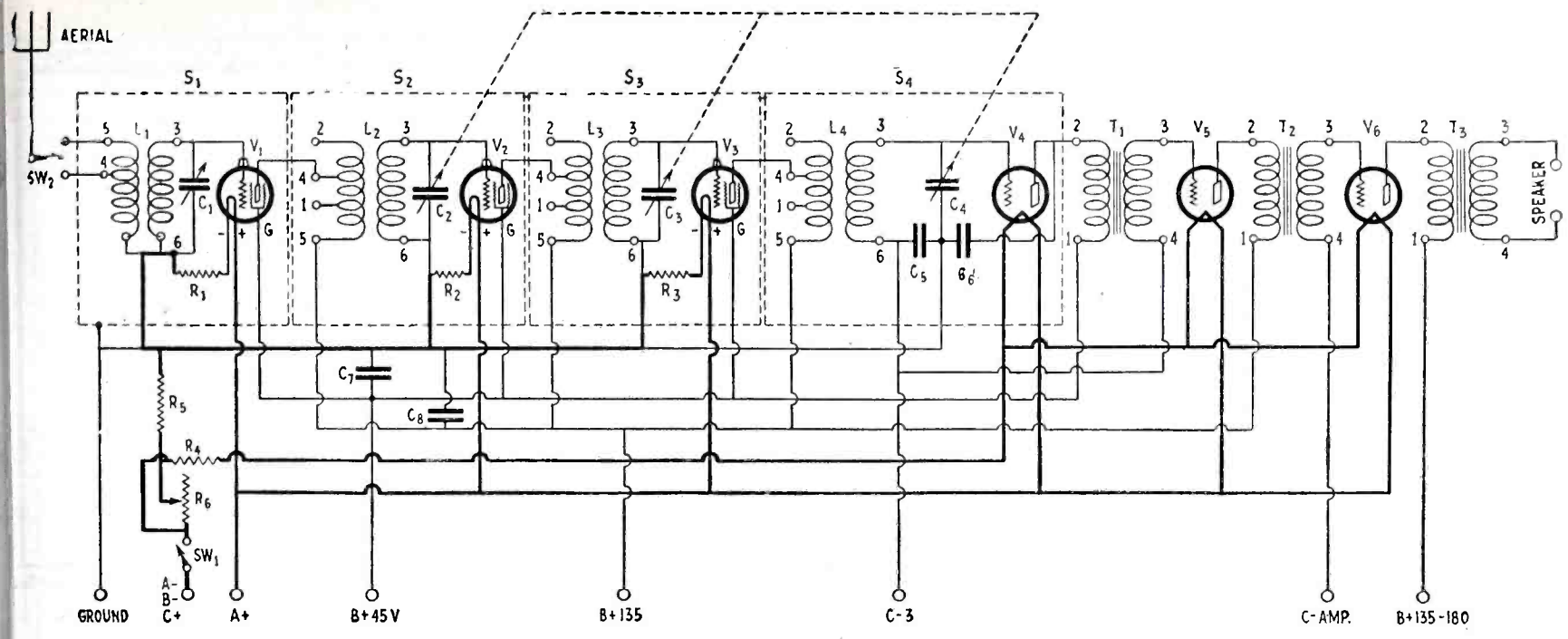
The receiver requires for its operation no less than 135 volts and preferably 180 volts of "B" power, at a total current consumption of 30 milliamperes (a total of 180 to 220 volts, which may be furnished by the reservoir "B" supply described on page 99 of Radio Listeners' Guide and Call Book of December, 1927, is preferable.) In addition, "C" batteries, as dictated by the output power tube employed, are required, and a 6-volt storage battery or equivalent 6-volt "A" power unit. Using a standard "B" socket-power unit and "A" power unit, the receiver is completely light-socket-operated with the exception of dry "C" batteries, which are long in life and low in cost.

Three 222-type shielded-grid tubes are required for the R.F. amplifier. For the detector tube, a 200A-, 201A-, or 112A-type is recommended. For the first audio amplifier, a 112 or 112A-type is strongly recommended; though in both detector and first-audio positions 201A-type tubes may be used, but with inferior results due to overloading, so strong are the signals developed by the receiver. For the last audio output stage a 171- or 171A-type is recommended if a plate voltage of 180 to 220 is available. If not over 135 volts is available, a 112- or 112A-type output tube is recommended.

The receiver circuit consists of three stages of radio-frequency amplification sharply tuned, followed by the sharply-tuned detector circuit; which, in turn, works into a two-stage, audio-frequency amplifier. The radio-frequency amplifier circuits consist of low-loss variable condensers, providing substantially even spacing of stations over the control-dial scales, and low-loss, low-resistance, plug-in R.F. transformers. One condenser and one R.F. transformer are used in each of the four R.F. stage circuits, one circuit being housed in each of the four aluminum shielding cans. The antenna stage at the left employs a special antenna coupler provided with a tapped primary, allowing the use of a short or a long antenna at will by means of the switch in the lower left-hand corner of the panel. The three R.F. stages employ shielded-grid amplifier tubes, and the battery circuits of these stages are so arranged and so by-passed that, together with the effective shielding provided by the aluminum cans, no oscillation tendency or trouble is experienced in the receiver.



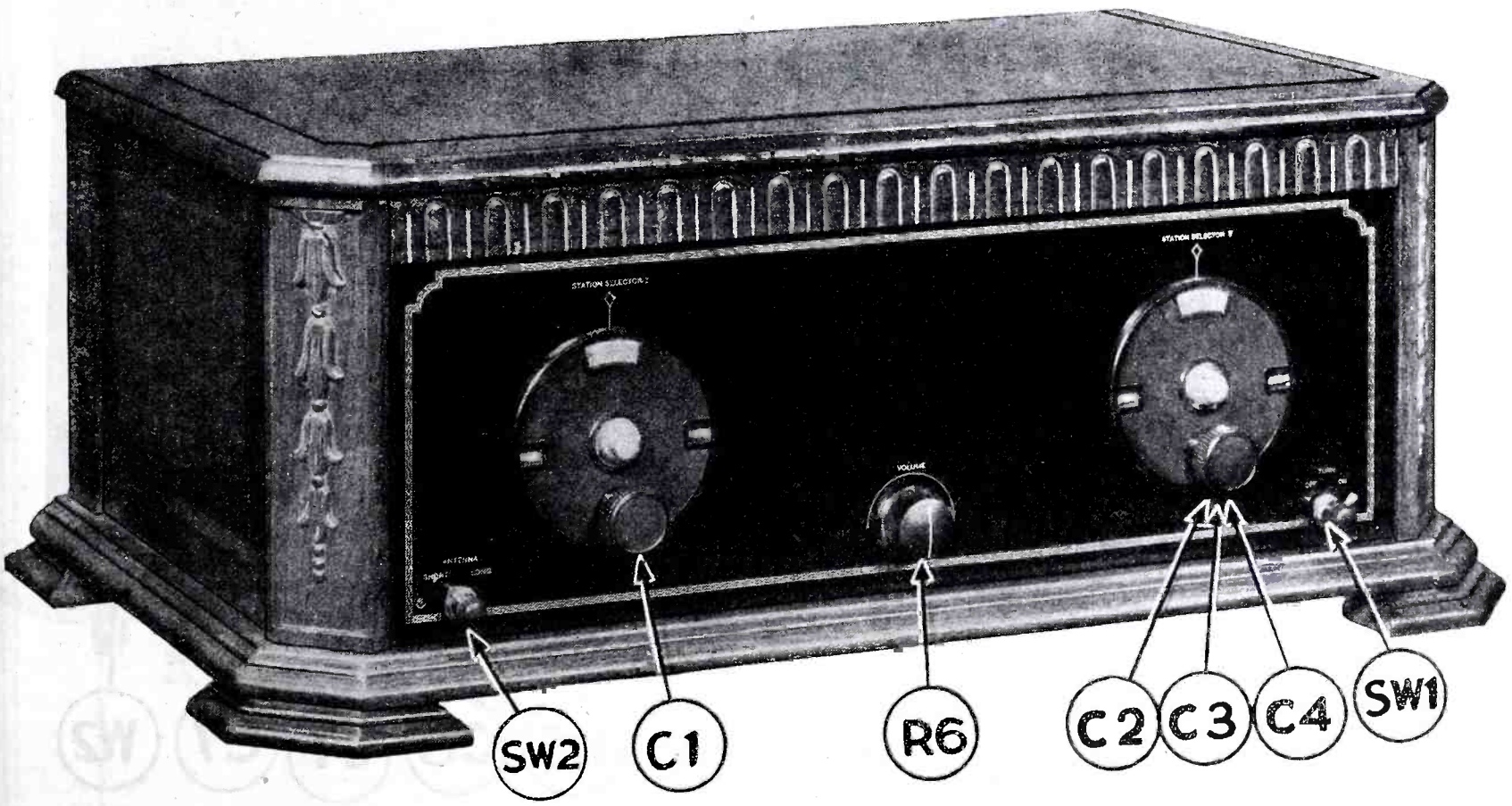

**This picture shows the appearance of the Shielded-Grid Six receiver with the shielding cans removed. The three shielded-grid tubes are shown at V1, V2 and V3; and the special R.F. transformers which have been designed for these tubes are indicated at L1, L2, L3 and L4. The new tubes are used in the three R.F. circuits. V4 is the detector tube, and V5 and V6 are the two audio tubes, semi-power and power.**



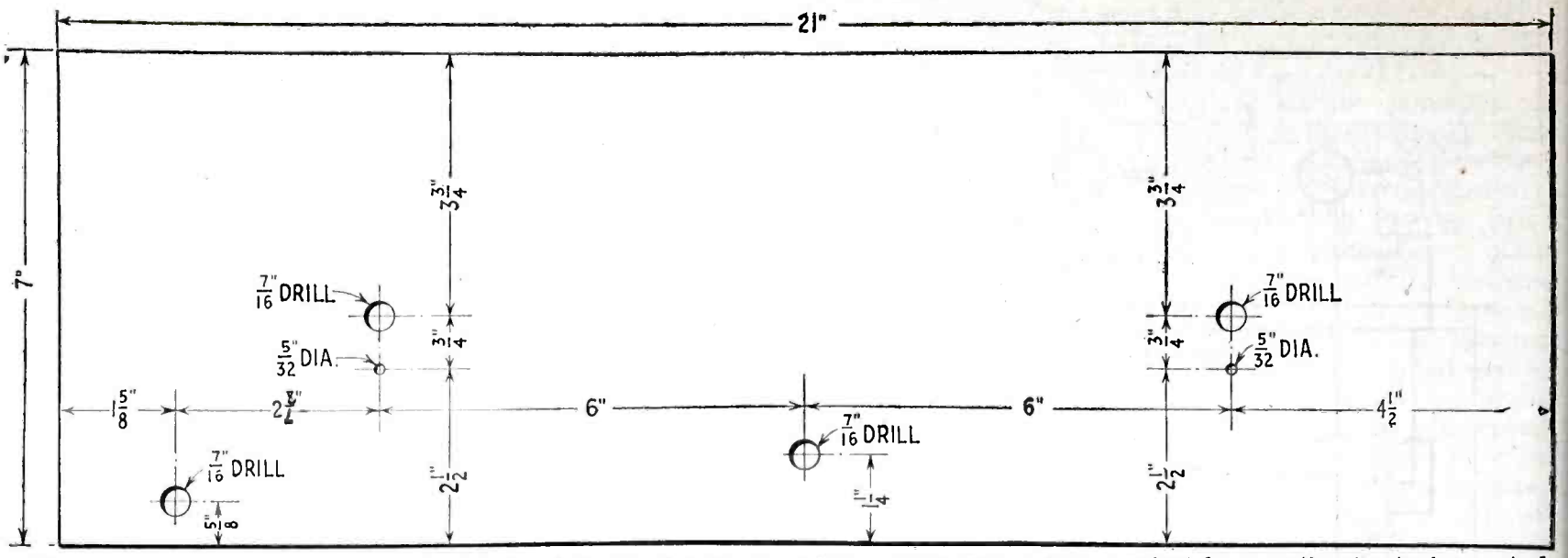

**In this schematic wiring diagram of the Shielded-Grid Six, dotted lines show the enclosure of parts and wiring within the stage shields, as well as the connection of the variable condensers by the link motion. In the detector circuit a biasing voltage is used on the grid to prevent overloading.**

A very special feature of the radio-frequency amplifier circuit of the receiver is that it does not employ the tuned-impedence coupling, which has been believed necessary to the operation of shielded-grid tubes. This type of coupling is, inherently, extremely broad in tuning and is far from desirable; though circuits for tuned-impedance coupling are given with the data sheets accompanying shielded-grid tubes as a theoretical, but not necessarily a practical, means of operating these tubes. This type of coupling is highly undesirable in a radio receiver which is to be sufficiently selective on modern broadcast-receiver conditions and it introduces circuit losses occasioned by the necessary grid-blocking condenser and grid leak which seriously impair the amplification possibilities of the shielded-grid tube; for, unlike the practice in previous radio-frequency amplifiers, regeneration is not employed in a shielded-grid amplifier and may not well be utilized to off-set circuit losses.

It is apparent to engineers that the amplification obtainable from a shielded-grid receiver is dependent upon the excellence of the tuning circuit (coil and condenser) making up the R.F. amplifier stage; and the selectivity upon the degree of coupling of one tube to the next through the tuned circuit. Because of this requirement, this receiver provides a tremendously high value of radio-frequency amplification, due to the unusually efficient design of the plug-in coils and condensers. In addition, the selectivity of the receiver has not been arbitrarily determined and put beyond the control of the user, but is made adjustable by means of extra taps upon the primaries of the R.F. transformers. Thus the receiver may be easily and simply adjusted to a point of highest efficiency by the merest novice, whether he be located in the middle of a desert far from broadcast stations or in the center of the most congested broadcast communities of the United States and Europe.

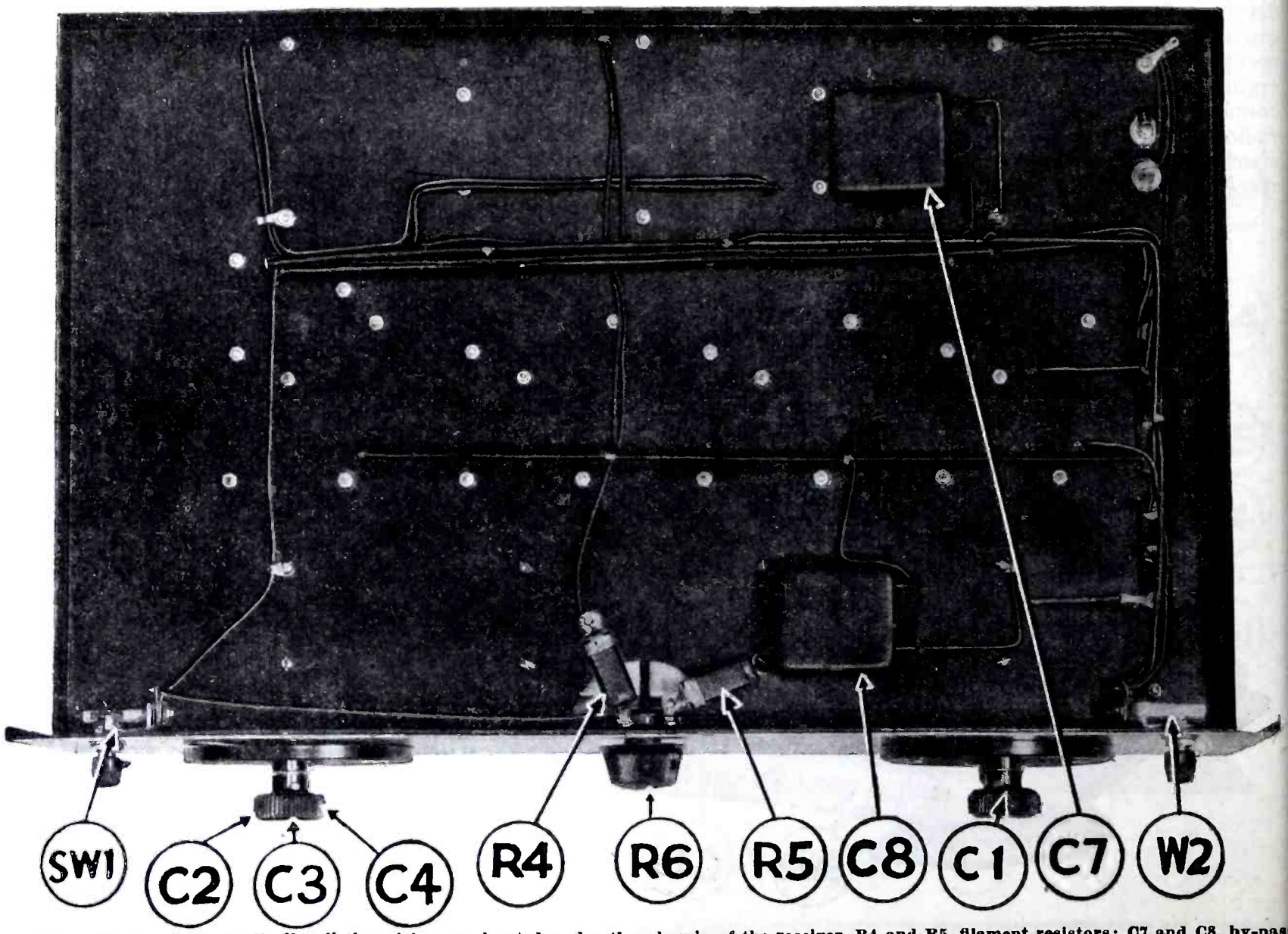



**View of the new Shielded-Grid Six receiver, installed in a table type cabinet. The two vernier dials control the wavelength, the knob (R6) is the volume control, SW1 is the battery switch, and Sw2 the antenna switch.**

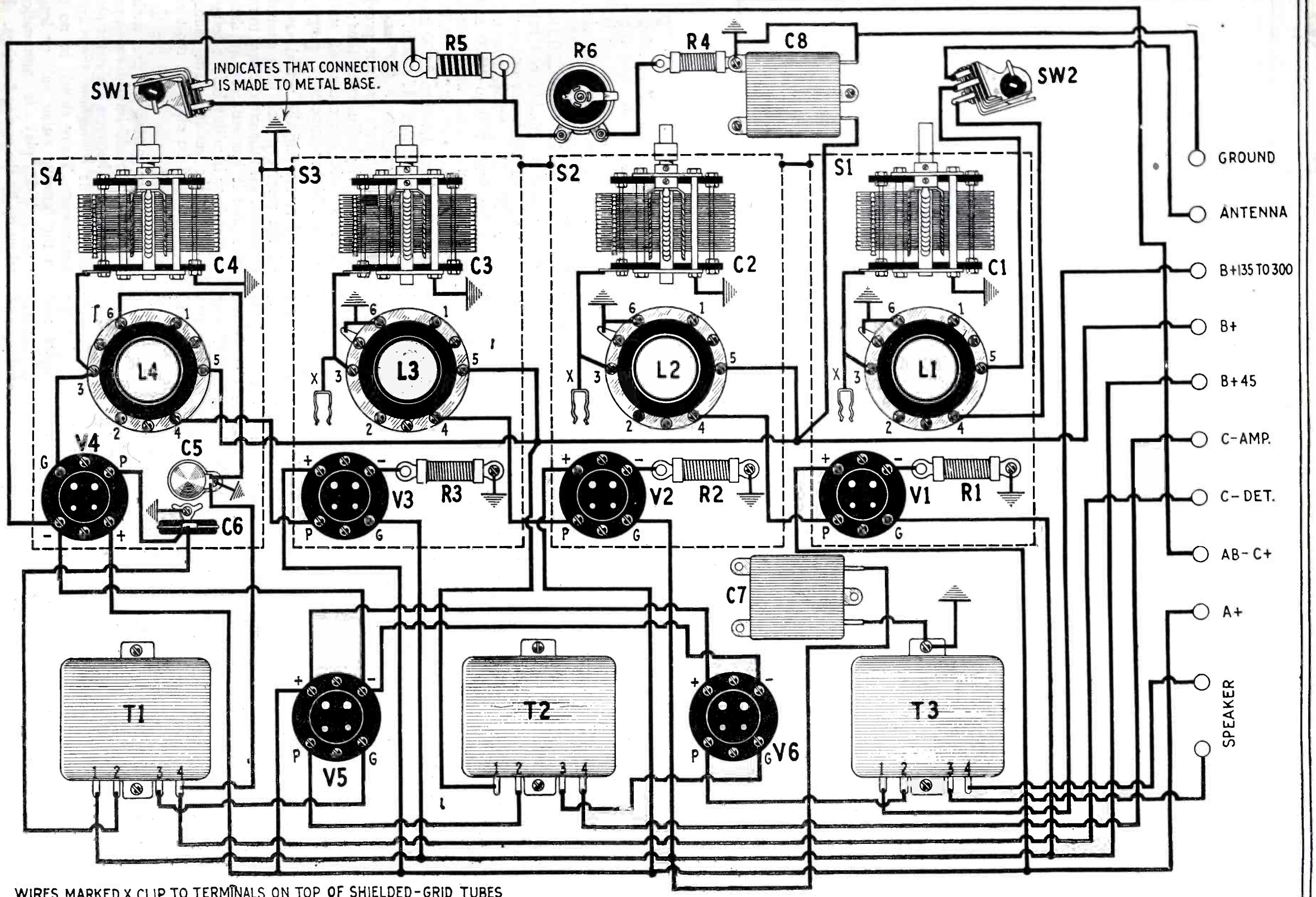


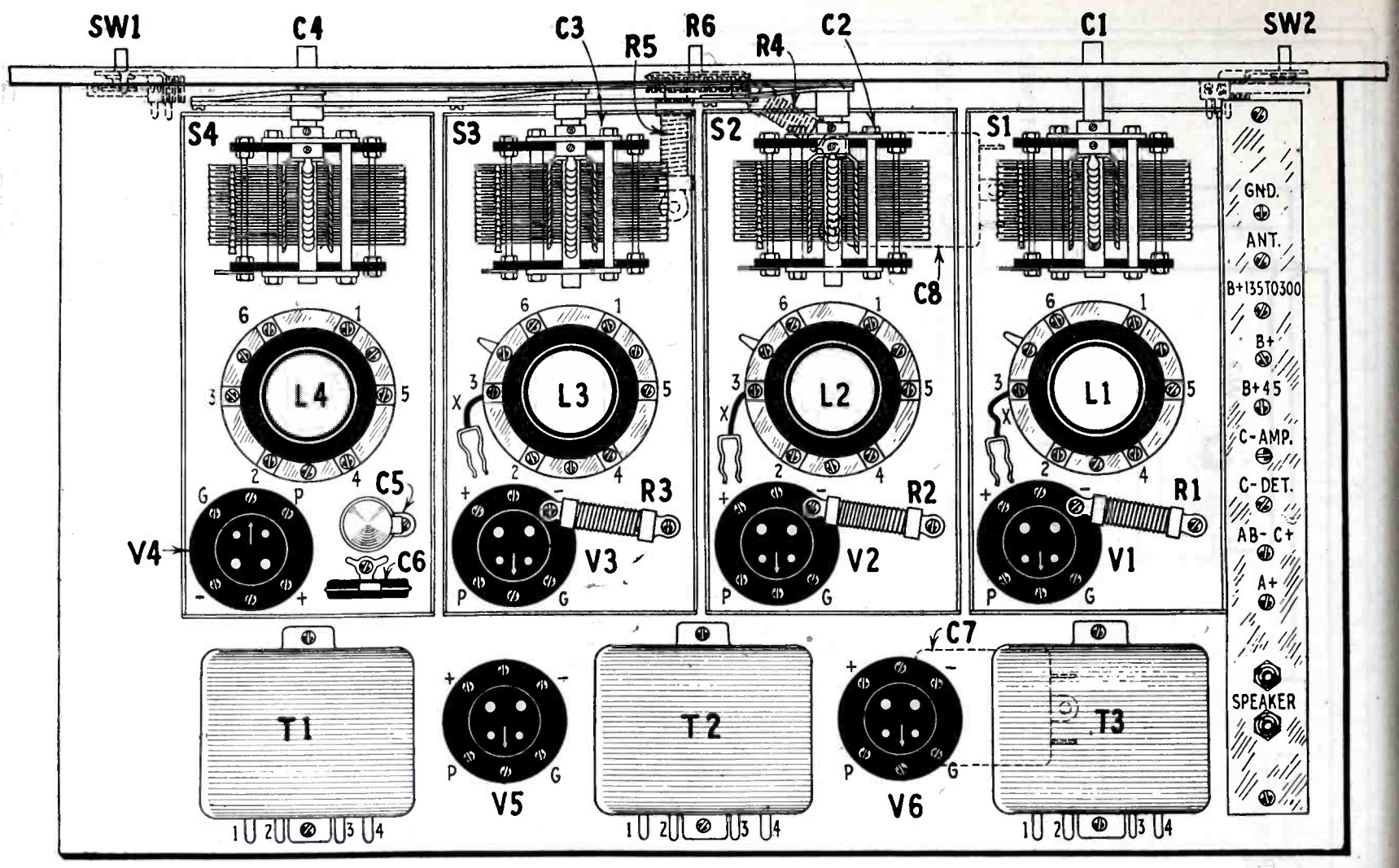

**Drilling layout for the front panel of the Shielded-Grid Six showing the position of the various holes required for mounting the tuning controls.**

Because of the impossibility of definitely pre-determining antenna characteristics, the antenna stage of the receiver is tuned by the *"Station Selector I,"* or left-hand dial control—the left-hand variable condenser (C1) in the schematic diagram, and contained in the left-hand shield compartment (S1) of te receiver. The three variable condensers (C2, C3 and C4) in the three right-hand shield compartments (S2, S3 and S4) tune substantially identical circuits consisting of laboratory-matched coils and condensers, and are connected together by means of a positive mechanical link with no back-lash; all three are tuned by the single right-hand "Station Selector II" dial. All radio-frequency circuits are completely shielded; the radio-frequency lead from one stage to the other passes the small crevice between the stage compartments through slots provided in the shields for that purpose, and is insufficiently exposed to cause signal pick-up. In fact, so thorough is the shielding of the receiver that it is practically impossible to pick up even a powerful local signal with the antenna removed; and with the two leads from the antenna-coil socket to the antenna switch removed entirely, the shielding becomes completely effective. So sensitive is the receiver, however, that simply placing one's finger upon the antenna binding post is sufficient to bring in stations, frequently over a radius of two hundred




**Several small parts and practically all the wiring are located under the chassis of the receiver. R4 and R5, filament resistors; C7 and C8, by-pass condensers; R6, rheostat; Sw1, battery switch; Sw2, antenna switch.**






**Instrument layout of the receiver showing the location of parts on the chassis and front panel.**

miles, with good loud-speaker volume —using only the body as an antenna. In fact, the use of a metal bed-spring as an antenna will provide entirely satisfactory results.

The filament voltage of all tubes is regulated through the use of fixed resistors, which definitely establish the filament voltages within correct ranges and do not allow excessive potentials to be applied to the tubes. Three separate 10-ohm resistors (R1, R2 and R3) are used on the 222-type tubes and the voltage drop across each, about 1.32 volts, is utilized for grid bias. A 2-ohm resistor (R5), common to the filament circuits of all the 222-type tubes, prevents the filament voltage ever rising above 3.4 volts; while the volume rheostat (R6) of 20 ohms allows it to be turned down to a value so low as to reduce volume to practically zero. An 0.57-ohm resistor (R4), mounted upon one rheostat binding post, regulates filament voltage for the detector, and two audio-amplifier tubes. A "C" bias of 3 volts (V4) (it may be increased to 4½ under certain operating conditions) is used upon the detector tube and upon the first audio tube (V5). The use of this low bias is to improve low-note reproduction for handling capacity for strong signals. For a like reason, a plate voltage of 135 volts is employed upon the first audio stage with an optional plate voltage on the last audio stage of from 135 to 180, 200, or even 450 if a 210-type output tube is used.

Looking down upon the chassis with the panel to the front, the stage compartments from left to right, S1, S2, S3 and S4 and the radio-frequency portions of the circuits are physically located as in the schematic diagram. Behind these compartments is the audio amplifier, progressing from right to left, with the second audio tube (V6) the left rear-tube socket. The detector "C" bias and plate by-pass condensers (C5 and C6) are contained in the detector stage compartment (S4). The 10-ohm filament resistors for the R.F. amplifiers are contained in the S1, S2 and S3 compartments, and in each compartment are located, of course, a tube socket, a coil socket and coil, and a variable condenser. Beneath the chassis are fastened the 2-ohm and 0.57-ohm resistors (R4 and R5) and the two 1-mf. by-pass condensers (C7 and C8) connected between the metal chassis and the "B+45" and "B+135" leads. The metal chassis is grounded to the negative side of the R.F. amplifier filament circuits. At its left end is a terminal strip carrying the loud-speaker tip jacks and connection screws, and connection terminals for all battery, antenna, and ground wiring.

Through the use of interchangeable coils (L1, L2, L3 and L4) the wavelength range of the receiver is from 200 to 3,000 meters. Employing the standard "A" type coils, the wavelength range is from 200 to 550 meters, and a suitable coil set consists of one 116A antenna coil and three 119A R.F. transformers. For operation from 500 to 1,500 meters, one 116D antenna coil and three 115D transformers are employed; while, for operation from 1,400 to 3,000 meters, one 116E and three 115E R.F. transformers are employed. "D" and "E" range transformers are not provided with selectivity-adjustment taps; since there is little congestion of stations in these higher-wavelength ranges.

Before starting the actual assembly of the receiver, each part should be examined with the utmost care to make sure that it has suffered no damage in transit or handling before being received by the builder. The following points should be observed most carefully:

The rotor plates of the variable condensers should interleave centrally in the spaces between the stator plates, at all points throughout their arc of movement. There should be no play in the bearing, either side or lengthwise. Side play is automatically taken up by the spring bearings. End play may be taken up by locking the

collars on the front of the shafts more tightly against the spring washer, which held between them and the front end plates.

The antenna coil and R.F. transformers should be carefully examined to see that they have suffered no physical damage and that their contacts make satisfactory contact with the coil-socket springs.

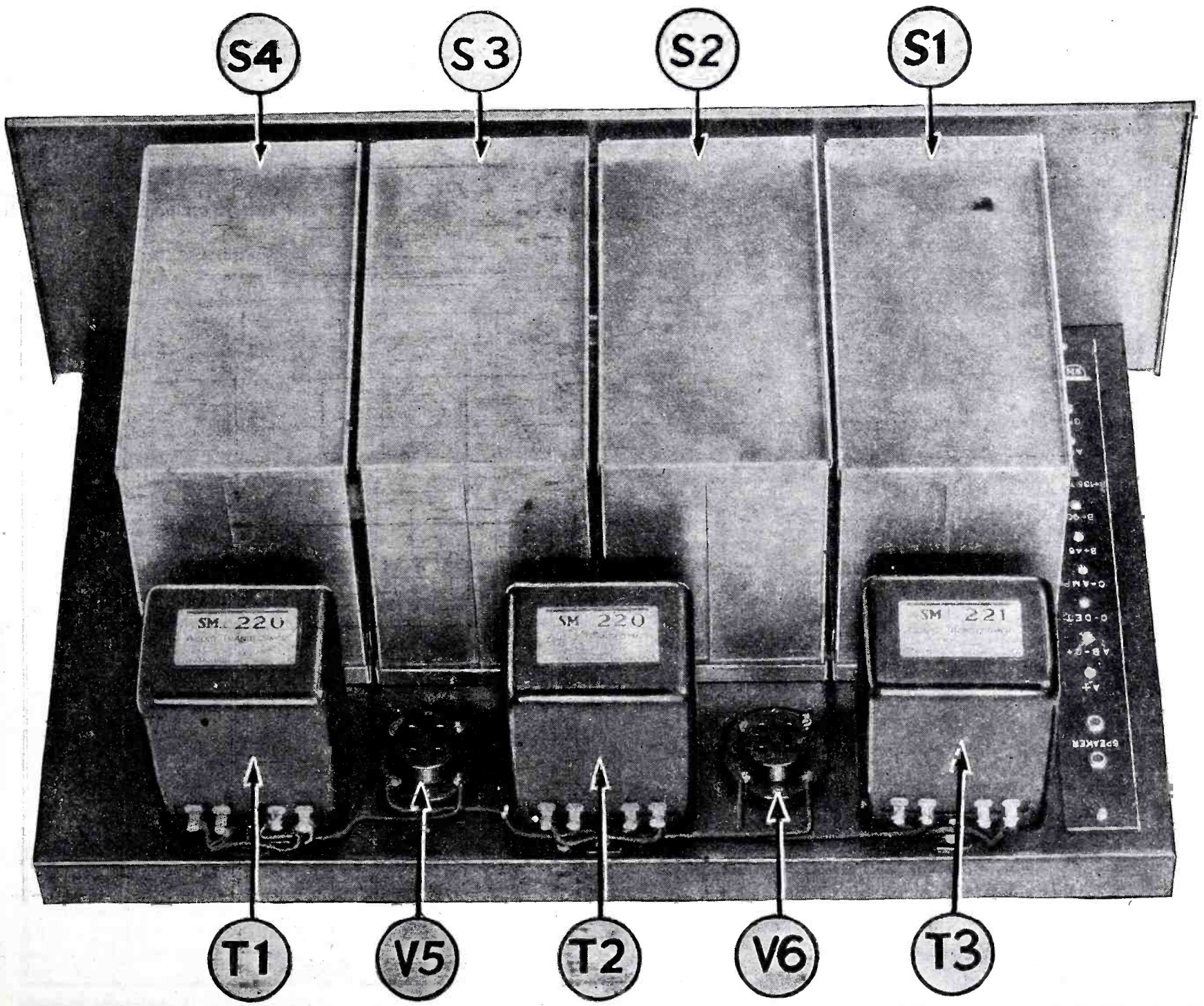
The tube sockets should be tried with vacuum tubes to make sure that proper contact is effected between the socket springs and the tube pins.

The link-motion should be examined to see that the long bars are not bent. The tip jacks, battery switch and antenna switch should be examined to make sure that proper contact is made.

The balance of the parts need not be examined, except to see that they appear to be mechanically undamaged, as there is little chance of trouble arising with them.

The assembly of the receiver will be quite clear, upon careful inspection of the accompanying illustrations, which indicate the placement of all parts above and below the chassis. The two tip jacks should be fastened in the two large holes of the terminal strip; which should, in turn, be fastened at the left end of the chassis (as seen in the illustrations) by means of two machine screws and nuts. The 20-ohm rheostat (R6) should be mounted in the hole in the projecting lip, in the center of the front edge of the chassis, using the insulating washers provided to prevent any metallic contact between the chassis and the rheostat frame. The antenna and battery switches (Sw1 and Sw2) should be mounted in the holes in the front edge of the chassis, the three-spring antenna switch at the left, and the two-spring battery switch at the right.

The illustrations should be carefully studied and the parts in the stage-shield compartment fastened down as indicated; care being taken to scrape bright the portion of the chassis falling beneath the stage-shield pans to provide good metallic contact between shield pans and chassis. The six tube sockets should be mounted with the arrows of all, except the detector socket, pointing to the rear; the detector socket arrow should point to the front. The 0.57-ohm resistor (R4) should have one mounting-foot bent at right angles and fastened to one terminal of the 20-ohm rheostat (R6). The .002- and 0.5-mf. condensers (C6 and C5) should be mounted in the detector-stage compartment in the holes provided, using machine screws and nuts. Thus, one connection of each condenser is automatically made to the chassis. The three 10-ohm resistors (R1, R2 and R3) should be mounted, one in each of the R.F.-amplifier stage compartments S1, S2 and S3. One end of each resistor should be fastened to the terminal screw of the tube sockets; and the other end, with a machine screw and nut, to the chassis as illustrated on the opposite page.




**View of the receiver with shielding compartments in place. S1, S2 and S3 are the first, second and third R.F. stages, respectively; S4, detector stage; T1 and T2, audio transformers; T3, output transformer; V5 and V6, audio-stage sockets.**

The audio and output transformers are to be mounted in the positions shown, as should be the variable condensers; placing the two long-shaft condensers in the extreme end compartments S1 and S4. On the bottom of the chassis, a soldering lug should be placed on the front mounting screw of the output transformer (T3) and under the rear mounting screw of condenser C2. These lugs are to be used for ground connections to the chassis. Under the front mounting-screw head of condenser C2, one end of the 2-ohm resistor (R5) should be fastened; the other end of this resistor being soldered to a lug on the binding post of the 20-ohm rheostat (R6). The two mounting screws of this same variable condenser serve to hold a 1-mf. condenser in position; while the two mounting screws of the left rear, or second, audio-tube socket, hold the second 1-mf. condenser in position.

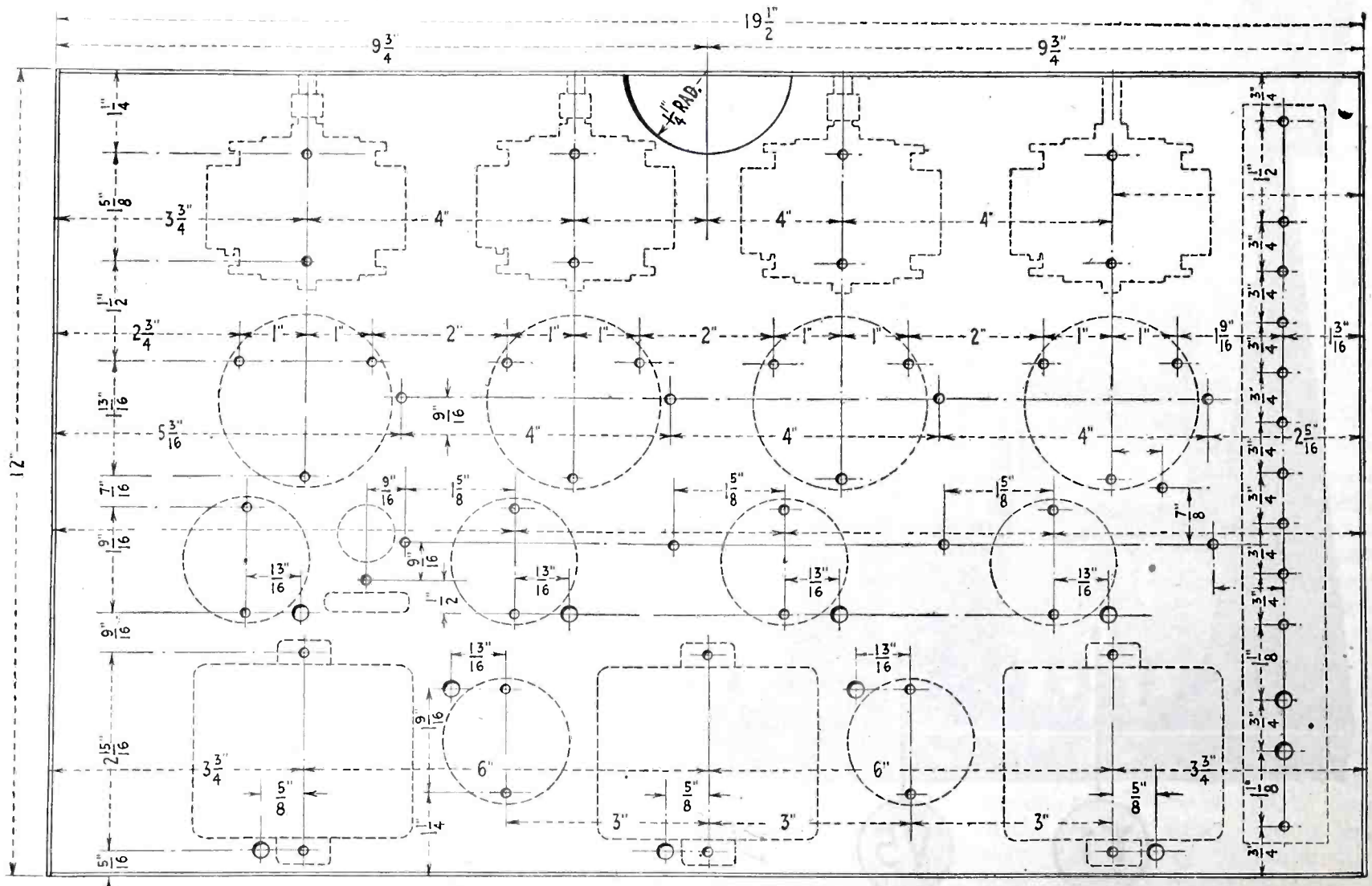
The coil sockets in the various compartments should be put in and elevated above the chassis by means of the long mounting screws and studs provided; taking care that terminal "3" of each coil socket projects directly to the right.

After all parts have been mounted upon the chassis, but before the front panel has been attached, the wiring should be put in place. With but three exceptions, all wiring is done with flexible insulated hook-up wire. A soldering iron, well heated and with a well-tinned tip, is required, in addition to a small can of non-corrosive soldering paste, and several lengths of rosin-core solder. Every joint to be soldered should have the wire and lug separately tinned, using the tiniest pin-point of soldering paste and an amply large drop of rosin-core solder. The wire end and lug may then be joined together, using a hot iron with a drop of solder.

The detail of the placement of all wiring in the receiver is not given here for it is clearly illustrated in the various illustrations and in the schematic and pictorial diagrams. The actual position of all battery wiring beneath the chassis is of little importance, though it should be kept as neat as possible. Certain leads in each stage compartment must be carefully handled, as follows:

The right stator lug of each variable condenser should be connected to terminal "3" of each tube socket. In the detector stage assembly (S4), this post "3" of the coil socket and post "G" of the tube socket should be joined. In the S1, S2 and S3 R.F.-amplifier sections, a 4¼-inch length of wire should be allowed to extend from terminal "3" of each coil socket, and to the far end of this wire should be fastened one of the three small clips accompanying the kit. These clips are to be fastened to the top terminals of the 222-type shielded-grid amplifier tubes. Terminal "6" of the three R.F. coil sockets should connect to a lug held between the nearest mounting screw and the hollow collar holding the coil socket above the shield, thus grounding this terminal to the metal receiver assembly. Three bus-bar leads are used in the receiver. One is soldered to the "B+135" binding post lug of the terminal strip and carried straight across the chassis for a distance of 13 inches. To it, at various points, are soldered the leads from post "5" of the coil sockets in compartments S2, S3 and S4 and from other portions of the circuit. Another lead, soldered to the "A+" lug of the terminal strip, is carried directly across the chassis for a distance of 14½ inches; and to this wire, at various points, are soldered the flexible hook-up-wire leads from the "A+" posts of all tube sockets. A third bus-bar lead, soldered to the "B+45" lug of the terminal strip is carried to the rear for 3 inches, and then down the chassis for 15 inches; and to it, at various points, are soldered all "B+45" circuit leads of flexible hook-up wire, with as short connections as possible from terminal "G" of the three R.F.-tube sockets to this bus line. The rear by-pass condenser, which has one lug grounded to the chassis by means of a short wire has its other lug soldered to this "+45"

(*Continued on page* **181**)




**All holes required for mounting apparatus on the metal chassis of the receiver are shown with the correct measurements, in the above drawing. Holes required for passing wires through the chassis are also shown, and the position of the various parts is indicated in dotted lines.**

# The Tyrman Shielded-Grid Seven

THE remarkable possibilities of the shielded-grid type of tube, with its practical elimination of inter-element tube capacity, and the enormous amplification with stability in the high-frequency circuits, have appealed to radio fans, long before this new addition to radio facilities emerged from the laboratory. In this article there is now made available complete details of a circuit designed to take full advantage of the possibilities of this tube, in producing a 7-tube receiver of extraordinary sensitivity and ease of control, equalling in amplification the possibilities of a combination of many additional tubes and avoiding the complications introduced by the latter. The constructor will find it easy to build and highly satisfactory in operation.

This receiver, which is known as the Tyrman Shielded-Grid Seven, is not an experiment or a laboratory design, but is a finished product which is known to operate satisfactorily. It is the result of several months of intensive experimental work, and provides an ideal set for one who desires the utmost in sensitivity. Another feature is that standard parts are used throughout in the construction.

Various pictures which appear accompanying this article show all details of the completed receiver. From these illustrations it may be seen that the set presents the appearance of a well-designed factory receiver. The apparatus used in the construction is mounted on the front and sub-base panels in a symmetrical arrangement which is pleasing to the eye.

In the front view of the set the arrangement of controls is shown. Although the set incorporates entirely new principles, the operation is not difficult. The only wavelength tuning control of the set is the double drum dial in the center of the panel. In actual practice the two drums of this dial have practically identical settings for all wavelengths within the broadcast band. The knob in the lower right corner of the panel operates a combination instrument which serves as a volume control and control switch. The control at the left of the panel operates a switch, which need seldom be used when tuning the receiver.

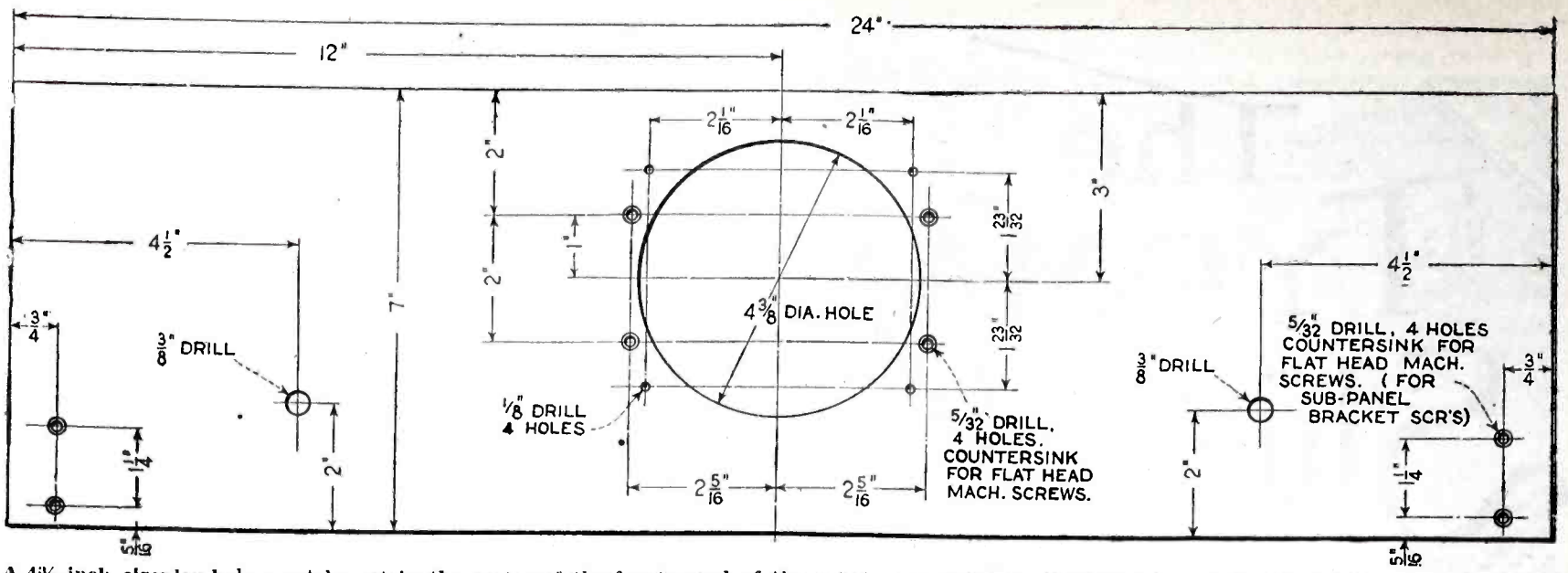
**PARTS REQUIRED**

- 3 Tyrman Impedance units, L1, L2, L3
- 1 Camfield oscillator coupler, L4
- 2 Tyrman audio transformers, T1, T2
- 1 Tyrman output transformer, T3
- 1 Camfield variable condenser, .0005 mfd., C1
- 1 Camfield variable condenser, .00025 mfd., C2
- 1 Carter fixed condenser, .0001 mfd., C3
- 4 Carter by-pass condensers, 1 1 mfd., C4, C7
- 1 Carter fixed condenser, .0005 mfd., C8
- 1 Yaxley switch-rheostat, 15 ohms, R1—SW
- 1 Yaxley fixed resistor, 15 ohms, R2
- 1 Yaxley fixed resistor, 1 ohm, R3
- 1 Yaxley S.P.S.T. switch, SW1
- 4 Tyrman sockets, UX type with shield
- 3 Tyrman sockets, UX type with special 22 shield
- 1 Tyrman drum dial, double vernier type
- 1 Yaxley 7 wire battery cable with connector plug
- 8 X-L binding posts
- 3 Shieldplate vacuum tubes, shielded grid, SP1 type 22, V1, V2, V3
- 3 201A type vacuum tubes, V4, V5, V7
- 1 171 type vacuum tube, V6
- 1 Formica front panel, 7 x 24 x 3/16 inches
- 1 Formica sub-panel, 8 x 23 x 3/16 inches
- 2 Benjamin metal brackets
- 1 Bodine L 500 loop.
- 1 Pkg. Acme Celatsite hook-up wire
- 1 Pkg. Kester rosin core solder
- 1 Excello Console Cabinet

The arrangement of apparatus mounted above the sub-base panel is shown in the top view of the receiver. On the rear edge of the sub-base are six octagonal containers of identical appearance. The three on the left contain the R.F. apparatus, and the three on the right the audio apparatus. Directly in front of these units the seven sockets of the set are mounted. Each socket is equipped with a special shield and these add to the efficiency as well as the appearance of the receiver.

In wiring the receiver all connections are made under the sub-base panel, as may be seen in another view of the set. This feature also adds to the business-like appearance of the set. In addition several small parts, including fixed resistors and fixed condensers, are mounted under the sub-base panel.

Before entering into a description of the construction of this receiver the circuit will be considered. This will be found in the accompanying schematic design. It will be noticed that the receiver consists of a circuit employing an oscillator, a first detector, two stages of intermediate-frequency amplification, a second detector and two stages of audio-frequency amplification. Although three




**A 4⅜-inch circular hole must be cut in the center of the front panel of the set, to accommodate the large drum-type tuning control. The above drawing shows the exact location of this hole and gives also details of all others which are required.**

stages of intermediate-frequency amplification are required in the average super-heterodyne receiver it has been found that two stages are more than ample when shielded grid tubes are employed.

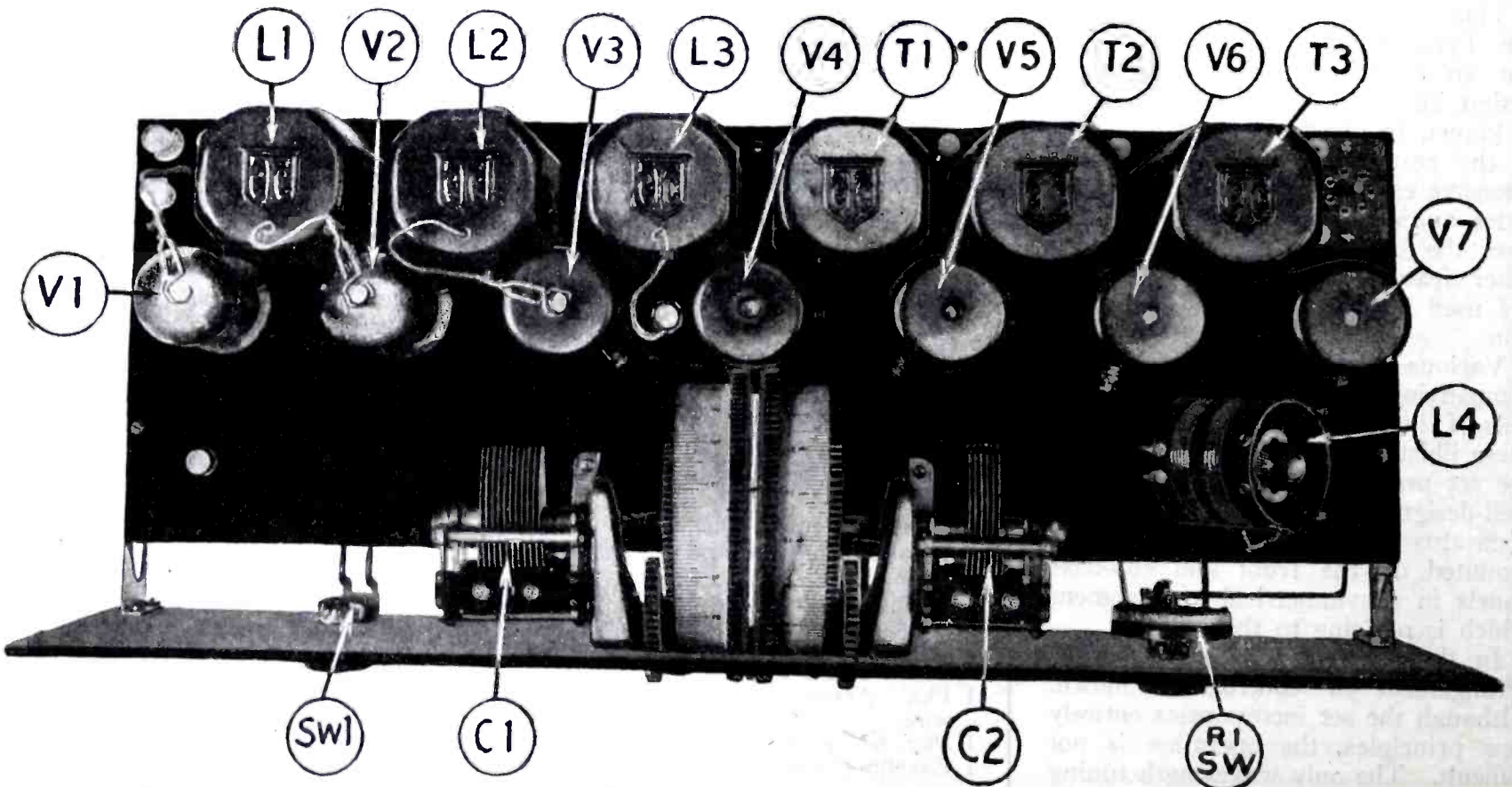
The three shielded-grid tubes are shown in the diagrams as V1, V2 and V3, and are used in the first-detector circuit and the two intermediate-frequency stages. V4, the second detector, may be a standard 200A- or 201A-type; V5, the first audio tube, and V7, the oscillator tube, are standard 201A-type tubes; and V6, the second audio tube, is a type-171 power tube.

The schematic diagram of the shielded-grid tube shows that it has one more element than the standard tube. In construction the filament of the tube is similar to the one used in the 120-type power tube. It draws a current of 0.132 amperes and its maximum operating voltage is 3.3 volts. The filament is a single straight wire, surrounded by the circular grid of the tube, but it will be called the control-grid in this article. The fourth element of the tube, i.e., the screen-grid, is a double spiral enclosing the plate. It is placed between the plate and the control-grid and outside the plate.

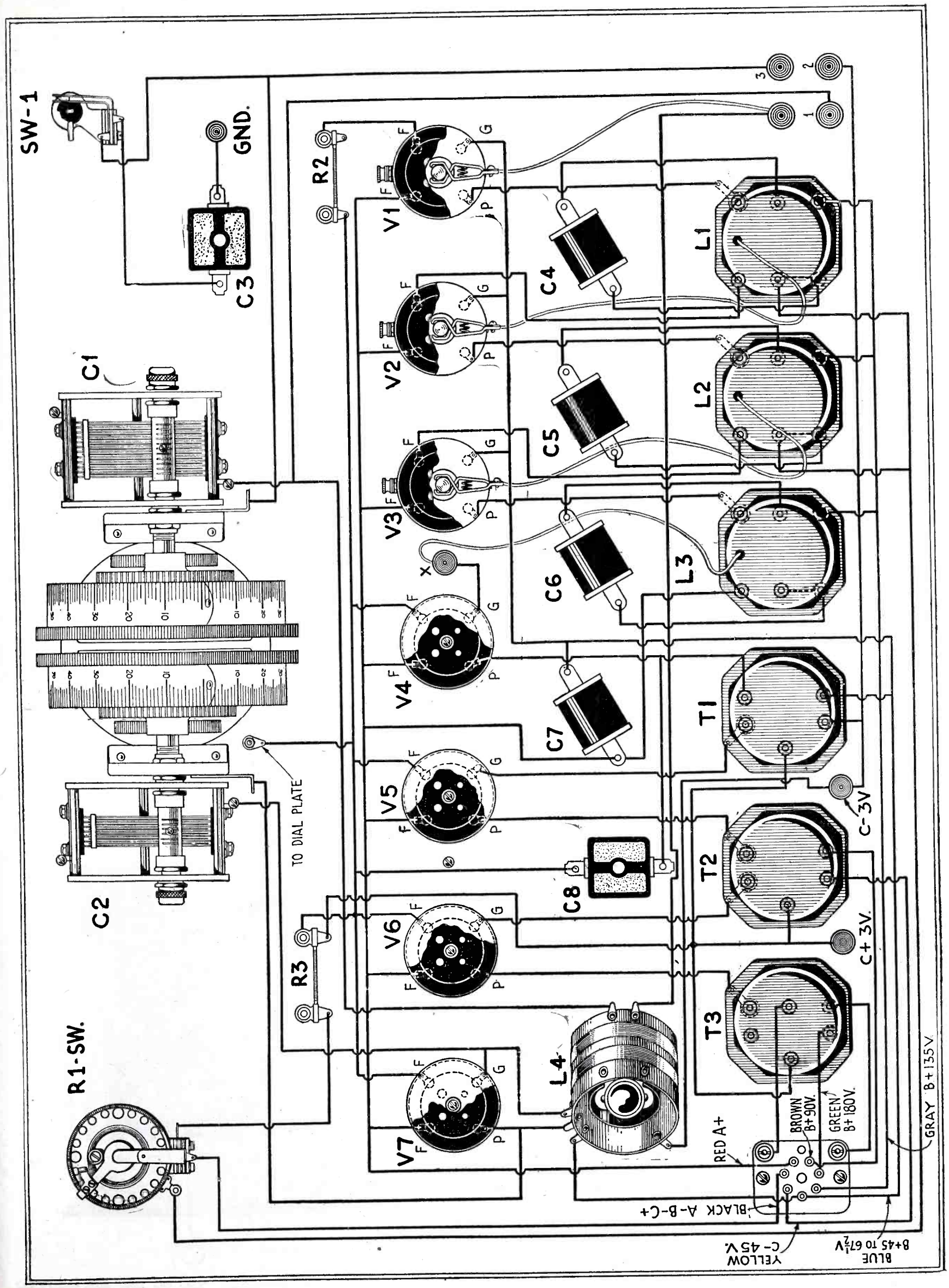
The addition of a fourth element to the new tube makes necessary five terminals to each tube. The tube is mounted in a standard UX base and the terminals are connected as usual, except that the screen-grid is connected to the grid terminal and the control-grid is connected to a special terminal which has been mounted on the top of the tube. When the tube is used in a receiver connection to the control-grid is usually made with a flexible wire and a clip.

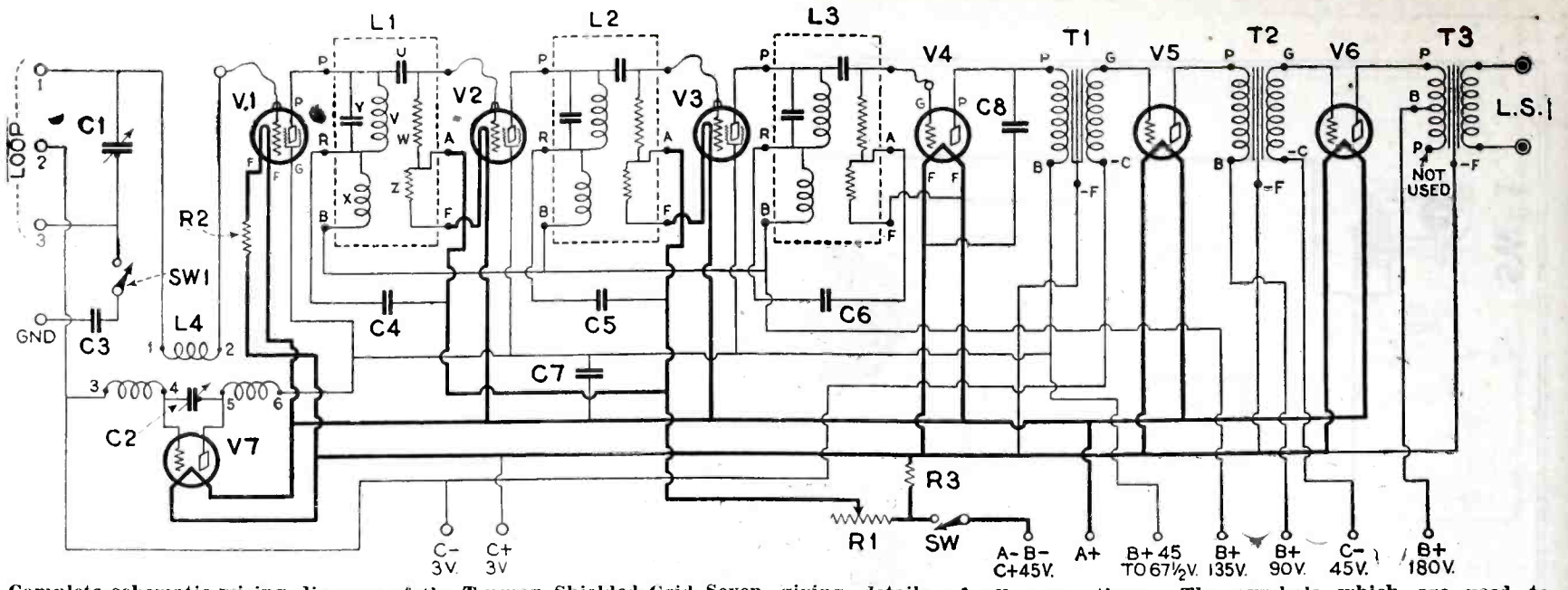
A theoretical explanation of the operation of the tube would be too lengthy to include here. However, it may be explained that the use of the fourth element reduces the internal capacity of the tube to a minimum and eliminates oscillating disturbances in R.F. circuits without the necessity of neutralization. The plate resistance of the tube is approximately 500,000 ohms when a potential of 135 volts is used on the plate and a potential of 45 to 50 volts is applied to the screen-grid. The negative bias potential applied to the control-grid is from 1 to 3 volts.

To obtain the highest possible efficiency when using tubes of the shielded-grid type an external shield must be placed around each stage. This was found necessary in order to avoid oscillations and to obtain maximum amplification. A comparison between a standard receiver and one using shielded-grid tubes will show the outstanding advantage of the lat-




**This picture shows the arrangement of parts on the top of the sub-base panel. L1, L2 and L3 are impedance units; T1 and T2, audio transformers; T3, output transformer; L4, oscillator coupler; C1 and C2, tuning condensers; R1-Sw, rheostat-switch; Sw1, S.P.S.T. switch; V1, first detector; V2 and V3, intermediate-frequency amplifiers; V4, second detector; V5 and V6, audio-frequency amplifiers, and V7, oscillator.**






**Complete schematic wiring diagram of the Tyrman Shielded-Grid Seven, giving details of all connections. The symbols which are used to identify the various pieces of apparatus in the circuit correspond to those used in the list of parts and the other illustrations which accompany this article.**

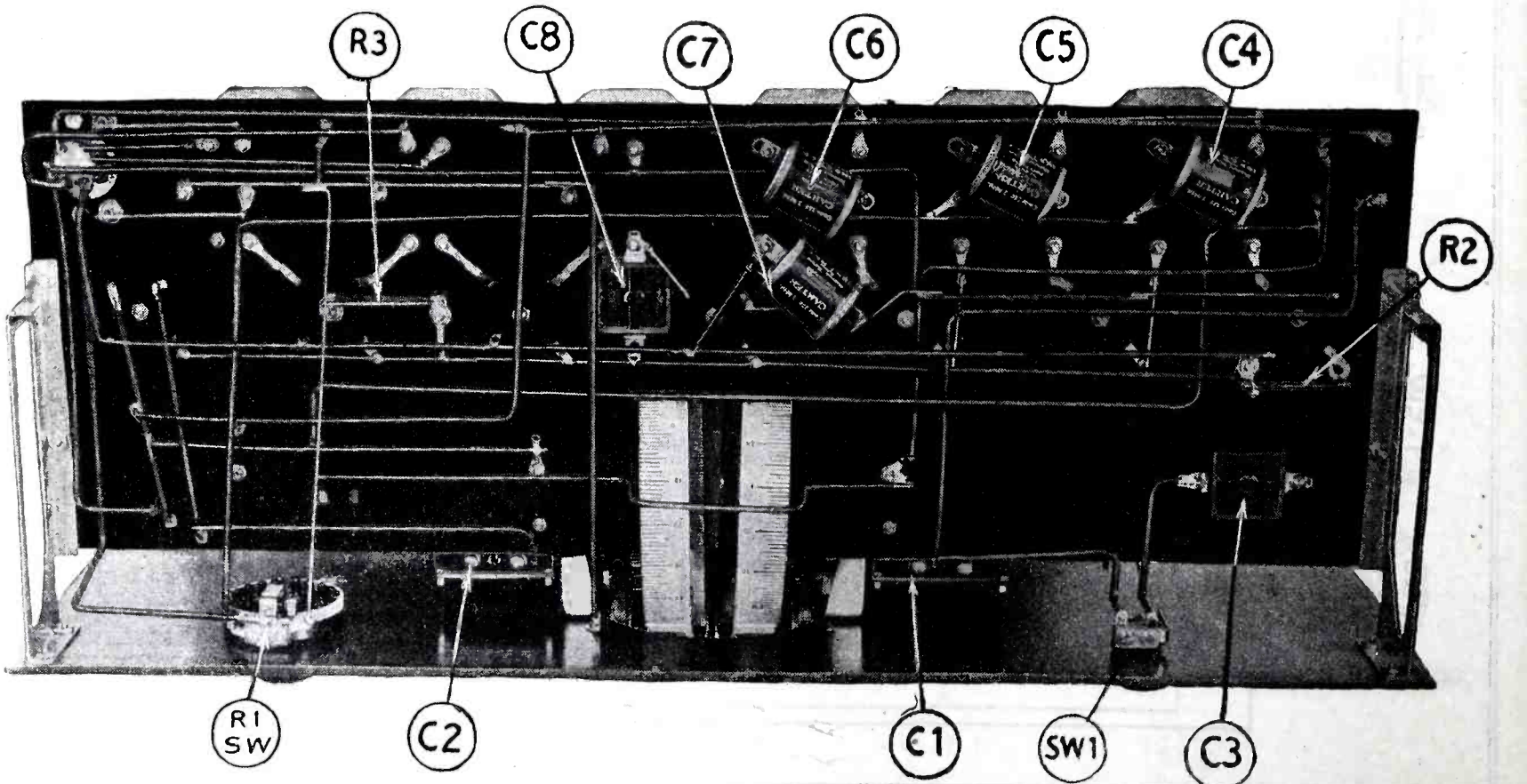
ter. When 201A-type tubes are used in an R.F. amplifier, it is difficult to obtain a gain greater than seven per stage; but properly designed circuits using the shielded-grid tubes will give an R.F. amplification of thirty per stage, and considerably more when lower frequencies are used as in all intermediate-frequency circuits of super-heterodyne receivers.

By careful examination of the intermediate stages in the schematic diagram it will be noticed that the tuned-plate-impedance system was selected as best suited to the characteristics of the shielded grid tubes; and for maximum efficiency a frequency of 350 kilocycles should be use. With this arrangement it is possible to obtain an amplification of fifty per stage.

In actual practice the plate impedance may consist of a solenoid coil (V) of the proper inductance shunted by a fixed condenser (Y) which tunes the circuit to the desired frequency. To prevent inter-stage coupling a 1-mf. by-pass condenser is connected between the inductor and the filament, and a radio-frequency choke coil (X) is connected in series with the plate supply wire. When a six-volt battery is used for heating the filament a resistor (Z) must be connected in the negative filament lead to reduce the voltage. The bias for the gride of the tube is obtained by connecting the resistor between the grid and the negative terminal of the battery, thus utilizing the voltage drop across the filament resistor. The grid resistor (W) has a resistance of 2 to 3 megohms. The grid and plate circuits are coupled by a fixed condenser (U) having a capacity of .0001 mf.

A photo within this article shows an interior view of one of the units used in this receiver. In this picture V is the plate inductor, which is tuned by the fixed condenser marked Y. The radio-frequency choke coil is located above the plate impedance at X and the grid resistor is mounted on the top of the assembly at W. The grid coupling condenser is located at U and the filament resistor is on the base at Z. The 1-mf. by-pass condenser, which is shown connected between the inductor and the filament in the diagram, is connected externally to the unit. When the unit is enclosed in its shield, it measures 2½ x 2½ x 4 inches.

The two advantages of this type of unit are that it contains all the essential parts of an intermediate-frequency




**A bottom view of the set showing how the fixed condensers and resistances are mounted beneath the sub-panel. Note the neat and convenient method of wiring all parts.**

stage, and that it is completely wired. The terminals used for connecting the unit into a receiver are seven in number, and six of these are on the bottom, thus allowing invisible sub-base wiring. The seventh terminal connects with the control-grid of the tube, and this connection is made with a flexible wire attached to the top of the transformer. This arrangement is very satisfactory, as connection to the control-grid of shield-plate tubes is made to the metal cap on the top of the tube.

In connection with the second detector and audio amplifier circuit it is not necessary to enter into a lengthy description of the apparatus used, as it is similar to the standard design. The two audio transformers and output transformer are connected in the usual manner, except that the core is grounded to the filament in each case. A glance at the diagram will show also that one terminal on the output transformer is not used.

When building the set, it is wise to start work on the sub-base panel. Panels which have been drilled for the apparatus used in this receiver are available; or it is possible to drill any 8 x 23 x 3/16 inch panel by following the accompanying drilling layout. When mounting the apparatus on the sub-base the two brackets should be placed in position before mounting any of the parts. Next, the three impedance units used in the intermediate-frequency amplifier may be mounted on the top of the sub-base; and at the same time the four cylindrical 1-mf. by-pass condensers should be fastened in place under the sub-base, with the proper terminals of the impedance units as seen in the photo of the bottom view of the set.

One of the terminals of the first audio transformer is used to support a small fixed condenser under the sub-base. However, when the second audio transformer and the output

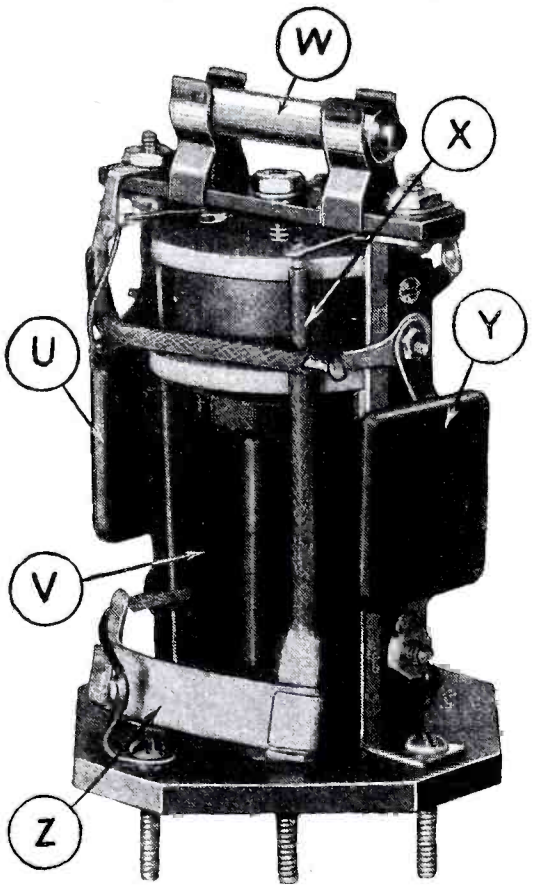


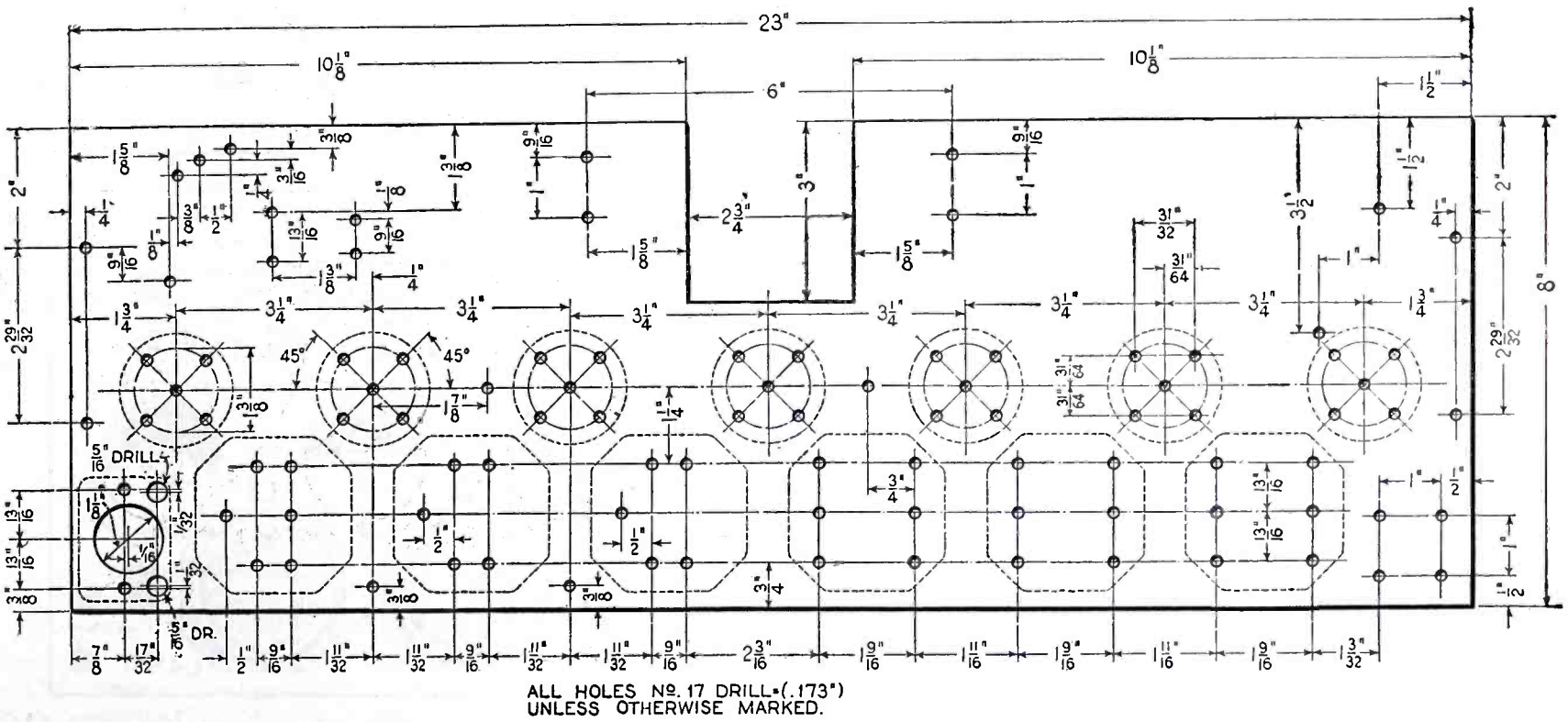

**Photo showing the arrangement of parts inside an impedance unit employed in the intermediate-frequency amplifier of the Tyrman Shielded-Grid Seven.**

transformer are mounted, it is necessary only to place a soldering lug under each nut.

In mounting the tube sockets only one mounting screw is required, as the terminals of the socket take the form of soldering lugs and holes are drilled in the sub-base for these to pass through. In one case a socket mounting screw is used to fasten a resistor (R3) under the sub-base. After the sockets are in place the mounting of apparatus on the sub-base may be completed by fastening the two variable condensers, the oscillator coupler, the cable plug and eight binding posts on top of the sub-base, and the fixed condenser C2 and resistor R2 under the sub-base. The position of these parts is clearly illustrated in the photos of the set herewith.

It is wise to wire as much of the set as possible before fastening the front panel in place. As only a few wires connect with instruments on the front panel, this method is not apt to confuse the constructor. In wiring the set, if the pictorial wiring diagram is being followed, it is highly important to make sure that all parts are mounted in the proper position. This applies particularly to the tube sockets and the octagonal amplifying units. (See photos and drilling layouts of front and sub-panel.)

The diagrams clearly point out the wiring and a point-to-point description of the connections is unnecessary. However, connections to the cable plug should be explained. This device facilitates connecting the receiver with the batteries and has provisions for seven wires. Each of the seven terminals is marked with a color which corresponds to that of the corresponding wire in the battery cable. When wiring the set the following system should be followed: connect the common "A—," "B—" and "C+45" lead with the terminal of the cable plug marked "Black"; connect "A+" with "Red"; connect "B+45" with "Blue"; connect "B+90" with "Brown"; connect "B+135" volts with "Grey"; connect "B+180"




**The sub-base panel drilling layout shows the exact location of all parts in dotted lines, and indicates the exact position of all holes required for mounting the various pieces of apparatus.**

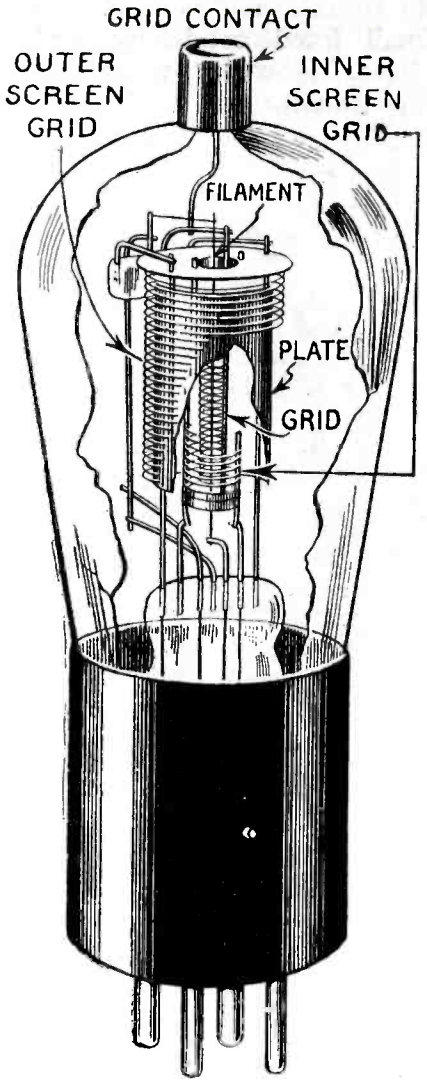
volts with "Green"; and connect "C—" 45 volts with "Yellow."

After the wiring on the sub-base has been completed, the parts on the front panel should be mounted; and then four screws are used to attach the front panel to the sub-base. When the set is in this state of completion only six wires remain to be connected.

Either batteries or a power unit may be used for the operation of the receiver. As the three shielded-grid tubes require a current of only .125 amperes each, the total current required by the filament circuits of this receiver is only 1.625 amperes, which makes the set very economical to operate. Also, the plate current is not excessive, as it is usually less than 35 milliamperes. For the grid circuit two "C" batteries are required; one of 45 volts, and the other 3 volts.

In order to give the reader some idea of the appearance of the tubes used in this set, the cut-away view of the shielded-grid tube, which appears on this page, shows very plainly the internal construction and the arrangement of the four elements.

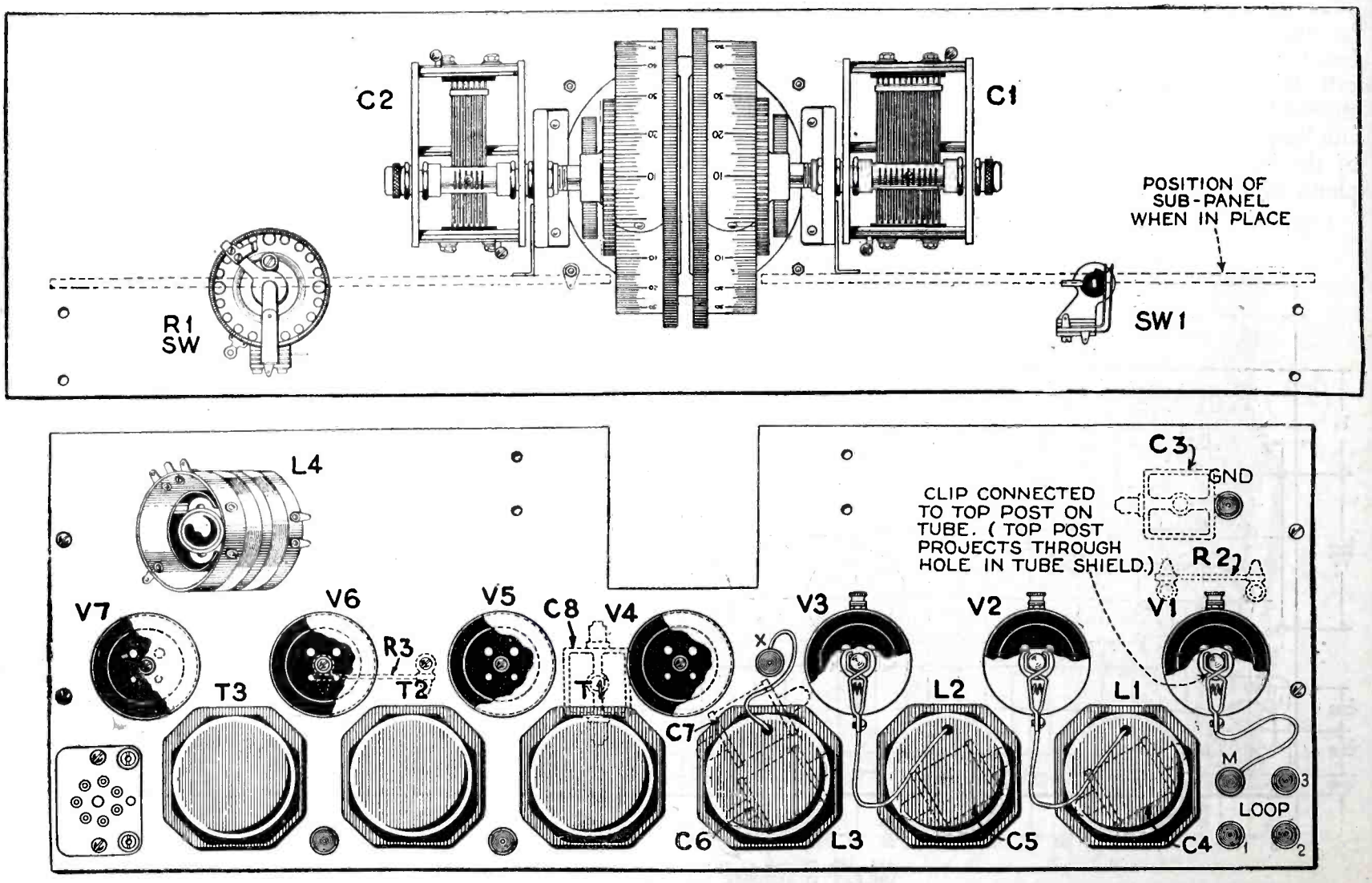
The shielded-grid tube greatly resembles, externally, one of the ordinary 201A type; it is of about the same diameter, but slightly longer. It is equipped with a standard four-prong UX base, the fifth connection being made to a small brass cap which is mounted on the top of the glass bulb. The glass appears to be partially silvered on the inside, as do most tubes because of certain chemical treatments which they undergo during evacuation.




**This cut-away drawing clearly shows the internal construction of the shielded-grid tube.**

For the operation of this receiver a Bodine loop is employed as a pick-up. The sensitivity of the receiver is sufficient to allow distance reception without the necessity of an outside aerial, and the use of the loop provides the additional advantage of directional selectivity. A satisfactory loop is specified in this article, but if the amateur wishes to construct one he will not find it a difficult task. The loop is of the box type and wound on a rectangular frame; 23 inches high, 12 inches wide and 6 inches deep. It has 14 turns of wire and a center-tap connection is made to the seventh turn. Flexible silk-covered wire is used and the winding is in two sections of seven turns each, with the wires spaced 6 turns to the inch and one inch between each section. The loop revolves on a wooden rod, ¾ inch in diameter, passing through the center of the frame.

After completion the set may be installed in either a table type cabinet or Excello console as seen in the heading of this article. As to loud speakers recommended for use with this set, the Ensco three-foot cone will give remarkable reproduction of all tones capable by the receiver itself.




**Instrument layout of the front and sub-panel. Parts mounted beneath the sub-panel are indicated in dotted lines.**

# The Karas A.C. Equamatic

WHEN building the laboratory model of this receiver the designers endeavored to combine as many desirable features in as compact a space as possible. That they have been successful in their attempt will be granted by even the most skeptical radio engineer after hearing a demonstration of the finished product. Taking into consideration size, weight, cost of assembly, cost of operation, number of accessories, etc., this receiver provides a radio installation for the average home which closely approaches the idea. Also, the set is not beyond the reach of the layman radio-set builder.

The system of electrification in this set is probably the newest, simplest and most efficient method thus far developed. The new 226-type A.C. tubes are used in both R.F. and one A.F. stage, a 227-type (heated-cathode) tube in the detector circuit, and a 171-type power tube in the last audio-frequency stage.

In the operation of the set alternating current, obtained from a small transformer, is supplied directly to the filaments of all tubes, and the plate current is provided by a "B" socket-power unit of standard design. The various values of grid bias required by the tubes of the receiver are secured through the voltage drop across fixed resistors installed in the set proper. With this apparatus there is a continuous source of power available at all times, the alternating-current hum is reduced to an almost negligible value, the necessity of batteries in any form is completely avoided, and the entire installation requires practically no attention or replacement of parts.

As the second vital feature of the receiver the system of reception should receive consideration. In this year's model of the Karas Equamatic the same highly efficient radio-frequency circuit, which gained nation-wide popularity last season, is employed. Amplification, which is practically uniform over the entire broadcast waveband, complete and perfect neutralization or balance on all dial settings, and high efficiency are the important advantages of the radio-frequency circuits of the set.

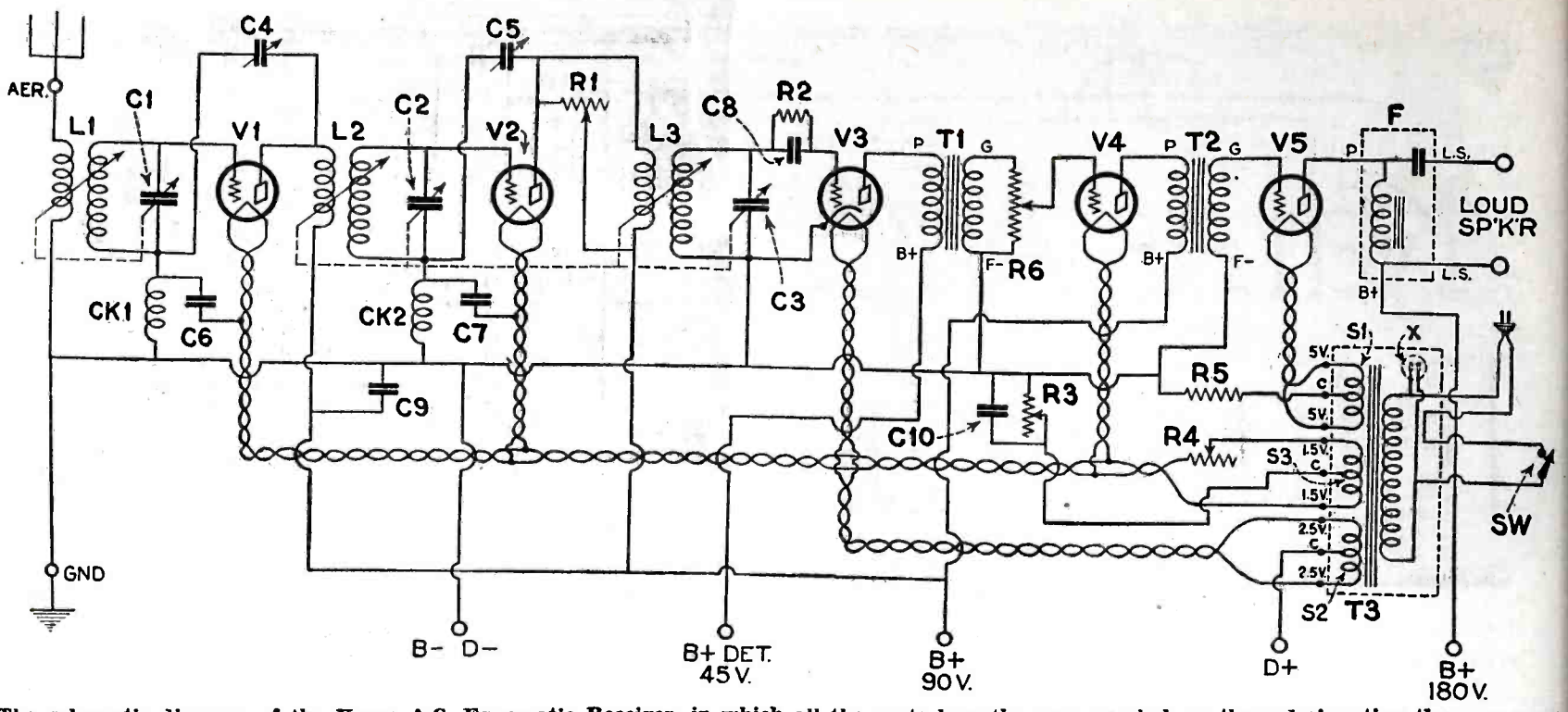
The fact that uniform amplification is obtained on all wavelengths might lead one to believe that the adjustment of the R.F. circuit is complicated; but such is not the case. A simple mechanical device accomplishes the effects described, and the set is no more difficult to build, adjust or operate than the average tuned R.F. receiver. Two dials, which follow each other closely over the entire scale, are the only wavelength controls for the set and after the desired station has been tuned in with these dials, only the volume controls remain to require adjustment.

Automatic variation of coupling between the primary and secondary coils of the R.F. transformers is the characteristic of the circuit which makes possible uniform amplification on all waves. The primary coils of the transformers are mounted on the shafts of the condensers in such a way that the rotation of the condensers causes the exact change of coupling required in order to maintain a uniform transfer of energy. (See page 97, Fall, 1927, Edition of Radio Listeners' Guide and Call Book for an explanation of the system by which this is brought about.)

To appreciate fully the value of uniform amplification on all wavelengths, it is necessary to compare the operation obtained from an Equamatic with those secured from an ordinary tuned-R.F. set in which no provision has been made for coupling compensation.

### LIST OF PARTS

- 3 Karas variable condensers, .00035 mfd. with extended shaft, C1, C2 C3
- 3 Karas R.F. transformers, Equamatic type, L1, L2, L3
- 2 Karas A. F. transformers, T1, T2
- 1 Karas output filter, F
- 2 Samson neutralizing condensers, .00002 mfd. to .00015 mfd., C4, C5
- 2 Carter fixed condensers, .00015 mfd., C6, C7
- 1 Carter fixed condenser, .00025 mfd., C8
- 1 Carter fixed condenser, .006 mfd., C9
- 1 Carter by-pass condenser, 1 mfd., C10
- 1 Carter rheostat, 75 ohms, R1
- 1 Durham grid leak, 3 megohm, R2
- 1 Carter variable resistor, 2000 ohms, R3
- 1 Carter rheostat, 0.2 ohms, R4
- 1 Electrad fixed resistor, 2,000 ohms, R5
- 1 Electrad potentiometer, 500,000 ohms, R6
- 2 Hammarlund R.F. choke coils, 85 millihenries, Ckl, Ck2
- 3 A.C. tubes, UX 226 type, V1, V2, V4
- 1 A.C. tube, UX 227 type, V3
- 1 Power tube, UX 171 type, V3
- 1 Karas filament transformer, T3
- 5 Benjamin tube sockets, UX type
- 1 Yaxley 7 wire cable plug
- 1 Formica front panel, 7 x 24 x 3/16 inches
- 1 Formica sub-base panel, 9 x 24 x 3/16 inches
- 3 Karas brackets for sub-base panel
- 1 Karas link motion 2 dial control
- 2 Yaxley tip jacks
- 1 X-L binding post
- 1 Carter switch, 110 volt type, SW
- 2 Karas vernier type dials
- 1 Pkg. Kester Rosin Core solder
- 1 Pkg. Acme Celatsite wire



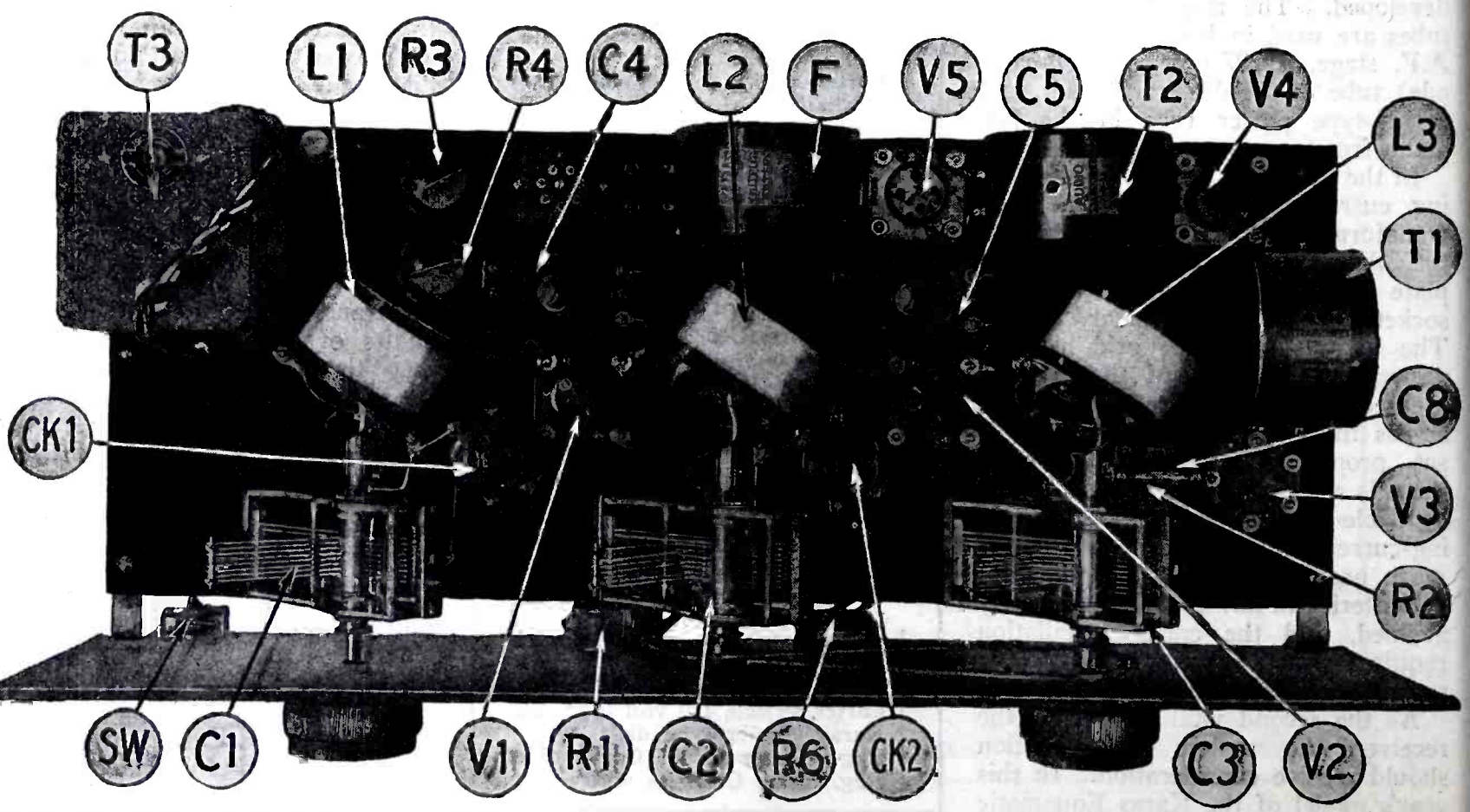

**The schematic diagram of the Karas A.C. Equamatic Receiver, in which all the parts bear the same symbols as those designating the same parts in the other illustrations.**

In the tuned-radio-frequency receiver, the efficiency is highest when the dials are tuned to the lowest wavelength; and, as the wavelength is increased, the efficiency decreases steadily. The result is that, on the waves between 400 and 500 meters, where most of the listening actually takes place, the sensitivity of the set is often only one-third of maximum. On the other hand, wtih the Equamatic system, the efficiency on short waves is maximum, but the coupling between the two coils of the transformer is minimum. As the wavelength is increased the efficiency remains near maximum because of the fact that the coupling between the coils is increased. The result is that, on the high waves, the set often has three times the efficiency of other receivers. When one takes into consideration the large number of high-quality programs which are broadcast on the highest wavelengths, the importance of the above will be more thoroughly understood.

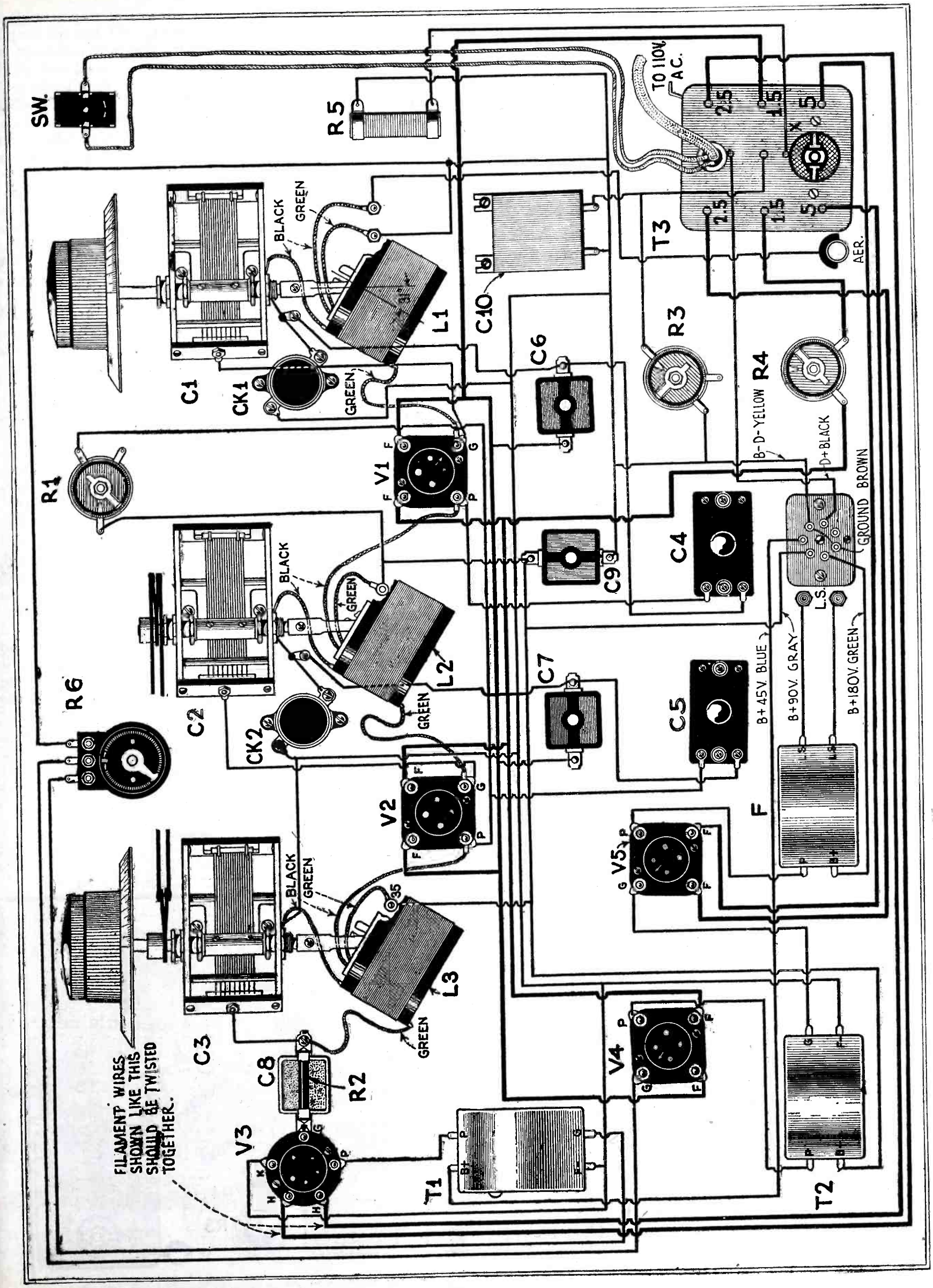
In this day and age a receiver is of little value if serious consideration has not been given to the audio-frequency amplifier. Distortionless reproduction is a modern necessity, and it can be obtained only by using the best quality modern apparatus.

In the receiver under discussion two high-quality amplifying transformers are used in the audio circuit and these are followed by an audio filter in the output circuit. Ample available power is assured by the use of a power tube in the output stage, and distortion due to overloading is prevented by the resistors which apply a bias of the correct value to the grid of each tube.

The type of volume control used also helps to prevent distortion. A variable resistor, which serves as a sensitivity control, is employed in the R.F. circuit; and this makes it impossible to overload the detector, if it is properly adjusted. The second volume control is in the audio circuit and consists of a high-resistance potentiometer connected across the secondary of the first audio transformer in




**The top view of the sub-panel: T3, power transformer; L1, L2, L3, R.F. transformers; CK1 and CK2, choke coils; C1, C2, C8, variable condensers; V1 and V2, R.F. amplifier sockets; V3, detector socket; V4 and V5, A.F. amplifier sockets; C4 and C5, neutralizing condensers; SW, switch.**



such a way that the grid potential of the tube may be varied.

Before continuing with a description of the receiver it is necessary to examine the schematic and picture wiring diagram. After a thorough study of the circuit used it will be seen that the R.F. end of the set is a standard two-stage tuned-R.F. amplifier to which many refinements have been added. This is followed by a standard tuned detector circuit and two stages of transformer-coupled audio-frequency amplification.

In the R.F. circuits the condensers C1, C2 and C3 control the wavelength of all stages. The arrow which passes through the condenser and transformer in each case indicates that both the condenser and the coupling between the coils are varied by the same dial as described in the early part of this article. The dotted line which connects condensers C2 and C3 indicates that both are tuned with the same dial. The three tuning condensers are of identical construction, each having 17 plates, or a capacity of .00035 mf.

To prevent oscillation in the R.F. circuits the condensers C4 and C5 are used. These are the standard fixed-adjustable neutralizing condensers and are connected in the conventional manner. Interstage feed-back in the radio-frequency stages is prevented also by the condensers C6 and C7 and by the radio-frequency choke coils Ck1 and Ck2. The condensers allow the radio-frequency currents to pass directly to the filament circuit without entering the biasing resistor, and the two choke coils provide a part for the biasing potential, which is applied to the grids of the two R.F. tubes. The two condensers used for this purpose are of the fixed-mica variety and each has a capacity of .00015 mf. The two choke coils have an inductance of 85 millihenries each.

In the second audio-frequency stage a very interesting feature is to be found. A 75-ohm rheostat (R1) is connected across the primary coil of L3. This rheostat may be used as an auxiliary volume control when loud local stations are being received, and will prevent distortion by the detector tube, which would occur if it were overloaded.

In the detector and audio-frequency circuits of the set the wiring is practically standard and the few changes which have been made necessary by the special alternating-current tubes. In the detector the usual grid leak and condenser method of detection is employed.

When taking a quick glance at the circuit it appears different from the average; it is the use of the A.C. tubes which makes this difference so noticeable. In the diagram it will be seen that the filament wiring is represented by three sets of twisted wires and these wires terminate at three separate secondary windings of the transformer.

This is the power transformer which provides filament current for the entire receiver. As each of the various types of tubes used in the set requires a different filament voltage, three different secondary windings are needed on the transformer. Also, each winding has a center tap in order that a zero-potential point may be obtained.

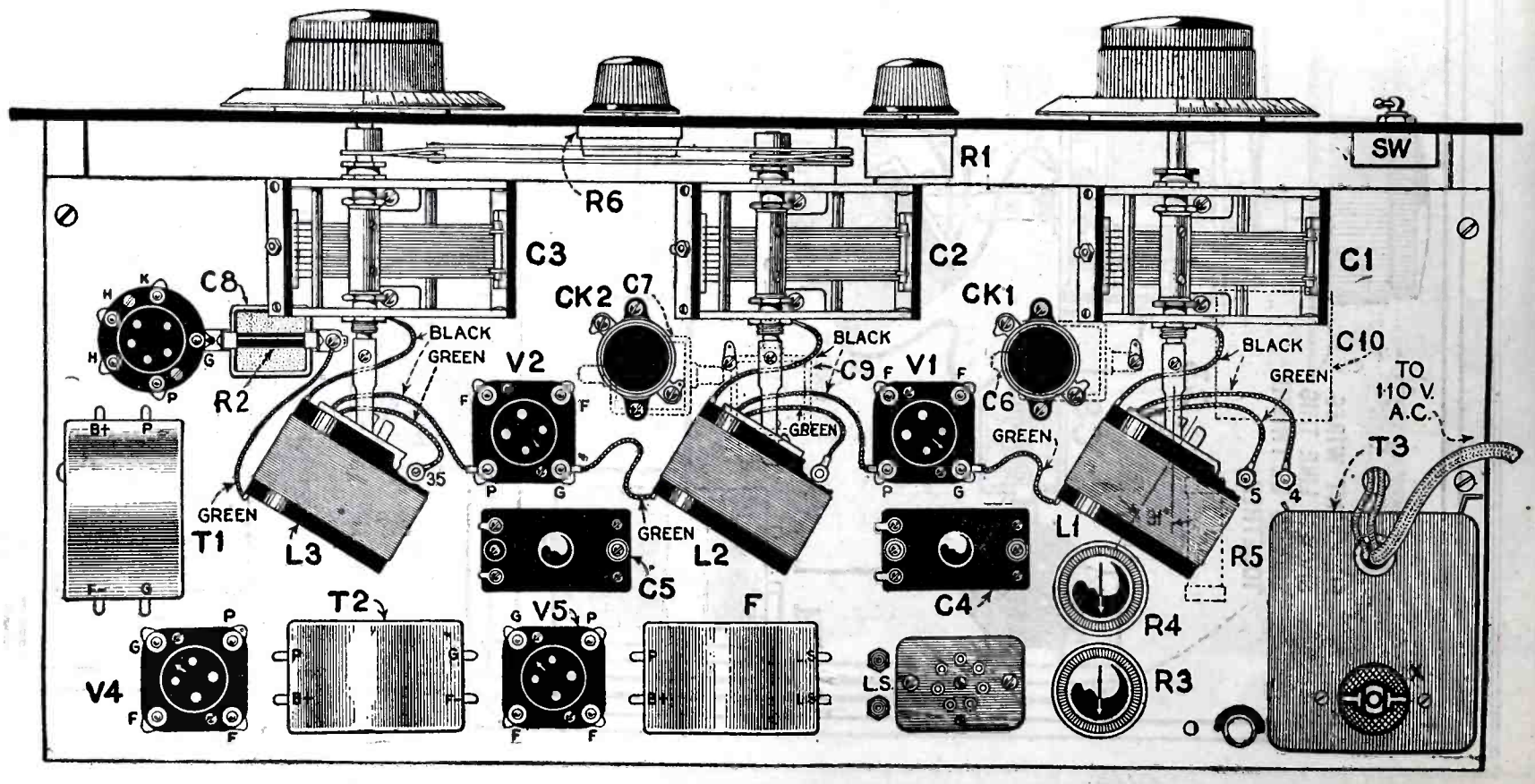
Winding S1 provides the filament current for the 171 tube, in the last stage of audio amplification, which requires ½ ampere at a potential of 5 volts. Winding S2 has an output of 2.5 volts for the heater-element of the type-227 detector tube; and winding S3 is used to heat the filaments of all of the 226-type amplifier tubes, which require 1.5 volts.

Usually, when operating tubes from alternating current, a rheostat is not required; as the transformer provides exactly the voltage desired. However, in the case of winding S3, as several tubes are heated from the same source, it was considered advisable to include one. The rheostat used, R4, is a small wire-wound unit with a total resistance of 0.2 ohms.

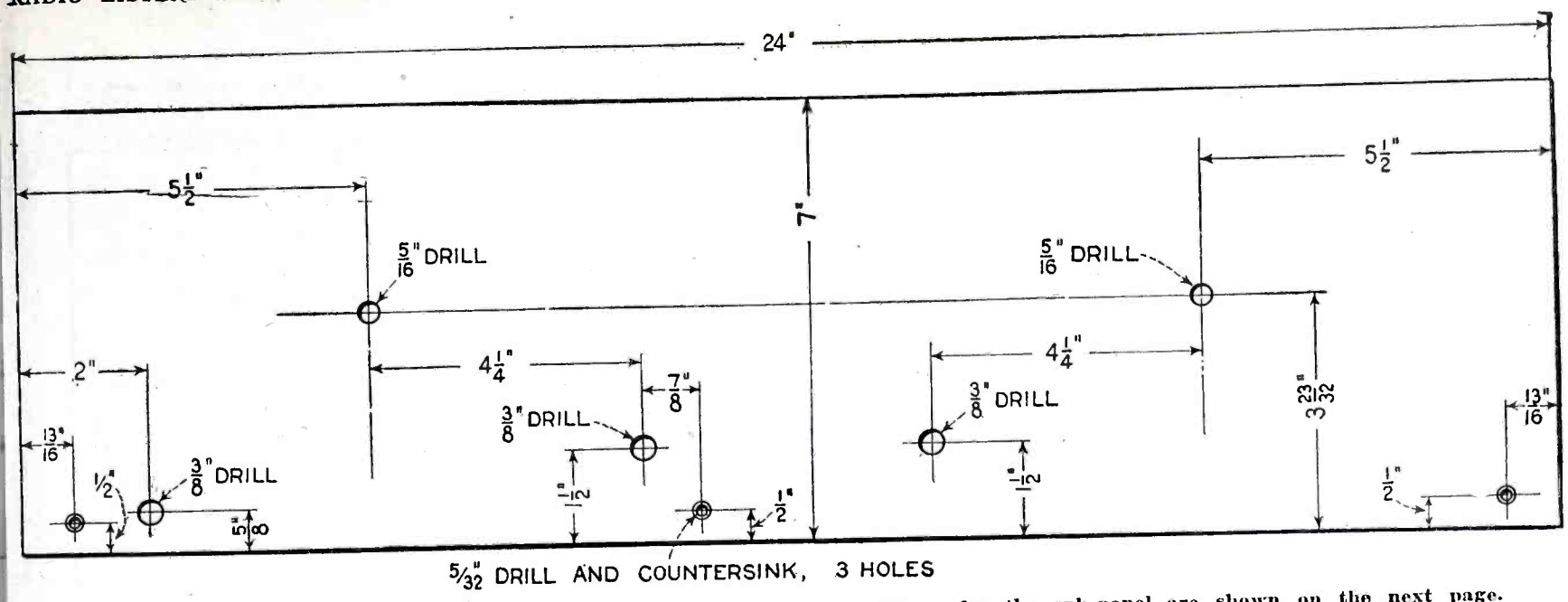
Many readers will probably ask themselves how the grid potential is obtained for the various tubes of the set. Batteries cannot be used for the purpose, as the set has been designed for complete A.C. operation; nor can the desired voltages be obtained from the power unit, as the set has been designed for operation with any standard "B" socket-power unit. The method used utilizes the voltage drop which takes place across R3 and R5.

Careful examination of the circuit will show that the grid-return wire of each tube is connected to the ground, which is also the "B—" wire. Also, the resistor R3 is connected between the ground and the center tap of filament winding S3, and the resistor R5 is connected between the ground and the center tap of S1. Therefore, it may be seen that the drop in voltage between the filament winding and the ground provides the desired bias.

In the case of the power tube a variable bias is not necessary; as the value of this potential is not critical and it has been found that in most




**Layout showing the placement of all parts. The filament transformer, T3, is shown in the lower right corner of the above illustration.**




**The drilling details for the front panel of the A.C. Equamatic Receiver. Those for the sub-panel are shown on the next page.**

cases a 2,000-ohm resistor provides the correct potential. The bias for the R.F. tubes, however, is more critical and for this reason a 2,000-ohm variable resistor is used. In addition the by-pass condenser C10, with a value of 1 mf., is connected in shunt with this resistor to reduce the resistance to high-frequency currents.

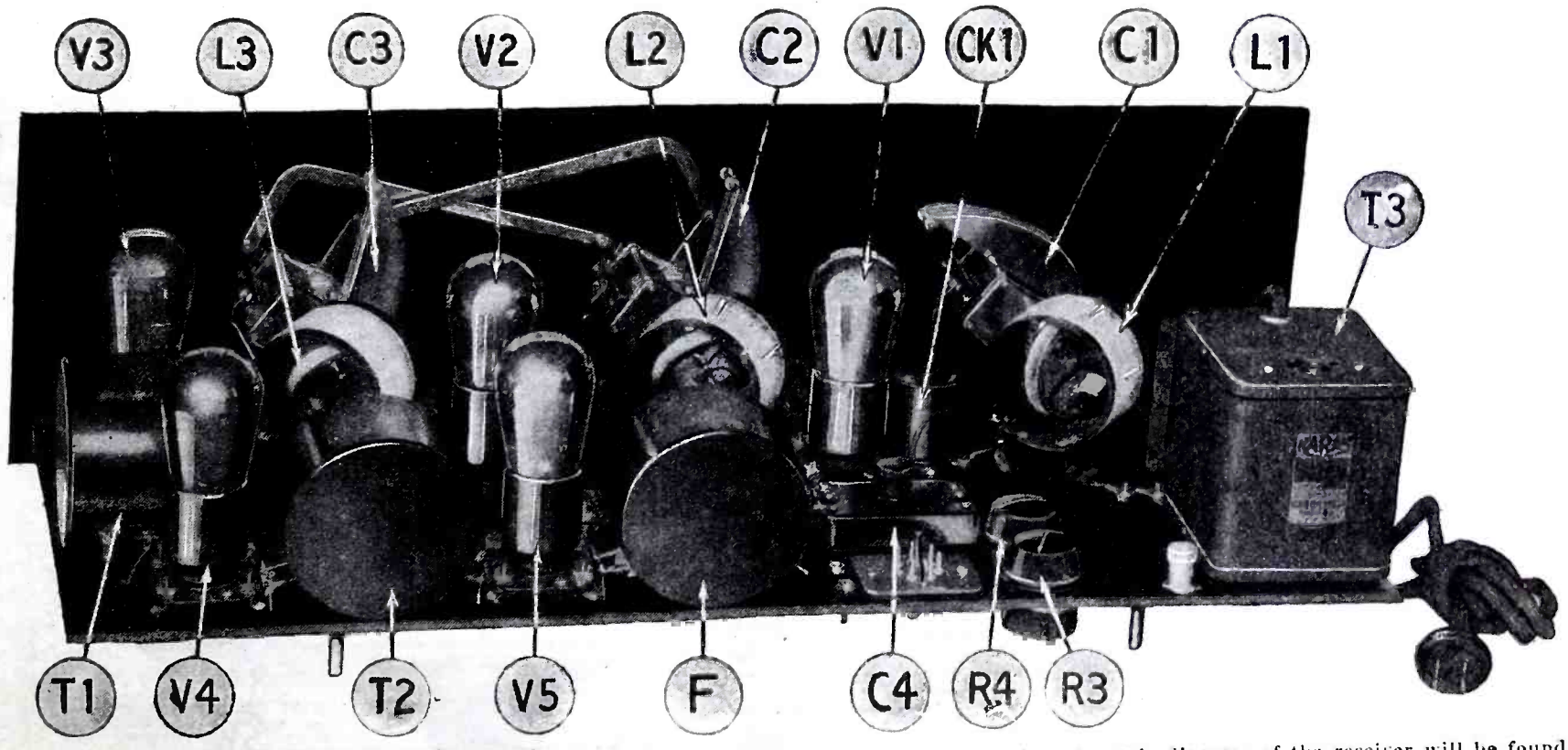
The front panel view of the set in an Excello Console in the heading of this article shows the arrangement of controls on the front panel of the receiver. The two large dials are the wavelength controls and of the vernier type, although they present the appearance of standard dials. The one at the left tunes the antenna coupler and that to the right tunes the second R.F. stage and the detector circuit. The knob slightly to the left of the center is the 75-ohm rheostat R4, which serves as a sensitivity control, and the knob on the right of the panel is the volume control R3, which is a 500,000-ohm variable high resistor.

At the extreme left of the panel, the off-and-on switch is located. This switch is connected in the 110-volt house-lighting circuit, in series with the plate-power-supply unit and the filament transformer. The front panel is 7 x 24 x 3/16 inches, and a panel drilled for the apparatus used in this receiver is available on the market. However, those who wish to drill their own panels will find in these pages a diagram showing the necessary holes.

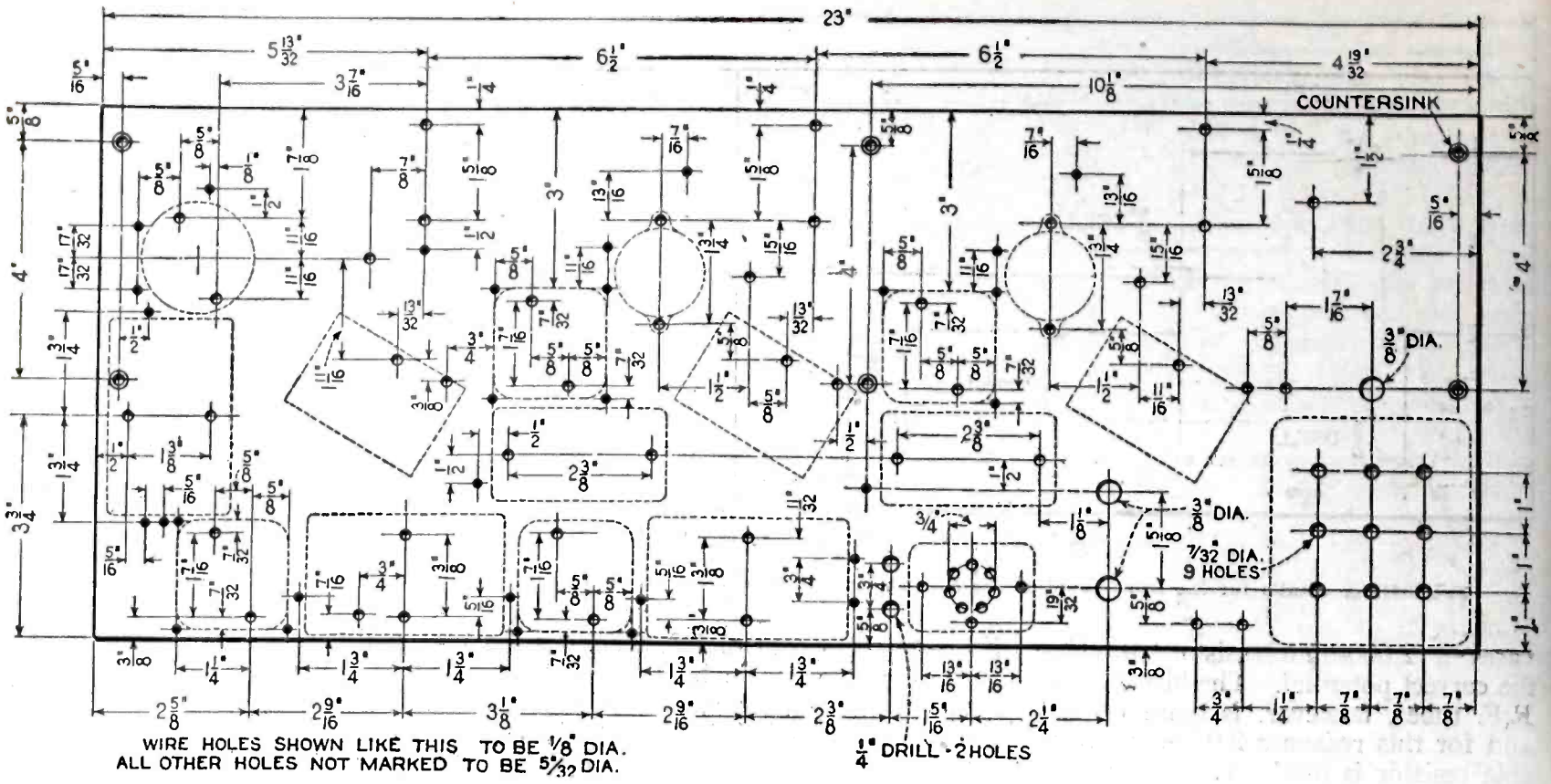
An accompanying photo shows the appearance of the receiver when viewed from above. The power transformer which supplies current for the filaments will be found on the rear edge of the panel, at the extreme left. It will be noticed that there is a standard 110-volt receptacle on the top of the transformer; this is used for connecting the plate socket-power unit with the house current. When the plug from the power unit is inserted in this receptacle the operation of the unit is automatically controlled by the switch on the front panel. In addition to the wire from the filament transformer which goes to the light socket, the wires which go to the switch are also provided and properly connected inside the unit.

On the right of the filament transformer are two knobs which control the variable resistors R3 and R4; the former is the resistor nearest the rear edge of the baseboard. These two units are located under the sub-base panel.

For making connections between the receiver and the plate-power unit, a connector plug and battery cable is employed. The socket of this plug is located at the right of the two resistor knobs. When using a plug and cable of this type, the power unit is connected to the battery cable is the usual




**T1 and T2, A.F. transformers; F, output filter; R3, "C" bias rheostat; R4, filament rheostat; the schematic diagram of the receiver will be found on page 98, the symbols being the same as those in the above illustrations.**




**The above illustration indicates the proper positions for the instruments mounted on the sub-panel, as well as the necessary holes.**

way; but, to connect the set with the battery cable, it is necessary only to insert the plug in the socket mounted on the sub-base panel. This facilitates connecting and disconnecting the receiver and also avoids errors. It will also be noticed that to the right of the cable socket two small tip jacks are provided for the loud speaker.

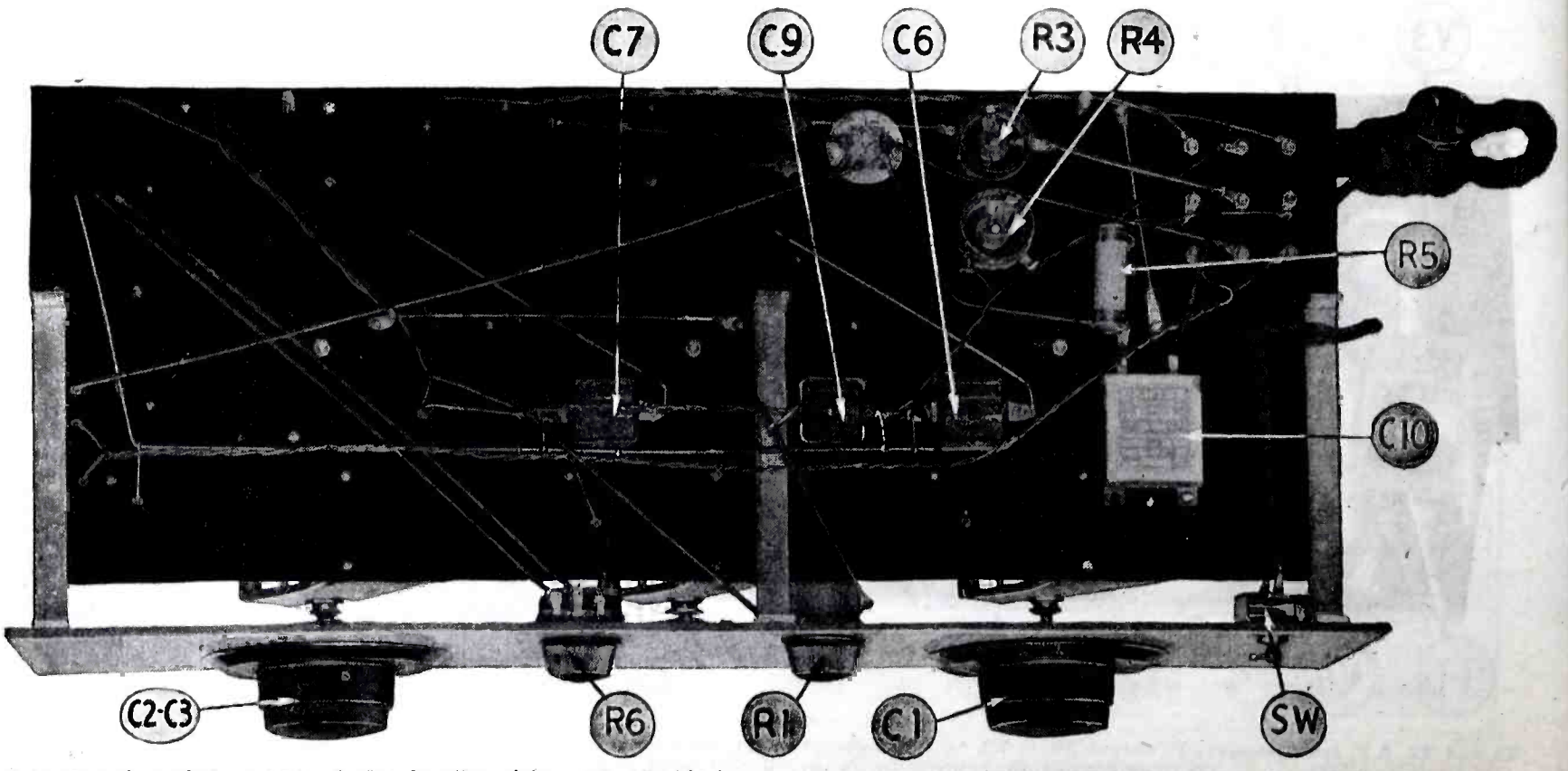
The remaining apparatus on the rear edge of the sub-base is in the audio circuit. The parts are, from left to right: output filter, power tube, second-stage transformer and first-stage amplifier tube. The first-stage transformer is located in front of the first-stage tube.

All the apparatus in the radio-frequency circuits is located on the front edge of the baseboard. The components on the left of the sub-base, consisting of a variable condenser, radio-frequency transformer, R.F. choke coil, neutralizing condenser and tube, make up the first R.F. stage. A similar group of apparatus in the middle are the parts for the second stage; and the condenser, R.F. transformer, tube, grid leak and grid condenser on the right of the panel are in the detector circuit.

In an effort to give the receiver as commercial an appearance as possible the designers have placed most of the wiring and many parts under the sub-base panel. This is clearly shown in a bottom view photo herewith. Three brackets are used to fasten the front panel to the sub-base, and two metal pins are mounted on the rear edge of the sub-base to support the weight at this point.

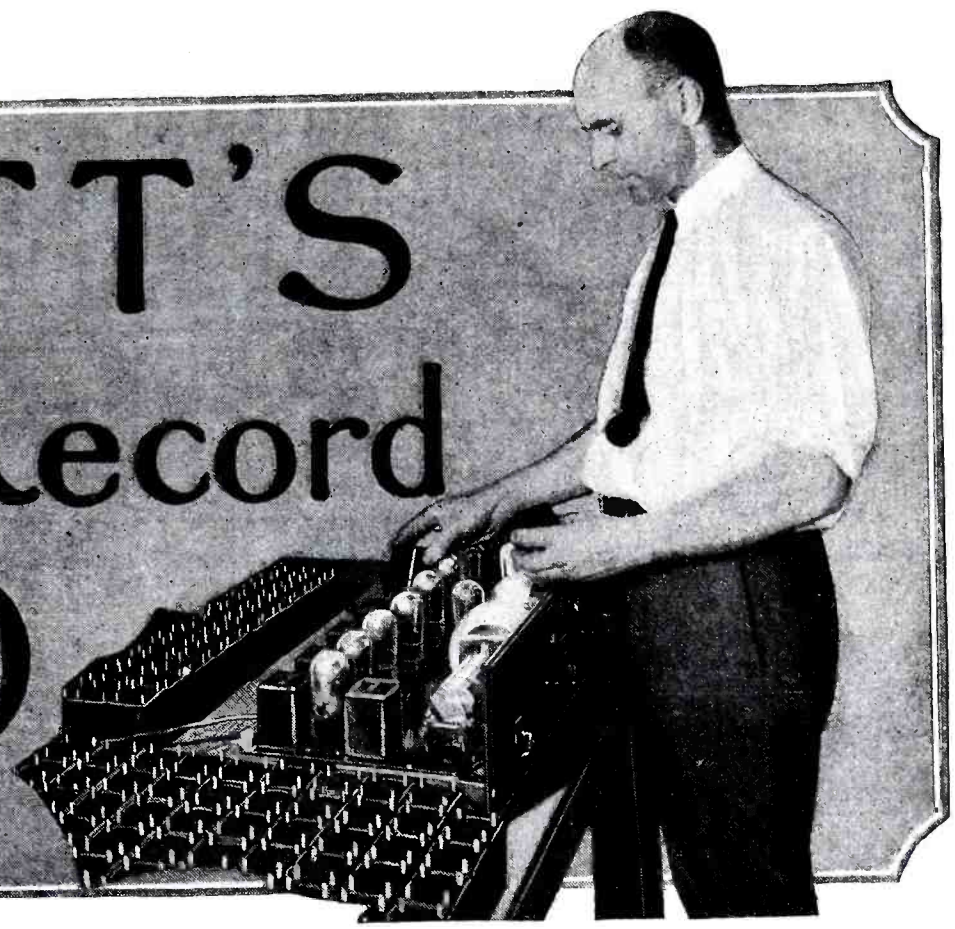
The most important point of interest under the sub-base is the filament wiring, which is twisted. This is necessary in order to reduce the A.C. hum in the output. It will be noticed that the filament transformer is mounted so that the low-voltage terminals pass through the sub-base, and the twisted filament wires connect directly with these posts.

(*Continued on page* 185)




**A bottom view of the sub-panel, showing the wiring. R3, "C" biasing rh eostat; R4, filament rheostat; R5, resistor, C6, C7, C9, C10, condensers.**

# SCOTT'S World's Record Super 10



ON a recent visit to Chicago, the managing editor and local representative of RADIO LISTENERS GUIDE AND CALL BOOK were given a demonstration of the World's Record Super 10. Among others present at this demonstration were a few Chicago manufacturers and radio enthusiasts.

We were all grouped around the set, which was being operated by Mr. Scott, and comments on the unusualness of the performance of the set were free and numerous. We were, to put it mildly, all thoroughly surprised and amazed.

Station KFI of Los Angeles, California, was just tuned-in, and were all enjoying the thrill that is associated with perfect reception of long distance. The program from KFI came to us with great volume and unimpeachable clarity—in fact, we were all listening critically to see if we could detect any flaws in the performance of the World's Record Super 10, which was bringing to us this fine music that had traveled so far to reach us.

Here was KFI coming to us clear and loud after traversing more than two thousand miles of mountains and plains. But what was immeasurably more gratifying, here was the World's Record Super 10, performing in Chicago at 9:30 P.M., selecting the weak impulses from KFI from a spectrum of radio broadcast transmissions, that is notably congested and punctuated with powerful local broadcasting stations. WCFL a fifteen hundred watt Chicago station was broadcasting its evening concert of organ music on a frequency of 620 kilocycles, only twenty kilocycles (15.1 meters) away from KFI which operates on 640 kc. Despite this meagre separation, the World's Record Super 10 brought us the program without interference, without background noise.

Naturally, we were astounded, when Mr. Scott calmly removed the antenna lead from the World's Record Super 10, and the program from KFI only diminished slightly in intensity. We felt sure that the ground connection was doing the work of an antenna, so Mr. Scott also removed this, to dispel any of our doubts. KFI still came in with loud speaker volume, after a few minor adjustments in sensitivity had been made.

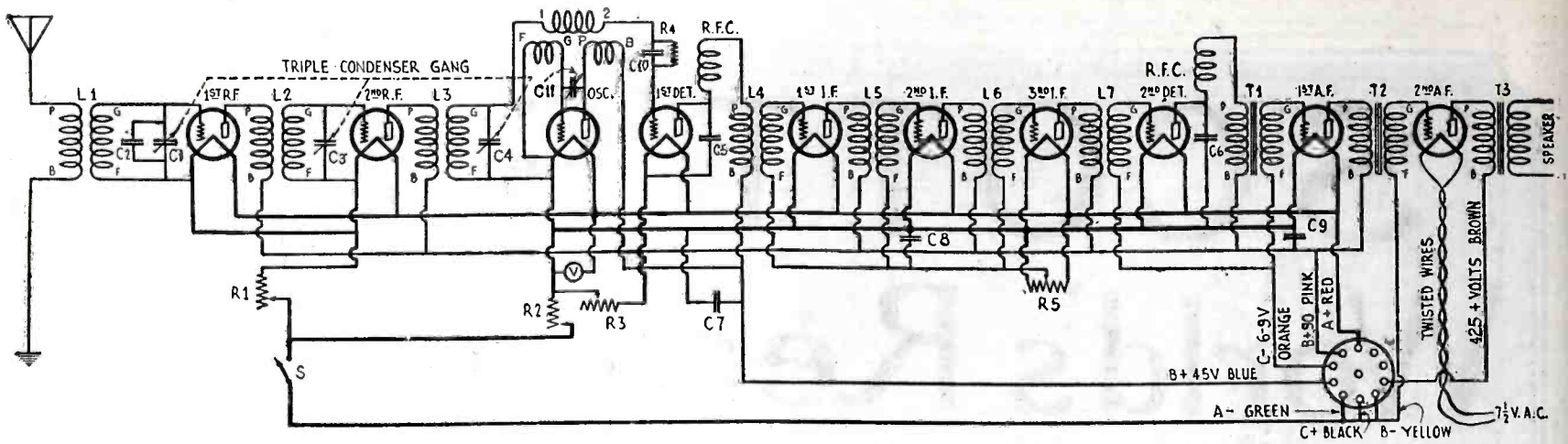
"That," said Mr. Scott, with justified satisfaction, "That is what I consider the supreme test of sensitivity of any receiver."

There was nothing for the rest of us to do but agree, for the demonstration of sensitivity made us all feel that the World's Record Super 10 is one of the most sensitive radio receivers we had ever heard.

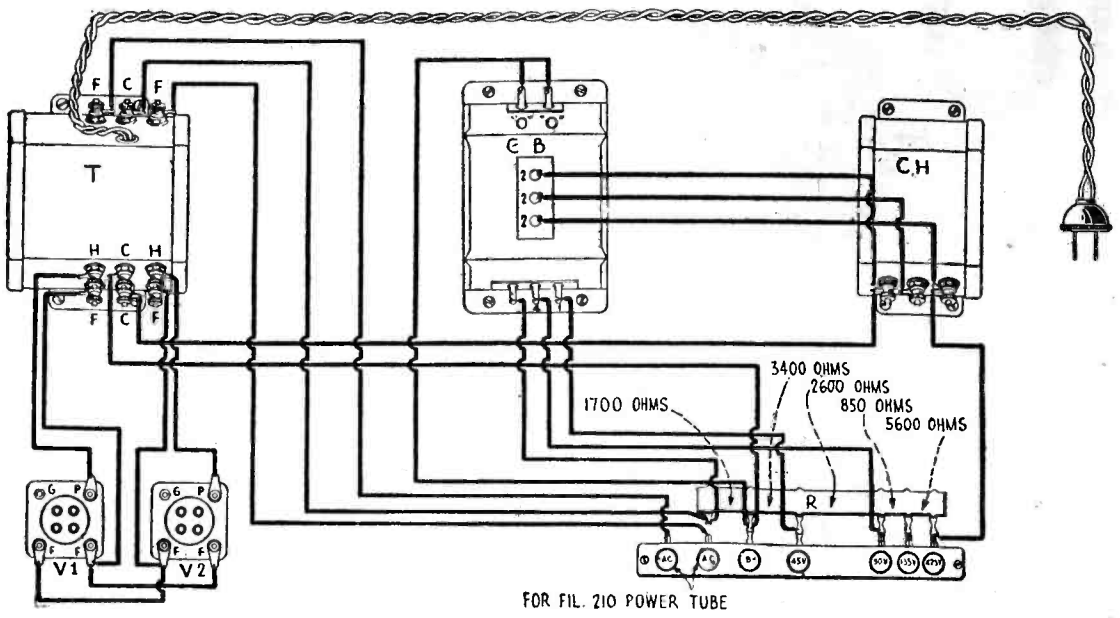
A little later, we listened to the program of WJZ of New York, coming direct, with so much volume that one of the members of our party requested that the set be toned down so we could talk more easily. Every tone, every harmonic, and every overtone from kettle drum to piccolo were faithfully reproduced. An absence of background noise or rustle further enhanced the entertaining value of the reproduced WJZ program.

### LIST OF PARTS

| | |
|---|---|
| 1 | Formica Panel, drilled and engraved, 26 x 7 x 3-16 inches. |
| 1 | Formica sub-panel, drilled 25 x 10 x 3-16 inches. |
| 1 | Remler 3 in line condenser No. 633, .00035 mfd., C1. C3, C4. |
| 1 | Remler condenser No. 638, .0035 mfd., C11. |
| 1 | Silver-Marshall 340 midget variable condenser, .000025 mfd., C2. |
| 2 | Remler Drum dials No. 110 (1 each 110 and 110-R). |
| 2 | Remler R.F. Choke Coils No. 35, RFC. |
| 2 | Thordarson Audio transformers R200, T1, T2. |
| 1 | Thordarson output transformer No. 76, T3. |
| 2 | Selectone L.W. transformers No. B 500, L4, L6. |
| 2 | Selectone L.W. transformers No. B 510, L5, L7. |
| 2 | Selectone R.F. transformers No. 520, L2, L3. |
| 1 | Selectone Antenna Coupler No. 530, L1. |
| 1 | Selectone Oscillator Coupler No. 540, L. |
| 10 | Benjamin Sockets (without bases). |
| 1 | Pair Benjamin brackets No. 8629. |
| 1 | Carter Rheostat 1R-30 ohms, R3. |
| 1 | Carter Rheostat 1R-15 ohms, R1. |
| 1 | Carter Rheostat MW-1 ohm, R2. |
| 1 | Carter potent., 1R-400 ohms, R5. |
| 1 | Carter fixed condenser, .00025 mfd. with grid clips, C10. |
| 1 | Carter fixed condenser, .002 mfd., C6. |
| 1 | Tobe fixed condenser, .0001 mfd., C5. |
| 1 | Pair No. 10 Carter pin jacks. |
| 1 | Jewell Voltmeter O-8 Volts, type No. 135, V. |
| 3 | Tobe By-pass condensers, 1 mfd., C7, C8, C9. |
| 1 | Tobe 3 meg. grid leak, R4. |
| 1 | Jones 10 contact Multi-Plug. |
| 40 | soldering lugs and Kester radio solder. |
| 30 | ft. Acme Celatsite hook-up wire. |




**Schematic wiring diagram of Scott's World's Record Super Ten. Connections from the Multiplug connector are made to the proper binding post terminals of the "B" unit shown below.**




**Picture wiring diagram of the "B" eliminator unit employed with Scott's set.**

Here Mr. Scott interposed with a little explanation.

"I have tuned in WJZ for you, chiefly because WJZ operates on a frequency that is removed from the operating frequency of WMAQ by a side band of only ten Kilocycles," he said. "In view of this ten kilocycle separation, and considering the fact that WMAQ is a 1,500-watt station, located not more than eight miles from here, I feel that it is ample evidence of the selectivity of the set. At the time of the demonstration WMAQ transmitted on 670 kc (447.5 meters) and WJZ on 660 kc (454.3 meters). This was changed in the revision of December 15th.

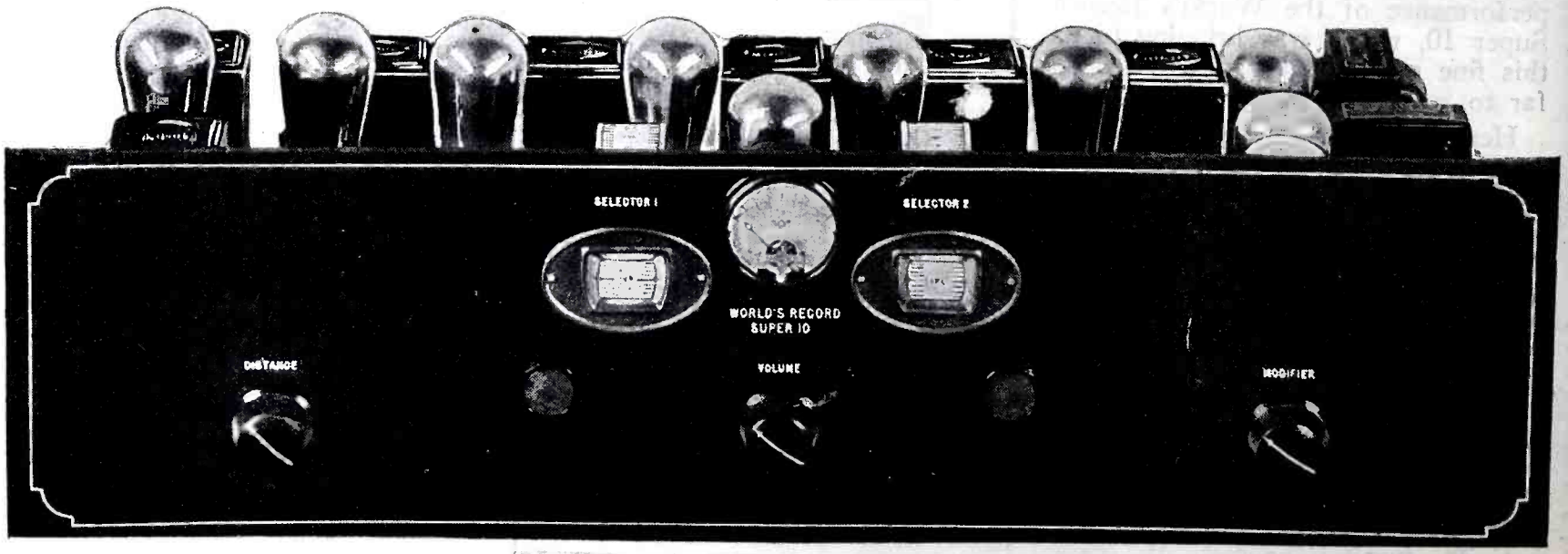
We were all forced to admit that the World's Record Super 10 had selectivity, and, plenty of it by this demonstration. The reader should remember that it is unusual for a radio set to tune closer than ten kilocycles, and still deliver faithful music under the present system of broadcasting.

"I want you to hear," Mr. Scott went on, "how the receiver performs on heavy local reception. I am going to tune in WEBH one of our Chicago stations and let you hear how full local volume sounds on this set. WEBH is located only three miles away from here and has according to generally accepted lists, a power of 2,000 watts. They operate on 365 meters—here we are."

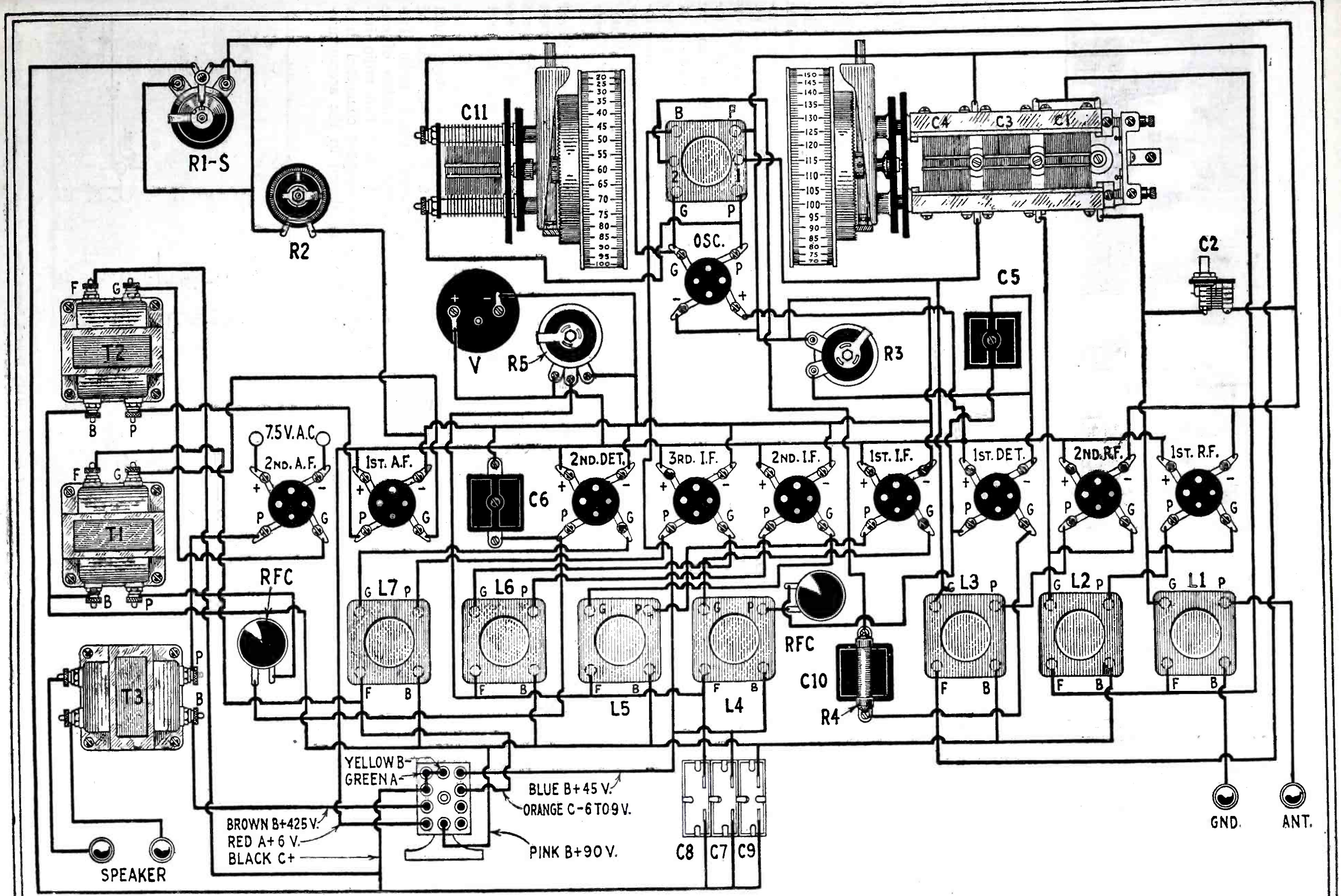
One of the members of our party pertinently asked if the World's Record Super 10 was difficult to operate. Mr. Scott in reply invited all to take a hand at operating the set which we did in turn. It is a simple matter to duplicate Mr. Scott's demonstration of separating WJZ from WMAQ, though KFI

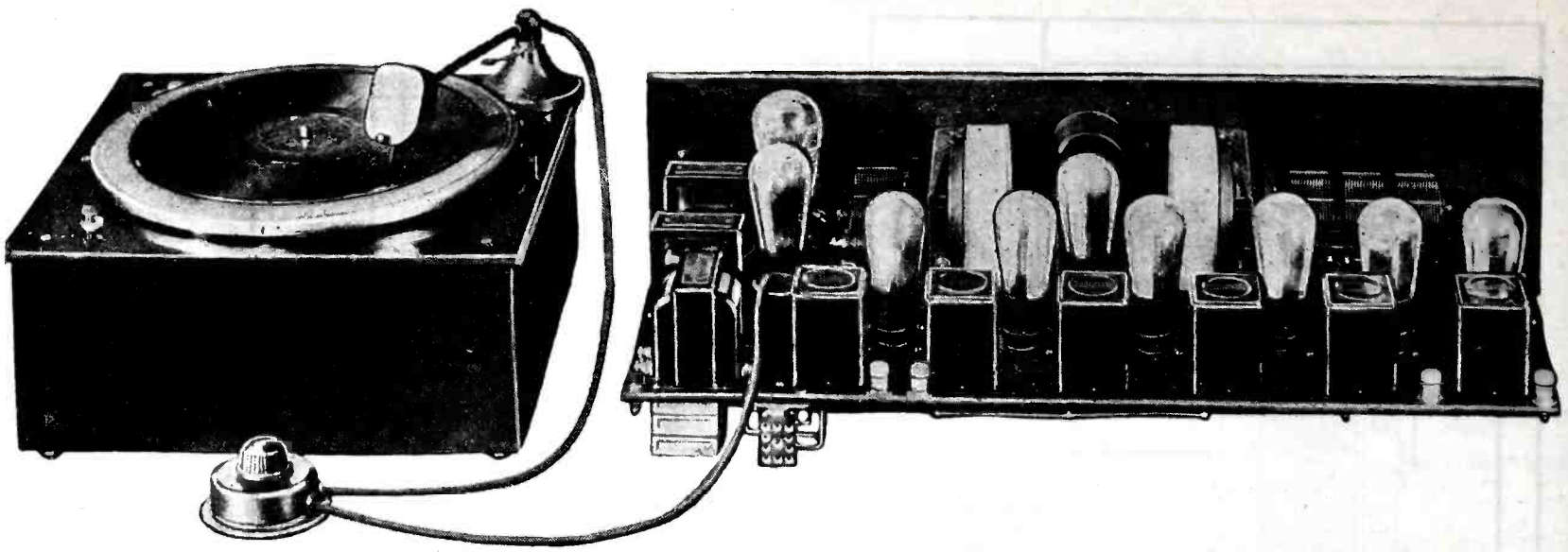
**PARTS FOR "B" UNIT**

| | |
|---|---|
| 1 | Thordarson, T 2098 transformer, T. |
| 1 | Thordarson, T 2099 choke, CH. |
| 1 | Tobe 210 condenser block, CB. |
| 2 | Benjamin tube sockets, V1, V2. |
| 1 | Carter type S-20M resistance, R. |
| 7 | X-L binding posts. |
| 1 | Formica binding post strip. |
| 1 | Wood baseboard 10 x 12 inches. |
| 1 | Pkg. Acme Celatsite hook-up wire. |
| 1 | Pkg. Kester rosin core solder, solder lugs, wood screws, etc. |
| 2 | CX-381 rectifier tubes. |




**A front panel view of Scott's World's Record Super Ten. Balance in panel design is another feature of this new set. The number of controls are minimized consistent with ample flexibility.**





The World's Record Super Ten can also be adapted for use in conjunction with any type of magnetic phonograph pick-up.

could not be tuned in through heavy hetrodyne interference caused by WRC at Washington, D. C. We all laughed heartily over the fact that the World's Record Super 10 was so sensitive that broadcast transmissions from one coast interfered with those from the opposite. WRC at Washington, D. C., and KFI at Los Angeles, Calif., both operate 640 kc (468.5 meters) at the same time.

Of course we all plied Mr. Scott generously with questions which he answered patiently and good naturedly during the course of the remainder of our visit to his laboratory. Space prevents narrating the progress of our visit with the genial Mr. Scott, but insofar as the following remarks are most interesting to those technically inclined, let us go on with some of the paramount parts of our interview.

We were quite surprised when Mr. Scott told us that the World's Record Super 10 had no outstanding features. His arguments in this direction however dispelled our fears that he was missing a very fine talking point for his receiver. This is what he told us:

"While the World's Record Super 10 is quite different from other types of super receivers of the same general idea, it does not have what one would call 'outstanding' features. It is very much like a well balanced football team—a collective group of meritoris players, which when properly co-ordinated and properly managed give brilliant performance. In the World's Record Super 10 there is no 'star' feature —the set is rather an aggregation of fine points properly executed and made to co-operate so that the finished product is highly efficient. A few of these points are as follows:

1. The use of a very short (30 to 50 feet) antenna, and the subsequent increase in selectivity with decreased 'noise' pick-up.

2. The filtering action of two stages of tuned radio frequency amplification, with the corresponding increase in pick-up sensitivity or 'reserve power' together with the 'one spot' effect that the radio frequency stages give.

3. The use of the 'beat' frequency principle of reception which is the most sensitive and selective known to radio engineers today.

4. The use of three stages of intermediate frequency amplification of the right design.

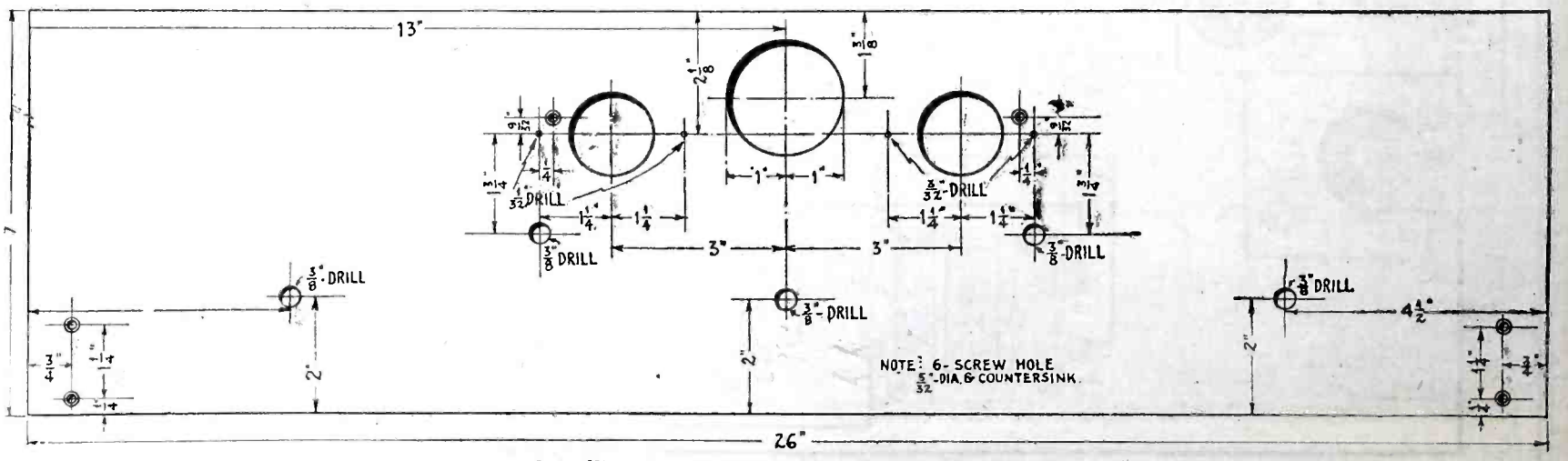
5. The general design of the transformers used in the receiver in conjunction with the fine associated equipment which represents an aggregation of the finest devices in radio today.

6. The use of an audio amplifier and power supply so designed as to have ample and generous capacity to handle and amplify audio impulses faithfully and intensely.

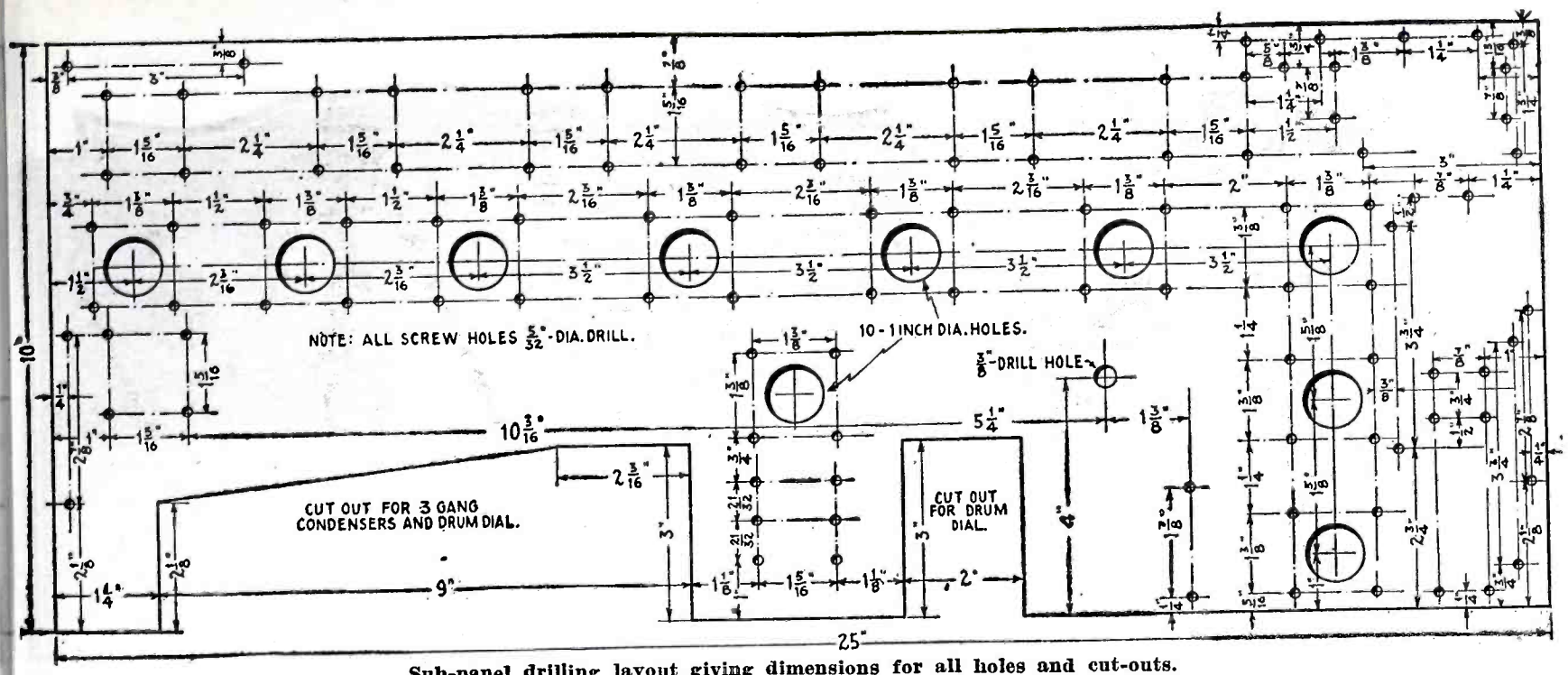
This set is a 7x26 in. panel size sub-panel type receiver of very fine appearance. It has two major controls, the remaining three being refining adjustments. The photographs and wiring diagrams are fully descriptive of the appearance, so we need not dwell on this feature of the set to any great length. (Complete detailed constructional description of the World's Record Super 10 appeared in the Fall and Winter editions of *Radio Listeners' Guide and Call Book.*)

In order to simplify the technical description of the receiver, it is best to consider the receiver in three main divisions. The various features of each division are then most readily understood.

In its entirety, the radio frequency pick-up of this set is very much similar to the first three tubes of the conventional tuned radio frequency receiver. It consists of one antenna coupler and two radio frequency transformers connected in a circuit as shown in the accompany-



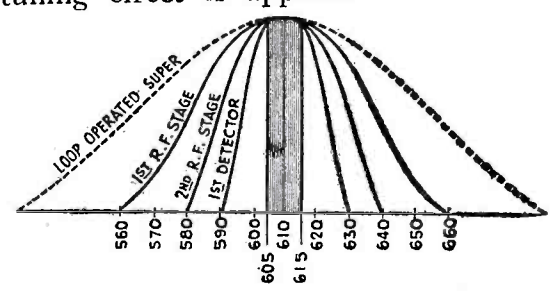

Front panel drilling layout for Scott's World's Record Super Ten.




**Sub-panel drilling layout giving dimensions for all holes and cut-outs.**

ing picture diagram, and uses the filament temperature control method of stabilization. The grid returns of each R.F. stage are connected to the rheostat, which aids in suppressing oscillations, but the actual stability is effected by means of the filament emission of electrons. A small midget condenser across the oscillator coupler coils compensates for any deletrious effect that the antenna might have. The entire R.F. unit is gang controlled by the use of a triple variable condenser gang.

The accompanying graph gives one a good idea of the value of the use of this R.F. amplifier in attaining selectivity The diagram does not show, due to lack of space the amplification value of each succeeding stage, but it does illustrate how the input to the superheterodyne amplifier is whittled down to 40 kc selectivity before the keen "beat" tuning effect is applied.

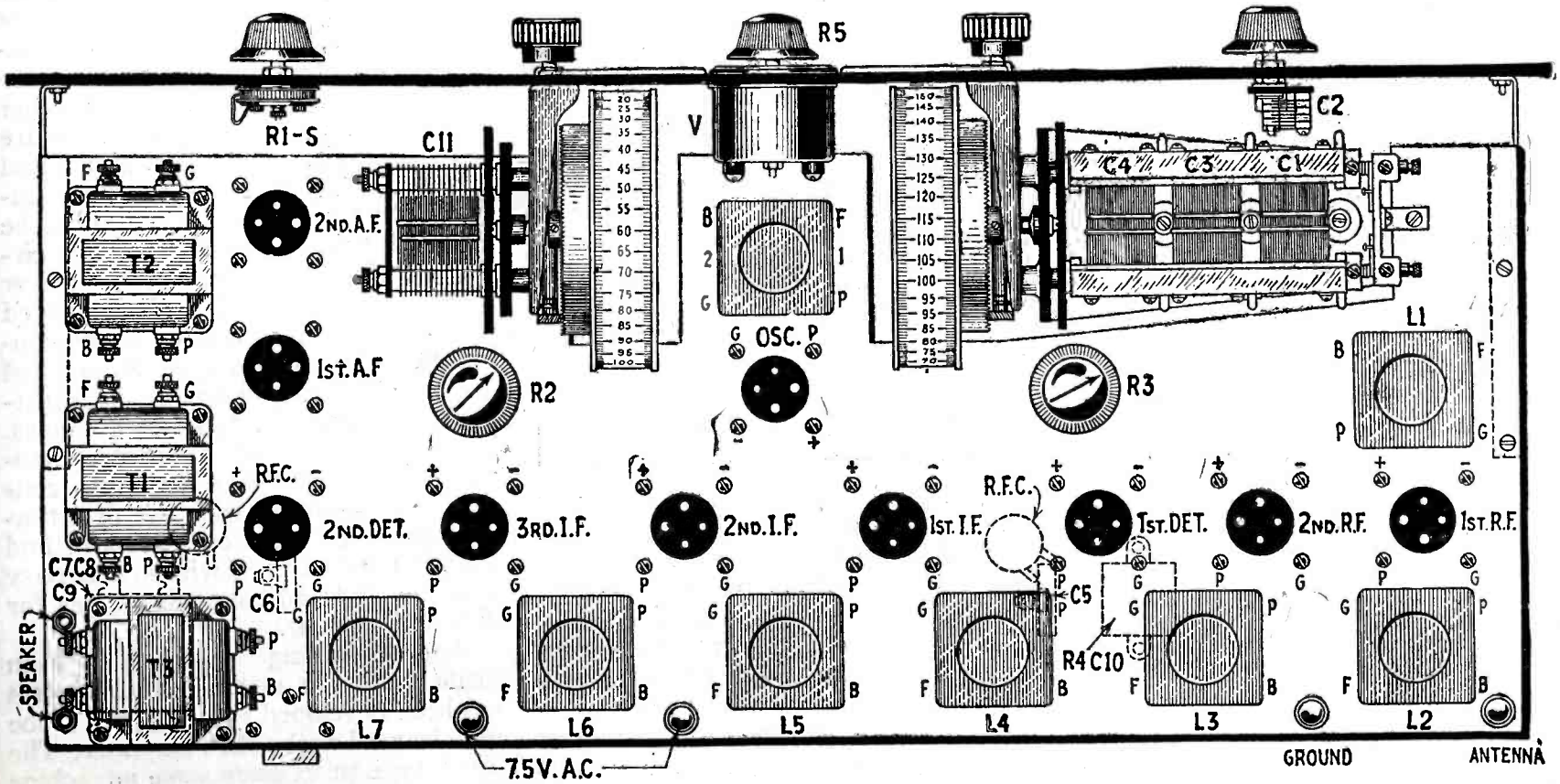



**The loop operated super and R.F. pick-up is indicated by the dotted line. The World's Record Super 10 the filtering action is illustrated by successive curves.**

When the 40 kc band passed by the second detector transformer is impressed on the detector tube, and subsequently fed into the 10 kc intermediate amplifier, the result is that the second detector has a response very close to 10 kilocycles, without cutting sidebands. It is generally accepted by engineers that a station must have a 10 kc sideband to allow all the musical notes to be broadcast.

When the input signal to the first detector is brought down to a 40 kc band, the work of the intermediate amplifier is much simpler. In the World's Record Super 10, the amplifier has been designed and the transformers are so matched that each set has a band pass of 10 kilocycles when used in connection with the recommended circuit. Two filters and two intermediate transformers are used in this amplifier which is standard in its connections. The amplifier is controlled by the voltage drop across a 400 ohm potentiometer connected across the

(*Continued on page* 176)




**Layout of parts on the sub-panel of the receiver. This arrangement of parts should be followed as the set can thus be conveniently wired.**

# The Official A.C. Browning-Drake

WITH the announcement of a new Browning-Drake receiver, giving single, illuminated, drum dial control, smaller coils and a new method of neutralization which permits the use of storage battery or A.C. tubes, an excellent receiver may be built using this unit as a two-tube set and feeding it into a good power amplifier using the 310 type of power tube.

The public is fast realizing that power amplification is essential for good quality of reproduction and that it is necessary to use a power tube in order to deliver any volume of undistorted music to the loud speaker. It is unnecessary to incorporate the audio end of the receiver in the same cabinet with the R.F. and detector, and in fact it is extremely advisable to have the audio amplifier and "B" supply combined as one unit, as this greatly reduces the length of the leads which carry the high voltage, which, in the case of the 310 tube, is as much as 450 volts. Consequently, the combination of a good tuner and detector with a power amplifier and "B" supply is most advantageous from the set builder's standpoint.

The principles involved in the R.F. end of receivers for the past five years have not changed to any appreciable degree. Consequently, circuits which were correctly designed originally have not, of necessity, been greatly changed, except in minor details. Of course, it is necessary, from time to time, to bring a receiver up to date from the standpoints of appearance and mechanical workmanship, incorporating in it any minor electrical improvements which constant research has brought about.

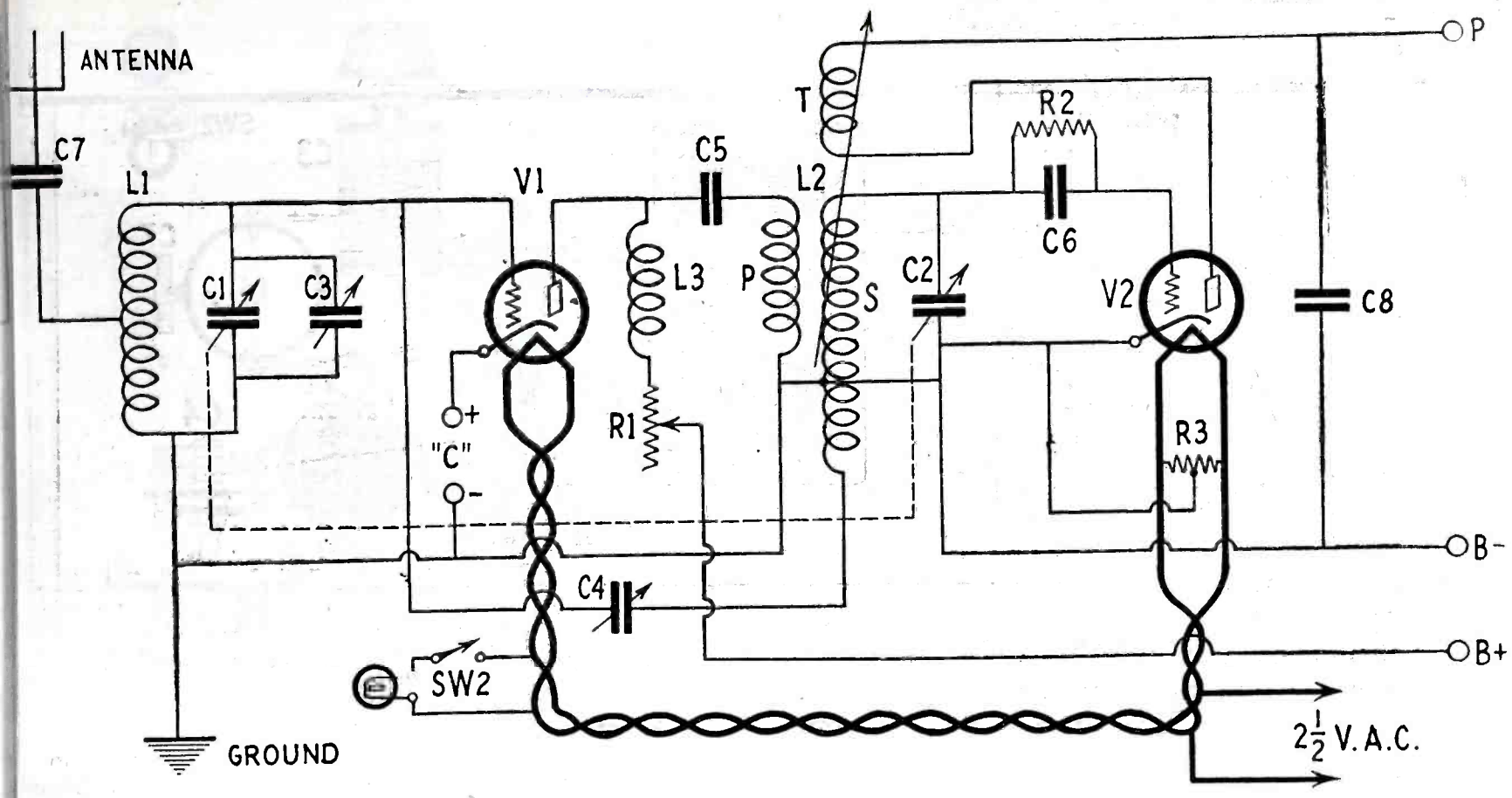
The Browning-Drake circuit consists essentially of one stage of tuned R.F. amplification with a specially constructed slot-wound R.F. transformer which was developed mathematically by Glen H. Browning and Dr. F. B. Drake. This is combined with a tickler feed-back detector, the stage of R.F being neutralized. The resulting combination makes a tuner which is both easy to construct and sufficiently selective to enable the operator to receive almost all signals which are above the noisy level. The R.F. amplifier above mentioned has proven to be much more efficient than one stage of neutralized R.F. amplification with tickler feedback on the antenna circuit. This is undoubtedly due to the fact that when feedback is applied to the detector circuit it also causes some tickler feedback in the antenna circuit, thus increasing the amplification of both circuits in the same operation.

The antenna circuit incorporated in the Browning-Drake receiver is a conductively coupled one, that is, the antenna comes in directly to a tap on the antenna coil through a .0001-mfd. condenser. This system has proven extremely efficient inasmuch at it has a very much more even response over the entire broadcast band of frequencies than any other circuit tested. Another advantage is that good signal strength may be secured even when using an extremely short antenna. One disadvantage, however, is that it is extremely difficult to make the two condensers on the receiver run together when both long and short antennas are being used alternately. Dr. Drake and Mr. Browning have, for the past season, been working on what might be termed a "single control" for this circuit and has so designed the receiver that the tuning condensers employed may be attached to one shaft and controlled with a drum type illuminated dial without making any other adjustment for particular types of antennas. The receiver described, however, employs what is called a "trimmer condenser" in parallel with the first tuning condenser. The operator will find that, in most cases, it will be necessary to make slight adjustments on this for different stations.

Another change which has been made is that a neutralization system has been developed so that a large tube may be used as the R.F. amplifier. The 301A type tubes have some advantage

### LIST OF PARTS

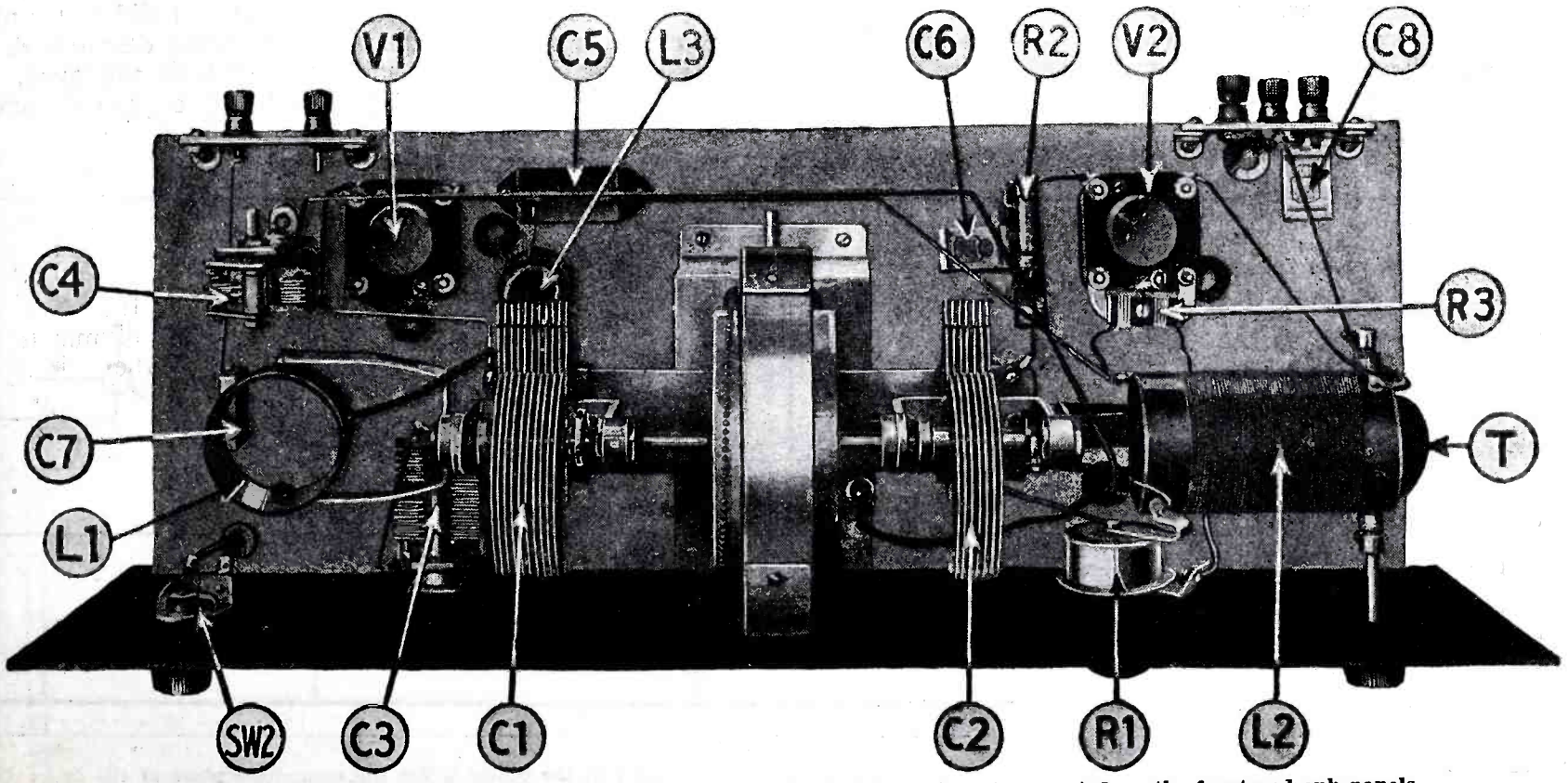
1 Official Browning-Drake Single Drum Control Kit, L1, L2 and C1, C2.
1 Official Browning-Drake Foundation Unit, consisting of drilled and engraved front panel, base panel complete with mounting hardware. Also miscellaneous machine screws, nuts and wire.
1 B-D 135 mmfd. condenser, C3
1 Yaxley No. 10 filament switch, SW2
1 B-D radio frequency choke coil, L3
1 Tobe special B-D condenser .5 mfd. capacity, C5
1 B-D official neutralizing condenser, C4
1 Tobe .00007 mfd. condenser, C6
1 Tobe .0001 mfd. condenser, C7
1 Tobe .001 mfd. condenser, C8
1 Tobe Veritas or Durham 8 megohm resistor, R2
1 Clarostat, R1
2 Benjamin Y type 5 contact sockets
1 Center tapped resistor, 20 to 50 ohms, R3
1 Thordarson T-2370 filament transformer, T7
5 Eby binding posts (Ant., Gnd., B+, Output, B—)
1 Pkg. Acme Celatsite hook-up wire
1 Pkg. Kester radio solder



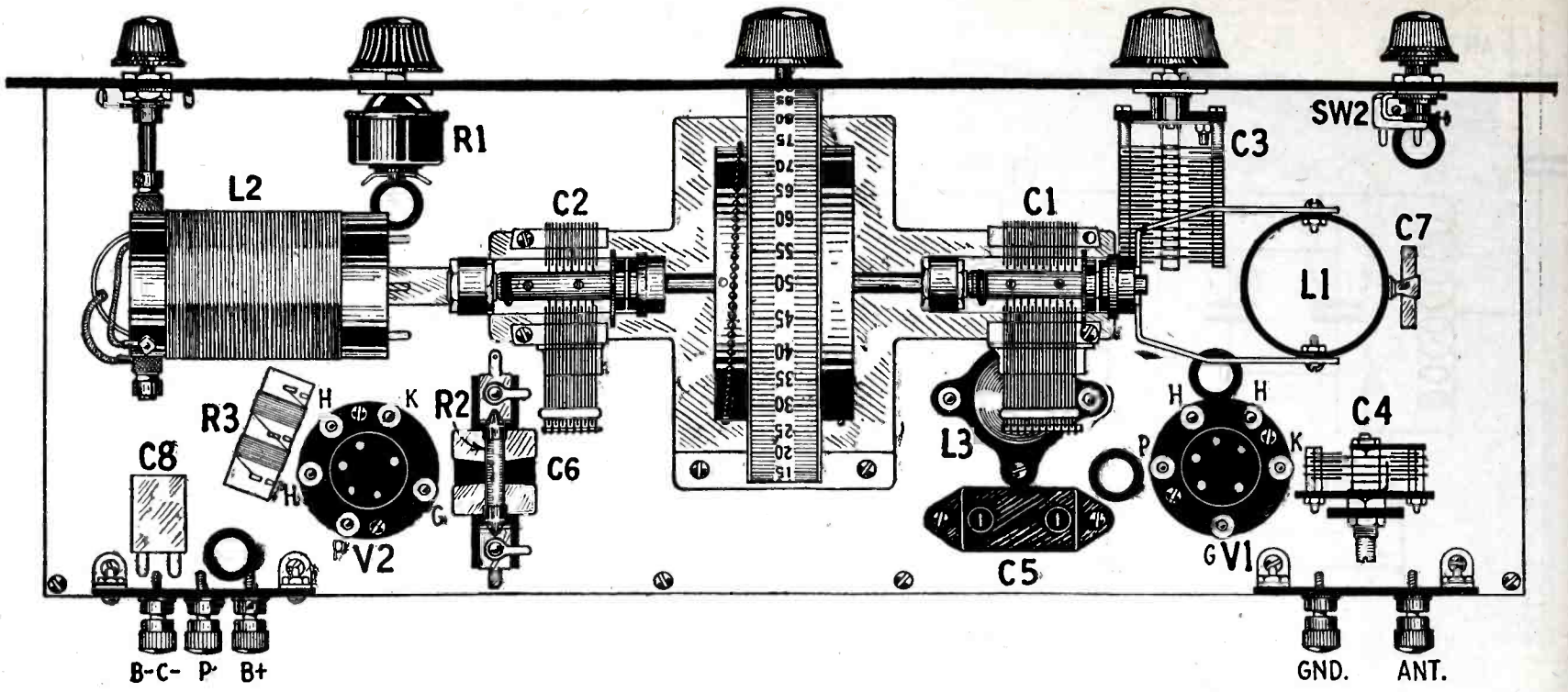

**Schematic wiring diagram of the Official A.C. Browning-Drake two-tube tuner. All parts of the circuit are indicated to correspond with picture diagram, layout, photo, etc.**

over the 299 tubes, although, in reality, they are no more efficient R.F. amplifiers. The life of the 299 tubes, however, is so short that it was deemed advisable to utilize, if possible, the storage battery type or A.C. tubes throughout. The neutralization system, as will be noted from the wiring diagrams, consists of a number of extra turns added on the secondary of the R.F. transformer and the end connected to the rotor plates of the neutralizing condenser, the stator plates then being connected to the grid of the first tube. It has also been found advisable, even with this system of neutralization, to keep all R.F. current out of the "B" supply. Consequently, a condenser of .5 mfd. capacity is placed in the line which runs to the primary of the R.F. transformer and a parallel feed employed which incorporates a R.F. choke connected directly to the plate of the tube, the other end going to the "B" supply. Some of the readers may wonder why a .5 mfd. condenser is used in this parallel feed system, inasmuch as it would seem that radio frequency currents could readily pass through as small a condenser as .006 mfd. It is correct that the radio frequency currents can pass through a .006 mfd. condenser, but the .006 mfd. has a large impedance to all audio frequencies and it is shown in the paper by Dr. Chaffee and Glen H. Browning in the Institute of Radio Engineers that if an audio plate impedance is added in an R.F. amplifier tube, detection of signals occurs in this tube. Keeping this in mind, therefore, various sizes of condensers were experimented with, and it was found that a .5 mfd. was about as small as could be used in the place indicated above without seriously impairing the operation of the first tube as an R.F. amplifier.

Shielding is, for the first time, being recommended for the kit-set circuit. The previous Official Browning-Drake kit-set was made as sharp as possible, but when located within a radius of a few miles from broadcasting stations, it was found that such a




**A top view of the Official Browning-Drake receiver, showing location of parts mounted on the front and sub-panels.**




**Layout of parts for the Official A.C. Browning-Drake two-tube tuner. All parts are indicated to correspond with photo, diagrams.**

large amount of signals were picked up on the coils and wiring of the set that it was extremely difficult to receive distance while the locals were on. When located four or five miles from broadcasting stations, the receiver operated very satisfactorily. The set builder may now choose whether to completely shield the receiver or not and he should govern his choice by is local receiving conditions, that is, if he is located in an extremely congested section, he should, by all means, completely shield the two-tube tuner, while, on the other hand, if he is located in the country, this would be an added expense and would be entirely unnecessary. In order to facilitate the use of shields and not make the tuner too cumbersome, it was found necessary to cut the tuning coils down from the three inch form to a two inch (the shielding, in all cases, must be kept one inch away from the low potential end and one and one-half inches away from the high potential end of the coils in order that their efficiency is not reduced).

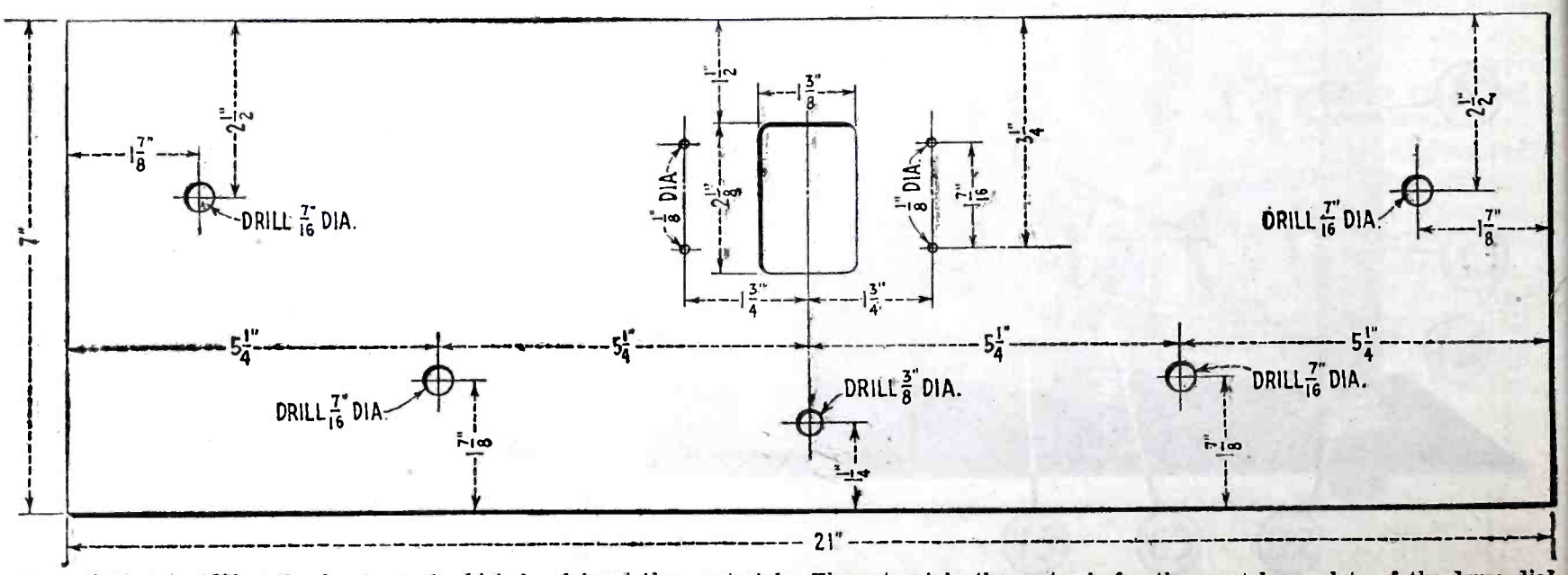
The kit for the new Browning-Drake might be termed a "single mount" unit as it employs two Browning-Drake condensers driven by the single illuminated drum dial, together with the two coils necessary for the circuit all mounted to make a single unit, in fact, it is only necessary to secure the foundation unit, which consists of front and base panels with mounting hardware, to make a tuner which may be used with any type of audio system.

The set herein may be termed "universal," that is, the set constructor may use either A.C. or D.C. tubes. If the receiver is to be operated from a storage battery, using a 301A type tube as R.F. amplifier and a 300A type tube as a detector, two standard Benjamin four-prong sockets should be employed. Should the constructor desire to use the new A.C. tubes, 327 type, he should secure two Benjamin five-prong sockets. The holes drilled in the sub-panel will accommodate either of the types of tube sockets.

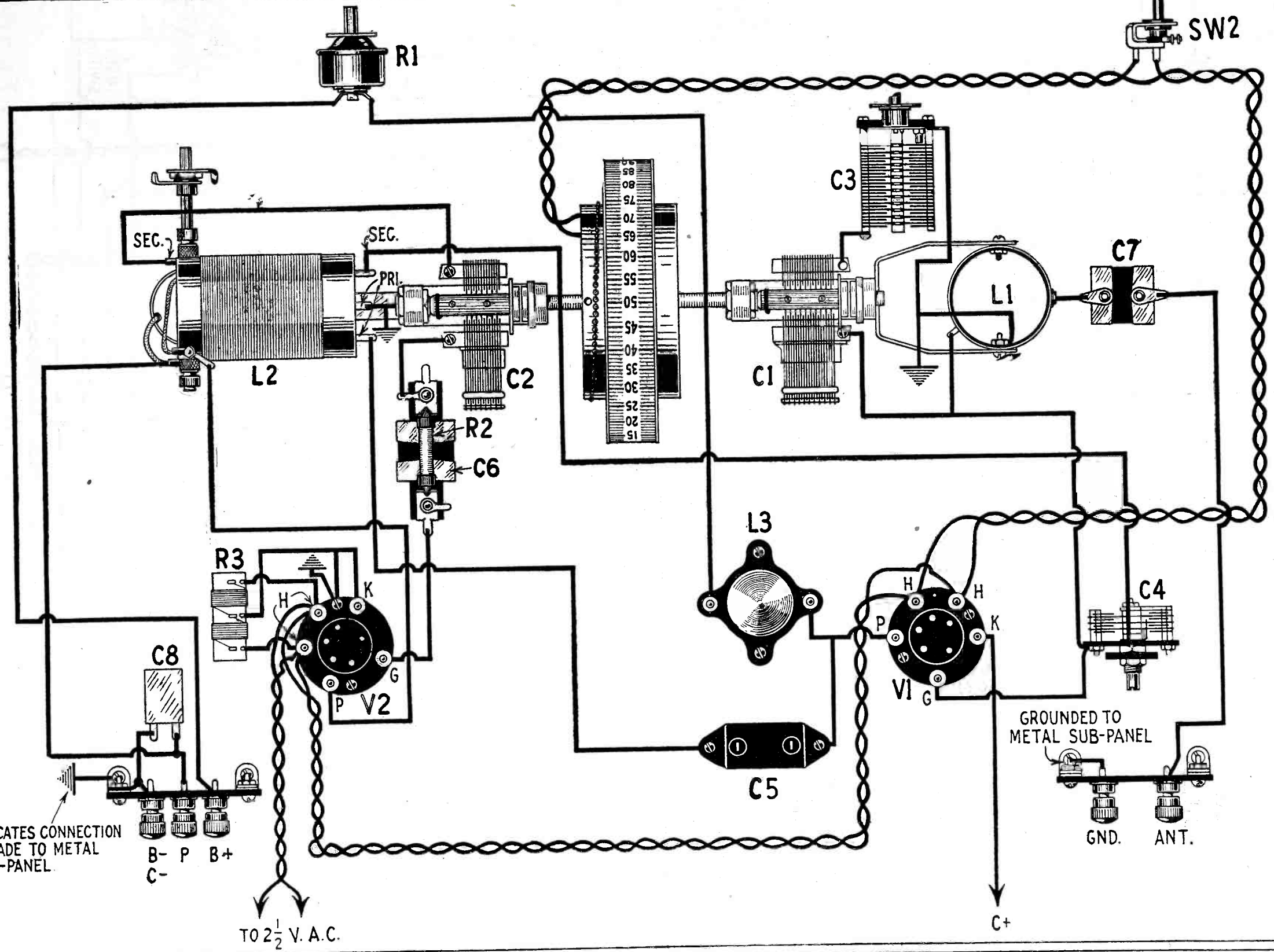
The two-tube Tuner is very simple to construct. A few constructional details might be given to good advantage, however. There are two long leads in the set which carry R.F. current—one running from the .5 mfd. condenser, C5, to the plate circuit of the R.F. tube, V1, to the primary of the R.F. transformer, L2—the other running from the end of the secondary winding of the R.F. transformer to the *rotor plates* of the neutralizing condenser C4. These two connections should be kept away from all other leads and also from each other. Other R.F. connections, such as that from the stator plates of the condenser to the grids of the tubes, should be run as directly as possible.

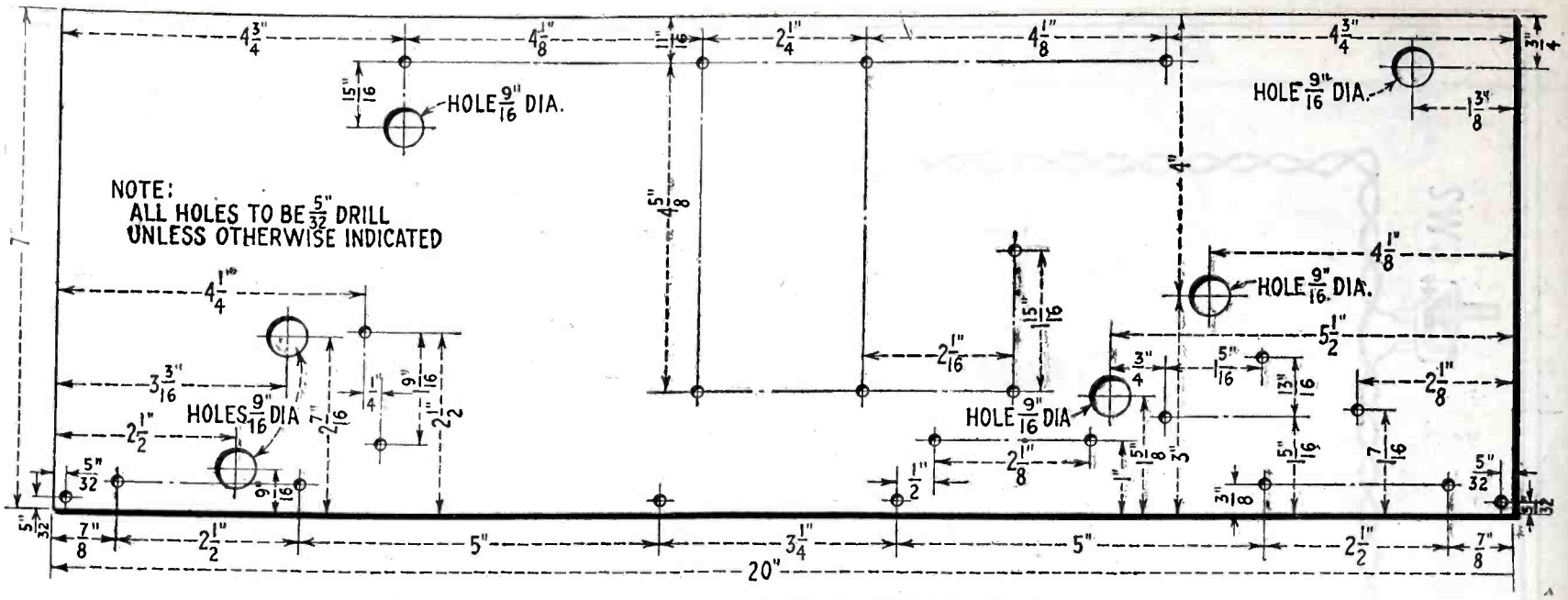
In order that the set builder may use shielding if his location demands it, a metal sub-panel has been employed.

The grid leak R2 on the detector




**Dimensions for drilling the front panel which is of insulating material. The cut-out in the center is for the escutcheon plate of the drum dial.**



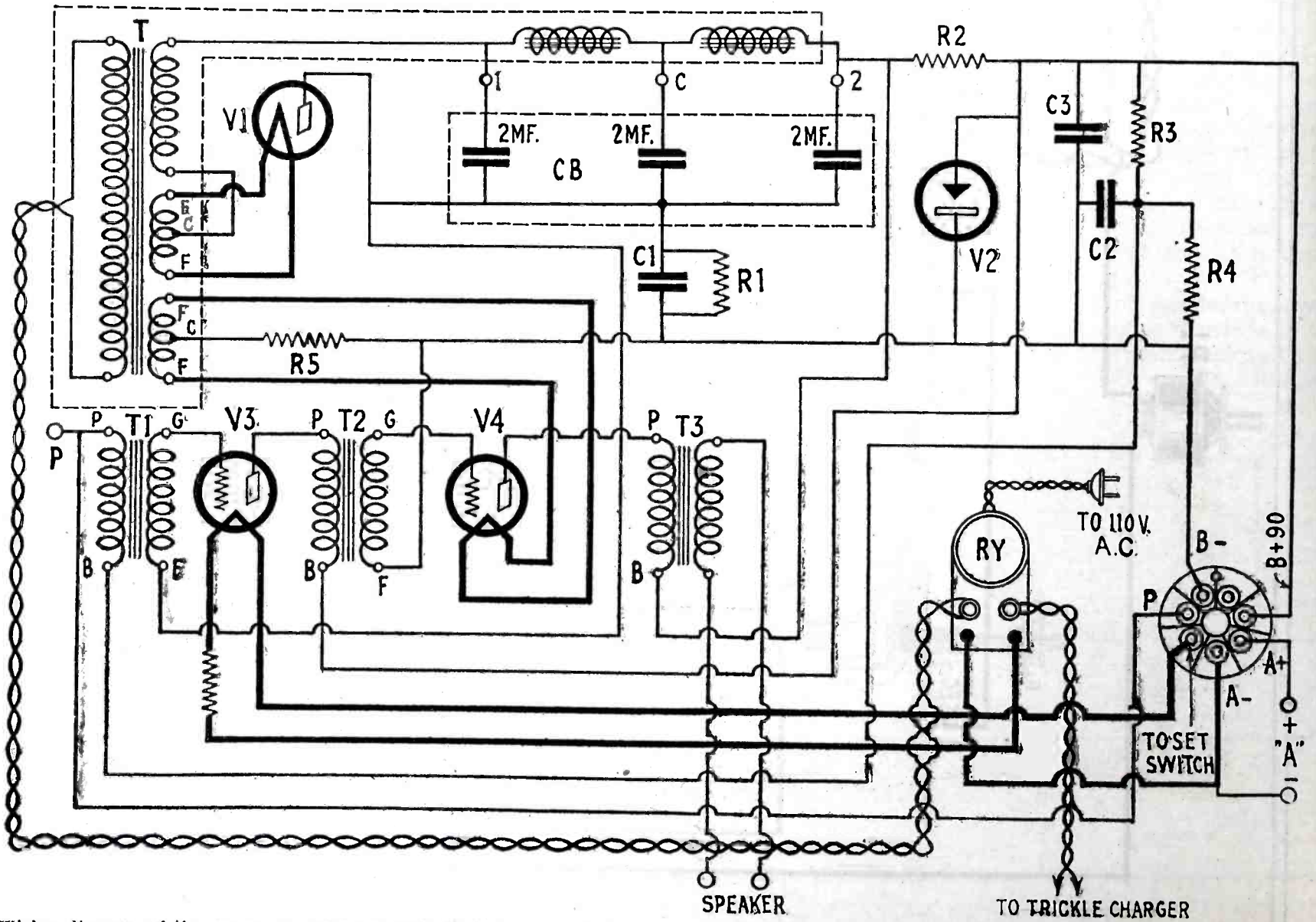



**Drilling layout showing dimensions of all holes drilled in the metal sub-panel.**

tube is suspended by a stiff wire from the stator plates of the second tuning condenser directly to the grid connection on the tube.

If the constructor does not wish to use A.C. tubes and also does not wish to have the bother of a storage battery to supply the filaments of the 301A and 300A tubes, he may use two 299 tubes, lighting their filaments directly from two No. 6 dry cells connected in series. This combination is very satisfactory, although the 299 tube, used as a detector, is not as efficient as the 300A special detector. It will be necessary in this case to leave out or short circuit the filament ballast necessary for use with the storage battery type tubes. For D.C. operation a hole in the front panel is drilled to accommodate a filament switch which turns on and off the tubes. The wiring of the filament circuits should be done under the metal sub-panel. Holes are provided in this base panel for this purpose. Rubber bushings are also provided in order that the connections coming through the panel will have no opportunity of becoming short circuited. Inasmuch as this set is designed for either D.C. or A.C. tubes, no "A" battery terminals are provided on the sub-panel. In the case of D.C. operation, the set builder should take out a cable consisting of two wires for his "A" battery supply.

If the constructor desires to use the new type A.C. tubes, he should provide himself with two Benjamin five-prong sockets, as well as one centre tap resistor of about from 50 to 100 ohms. He should also secure two CX-




**Wiring diagram of the power amplifier and "B" eliminator described for use in conjunction with the Browning-Drake set. Photo of this unit built up with parts specified is shown on the opposite page.**

327 A.C. tubes. These are the heater type tubes and require a step-down transformer which supplies 2½ volts fo lighting the filaments of t hese tubes. The filament connections should be made by means of two wires twisted together. This is extremely necessary if there is to be no A.C. hum in the completed receiver. All the twisted pairs also should be run under the sub-panel. The R.F. tube should have from 3 to 4½ volts of "C" battery bias, as shown in the diagram. No binding posts are put on the sub-panel for this connection, as it is best to run them out in a cable, preferably using two different colored wires twisted together.

The set builder will find that if he is extremely careful in constructing the receiver for use with these tubes, he will get no hum whatever on the loud speaker. If, however, the slightest error is made, a 60 cycle note is very likely to spoil the quality of the music received. It is sometimes necessary, instead of connecting the cathode directly to the centre point of the filament circuit, to put in a 22 or 45 volt bias, as recommended in the instructions which accompany the tubes. The writer, however, found that the cathode can be connected directly to the centre tap of the resistor R3. A little experimenting on this point is well worth while.

When the receiver is constructed with the D.C. supply for the filaments of the tubes, neutralization is accomplished by the same method as previous Browning-Drake sets, that is, a local station should be tuned in, preferably on a low wavelength. The rheostat which controls the filament of the R.F. tube should then be turned off and the condensers adjusted for maximum signal strength. The neutralizing condenser should then be set so that the signal receiver is a minimum. It will be found that this minimum point, using a 300A as a R.F. amplifier is extremely sharp and, consequently, considerable care should be taken in balancing. When a 299 tube is used as R.F. amplifier this adjustment is not as critical.

When the C4 327 A.C. tubes are used, both as detector and R.F. amplifier, the set may be neutralized in the following manner (of course, the filament of the 327 used as R.F. amplifier could be extinguished by unsoldering one of the connections and the set neutralized in the same way as above described. However, this is usually inconvenient and the set may be neutralized in the manner described below). Set the condensers at about 15 or 20 on the scale. Rotate the tickler coil so that the second circuit oscillates. This may be determined by touching the finger to the stator plates of the second tuning condenser (the one to the right as one faces the receiver). Then turn

(*Continued on page* 178)

**POWER UNIT PARTS**

| | |
|---|---|
| 2 | Thordarson R-200 audio transformers, T1, T2 |
| 1 | Thordarson R-76 speaker coupling transformer, T3 |
| 1 | Thordarson R-210 power compact, T |
| 1 | Tobe-Deutschmann R-210 condenser block, CB, C1, C2, C3 |
| 1 | Thordarson R-508-3445 resistance kit, 8000 ohms, R2; 10000 ohms each R3 and R4 |
| 1 | Yaxley 100 ohm resistance, R1 |
| 1 | Yaxley 1000 ohm resistance, R5 |
| 1 | Yaxley cable plug, P |
| 1 | Yaxley relay, RY |
| 4 | Benjamin sockets |
| 6 | Binding posts |
| 4 | Tubes, CX-301A, (V3); CX-316B, (V1); CX-374, (V2); CX-310, (V4) |

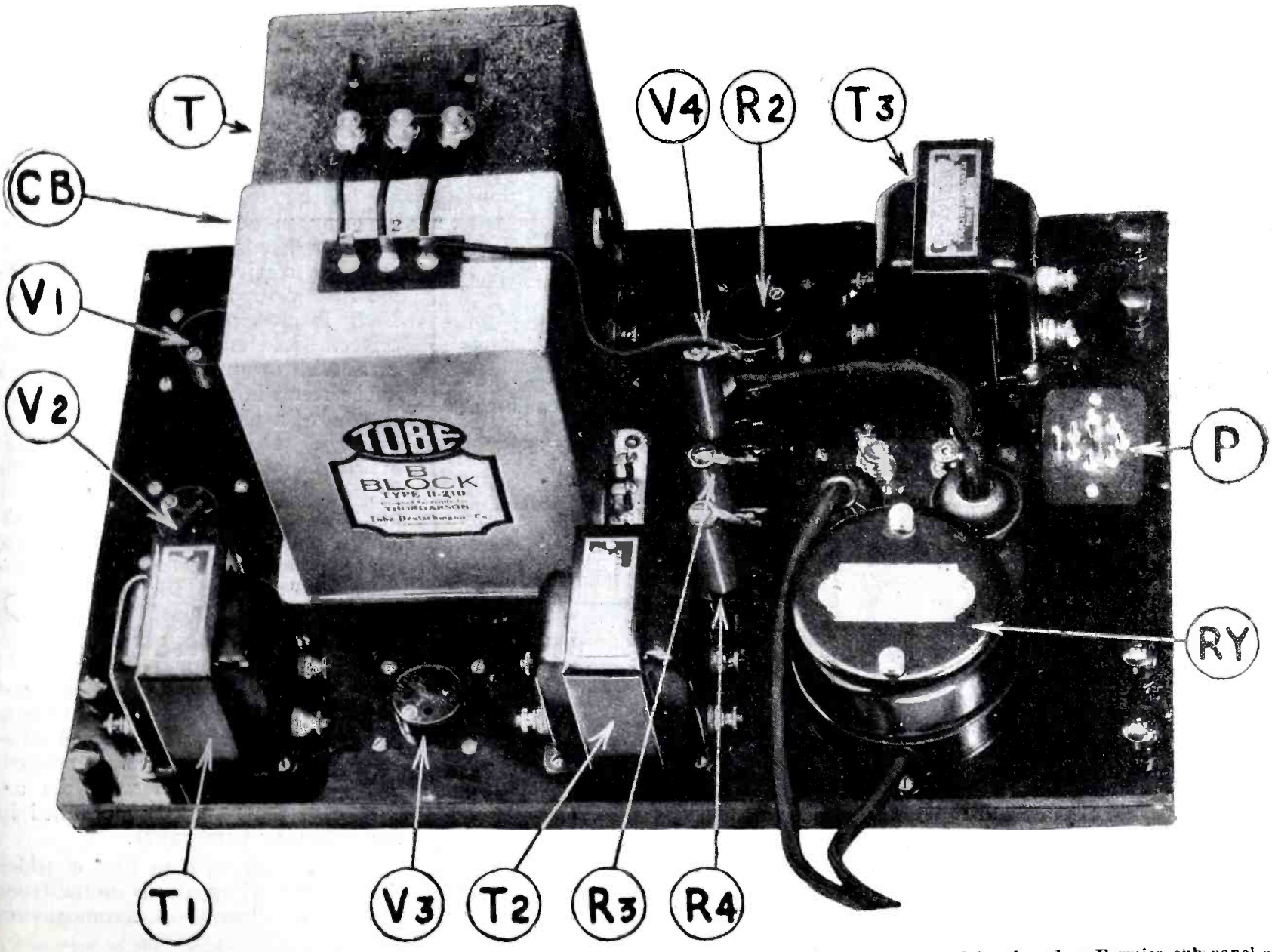
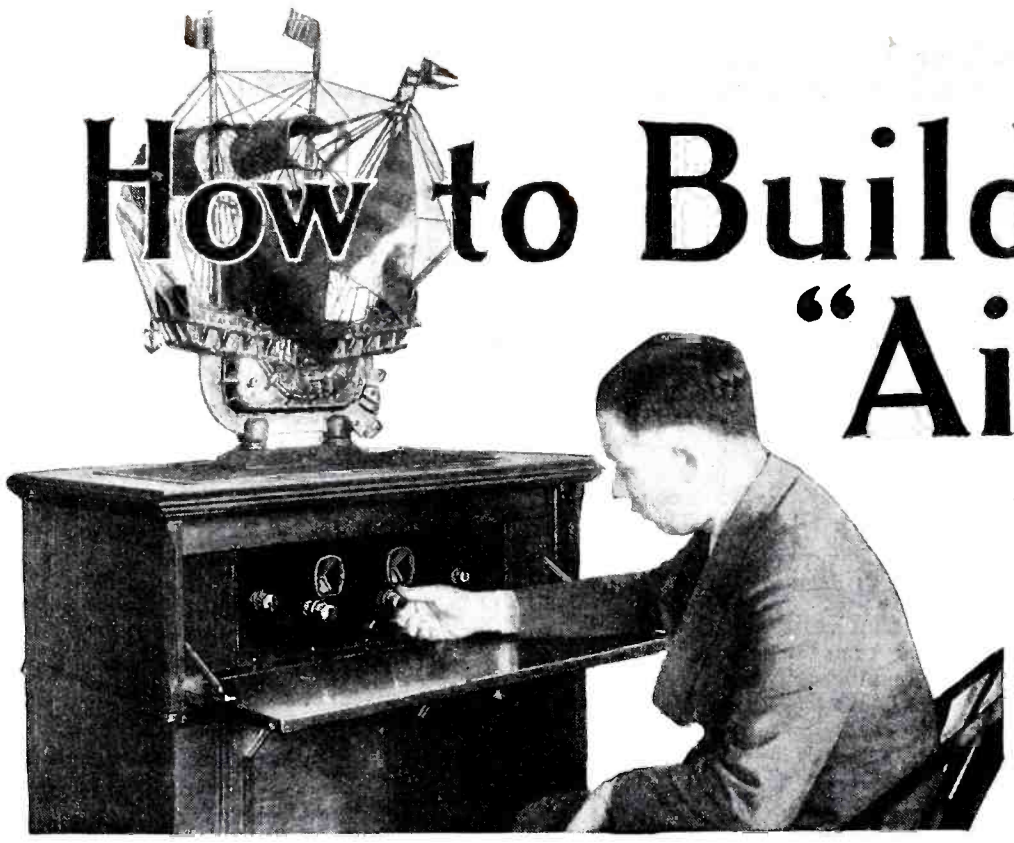



**Photo of the amplifier and power unit for the Browning-Drake set. The parts can be mounted on a wood baseboard or Formica sub-panel as has been done in the case of the unit photographed here.**

# How to Build the "Air Scout" Four



THE "Air Scout" Four has been developed to supply the demand for a radio receiver possessing reliability, quality of performance, simplicity of construction and economy of first cost and operation. A receiver possessing these attributes will be a superior radio receiver and the "Air Scout" Four has the distinction of being such a set. This receiver has been carefully designed from one end to the other, keeping always in mind that superior performance must be the result. A circuit has been chosen which can be depended on for reliability. It is an old friend.

The secret of the wonderful results which the "Air Scout" Four gives is due primarily to two things. One of these is the choice of circuit. This circuit consists of one stage of tuned radio frequency amplification, a regenerative detector, and two stages of transformer coupled audio amplification. A power tube is used in the last stage to give ample volume without distortion. The circuit is one which is entirely orthodox and must not be confused with any of the "trick" circuit arrangements appearing at such frequent intervals. The radio frequency stage is balanced so as to free it from oscillation—this balancing being done through a tapped primary coil. An extremely smooth control of regeneration is made use of thus allowing the regenerative detector to be worked at its highest efficiency.

DX ability seems to be something often talked of but seldom encountered. The selectivity and sensitivity required of a radio receiver to pull in DX stations through the barrage of local broadcasting has been taken into account in designing this new set. Its selectivity is such that the term "ten kilocycle separation between stations" begins to mean something. Coupled with the necessary selectivity has been added sensitivity of a high order. All in all it may be said that the New Yorker Four will far out-perform many six and eight tube receivers in its ability to reach out and corral the elusive West Coast Stations.

A receiver which has selectivity and sensitivity but fails to deliver high quality audio output can hardly be ranked as a great receiver. Consequently unusual care has been used to insure excellent tonal quality. This care has not merely shown itself in the choice of an audio amplifier but the same care was exercised in the choice and design of the radio frequency end of the receiver. Correctly built audio frequency transformers have been used, and although the receiver has a total of only four tubes it delivers great volume of extraordinarily high quality.

There are only two major tuning controls. A tapped primary coil is used allowing the radio frequency tube to be balanced to prevent oscillation, thus eliminating one control. Control of volume and regeneration is effected by means of a variable high resistance in the tickler circuit—the tickler being of the fixed variety.

Custom-built receivers are now every bit as attractive in appearance as is the factory built receiver. Panels are laid out with a view to preserving harmony in general appearance, and all other details affecting the final appearance receive great thought. The pictures show that the "Air Scout" Four is an extremely attractive receiver. Gold engraving on black micarta with drum dials and small black knobs result in a receiver which is deserving of a place in any home.

In the preceeding paragraphs of this article a general description of the "Air Scout" Four is presented, and we are now ready to consider the construction details. Elsewhere in these columns there is a complete list of the apparatus required for building this set and the first step is to secure all of these parts. After one is in possession of all of the apparatus he should give it a thorough inspection and test for electrical and mechanical defects to make sure that it will perform satisfactorily when the set is completed. He may then proceed with the assemble of the receiver as outlined in the following paragraphs.

It is usually wise to first consider the assembly of apparatus on the front panel. An illustration accompanying

**LIST OF PARTS**

1 Formica panel 7x18 inches
1 Wooden baseboard, 17x8¾ inches
1 Aero coil kit U95, L1, L2
2 Hammarland .0005 mfd. midline variable condensers, C1, C2
1 Aero No-Skip choke coil No. 60, RFC
2 S-M Drum dials
2 Thordarson R-200 audio transformers, T1, T2
4 Benjamin No. 9040 "Red Top" cushion sockets
1 Yaxley cable connector
1 Frost 25 ohm rheostat, R2
1 X-L Variodenser Model N, C3
4 X-L binding posts (Ant., Gnd., Speaker Neg., Speaker Pos.)
1 Clarostat variable resistor, R4
1 Amperite type 4A with power tube in last stage, without power tube use type 112, R3
2 Tinytobe .00025 mfd. condensers, C4, C5
1 Durham 2 meg. grid leak, R1
1 Durham grid leak mounting
1 Yaxley battery switch, SW
Cornish flexibus or Braidite hookup wire
Miscellaneous screws, etc.

his article shows the exact location of all holes required for mounting the apparatus specified and this may be followed by the person who prefers to drill his own panel. However, those who do not wish to drill their panel may purchase a formica front panel which is correctly drilled and engraved for the instruments used.

After the front panel has been prepared the parts may be mounted. The rheostat is mounted in the middle of the panel near the left edge and the potentiometer is mounted in the same corresponding position on the right side of the panel. The battery switch is then mounted in the center of the panel as indicated. The two drum dial windows, knobs and brackets are mounted on either side of the center in the position shown in the photos and panel layout. As all holes have been drilled in advance the operation of mounting these parts is merely a matter of fastening the parts to the panel with machine screws.

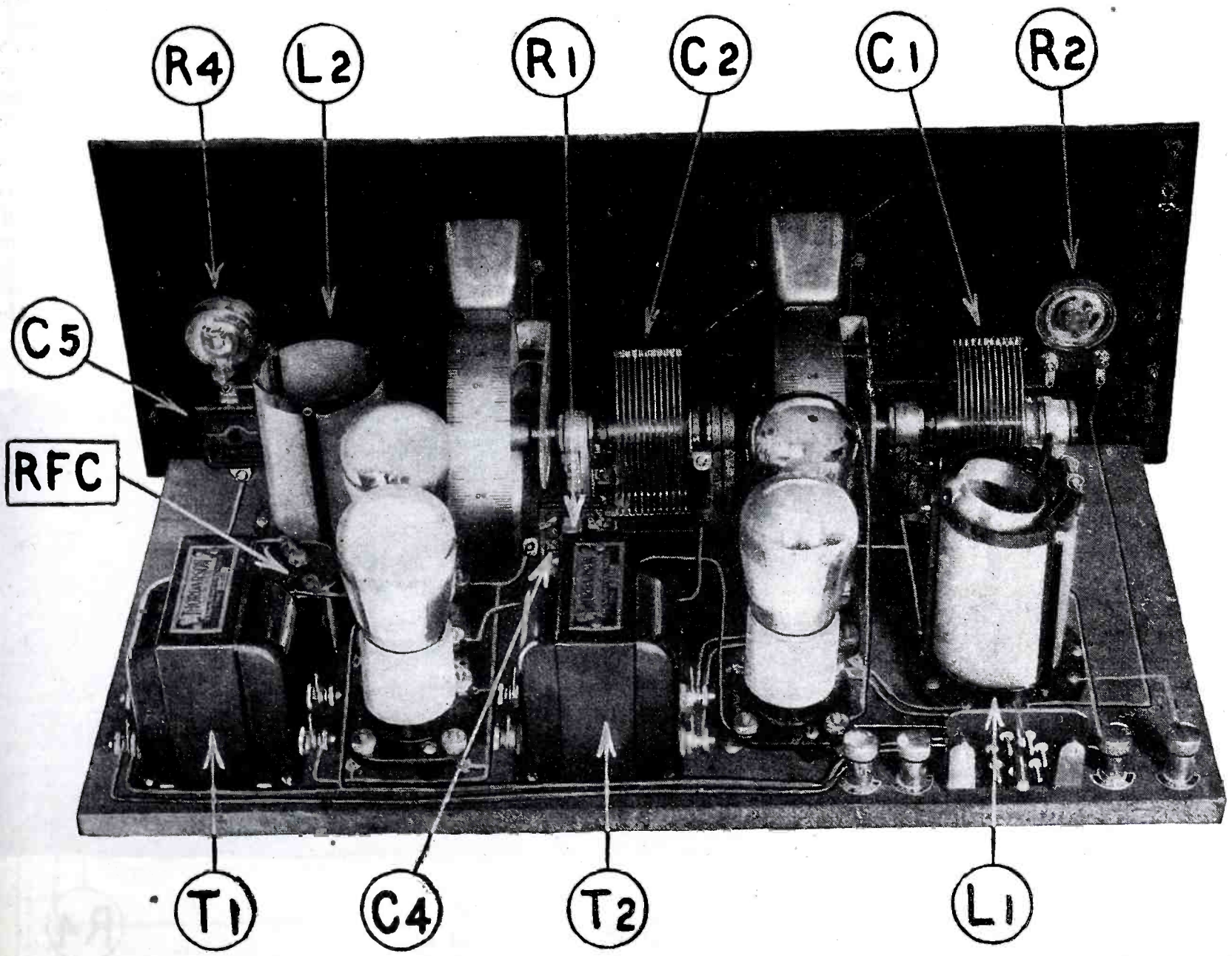
The second step in the assembly of the set includes fastening parts in position on the wooden baseboard. To do this the picture and picture wiring diagram should be carefully examined to determine the exact location of each piece of apparatus. Now with a small punch mark the position of each screw hole for each piece of apparatus and then using wood screws fasten each piece of apparatus in the approximately correct position.

Special note should be made of the mechanical construction of the radio frequency choke coil before attempting to mount it in position. It will probably be found easiest to remove the outer nut on the bolt running through the coil, and then after a small hole has been drilled in the baseboard to receive this bolt merely screw the choke coil in position just as if the bolt were a wood screw. However, when doing this it is important to be careful not to remove the nut on the choke coil which holds the bakelite disc in position. If this disc were removed it would expose the fine wire of the choke coil to mechanical injury.

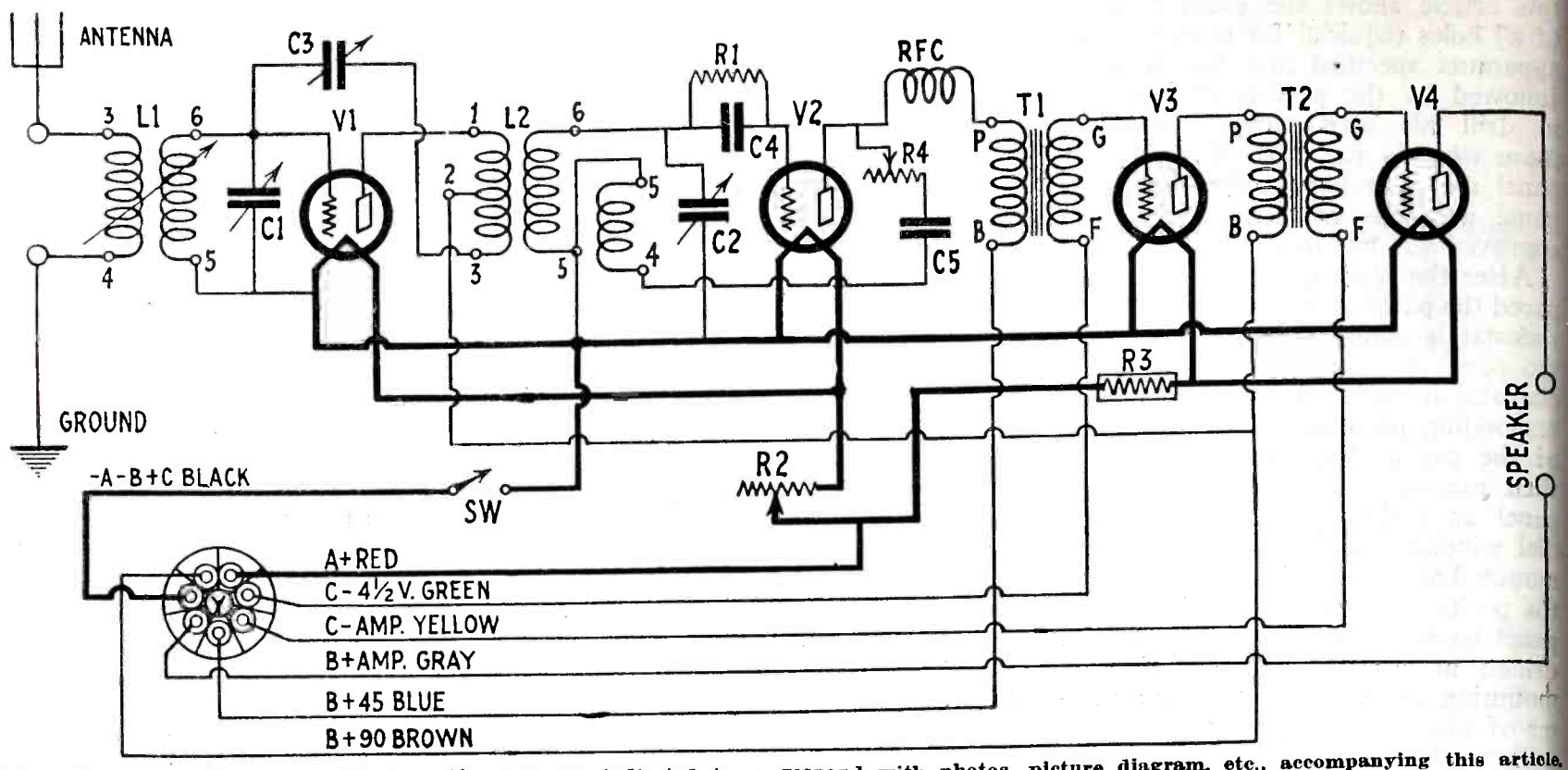
It is also necessary to carefully refer to the picture in order to discover the way the drum dials and variable condensers are mounted. Each of the two variable condensers are mounted on the baseboard with two machine screws which pass through holes drilled in the base. The screws are of the flat head type and the holes are countersunk on the under side of the base to receive the head. When attaching the condensers to the dials care should be exercized to see that none of the mechanism is bent or stained, and no attempt should be made to fasten the frame of the condenser to the brackets of the dial.

When the entire assembly is complete and every part of apparatus fastened securely one is then ready to proceed with the wiring of the receiver. Reference to the schematic wiring diagram will enable one to become familiar with the circuit to be used. This circuit consists of one stage of tuned radio frequency amplification, a regenerative detector and two stages of transformer coupled audio amplification. Perhaps a word of explanation about the windings of the coils will give a better understanding of the receiver.

The coil having the moveable winding at one end is merely an antenna coupler. Energy from the antenna is brought into this coil and then transferred to the larger winding of the coil which is in turn connected to the grid and filament circuit of the radio frequency tube. The small




**A rear view of the "Air Scout" Four showing how parts are arranged. The variable condensers ,C1 and C2 are mounted directly on the baseboard. The location of other parts are clearly shown in the above photo and instrument layout.**




**Schematic wiring diagram of the set. All parts are indicated to correspond with photos, picture diagram, etc., accompanying this article.**

variable coil is made variable to allow that degree of coupling desired to be obtained. With tight coupling, that is with the small coil all the way inside the larger coil, great volume and less selectivity will be obtained and with the small coil entirely out of the big coil just the opposite will be true. You may thus compromise between selectivity and volume to whatever degree suits your individual needs best.

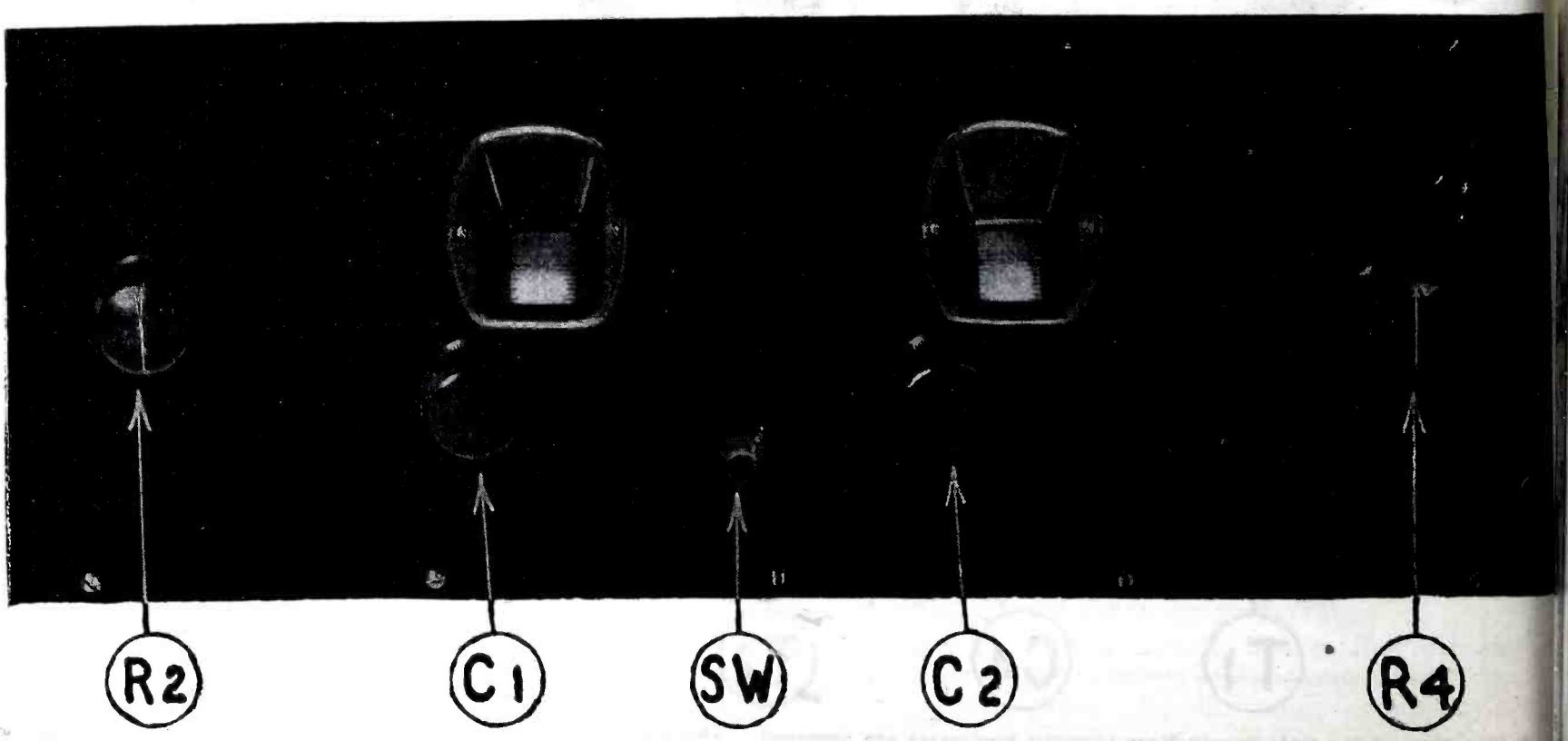
The second coil has three separate windings. The primary winding is that one having terminals 1 and 3, as shown both on the base of the coil and on the wiring diagram. Terminals 1 and 2 of this winding are used for the plate and positive 90 volt B connection. That part of the winding between terminals 2 and 3 is used in conjunction with the variodenser to neutralize the capacity between the plate and grid of the R.F. tube, thus preventing oscillation.

The other windings on this second coil compose the secondary and the tickler. The tickler is fixed in its relation to the secondary and control of regeneration is secured by placing a variable high resistor in the tickler circuit. This method of regeneration control results in an extremely smooth type of regeneration.

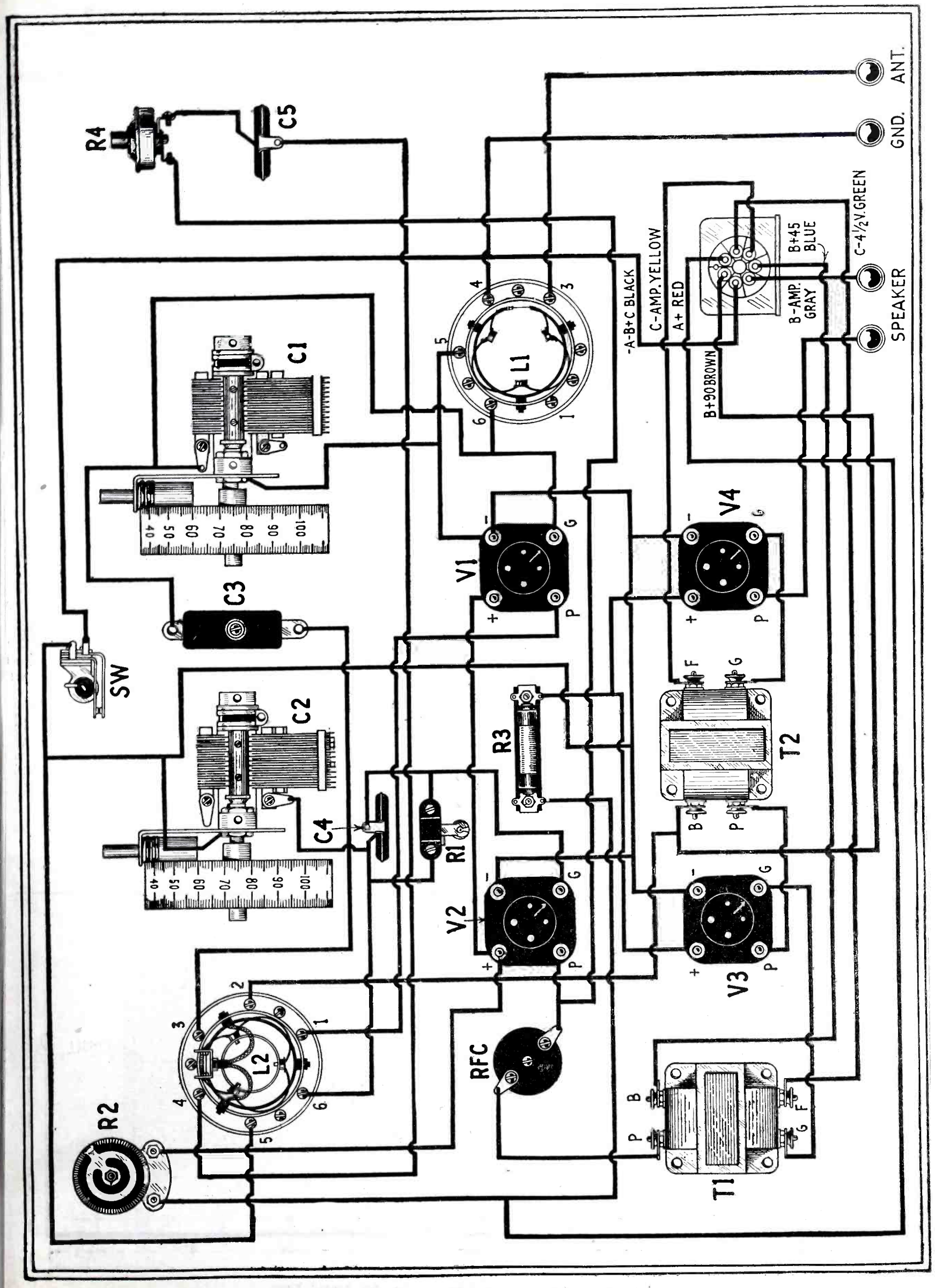
Now to begin the actual wiring of the receiver. The entire receiver is wired as shown in the accompanying picture and schematic diagrams. The R.F. tube and detector are controlled by means of the rheostat while the filament circuit, first audio and second audio of power tube is automatically controlled by means of the amperite.

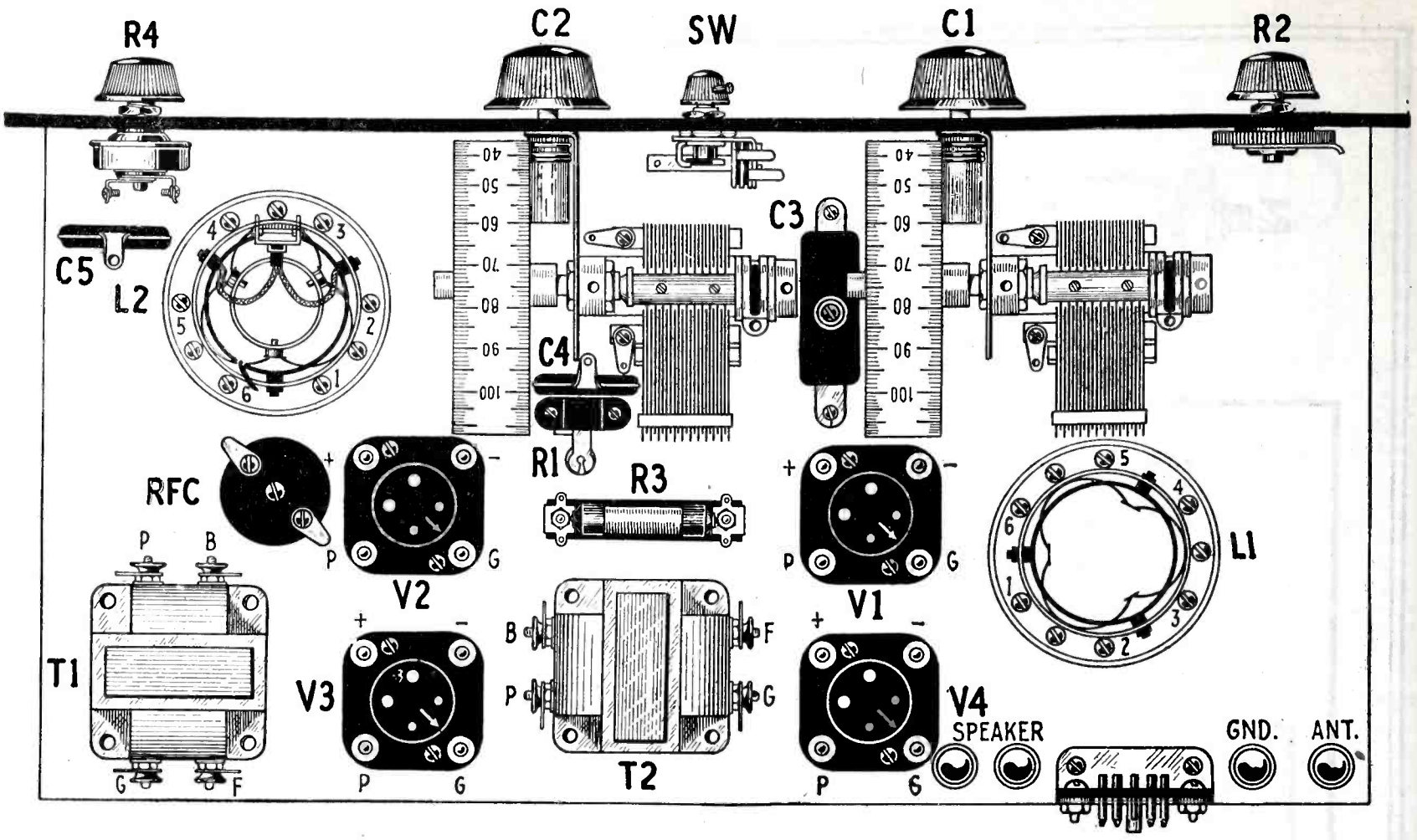
After checking over the wiring very carefully to see that all connections are tight, and that there has been no mistakes made, connect up the "A" Battery through the cable and see if the tubes light correctly. At all times in wiring this receiver, one should check themselves with reference to the schematic wiring diagram.

The construction of the "Air Scout" Four is now complete, and providing the wiring diagrams and details have been followed very closely, one should now be ready to put the receiver in operation and make the final adjustment.




**A close-up photo of the front panel showing the location of controls. At the extreme left is rheostat R2, which controls the R.F. stage and detector. C1 and C2 are the two tuning knobs and R4 is the Clarostat regeneration control.**



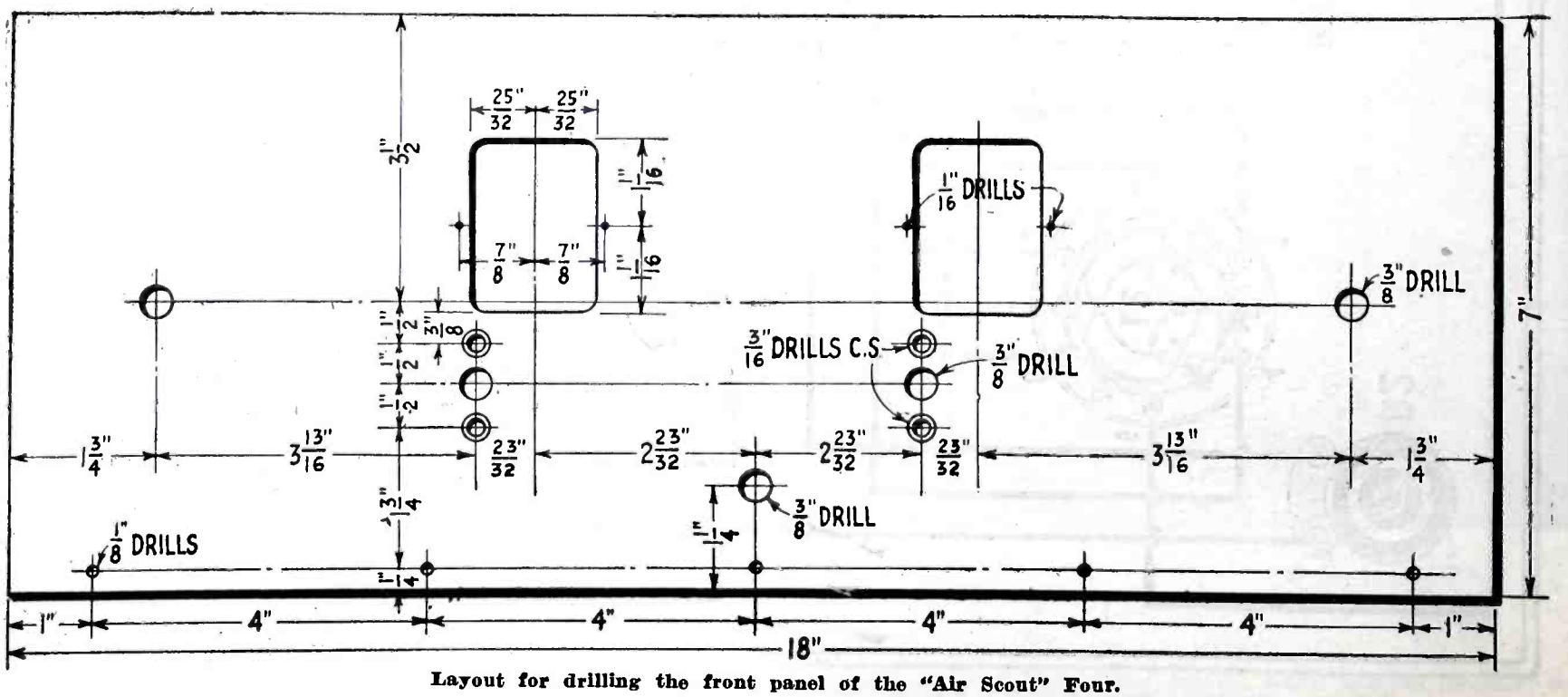



**Layout of parts on the baseboard and panel. The location of parts for this set should be followed exactly as shown in the above sketch.**

Three tubes of the 201A type are used and one 171 type tube. The layout arrangement of the receiver may be somewhat confusing in-so-far as the placing of sockets goes. Viewing the receiver from the rear, the socket arrangement is as follows—the two tubes nearest the panel are the R.F. and detector tube, from right to left respectively. The two in the rear of the receiver are the second and first audio tubes from right to left respectively. The second audio tube being the 171 type tube.

The receiver is ready to be adjusted. If headphones are available, they will serve better than a speaker in making the adjustment. The speaker may be used in the absence of headphones, however. A long hardwood stick sharpened to form a screw driver should be used to adjust the screw on the neutralizing condenser. The wooden stick is specified for two reasons, the first being that the metal in close proximity to the hand has an effect upon the results to be obtained, and the second that no matter how carefully one may handle a screw driver, there is the possibility of it slipping and accidentally joining the "B" battery and "A" battery wiring, causing a premature loss of four tubes.

The object of the neutralizing process is to neturalize the internal capacity between the plate and grid elements of the radio frequency stage and to thus stabilize the receiver to prevent its tendency to suddenly drop into oscillation. Various methods may be employed, but the instructions given here have usually been found to be the easiest and most effective.




**Layout for drilling the front panel of the "Air Scout" Four.**

Turn the adjusting screw in the variodenser to the left until it is loose, then turn the rheostat to the right until there is a frying noise in the headphones or speaker. Turn it to the left until the noise has just been eliminated. Set the regeneration control at a setting which just places the detector circuit in oscillation. Turn the tuning condensers together until a station signal is picked up around 50 on the dials. It is not very likely that the signal can be cleared with the tuning condensers so the regeneration should be reduced. As this is done, the signal will build up to a maximum point where it will clear the signal. The volume may be somewhat low, however, and the regeneration may again be advanced to build up the signal. Set the turning dials for maximum strength of signal. Remove one of the filament connections to the first tube (the radio frequency tube) socket, being careful that in breaking the filament connection to the tube all other connections are kept intact. The tube is to remain in the socket during the adjustment. When the filament circuit has been broken return the first condenser until the signal has again reached its maximum strength. With the wooden screw-driver, turn the screw in the variodenser, until the signal disappears entirely or reaches a minimum point. It may be found that on turning the adjustment on the variodenser, the signal will disappear and then reappear with a small space between the two points. Determine as nearly as possible, the mid-point of such a space and leave the neutralizer at that point. One setting of the neutralizing condenser should (and in a properly constructed set will) be satisfactory over the entire broadcast range. Replace the filament connection to the radio frequency tube socket and the receiver is ready for operation.

The two tuning condensers will be found to have very nearly the same setting. Individual receivers may vary a little from this condition, however, and the difference between the two may be determined by the operator. Once a station is found on a particular dial setting, the setting can be logged for future reference.

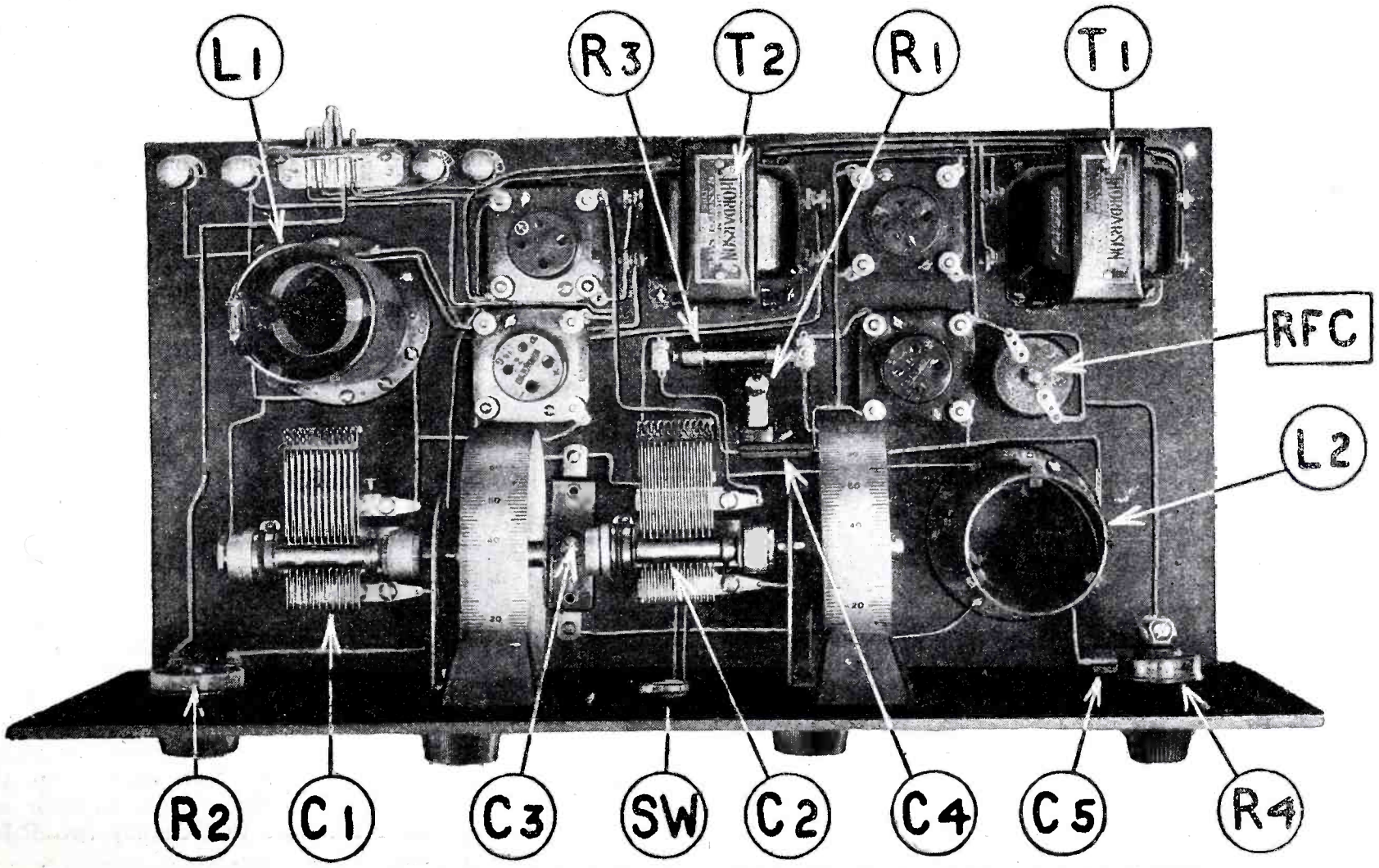
The rheostat setting and the adjustment of the regeneration control at the right end of the panel, must be taken into consideration for proper tuning of the set. The regeneration control will have to be advanced further for the higher wave stations than it will be for stations on the lower waves. The easiest way to pick up a signal with a receiver of this type, is to turn the regeneration control until a squeal can be heard. Adjust the tuning condensers to the center point of the squeal and clear the signal by adjusting the variable resistance in the plate circuit, (regeneration control) and the rheostat.

The receiver is extremely selective and sensitive when properly constructed, due to the careful selection and distribution of values, particularly in the tuning section of the set. The lower wave stations may appear to cover a comparatively wide band, but such broadness is due to the construction of the condenser plates to allow easier tuning.

The question as to whether or not the set is capable of picking up distance, may be answered forcibly in the affirmative. The extent of DX reception will depend upon local conditions in and around the individual receivers. Conditions being right, however, good long distance work can be expected.

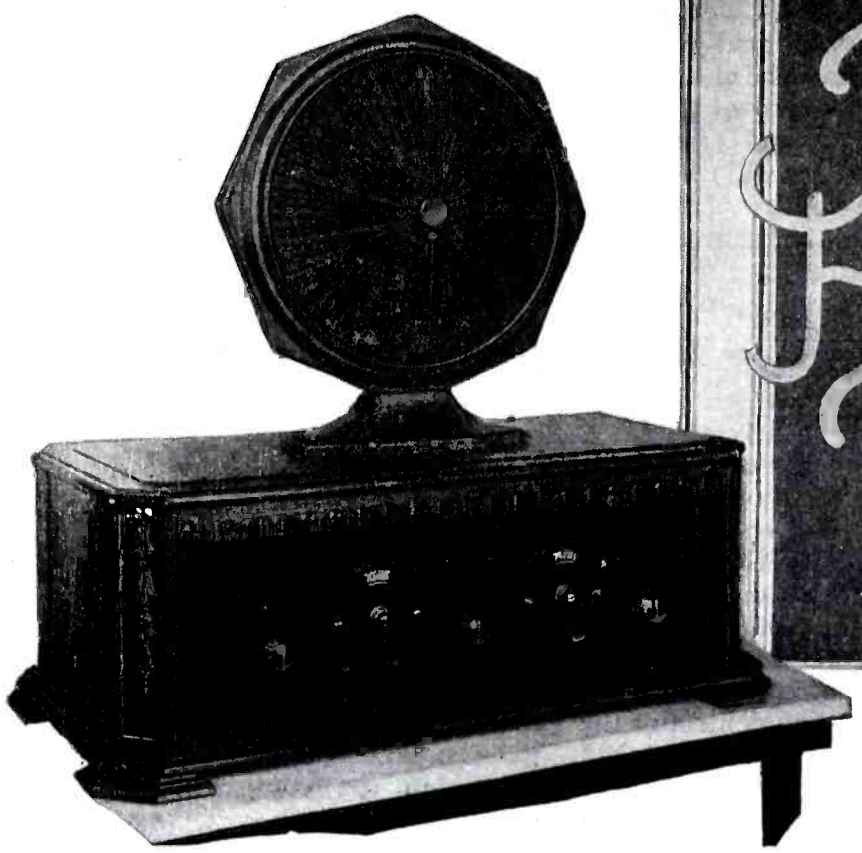
The completed receiver can either be installed in a table type cabinet or Excello console cabinet as pictured in the heading of this article. The Excello console makes an ideal cabinet as the batteries or battery eliminators, and loud speaker can be placed in the compartment beneath the cabinet.

The antenna for best operation of the Air Scout from receiver should be in the neighborhood of 100 feet in length. Some receivers of this construction will give only a slight signal on local station if the antenna or ground connection are not made, a condition which shows the selectivity of the receiver. A 100-foot antenna, then, does not impair the selectivity of the set.




**Top view of the set. Each part is indicated to correspond with the diagrams and list of parts.**

# The Lynch-Hammarlund Receiver



SIMPLICITY, low cost. best quality parts and high efficiency are a few of the features of the Lynch-Hammarlund receiver.

The cost of the receiver has been kept below fifty dollars, yet every part used in its construction is of the highest quality available.

Simplicity of assembly and construction is another outstanding feature. To this end a simple circuit which employs only one stage of tuned radio-frequency amplification and a regenerative detector circuit was selected—the ever popular Robert's circuit. The features of this circuit are so well known that little need be said here about its unusual sensitivity and selectivity.

The choice of this circuit required only a few parts for the tuned R.F. and detector circuits. The "deck" unit made up the balance of the receiver. The "deck" is an assembled sub-panel unit which includes a complete three stage, resistance-coupled audio amplifier and also the R.F. and detector sockets with the detector grid leak and grid condenser. Yet the assembled deck costs less than a pair of good audio transformers and accounts in a large measure for the low cost of the complete receiver.

In addition to having the sensitivity, quality and selectivity of many much more expensive and larger receivers, this one has certain other advantages too important to overlook. For instance the operation of its filaments is made fool-proof so that the filament current cannot be increased too far. This is accomplished by feeding each filament through a special resistance so that the normal voltage is always applied to the filaments except in the case of the R.F. tube. The filament circuit for the R.F. tube is so arranged that the filament current may be varied by means of the rheostat R5 but even with this rheostat turned up full the filament cannot be overloaded.

Another feature is the ease with which the audio amplifier of the Lynch-Hammarlund Five receiver can be used for the reproduction of phonograph music. By simply inserting the plug of the phonograph pick-up unit in the detector socket of the receiver the fine quality of this resistance coupled amplifier may be taken advantage of for the electrical reproduction of phonograph records. The fact that individual tube resistors are employed in the filament circuits of the R.F. and detector stages permits the removal of these two tubes when using the audio amplifier for phonograph reproduction, without in any way affecting the filament supply to the audio tubes.

The radio-frequency amplifier in the Lynch Hammarlund receiver can scarcely be said to employ but one tube, yet there is only one tube ahead of the detector tube. As a matter of actual fact two tubes are employed for this purpose but one of them is also the detector. The regenerative amplification obtained in the detector in this receiver is greater than that ordinarily obtained from another stage of R.F. amplification and it is for this reason that this little receiver shows a degree of sensitivity equaling many receivers that employ up to three R.F. stages. It is superior to most receivers that employ two R.F. stages.

The use of only one R.F. stage

### PARTS REQUIRED

1 Lynch 5 tube De Luxe "Deck" which includes the following:
1 Lynch cartridge type .00025 mfd. fixed condenser, C4
3 Lynch cartridge type .006 mfd. fixed condensers, C6, C7, C8
1 Lynch 2 megohm Metallized resistor, R6
3 Lynch .1 megohm Metallized resistors, R7, R8, R9
3 Lynch .5 megohm Metallized resistors, R10, R11, R12
5 Eby Universal vacuum tube sockets, VT1, VT2, VT3, VT4, VT5
1 sub-panel 6 x 12 inches
4 Sets special mountings.
All of this material is complete assembled on the sub-panel and is ready for wiring.
2 Hammarlund Type ML 23, .0005 mfd. variable condensers, C1, C2.
1 Hammarlund Type EC Equalizor balancing condenser, C3
1 Carter .0005 mfd. fixed condenser, C5
1 Carter .006 mfd. fixed condenser, C9
2 Lynch Type 4 Equalizors, automatic filament controls, R1, R2
2 Lynch Type 2 Equalizors, automatic filament controls, R3, R4
1 Carter Type M-20-S, midget combination filament switch and 20 ohm rheostat, R5
1 Carter Type 404, Imp inductance switch, S1
1 See R5 above, S2
1 Hammarlund Type HR-23 antenna coupler, T1
1 Hammarlund Type TCT-23 coupler coil, T2
1 Pair Benjamin No. 8629, shelf supporting brackets
2 Marco No. 192 vernier dials
1 Formica panel, 7 x 21 x 3/16 in.
10 Eby binding posts.
1 Package Acme Celatsite, flexible hook-up wire
1 Package Kester radio solder

simplifies the receiver tremendously from the standpoints of both construction and operation. It means that there are only two circuits to be tuned and therefore two tuning controls are all that are required. There is no necessity for "ganging" tuning units together for operation from a single control. Thus one source of trouble is eliminated. Then the elimination of the extra coil condenser, tube and neutralizing device that would be required for another stage of R.F. means that the cost is much reduced, space is saved and there is considerably less labor involved in the assembly and wiring.

The R.F. stage proper employs a balanced circuit of the Roberts type. With this arrangement a small amount of the energy from the plate circuit of the R.F. tube is fed back to the grid circuit through the small condencer C3, which is variable to regulate the amount of feed-back. But the current from the plate circuit is drawn from such a point that this feed-back is just the reverse of the unavoidable and natural feed back through the capacity of the tube elements. The two therefore balance one another out with the result that this circuit when properly adjusted will not oscillate and is therefore extremely stable. If it were not for this stability the use of regeneration in the detector circuit would prove highly impractical but with the R.F. circuit stabilized in this manner regeneration can be as freely employed in the detector circuit as though the R.F. stage were not there at all.

The R.F. stage is inductively coupled to the antenna through the coupling transformer T1 which consists of a tapped primary that is permanently fixed within the secondary winding. The taps from the primary are brought out to a tap switch mounted on the front panel. Selectivity can therefore be regulated by using this switch to cut more or fewer turns of the primary into the antenna circuit, in this way adapting the receiver to the particular antenna with which it is being used.

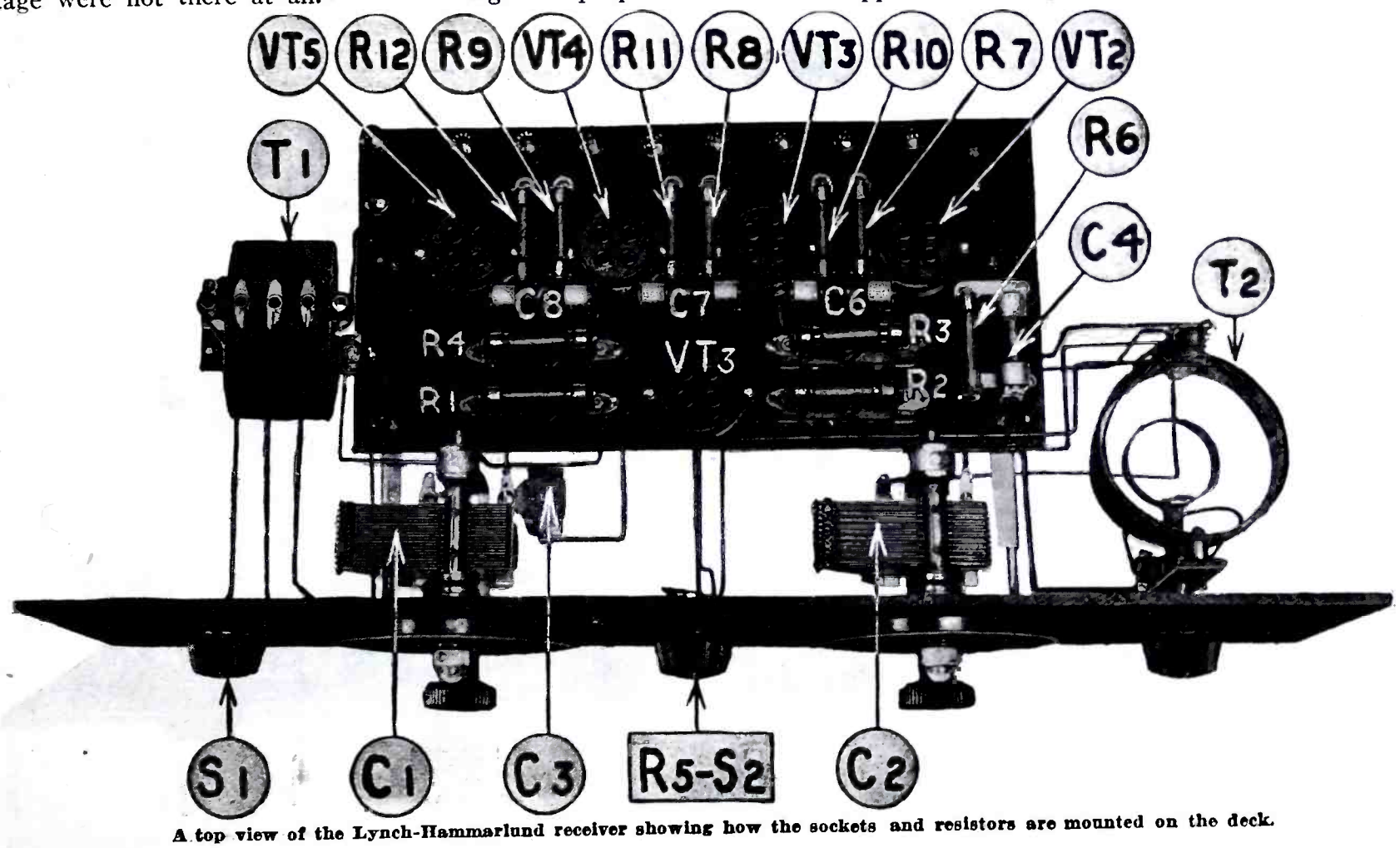
The filament of the R.F. tube is supplied through an automatic filament control resistor. In series with this automatic control is a hand operated rheostat. At first glance it would appear that either one of these units would be sufficient without the other. This is true but the use of both makes for greater safety and convenience. The rheostat serves as a volume control while the automatic filament resistor prevents the filament voltage from rising above normal even if the rheostat should be turned all the way up. This also allows the use of the full range of the rheostat for volume control with the result that there is a smooth working, gradual regulation not otherwise obtainable.

In the detector circuit the coupler T2 is employed. This is a three circuit coupler that was especially designed for use with this Roberts circuit. The center-tapped primary winding is in a fixed position inside of the filament end of the secondary winding. The purpose of the center tapped winding is to provide the reverse feedback current for the balance system described above.

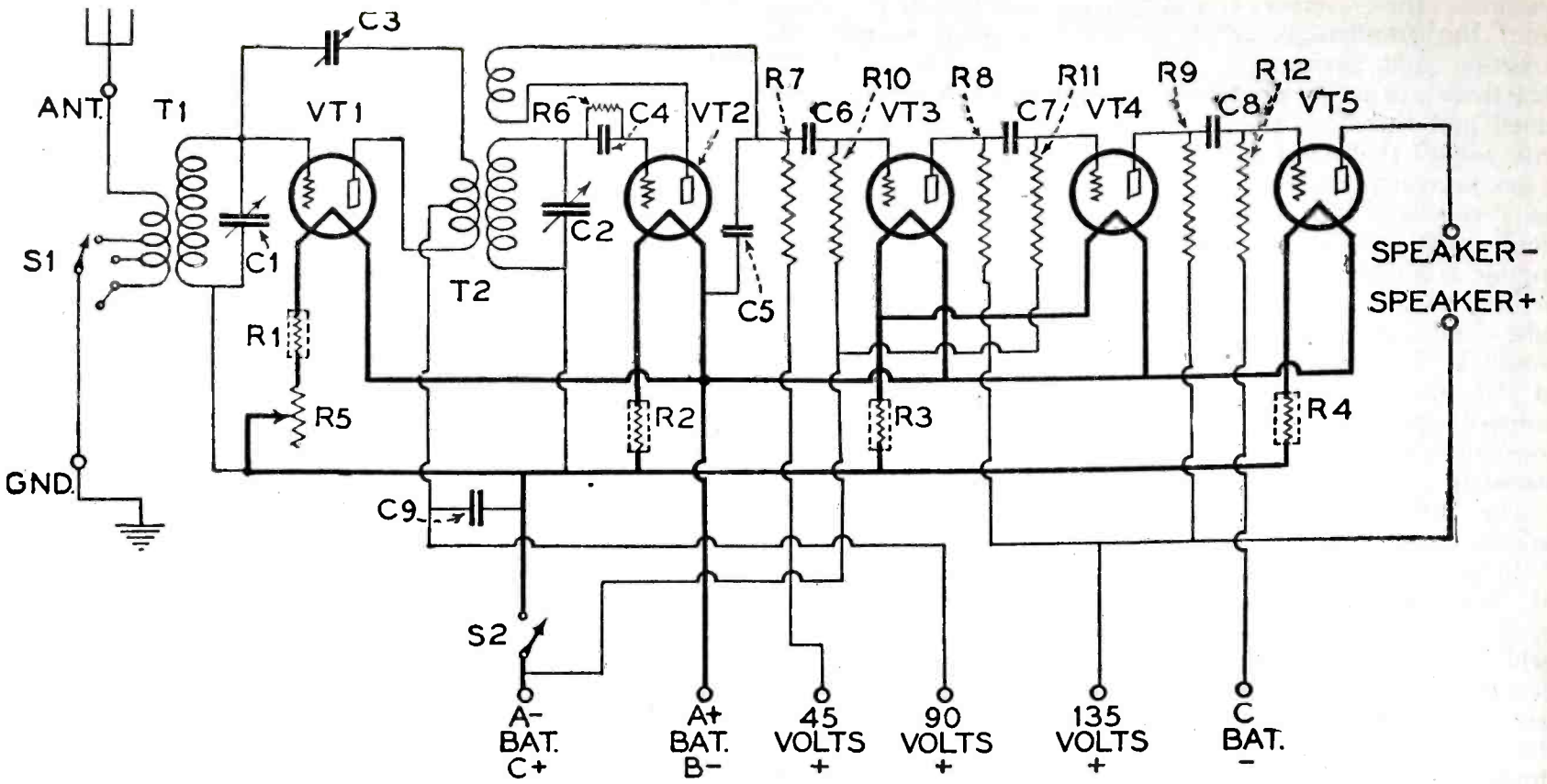
The tickler coil is made much smaller in diameter than either the primary or secondary, and is spaced well away from the secondary. This tickler is rotatable and is provided with a shaft that projects through the front panel of the receiver to provide the regeneration control. The small diameter and remote location of the tickler are for the purpose of providing gradual and smooth regulation of the regenerative action.

Contrary to the usual belief, there is a growing conviction that the quality obtainable from a detector which employs a grid condenser and leak is equal to that obtained when a "C" bias is employed to provide so called "plate" detection. Recent studies along these lines have shown that mathematically and actually the quality remains the same so far as the audible frequencies are concerned, regardless of whether "plate" or "grid" detection is used. There is absolutely no question, however, regarding the superior sensitivity of the "grid" method, which is the one that employs a condenser and leak. Considering these facts the use of the "grid" method was obviously the logical one to use in this receiver.

In the detector output circuit a bypass condenser is provided to furnish a low resistance path for the R.F. component of the detector output. This condenser is essential to proper regenerative action and also helps to avoid possible distortion resulting




**A top view of the Lynch-Hammarlund receiver showing how the sockets and resistors are mounted on the deck.**




**Schematic wiring diagram of the set. Despite the apparent complexity of this circuit, it is easy to build and simple to operate.**

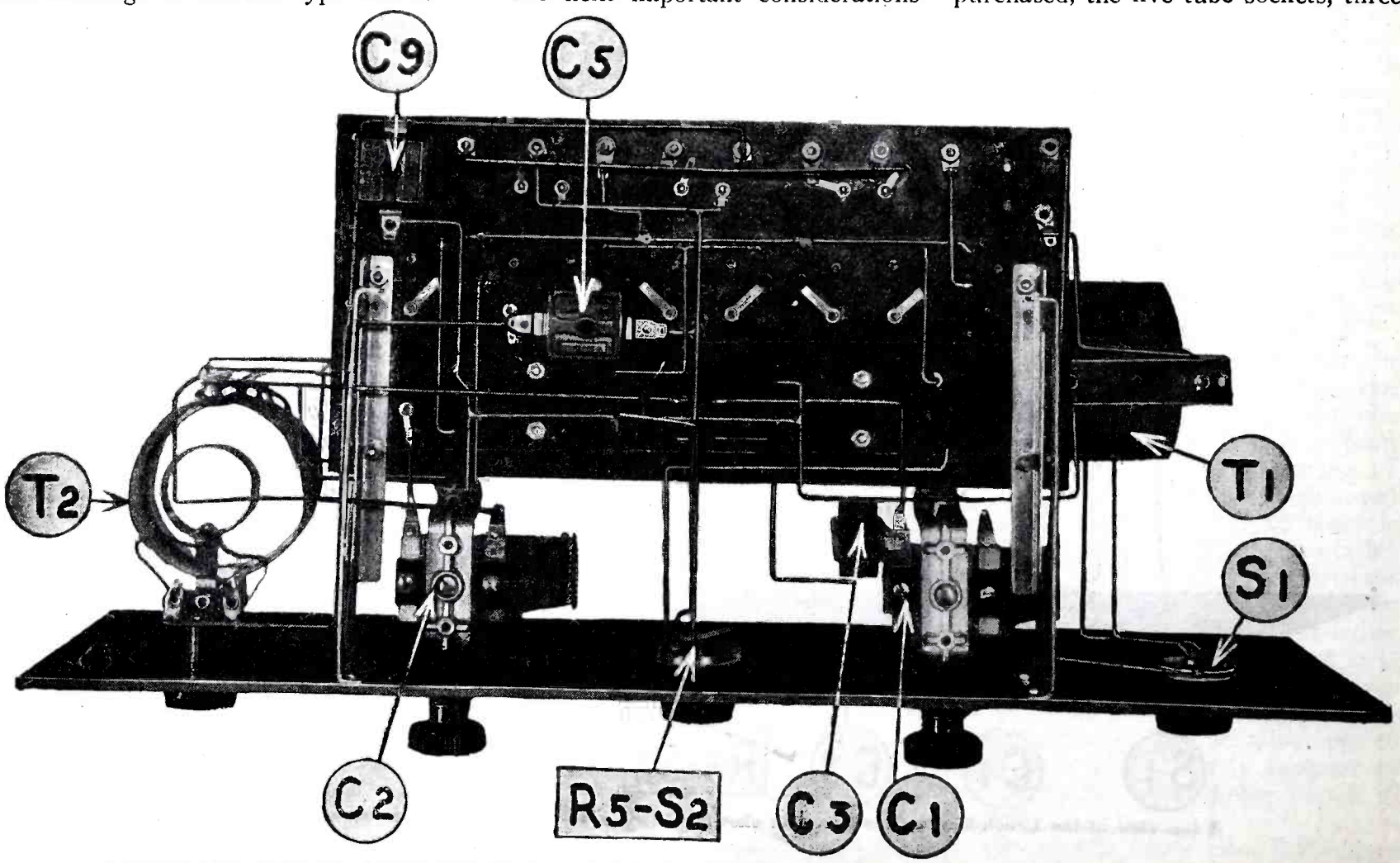
from the R.F. energy getting into the audio end.

The audio-frequency amplifier in the Lynch-Hammarlund receiver is one of the highest quality. In fact it is the same amplifier that has been used in many of the high priced kit receivers and in a number of the better class of commercial receivers. It consists of three audio stages, resistance coupled, and uses permanently fixed Metallized resistors throughout. The coupling condensers too are of the cartridge or tubular type and resemble the resistance units in appearance but are somewhat larger.

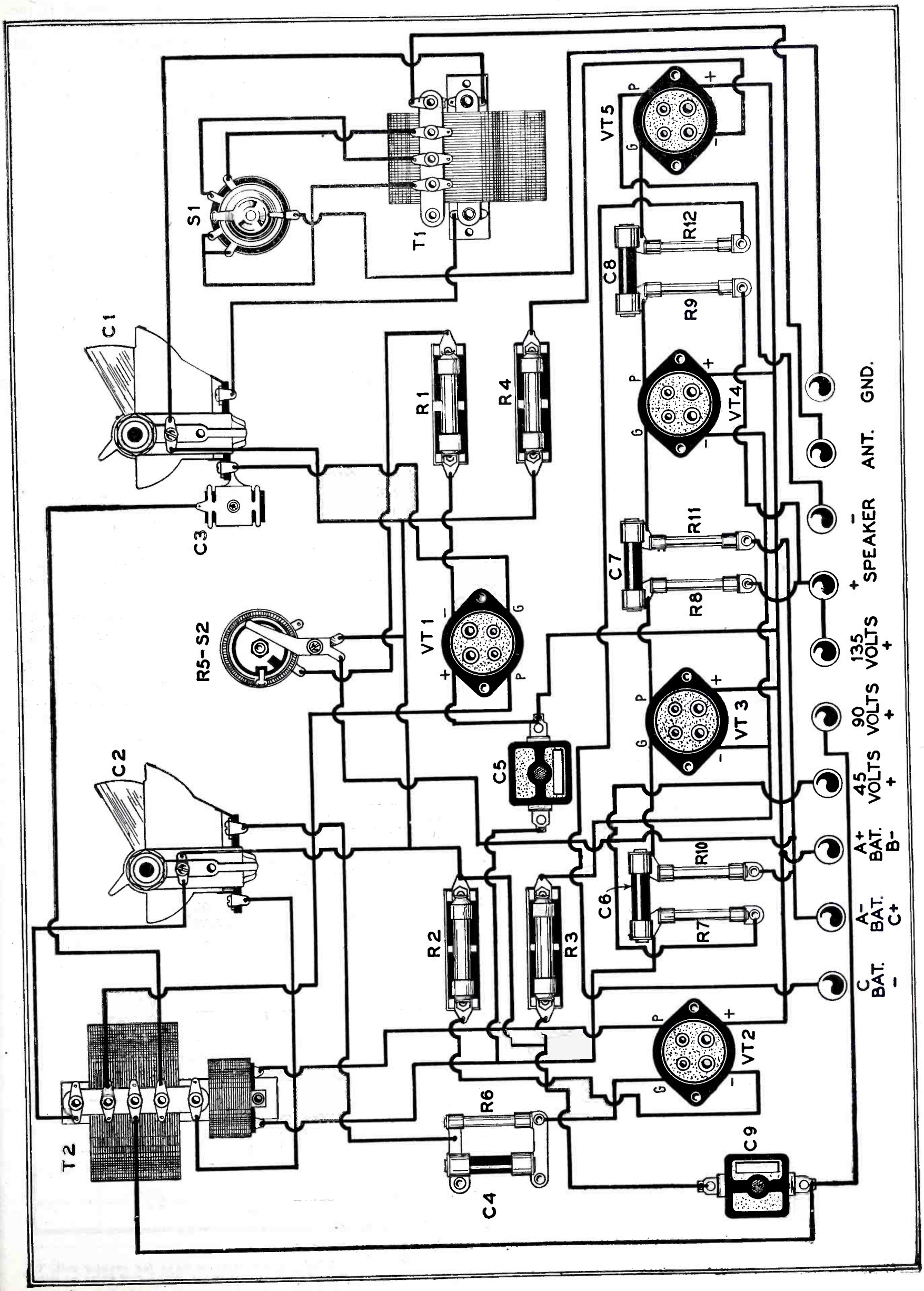
Using the High Mu tubes in the first two stages, this amplifier provides exceptional quality of tone with volume comparable with that of any other type of audio amplifier coupling.

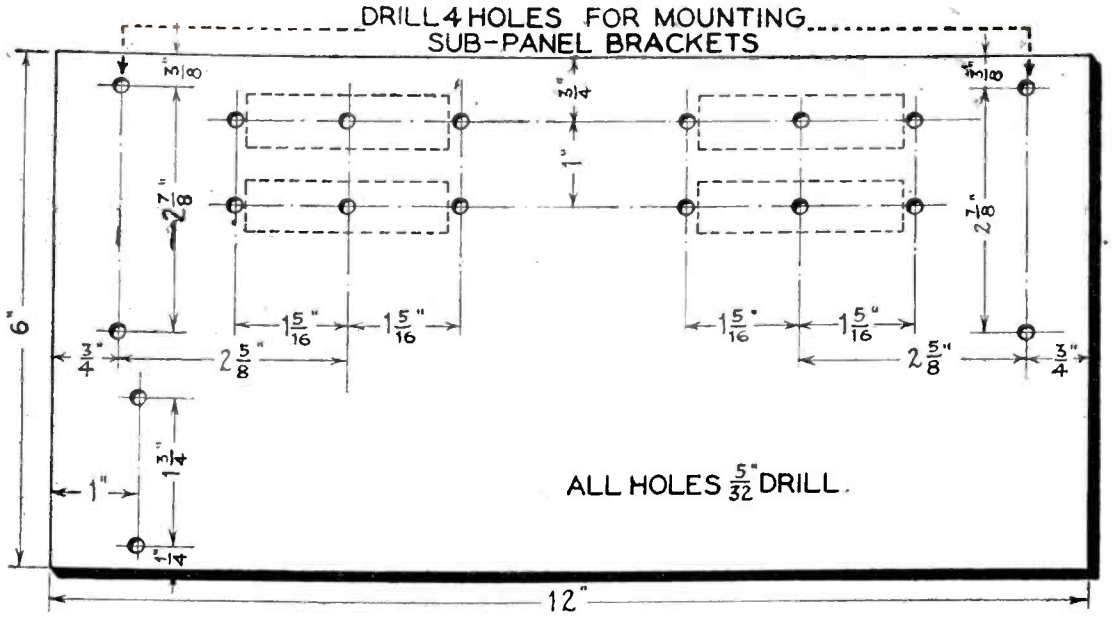
So much for the circuit itself. From the foregoing description it is evident that the circuit is fundamentally a sound one and capable of excellent results.

The next important considerations are the simplicity of layout, assembly, wiring and the cost. There would be much less to recommend this receiver over other first class receivers if its cost for parts were high or if it were complicated in construction. But fortunately its cost is unusually low and it is probably the most simple five tube receiver that has been brought out, so far as construction and wiring are concerned. This simplicity is accounted for by the fact that the sub-panel or "deck" includes, when purchased, the five tube sockets, three




**A bottom view of the set showing how the two small fixed condensers, C5 and C9 are mounted directly beneath the deck.**






**Drilling layout of the deck of the Lynch-Hammarlund set.**

coupling resistors, four grid resistors, three coupling condensers and the grid condenser. Thus the whole audio amplifier is completely assembled, ready for wiring.

The "deck" also provides the space for mounting the four filament Equalizors, R1, R2, R3 and R4, as well as the by-pass condenser C9 and the antenna coupler coil T1. A drilling layout for the mounting holes for these instruments is given herewith. The layout for drilling the front panel is also shown. The two condensers, C1 and C2 are mounted in the holes provided for them and the coupler T2 is mounted at the right hand end, with its rotor knob projecting through the panel. At the extreme left is the antenna switch, S1, and in the center the combination volume control rheostat and switch R5 (S2).

In connection with the antenna switch, it will be noted that there are four contact points whereas the antenna coupler T1 has only four taps. It is for this reason that two of the points on the switch are joined together, to avoid a dead point.

The entire layout is made sufficiently clear in the accompanying photos and diagrams, therefore no further verbal description will be required.

The wiring of the assembled receiver is made easy by the fact that all of the instruments which are supplied with the "deck" have their terminals underneath. The connections are therefore kept below out of sight. The layout drawing also shows holes which are provided to carry to connections from the added instruments down underneath this sub-panel. This arrangement not only adds much to the appearance of the receiver but also makes for short leads and thus adds to the efficiency of the receiver.

Any standard make of tubes can be used in the set, although if a type 210-A or special R.F. tube is used in the R.F. socket, special detector in the detector socket; High-Mu in the first two audio stages; and power tube in the last audio stage, best results will be had. However, the receiver is especially intended for use with the 112 type tube.

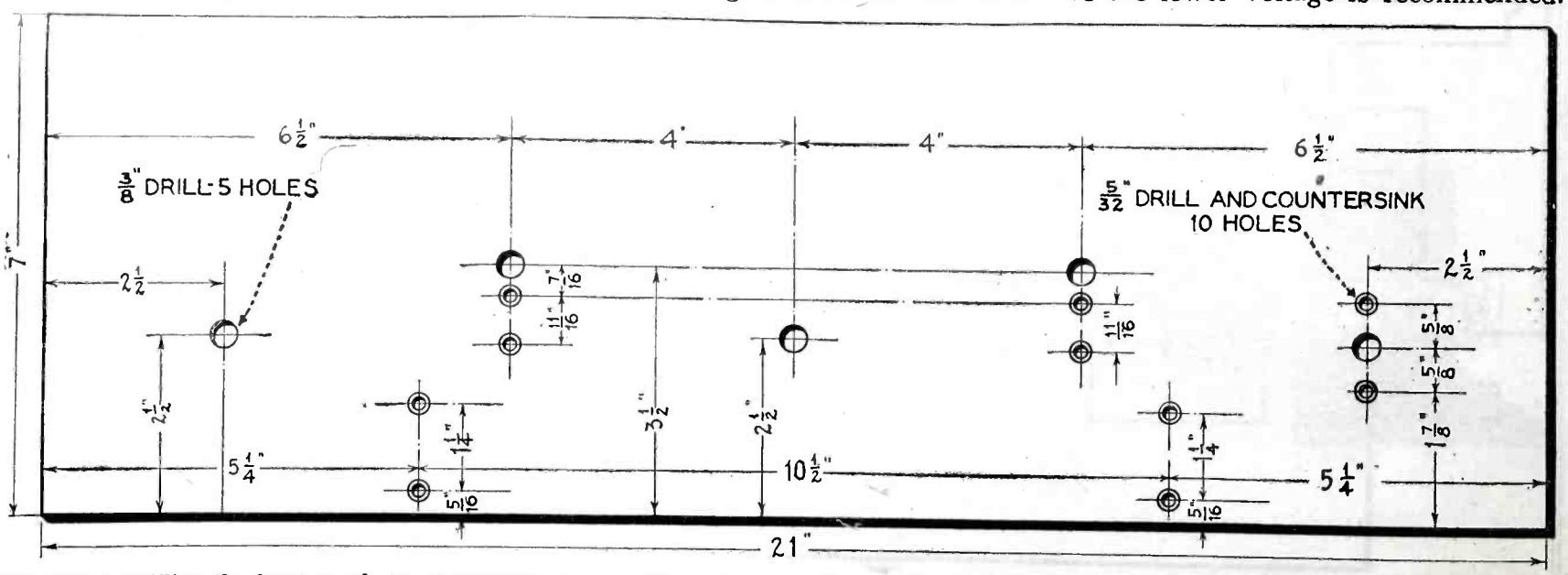
If a type 171 tube is used in the last stage, a higher "C" bias will be required and it will also be advisable to provide a grid bias of from one to three volts for the first two audio tubes. This grid bias on the first two audio tubes is not needed if the type 112 tube is used in the last stage. Also, if the 171 tube is used an output filter should be connected between the receiver output and the loudspeaker in order to shunt the comparatively high D.C. plate current around the loudspeaker winding. This precaution is not necessary if the plate voltage used is 135 volts or less.

When the wiring has been completed the batteries, antenna, ground and loud speaker are connected as shown in the diagram. Then, with the knob of the combination battery switch and rheostat, R5, turned all the way, in an anti-clockwise direction, the five tubes are inserted in their sockets.

All but the R.F. tube should light when the knob of R5 is turned slightly in a clockwise direction. The R.F. tube will also light but will be dim until this knob is turned farther up.

With this knob turned approximately half way on, the receiver is ready for operation. Turn the two tuning control knobs slowly and approximately together until a station is heard, then readjust each one slightly until the station is brought in with maximum volume. There will now undoubtedly be a pronounced tendency toward oscillation which must be overcome by the adjustment of the balancing condenser C3. Keeping the station tuned in, turn the screw of the balancing condenser in or out until a position is found where oscillation is at a minimum. During this process, the two tuning controls should be varied as necessary to keep the station tuned in at maximum. It is advisable to keep the tickler of T2 turned all the way down (anti-clockwise) so that regeneration in the detector circuit will not be confused with R.F. oscillation in the balancing process.

It will likely be found that 45 volts will be ample for the R.F. plate supply, instead of the 90 volts specified in the diagram. In that case the use of the lower voltage is recommended.




**Layout for drilling the front panel. The hole at the extreme left is for mounting switch, S1 and hole at the extreme right for coupler coil, T2, either side are for mounting the variable condensers, C1 and C2. The hole directly in the center of the panel is for R5-S2, and holes on either side are for mounting the variable condensers, C1 and C2.**

After the receiver has been balanced it is "all set to go." In the case of reception from local stations it will not usually be necessary to employ regeneration but in tuning in distant stations the tickler coil can be adjusted to provide as much regeneration as may be required to provide the necessary sensitivity. Where there is troublesome interference due to powerful local stations the use of some regeneration will sharpen tuning and make for greater selectivity. The antenna switch will also be found helpful in this connection.

In general the right hand knob (regeneration) should be used for the "sensitivity" control, while the middle knob (R5) will serve as the volume control. The left hand knob (S1) is not used after it has once been set at the point which provides the best results, except in case of unusual interference, as mentioned above.

The most outstanding feature of the receiver of course is its low price and there is just a possibility that its excellent features from the standpoint of performance may be overlooked on the assumption that low price must necessarily mean poorer performance.

If the set is dissected however, and each element analyzed, the intrinsic worth of the set can easily be realized.

From the standpoint of audio quality, the resistance-coupled audio unit can be depended upon to reproduce faithfully the complete range of the frequencies transmitted by the broadcasting station. As far as this portion of the receiver is concerned, the low price of the amplifier is obtained by the comparatively low cost of resistance and condenser units as compared to transformers. In addition that cost has been further reduced by the "deck" asembly which eliminates the usual "waste" of additional resistor mountings.

In the radio frequency and detector unit the use of a highly efficient circuit which takes full advantage of the possibilities of increased amplification resulting from the use of regeneration in the detector makes possible economy without loss in efficiency.

The variable condensers and tuning coils used in the radio frequency and detector circuits are of the highest grade. No attempt has been made to skimp in that direction because of the great importance of using only the highest grade of parts in the tuning circuits. While it is possible to use cheaper parts for the purpose with fair results, maximum efficiency, so necessary in a receiver which does not employ several stages of tuned radio frequency amplification makes any saving in that direction impractical.

It might be well to mention that this receiver was designed particularly for use with a storage battery filament supply and dry battery plate supply.

The low "B" battery current consumption of such a receiver using resistance coupled amplification makes it ideally suited for use where "B" batteries must be used as the source of "B" supply, either because no suitable current is available or because of the high initial cost of a "B" eliminator.

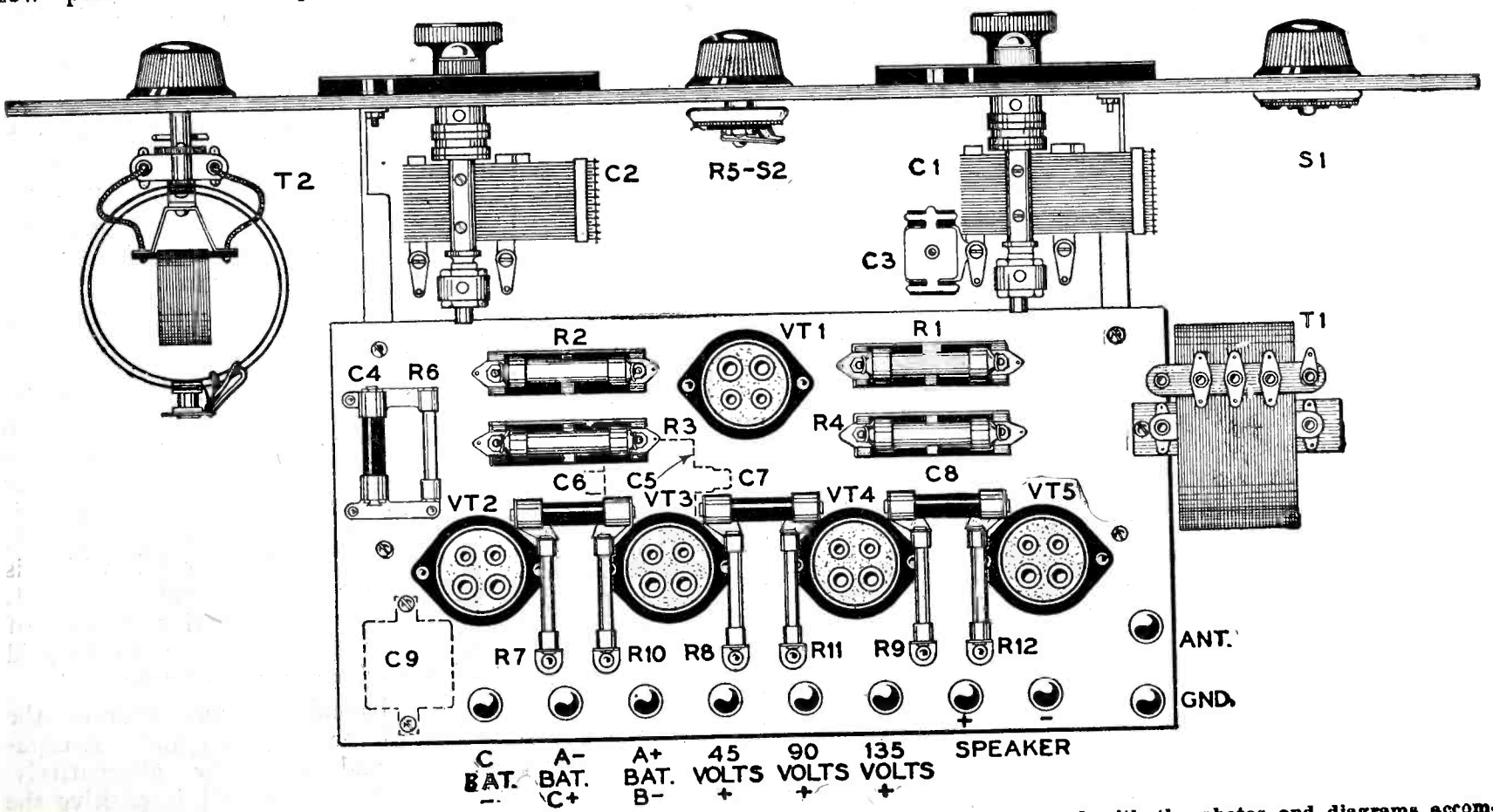
The use of an "A" or "B" battery eliminator is not recommended with this receiver. In the first place the use of any type of eliminator with any type of receiver has a decided tendency to broaden the tuning and cut down the selectivity and in the second place there are some eliminators which will not give even fair results from the standpoint of quality when used with this type of receiver.

The ideal installation for filament current supply for this receiver consists of a storage "A" battery with suitable automatic trickle charger. "B" batteries constitute the best source of supply for the plate current for the tubes. Two 4½-volt dry batteries connected to give 9 volts negative bias should be used as a "C" battery.

This type of power supply with its steady current, free from all line disturbances will produce excellent results in selectivity, distance-getting ability and tone quality.

It is interesting to note that a "C" bias is used only on the last stage. The voltage drop across the grid resistor in the first and second audio stages provides sufficient biasing for tubes VT3 and VT4 to take care of their requirements. The use of an extra bias such as would be provided by using a 4½-volt "C" battery, would impair the tone quality of the amplifier and in many cases make the amplifier inoperative.

If care is taken in the assembly and use of the receiver, as described in this article no trouble should be experienced in obtaining excellent results.




**Layout of parts on the front and sub-panels of the set. All parts are clearly indicated to correspond with the photos and diagrams accompanying this article.**

# How to Construct the Super-Hilodyne

WHEN a radio wave coming through the air at the rate of 186,000 miles per second comes in contact with the wire of an aerial, it sets up in that wire a current which after a great deal of amplification, emerges as sound energy from the loud speaker. Whether this sound is a faithful reproduction of what took place in the broadcast studio is merely a matter of engineering and as we generally assume that there is no distortion between the studio and the receiving antenna, the main troubles are encountered most often in the receiving sets themselves.

As has been intimated the problem of distortion is one that has been engaging the attention of engineers ever since the start of broadcasting. Sets of all types, circuits, number of tubes, etc. have been tried with the idea in mind that distortion was to be reduced to a minimum or eliminated entirely. New circuits were brought out, which upon inspection proved to be nothing more than old hook-ups dressed up in new clothes and many of these new-comers were little better than their fore-runners.

So many of these so-called "new" circuits have been foisted upon the radio public that every time something really worth while is put on the market the thinking portion of the radio enthusiasts look at it in askance. It is seldom that anything radically new is presented to the radio constructor as something that is actually new in every sense of the word, but in the case of the circuit which we are about to describe here the Super-Hilodyne has embodied in it several features that have not been employed in a circuit in the manner in which the designer uses them.

In the development of the Super-Hilodyne circuit no attempt has been made to evade the patent situation, as it was found that many of the previously patented circuits are not capable of reproducing the results that the originator of the Super-Hilodyne had in mind. For instance, in the case of the superheterodyne circuit, which would be ideal if it were not for the fact that it has a double beat-note, reception is oftentimes spoiled, due to the undesirable beat-note from a station that is not wanted. It is possible to add one or two stages of radio-frequency amplification before the set to overcome this condition; but, if this is done, the circuit becomes more complicated than ever. However, tuned radio-frequency has many faults of its own.

When this type of amplification is used it is necessary to introduce some means whereby oscillations are prevented and, in general, when this is done the circuit does not function efficiently over the entire waveband of broadcast stations. When steps are taken to keep the signal intensity equal over the waveband, additional means for preventing interstage coupling must be introduced if a high degree of amplification is desired. Generally when this is done by adding several stages of cascade coupling side bands are cut off, and distortion results. Unless gang condensers are employed to get maximum efficiency, each stage has to be individually tuned, which in turn offers more complications.

In the center of the schematic diagram herewith may be seen the two tubes, V1 and V2, which are connected in push-pull. Let us consider the path followed by a signal after it is picked up in the antenna circuit L1. The variable condenser C1, which is in shunt across the secondary S of L1, tunes this circuit; and each side of the condenser is connected to the grid of one of the push-pull tubes.

An incoming signal charges the grids of the tubes, V1 and V2, negatively and positively alternatively. When the grid of V1 is positive the

**LIST OF PARTS**

1 Potter Products varicoil, L1
1 Potter Products Hilocoil, L2
1 Potter Products 18 plate, .00037 mfd. variable condenser, C1
1 Potter Products 17 plate, .00035 mfd. variable condenser, C2
1 Potter Products 9 plate midget condenser, C3
1 Potter Products 0-5,000 ohm switch-resistor unit, R1, SW
4 Potter Products radio frequency units, RF1, RF2, ARF3, RF4
1 Potter Products audio frequency unit, AF1
2 Potter Products double impedance audio frequency units, AF2, AF3
1 Potter Products audio frequency unit, output filter, AF4
3 Potter Products ballast resistors, 5 volts, .75 amperes, R2, R3, R4
1 Potter Products grid leak, 1 to 3 megohms, R8
1 Potter Products fixed condenser, .00025 mfd., C7
9 Potter Products UX type sockets
1 Potter Products vernier dial
1 Potter Products shield cover
1 Potter Products front panel, laminated iron, 8x21x1/8 inches
3 Potter Products sub-base panels, 7x12x¼ inches
1 Potter Products 6 wire battery cable
2 Potter Products braces for sub-panels
2 Potter Products brackets for chassis mounting
2 Potter Products binding posts
2 Potter Products phone tip jacks
1 Potter Products condenser coupling
8 201-A type vacuum tubes
1 171 type vacuum tube
1 Pkg. Kester rosin core solder
1 Pkg. Acme celatsite wire

grid of V2 is negative, and *vice versa*. When the grid of V1 is negative this will cause a drop in the plate current of that tube and the opposite effect will take place at the same instant in V2 with an increase in the plate current in the same proportion. Now, that coil F-E is tapped midway between the windings, the flow of current in the circuit will be always the same; as the plates of V1 and V2 are in parellel just opposite to the input circuit. In other words this circuit is neutralized, as signals of all frequencies are balanced out.

If we were to allow the circuit to remain in that form it would be useless as a receiver. However, on further consideration it will be seen that a variation of current exists between the plate of each tube and the lead A. Therefore, on connecting the coil F-E in series with the plate of V1, we have a variable signal flowing in this coil. The coil C-B, which is shunted by the variable condensers, C2 and C3 (the latter being a vernier) is tuned to the frequency which it is desired to get through to the loud speaker, and all others are cancelled out. This desired frequency is picked up by the coil A-C and charges the grids of the two tubes in the phase just opposite to that of the current picked up in the antenna coil. In this way the grid of V1 is reinforced by the current transferred through the coil system of unit L2, while the grid input of V2 is balanced out, thereby causing no current flow from its plate to the lead A, no matter to what frequency C-B is tuned. Therefore an amplified current, at whatever frequency is passed by coil C-B and its attendant condensers, flows in the primary of the radio - frequency transformer T1; while all the other signals are cancelled out.

After the signal has passed through the tubes V1 and V2 it leaves the center panel or unit and goes to the left to the input of the intermediate radio-frequency amplifier.

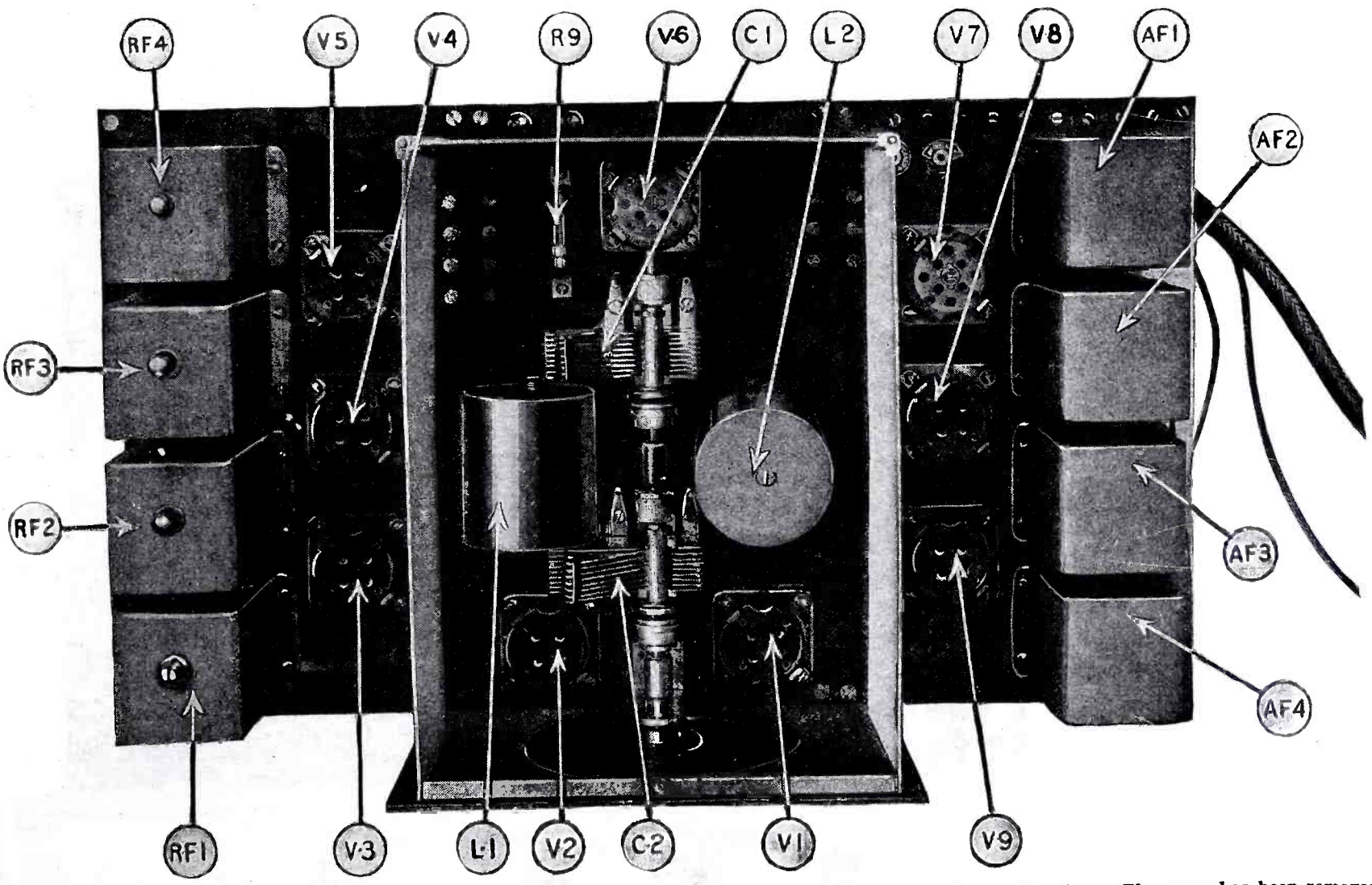
The Hilograd system of amplification is one that is untuned and in which there is little danger of cutting off any of the sidebands. This method is highly desirable for complete efficiency.

The four radio-frequency transformers, T1, 2, 3 and 4, are untuned and give high amplification between 220 and 300 meters. In order to eliminate oscillations, resistors are placed in the primaries of these transformers. These resistors are so adjusted that the R.F. amplifier operates just below the point of oscillation, making it function most efficiently within the wavelength band mentioned above. As the amplification factor begins to drop off, above 300 meters, a portion of the plate current is fed back to the grid circuits through the radio-frequency chokes. In T1, 2 and 3. This current is forced through these chokes and the condensers to the coils in series, and thence to the filaments or ground. This is because these chokes have a lower impedance than the resistors at the lower frequencies, or higher wavelengths.

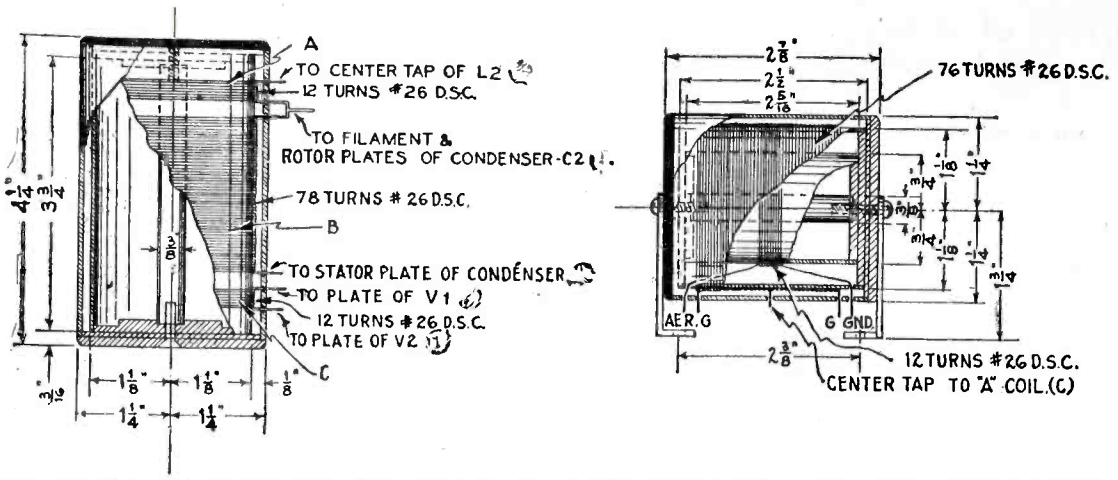
The impedance of a choke coil drops when the frequency is lowered; therefore, the increase of current fed back to the grid circuit is in proportion to the drop in frequency. As the coils are coupled through the secondary of the radio-frequency transformers we have an electrically automatic form of regeneration that compensates for the drop in amplification at the higher wavelengths; and therefore keeps the amplification factor at its efficiency over the entire broadcast waveband.

From the output of the radio-frequency amplifier, at the left, the signal returns again to the center panel where it is rectified in the detector tube, V6. From the plate of this tube it goes to the right-hand panel, or which is located the audio-frequency amplifier, which embodies the dual-impedance system of coupling that has been developed by the writer.

This type of audio-frequency amplifier has several advantages. One



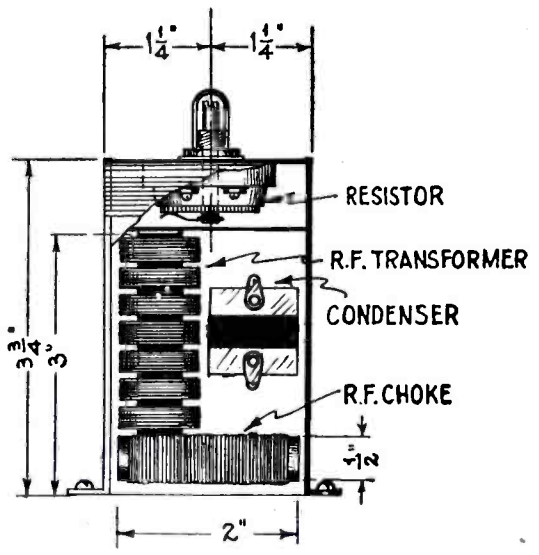

**The top portion of the shield has been removed in order to show the tuning portion of the Super-Hilodyne Receiver. The cover has been removed from the adjusting screw of the resistor in the radio-frequency unit, RF1.**




**The construction of the inductors, L1 and L2, in the tuning unit. All constructional details are clearly indicated.**

of these is that, by placing the audio transformer in the first stage, where the signal is weakest, and the impedances in the following stages, the resulting signal is stronger and less distorted than is usual. The high and low frequencies are amplified with equal intensity because of the large values of the condensers, and because the values of the inductances are staggered, one being high and the next being low.

In the output of the last stage of the amplifier, in which a power tube is employed to prevent any distortion, is an audio-frequency choke coil and a condenser in L3. These are placed at this point so that no high voltage can get into the windings of the loud speaker. A similar system in AF1 is used at the input of the audio-frequency amplifier to keep the radio-frequency currents from entering the primary of the audio-frequency transformer.

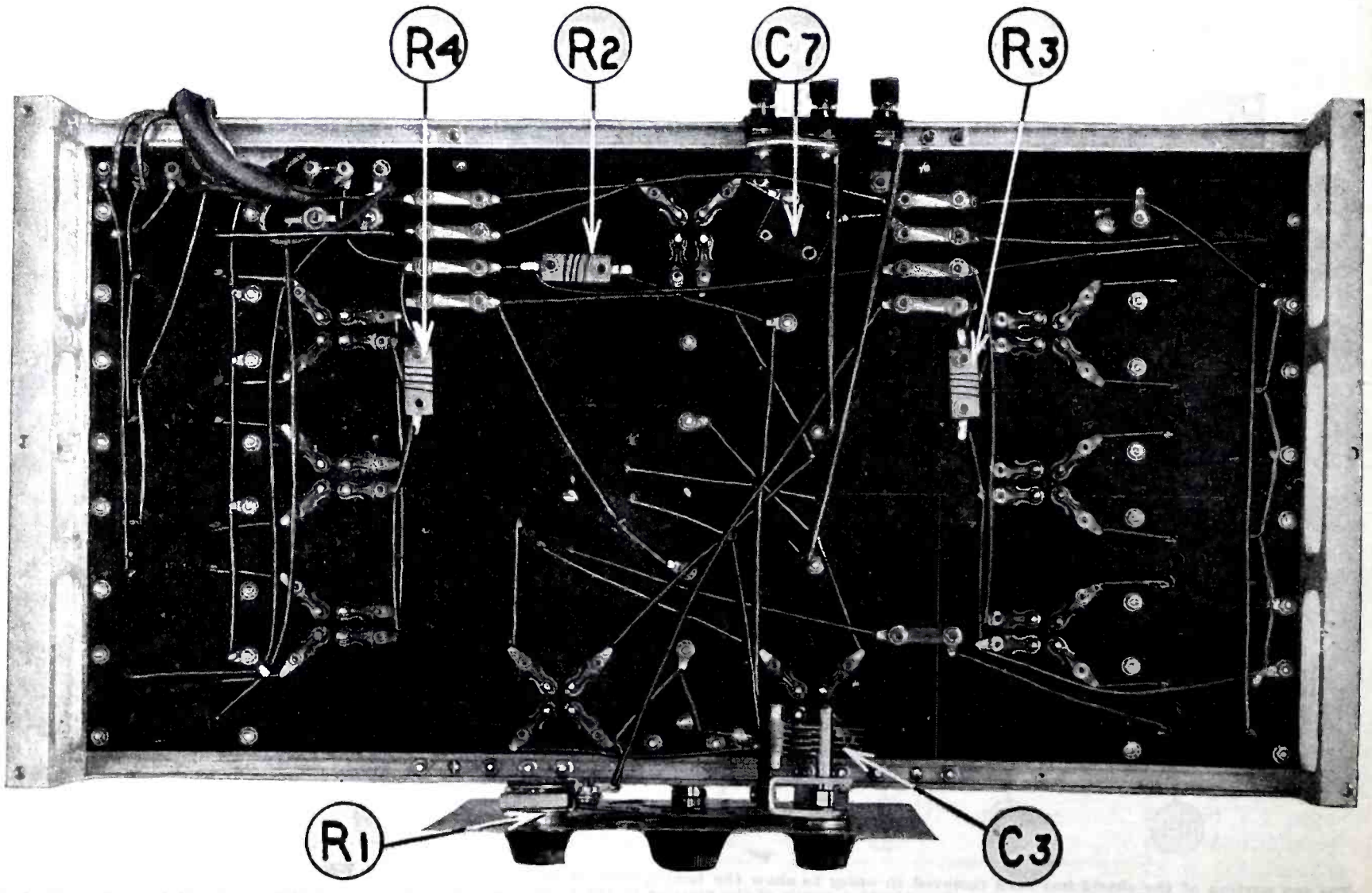



**Interior of one of the radio-frequency units, the different parts being indicated.**

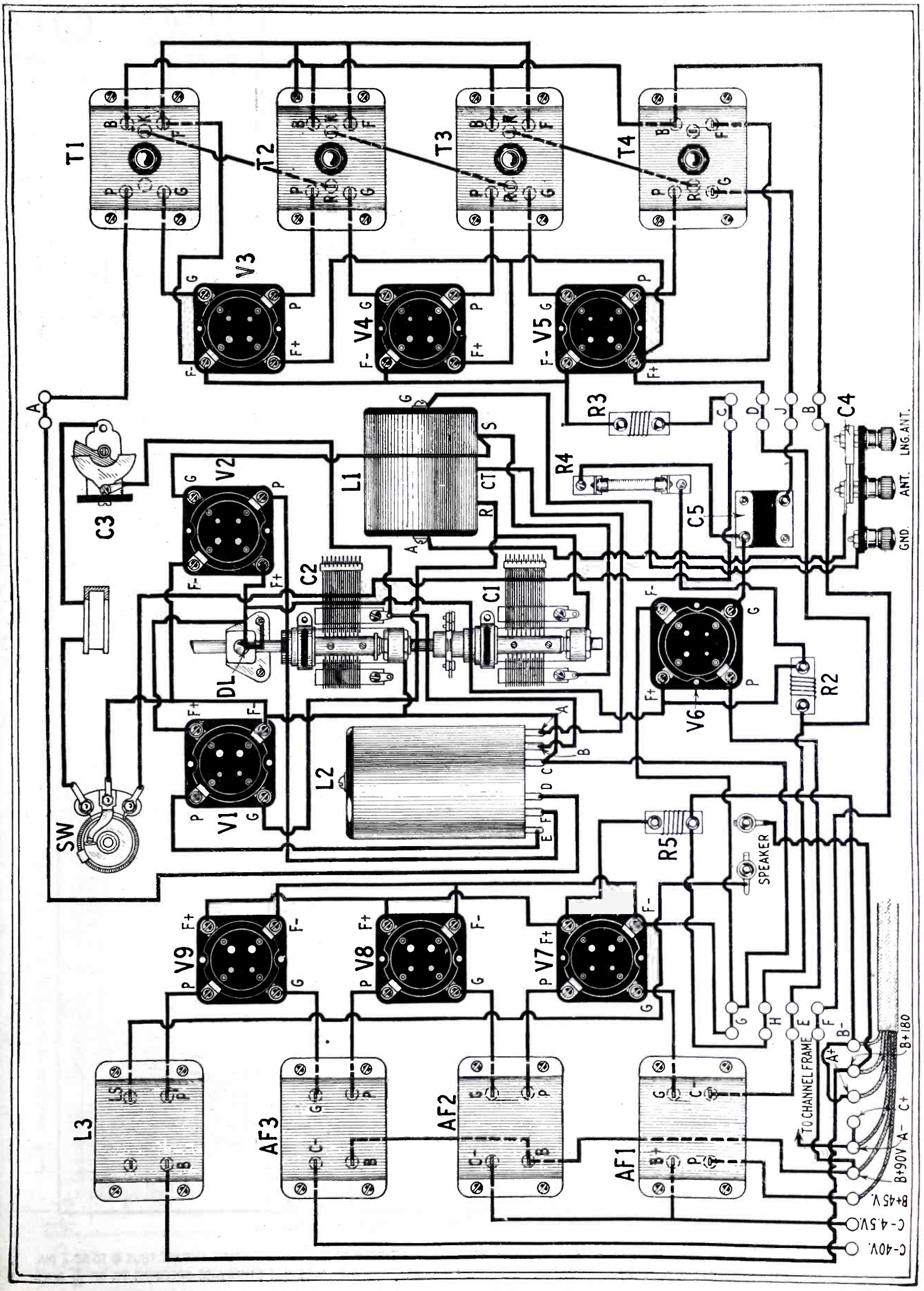
From an inspection of the receiver as shown in the accompanying illustrations, it will be seen that the tubes, V1, 2 and 6 (the push-pull tubes and the detector respectively) are located within the shielded portion, in which are also the two variable condensers C1 and C2, and the two systems of coils used in the tuning circuit. On the left panel of the set are the three radio-frequency amplifier tubes together with the shields enclosing the transformers, chokes, condensers and variable resistors. On the right-hand panel is mounted the audio system with its three tubes, the one nearest the front panel being the power tube, V9.

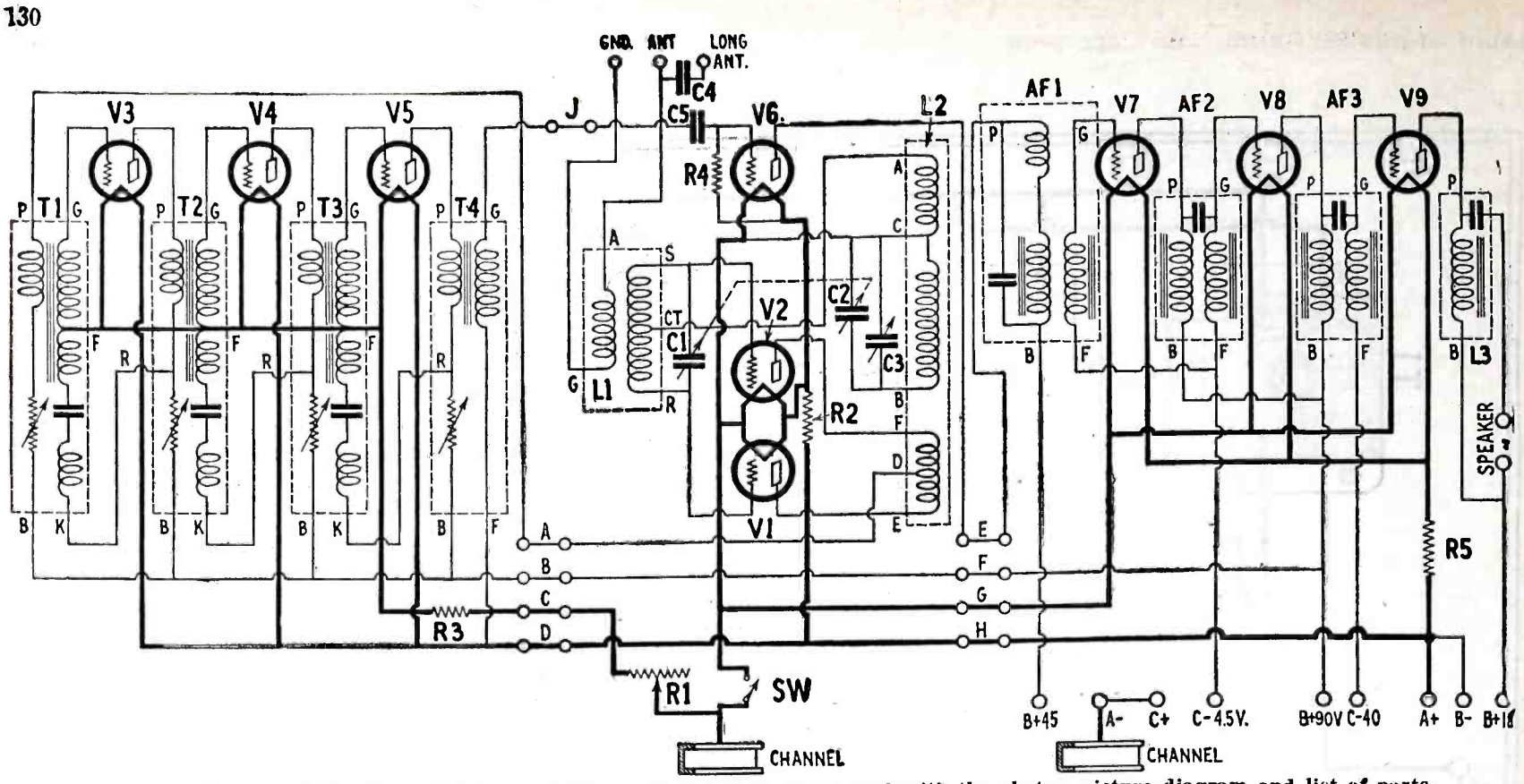
In the photo (bottom view of the three sub-panels) the very few wires necessary are clearly shown. On the front panel, which is of metal, are mounted the combination volume control and filament switch (R1 and Sw) and the vernier condenser C3. On each of the three sub-panels is mounted a specially-wound resistor which takes care of the filament current to all the tubes on that panel. The grid condenser is mounted immediately under the grid leak in the center panel.

In the lower right hand corner of the set are the eight outlets for the




**A bottom view of the Super-Hilodyne receiver showing how the panels are connected together and wired. Controls R1 and C3 are on the small front panel.**






**Schematic diagram of the Super-Hilodyne. Letters and numerals correspond with the photos, picture diagram and list of parts.**

battery leads, which are connected to a cable. As the sub-panel is in three sections, it becomes necessary to support them at the rear of the set as well as along the sides. A special rear bracket is provided with spaces which allow the antenna and ground terminals, as well as the cable terminals, to be placed at the rear out of the way.

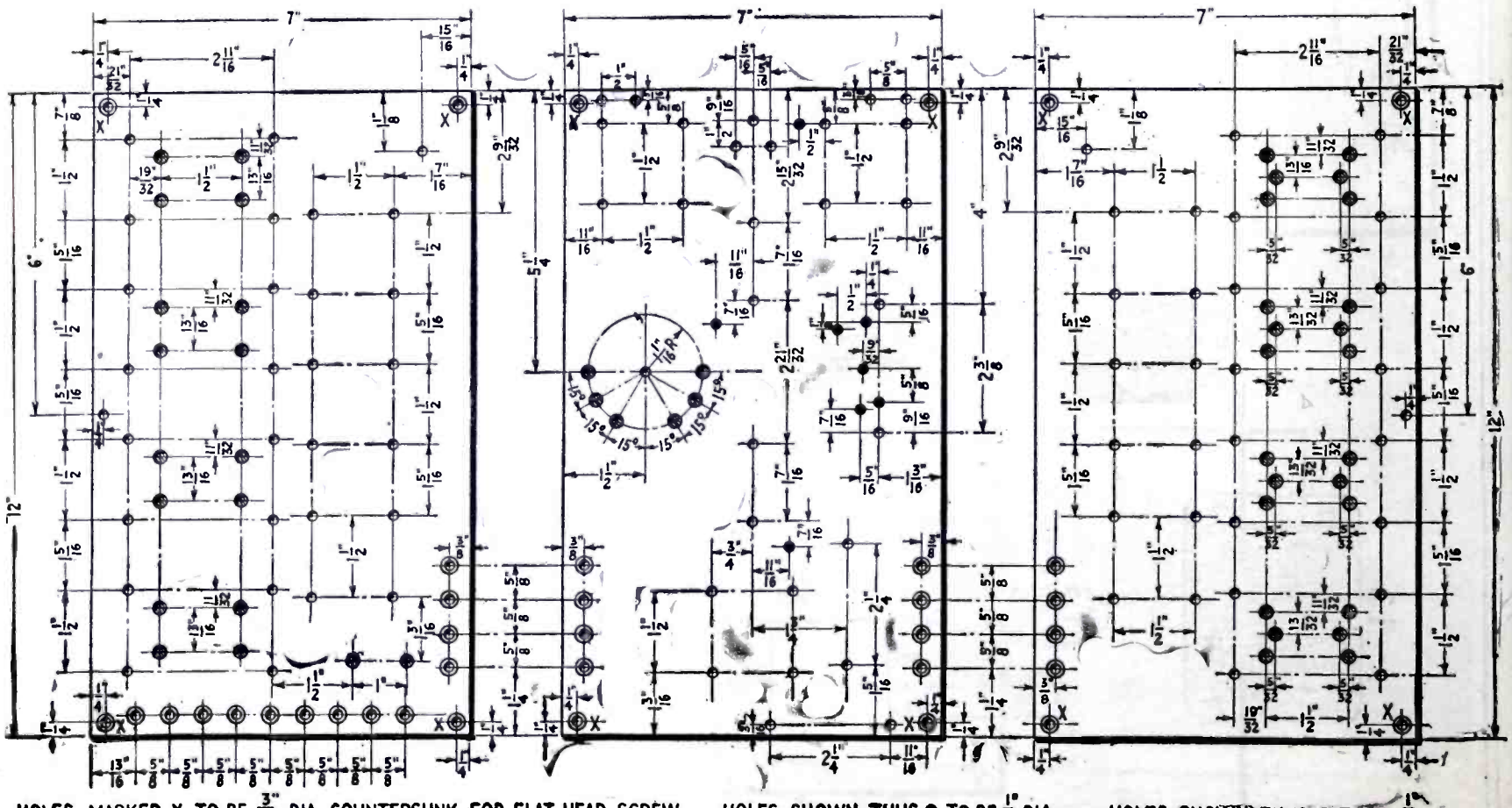
As previously mentioned, the receiver is composed of three separate units: the tuner and the detector, the radio-frequency amplifier, and the audio-frequency amplifier. Each unit is built up separately and then the three are assembled on the brackets and front panel. The wiring is done in the main part under the sub-panel and each unit can be wired before mounting on the brackets. They can then be connected together by the nine short jumpers lettered from A to D and from E to J in Fig. 1.

It is easily understood that such a method of procedure is extremely simple. If it is so desired, the constructor can assemble the instruments of the sub-panels himself; or he can obtain the three units wired already for assembling on the brackets and front panel.

The layout shows how the different components are placed within the shields in the radio-frequency amplifier. On one side is the radio-frequency transformer, with the choke coil and condenser on the other. In a small compartment in the top of the shield is placed the variable resistor which is in series with the primary of the transformer.

In the audio amplifier, the two impedances are placed perpendicular to the base of each unit, with the condenser standing vertically at the side.

The variable condensers C1 and C2 are dissimilar in capacity, as it was necessary to add one plate to C2, making the number of plates on C1 seventeen and on C2 eighteen. The reason for this departure from the usual cus-



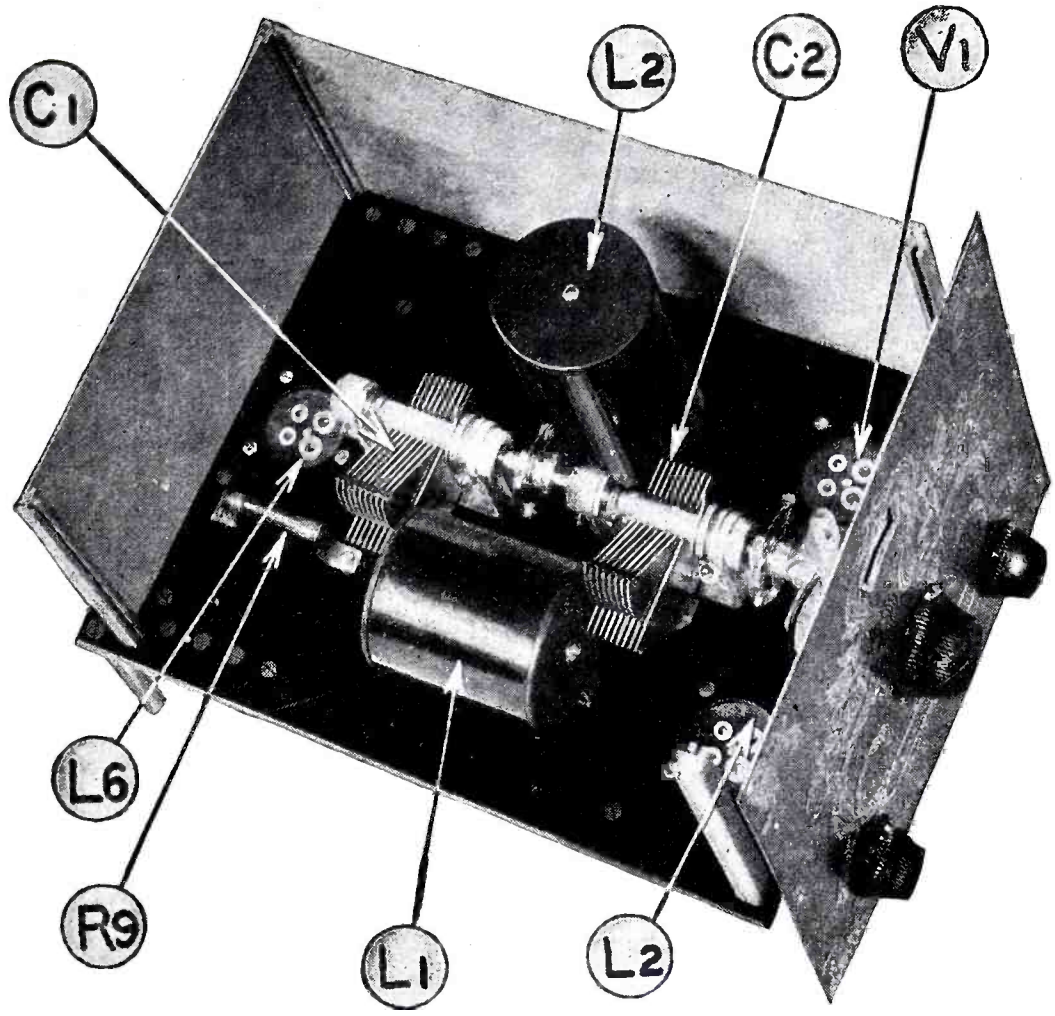

**The drilling of the three sub-panels is clearly detailed in the above, which also carry outlines of the parts to be mounted.**

tom is that the vernier condenser C3 is thereby made more effective in its functioning as a fine adjustment for tuning.

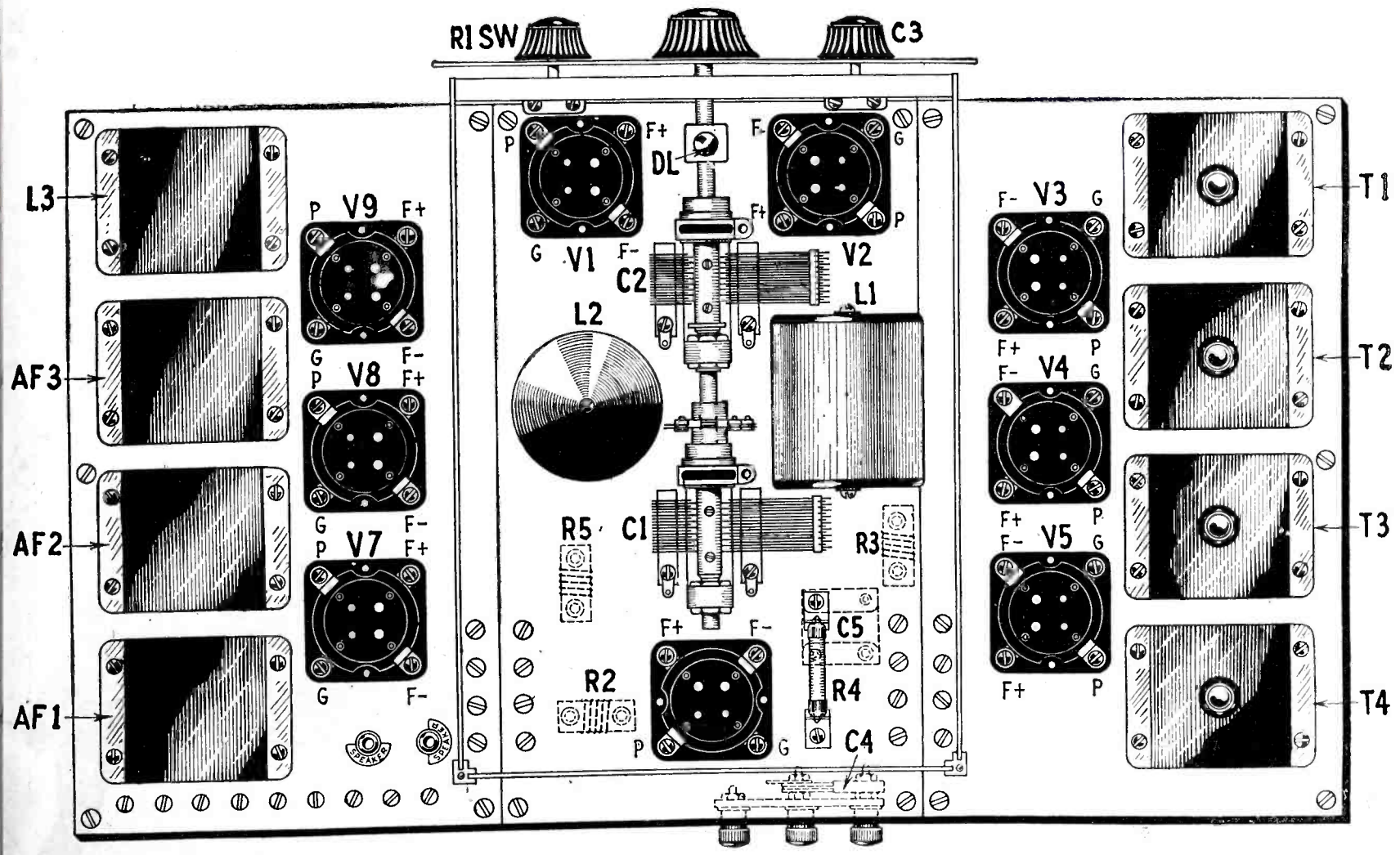
The two coils in the antenna coupler L1 are wound on forms 1½ and 2¼ inches in diameter, the primary having 12 turns and the secondary 76 turns tapped at the 39 turn. These are wound with No. 26 wire. In the systems of coils in L2, A has 12 turns, B has 78 turns and C 12 turns of No. 26 wire wound on a form 2¼ inches in diameter (see details on page 128). Each of these groups of inductors is enclosed in a cylindrical cover, and they are mounted at right angles to each other on the middle panel.

After the connections have been made and the various circuits tested to see that they are correct in every detail, insert eight 201-A tubes in the sockets, V1 to V8 inclusive. In the last socket V9 is placed the power tube with the appropriate negative grid-biasing voltage connected to the lead provided for it. The loud speaker connections are plugged into the tip jacks at the rear of the sub-panel on which is mounted the audio-frequency amplifier. The aerial and ground connections are made to the binding posts at the rear of the set. The aerial should be between 100 to 125 feet in length.

It is, first of all, necessary to adjust the resistors in the radio-frequency amplifier; when these adjustments have been made the dust-proof caps are replaced over the slotted shafts. The procedure of adjustment is as follows: a station that operates on a wavelength in the neighborhood of 480 or 500 meters is tuned in and the resistors on the top of the shields en-




**Close up photo of the tuning unit, showing the arrangement of parts within the shielding.**




**V1 and V2 are the push-pull tuner sockets; V2, V4 and V5, the R.F. sockets; V6, detector; V7, V8, A.F. sockets; V9, power amplifier socket; RF1 to RF4, Hilograd units; AF1, R.F. filter and transformer; AF2 and AF3, dual-impedance units; L3, output filter; C1 and C2, variable condensers; and R4, grid leak.**

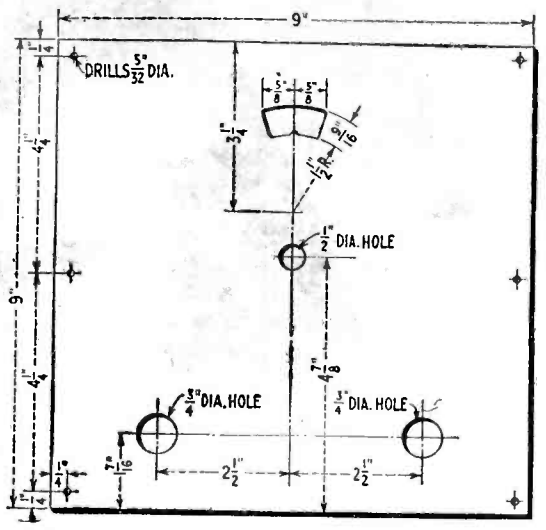
closing the radio-frequency units are varied in turn until all howls are eliminated from the signals. For example, let us follow the adjustment of the resistor in T2. A point will be found, by turning the shaft to the left, at which the squeals in the loud speaker just stop; which means that the particular stage is operating just under the point of oscillation on the high wavelengths. Each of the stages is adjusted in the same manner.

The station operating on a wavelength between 200 or 220 meters is tuned in and the same procedure followed. It will be found that a point can be reached on each resistor, whereby the set will not oscillate at any frequency within the 200 to 550 meter band. When these settings have been finally made, the caps are replaced on the shields and the set is ready for use. As previously explained these adjustments need not be varied unless some changes are made in the receiver, such as the substitution of different tubes, etc.

The three sections into which the sub-panel is divided have other uses than those outlined above. Let us assume, for example, that we have a receiver which is not selective and we wish to remedy this defect. This is easily accomplished, assuming again that there are already installed a good radio-frequency amplifier and a good audio-frequency amplifier, by connecting a tuning unit (middle section of the Super-Hilodyne) before the R.F. amplifier.

Again, let us consider an R.F. set which is sufficiently selective but will not reach out and get distance. Here the Hilograd intermediate radio-frequency amplifier can be used to good advantage, for it may be inserted in the set, after the tuner.

Then, in the case of a set which has everything but a good audio-frequency amplifier, the dual-impedance




**Drilling dimensions for small metal front panel. This panel is furnished with the foundation unit and is only used with the special cabinet shown in the photo heading this article.**

amplifier can be substituted in the receiver and will undoubtedly clear up many of the troubles previously encountered, in the way of distortion, motorboating and other amplifier shortcomings.

The tuning of the Super-Hilodyne is very simple, all that is required is the manipulating of the main selector knob, which is the upper one in the center of the panel, to the desired station and by slightly adjusting the vernier, absolute resonance may be obtained. Volume may be increased by turning the rheostat to the right or decreased to the desired volume by turning to the left. When volume control is turned all the way to the left the set is automatically cut off.

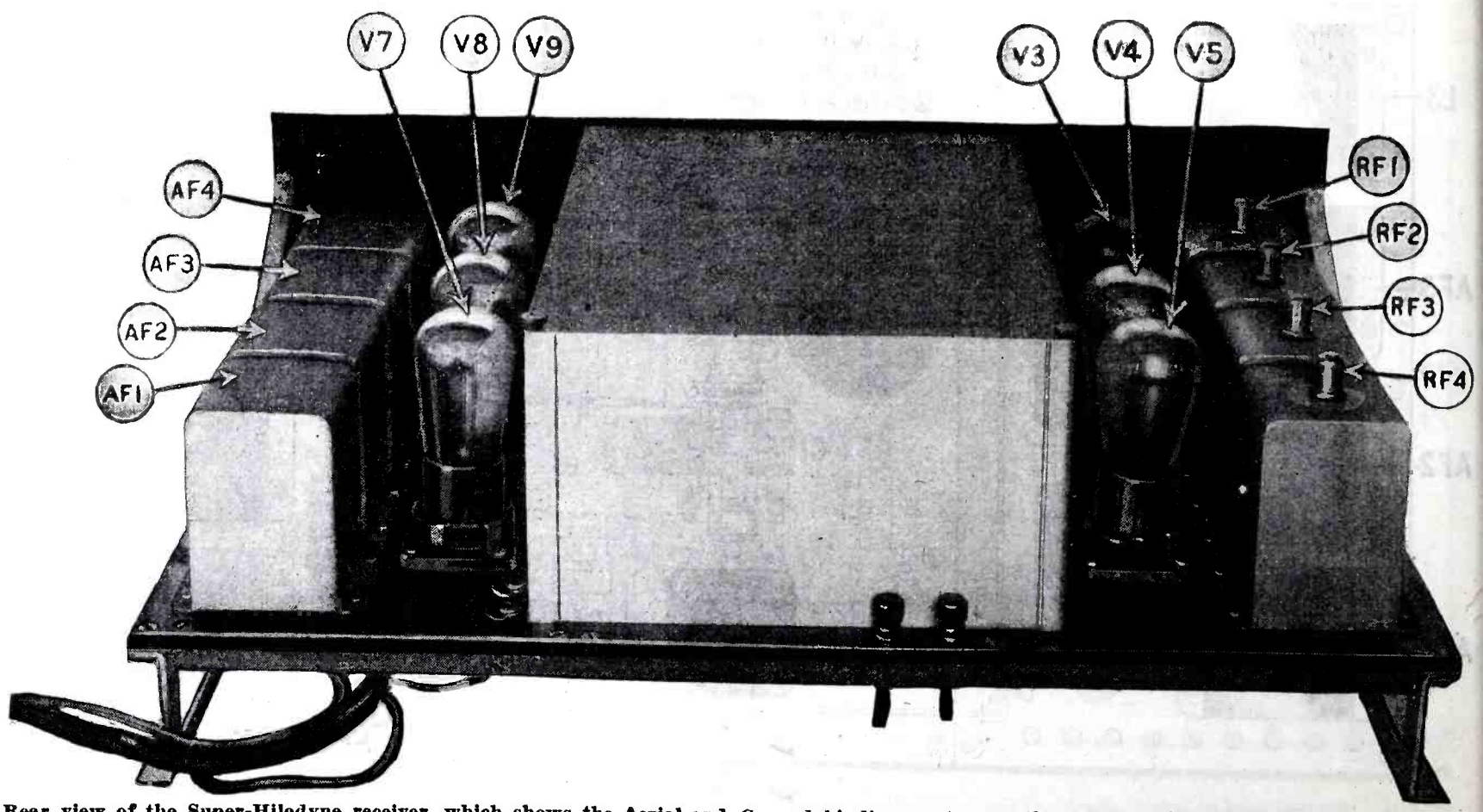
It may be well to say that for the best results, the two tubes, V1 and V2 should be balanced, both having the same characteristics although this is not critical, as the set will perform very satisfactorily even if tubes of slight difference in characteristics are used.

In the engineering and developing of the Super-Hilodyne special consideration was given to the servicing of same. It was so designed that each unit may readily be replaced without having to dismantle and completely reassemble and wire the entire receiver.

In the event that the set fails to function properly and after carefully checking and testing all external conditions, such as tubes, batteries, loud speaker and aerial and ground, and the trouble still exists, the trouble may be in one of the three units which are assembled on separate sub-panels.

If trouble is found in one of the units, the particular unit that is not functioning properly may be taken out of the set by the simple operation of removing the jumpers that connect the units. The manufacturer of the special Super-Hilodyne parts fully agrees to replace or repair defective parts free of charge.

In this way the Super-Hilodyne is easily and conveninetly serviced at a minimum of time, labor and cost.




**Rear view of the Super-Hilodyne receiver, which shows the Aerial and Ground binding posts and the place at the rear of the sub-panel from which the battery cable comes.**

# The New H.F.L. Model 28 A.C. Nine-in-Line

NO matter what sort of circuit or system is used in a radio receiver, the inevitable question of performance must be answered. To the average radio set owner, performance means, first of all, the ability to bring in distant stations. Other considerations are of course, tone quality, selectivity, volume and ease of operation, but in general sensitivity is the main requisite. The receiver described herewith covers these five points to complete satisfaction.

**LIST OF PARTS**

1 H.F.L. No. A.C. 15 filament transformer, FT.
3 H.F.L. No. H. 210 transformers, T1, T2, T4.
2 H.F.L. No. H. 215 transformers, T3, T5.
1 H.F.L. No. L. 430 radio frequency transformer, OC.
1 H.F.L. No. L. 425 radio frequency choke unit, RFF.
1 H.F.L. No. C. 16 audio transformer, T6.
1 H.F.L. No. C. 26 audio transformer, T7.
1 H.F.L. No. C. 25 output transformer, OT.
2 Remler No. 631 .0005 mfd. variable condensers, C1, C2.
2 Remler No. 110 illuminated drum dials, 1 right and 1 left.
9 Benjamin No. 9044 sub-panel sockets.
2 Benjamin No. 8629 sub-panel brackets.
2 Carter No. 110, 1 mfd. by-pass condensers, C5, C6.
2 Carter .002 mfd. fixed condensers, C7, C8.
1 Carter .0005 mfd. fixed condenser, C4.
1 Carter No. 22-200,000 ohm Hi-Pot with knob, R3.
2 Carter No. 1. 50,000 ohm Hi-Ohms with knobs, R, R2.
1 Carter No. H. 25-25 ohm fixed resistance, R4.
8 Carter No. 10 tip jacks.
1 Jones type B.M. wire multi-plug.
1 Silver-Marshall No. 340 midget condenser, C3.
1 Formica or Lignole drilled and engraved front panel, 7x26x3-16 inches.
1 Celeron, Formica drilled sub-panel, 8 x 24 x 3-16 inches.
30 feet Acme Celatsite wire.
1 Pkg. Kester rosin core solder.
Miscellaneous nuts and bolts.
Qualitone loop.
Ensco loud speaker.
Arcturus tubes A.C. 26-28-30.

Under a recent test in Chicago, Ill., the Nine-in-Line proved its ability most admirably. The set was just an ordinary one built from the regular kit of parts and no special engineering talent lavished on its construction. The point of reception was close by station WBBM, which has a rated power of 10,000 watts. This was an excellent testing point. Strange to say, there was no interference whatever from this station when other locals were tuned-in.

After determining the set's ability to receive local stations, it was tried for distant stations. WJZ was the first station encountered, and this station came in loud enough to be heard throughout the entire building.

Anyone who has heard the excellent transmission of station WJZ in New York will appreciate the statement that the low notes came through in a manner that was thoroughly pleasing. The big transmitting tubes used at this station handled bass tones in a realistic manner.

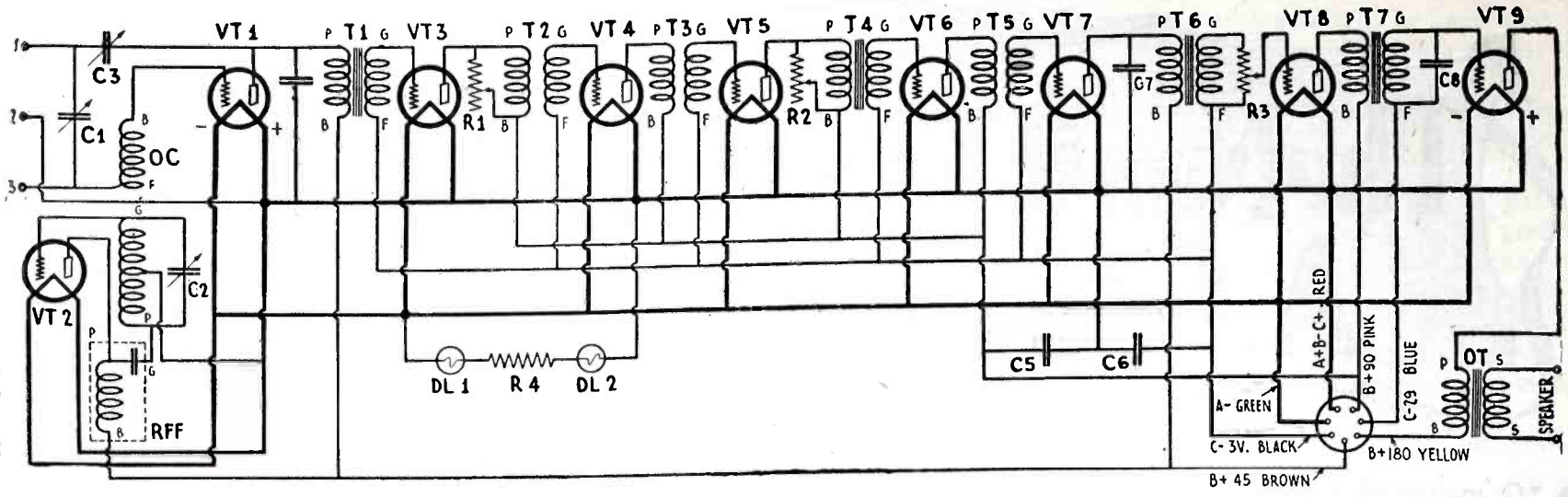
Since the primary purpose of the test was to check the sensitivity of this receiver, an hour or so was allowed and other stations were tuned in as fast as the announcements or call letters were heard. Fourteen stations were logged in one hour.

WSMB at New Orleans, and WSM at Nashville came in with great volume. Other stations received were KOA at Denver, WEAF, New York City, WHO, Des Moines, WCCO, Minneapolis, KTHS, Hot Springs, WSB in Atlanta, Ga., WLW, Cincinnati, WFHH, Clearwater, Fla., KFI, Los Angeles, Calif., KFSD, San Diego, and the hour was terminated, with the voice of KWKH, the W. K. Henderson Iron Works, station at Shreveport, La.

Now as to the receiver itself, the remarkable sensitivity is due to the intermediate amplifier which consists of four stages. The input transformer has an iron core which allows a wide band of frequencies to be amplified and the iron tends to increase the amplification. The next transformer is of the same type, but the third one is a sharply tuned one without an iron core. The fourth one is the same as the first two, while the fifth one is sharply tuned which still further increases the selectivity of the amplifier as a whole. Thus, it will be seen that the overall characteristic of the amplifier is one of high amplification and excellent selectivity.

Immediately proceeding the intermediate amplifier is the usual detector and oscillator combination. These circuits are standard in all receivers of this type. However, it might be well to mention that the oscillator unit has been designed especially for this receiver and it operates with a total absence of bothersome harmonics, being of the low-loss non-pick-up type.

The radio frequency choke which is used in conjunction with the oscillator tends to stabilize the circuit as a whole, and is invaluable in isolating the oscillator from the rest of the receiver, thereby doing




**Schematic wiring diagram of the H. F. L. model 28 Nine-in-Line. All parts are indicated to correspond with photo, picture diagram and list of parts.**

away with harmonics, distortion and fluctuation.

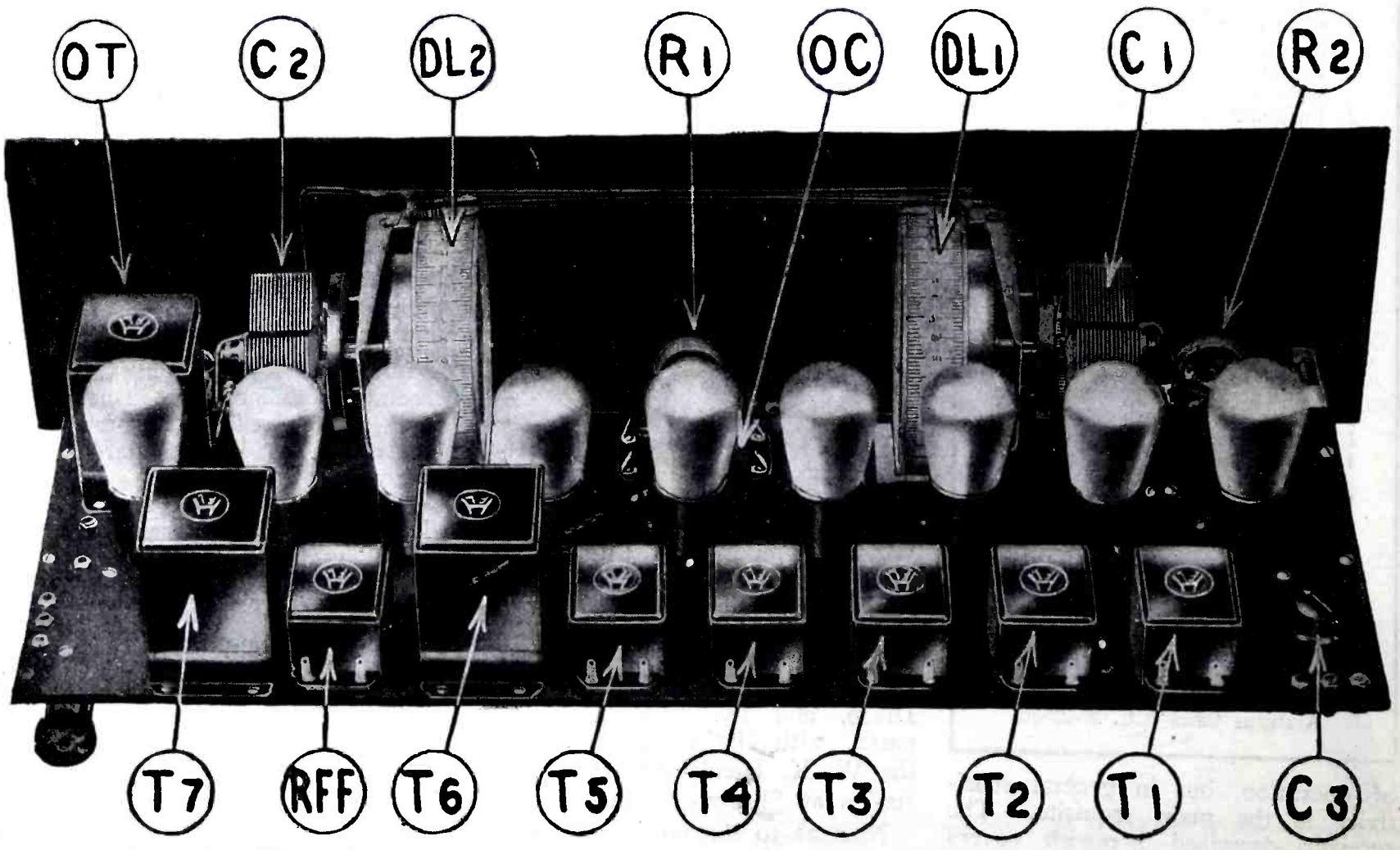
The usual regenerative detector is used and regeneration is accomplished by the small feed-back condenser C-3. This adjustment need not be used ordinarily as the receiver is extremely sensitive without it. However, for distant stations it will be of value. It need be adjusted only once on a distant station and then left in that position.

It will be noticed in the circuit diagram that all of the tubes excepting the oscillator make use of the negative grid bias. This feature greatly decreases plate current consumption, and at the same time the selectivity and tone quality of the receiver are greatly improved.

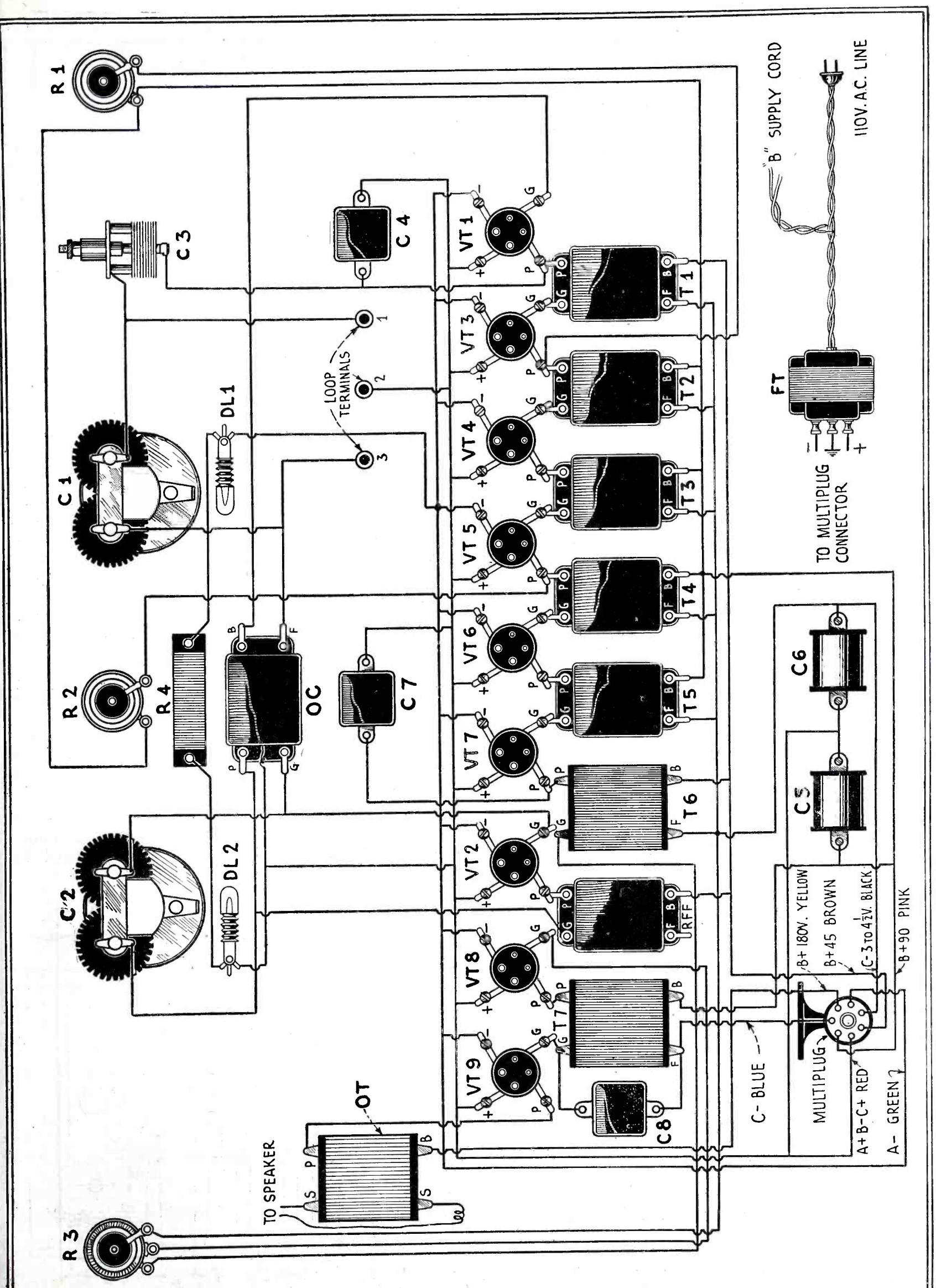
Of course, in its final analysis tone quality is to a large extent dependent upon the audio amplifier. The husky well designed audio transformers easily handle lower tones—the point at which many audio transformers develop distortion. The output transformer serves to reduce the output impedance to a value which matches approximately the average loud speaker on the market. The transformer serves further by isolating the direct plate current and passing only pure alternating current to the speaker. This saves the speaker magnets from demagnetization and allows the speaker to handle a greater load with a much better tone.

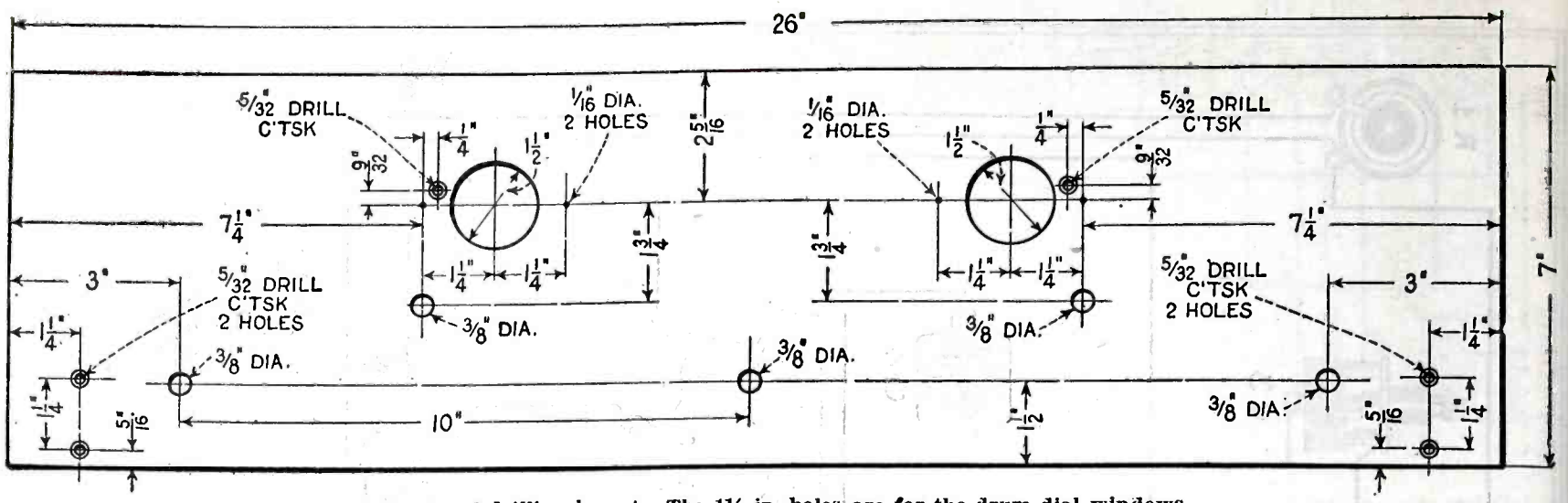
The equipment needed to operate the set consists of a plate current supply either a standard 180 volt B unit or the equivalent in B batteries. One 6 to 7½ volt C battery on the intermediates and first audio transformer, and 40 volts of C battery for the last amplifier tube. The loud speaker may be of the regular cone or expotential type. The Ensco three-foot cone speaker is especially recommended for use in conjuction with this receiver as it reproduces all tones faithfully. A standard six volt battery rated at 120 amperes will handle the filament circuit satisfactorily.

The loop antenna can be any one of the center tap jobs designed to operate with a .0005 mfd. con-




**A rear view of the receiver showing the layout of parts. Note the neat and well designed arrangement of components.**






**Front panel drilling layout. The 1½-in. holes are for the drum dial windows.**

denser. The Qualitone loop as specified is especially efficient for use in conjunction with this receiver.

The photos and diagrams explain the layout of parts and wiring better than it can be done with words. It may be well to call attention to the arrangement of the tubes. Starting at the left end of the set they progress in this order. First detector, first intermediate, second intermediate, third intermediate, fourth intermediate, second detector-oscillator, first audio and second audio.

Judging from the general assembly, layout of parts and the simplicity of wiring, this receiver has no doubt been brought up to this high standard after lengthy and careful design. It seems to have undergone a series of improvements, like the present day automobile.

The designers of this receiver have even gone further. Realizing that there is a great demand by the home set builder for a hook-up using A.C. tubes, which may be run direct from the house lighting current the A.C. Nine-in-Line has been presented as illustrated in the diagrams. While most of the parts manufacturers are debating this subject pro and con, the Nine-in-Line circuit has been adapted for A.C. tubes. No doubt a lot of home set builders will keep on building the battery operated receiver as described in previous issues of *Radio Listeners' Guide and Call Book,* while others are eagerly awaiting developments of hook-ups using A.C. operated tubes. The results obtained, however, as described in the previous part of this article, were with the new A.C. operated Nine-in-Line.

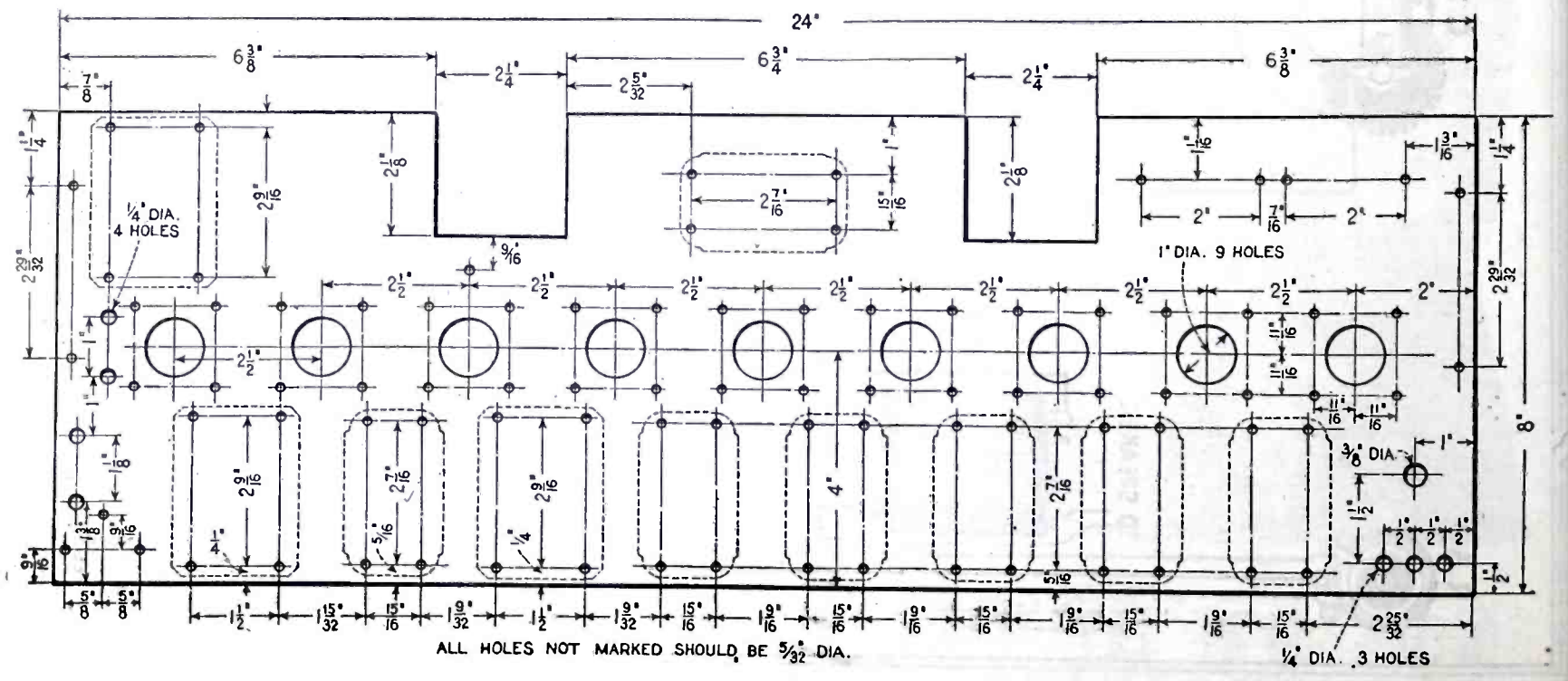
An hour of study on the diagrams will save much time when the actual construction is started. The reader will note from the specifications that Arcturus tubes are used in this set. This tube is one of the heater type and the cathode is connected inside the tube to what normally would be the positive filament prong.

For this reason, in wiring the receiver, all grid returns must eventually go to the positive filament line through their respective C batteries. This includes all by-pass condensers which would normally connect to the negative filament.

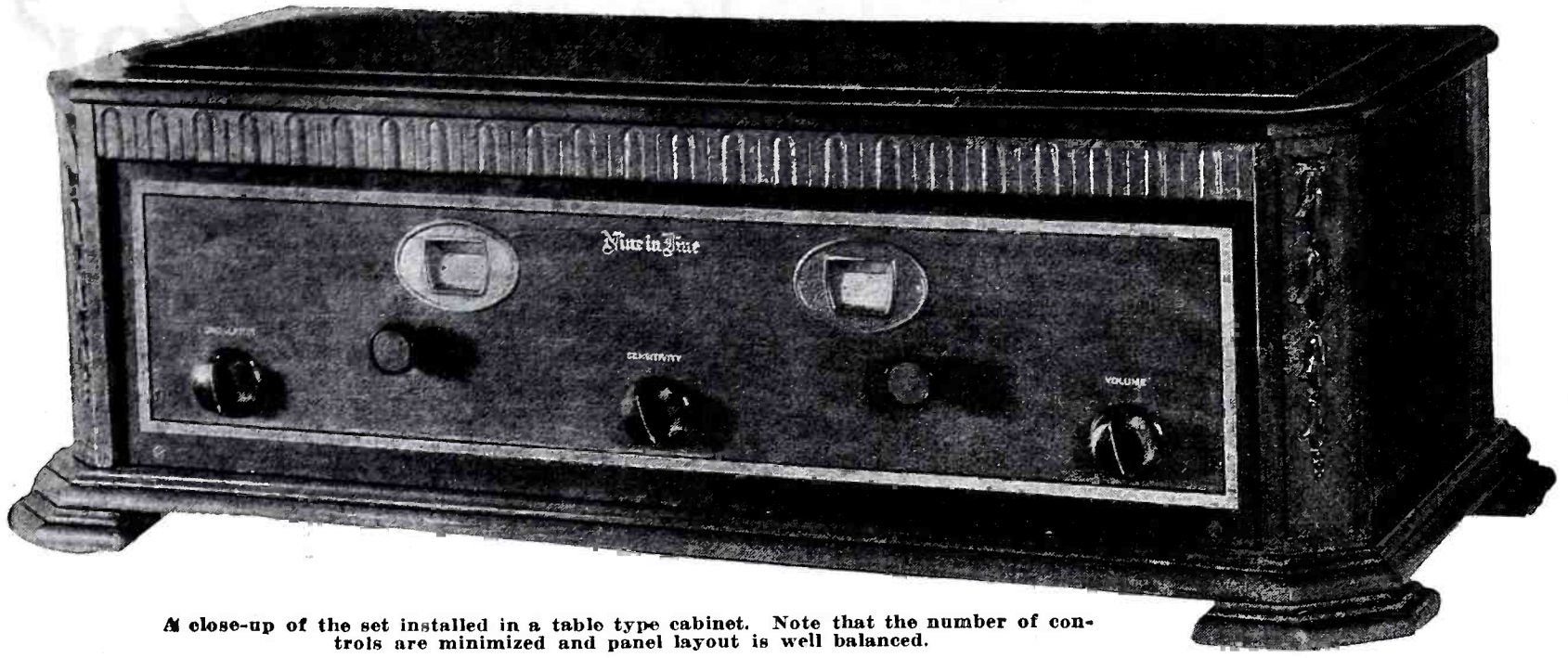
The regular Jones cable is used for connecting power to the set and in this model the C batteries connect to the cable instead of plugging in on the sub-panel. The sub-panel C battery jacks as used in the D.C. model are not used in the A.C. model.

For A.C. operation it is advisable to use a 3 to 4½ volt negative C bias on the intermediate and filter transformers and the first audio transformer and 29 to 40 volts on the last audio stage.

Two Carter Hi-Ohms are used to stabilize the radio frequency amplifier. On the battery operated set




**Drilling layout for the sub-panel of the H. F. L. Model 28 A. C. Nine-in-Line.**




**A close-up of the set installed in a table type cabinet. Note that the number of controls are minimized and panel layout is well balanced.**

as described in the last issue of this magazine this operation is accomplished through the rheostats. A Carter 25-ohm type H25 fixed resistance is used in series with the dial lights to furnish them with the proper voltage. These lights are wired in series so that if one should burn out the other would not be damaged by the increased voltage that would be thrown across it. In wiring the set the important point to be remembered is that the red lead must connect to the positive side of all tube sockets. Externally the red lead connects to one side of the filament lighting transformer (the green lead going to the other side) and the red lead also connects to the B negative and C plus terminals.

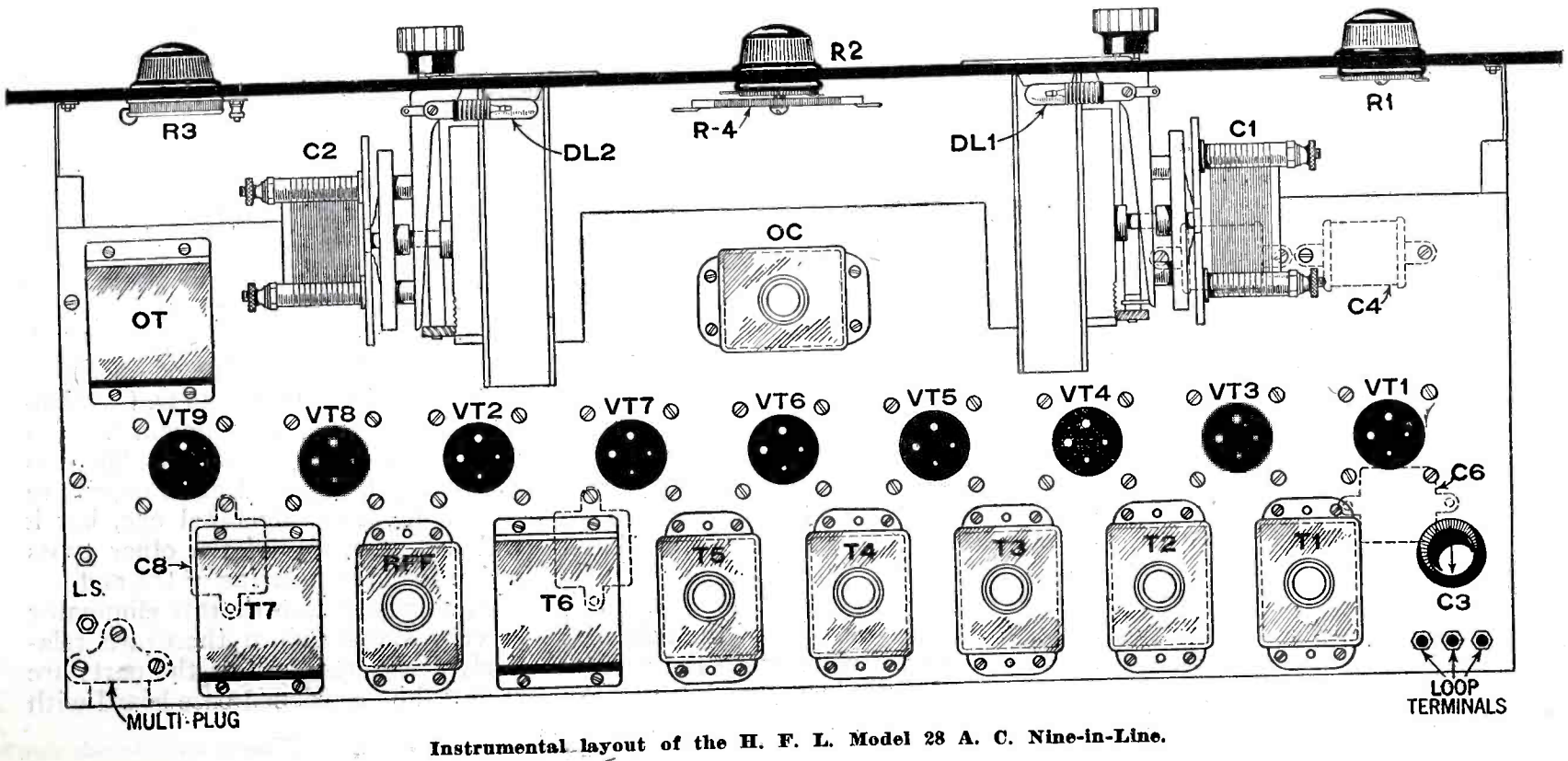
This A.C. circuit was designed especially for the Arcturus tubes. The tubes are manufactured in three forms; i.e., amplifiers, detectors and power amplifiers. This practice must be carried out in operation, the two detectors being the No. 26 type, the oscillator and five amplifiers the No. 28 type, and the power amplifier being the No. 30 type.

On test the A.C. Model Nine-in-Line delivered tremendous volume and very fine tone. The operation was, in every way, entirely satisfactory.

Attention is called to the fact that all heater type tubes take about a minute to build up enough heat for them to function properly. This is an important point to remember in testing and matching the tubes in the intermediate amplifier for best position.

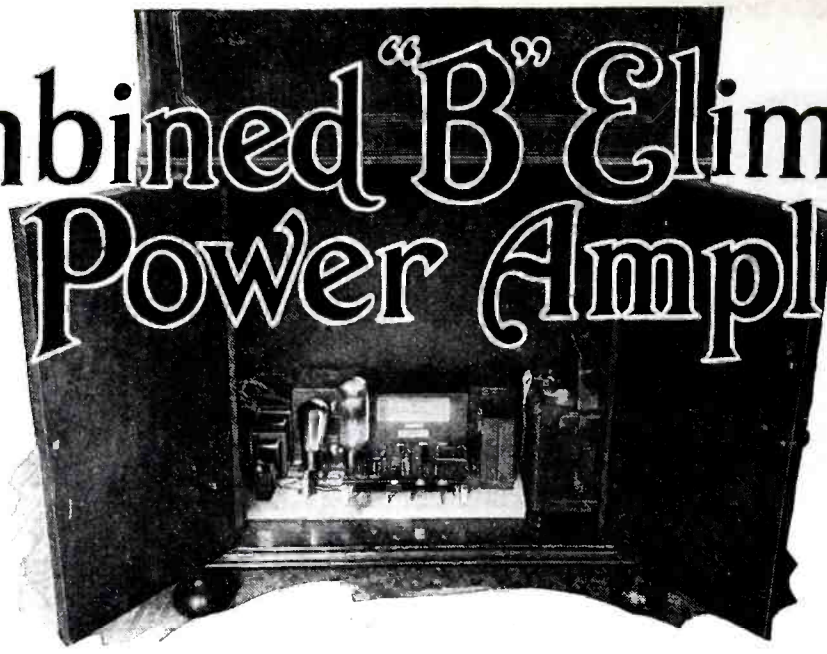
Much has been said pro and con about the Super-Heterodyne receiver. There are many who feel that a three-tube set is good enough. In radio, as in everything else, a worth while receiver requires greater effort and for that matter a greater outlay of money.

Complete constructional details and wiring of the A.C. Nine-in-Line are clearly given in the illustrations accompanying this article, and if care is exercised in following these the home or custom-set builder will find that this receiver will give astonishing results for all-around reception.




**Instrumental layout of the H. F. L. Model 28 A. C. Nine-in-Line.**

# A Combined "B" Eliminator and Power Amplifier



THE radio public is now demanding—quality of tone—absolute realism. Distance getting ability is rapidly becoming of secondary importance. Probably the average set of today possesses neither of the qualities — but even the modern receiver can be materially improved by the addition of a good power amplifier.

The type CX310 power tube has the largest handling capacity of any tube now being used. When it is used in a suitable amplifying circuit it will give excellent results for either home or large auditorium.

Many of these tubes are now being used but a great many of them have been giving poor results because improper plate and grid voltages were used. In fact, a type 310 tube operating with a 350 volt plate potential will only have an undistorted output capacity slightly greater than a 371 type tube. If, however, the plate potential is increased to 425 volts, the maximum undistorted output will be almost doubled, or 1540 milliwatts.

One may ask, "Why have such a large output capacity when only moderate volume is desired?" The answer is—it takes four times greater handling capacity to reproduce a 30 cycle note without distortion than it does to reproduce a 1,000 cycle not with the same intensity. It is easy to perceive that—in a set without a power tube—we could have undistorted reproduction of the higher notes while the lower tones would be badly distorted and the timbre and realism would be lost.

The "B" eliminator power amplifier combination to be described in this article uses a Q. R. S. high voltage, full wave rectifier tube which has a capacity of 100 mills. This is sufficient to supply both the power amplifier and any radio set. The plate voltage applied to the type 310 power tube is considerably over 425 which, as stated before, permits the tube to deliver its maximum undistorted output. The 7½ volt A.C. current for the 310 tube is supplied by a separate winding on the power transformer. The two choke coils for filtering the rectified current are housed in the same case to give a neater appearance and simplify wiring.

Since this device may also be used as a "B" eliminator, a "voltage divider" is necessary to reduce the 425 volt output to the values required by the radio receiver. This voltage control kit is very unique inasmuch as it consists of 3 wire wound resistors equipped with sliders that act as voltage taps. These sliders may be varied to give any desired "B" or "C" voltage. No regulator tube is required because the resistors are wire-wound and after the adjustment is made, the voltages will always remain fixed. The large current capacity of the tube and transformer also improves the regulation of the eliminator and keeps the voltage constant in spite of severe changes in load. The total resistance of the wire-wound strips is but 14,000 ohms—this is bridged across the entire voltage output and the sliders adjusted until the voltage is obtained that operates the set most satisfactorily. It will be found that the resistance in series with the 90 volt tap will only be about 6,000 ohms or less than one-third that of the customary type. This low resistance in series with the load will also reduce voltage fluctuation with change of load and materially improve the tone quality of a receiver.

The Input circuit to the amplifier uses a high grade audio transformer, the primary of which is connected to binding posts as indicated.

The output of the amplifier is fed through the customary condenser-choke system using a 30 henry choke coil and a 600 volt 2 MFD. condenser. This will keep the plate current of the type 310 tube out of the speaker and protect the speaker unit.

The rectifier circuit is a full wave type. By that we mean that each side of the alternating current wave is utilized. This type of rectified current is much easier to filter and there is no tendency for the eliminator to hum.

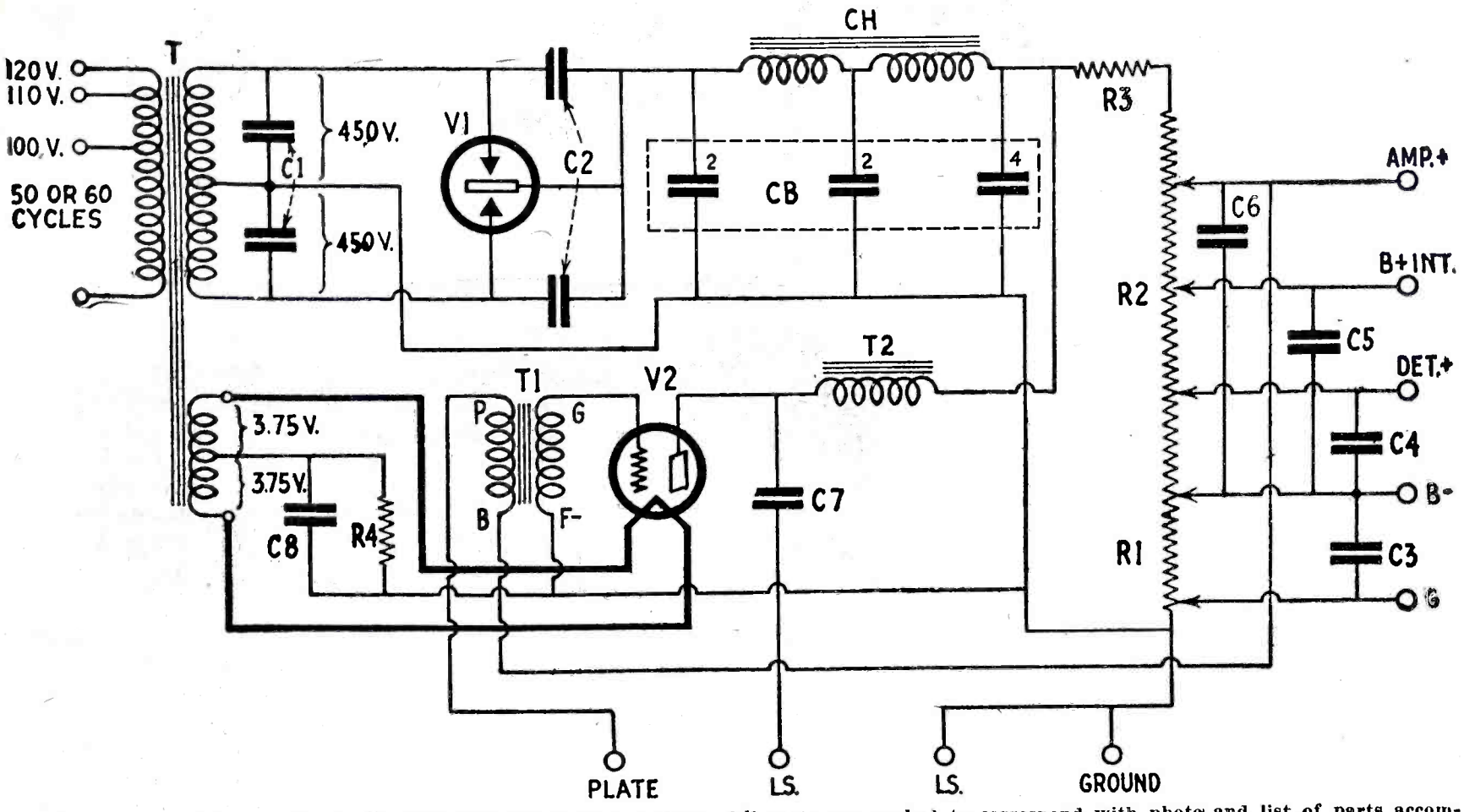
The A.C. Output of the power transformer is about 550 volts, each side of the center tap. The peak voltage of this wave is about 780, disregarding distorted wave form and surges.

In view of this it will be necessary to use high voltage condensers with a great deal of insulation between adjacent layers of tin foil. The three condensers in this filter block (2-2-4 Mfd.) are capable of operating continuously at 1000 volts D. C., without any danger of breakdown. A condenser having this much insulation is necessarily larger and more expensive than a more closely rated one, but it will outlast many of the other types and prove to be a saving in the end.

The construction of this eliminator is very simple. since there are relatively few parts. All of the parts are mounted on a wooden base board with

### LIST OF PARTS

1 Thordarson T2098 transformer, T
1 Thordarson T2099 double choke, CH
1 Thordarson R200 audio transformer, T1
1 Thordarson R196 loud speaker choke, T2
1 Carter T-1000 condenser block, 2-2-4 mfd., CB
2 Carter 1110 buffer condensers, 0.1-0.1 mfd., C1, C2
4 Carter 410 filter condensers, 1.0 mfd., C3, C4, C5, C6
1 Carter 1020 filter condenser, 2.0 mfd., C7
1 Carter filter condenser, 0.1 mfd., C8
1 Carter 2313 voltage control kit, R1, R2
1 Carter P-3800-60 multiplier, R3
1 Durham resistor mounting
1 Durham resistor, 1500 ohms, R4
9 X-L binding posts
2 Benjamin No. 9040 cushion tube sockets
1 Wood baseboard, 12x20 inches
1 Pkg. Corwico Braidite hook-up wire
1 Pkg. Kester radio solder
Brass angles, wood screws, etc.
1 Q.R.S. 100MA rectifying tube, V1
1 CX 310 power tube, V2




**Wiring diagram of the combined "B" eliminator and power amplifier. All parts are marked to correspond with photo and list of parts accompanying this article.**

wood screws as shown in the accompanying photo. The bakelite terminal strip for the binding posts may be supported from the baseboard by a few metal washers.

The large condenser block is mounted on the rear of the baseboard with transformer, T at the left and double choke, CH at the extreme right. Directly in front of the choke coil unit the two buffer condensers, C1 and C2 are mounted.

The variable resistance units are bolted together with hexigon nuts for

(*Continued on page* 191)

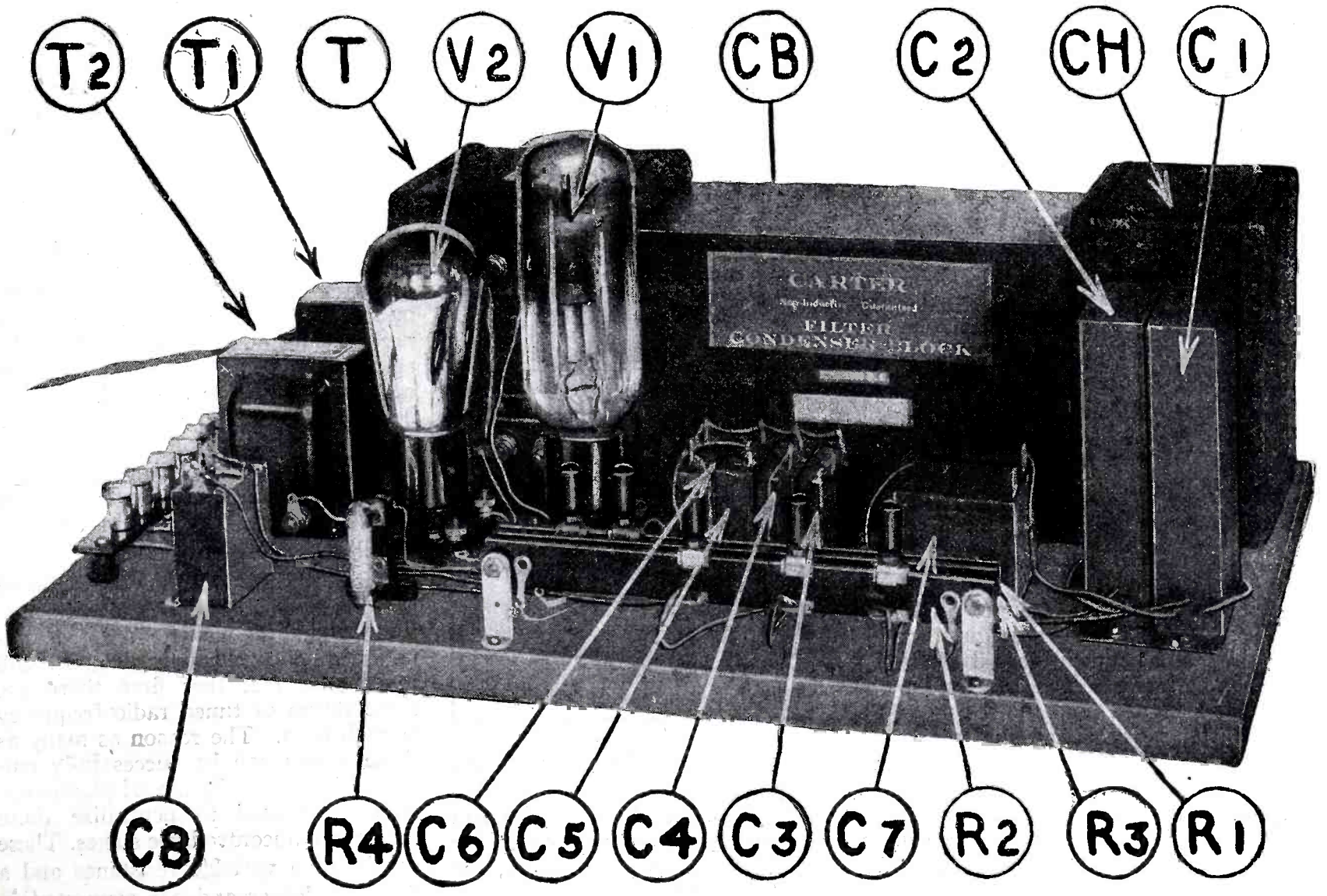



**Photo showing the assembly of parts on the baseboard. The transformer, block condenser, CB, and double choke, CH are mounted on the rear while the other parts are arranged as shown.**

# The Continental Six Receiver

HAVE you stopped to consider about the radio receivers that were introduced this season? Do you realize that comparatively few of them were said to have new circuits or in fact anything revoltionary at all? In case you have not given this subject much thought such is indeed the case. However, the engineers and the manufacturers wanted to give the radio public something new—for that is what the followers of radio are always panting for—and so more and more receivers were designed to operate from the house lighting circuits.

This was all well and good for the vast majority of people who were fortunate enough to have their homes lighted by alternating current but there are a great number who immediately set up a wail saying, "What are we to do? We have 110 volts D.C." or in some cases 220 volts D.C. Seemingly these folks were "out of luck." However the old proverb, "While there's life there's hope" might be changed to "While there are engineers there's hope." For these gentlemen of the laboratory at once heeded the cry of those possessors of direct current and designed a socket power unit for them.

Then came along another fly that fell into the ointment. The receivers that were designed to operate from A.C. refused to function on D.C. Someone recommended to a friend to get the socket operated "Super-something-or-other" and the first question would be "What current does it use?" thus spoiling many a good sale for the dealers and a good time for the prospective listener if he had the wrong kind of current.

However all these troubles at last had Finis written after their telling. A six-tube receiver has been designed so that in addition to its battery operation feature, it can also be operated from 110-volt A.C. or D.C. or 220 volts D.C. with a suitable battery eliminator unit. No matter what type of current is in your home this set with a few minor adjustments to the power unit wil loperate from the nearest light socket you plug it into. There are no changes in the set proper for any of the three types of power, the changes being in the power units.

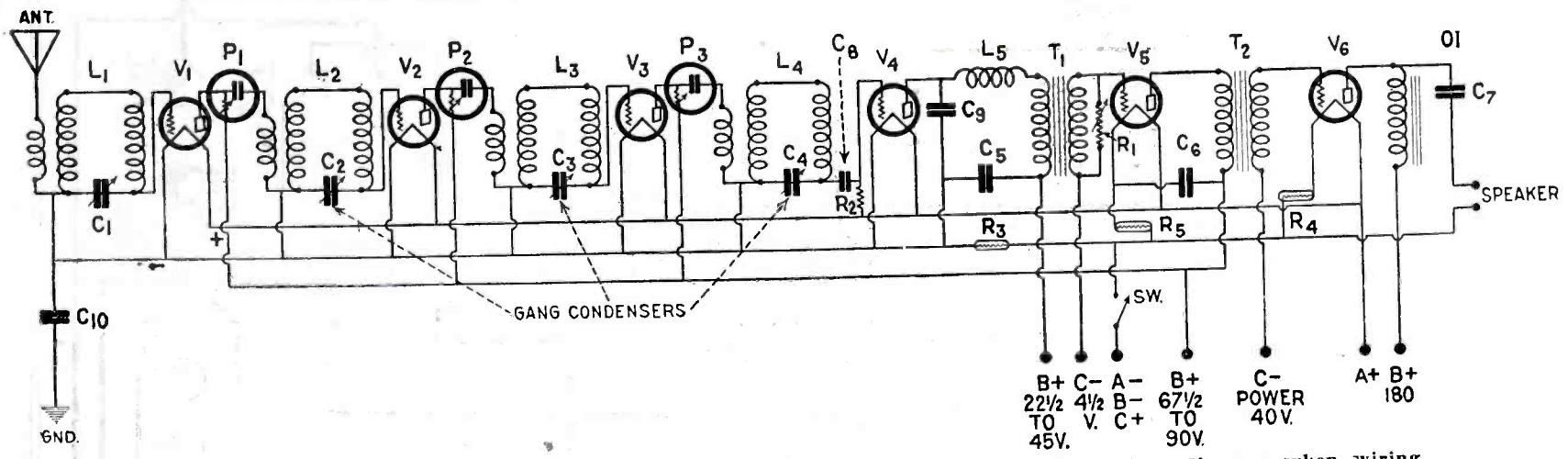
**LIST OF PARTS**

1 Set Precision type 4B radio frequency transformers, L1, L2, L3, L4
4 Hammarlund Midline condensers, .000275 mfd., C1, C2, C3, C4
6 Eby sockets
2 Samson symphonic audio frequency transformers, T1, T2
1 Samson output impedance, O.P.
1 Tyrman double vernier drum dial
3 Electrad phasatrols, P1, P2, P3
1 Electrad tonatrol, R1
1 Durham single mount
1 Durham 2 meg. registor, R2
1 Precision radio frequency choke, L5
3 Tobe 1 mfd. fixed condensers, series A, C5, C6, C7
2 Carter fixed condensers, .00025 mfd., C8, C9
1 Carter fixed condenser, .002 mfd., C10
1 Amperite type 4A, R3
1 Amperite type 112, R4
1 Amperite type 1A, R5
2 Carter tip jacks
1 Pair Tait brackets
1 Length, ¼" Hammarlund brass shaft
9 Eby binding posts as follows: Ant; Gnd; 67 volts plus; C minus power; B plus power; 45 volts plus; 4 volts C minus; A bat plus; A bat minus
1 Formica front panel, 8x26x3/16 inches
1 Formica sub-panel, 9 x 26 x 3/16 inches
1 Pkg. Kester radio solder
1 Pkg. Corwico flexibus hook-up wire

When you inspect the schematic diagram of the receiver you will find nothing new, so do not look for it. But you will find a tuned radio-frequency receiver that is a good one, whether you are a DX hound or a striver for quality. This circuit is one that is difficult to beat for all-around performance and added to this fact is the one that it can be operated from *any* type of house lighting current that is found in the ordinary city and vicinity.

A word or two about costs might not be amiss, for that is in most cases a controlling factor in the choice of a receiver. If you were to go into the market today and purchase an electrically operated receiver you would pay in the neighborhood of $300 or $400. It is unwise to place a figure on a receiver for in most cases the constructor has some parts he can use or knows where he can pick them up under the list price. But the power units being new are something else again. For approximately $75 the necessary parts for the A.C. unit can be had; $48 or so will get you the parts for the 110-volt D.C. unit and if you have 220 volts D.C. in your home the outlay will be somewhere around $53. Taken all in all "It's cheap at half the price."

After all this about how good the set is it might be a good idea to tell something about its makeup. An examination of the schematic diagram will reveal the fact that first there are three stages of tuned radio-frequency amplification. The reason as many as three stages can be successfully employed is due to the use of phasatrols, which are used to neutralize these heretofore uncontrollable stages. These consist of a variable resistance and a fixed condenser and are connected in




**Schematic diagram of the set. The constructor can follow either the above or the picture diagram when wiring.**

series with the plate of the tube and the primary of the radio-frequency transformer and are indicated by P1, P2 and P3 in the diagram. They are simple to adjust and after the initial adjustment are let alone.

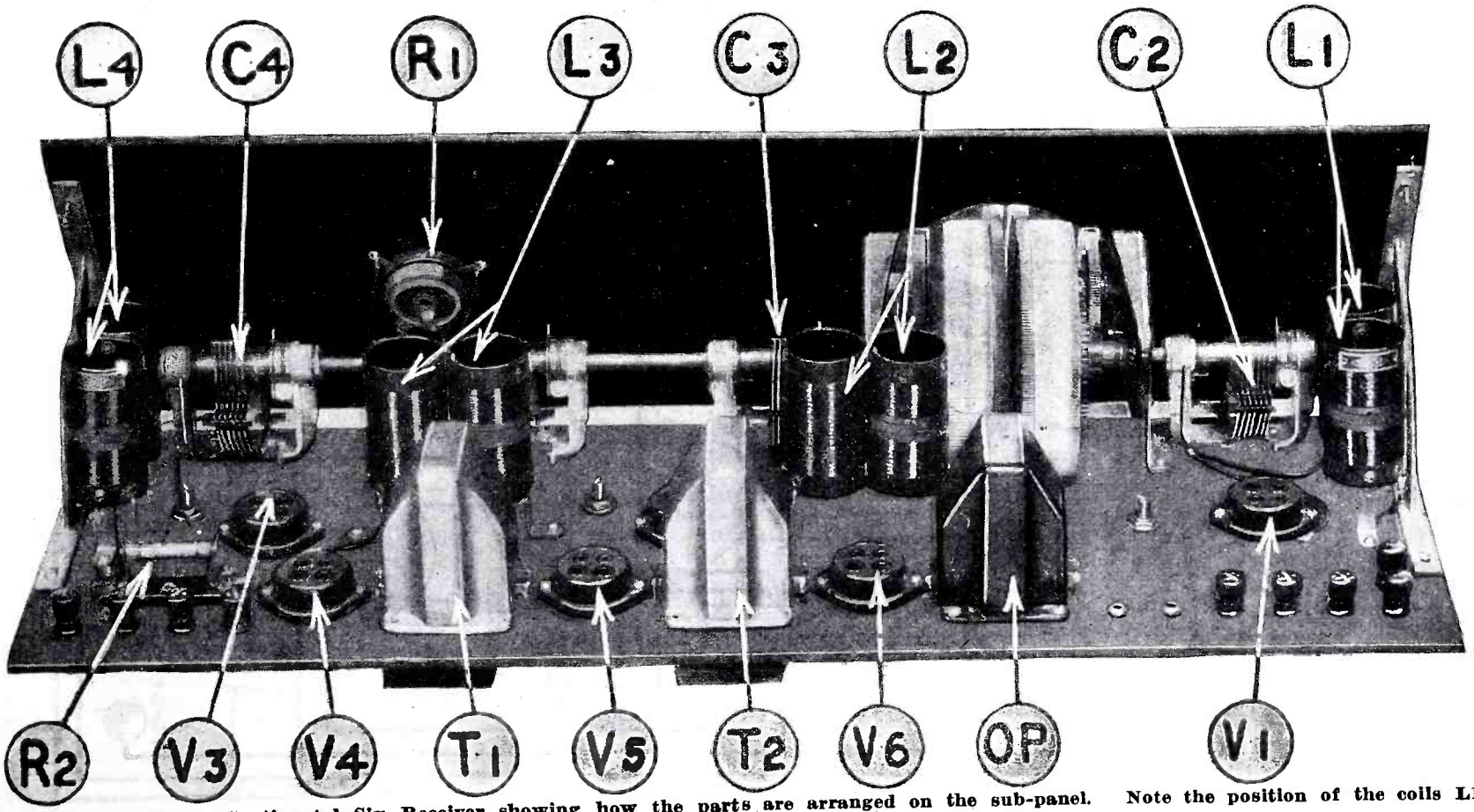
These three stages of R.F. amplification, which supply an unusual gain, are tuned by .000275 mf. variable condensers, C1, C2, C3 and C4. An additional tuned coil in the antenna circuit feeds into the grid of the first tube.

The detector is non-regenerative, since there was nothing to gain by having it otherwise. Following the detector we have a two-stage audio-frequency amplifier with transformer coupling, contributing high quality amplification and at the same time an audio-frequency gain that will provide ample volume for all home requirements. While on the subject of the A.F. amplifier it might be well to call attention to the 1-mf. fixed condensers. These were introduced in order to eliminate some of the foreign noises that might occur in any set which has not the B plus leads bypassed. The set is also equipped with an output impedance, OI thus permitting the use of 180 volts on the plate of the power amplifier tube without fear of damage being done to the loud speaker windings.

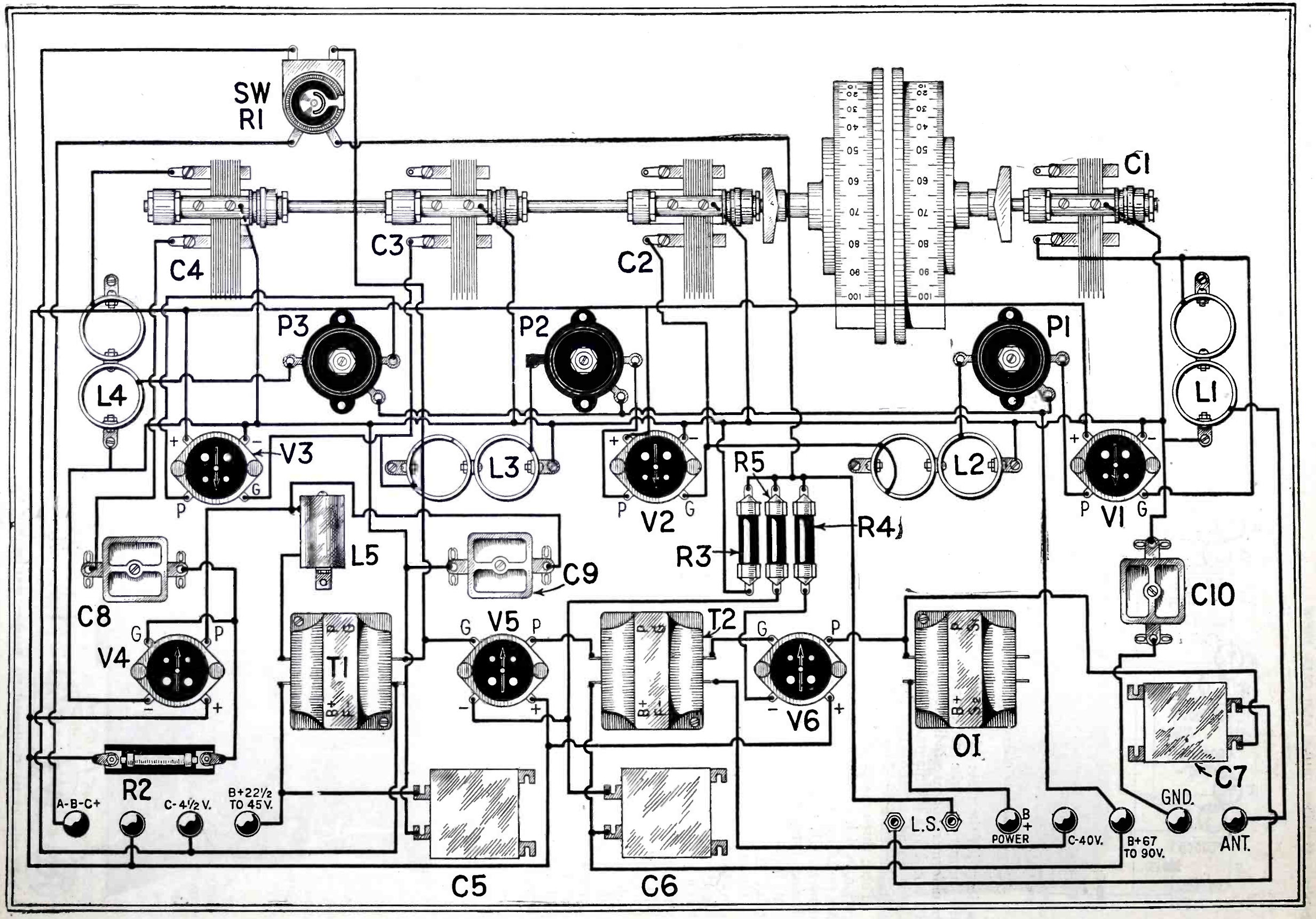
The work of constructing the set may be divided conveniently into three parts, i.e., the panel, the sub-panel and the under side of the sub-panel. As may be seen from the illustrations and the wiring diagram the work on the panel is really extremely simple, that is. of course, that the rest of the assembly is put together in the correct manner. The only parts that are mounted on the front panel are the drum condenser controls and the volume control R1, with which is combined the battery switch, and which is at the right of the drum dials.

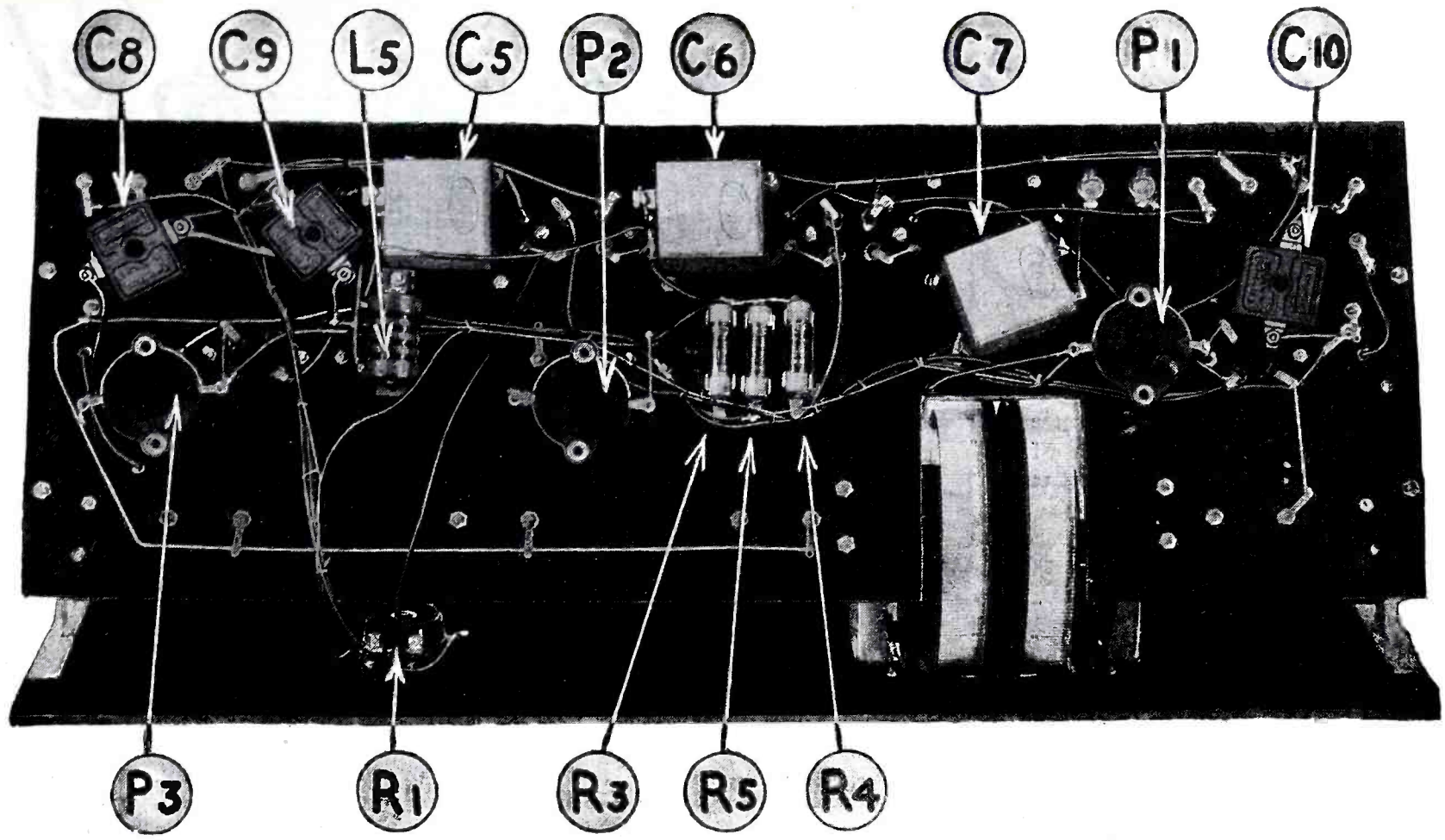
To make it as easy and simple for the constructor as possible it is suggested that the small parts that are mounted beneath the sub-panel be put in place before the heavier apparatus is fastened to the upper side. The exact location of these small parts can be had from the diagram and illustrations; care should be taken to see that they are in their correct relative positions. The apparatus that is mounted beneath the sub-panel is as follows: the three 1-mf. condensers C5, C6 and C7; two .00025 mf. condensers, C8 and C9; the .002 mf. condenser in the antenna circuit, C10; the three phasatrols, P1, P2 and P3; the three amperites and the radio-frequency choke coil, L5. The two tip jacks for the loud speaker connections are mounted in the sub-panel at the output side of the output impedance, OI.

If the set is operated from a D.C. line instead of batteries the .002 mf. fixed condenser C10 in the ground lead plays an important role. One side of the D.C. lighting circuit is grounded and if some provision like




**A back view of the Continental Six Receiver showing how the parts are arranged on the sub-panel. Note the position of the coils L1, L2, L3 and L4.**






**A bottom view of the receiver showing parts mounted beneath the sub-panel.**

this condenser is not made, the chances are that you will have to make a journey to your radio dealer and provide yourself with a new set of tubes, for filaments do not last long when plate voltage is applied to them, which would be what would happen in this case. Adding this simple condenser is a simple and cheap precaution against trouble.

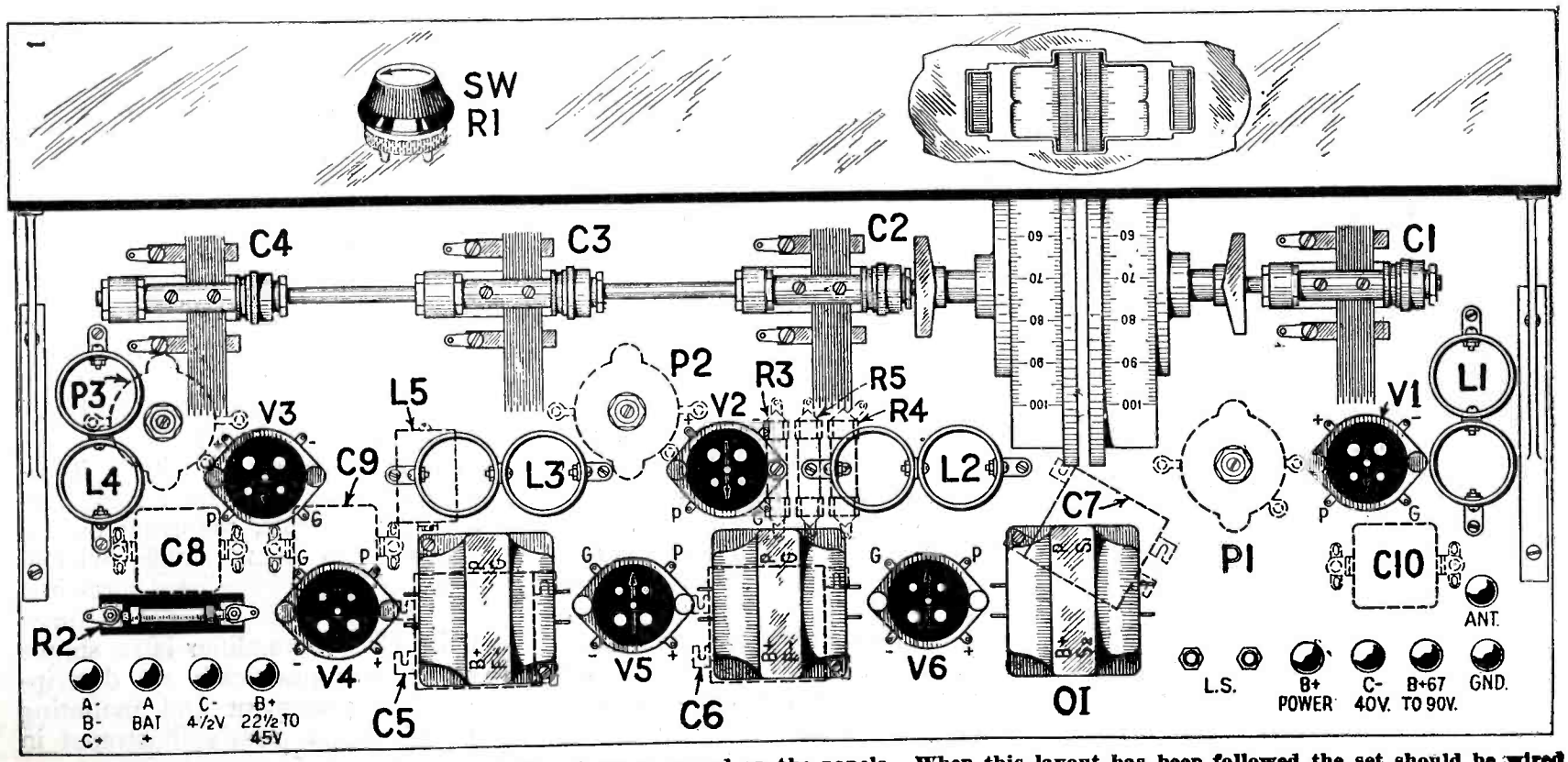
In mounting the phasatrols the portion of the instrument with the three connection terminals is mounted below the sub-panel, while the threaded portion which encloses the screw adjustment is brought up through a hole in the sub-panel so that the screw can be accessable from the top. These three neutralizing units are held firmly in position by means of nuts which fit over the threaded portion projecting above the surface of the sub-panel.

The three amperites which replace the old type of manually-operated filament controls, are mounted on the under surface of the sub-panel near the center in their clip holders. From inspection of the schematic diagram it is seen that the 4A type controls the filaments of the three radio-frequency amplifier tubes as well as the detector. The 1A and the 112 type automatically adjust the filaments of the first and second audio-frequency tubes respectively.

By reference to the illustrations it is seen that a portion of the sub-panel must be cut away to allow for the drum dials. This should of course, be done before any apparatus is mounted on the sub-panel.

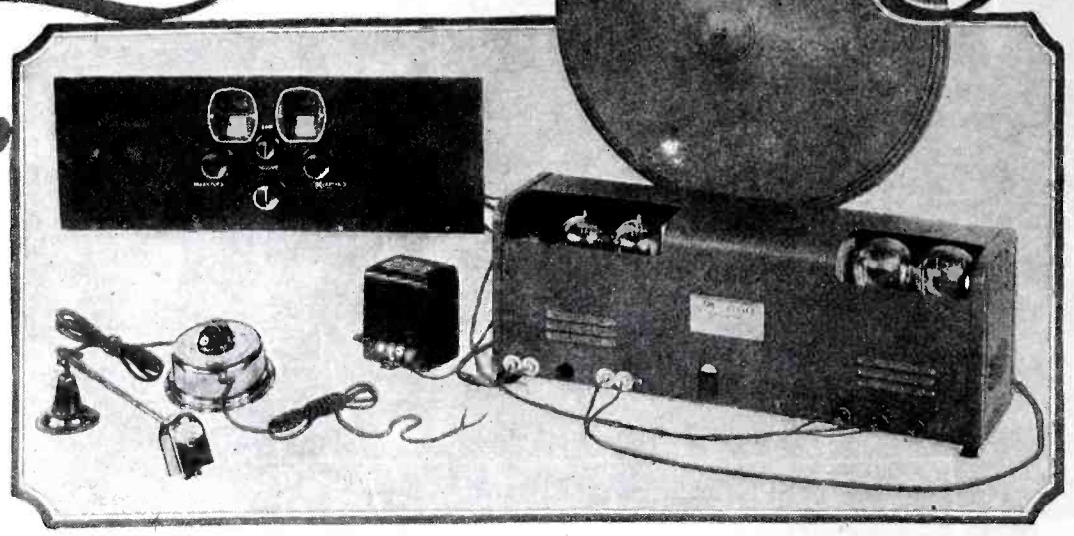
The manner in which the apparatus is mounted and their respective positions may be seen in the various illustrations. The most exhausting work here is the correct mounting and ganging of the four variable condensers,

(*Continued on page* 173)




**The above illustration shows how all parts of the set are arranged on the panels. When this layout has been followed the set should be wired according to either the picture or schematic diagram accompanying this article.**

# A Two-Tube Socket-Power Set



IN the following article is described a very unusual combination of a two-tube socket-powered radio set covering all wavelengths from 18 to 3,000 meters with sensitivity and selectivity sufficient to provide adequate volume over ranges of 500 to 1,500 miles under favorable reception conditions, and a socket-powered Unipac audio amplifier capable of developing sufficient undistorted volume for a small theatre, dance hall, or auditorium, operating from either the two-tube tuner set, or only standard magnetic phonograph record pick-up. The combination Unipac amplifier and two-tube socket-power set is especially recommended for the remarkable quality of its reproduction, and the flexibility which it allows in the matters of wavelength, and radio or phonograph use.

The combination is illustrated in the photographs accompanying the article. The tuner is mounted upon a 7 x 18 inch metal or Formica panel and wood base board. It consists of the old standby circuit of one stage of tuned radio frequency amplification and a regenerative detector, which gives very high sensitivity, extremely easy tuning, and high selectivity. Two vernier drum dials control the two .00035 mfd. tuning condensers, while between these controls are the small regeneration control condensers of .000075 mfd., and the volume control which varies the plate voltage of the radio frequency amplifier tube. While UY227 or equivalent A.C. tubes are used in this socket-powered tuner, it is quite feasible to use one of the new UX-222 shielded grid R.F. amplifier tubes together with a regular A.C. or 200A five volt detector tube. Of course, a suitable A battery would then have to be used, at least for the UX-222 tube (and for the detector if not a UY227 tube), the B power would be obtained from the Unipac amplifier in either case. With the socket-powered tuner here illustrated B power (and C automatically) is obtained from the Unipac amplifier, and A power from a filament lighting transformer. (If the larger 680 Unipac amplifier case is used, the filament transformer may be housed in it with the amplifier.) Of course, this two tube tuner is suited not only to use with any two stage amplifier at all, but for headphone reception as well, or it could easily have an extra audio stage incorporated in it so as to operate with any of the popular one stage power amplifiers.

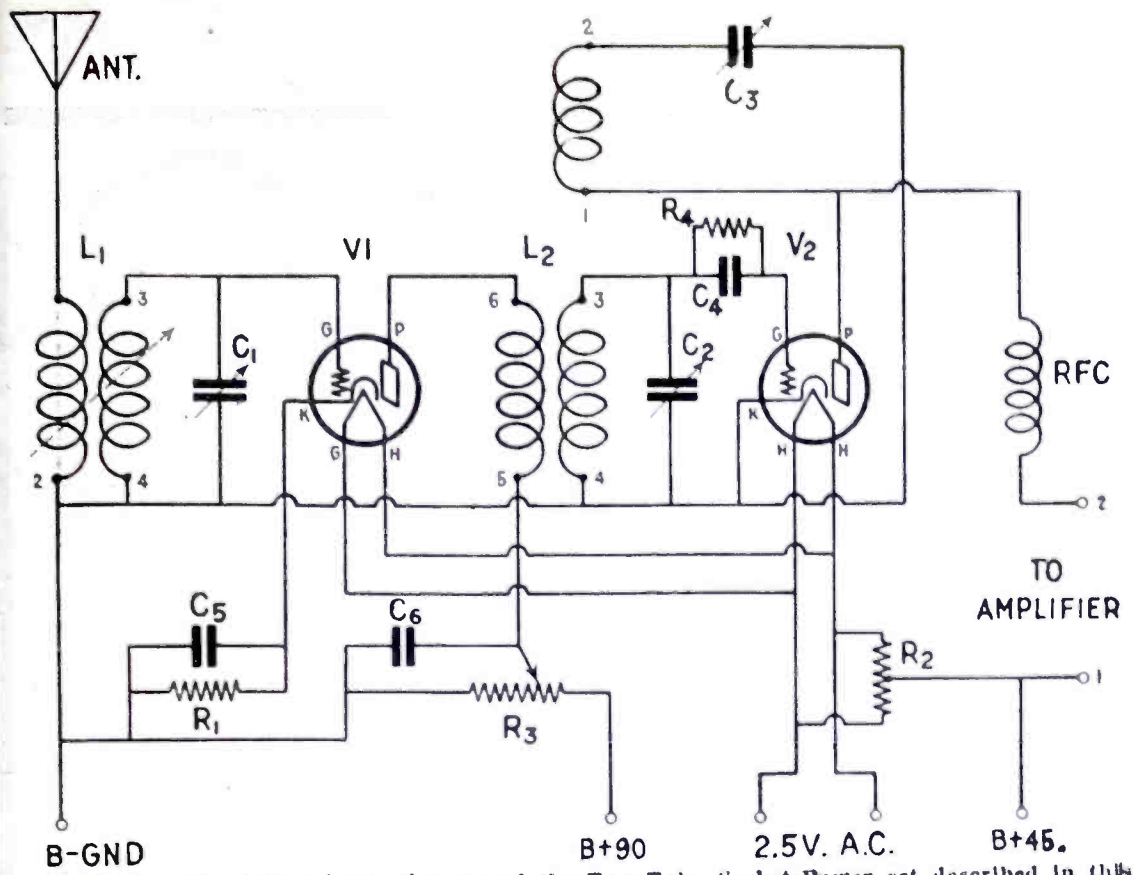
**PARTS FOR SET**

2 Silver-Marshall 320 variable condensers, C1, C2.
2 Silver-Marshall 805 drum dials.
1 Silver-Marshall 111A antenna coil, L1.
1 Silver-Marshall 114A RF transformer, L2.
2 Silver-Marshall 515 coil sockets.
2 Silver-Marshall 512 tube sockets, V1, V2.
1 Silver-Marshall 275 RF choke, RFC.
1 Silver-Marshall 342 midget condenser C3.
1 Polymet .00015 mfd. grid condenser with clips, C4
1 Durham grid leak, 2 meg., R4
2 Polymet .002 mfd. condensers, C5, C6.
1 Yaxley 1500 ohm resistor, R1.
1 Frost FT64 resistor, R2
1 Frost 500 ohm potentiometer, R4.
6 X-L binding posts or Fahenstock clips,
1 Van Doorn metal Panel.
25 feet Corwico Flexibus hook-up wire.
18 x 17 x ½" wood baseboard with hdwe., such as wire, lugs, screws, etc.
1 Package Kester radio solder.

The Unipac power amplifier is a two stage, push-pull light socket powered amplifier which could well be used with any radio set at all or as a phonograph amplifier. It contains a first audio stage consisting of one of the popular S-M 240 audio transformers and a UX226 A.C. amplifier tube which feeds into a push-pull output stage through an S-M 245 input transformer and a 246 output transformer, with a pair of UX-210 tubes used in this stage. All A, B, and C power is optional from a power supply consisting of a full-wave power transformer feeding 550 volts to the plates of the UX281 rectifier tubes, 7.5 volts to their filaments, and to the UX210 filaments, and 1.5 volts to the UX226 tube filament. A total of abort 460 to 500 volts is delivered at about 104 milliamperes, 44 milliamperes going to the two push-pull amplifier tubes, and 60 milliamperes to the voltage dividing resistors. Of this 60 milliamperes, up to 10 milliamperes is available at 45 volts, and up to 45 milliamperes is available at 90 volts for operation of any radio receiver. No voltage regulator tube is used as the combination has been found to work entirely satisfactorily without it in the case of this particular amplifier, Of the 460 to 500 volts available, this automatically divides up to give about the proper values of B and C potential to the UX210 or CX310 tubes. The Unipac is shown with and without case—if it is to be operated for periods of more than an hour at a time, it is well to leave the case off to insure good ventilation. (If the larger Unipac case is procured, this is not necessary, and, incidentally, a glow tube can be included as well as the filament lighting transformer, while the S-M 220, 230 and 231 large transformers can be substituted for 240, 245 and 246 small types if desired.)

The construction of both Two-Tube Socket-Power Tuner and Unipac is quite simple, requiring only a few tools and some simple wiring. The parts needed are listed herewith:

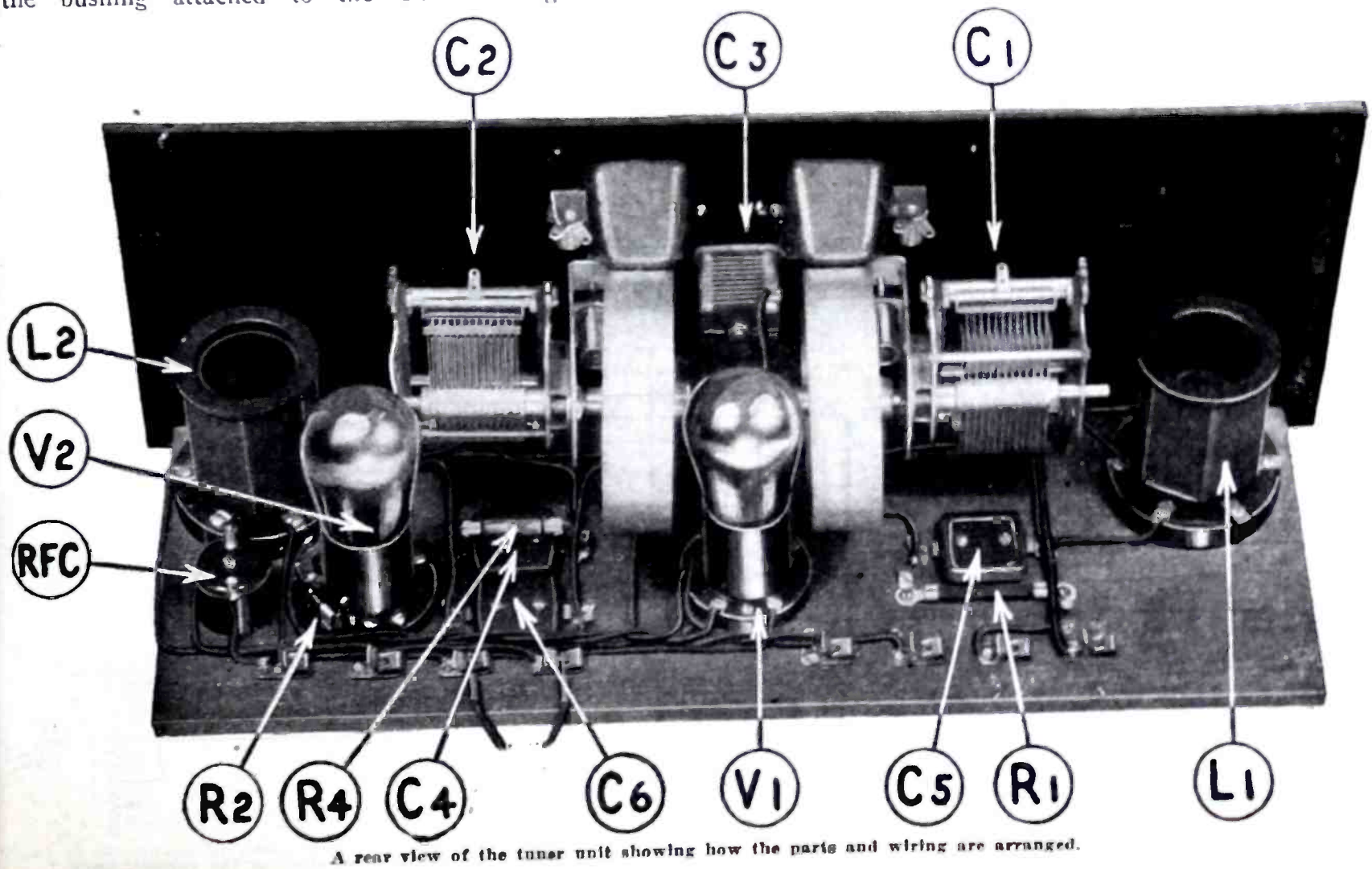
The assembly of both the tuner and the Unipac amplifier is so simple as to require practically no description. The placement and mounting of all parts are clearly illustrated in



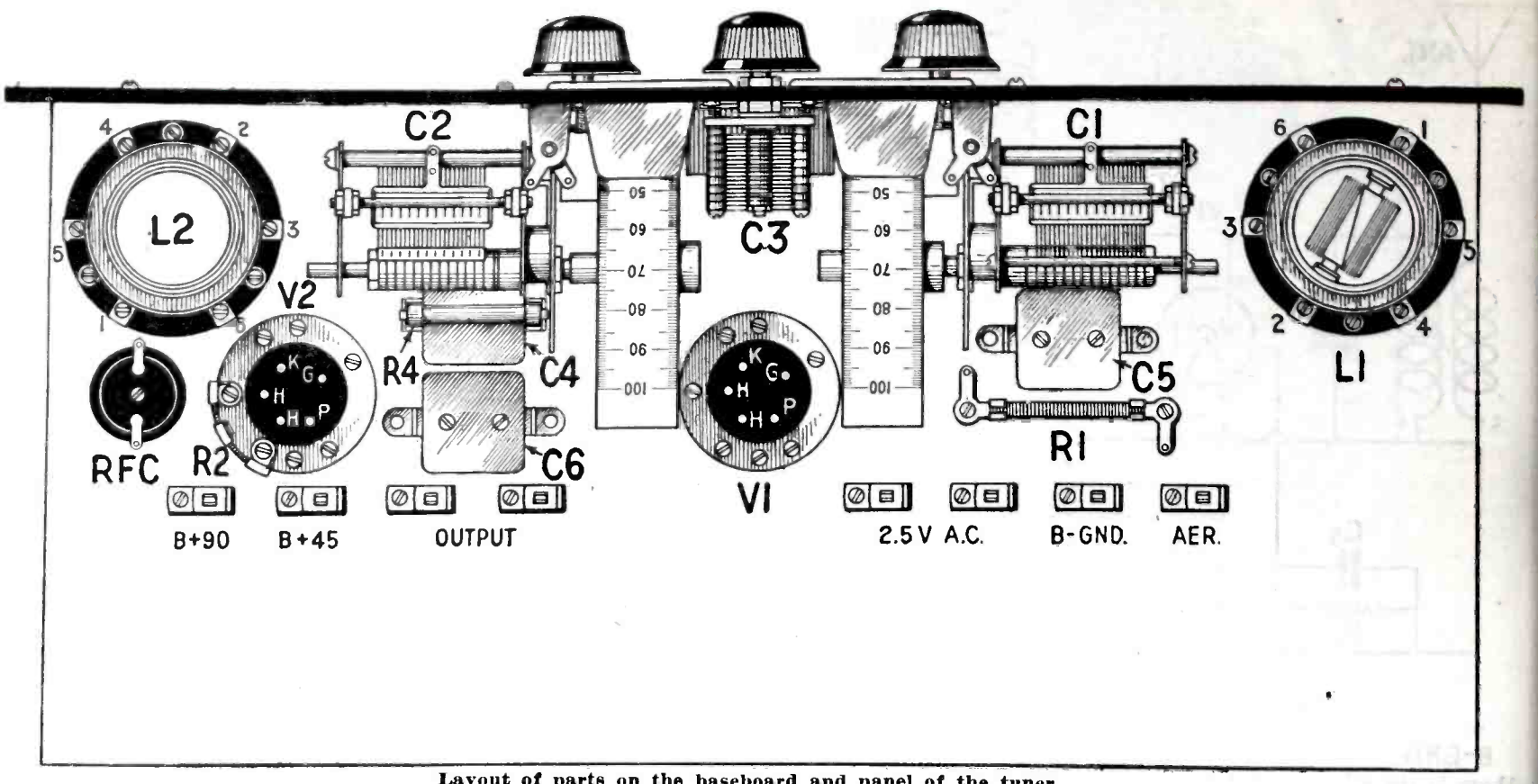

Above is the schematic wiring diagram of the Two-Tube Socket-Power set described in this article.

the photographs and pictorial diagrams. In the tuner, the two variable condensers are mounted upon the drum dial brackets using the small adapting washers accompanying the dials which accommodate the over-sized hole in the brackets to the single hole mounting nut of the condensers. The drums are fastened on the condenser shafts with their edges inserted in the slots in the small drive mechanism carried in the bushing attached to the dial bracket. The brackets are fastened to the front panel by means of two screws with the drive shafts projecting through the front for knob attachment. In mounting the potentiometer, the frame should be carefully insulated from the panel, though one foot of the potentiometer, as can be seen from the diagram, is connected to the "B—" circuit which, of course, grounds to the panel. The midget regeneration condenser shaft bushing should make good contact with the panel. With these parts mounted on the panel and the latter screwed to the wooden baseboard, the various parts to go on the baseboard should be placed as seen in the photographs and drawings and screwed down. All wiring is done with Corwico Flexibus hook-up wire, cut to length, and wire ends soldered or fastened under terminal screws where provided. The small FT64 resistor in the receiver is mounted on the "F" terminals of the detector socket, its center tap connecting to "B+45." If a shielded grid RF amplifier tube is used in the receiver, it is well to employ a UX200A detector. In this case, the 5,000 ohm volume potentiometer is omitted and lead No. 5 of the detector coil socket connected directly to a binding post or connection clip which should be marked for the proper voltage—either "B+90," or, preferably, "B+-1..5." The regular "G" post of the shielded grid tube socket should be connected to the "+45" binding post of the receiver; while the grid lead to this tube from terminal No. 3 of the antenna coil socket and the left-hand variable condenser stator lug runs to the cap on the top of the tube.

In connecting the filament circuit for this tube, the "+" post should be connected to the "+" post of the detector socket and thence to one end of a 6 ohm rheostaat mounted upon, and insulated from, the front panel in the Volume hole. The other end of this rheostat goes to the "A+" binding post. The "—" post




A rear view of the tuner unit showing how the parts and wiring are arranged.




**Layout of parts on the baseboard and panel of the tuner.**

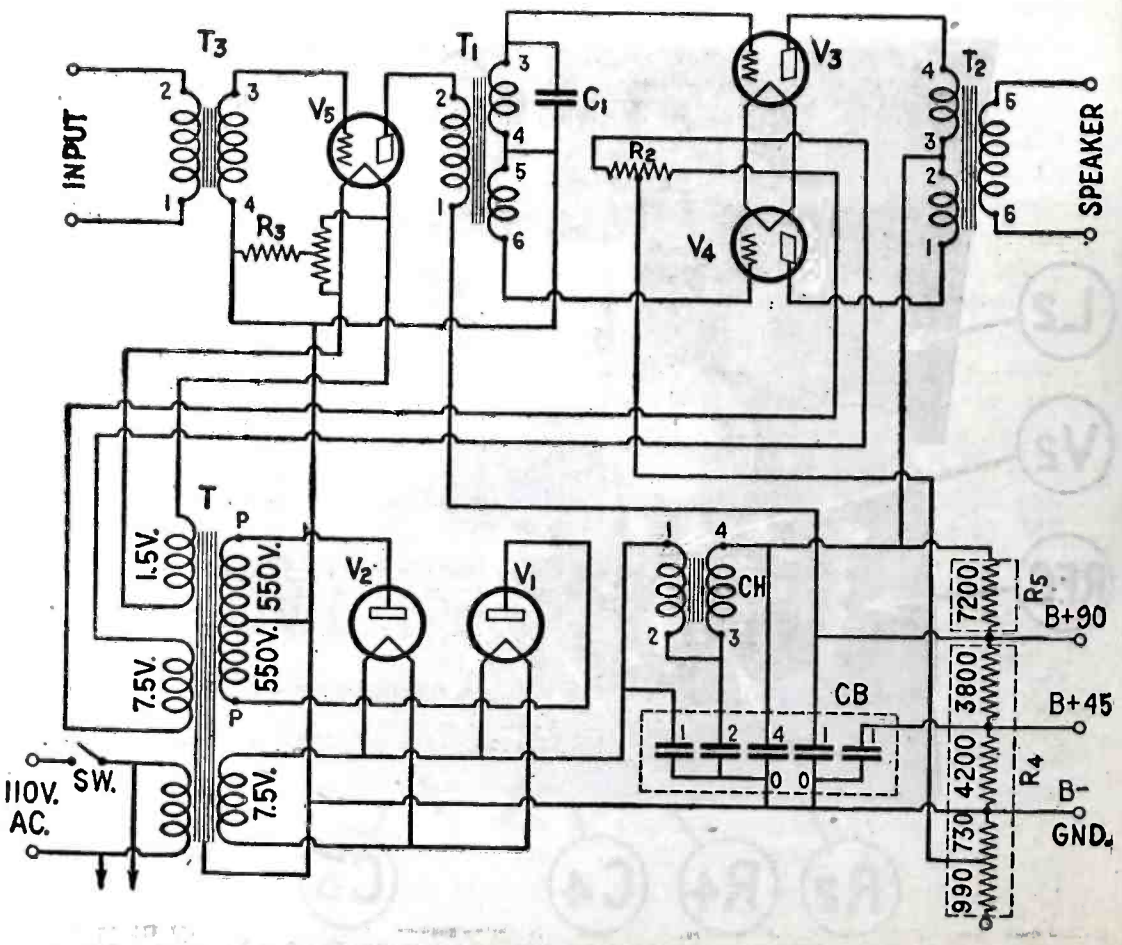
of the detector tube socket connects to the "B—" and ground binding posts; while the "—" post of the UX222 tube socket connects to one end of a 15 ohm fixed resistance, the other end of which connects to the "B—" and ground binding posts or connection clips; when using the shielded grid tube, it is well to remove the primary of the 114A coil and rewind it with about forty turns of No. 34 or No. 36 wire, layer wound on the center of the primary tube, connecting it to the No. 5 and 6 contacts of the coil and taking care to wind this new primary in the same direction and connect it exactly as was the original primary.

In the socket-powered tuner illustrated in the diagrams of this article, "B" and "C" power is obtained by connecting the "B—," "+45," and "+90" binding post directly to the Unipac binding posts similarly marked. A value of 2.5 volts A.C. for the heater tube is obtained from an S-M 325 or 247 filament lighting transformer—the 325 type can be seen in the photograph of receiver, speaker, Unipac, and pick-up together shown in the heading of this article.

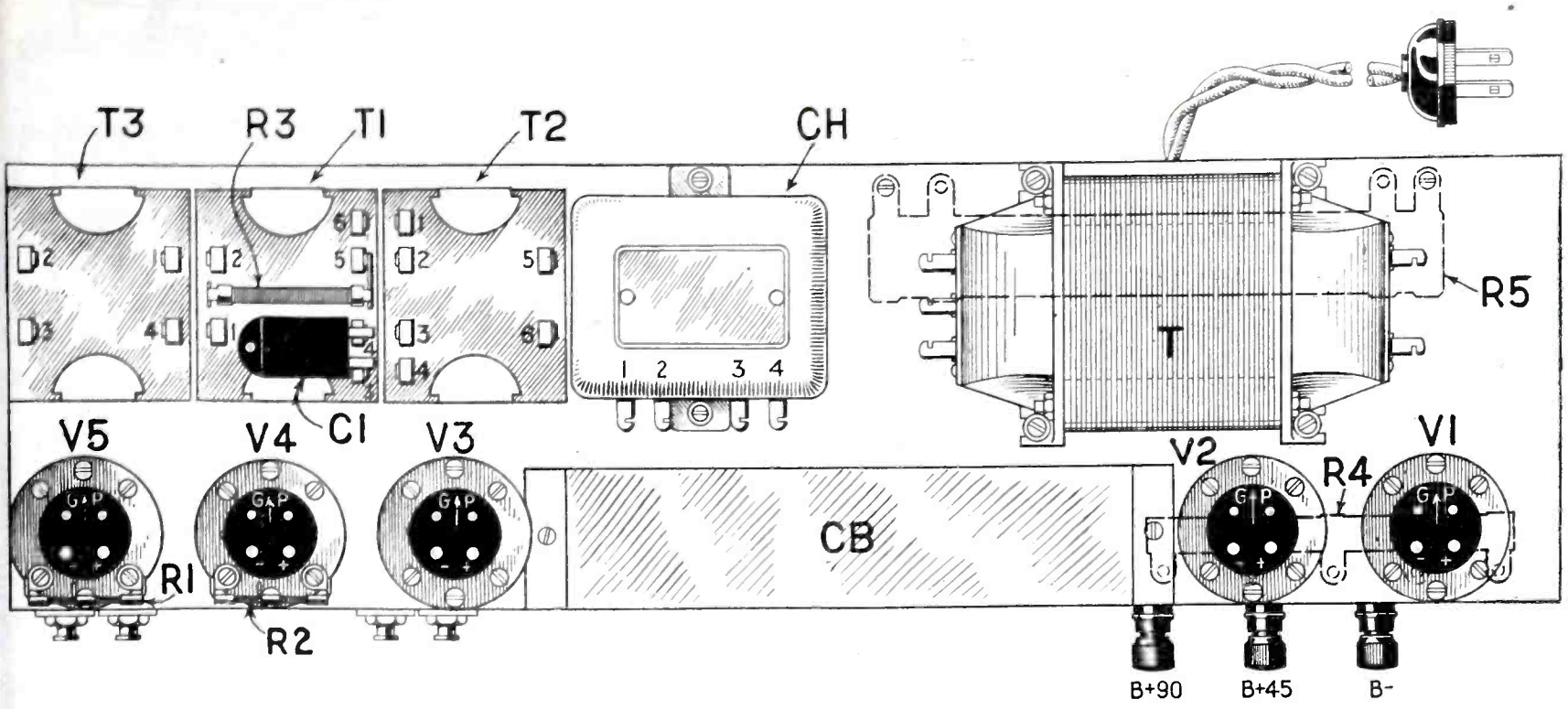
The Unipac amplifier construction is clearly illustrated in the photographs herewith. The various parts are mounted upon the chassis as illustrated, with the primary lugs of the power transformer to the right. The small 9720 ohm section of the 651 resistor is mounted by having certain of its lugs soldered directly or through short lengths of wire to the threaded binding post shanks. The large resistor section is mounted on long screws using 3-4 inch spacing collars to hold it beneath the chassis. The extreme outside lugs are unconnected electrically and are for mounting only. The inner lugs are for the electrical connections to the large re-

### PARTS FOR POWER UNIT

1 Silver-Marshall 328 full-wave super power transformer, T.
1 Silver-Marshall 331 Unichoke filter system, CH.
1 Silver-Marshall 245 transformer, T1.
1 Silver-Marshall 240 audio former, T3.
1 Silver-Marshall 245 transformer, T2.
1 Tobe 662 condenser block, CB.
1 Tobe fixed condenser, .00025 mfd. C1.
5 Silver-Marshall 511 tube sockets, V1, V2, V3, V4, V5.
1 Silver-Marshall 651 resistor kit, R4, R5.
4 Frost 253 tipjacks.
1 Van Doorn 661 steel chassis and cabinet with hdwe.
3 Eby binding posts (B—, —45, —90).
25 ft. Corwico Flexibus hook-up wire.
2 Frost FT64 resistors, R1, R2.
1 Frost F1500 resistor, R3.




**Wiring diagram of the power unit shown in the illustration on the opposite page.**




**The parts of the power unit are assembled on the metal chassis as shown above.**

sistor. A small 1500 ohm "C" bias resistor, as well as the stabilizing condenser, are shown mounted by having their lugs soldered directly to terminal lugs of the 245 input transformer. In assembly, the tipjacks and binding posts are insulated from the chassis by insulating washers, and the two small FT64 resistors are mounted directly on the "F" terminals of the two left-hand tube sockets. Care should be taken to see that their center taps do not "short-circuit" upon the mounting screws of these tube sockets which should be omitted in this particular amplifier.

The Unipac is wired with the usual Kellogg fabric insulated switchboard wire or Acme Celostite.

To operate the receiver, it is merely necessary to connect it to the "B" binding post of the Unipac, to the filament transformer, and to a suitable antenna and ground to obtain satisfactory headphone reception. Of course, two UX227 tubes must be inserted in the receiver sockets. To tune the receiver, it is merely necessary to turn the Volume control all the way to the right, turn the midget condenser all in, and rotate the Selector II dial until a squeal is heard. Bear in mind that for the Universal Tuner every squeal heard is a station, and once one has been located, Selector II dial should be adjusted for maximum volume of squeal followed by a similar adjustment of the Selector I dial. If the Gain knob is now turned to the left slowly, to disengage the midget condenser plates, the squeal will disappear and the signal be heard, signal volume being loudest on weak stations when the midget condenser plates are just sufficiently disengaged to prevent the station being heard as a squeal. With the "A" range coils, that is, type 111A antenna, and type 114A RF transformer, the range of the set is from 200 to 550 meters, while with other standard coils it may be extended down to 18 meters and up to 3,000.

The operation of the Unipac is equally simple. Once assembled, its cord and plug should be inserted in any 110 volt, 60 cycle, light socket, and if the Unipac is to be operated for more than an hour at a time, the case should be left off entirely.

(*Continued on page* 188)

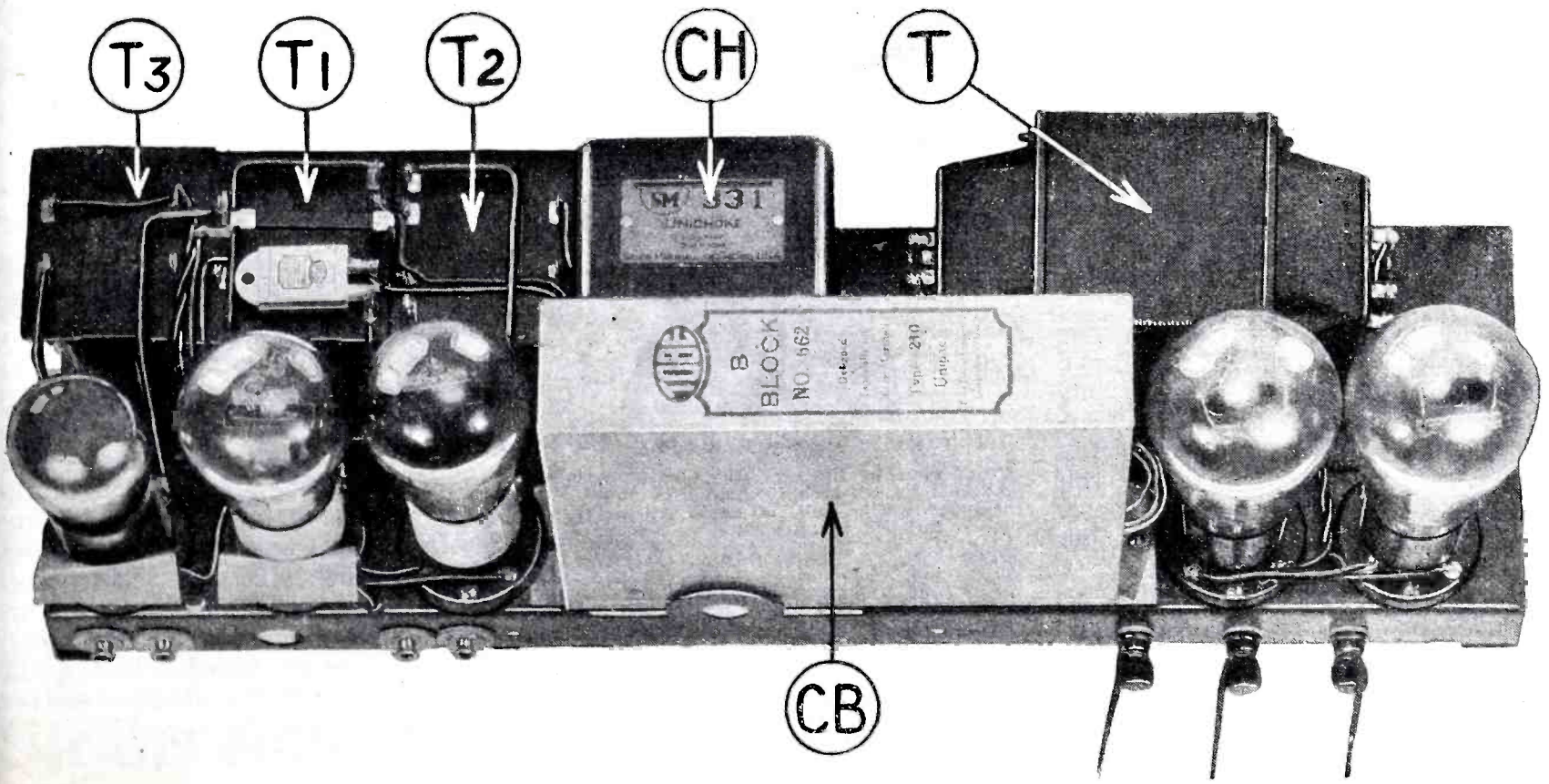



**Photo of the completed power unit. Parts are marked to correspond with the schematic wiring diagram and list of parts on the opposite page.**


## An "A, B and C" D.C. Eliminator

THE accompanying photo shows a new socket-power device which provides "A, B and C" battery voltages from the direct current house lighting lines.

The "A" power source of this unit is adjustable by means of a rheostat across the filament leads which makes it adaptable for use with either four or six volt type tubes—the maximum output being 2.2 amperes. "C" battery voltage taps are connected to binding post terminals for either 4½ or 9 volts.

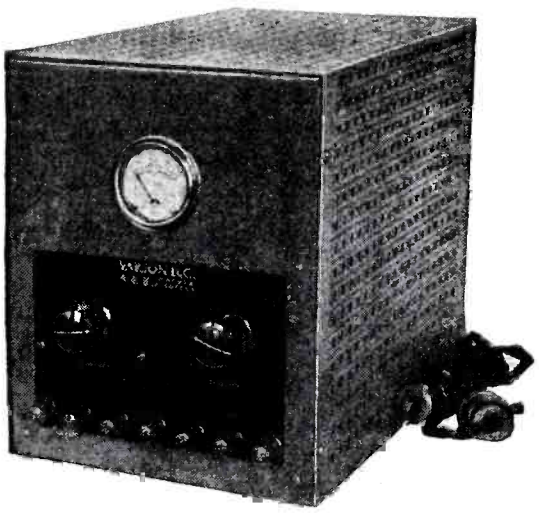


*Photo by courtesy of Varion Products Co.*

**Here is the complete "A, B and C" direct current eliminator. The unit is encased in perforated sheet metal with a bakelite panel in front.**

The maximum output from the "B" power supply is 105 volts when employed in connection with the 110 volt line. However, this unit can also be used on a 220 volt line and will deliver a maximum of 180 volts for the "B" supply.

Perforated steel casing houses two choke coils, one in the "A" circuit and the other in the "B". Two heavy duty resistors are connected in the "A" circuit, while another of much higher resistance is employed in the 67 volt "B" lead. A high-grade condenser block in the circuit provides the filter system.

At the front end of the unit a voltmeter can be seen for reading the filament voltage, and just below, towards the left, is the rheostat knob for regulating this voltage. Directly at the right is a potentiometer control for the "B" voltage. A double fuse block mounted in the rear end of the unit protects the house line fuses in the event of a short circuit.

## A Compact Exponential Speaker

THE reproducer illustrated herewith is not a cone, nor a horn in the ordinary understanding of the word. It is a drum speaker, which embodies new and scientific principles of sound reproduction, and which combines in a compact form a loud-speaker unit of improved design and an exponentially-curved tone chamber.

Fifty-four inches of travel is available for the sound in the tone chamber of the speaker—yet the exterior dimensions approximate those of the conventional cone speaker of the same general appearance. The unit is 16 inches in diameter, 10 inches deep, 18 inches high, and stands on a base 6¼ by 9 inches. The case of the speaker

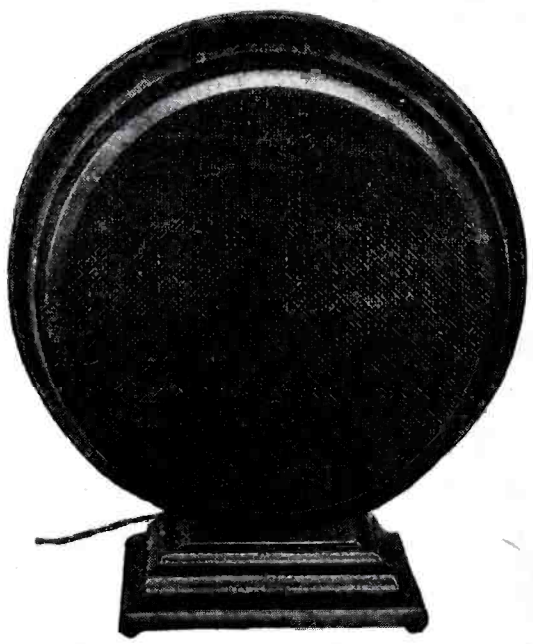


*Photo by courtesy Newcombe-Hawley, Inc.*

**Front view of the new drum speaker, which conceals a 54-inch exponential-curve tone chamber. The unit is made of metal and finished in an attractive brown.**

is made of metal finished in an attractive dark brown. The front of the speaker is covered with a wire grille which has been placed over a silk mesh. The speaker stands on four rubber feet which tend to prevent microphonic noises resulting from vibrations when the speaker is placed near the radio cabinet.

Experimenters should not compare speakers of the exponential type with the old horn-type loud speaker, as the former in capable of giving far superior results. When properly designed the exponential speaker will reproduce the entire band of sound frequencies without any appreciable distortion of the music.

## A New "A" Battery Power Unit

AN "A" power unit of improved design has just been introduced. It is of the usual trickle charger-storage battery type, but has several features

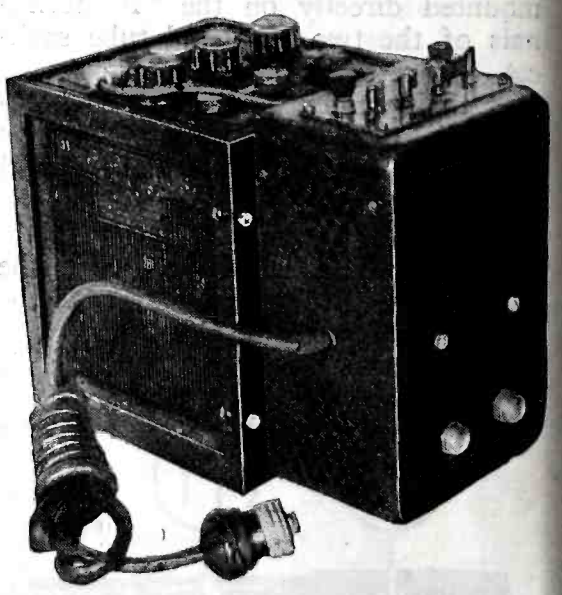


*Photo by courtesy of Westinghouse Union Bat. Co.*

**The above shows the "A" power unit as described herewith.**

which are not found in many other designs. The outfit is compact in design, entirely automatic, has two charging rates and employs a dry rectifier.

The photo herewith clearly illustrates this unit. On the top of the power unit there are two binding posts, a fuse and four metal posts, two of which are connected together with a jumper. The binding posts are the output terminals of the power unit and are connected with the filament binding posts of the receiver.

(*Continued on page* 156)

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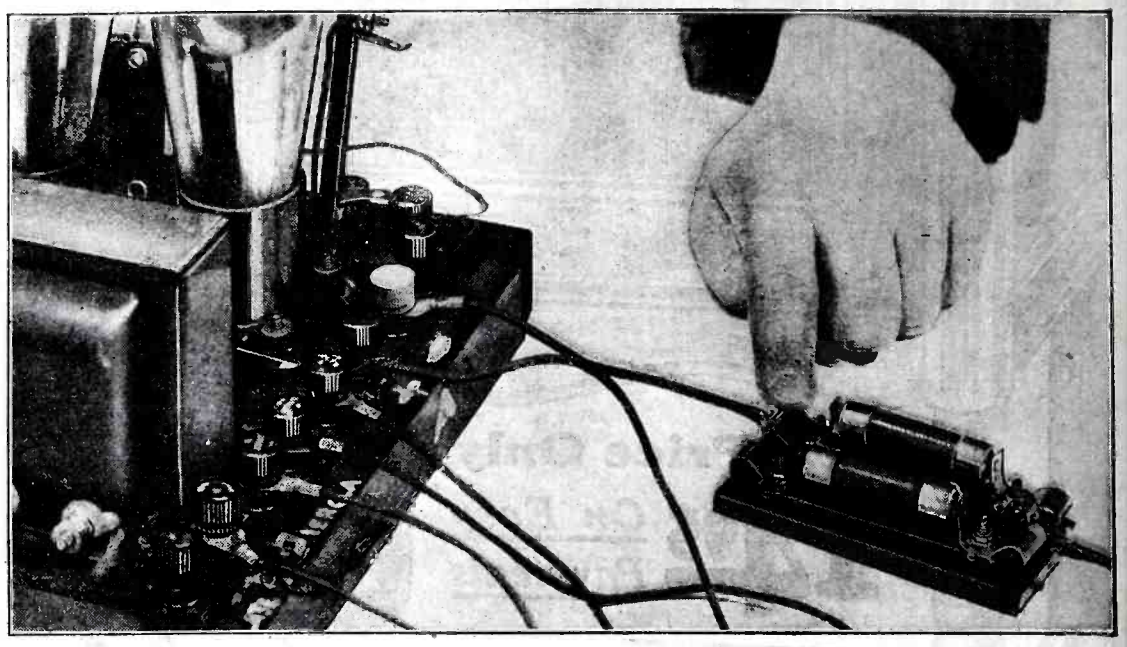
# Eliminating the Filament Rheostats

THE manually-controlled filament rheostats in the average tuned-radio-frequency receiver may be entirely eliminated by the use of a new adapter which automatically regulates the filament current. The first step is to short-circuit the rheostats (or other ballast controls), and then to connect the adapter directly in series with the "A" minus or plus lead running from the storage "A" battery or power unit to the radio set.

The adapter consists of a double clip, in which amperites of the proper current-carrying capacity may be placed; the adapter affords a shunt connection. The amperite units are selected in order that the combination may provide the desired amperage for the group of tubes thus controlled. Combinations are available for the precise control of any set from a simple three-tube layout without power tube to a six-tube layout with power tube.

The amperite adapter may be mounted within the cabinet or at the rear, or near the external storage battery, according to individual preference. The receiver is turned on and off by means of the regular switch.

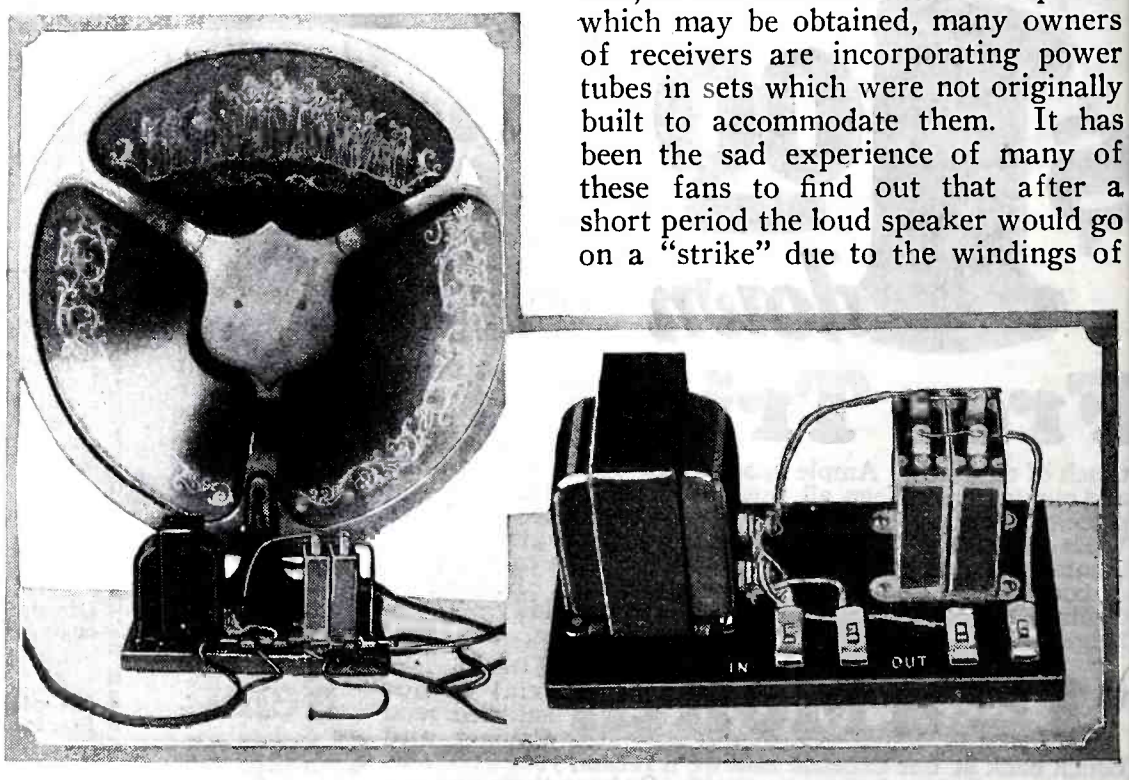


**The adapter is connected directly to the set lead from the storage battery or power unit. It consists of a double clip in which amperites of the proper current capacity may be placed.**

# Preventing Speaker Damage When Power Tube Is Used

Due to the increased clarity of signals, as well as to the additional power which may be obtained, many owners of receivers are incorporating power tubes in sets which were not originally built to accommodate them. It has been the sad experience of many of these fans to find out that after a short period the loud speaker would go on a "strike" due to the windings of the electromagnet coils burning out.

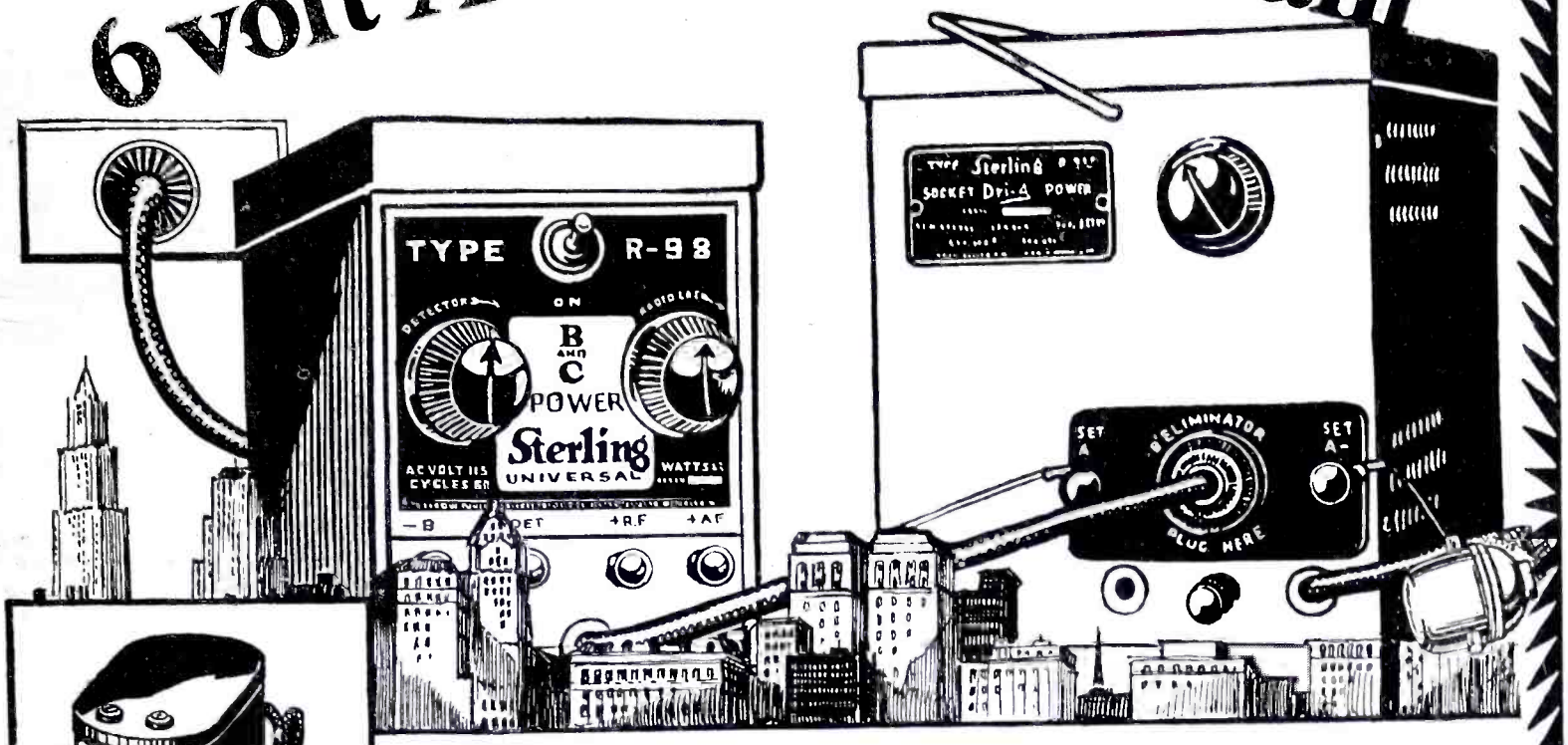
This condition arises from the fact that the additional current necessary




**The photo at the right shows the choke coil and condenser mounted on a small wood base. At the left can be seen the unit connected to a cone speaker to prevent damage of the delicate electromagnet windings.**

# Sterling

## 6 volt "A" and "B" Power Team





***Output Transformer***
Protects speaker from overload. Eliminates noise, improves tone quality.
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Controls all "A" and "B" Power filament switch.
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***"B" Power Tester***
A high resistance meter for Power Units and all D. C. circuits up to 300 volts.
R-415 D. C. . . . **$8.50**
R-417 A. C. . . . **$7.50**

# *Have an A. C. Set but don't experiment!*

IF you have a good radio set you can have A. C. without buying new tubes, without rewiring. Simply add a Sterling A. C. Power Team and you have a light socket set, an electric set, an A. C. receiver.

The 6 volt Sterling A. C. Power Team is absolutely dry. It contains no battery or charger in any form. Reception and power are controlled entirely from a single switch. It operates only during reception.

Nothing untried or experimental about a set made A.C. with Sterling. You are sure of clear tone quality, distance and above all, *dependability.*

If you are about to buy a set, select a good standard receiver *and power it with Sterling A.C. Power Team.*

There is no better combination in radio—play safe.

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**Sterling**
*Powered is an A.C. Set*

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For Radiolas, Victor or Brunswick combinations, Best supers and all 4 volt sets:—
RT-41 "B" Power **$27.00**
R-94 "A" Power **32.00**
*Above prices include tubes*
*Prices slightly higher West of Rockies and Canada*

to operate these tubes is really more than the windings of the speaker can stand, with the result that a powerful surge induced by a loud burst of music will cause the fine wires to fuse.

Damage to a loud speaker can be prevented in a very simple manner, by the use of an output circuit, one type of which is illustrated herewith. It is not necessary to place this apparatus in the cabinet, as it may easily be mounted right on the base of the loud speaker, as shown.

The apparatus necessary is a choke coil and two 1 mfd. fixed condensers. These are connected in the following manner. First, they are mounted, as shown, with the two condensers in parallel. From one side of the output going to the speaker, connect a wire to one side of this condenser bank. From the other side of this condenser bank a wire goes direct to one side of the choke coil, and continues from there to one terminal of the set output.

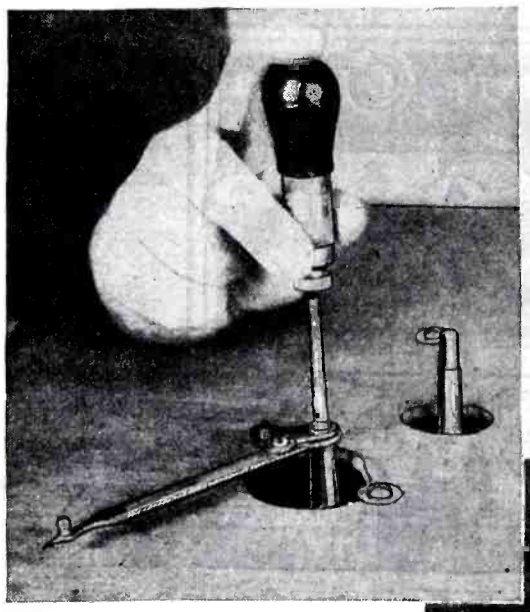
From the other output terminal of the set connect a wire to the other side of this choke coil and to a terminal for the output to the loud speaker.

# How to Make an Inexpensive Phonograph Turntable

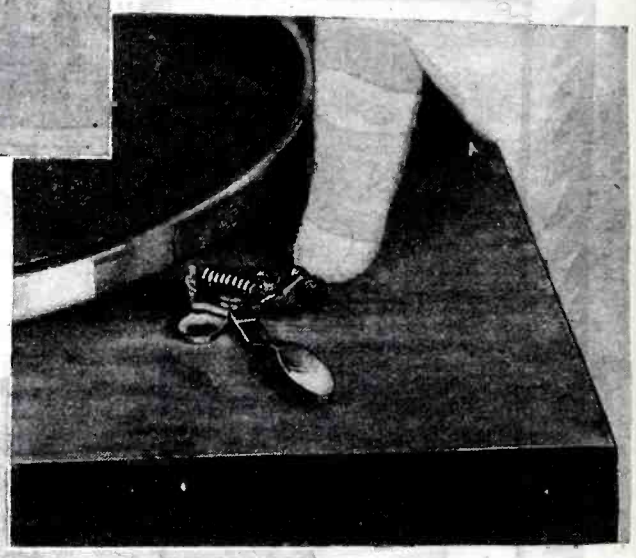
RADIO set owners who desire to avail themselves of the marvelous reproduction afforded by the new electrically-recorded phonograph rec ords when used in conjunction with a "pick-up" working through the radio amplifier, can do so without going to the expense of buying a complete talking machine to accommodate the records. The only part of a regular phonograph that serves any useful function in combinations of this kind is the turntable, whose purpose it is to revolve the record. The rest of the machine is wasted.

A turntable is merely a large metal disc rotated by a spring motor. The parts for one can be purchased for a few dollars in any phonograph repair shop, and can be assembled at home in a form to fit a convenient opening in a console or other type of radio cabinet.

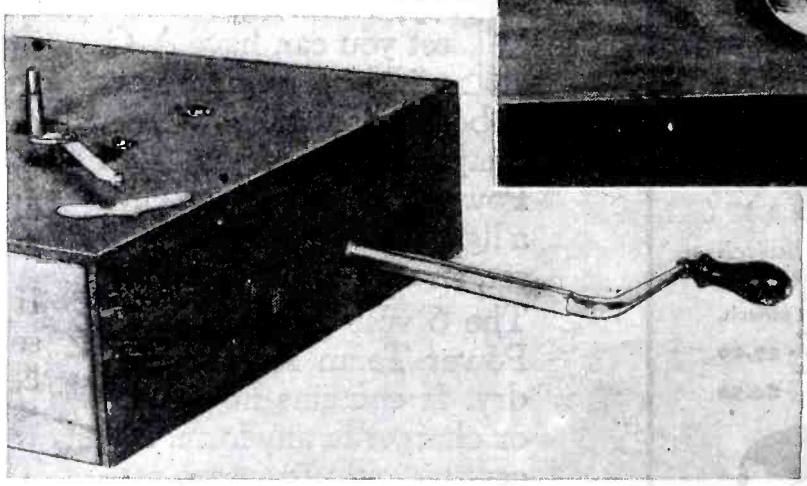
A shallow box about 15 inches square and four inches deep is big



**Above is the completed phonograph turntable assembled with a pick-up device.**



**In the photo above, the speed regulator arm of the phonograph motor is being fastened in position on top of the box. The turntable shaft can be seen protruding through at the right.**



**The turntable stop is fastened on the top of the box so that the small felt catch will grip the edge of the disc. After all fixtures of the motor have been mounted, the phonograph record pick-up can be fastened in place.**

**The winding crank is passed through a hole in the side of the box.**

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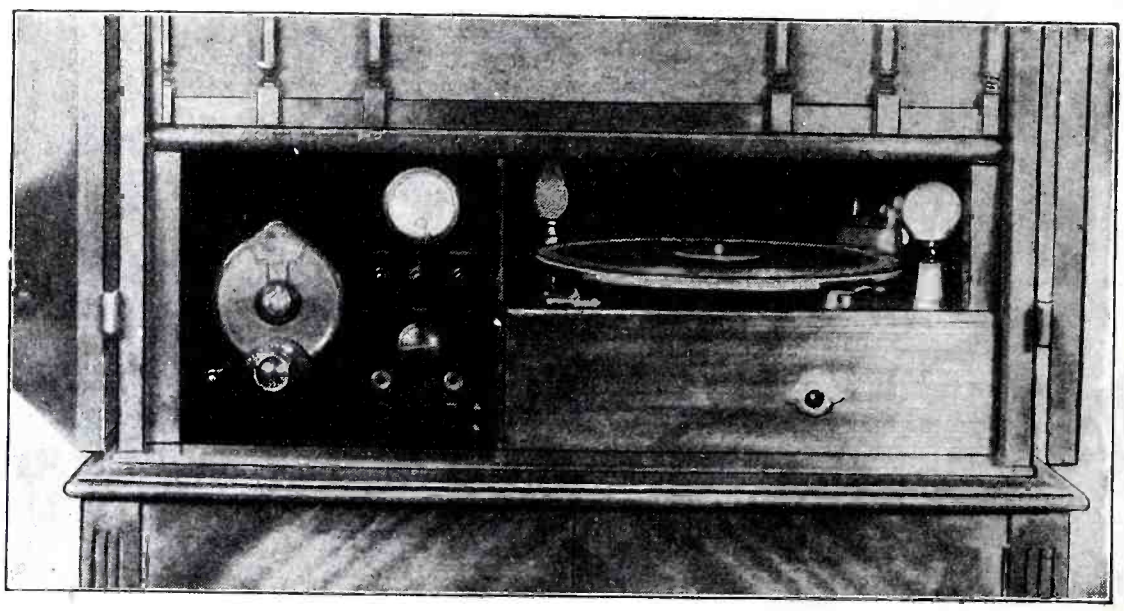
enough to hold all the operating mechanism. Such a box can be made from thin strips of wood obtained from packing boxes or grocery containers. The accompanying photographs show the general shape and construction. The number and location of the various holes to be cut in the box depends on the particular turntable and spring motor on hand. At any event, the mounting of the parts is a simple operation for any radio constructor who has ever mounted two or three variable condensers on a bakelite panel.

The essential parts comprise the spring motor proper, which is wound up by a crank handle that projects one side of the box; the speed regulator; the turntable friction brake; and the turntable itself. The speed regulator and the brake should face the side of the box through which the crank handle projects. Then when the whole unit is mounted in a cabinet all the controls will be readily accessible.

The phonograph pick-up selected for the machine should be a complete unit; that is, it should consist of a supporting base and arm, in addition to the unit itself. When the instrument is not in use the needle chuck can be rested on a large cork glued to the top of the box at a point just beyond the edge of the turntable. The pick-up should never be allowed to drop on the box or on the turntable, as a heavy jar is likely to bend the tiny armature to which the needle chuck is attached.

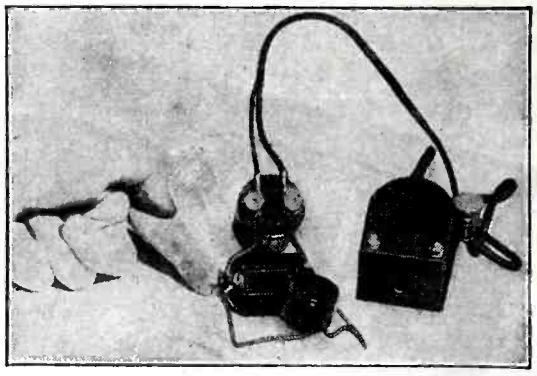
One of the accompanying illustrations shows how the phonograph unit is combined with a one-dial radio receiver in a cabinet. This is a very fine combination, of great flexibility and usefullness. On the panel of the radio set is a switch which allows the use of either radio or phonograph. The grille above these instruments hides the loud speaker.



**The completed phonograph device can be nicely installed in a standard radio cabinet alongside of a small set as shown in the above photo.**

## Scratch Filter for Phonograph Pick-Ups

THE beautiful reproduction which phonograph "pick-ups" allow when operated in conjunction with the A.F. amplifier of a radio receiver is sometimes marred by a soft, hissing sound, commonly known as "needle scratch". This usually is not very strong, but it is annoying to the ears of a radio man accustomed to the smooth performance of a good radio set.



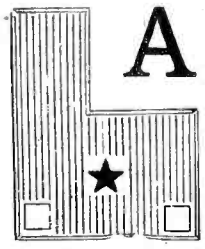
**The scratch filter connected to a phonograph pick-up device.**

As this "needle scratch" is always of rather high frequency, it can be eliminated very easily by the use of a simple filter arrangement, adjusted so as to choke off such high audio frequencies without perceptibly affecting the other frequencies. In physical form such a filter consists merely of a small fixed condenser and an inductance coil of fairly high value. The condenser should have a capacity of .005 mf., and the coil an inductance of 65 millihenries. If a single condenser of this size is not available, five .001-mf. condensers (or a number of others of equivalent total value) may be connected in parallel. For the coil, a common R.F. choke such as used in the plate circuits of detector tubes will serve very nicely.

(*Continued on page* 187)

# GERALD M. BEST

## *Announces his masterpiece*



A quarter million—or more—radio fans had faith in Gerald M. Best's original 45,000 cycle Super Heterodyne. They built it and marvelled at its performance. Now Gerald M. Best announces his 1928 Model 115 Super Heterodyne using the new shielded grid tubes. You can bet your last dollar on its performance. It is a clean cutting 10 kilocycle receiver. There's nothing better in radio. A fine looking job, mechanically, with its shielded stages and its utter simplicity of design. A simple set to build and a sure shot distance record smasher. the new shielded grid tubes make possible extreme quietness of reception. Long distance stations come in with a powerful wallop. The new 1928 Gerald M. Best Super Heterodyne uses four of these new tubes—two in the radio frequency amplifier ahead of the detector and two in the intermediate stages. The transformers are peaked at 115 kilocycles. They are of the plug-in type and extremely simple to install. The set has been designed for simplicity, beauty and unparalleled performance. Series filament operation for practical elimination of the "A" battery is another feature for those who want batteryless receivers. The best way to build this new set is to purchase the official full size working prints and instructions by Gerald M. Best. These are now available in package form and will be sent to you immediately upon receipt of one dollar. We pay the postage. Get the original and genuine instructions from headquarters. Mail the coupon NOW!

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# The Listeners' Accessory Guide

(*Continued from page* 148)

The fuse protects the unit from overload, and the four metal posts with the jumper are for changing the rate of charge. With the jumper in one position, the battery of the power unit is provided with a trickle charge which compensates for the current consumed under average conditions and keeps the battery full charged. However, if the battery should become low as the result of overuse, the jumper may be connected with the other pair of posts and the battery is given a "booster" charge which quickly restores it to condition.

A special power transformer is contained within the unit which steps down the 110-volt house current to the potential required for charging the battery. A rectifier element is of the dry electrolytic type and its purpose is to change the charging current from alternating to direct. A resistor is connected in series with the charging current to reduce the rate of charge; this is short-circuited, when the battery is to be placed on a booster charge, by adjusting the voltage regulator. An automatic-control relay switch is employed which disconnects the power unit from the 110-volt current when the battery is in use, and reconnects the power when the battery is at rest. It is actuated by an electromagnet connected in the output circuit of the unit.

From the viewpoint of utility the power unit has other features. The weight is only 36 pounds, which is not excessive for a unit of this type. It is equipped with a hard-rubber cover for the battery, which serves to improve its appearance and protect the cabinet from acid.

## A Powerful Loud Speaker

Speaker units of the electrodynamic type have recently been made available for the first time to the amateur constructor. These units are offered with a small free-edge cone attached, and have been designed so that they may be installed easily in a radio console cabinet, or attached to any suitable baffle. They make it possible for the set builder to realize fully the advantages of power amplification and do so at a comparatively moderate cost.

Electrodynamic speakers differ from others both in principle of

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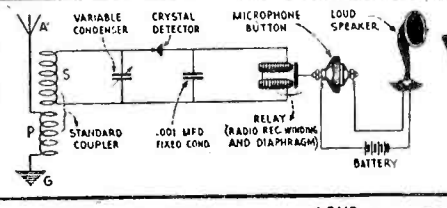
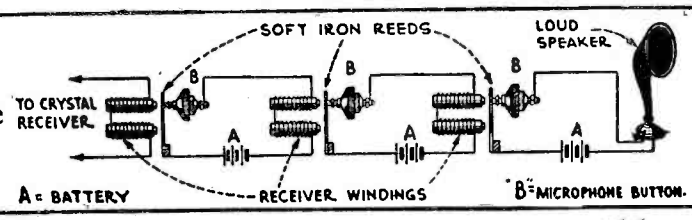
Operate loud speaker with no tubes, batteries or eliminators. SKINDERVIKEN UNIT provides additional power.



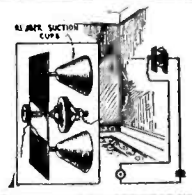

**Radio Amplifier and Grid Leak**

Improve your Radio Set, add Amplification in any quantity with these Units—also used as Grid leaks.



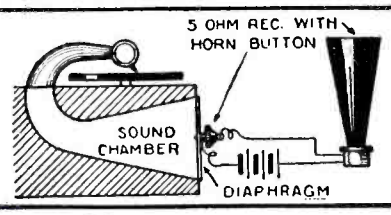

**Detectaphone**

The Unit makes a real, practical listening outfit, sensitive, efficient, simple to make. Attaches to wall. Plenty of fun and real detective work.



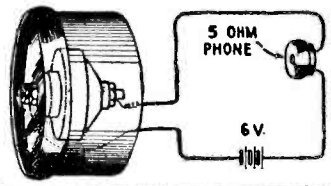
**Phonograph Amplifier**

Want to give your phonograph new pep—and greater volume? SKINDERVIKEN UNITS bring the old machine to life—try one—and be surprised.




**Stethoscope**

The stethoscope, the wonder of modern medical instruments, can be made at home. Hear real heart beats. Apparatus simple and costs only a few cents.




**Telephone Amplifier**

Build a home telephone—Talk from room to room or house to house—These units make a genuine, clear transmitting apparatus.

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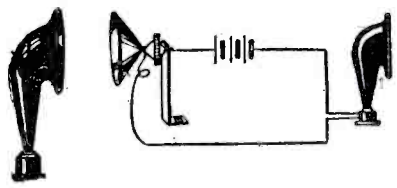
Double the volume of your Radio Loud Speaker with a SKINDERVIKEN UNIT—or amplify speaker's voice through horns at outdoor gatherings.



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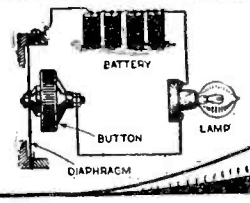


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**Conrad Richter, 1284 Market Street, San Francisco.**
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operation and in construction. They possess valuable characteristics, found only in this type of reproducers and lack many of the inherent faults of the permanent-magnet type speakers.

In speakers of the electrodynamic type there is a field winding which must be excited by an external source of direct current. In the magnetic field of this winding a separate moving coil is freely suspended, and the audio-frequency currents are passed through this coil.

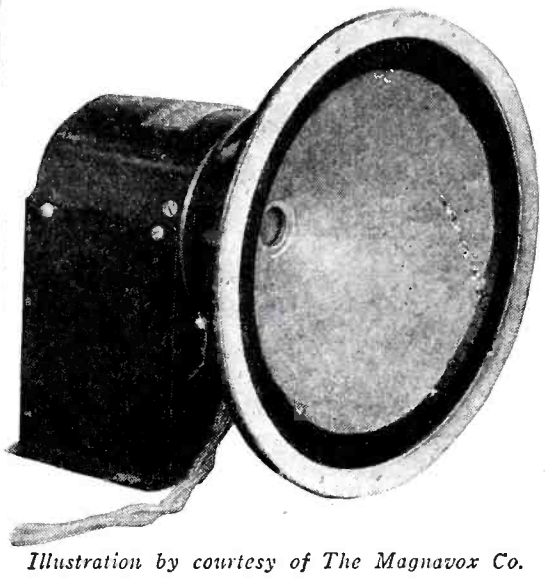

*Illustration by courtesy of The Magnavox Co.*

**The above photo shows the electrodynamic loud speaker described. This unit also includes of a special transformer and choke coil contained in its base.**

The cone, which is of free-edge design, is attached directly to the moving coil. This construction gives great volume and purity of tone, due to a number of factors.

The field is of great strength and constancy, and in this field the moving coil is freely suspended. The forces on this coil, which produce the sound, are dependent only upon the current in the coil, and not upon its position in the field; and there is no iron in the armature, to be over-saturated. This results in almost complete freedom from dis- the permanent-magnet type of speakers.

The drive of the speaker is applied directly to the cone, eliminating the necessity for a connecting pin which might bend and vibrate. The inductance of the coil is extremely low and the speaker offers to the tube an almost pure resistance-load, resulting in a high power high-factor and an impedance which varies but slightly with the frequency. This makes for a remarkably flat response-curve. The motion of the coil is *across* the air gap, instead of *along* the gap, and as a consequence, the unit is free of the limitations imposed by the danger of hitting the pole-pieces. Chatter as a result is almost impossible.

The freely-floating coil offers other advantages besides the ability to supply great volume without chattering. It is free to move an

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eighth of an inch at a mere touch, and is practically free from the definite resonances, which cause the characteristic pitch of other types of speakers. The impedance of the coil is practically constant for all frequencies and as a result the speaker is capable of giving full volume from 50 to 12,000 cycles. However, as broadcast stations do not transmit frequencies over 5,000 cycles, a filter has been added to the speaker, which deliberately cuts off reproduction above this frequency. Because the impedance of the moving coil is very much less than the output impedance of the power tubes used in radio reception, a step-down transformer also has been added to the speaker.

The speaker may be used in connection with radio receivers of any type; but best results are obtained when a power tube such as the 210 is used in the output stage. The unit will not deteriorate with use or age like the permanent magnet type, as the magnetic lines of force are produced solely by the current passing through the field coil.

Another important point in connection with the operation of the speaker is that a baffle is required for best results. This is true of all speakers of the free-edge cone type; as, otherwise, the air waves which are set up simultaneously by both the front and back of the cone would alternately neutralize and reinforce each other and seriously affect the volume.

The speaker unit as illustrated in the photo herewith is made in two types for operation, one with 6 volts D.C., and the other with 110 volts D.C. The 6-volt type requires for the field winding a current of ½-ampere and this may be furnished by the storage battery used for the operation of the receiver. The 110-volt type requires 50 milliamperes, which may be obtained by connecting the field coil of the speaker in place of a filter coil in the plate power unit.

## An "A and B" Power Unit for Battery Sets

A LARGE majority of those who have hitherto converted their battery-operated receivers into electrified or electric s ts, which operate from the 110-volt 60-cycle house supply wires, were forced to make changes in the wiring. In some cases it was necessary to wire the filaments in series; while in others the use of the new A.C. tubes necessitated a slightly-

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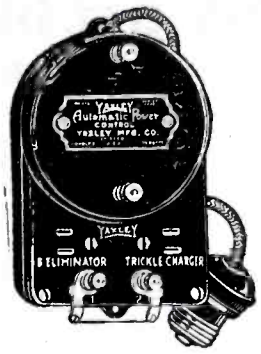


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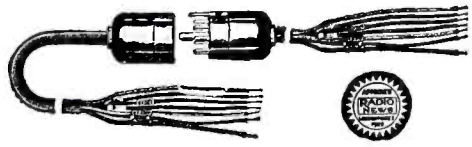


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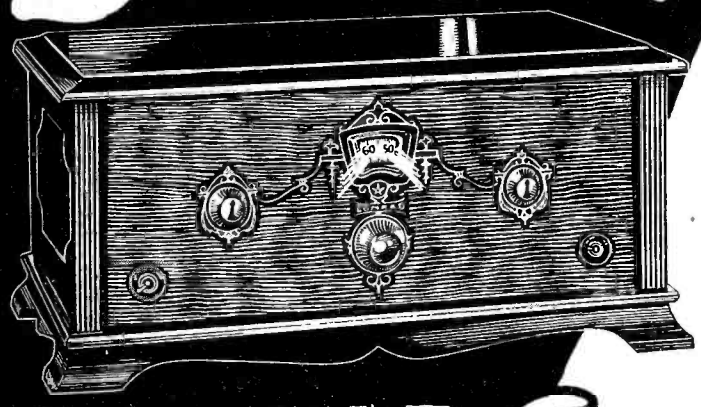

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different circuit. Recently, however, there have been developed socket-power units which may be substituted for batteries without making any changes in the receiver. The unit illustrated herewith is one of the latest designs and provides plate ("B") power as well as filament ("A") power for the tubes of the receiver.

With the unit under discussion, ample power is supplied for the operation of any receiver using eight or fewer tubes of the 201A type. The "A" power circuit has a maximum output of 2 amperes at 6 volts; and the "B" power circuit delivers a current of 55 milliamperes at a potential of 180 volts. This high voltage makes it possible to use a power tube of the 171 or 112 type in the last audio stage; and the four additional binding posts provide lower voltages for the detector, radio-frequency and first audio-frequency tubes.

*Photo by courtesy Fansteel Products Co.*

**This compact metal case houses a complete power-supply unit for sets using six-volt tubes.**

The complete unit is mounted in a compact case measuring only 10¼ x 18¼ inches by 7½ inches high. This is only slightly larger than a set of heavy-duty "B" batteries delivering 180 volts, and the weight of the unit is approximately the same as that of the batteries.

The "A" power device is essentially a electrolytic rectifier and condenser. The circuit employs a step-down transformer; a rectifier of the electrolytic type; a filter circuit consisting of a heavy-duty choke coil and an electrolytic-condenser bank; and a voltage-regulator circuit made up of the fixed resistors.

The "B" power circuit is somewhat similar to the standard type, but employs an electrolytic half-wave rectifier which consists of six small cells connected in series and is by-passed by a 0.2 mf. condenser. The step-up transformer provides power for the rectifier circuit and the current is filtered by the choke coils and the condensers. The higher, lower and medium intermediate voltages are obtained by virtue of the voltage drop which takes place across the resistors employed in the unit. A by-pass condenser is connected between each of these resistors and the negative lead.

In operating a power unit of this type, it is necessary only for the owner

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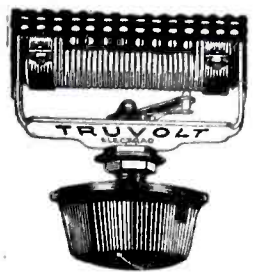


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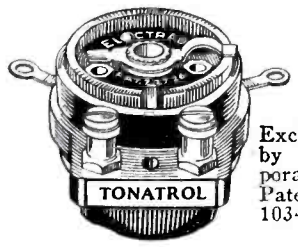


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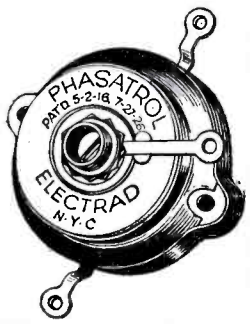


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to connect it properly the first time and, after that, to add distilled water to the rectifier cells once every three or four months. The output voltage of the "A" power unit need be adjusted only once for a set using a given number of tubes.

## Drum-Shaped Horn Speaker

DURING the past year, many changes have been made in design of loud speakers; and these have produced instruments which are not only much more decorative in appearance, but provide more realistic reproduction. These improvements have not been confined to any particular type of loud speaker; but are found manifested to a greater or lesser extent in all designs, including those of the horn, cone and baffle-board construction.

Today, an examination of the newest cone- and horn-type speakers will show that they often present a very similar appearance. Speakers of both classes will be found within cabinets

*Photo by courtesy Temple, Inc.*

**Front view of new drum-type horn loud speaker with silk mesh over the front.**

of similar design, and also in metal drums of similar appearance.

From the external appearance of the speaker illustrated herewith it is difficult to tell whether it is of the horn or the cone type. However, if the front cover is removed a horn-type reproducer of improved design will be found.

The speaker is built within a cylinder 13 inches in diameter and 7 inches deep. The case is of metal and has a dull brown finish. It is mounted on a base of walnut, which is two inches high. The front of the speaker is covered with a silk mesh which is stretched tightly over a wire screen.

The loud-speaker unit and the horn of the speaker are both of modern construction. The speaker unit is of

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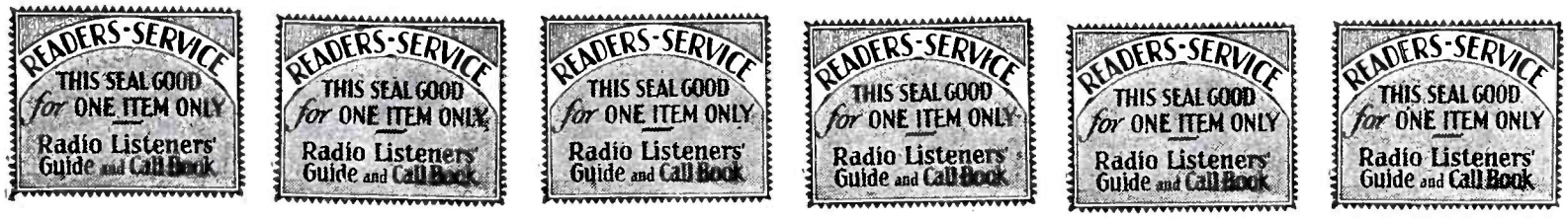


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the non-adjustable electromagnetic type, and the horn is of the semi-exponential design. The air column of the horn has been coiled in order to provide it with the length which is required for good reproduction.

---

## Plaster Tone-Chamber Speaker of Unique Design

IN the accompanying photo is shown the newest product of an old established loud speaker manufacturer. Externally the speaker resembles a cone, but actually the reproduction of voice and music is afforded by an unusual tone chamber of curved shape. This is so constructed that the tone-response characteristics of the

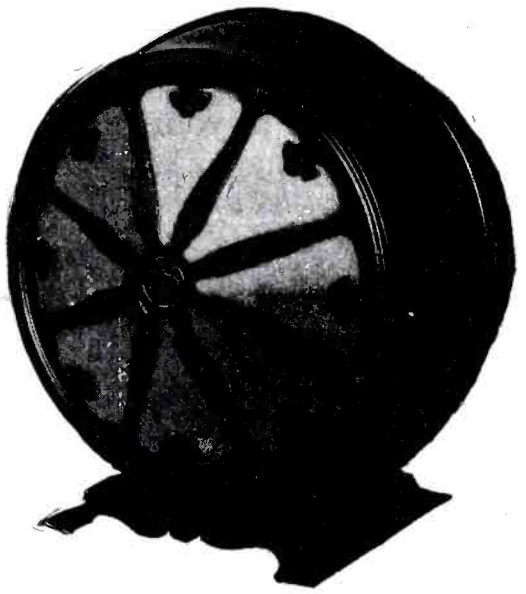

*Illustration courtesy Nathaniel Baldwin, Inc.*

**Photo of the plaster tone-chamber speaker described herewith. This speaker is furnished in two models, table model 14 in. high and pedestal model, 49 in. high.**

instrument cover a wide range of frequencies, taking in both the low and high notes transmitted by broadcast stations.

The operating unit of the speaker is a heavy, white plaster cylinder, 11 inches in diameter and 8 inches deep, with an opening in the center. The reproducing unit proper is fastened to the side of a recess in the plaster cylinder, its diaphragm facing the end of the hollow tone chamber formed when the plaster is moulded. The tone chamber curls inside the plaster cast and gradually enlarges into the opening in horn-like fashion.

The reproducing unit employed in this speaker is of the balanced armature type with which many of the older radio fans are familiar.

The complete instrument is enclosed in a decorative metal case which is equipped with a heavy base. It may be used with any standard receiving set and furnishes clear signals of good volume.

# The Custom-Built Hammarlund-Roberts Hi-Q Six

(*Continued from page 74*)

is started. The shielding is not fastened in place until the construction is practically complete and this operation may be accomplished in a few moments. After the set has been completely assembled and wired the only adjustments necessary are setting the condensers and cam rods in the proper position.

When starting the assembly of apparatus on the chassis the six vacuum tube sockets should first be mounted. The sockets in the four shield compartments are arranged so that their filament binding posts face the front edge of the chassis and the two sockets in the audio circuits have their filament posts face the rear edge of the chassis. The sockets in the first, second and third radio frequency stages are mounted with machine screws and nuts, and care should be taken to place a soldering lug under the head of the screw near terminal "G" of the socket in the first compartment. The three remaining sockets are fastened in the same way but their negative filament terminals must be connected with the chassis. This is accomplished by removing the F- binding post and then placing one of the spacing bushings furnished with the foundation unit between the socket spring and the chassis. The bushing is held in place with a machine screw passed through the hole made vacant by the removal of the binding post and fastened with a nut under the chassis.

Next the six filament resistors may me mounted in place. The three resistor strips (R1, R2 and R3) are located in the first three shielded compartments (S1, S2 and S3) and are fastened to the F- terminal of the socket on one end and to the metal chassis on the other end. Holes have been drilled in the proper location for the screws which hold these resistors in position. R7, R8 and R9 the automatic rheostats which serve as resistors for the detector and audio frequency tubes (V4, V5 and V6) are located on the rear edge of the baseboard in the position indicated in the picture. The mountings for these units are each held in place with a single machine screw.

Three ½ mf. bypass condensers, (C5, C6 and C7) are now mounted in compartments S2, S3 and S4. These units are mounted with their terminals facing the front edge of the chassis and they are secured in place with a screw and nut holding the right mounting lug. A second mount-

ing screw also serves to connect the condenser to the chassis and this is attached to the left terminal. When placing this screw in position a thin spacer, which is supplied, is placed between the terminal and chassis.

Two screws are used in mounting each of the four radio frequency choke coils L5, L6, L7 and L8. One choke coil is mounted in each of the last three shield compartments S2, S3 and S4 and the fourth choke coil is placed on the edge of the chassis in back of compartment S4. When mounting the two audio transformers the symphonic (copper colored) unit is placed to the left of choke coil L8 and the black transformer is mounted between the two audio tube sockets V5 and V6.

Now fasten the binding post strip in position under the chassis and mount the three binding posts in the order indicated in the picture layout diagram. Also, fasten the mounting for the gridleak (R10) in the front left corner of shield compartment S4.

Before continuing farther with the assembly of apparatus on the chassis the parts on the front panel should be fastened in position. First, mount the rheostat in the hole on the right of the panel in such a way that its terminals face the right and that no part of the rheostat will make contact with the chassis when the panel is fastened in position. Next, the filament switch is mounted in the hole on the left of the panel with its terminals on top. The double drum dial may now be fastened in position and complete instructions for accomplishing this are supplied with the instrument.

The receiver has now reached the state of completion where the front panel may be joined to the chassis. However, before doing this it is wise to solder two wires to the terminals of the rheostat. Each of these wires should be approximately 16 inches in length. In mounting the front panel four flat head machine screws and nuts are used, and after the two units have been fastened together the wires from the rheostat threaded through the two holes directly under the instrument.

With the instrument in this stage of construction it is wise to complete as much of the wiring as possible before mounting the variable condensers and coils. By observing this precaution these delicate units are protected from damage. The actual wiring of the receiver is very simple and should not require a detailed explanation as it is clearly illustrated in the picture wiring diagram. However a few pointers may aid the constructor.

One of the first steps in wiring the receiver is installing the cable connector, but before this is done, it is wise to solder wires to the various

terminals. Also the markings on both the cable connector and the cable wires should be disregarded and the following system should be followed: red, A+; brown, C— 9 volts; green, C—4½ volts; gray, B+ 135 volts; blue, B+ 67 volts; yellow, B+ 90 volts; black, A—, B—, C+ and ground. The lengths of wire which should be soldered to the various terminals before mounting the connector in place on the chassis follow: red, 24 inches; brown, 12 inches; green, 8 inches; gray, 20 inches; blue, 24 inches; yellow, 10 inches. When mounting pass the six wires through the ⅜ inch hole provided, secure the unit to the chassis with two machine screws and connect a wire between the black terminal and one of the mounting screws.

After the cable connector has been installed the wiring of the battery circuits may be started. Wherever possible, connections should be made under the chassis. The first step in wiring should be to attach short pieces of wire to the following terminals: + terminals for sockets V1, V2 and V3; the terminal nearest the panel of choke coils L5, L6 and L7; the left terminal of amperite R7, and the B+ terminal of transformer T1. These wires should be inserted in the holes in the chassis which are provided and should be allowed to protrude about ½ inch below the under side of the chassis. When making connections in battery circuits, wires from the connector should be soldered to these wires rather than actually passing through the holes of the chassis. Another important point in wiring is in connection with the two fixed condensers C8 and C9. These two condensers are held in position by the wires and are not mounted with screws.

When the wiring in the battery and audio frequency circuits is complete, it is necessary to mount the condensers and coils in position. First, take each of the four condensers and remove and discard the single hole mounting nut, the mounting screws and the shaft. The shield pieces may also be thrown away and the screws in the friction band brakes should be loosened so that the condenser plates rotate very freely.

All four condensers are mounted directly on the chassis with screws passing through the condenser frame and holes in the chassis. Each condenser is positioned so that the front end faces the right side of the receiver and before they are fastened securely in place each pair, i.e., C1, C2 and C3, C4, are coupled to the dial by threading the long ¼ inch diameter shaft supplied with the foundation unit through the condensers and into the flexible coupling on the dial.

To adjust the condenser plates the set screws in the hub of the dial should be tightened to hold the two shafts securely in place and the two sections of the dial should be set at 100 degrees. Now adjust all four condensers so that their plates are fully in mesh and tighten the two set screws in each condenser rotor. After the dial has been rotated several times to make sure that the complete condenser assembly is properly aligned the mounting screws holding the condensers to the chassis may be tightened.

To complete the assembly of the receiver the coil assembly should be installed. First, mount the four angle brackets of the foundation unit in the space provided in each of the shield compartments and arrange them so that the upright end is on the right-hand side. Next, take the two 3/16 inch round shaft and fasten one of the slotted rocker arms to one end of each, and then thread the shafts through the angle brackets using one shaft for each pair. With the shafts in position the two remaining rocker arms may be fastened on the other end. Al four rocker arms should be adjusted so that their hubs are on the left and so that the set screws are uppermost. The two arms on each shaft should be just far enough apart to permit the shaft to operate freely in the angle brackets and should be exactly in line with each other. The four coils may now be mounted on the screws which project upward through the chassis, and at the same time care must be taken to see that the slots in the rocker arms engage the pins that move the primary coils.

With the coils and condensers in place the wiring may be completed. The schematic and picture wiring diagrams give all necessary details and for this reason it is unnecessary to give step-by-step instructions in this article. However, mention should be made of the three grid suppressor resistors (R4, R5 and R6) which are installed in the first three shield compartments (S1, S2 and S3). These resistors are used in place of a wire for making connections between the grid binding post of the tube sockets in the shield compartments named and the stator plates of the condenser in the same shield compartment. Also it will be noticed that two of the resistors are black and that the third is red. The two black resistors are used in S1 and S3, and the red resistor is used in S2.

With the wiring of the receiver complete it is now possible to make the final adjustments which are necessary before operating the set. First. the cam rods of the foundation unit should be installed. These rods are for operating the movement of the

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primary coils and are installed between the cams on the drum dial and the 3/16 inch shafts of the rocker arm assemblies. When the cam rods are properly adjusted and when the dial is set at 100 degrees, the distance between the edge of the cam and the bent tip of the cam rod is ¾ of an inch and the cam rods are lifted as far as possible without forcing. In some cases the efficiency of the set may be improved upon by changing this adjustment but this must be determined by experiment after the set has been placed in operation. In this connection the rule which usually holds true is that as the normal distance is lessened the selectivity of the set is increased and the stability is decreased, and vica versa.

Next the corner posts for the aluminum shields may be installed in position, each being secured with a screw projecting up through holes which have been drilled in the chassis in the proper positions. Then the shield sides and partitions may be slid into position. Now take the coil springs of the foundation unit, slip them over the cam rods and adjust them so that the cam rods are held down against the cams. To complete the construction of the receiver fasten the shield covers in place.

## The Continental Six

(*Continued from page* 143)

C1, C2, C3 and C4. The best way to start is to note the exact distance between the centers of the condensers, which will be seen in the occompanying diagram. Note also that the center of the shafting is 1½ inches from the front edge of the sub-panel.

Mark with a scriber or some other sharp instrument in a line 1½ inches in and parallel to the front edge of the sub-panel. The distances indicated for the spacing of the condensers as shown on the diagram is now laid off along this line. The variable condenser at the right, C1, is simple to handle and should be left out the set is nearly completed and ready to wire.

Variable condensers can be obtained with removable shafts, this being the type used in this receiver. With condensers of this type the ganging is not as difficult as it appears on first sight. The individual shaft of each condenser is removed and the long 15⅝-inch shaft is run through the three condensers so that they will operate uniformly from the drum tuning control. If the directions and dimensions are carefully followed there is no reason why this system of condenser control should not work out very satisfactorily.

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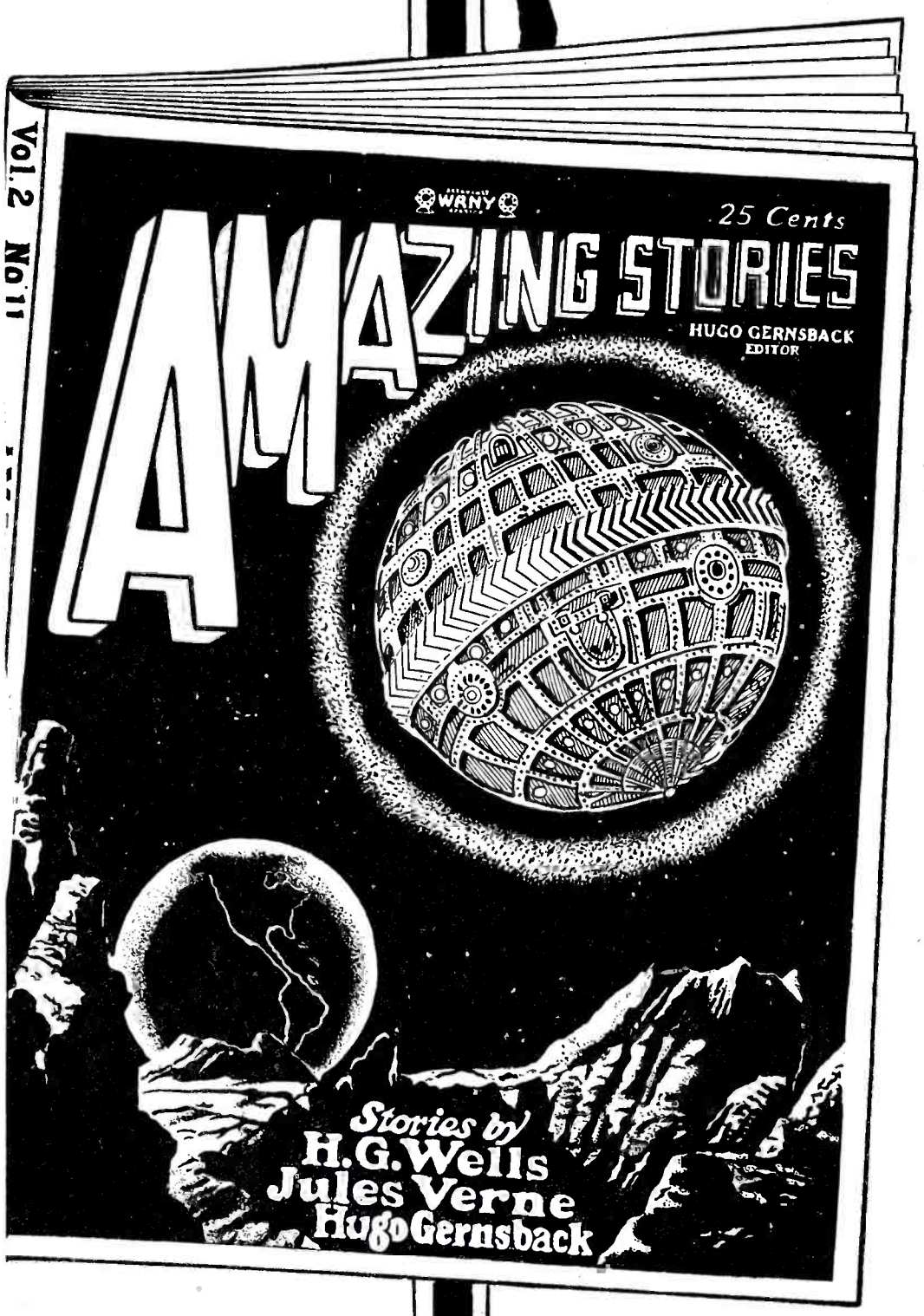


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Now that the positions of the four variable condensers have been established, the other parts' positions on the sub-panel are determined. The antenna coil, L1, is placed at the right front of the assembly. The other three radio-frequency transformers, L2, L3 and L4, go in the positions indicated; one just to the left and to the rear of the drum dials, the third on a line with this and to the left, and the last at the left front to the sub-panel. These coils can be mounted conveniently with right angle brackets.

The six vacuum tube sockets are next mounted. It is necessary to drill four holes in the sub-panel large enough to take the connecting wires to the four terminals, and two additional holes are needed for the bolts which hold the sockets in position.

The transformers and sockets for the audio-frequency amplifier are mounted at the left rear of the sub-panel, as shown in the illustrations. The first transform r, T1, mounts just to the right of the detector socket. Next comes the first A.F. amplifier tube socket; then to the right of this socket is mounted the second transformer, T2, with the output or power tube socket to its right. At the right of this last mentioned socket is placed the output impendance. The two tip jacks are mounted next to the output side of this instrument.

The binding posts for the various power supply connections and for the antenna and ground are mounted near the back of the sub-panel. Five posts are on the right with the remaining four at the opposite side. The single grid leak mounting goes in front of the four binding posts at the left back.

At this point it will facilitate matters greatly if as much of the wiring as is possible is done without joining the front panel to the sub-panel. It is a good idea to employ covered hook-up wire for making the various connections.

It is now necessary to assemble whatever apparatus goes on the front panel. The combination filament switch and volume control is mounted to the right of the drum contol dials. The metal plate which is mounted on the front of the panel can be used as a template for the positioning of the drum dial. After the holes have been drilled the drum control device is held in place by means of bolts and nuts.

When the drum dial and the volume control have been mounted, the front panel is attached to the sub-panel by means of the two brackets, one at each end. In doing this work see that the end of the ganged condensers' shaft is fitted into the drum dial. This done, the three condensers should be lined up and tightened down to the shaft-



Official Peridyne Pattern can be obtained for Fifty Cents from Consrad Company, Inc., 230 Fifth Avenue, New York City.

ing. Before locking the dial to the end of the shafting vary the plates of the ganged condensers so that they are all but out from between the stator plates.

Now turn the right side of the drum control to zero and tighten up this side of the drum to the shafting. With this relation the higher the numbers on the dial the higher the wavelength of the station tuned in. Now the other condenser, C1, is mounted and secured to the other side of the drum dial. Wire this condenser with the three connections shown in the wiring diagram.

When the wiring is completed go over it carefully to see that no errors have been made. First connect the "A" battery to the proper terminals and try one tube in each socket to see that the filament lights properly. If it does connect the various plate voltage leads and again try the tube in each socket.

If everything is satisfactory the set can be tested on batteries instead of the socket power units previously mentioned. 201-A type tubes are used throughout with the exception of the power amplifier tube, which should be a 112- or 171-type.

When a loud speaker is first connected to the tip jacks it will more than likely squeal, due to oscillations in the radio-frequency stages. This can be eliminated by adjusting the three phasatrols, P1, P2 and P3, in the following manner: first tune in a station with maximum volume. If the set still oscillates adjust the screws of the phasatrols until all squeals are gone. The proper adjustment of these neutralizers is so that the set will be operating just under the point of oscillation. At this point maximum sensitivity and selectivity are present.

As has been mentioned previously once these neutralizers are correctly adjusted, no further notice need be taken of them.

---

## Scott's World's Record Super 10

(*Continued from page* 107)

A battery terminals, the grids of the three transformers being wired to the sliding arm. Complete and smooth control of oscillation and volume is effected with this resistance.

Each special long wave transformer (as the Selectone B-500 and B-510 are called) is a laboratory matched with precision equipment to a peak frequency of 120 kilocycles. The use of this frequency in connection with the R.F. pick-up and a

properly designed oscillator unit makes the set a one spot receiver. Stations come in at only one place on each dial, instead of two as in ordinary mul tube receivers.

This brings us to the second detector and audio system of the World's Record Super 10 in our review of the electrical details of the set. Here we find that the second detector uses plate rectification of the greatly amplified signal impressed on its grid by the last intermediate transformer. It was found that grid bias detection was necessary in the second detector because of the extremely heavy load that this tube must carry.

The output of the detector is transferred to the first audio stage which uses a CX 112A tube through a audio transformer. The use of the CX 112A tube is good assurance that there can be no overloading in this first stage of audio. A second audio transformer couples the first audio to a CX 310 Power amplifier.

It is necessary to explain that measurements of the output of this set indicated the necessity of using the CX 310 tube. Practically all present day receivers are designed to use the 171 type tube with a maximum of 180 volts. While the 171 is a very fine tube for the average six and eight tube set, it cannot begin to compare with the 310. The maximum undistorted output of a 171 at 180 volts is 700 milliwatts, while the maximum undistorted output of the 310 power tube at 425 volts is 1540 milliwatts or more than twice as much. In early experiments it was found that the 171 tube was by far too small to handle the tremendous loads generated by the R.F., Intermediate and audio amplifying circuits, and since there could be no compromise in tone quality with the World's Record Super 10, the designer set about to provide for its use.

The use of the CX 310 power tube made it necessary to design a special power supply shown in the accompanying picture diagram. It has provision for all the necessary voltages required by the receiver, and in addition supplies the "C" battery energy for the 310 power tube in the last stage. This eliminator is a very simple device to build, and requires about two hours of actual construction time.

Full sized, numbered and detailed blueprints of both receiver and power pack, showing the wiring and assembly of the receiver and pack together with full printed instructions giving the order of operations in numerical sequence are furnished.

The audio amplifier of the World's Record Super 10 is adaptable to pho-



SEE PAGE 184!

nograph pick-up, and the results obtainable are probably better than in any other receiver because of the generous limits of the audio system. The only change necessary is the removal of the second detector tube from its socket and the insertion of the pick-up plug in its place. The volume of the reproduced music can be controlled from a soft whisper to full orchestra volume.

---

## The Official A.C. Browning-Drake

(*Continued from page* 113)

back the tickler so that this circuit goes out of oscillation. Rotate the trimmer condenser. If any setting of the trimmer condenser throws the second circuit into oscillation the set is not properly neutralized and the balancing condenser should be re-set until this test is satisfactory.

A satisfactory audio amplifier unit for the Browning-Drake tuning system consists of a completely self-contained, two-stage, transformer coupled amplifier using a 301-A in the first stage and a 310 tube in the output stage. The amplifier unit supplies all plate and grid bias voltages to the amplifier itself in addition to furnishing plate current for the receiver proper.

It is imperative that a power tube be used in the output stage if full depth of tone is desired. The 310 tube has a maximum undistorted power output of 1,540 milliwatts, or more than 100 times the output of the standard 301-A type. Bass notes require a great expenditure of energy. When we realize how much more energy is required to reproduce the pedal diapason of the organ than the treble of the violin, we can understand the reason for the glaring absence of bass notes in the receivers of yesterday, and the necessity of power tubes wherever full, rich reproduction is expected.

In order to correct a mistaken opinion which many radio listeners entertain, let us state that volume of sound is not the main objective of power amplification. It is not expected that the listener will operate this amplifier at top volume any more than we expect the owner of an 80-mile an hour automobile to travel at top speed through traffic. This amplifier has a liberal fund of reserve power so that it may operate smoothly and reproduce modulations and crescendos over the entire musical range with a minimum of distortion.

The simplicity of the assembly of the audio amplifier is apparent from first glance at the accompanying il-

lustration and diagram. This is made possible through the use of the Thordarson power compact R-210. This contains the foundation essentials of the power supply. The rectifier supply of 585 volts, no load, two 7½ volt filament windings for the rectifier and power tubes, and two 30 henry choke coils are all assembled in this unit. As well as reducing the mounting space, this also simplifies the wiring of the power unit, so that a neat, efficient, and compact unit is the result.

The Tobe Deutschmann condenser block R-210 is especially designed for use with the power compact, and contains all the filter and by-pass condensers required in this amplifier. Two common terminals are provided; the one marked C— is common to the three filter condensers; terminal marked B— is common to the by-pass condensers. An examination of the diagram will show that the grid bias resistor for the first audio tube is placed between these two common leads.

The output resistors are the fixed vitreous enameled type, and are likewise designed exclusively for this amplifier. Another important feature of this assembly is the use of the voltage regulator tube CX374. This tube, connected across the 90 volt B supply serves as a ballast to keep the lower B voltages constant regardless of variations in load or fluctuations of line voltage.

A Yaxley relay is built into the amplifier assembly so that the operation of the receiver will be entirely automatic. The primary of the power compact should be plugged into the socket marked B eliminator. Battery and trickle charger connections are clearly marked on the relay. This relay is provided with a shunt consisting of a single strand of resistance wire placed across the battery terminals. As the A current drain of the complete receiver and amplifier is exceedingly light, it is necessary that this shunt be removed so that all the current will flow through the relay. If this shunt is not removed the relay will not function properly with this receiver.

The cable-plug contains all the connections between the amplifier and the tuning unit. The A—, A+, B— and B+ 90 leads are clearly marked. Two extra leads are necessary, one to connect the plate lead of the detector to the first amplifying transformer, and the other to connect the A— lead of the first audio tube to the switch on the tuning unit. Every lead of the cable plug has an individual color. The following color code is used: A— black, A+ red, B— yellow, B 90 gray, Plate green. Filament Switch brown.

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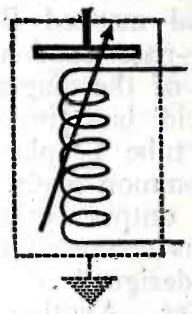

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Even though power amplification be used in a receiver, unless the first audio stage is capable of amplifying over a wide band of audible frequencies, the full effectiveness of the power tube cannot be obtained. The Thordarson R-200 audio transformers used in this unit have a very high impedance primary and a large core cross section, giving even amplification over the entire range of audible frequencies. This insures the least possible distortion in the input to the power tube, and hence a great realism in the output of the entire receiver.

Under load, the amplifier supplies the following voltages:

Plate voltage to CX 310 power tube, 375 volts; Plate voltage to detector tube, 44 volts; Plate voltage to 1st audio and r. f. tube, 89 volts; Grid bias to power tube, 25 volts; Grid bias to 1st audio tube, 5 volts.

Two blank input binding posts are provided. When the amplifier is used with the tuning circuit these should be disregarded. They correspond to the input terminals of the first audio transformer and should be used when coupling the amplifier to an electrical pick-up for phonograph operation.

## How to Build the Shielded-Grid Six

(*Continued from page* 90)

bus. All bus-bar wiring is insulated with lengths of spaghetti tubing, slipped over it.

The lead from post "P" of tube sockets in compartments S1, S2 and S3 should be a little longer than necessary, and should terminate in a lug so cut that it may be slipped under terminal screws "1," "2," and "4" of the coil sockets in compartments S2, S3 and S4, respectively, to regulate selectivity.

The "ground" can consist of a ground lead, terminated in a ground clamp on a well-scraped water, gas, or steam pipe. The aerial may be a bedspring for medium-range reception, or a 30- to 60-foot indoor or outdoor wire preferably the latter.

Connect the aerial and ground leads to the "aerial" and "ground" binding posts upon the terminal strip. Connect the "A" battery to the *"A Bat"* post upon the terminal strip using the two heaviest wires in the battery cable. Connect the red, or plus, terminal of the battery to the "A+" post of the receiver. Connect the black, or negative, post of the battery to the "A—" post of the receiver. Insert all tubes in sockets, turn rheostat to left, and turn switch Sw1. The

detector and audio amplifier tubes should light to a cherry red if 112A-type tubes are used. The volume-control rheostat should be turned to the right gradually and, when all to the right, the filaments of the 222-type tubes should glow with a bright yellowish color. All tubes should extinguish when the switch Sw1 is turned to the *"off"* position.

Remove the "A+" lead and connect it successively to all remaining battery posts upon the terminal strip. In any of these positions the tubes should *not* light, and they should only light with the "A" battery properly connected. Should the tubes light with any other connection, the receiver wiring is at fault and should be carefully checked. The 4½-volt "C" battery should have its plus lead connected to the black, or negative, lead of the "A" power unit. Its "3—" lead should connect to the "C—3" binding post of the terminal strip. The "C" battery for the last audio amplifier stage should preferably be of about 15 volts value when using a 112A-type tube on 180 volts, an extremely satisfactory operating value for this tube. The minus lead of the "C" battery should connect to the *"C-Amp"* post of the terminal strip. If "B" batteries are used, they should first connect with the "—" lead to the black, or negative, post of the storage battery, and the plus lead to the "+45" post of the receiver. The second and third batteries should be connected in series; that is, plus to minus and the free minus post of one connected to the "B+45" post of the receiver. The second and third batteries should be connected in series; that is, plus to minus and the free minus post of one connected to the "B+45" post of the receiver. The free plus post of the second should connect to the "B+135" of the receiver. The fourth battery should have its minus post connected to the plus 135 post of the receiver, and its plus post to the "B+Amp" post of the receiver.

If a "B" socket-power unit is used with the receiver, it is very important that it be only of the glow-tube-regulator, fixed-voltage type; for it is necessary that the values of 45 and 135 volts required for the receiver "B" circuit be accurate within 10 to 15 per cent—an accuracy which is absolutely impossible to obtain by guess-work with a standard "B" socket unit equipped with variable-voltage controls. Such units may be used with this receiver only when preliminary adjustment of their output voltage may be made with a good high-resistance voltmeter.

The operation of the receiver is ridiculously simple. It is necessary to simply turn it on with an *"On-Off"* switch, adjust the *"Volume"* knob to

the maximum or full right position, and tune in stations; which will be received with the two dials rotating approximately alike. Volume may be regulated with the *"volume"* knob and a coarse regulation of the selectivity *"Selector I"* dial effected by throwing the antenna short-and-long switch from *"short"* to *"long"* position and *vice versa.*

If the set is to be operated in a residential district three or four miles from a local broadcast station, the plate leads of the R.F.-amplifier tubes should be fastened under terminal screws "2" of the coil sockets in compartments S2, S3 and S4; this is the position of greatest volume together with extremely good selectivity. Moving the three plate leads to post "4" of the respective coil sockets increases the selectivity and decreases the volume very slightly. While connecting the plate leads to post "1" of the coil sockets gives an extremely high value of selectivity at the expense of a slight decrease in volume, this connection is recommended only where the receiver is located within half a mile or a mile of a broadcast station.

The three condensers in stage compartments S2, S3 and S4 should be gauged by fastening the link motion to them and adjusting it so that all three condensers begin to interleave and hit their stop rods at the same time. After the set has been put in operation, the aerial length should be cut down until some station at about 300 or 325 meters is barely audible. The right-hand condenser (C4) should then be loosened from the ganging and tuned individually. While condensers S2 and S3 are tuned together for loudest signal, the condition of loudest signal will be when condenser S4 lags slightly behind condensers S2 and S3. The link motion should be tightly locked in place at this point, after which no attention need be paid to ganging.

In operating this receiver, remember that it tunes exactly like any ordinary neutrodyne or non-oscillating tuned R.F. receiver, and that it will not oscillate if properly assembled (except in the case of very unusual operating conditions where it may oscillate with the plate leads connected to post "2" of coils L2, L3 and L4, and with no antenna connected to the receiver). With even a 15-foot aerial, the set will not oscillate at any wavelength. The set in operation should give loudspeaker signals upon stations barely audible upon other tuned R.F. or superheterodyne receivers, or equivalent volume with greater selectivity on any stations that may be heard with any standard tuned R.F. receiver operating on a 60- to 100-foot aerial. Thus, a loop is especially

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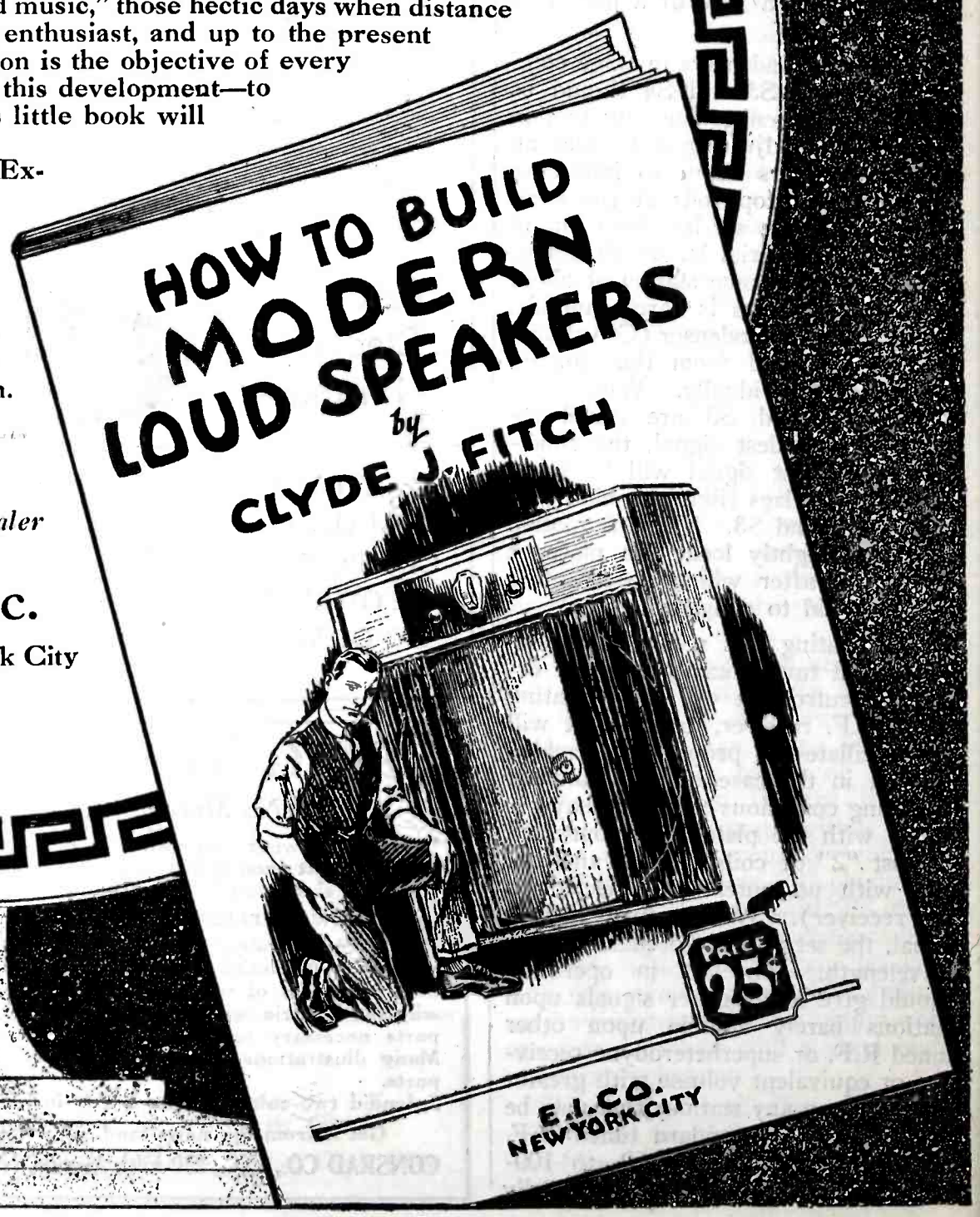


recommended for use in connection with the Shielded Grid Six, as will be found specified in the list of parts accompanying this article. So operated, it will provide superheterodyne selectivity, surprising simplicity of operation, and volume equal or greater than that obtainable from a standard tuned R.F. and ordinary superheterodyne receivers.

## The Karas A. C. Equamatic

(*Continued from page* 102)

Contact is made also to the terminals of the cable socket under the baseboard. Each terminal of the socket is given a color different and this color corresponds to that of the wire in the cable with which it connects. When connecting this socket with the power wires of the set the following system should be followed: "B+ Power" connects with green; "B+ Amp." connects with pale green, "B+Det." connects with blue, "B—," "D—" and Ground connect with yellow and brown, "D+" connects with Black; and the red terminal of the socket is not used. In addition to the parts mentioned, several fixed condensers and resistors are mounted under the sub-base.

After the condensers have been mounted, and before the front panel has been fastened in place, the coupling unit is passing over the shafts of the two condensers. The condensers should be adjusted so that their plates are in the same relative position and then the set screws on the coupling unit should be tightened.

This view also shows that the coils are mounted at an angle. This is necessary in order to prevent interstage coupling. The correct angle will be found indicated on the drilled sub-base, if one is used; and it is shown also in the sub-base drilling layout.

For the operation of this receiver it will be noticed that a "D" potential is called for as well as the usual "A" and "B" potentials. This is made necessary by the use of the heated-cathode type of tube in the detector circuit; and if the correct voltage is used the sensitivity of the receiver is improved. In the circuit the detector cathode and grid return are at ground potential and the "D" potential is connected between the cathode and the heater of the detector tube. The value of this potential is not critical and may vary from 10 to 45 volts, with the positive connected to the heater. Also, strange as it may

seem, the set sometimes works better if the potential is reversed, i.e., with the negative terminal connected to the heater; and in some cases it may be found that better results are obtained if the battery is omitted and the terminals connected together. When the "D" potential is used, the voltage from the plate-power-supply unit may be employed.

## Scratch Filter for Phonograph Pick-Ups

(*Continued from page* 154)

The condenser and coil are simply connected in parallel and then in parallel again across the output terminals of the phonograph pick-up device. This hook-up is plainly shown in the accompanying photograph. The finger in this illustration is pointing to the .005-mf. condenser, directly in front of which is the R.F. choke.

## Hint on Tightening Binding Posts

WHEN mounting binding posts of the type that have holes through their bodies, it is sometimes difficult to fasten them with the holes facing in the desired direction. If the under fastening nut is tightened, the upper part of the post has a tendency to turn with it.

**A sharp pointed instrument is passed through the hole in the binding post and held in position while the nut is being tightened.**

To overcome this minor trouble, put the point of a scriber or other thin tool through the hole in the binding post, and while holding the post straight with one hand, tighten the screw on the under side of the panel with the other. If all the binding posts are mounted in this way, their holes will all point uniformly, and the wires connecting to them will have a neat appearance.

## A Two-Tube Socket-Power Set

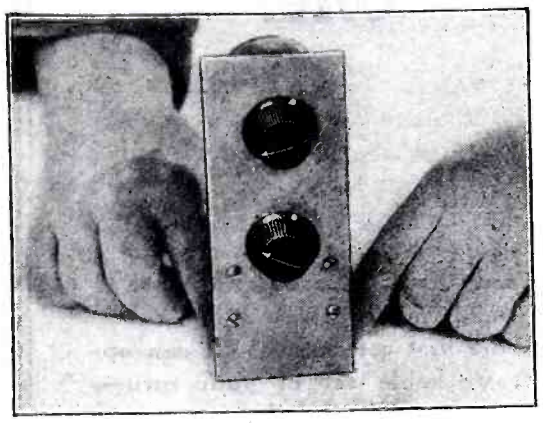
(*Continued from page* 147)

Two UX281 rectifiers (the Unipac will work entirely satisfactorily with only one rectifier tube but with slightly lower voltage delivered to the 210 tubes) should be inserted in the two right-hand sockets. One UX226 should be placed in the left-hand socket and two UX210 tubes in the middle sockets at the left end. If desired, the Unipac may be operated with only one 210 tube at first the other being added later or only where high volume without distortion is required. The loud speaker should be connected to the right-hand pair of tipjacks on the Unipac, and the two output binding posts of the tuner connected to the two left-hand tipjacks of the Unipac. To operate the set, the receiver is tuned as usual. On local stations the volume obtained should be equal or greater than that experienced with the majority of four, five, or six tube sets, and the tone quality finer than that of any other receiver.

For phonograph operation, it is simply necessary to remove the two connections from the tuner to the left-hand two tipjacks of the Unipac and to connect these tipjacks to the cord tips of some magnetic phonograph pick-up. The Unipac amplifier will produce with a standard record pick-up sufficient volume for dancing in a hall one hundred feet square, or even larger, with only one loud speaker; while with two or three loud speakers, it will give more than sufficient volume. A number of these Unipacs are used in small movie theatres with two or three loud speakers and provide phonograph music with the same volume as an original orchestra would in a theatre. Of course, the depth and richness of music delivered by the Unipac using good electrically cut records is far finer than would normally be obtained in a small theatre with the usual small theatre orchestra of a few pieces, for all of the better dance records are made with multi-piece orchestras and the Unipac reproduces them with all of their natural warmth and richness of tone. Using the Magnavox dynamic cone loud speaker, the reproduction of the set and Unipac combination for either radio or phonograph, is truly astonishing. The Magnavox speaker is available with a field requiring a 6 volt battery or trickle charger to excite it, or, in another model, with a 100 volt D.C. field which can be connected directly to the Unipac.

## Heat-Proof Mounting for Resistors

VARIABLE resistors of the open wire-wound type, when used as voltage regulators on "B" socket-power devices, develop a considerable amount of heat. Although the wire itself and the body on which it is wound will withstand this heat without trouble (in well-made resistors), it is not a good idea to mount the instruments on wood or composition panels that are easily affected by heat.

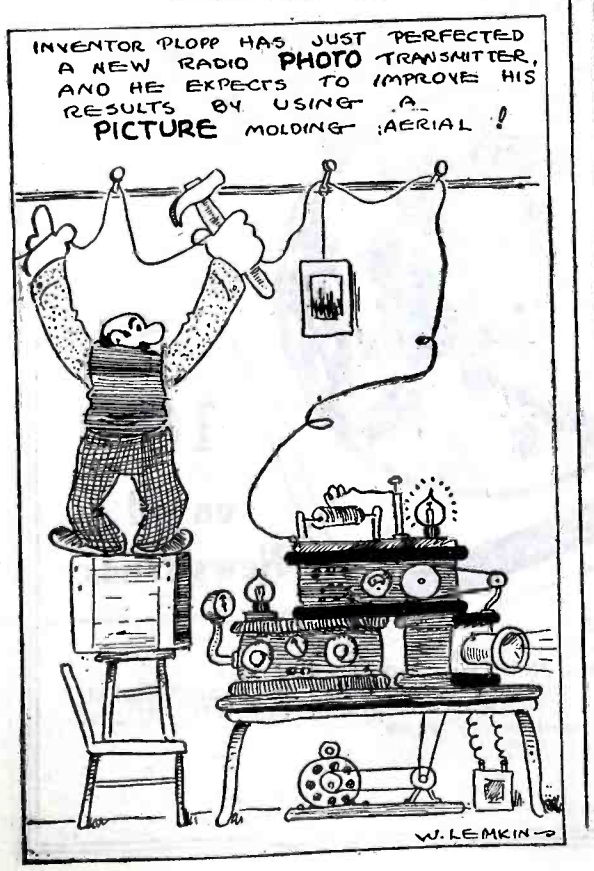


**Showing how resistors can be mounted on a small asbestos panel.**

If the power unit is kept running for several hours, particularly in a poorly ventilated cabinet, the accumulation of heat is likely to char the panel or at least to start decomposing it.

Trouble of this kind can be avoided by the use of a resistor-mounting panel made of asbestos. This material, which can be procured in hardware and plumbing supply stores, is easily drilled, and since it is absolutely fireproof, is ideal for the purpose.

The accompanying photo shows how two resistors can be mounted such as employed in "B" units.



## Profits in Custom-Setbuilding

(*Continued from page* 68)

radio in order to give all radio users the best possible service and build the radio business on a firm foundation.

A concern that sells radio receivers needs to be in a position to install them and service them. Its business in radio may be a side line, not large enough to jujstify its keeping a man on full time for such work. It may be glad to receive from the community set builder a proposition to install and service its sets.

The set builder might sell receivers for the concern, on commission, where he could not sell his own home-built outfits or produce them fast enough to supply the demand. It would be an advantage to be able to say to the customer that he could supply standard factory-built sets if that was what was wanted. A reliable service man who went about meeting people in the community and looking for business could increase business and save expense for a radio store or department.

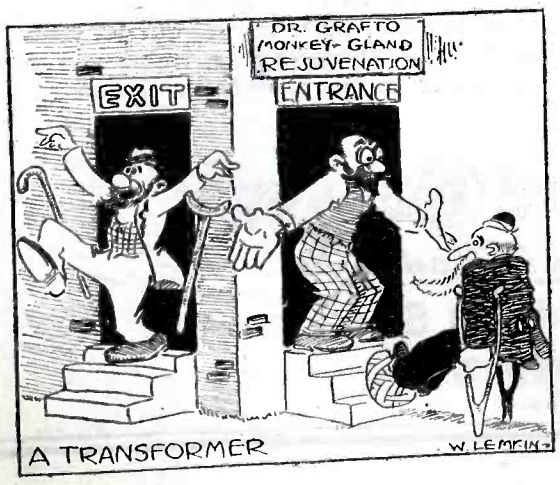
The community set builder meets a real need in the community because only one home out of five is using radio at present and the others have not been reached by the ordinary merchandizing methods.

## A Combined "B" Eliminator and Power Amplifier

(*Continued from page* 139)

separator and mounted on the front of the baseboard by means of brass angles. The audio transformer, T1 and loud speaker choke, T2, resistor mounting with resistor R4, and all small filter condensers, are then assembled on the baseboard as seen in the accompanying photo.

The voltage delivered by this device is very high and it should be handled accordingly. It is best not to handle the eliminator while the power is turned on.



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Chicago, Ill.

Gentlemen:

I have found that Subantenna gives greater distance consistently, than any other form of pick-up system.

I also find reception is nearly always perfectly clear when using a subantenna, particularly on days and evenings when static conditions are impossible to combat with a loop or overhead wire.

We use a Subantenna on our laboratory set in which all Selectone Long Wave transformers are tested, and I have chosen Subantenna for my own personal set at home.

Very truly yours,
SCOTT TRANSFORMER CO.

CIRCUIT DIAGRAM OF SCOTT WORLD'S RECORD SUPER 10 WILL BE SENT UPON REQUEST

# By Test

# SUBANTENNA

## proved best for DX by designer of the 9400 MILE SCOTT WORLD'S RECORD Super 10

The fact that Mr. E. H. Scott, whose fondness for far distant reception led him and his World's Record Super 10 into the spotlight of world-wide fame, endorses and uses a Subantenna in his laboratory work and at home is conclusive proof of the merit of this device.


Read the letter reproduced above. It contains the official answer to the question foremost in the mind of the inveterate DX listener. *"DOES Subantenna increase distance?"* E. H. Scott, the inventor of the WORLD'S RECORD SUPER 10—the receiver holding more distance records than any other, says Subantenna DOES. He says it not only increases distance but that it gives absolute clarity on far-away stations when a loop or up-in the-air aerial brings mostly static and noise. Thousands of fans, hundreds of whom have so written, confirm Mr. Scott's finding. For instance, J. White of Brooklyn, N.Y., picked up Sydney, Australia—10,144 miles away—with a Subantenna. Reception was *clear*, but the instant he switched to a 200 ft. up-in-the-air aerial, the reception became a jumble. From all parts of the world come letters describing truly amazing distance tests in which Subantenna asserts its superiority.

## Listen in on Static-Free Ground Waves Enjoy Louder, Clearer, Better "Distance"

The picture at the right explains why Subantenna brings in far distant stations when other types of "pick-up" fail. Subantenna, as the picture shows, intercepts only the ground component of the wave. This wave is always practically pure and static free. Hence, the radio signal dominates and comes in clearly regardless of the condition in the air. Result—loud, clear DX, irrespective of the weather or the season.

## Authorities and Thousands of Users Prove Amazing Merit of SUBANTENNA

### AUSTRALIA

John White of Brooklyn, New York, has verifications from station 2FC, Sydney, Australia, and 3AR, Melbourne, Australia, of reception made possible by a SUBANTENNA.

### CUBA and SOUTH AMERICA

"To show you that I received a program from Station PWX in Havana, Cuba, I enclose herewith a verification card from that station. On January 28th, I received a program on my set broadcasted from Buenos Aires, South America, at 10:15 in the evening. Many other long-distance stations have been heard on my set after installing the Subantenna. I never could receive such distance on my outside antenna."—W. C. F., Chicago, Ill.

### "MORE STATIONS—NO STATIC"

"I get plenty of stations with my Subantenna, on the loud speaker, that I have never been able to reach with my outside aerial. It absolutely cuts down interference to the minimum, cuts static out too—*not just partly out—but all out.*"—H. S. M., North Carolina.

# FREE TRIAL

## Make this Convincing Test at Our Risk

Install Subantenna. Leave your old aerial up. Select a bad night when DX is almost impossible with the ordinary aerial. Make a comparison station for station, connecting first your aerial, then Subantenna. If, from stations that are just a mess of jumbled noise with the old aerial, you don't get reception that rivals local in sweetness and clarity the instant you switch to Subantenna, this test is Free. Obtain a Subantenna from your dealer or send coupon at once for scientific explanation of Subantenna and for particulars of GUARANTEE and FREE TRIAL OFFER. SEND COUPON NOW!

## CLOVERLEAF Lifetime "B" Eliminator and Cloverleaf AUTOMATIC A and B CONTROL

**180 Volts**

**85 Mil. Tube**

A new, better, advanced type "B" at a new, lower price than any other unit of equal capability. Supplies fixed voltages of 22-45-90-135 and 180 volts for power tube from permanent, non-adjustable taps. No "motorboating." Will run any standard set. The true "lifetime" eliminator, because built of the finest quality materials that money can buy. Guaranteed for two years. Test it FREE. Mail coupon for full details of FREE TRIAL OFFER.

Localizes control of "A" battery, trickle charger and "B" Eliminator in the switch on your set. Installed in a minute. Never needs attention. When you turn your set "off," the Cloverleaf Control automatically turns the tubes *off*, the "B" Eliminator *off*, and the trickle charger *on*. When the set switch is turned "on," the opposite takes place. Try at our risk. Check coupon for full details.

**CLIP and MAIL AT ONCE**

CLOVERLEAF MFG. CO.
2713-X Canal St., Chicago, Illinois

Tell me all about SUBANTENNA; your unqualified, unconditional guarantee and your FREE TRIAL OFFER. Also send me particulars of

- ☐ Cloverleaf LIFETIME "B" Eliminator
- ☐ Cloverleaf Automatic A and B Control
- ☐ Send FREE Circuit Diagram of Scott World's Record Super 10

Name .....

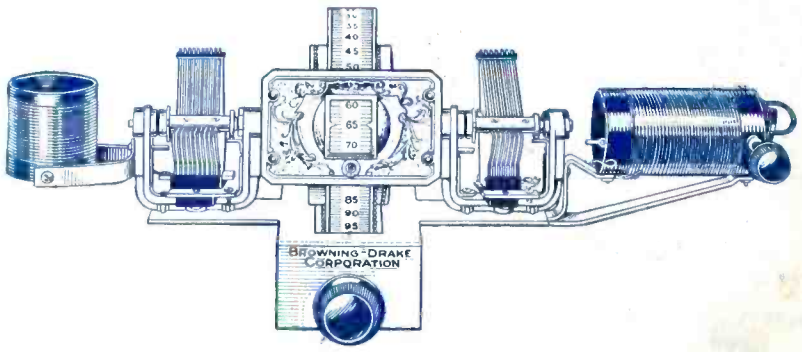
Street .....

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

## CLOVERLEAF MFG CO.

2713-X CANAL ST. CHICAGO, ILL.

# Now! It Is Easy To Build A Real Good Radio




## THE NEW OFFICIAL BROWNING-DRAKE KIT

THIS new Official Browning-Drake Kit is an advance in radio design and engineering. An exclusive product of the Browning-Drake Corporation, it incorporates electrical and mechanical refinements which simplify construction of receiving apparatus and assure efficient operation.

ONE knob controls the single drum illuminated dial, giving a new smoothness of tuning with absolutely no trace of backlash. Coils and condensers are "precision-placed" in the laboratory.

With this new Kit as a basis, it is easy to build either the new Official Browning-Drake five tube Kit-Set, or the new Official Browning-Drake Two Tube Tuner which may be used with any one of the power amplifiers tested and specified by the Browning-Drake Laboratories.

Attractive cabinets are supplied for these new Kit receivers.

Constructional booklets may be obtained either from your dealer or direct, for 25 cents.

## BROWNING-DRAKE CORPORATION

CAMBRIDGE MASS.

# BROWNING-DRAKE RADIO