Citizen's

RADIO CALL BOOK

REG. U.S. PAT. OFFICE

50¢

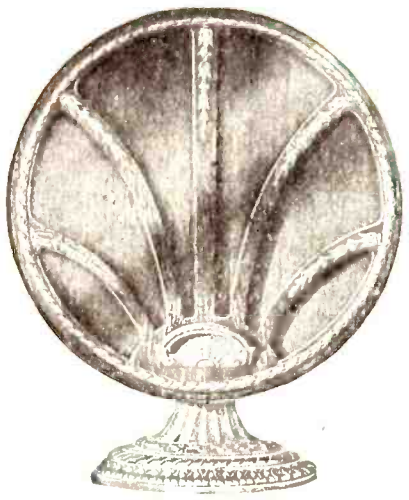
FOREIGN 65 CENTS

A COMPLETE RADIO CYCLOPEDIA

★ "Used the World Over"

Thorola

SPEAKERS & RECEIVERS



Model 9
Cone Speaker
Rich Walnut and Old Gold.
17" high, 14" wide.
Price..... $20.00

SPEAKER styles may change, but the standards of tonal quality were fixed by musical art and acoustic science long before radio. It was only the most advanced radio engineering which always enabled Thorola speakers to meet the established critical standards of tone.

That is why the introduction of a cone speaker bearing the Thorola name first caused Radio to concede that scientifically true reproduction was possible in instruments of this type. Here was another outstanding Thorola attainment—based on the Thorola double-diaphragm principle. With two diaphragms, the Thorola Cone Speaker is able to cover the entire range of reproduction without sacrificing accuracy for either the high or the low end!

Thorola thus literally built this popular kind of speaker around the most popular thing in radio—*tone*—THOROLA TONE. Here is perfect reception of music and speech embraced in a beauteous instrument of irresistible modern style. You want an improved set this year—you will get it with a Thorola speaker on your present set.

This Tudor Model 59 with its exclusive combination of the Thorola 4 Speaker on one side, the Thorola Cone Speaker on the other, and the large non-directorial sound openings, insures the finest possible radio reproduction, with glorious musical timbre.

It is just what a radio receiver should look like—a genuine antique high-lighted walnut console of Tudor design. Ideal for the small apartment or spacious house.
Price..... $185.00

You know how Thorola Low-Loss Doughnut Coils—and Thorola Golden Tone Transformers transferred public interest from the confusion of circuits to the realities of performance. These transformers, with their incredibly fine balance and precision construction, brought characteristic Thorola tonal perfection to the field of complete receivers.

And Thorola Low-Loss Doughnut Coils made selectivity a certainty instead of an argument. The self-contained field of Thorola Doughnut Coils banished uncontrollable "pick-up," and internal interferences as well. A whole train of circuit refinements followed because the old radio uncertainties and variables were no longer able to upset every scientific calculation.

All these fundamental Thorola advancements in tone and power have received another year of intensive development. Naturally, results are improved, and they are attained with certainty and simplicity. Modern two dial control is now used. Sooner or later all really selective sets must come to it.

Just look at the beauty of latest Thorola radio furniture. Listen to the sure artistic musical effects. And you will know why each Thorola receiver invariably produces a whole neighborhood of Thorola enthusiasts. The dealer who shows you Thorola radio is abreast of the best.

REICHMANN COMPANY, 1725 West 74th Street, *CHICAGO, U. S. A.* · Member R. M. A.

THOROLA JUNIOR

At a moderate price there is only one way to obtain Thorola character — the Thorola Junior Speaker. Its size is somewhat smaller, but its voice is fine. Price....$15.00

The smaller Thorola Console, Model 58, in Antique, High-Lighted Genuine Walnut, is a triumph of craftsmanship in the cabinet, circuit and speaker.
Price..... $125.00

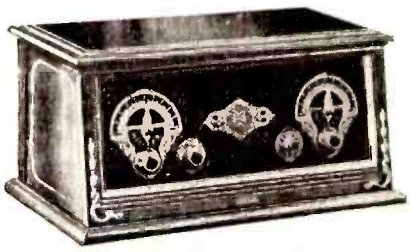
Thorola Doughnut Coils, with their patented indented wiring and true low-loss construction, go far beyond other type theories in improving reception..... $2.00 each (set of 3)..... $6.00

THOROLA 4

Thorola reputation for artistic leadership began with the Controlled Mica Diaphragm of this speaker, and its exclusive Separix, which brought true music to radio by making it possible to reproduce overtones faithfully.

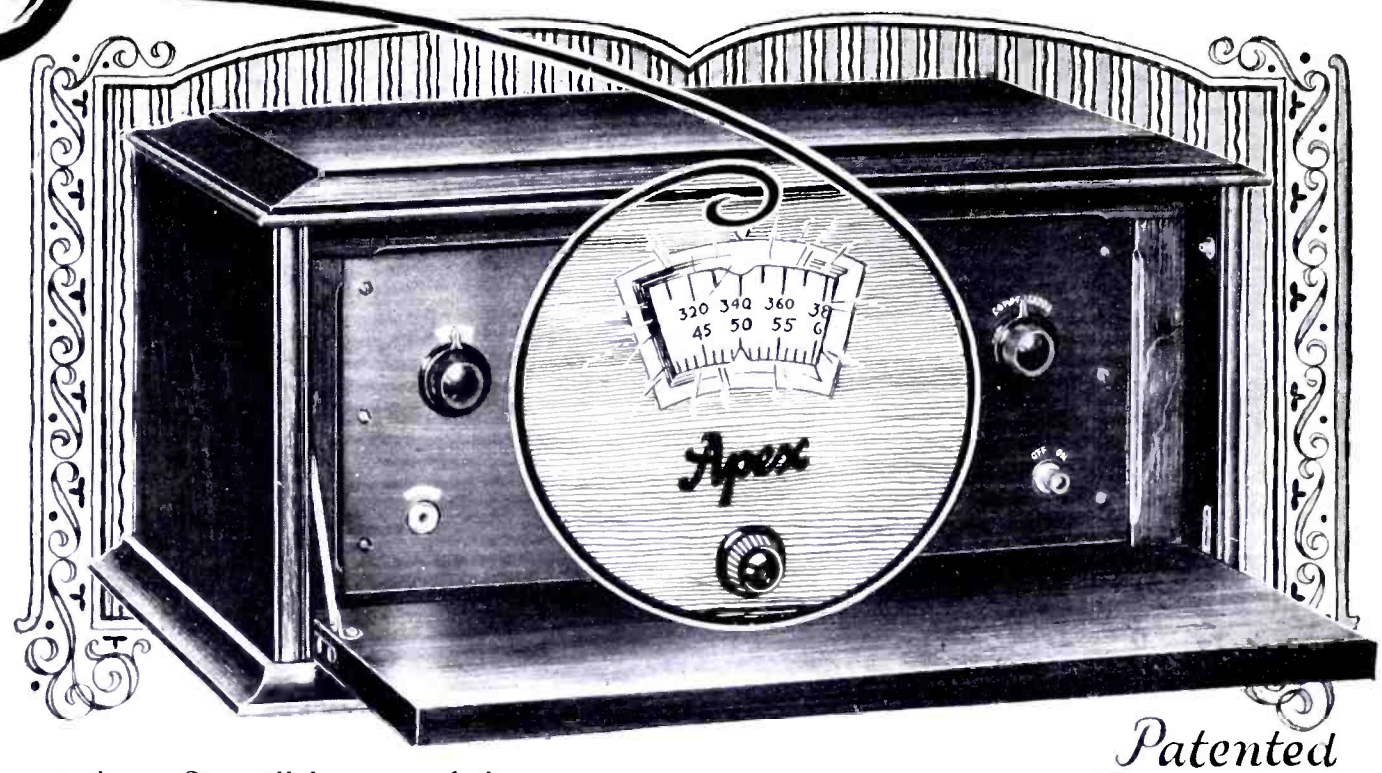
The matchless beauty of the Thorola Bakelite bell and Classic base, is why thousands will actually have no other type of speaker. Thorola 4 performance, made possible by double "push-pull" amplification and other features is why this speaker is more than ever the leader of its type. Price..... $25.00

The Thorola Model 57, of the compact type, puts finest radio within the reach of all. Workmanship and finish is the same as in the luxurious console models. Performance is uncompromisingly Thorola!
Price..... $60.00



All prices slightly higher West of the Rockies

Just One



Patented Compensator

That the new Apex Six will be one of the most popular sets on the market this season and for many seasons to come—is a foregone conclusion.

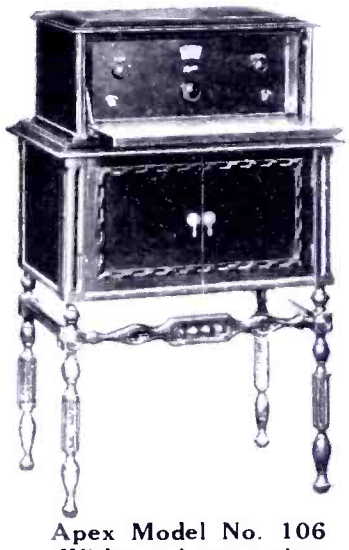
Consider these important improvements: Patented Compensator (patented in 1924 and withheld from the market until its merits had been established beyond all question)—one dial control—impedance coupled—the entire sphere of radio at the command of the turn of a single dial—all distortion eliminated—automatic filament control.

This notable receiver is housed in furniture worthy of its quality and in combinations which enable you to acquire one of the most attractive sets ever designed at a small initial cost. You may purchase an Apex Receiving Set—and later on one of the handsome Apex Cabinets. For example—receiver No. 6 combined with cabinet No. 100 makes set No. 106.

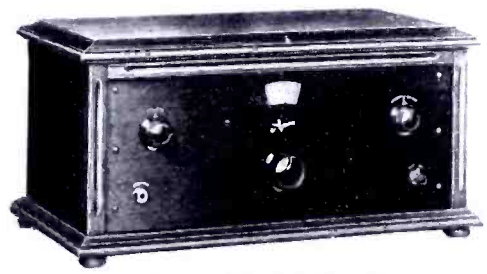
Sixteen years of unimpeachable manufacturing activities vouch for the value of Apex products.

A demonstration of the new Apex Model Six will convince you of its superiority. Ask your dealer.

APEX ELECTRIC MFG. COMPANY
Dept. 920, 1410 W. 59th St. Chicago



Apex Model No. 106
Without Accessories
$175



Apex Model No. 5
Without Accessories
$85

Apex Model No. 116
Without Accessories
$210

Apex

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

FROST-RADIO

MEMBER R.M.A. *Ask Your Neighbor* MEMBER R.M.A.

New Units for the Set Builder

FROST-FONES

are made with the same skill and patience required in building the finest precision instruments. During manufacture they are put through many tests and inspections to insure absolute uniformity of units. They are light in weight, attractive and extremely sensitive to weak signals. See them and compare them with others at your dealer's.

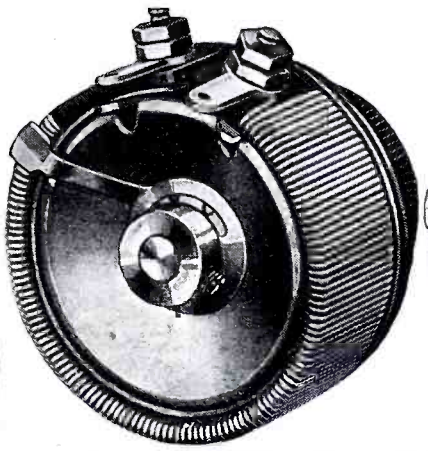
No. 172 — FROST-FONE, 3200 ohm, Bakelite shell and cap type.....$6.00

No. 174 — FROST-FONE, 2000 ohm, aluminum shell type.....$3.00

No. 175 — FROST-FONE, 3000 ohm, aluminum shell type.....$3.50

SEE OUR EXHIBIT
at the
3rd ANNUAL RADIO WORLD'S FAIR
New York, Sept. 13-18

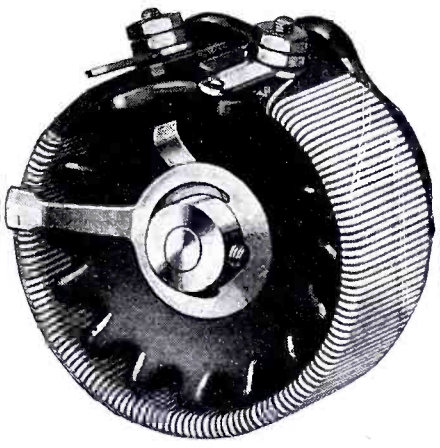
5th ANNUAL RADIO SHOW
Chicago, Oct. 11-17



FROST-RADIO Type 700
Metal Frame Rheostat

	Ohms		Ohms
No. 702½	2½	No. 707	7
No. 703	3	No. 710	10
No. 703½	3½	No. 720	20
No. 704	4	No. 730	30
No. 705	5	No. 750	50
No. 706	6	No. 775	75

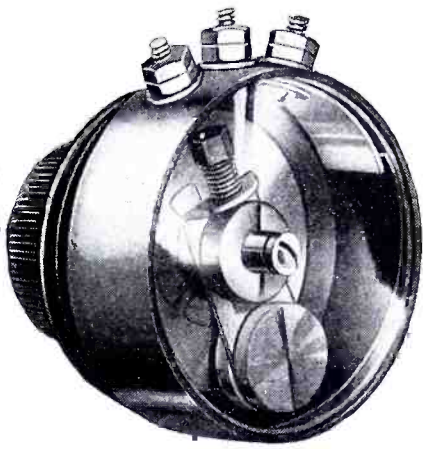
Type 700..... 50c



FROST-RADIO Type 800
Bakelite Frame Rheostat

	Ohms		Ohms
No. 802½	2½	No. 807	7
No. 803	3	No. 810	10
No. 803½	3½	No. 820	20
No. 804	4	No. 830	30
No. 805	5	No. 850	50
No. 806	6	No. 875	75

Type 800..... 75c



FROST-RADIO
Super-Variable Resistance

Two new **FROST-RADIO** units for controlling volume, tone, regeneration, grid bias, etc. These units have none of the objectionable features of wire wound types but have many new and exclusive advantages. They work smoothly and noiselessly and give any graduation of resistance from zero to maximum. Resistance element is designed for large current capacity. It will not overheat and when set the resistance does not vary. See these units today at your dealer's.

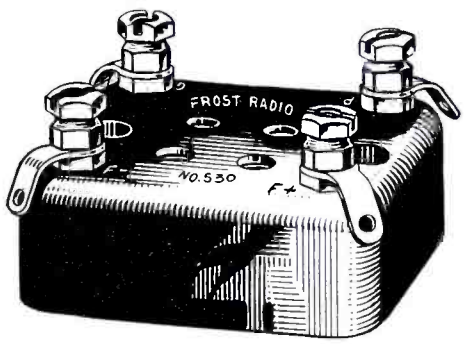
Type 880 Series
(2 Terminals)

No. 880	50,000 ohms
No. 881	100,000 ohms
No. 882	200,000 ohms
No. 885	500,000 ohms

Type 890 Series
(3 Terminals)

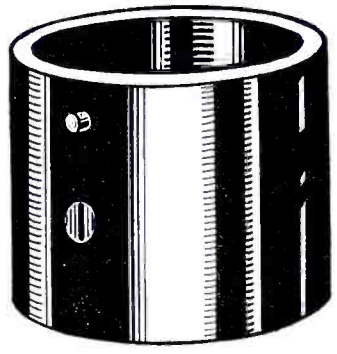
No. 890	50,000 ohms
No. 891	100,000 ohms
No. 892	200,000 ohms
No. 894	400 ohms
No. 895	500,000 ohms
No. 896	2,000 ohms

Both types, $1.25 each



No. 530 **FROST-RADIO** Socket..... 40c

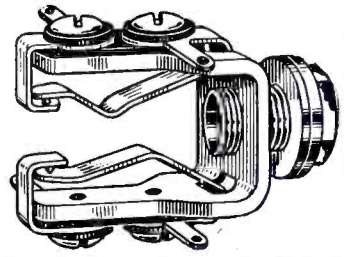
A new genuine Bakelite Socket that takes ALL tubes with new type bases. Its double grip springs are self-cleaning and they hold the tube prongs for almost their full length. Terminals are plainly marked. It is equipped with soldering lugs and hexagon slotted binding posts. Your dealer has them.



No. 540 **FROST-RADIO** Adapter..... 25c

Converts present standard sockets to UX199—CX299 or UX120—CX 220. Made of genuine Bakelite, handsomely finished. With this adapter there is no need of tearing your set apart to install the new tubes. Your dealer has these new adapters.

The NEW **FROST-RADIO** GEM-JAC No. 951 Double Circuit 50c



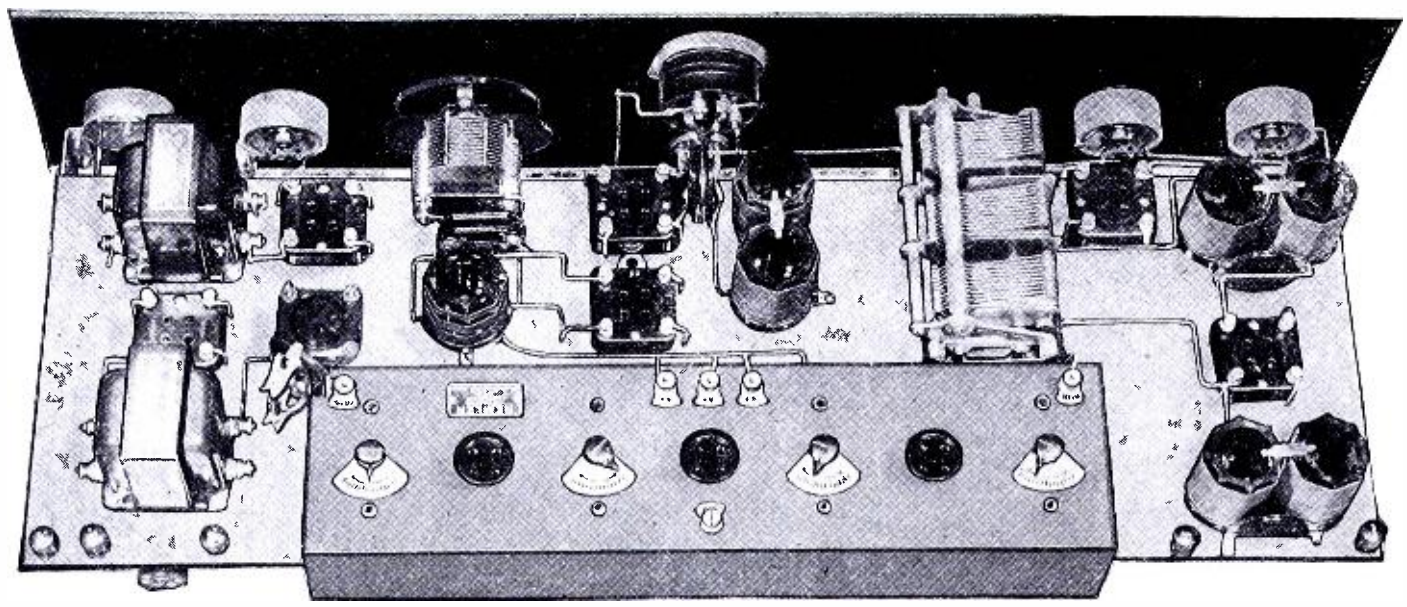
No. 953 Single open circuit.... 40c
No. 954 Single closed circuit.. 45c
No. 955 Single filament control 50c

A small, sturdy jack which projects only 1 inch behind the panel. Cannot get out of adjustment, is self-cleaning and it holds the plug in a firm grip. Sterling silver contacts; nickel plated brass frame; hand buffed thimble and washers. Illustrated actual size.

PACIFIC COAST
PRICES
SLIGHTLY HIGHER

HERBERT H. FROST, Inc.

160 NORTH LA SALLE STREET · CHICAGO, ILLINOIS
NEW YORK CITY LOS ANGELES



Infradyne—the Ultimate in Radio—

From all indications, the Infradyne Circuit promises to be the outstanding development in Radio receivers for the season of 1926-27. Best results, however, cannot be obtained when using inferior parts. We recommend and offer the list as shown in this issue of the Call Book. The complete kit includes drilled and engraved panel and sub-base, also miscellaneous screws, wire, lugs, etc. Write for complete catalog and prices.

We Handle the Following Lines

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

— Dealers —

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

By Serving others better, we the better Serve ourselves

TELEPHONE MAINTENANCE COMPANY

20 South Wells St., Chicago, Illinois

Established TELMACO *in 1918*

And finally —

"Here is the latest embodyment of all that is good in the Inverse Duplex System. I have spared no pains in making its quality of material, workmanship and performance the best. It justifies my years of study, research and accomplishment."

DAVID GRIMES

GRIMES OWN KIT

100% Shielded Inverse Duplex

TRUTH will out! The real rich values of the David Grimes Inverse Duplex System can be realized to their utmost only when quality parts, workmanship and design are present. Here is a master-made kit easily assembled into a master radio instrument that should last for a life-time.

The Grimes Own 5 Tube Storage Battery Kit (or the 4 Tube Dry Cell Kit) is built, sold and guaranteed by David Grimes. In addition each standard part is guaranteed by its own manufacturer, forming a double guarantee to the constructor. It is 100% shielded and when assembled, the finished aluminum castings form a sturdy artistic cabinet. The kit incorporates the latest improvements in the art, bringing the famous Inverse Duplex System to a point of utmost efficiency in selectivity, volume and tone. David Grimes has rightly called this kit his "own" because he is proud of it.

HIGHSPOTS

The Grimes Own is the only completely shielded kit set in existence. It is the first David Grimes Inverse Duplex Kit ever sold. It embodies three stages of radio, detector and three stages of audio frequency. Designed for power tube operation.

Connections furnished for loop or antenna.

Study These Parts With Care!

Two Samson Audio Transformers.
One Grimes special resistance coupling.
Five Benjamin non-microphonic UX sockets.
Three semi-straight line Lind vernier tuning condensers and coils.
One Grimes RF Choke Coil to equalize all wave-lengths.
One Grimes RF Fixed Transformer for added amplification and equalization.
One DeJur Rheostat.
One Electrad Potentiometer.
One drilled artistically etched black and gold metal panel, 7 x 18.
Grimes complete aluminum shielding cabinet.
One Grimes antenna switch.
Six Sangamo fixed condensers
Three Arthur Lynch Grid Leaks.
Three Grimes fixed filament resistances.
Acme flexible spaghetti wire in five colors.
Battery Cable.
Blueprints and instructions.

Send for Grimes Own Working Plans

You can now obtain charts and detailed descriptive matter covering the fascinating David Grimes Inverse Duplex System and its most recent developments. Pin a single dollar bill to this convenient coupon and get the valuable illustrated plans.

COUPON

DAVID GRIMES, Pres.
Grimes Radio Engineering Co., Inc.
430 Washington Ave.
Long Island City, N. Y.

I want the facts on your latest I. D. S.
I enclose a dollar bill.
Send me those plans.

Name .....

Address .....

Grimes Radio Engineering Co., Inc.
430 Washington Avenue, Long Island City, N. Y.
Not connected with any other company of a similar name

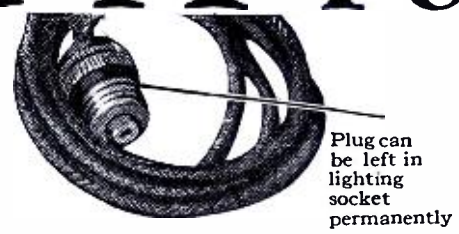
Territory still open for desirable dealers

Selective Charging

A new feature in "A" Power Units

The Willard "A" Power Unit

& "B" Battery Charger



Here's an "A" Power Unit you don't have to worry about. It gives you trickle charging for ordinary use of your radio set, and there's a two ampere rate for emergencies.

The colored balls in the sight gauge inform you which rate is needed to keep its genuine Willard Threaded Rubber "A" Battery fully charged at all times. A double throw switch enables you to *select* this rate. Another switch serves to throw the "A" Battery on the set, or the unit on charge, while another takes care of recharging up to 96 volts of "B" Batteries.

WILLARD STORAGE BATTERY CO.

CLEVELAND, OHIO, U. S. A.

The Willard Selling Plan for Radio Dealers

Your local Willard Service Station will act as your jobber on Willard Radio Products.

This means a quick source of supply for strictly fresh material which you can turn over to your customers in the pink of condition.

Your local Willard Service Station also assumes the responsibility for service, if needed.

Months of operation have proved that this plan is effective, and profitable for all concerned.

Willard Radio Products will be advertised extensively this fall. Doubles and full-pages in The Saturday Evening Post and other leading publications.

Have your local Willard Service Station explain the details of this practical plan for advertising and selling radio products. The advertisements are signed:

Sales and Service through
The Willard Battery men
and their
Authorized Radio Dealers

Appropriate signs and window cards will identify you as an Authorized Dealer. Booklets and other valuable selling helps will be furnished.

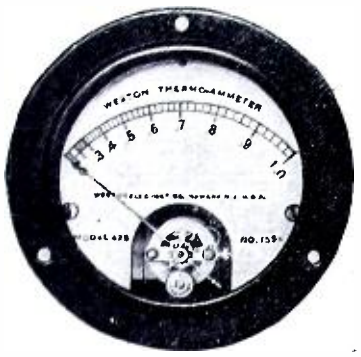
Your Nearest Willard Service Station is Your Nearest Willard Jobber

WESTON—*The Radio Authority*

INSTRUMENTS FOR RADIO MEASUREMENTS

As in every field of electrical endeavor, now, in Radio, Weston contributes the most accurate knowledge of measurement. The instruments Weston gives to this great new industry, make possible the great success of broadcasting and more pleasurable and more economical radio reception. ¶ Today, no broadcasting station could satisfactorily operate without electrical measuring instruments. ¶ Now, more than ever before, radio enthusiasts are learning that their radio sets cannot be expected to perform satisfactorily without instruments to control the voltage that safeguards tubes and prolongs battery life.

Transmission



Above—Weston Model 425 Thermo-couple type ammeter is an outstanding factor in the success of radio transmission. It is another of the famous line originated and developed by this corporation, which owns all controlling patents. This instrument eliminates entirely the many objections to the "hot wire expansion" type for the measurement of antennae currents—such as sluggish indications, zero shifts with consequent errors and lack of compensation against temperature changes. Weston Model 425 perfectly solves the problem of measuring High Frequency Currents. With equal facility it will measure A. C. of low frequency, and it is accurate on D. C., being a remarkable flexible instrument which may be checked on both A. C. and D. C.

Below Model 425 Thermo-galvanometer—a sensitive thermo-milliammeter of low resistance, especially designed for use in a wave meter circuit for the measurement of wave length and decrement. It is used for the measurement of high frequency resistances by the resistance and re-actance variation method having a large overload capacity.

You will be interested in a study of the free booklet "Weston Radio Instruments" which you can get by writing to us. It describes the various Weston instruments for radio work clearly so that it may be easily understood by both the amateur and the expert. The great manufacturers of receiving sets today know that the use of a control instrument on the panel of a radio set is the best device to protect themselves and their products. These instruments insure intelligent operation. Write us for the booklet describing them.

Reception

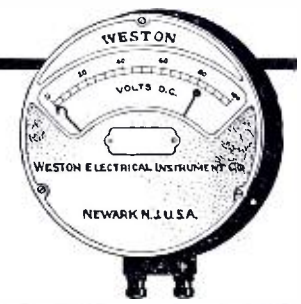
Of the many Weston instruments for improving radio reception and giving greater economy, the new Weston Model 506 "Pin-Jack" Voltmeter with High Range Stand is an especially valuable contribution. It is two instruments in one—a "Pin-Jack" Voltmeter and a High Range Stand. Just plug the "Pin-Jack" Voltmeter into the pin-jacks mounted on the panel and you can measure filament voltage—remove it—plug it into the High Range Stand and you have an instrument that will measure battery voltage up to 160 volts. The High Range Stand is equipped with a pair of 30-inch permanently attached flexible tinsel cables for battery testing or locating circuit troubles. ¶ This unique combination makes possible set operation at the proper filament voltage, gives better reception, makes tubes last longer and prolongs battery life. No operator of a good radio set should overlook the savings and the added pleasure he can get with his instrument.

WESTON ELECTRICAL INSTRUMENT CORPORATION
1 Weston Avenue, Newark, N. J.

STANDARD THE WORLD OVER

WESTON

Pioneers since 1888



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

CITIZENS RADIO CALL BOOK

A COMPLETE RADIO CYCLOPEDIA

Vol. 7 SEPTEMBER, 1926 No. 2

Published tri-annually by the

CITIZENS RADIO SERVICE BUREAU

Executive Offices: 508 South Dearborn Street, Chicago, Ill., U. S. A.

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MEMBER AUDIT BUREAU OF CIRCULATIONS
MEMBER OF RADIO MAGAZINE PUBLISHERS' ASSOCIATION

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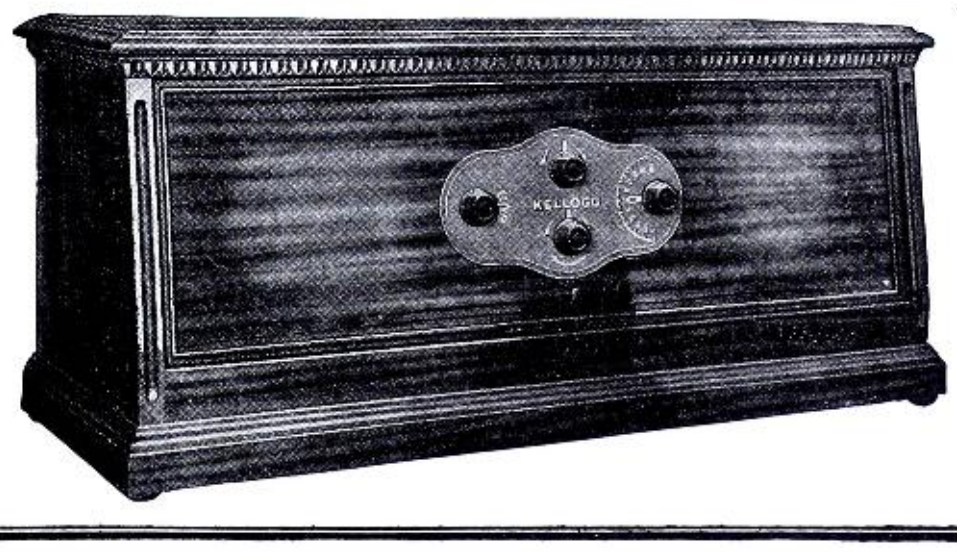
KELLOGG Radio

Flawless Reproduction



Licensed under application for letters patent of Radio Frenquency Laboratories, Inc. [R. F. L.]

Backed by 29 Years' Telephone Experience

Model 508 includes the apparatus of the table model and the famous Kellogg speaker, with ample space for all batteries or power supply units.

FLAWLESS, faultless radio reproduction such as Kellogg has attained can come from experience alone. In radio set building, nothing — absolutely nothing — matches experience.

Model 507 receiver is the finished result of our 29 years' experience in voice transmission — a set that cannot squeal or howl — that brings them in with a "punch" to delight the most critical radio fan.

Heavy shielding around and between the coils prevents interference, and three stages of radio frequency give maximum range and selectivity. Take our word for it — here's a receiver that's as perfect as can be made.

Mail this Coupon *Now* for full details of the new Kellogg 507 receiver with the refinements and improvements possible only from an experienced institution like Kellogg.

Kellogg Switchboard & Supply Co.
1066 W. Adams St., Dept. 241 Chicago

DEALERS FRANCHISES

Dealers now receiving franchises. Write and let us tell you all the things we are doing to make Kellogg sets sell BIG.

Mail the Coupon Today

Dept. 241
Kellogg Switchboard & Supply Co.
1066 West Adams St.
Chicago, Illinois

Please send me full information on the Kellogg Six Tube Receiver, model 507, and on the console model 508.

Name _____

Address _____

_____

If a dealer, interested in a Kellogg Sales Franchise, check here ☐

American Broadcasting Stations

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

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

AT9 United States Army, Fort Bragg, N. C. 434 meters. 750 watts. Tues, Thurs, Sat, 8-9:55 pm. Sun, services, 8-9:55 pm. Eastern time. Slogan: "Pioneer Broadcasting Station of the Army."

KDKA Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa. 309 meters, 970 kilocycles, 1000 watts, class B. Monday, 6:15-9:45 pm. Time calls, 11 am, 12 n, 2:30 pm; baseball scores, 3:20 pm; stock weather reports, 5:30; dinner program, 6:15; baseball scores, 7:40 pm; stock report, 8-9:55 pm; evening program, 9:55 pm. Time signals, late program, Tues & Thurs, 10:35 am; Sun, 10 am-12 m, church; 6:15 pm, baseball scores; 7:45-9 pm, church

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

KDPM Westinghouse Elec. & Mfg. Co., 1216 West 58th St, Cleveland, Ohio. 270 meters, 1870 kilocycles, 750 watts, class A. Schedules various and experimental. Eastern standard time.

KDPT Southern Elec. Co., San Diego, Calif. 244 meters, 1230 kilocycles, 50 watts, class A. Pacific time.

KDYL Newhouse Hotel, Salt Lake City, Utah. 246 meters, 1220 kilocycles, 50 watts, class A. Daily ex Sun, 2 pm to 2:30 pm; 2:30 pm to 3 pm; 3 pm to 4 pm; 4 pm to 5 pm; 5 pm to 5:30 pm; 5:30 pm to 6 pm; 6 pm to 6:30 pm; 6:30 pm to 8 pm entertainment. Sun, 11-1 am. Mountain time. Slogan: "The Little Station with the Big Voice."

KDZB Frank E. Siefert, 1402 20th st., Bakersfield, Calif. 209.7 meters, 1250 kilocycles, 100 watts, class A. Daily ex Sun, 8-9 pm, reports and music. Pacific standard time.

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

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

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

KFAJ University of Colorado, Boulder, Colo. 261 meters, 1150 kilocycles, 100 watts, class A. Fri, 11 pm, studio program; Sun, 3-5 pm, organ selections. Mountain time.

KFAN University of Idaho, Moscow, Idaho. 231 meters, 1300 kilocycles, 50 watts, class A. Pacific standard time.

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

KFAW The Radio Den, 115 N. Broadway, Santa Ana, Calif. 280 meters, 1070 kilocycles, 10 watts, class A. Pacific time.

KFBC Normal Heights Station, San Diego, Calif. 224 meters, 1080 kilocycles, 100 watts, class A. Tues, Thurs, 8-9 pm, educational talks and lectures. Sun, 8:15 am, sermon. Pacific standard time.

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

KFBK Kimball Upson Co., 610 Calif st., Sacramento, Calif. 247.8 meters, 1210 kilocycles, 100 watts, class A. Mon, Thurs & Sat, 7:30-10 pm. Standard time.

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

KFBS School District No. 1. 238 meters, 1260 kilocycles, 15 watts, class A.

KFBU St. Matthew Cathedral, Laramie, Wyo. 270 meters, 1110 kilocycles, 500 watts, class A. Mon, Wed, Fri, 9-11 pm; Sun, 2:30-3:30 pm, 7:30-8:30 pm. Mountain standard time.

KFCB Nielsen Radio Supply Co., 311 N. Central Ave., Phoenix, Ariz. 238 meters, 1260 kilocycles, 125 watts, class A. Sun, 9:30 to 10:30 am, Radio Community Bible class. Mon, 7:30 to 8:30 pm, children's hour. Wed, 8 to 9 pm, musical. Sat, 7-8 pm, educational program 12 to 2 am. Mountain standard time. Slogan: "Kind Friends Come Back."

KFCC First Congregational Church, Holter and Benton sts, Helena, Mont. 248 meters, 1210 kilocycles, 10 watts, class A. Mountain time.

KFCF Frank A. Moore, 707 Baker Bldg., Walla Walla, Wash. 256 meters, 1170 kilocycles, 100 watts, class A. Mon, 8-10 pm. Thurs, Fri, 8-12 midnight. Pacific time.

KFDD St. Michael's Cathedral, Boise, Idaho. 278.6 meters, 1080 kilocycles, 50 watts, class A. Sun, 11:15 am-12:30 pm; 7:30 pm-9:15 pm, church services. Mountain time.

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

KFDX First Baptist Church, Shreveport, La. 230.6 meters, 1300 kilocycles, 100 watts, class A. Sun, 10:50 am, 7:45 pm. Wed, 9-10 pm. Central standard time.

KFDY South Dakota State College, Brookings, S. Dak. 273 meters, 1100 kilocycles, 100 watts, class B. Daily ex Sun, 12:15 n, livestock markets and weather. Tues, 11 am, college assembly exercises. Thurs, 8-9 pm, special music and educational talks. 7:30 pm after Oct 1. Central standard time.

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

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

KFEL W. L. Winner, Inc., 1281 Grant st., Denver, Colo. 254 meters, 1180 kilocycles, 250 watts, class A. Daily ex Sun, 11-12 n, 2-3 pm, 4-5 pm, 5-6 pm, popular music. Tues, 9-10 pm, male trio. Thurs also, 8-12 pm, sleepwalkers. Mountain standard time.

KFEQ Scroggin & Co. Bank, Oak, Nebr. 268 meters, 1120 kilocycles, 500 watts, class A. Daily ex Sat & Sun, 23 pm, orchestra music. Tues, Thurs, 9-10:30 pm, musical. Sun, 4:30-6 pm, musical; 9-10:30 pm, orchestra. Central standard time.

KFEY Bunker Hill & Sullivan Mining & Concentrating Co., Industrial Y. M. C. A. Station, Kellogg, Idaho. 233 meters, 1290 kilocycles, 10 watts, class A. Wed, 6:30-7:30. Sat, 6:30-7:30 and 9-10 pm. Sun, 7:30-8:30 pm, church. Pacific standard time. Slogan: "The Voice of the Coeur D. Alenes."

KFFP The First Baptist Church, Moberly, Mo. 242 meters, 1240 kilocycles, 50 watts, class A. Central standard time. Slogan: "The Gospel Messenger of the Air."

KFFV Graceland College, Lamoni, Iowa. 250 meters, 1200 kilocycles, 100 watts, class A.

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

KFH Hotel Lassen, Wichita, Kans. 268 meters, 1120 kilocycles, 500 watts, class B. Sun, 9:40 am, Sunday school; 11 am, church; 7:15 pm, church; 10 pm, musical. Mon, 8:45-9 am to 2 pm; every hour markets; 12 n, musical; 7 pm, musical; 10 pm, musical. Daily ex Sun & Mon, 8:45-9 am to 2 pm; every hour markets; 12 n musical; 7 pm, musical; 10 pm, musical. Central standard time.

KFHA Western State College of Colorado, Gunnison, Colo. 252 meters, 1190 kilocycles, 50 watts, class A. Tues, 7:30-9:30 pm, musical program. Fri, 8-9 am, experimental test; 7:30-9:30, musicale. Mountain standard time. Slogan: "Where the Sun Shines Every Day."

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

KFI Earl C. Anthony, Inc., Packard Motor Car Bldg., Los Angeles, Calif. 467 meters, 640 kilocycles, 5 kw, class B. Mon, 9 pm. Tues, Wed & Thurs, 8 pm, varied. Fri, 6:45 pm, Burr McIntosh, "The Cheerful Philosopher," and at 10 pm, The Ballad Hour with Tom McLaughlin, Leslie Adams, Paul Roberts, Emma Kimmel and Lou Parker; 11 pm till 2 am, KFI Midnight Frolic, Carey Wilson, master of ceremonies. Pacific standard time. Slogan: "A National Institution."

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

KFIO North Central High School, Spokane, Wash. 365.3 meters, 1130 kilocycles, 100 watts, class A. Fri, 8-9:30 pm. Pacific standard time.

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

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

KFIZ The Daily Commonwealth & The Wisconsin Radio Sales, Inc., Fond du Lac, Wis. 273 meters, 1100 kilocycles, 100 watts, class A. Daily, 5 to 5:30 pm, markets, weather & news, occasional evening programs of music. Sun, 6 pm to 7 pm, dinner hour concert. Central standard time.

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

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

KFJF National Radio Mfg. Co., 406 N. Hudson st., Oklahoma City, Okla. 261 meters, 1150 kilocycles, 500 watts, class A. Daily except Sun, 12:15 n, entertainment & news; 3-4-5-6, baseball; 6:30 pm, dinner hour; 7 pm, news. Sun, 10 am, Bible class; 11 am, church; 8 pm, church. Central standard time. Slogan: "City of Opportunity."

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

KFJM University of North Dakota, Grand Forks, N. Dak. 278 meters, 1080 kilocycles, 100 watts, class A. Limited coml. Sun, 6-7 pm, orchestra; 8-9 pm, general music and addresses, weather, etc. Daily ex Sun, 12 n- 1 pm, music records; 6-7 pm, orchestra; 8-9 pm, general. Central standard time. Slogan; "The Educational Center of the State."

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

KFJX Iowa State Teachers' College, Cedar Falls, Iowa. 258 meters, 1163 kilocycles, 50 watts, class A. Educational programs. Schedule irregular. Central standard time.

KFJY Tunwall Radio Co., 13 N. 10th St., Fort Dodge, Iowa. 246 meters, 1220 kilocycles, 50 watts, class A. Sun, 11:00 am, church services. Mon, Wed & Sat, 5:45 pm, market, news & weather; 9:00 pm, dance program. Tues & Fri, 5:45 pm, market news, weather. Thurs, 5:45 pm, market, news, weather; 7:00 pm, program; 8:00 pm, program.

KFJZ W. E. Branch, 400 W. 7th St., Fort Worth, Tex. 254.1 meters, 1180 kilocycles, 100 watts, class A. Sun, 7:00-10:00 pm., 11:00-12:30 mornings. Daily ex Sun & Wed, 8:30-9:30 pm, 9:00 am to 6:00 pm. Central standard time.

The New Balkite Charger
with both Trickle and high charging rates

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

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MODEL K. With 6-volt "A" batteries can be left on continuous or trickle charge thus automatically keeping the battery at full power. With 4-volt batteries can be used as an intermittent charger. Or as a trickle charger if a resistance is added. Charging rate about .5 amperes. Price $10. West of Rockies $10.50. (In Canada $15.)

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Eliminates "B" batteries and supplies "B" current from the light socket. Three new models. Balkite "B"-W at $27.50 for sets of 5 tubes or less requiring 67 to 90 volts. Balkite "B"-X for sets of 8 tubes or less; capacity 30 milliamperes at 135 volts—$42. Balkite "B"-Y, for any radio set; capacity 40 milliamperes at 150 volts—$69. (In Canada: "B"-W $39; "B"-X $59.50; "B"-Y $96.)

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Now you can operate your radio set from the light socket. Merely by adding the new Balkite Radio Power Units—either by adding a Balkite Charger and Balkite "B," or by adding the new Balkite Combination Radio Power Unit.

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KFKA Colorado State Teachers' College, Greeley, Colo. 273 meters, 1100 kilocycles, 100 watts, class A. Wed, 10 am, chapel exercises. (Schedules to be announced.) Mountain time.

KFKQ Conway Radio Laboratories, Box 360, Conway, Ark. 250 meters, 1200 kilocycles, 100 watts, class A.

KFKU University of Kansas, Lawrence, Kan. 275 meters, 1099 kilocycles, 500 watts, class B. Mon & Thurs, 6:55-8 pm. (Also special broadcasting.) Central standard time. Slogan: "Up at Lawrence on the Kaw."

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

KFKZ F. M. Henry, 107 E. Harrison St., Kirksville, Mo. 226 meters, 1330 kilocycles, 50 watts, class A. Sun, 3:30 to 4:30 pm. Mon, 8-9 pm, dance music; 9 pm, radio plays. Slogan: "Kirksville, the Home of Osteopathy."

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

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

KFLV Swedish Evang. Miss. Church, Rockford, Ill. 229 meters, 1310 kilocycles, 200 watts, class A. Fri, 8:30 pm. Sun, 12:30 pm (Swedish), 9:30 pm (English). Central standard time.

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

KFLZ Atlantic Automobile Co., 3rd and Poplar Sts., Atlantic, Iowa. 273 meters, 1100 kilocycles, 100 watts, class A. Daily ex Sun, 11:50 am-12:30 pm. Tues, Wed, 8:30-10 pm. Central standard time.

KFMB Christian Churches of Little Rock, Little Rock, Ark. 254 meters, 1180 kilocycles, class A. Central standard time.

KFMQ University of Arkansas, Fayetteville, Ark. 299.8 meters, 1000 kilocycles, 750 watts, class B. Mon, 7:30 pm, farmers' night. Tues, 8 pm, musical. Thurs, 8 pm, Radio Extension lectures. Central standard time. Slogan: "The Voice of the Ozarks."

KFMR Morningside College, Sioux City, Iowa. 261 meters, 1149 kilocycles, 100 watts, class A, commercial. Thurs, 9:15-10 pm. Central standard time. No program. Silent during summer months.

KFMT Dr. George W. Young, 2219 Bryant Ave., North, Minneapolis, Minn. 263 meters, 1140 kilocycles, 100 watts, class A. Central standard time..

KFMW M. G. Sateren, Houghton, Mich. 263 meters, 1130 kilocycles, 50 watts, class A. Sun, 3-4:30 pm. Central standard time.

KFMX Carleton College, Northfield, Minn. 336.9 meters, 890 kilocycles, 500 watts, class B. Sun, 7 pm, college vesper service. Tues, 9:30 pm, lecture. Wed, 9 pm, concert. Fri, 10 pm, organ recital. Central standard time.

KFNF Henry Field Seed Co., Shenandoah, Iowa. 461 meters, 1130 kilocycles, 500 watts, class A. Sun, 10:45 am-12:15 pm, services; 2:30-4:30 pm, 6:30-9:00 pm, services. Mon, 7-8 am. Tues, 10-11 am. Wed, 12-2 pm. Thurs, 3-5 pm. Fri, 7-9 pm. Sat, 11-12 pm. Slogan: "Known for Neighborly Folks." Central standard time.

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

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

KFOJ Moberly High School, Moberly, Mo. 242 meters, 1240 kilocycles, 10 watts, class A. Central standard time.

KFON Eschophone Radio Shop, Long Beach, Calif. 233 meters, 1288 kilocycles, 500 watts, class A. Daily ex Sun & Mon, 10-11 am, 2:30-5 pm, 6-11 pm. Mon, 10-11 am, 6-11 pm. Sun, 2:30-4 pm. Pacific time. Slogan: "Where Your Ship Comes In."

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

KFOR David City Tire & Elec. Co., David City, Nebr. 226 meters, 1330 kilocycles, 1000 watts, class A. Mon & Tues, 8-9 pm. Central standard time. Slogan: "The Voice of David City."

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

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

KFOY Beacon Radio Service, 373 Robert St., St. Paul, Minn. 252 meters, 1190 kilocycles, 50 watts, class A. Sun, 2:30 pm, musical. Daily, 8 pm, reception reports. Central standard time.

KFPL C. C. Baxter, Dublin, Tex. 252 meters, 1190 kilocycles, 15 watts, class A. Central standard time.

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

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

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

KFPT Radio Service Corp. of Utah, Salt Lake City, Utah. 261 meters, 1150 kilocycles, 500 watts, class A. Mountain time.

KFPW St. Johns M. E. Church, Box 424, Carterville, Mo. 258 meters, 1130 kilocycles, 100 watts, class B. Sun, 9-10 am, 9-10 pm, chapel service. Mon, 7-8 pm, 9:30-10:30, popular and classical musical programs. Wed, 7-12 pm. Thurs, 7-8 pm, 10-12 pm. Fri, 7-8 pm. Sat, 7-8 pm, 11 pm to midnight. Central standard time. Slogan: "Keeping Pace with Christ Means Progress."

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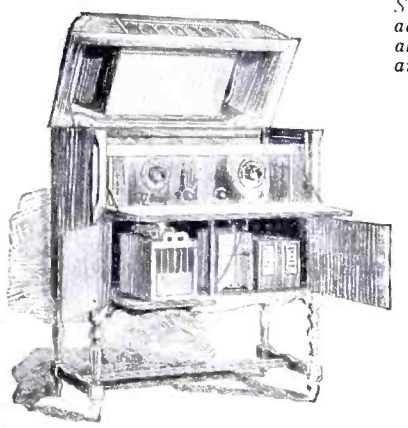

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KFPY Symons Investment Co., Symons Block, Spokane, Wash. 266 meters, 1130 kilocycles, 100 watts, class A. Daily ex Tues & Sun, 7-7:45 pm. Wed, 9-11:59 pm, 11-midnight. Sun, 9:45-10:30 am, 9-10 pm. Pacific standard time.

KFQA The Principia, 5539 Page Ave., St. Louis, Mo. 280 meters, 1070 kilocycles, 5000 watts, class B. Sun & Thurs, 8-9 pm, church services and lectures. Central standard time.

KFQB Searchlight Publishing Co., Ft.Worth, Tex. 412 meters, 1140 kilocycles, 10000-2500 watts, class B. Daily ex Sun & Wed, 8-12 midnight, musical. Sun, 10 am-12 pm, 3-10 pm, church services. Central standard time. Slogan: "Keep Folks Quoting the Bible—KFQB."

KFQC Kidd Bros.' Radio Shop, Taft, Calif. 231 meters, 1300 kilocycles, 100 watts, class A. Pacific time.

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

KFQP George S. Carson, Jr., 906 College St., Iowa City, Iowa. 223-7 meters, 1340 kilocycles, 10 watts, class A. Wed, 8-9 pm, musical program. Central standard time.

KFQT Texas National Guard, 36th Signal Co., Denison, Tex. 252 meters, 1190 kilocycles, 10 watts, class A. Central standard time.

KFQU Holy City Broadcasting Station, Holy City (Alma P.O.), Calif. 217.3 meters, 1380 kilocycles, 100 watts, class A. Daily ex Sun & Mon, 9-10 pm. Sun, 11 am-12 noon, 9-10 pm. Pacific standard time.

KFRU Stevens College, Columbia, Mo. 499.7 meters, 600 kilocycles. Daily ex Sun, 3-5 pm; 6:15, baseball. Wed, 9-11 pm. Sun, 7:30 am, 9:30 pm. Central standard time.

KFUJ Hoppert Radio Electric Co., Breckenridge, Minn. 242 meters, 1240 kilocycles, 50 watts, class A. Mon, Wed, 8-9 pm, music. Daily ex Sun, 10:30 am & 5:40 pm, music. Weather and markets, daily 10:30 am & 5:40 pm.

KFUO Concordia Theological Seminary, St. Louis, Mo. 545.1 meters, 550 kilocycles, 500 watts. Daily ex Sun, Sat. 3 pm. Mon, Tues, 6:30 pm. Wed, 9:15 pm. Fri, 9:30 pm. Sat, 7:45 pm. Sun, 4 pm, shut-in hour. Central standard time.

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

KFUU Mathewson & Colburn, Oakland, Calif. 220 meters, 100 watts. Mon, 6:30-7:30, 8-10 pm. Tues, 8-10 pm. Wed, 6:30-7:30, 8-10 pm. Thurs, 8-10 pm. Fri, 6:30-7:30, 8-10 pm. Sat, 6:30-7:30, 8-11 pm. Pacific time.

KFVS Hirsch Battery & Radio Co., 312 S. Frederick St., Cape Girardeau, Mo. 224 meters, 1340 kilocycles, 50 watts, class A. Sun, 11 am, church services. Mon, 8 pm, musical program. Thurs, 7 pm, program of old-time music. Central standard time. Slogan: "The City of Opportunity."

KFVX Radio Shop, 1211 S. Main St., Bentonville, Ark. 236 meters, 1270 kilocycles, 10 watts, class A. Central standard time.

KFVW Airfan Radio Corp., 402 B St., San Diego, Calif. 245.8 meters, 1220 kilocycles, 1000 watts, class A. Daily, 6:15-11 pm. Pacific time.

KFVY Radio Supply Co., 413 W. Central Ave., Albuquerque, N. Mex. 250 meters, 1200 kilocycles, 10 watts, class A. Daily ex Sun, 5:30-6:30 pm, news items & music. Tues & Fri, 8-9:30 pm, dance music. Mountain standard time.

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

KFWA Browning Bros. Co., 2451 Kiesel St., Ogden, Utah. 261 meters, 1149.46 kilocycles, 500 watts, class A. Daily ex Sun, 4-6 pm, studio program. Mon, Fri, 9-10 pm. Wed, Sat, 9-12 pm, dance program. Mountain time. Slogan: "Keeping Friends with All."

KFWB Warner Bros. Motion Picture Studios, Inc., 5806 Sunset Blvd., Hollywood, Calif. 252 meters, 1190 kilocycles, 500 watts, class A. Mon, Tue & Wed, 5-6 pm, Big Brother hour; 8-11 pm, musical. Thur, Fri & Sat, 8-11 pm, musical. Sun, 9-11 pm, musical. Pacific standard time. Slogan: "Movieland."

KFWC L. E. Wall, Upland, Calif. 211.1 meters, 1420 kilocycles, 200 watts, class A. Sun, 9-12 am, church services; 9-12 pm, musical. Mon, 9 am-1 pm, 4-12 pm. Tues, 11:30 am-12:30 pm, 3-5 pm, 9-12 pm. Wed, 11:30 am-12:30 pm, 4-6 pm, 9-12 pm. Thurs, 12-1 pm, 4-6 pm, 9-12 pm. Fri, 11:30 am-12:30 pm, 3-5 pm, 9-3 pm. Pacific standard time. Slogan: "The Voice of the Orange Empire."

KFWD Arkansas Light & Power Co., Arkadelphia, Ark. 266 meters, 1130 kilocycles, 500 watts, class A. Central time.

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

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

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

KFWM Oakland Educational Society, 1520 8th Ave., Oakland, Calif. 325.9 meters, 920 kilocycles, 500 watts, class B. Sun, 9:30-11 am, 1-2 pm, 8:30-9:30 pm. Mon, Thurs & Sat, 8-10 pm. Tues, Wed & Fri, 2-3 pm. Pacific standard time. Slogan: "Voice of Oakland."

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

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

KFWV Wilbur Jerman, 385 58th St., South Portland, Ore. 212-5 meters, 1410 kilocycles, 50 watts, class A. Sun, 12-1:30 pm, organ; 6-7 pm, Benson Hotel dinner music. Mon, Fri & Sat, 10-11 am, housewife hour; 6-7 pm, Benson; 7-8 pm, organ; 8-9 pm, dinner music. Tues, 10-11 am, housewife hour; 6-7 pm, Benson; 7-9 pm, organ. Wed, 10-11 am, housewife hour; 6-7 pm, 7-8 pm, organ; 8-9 pm, 11-11:30 pm, music. Thurs, 10-11 am, housewife music hour; 6-7 pm, Benson; 7-8 pm, organ; 8-9, 11-12.

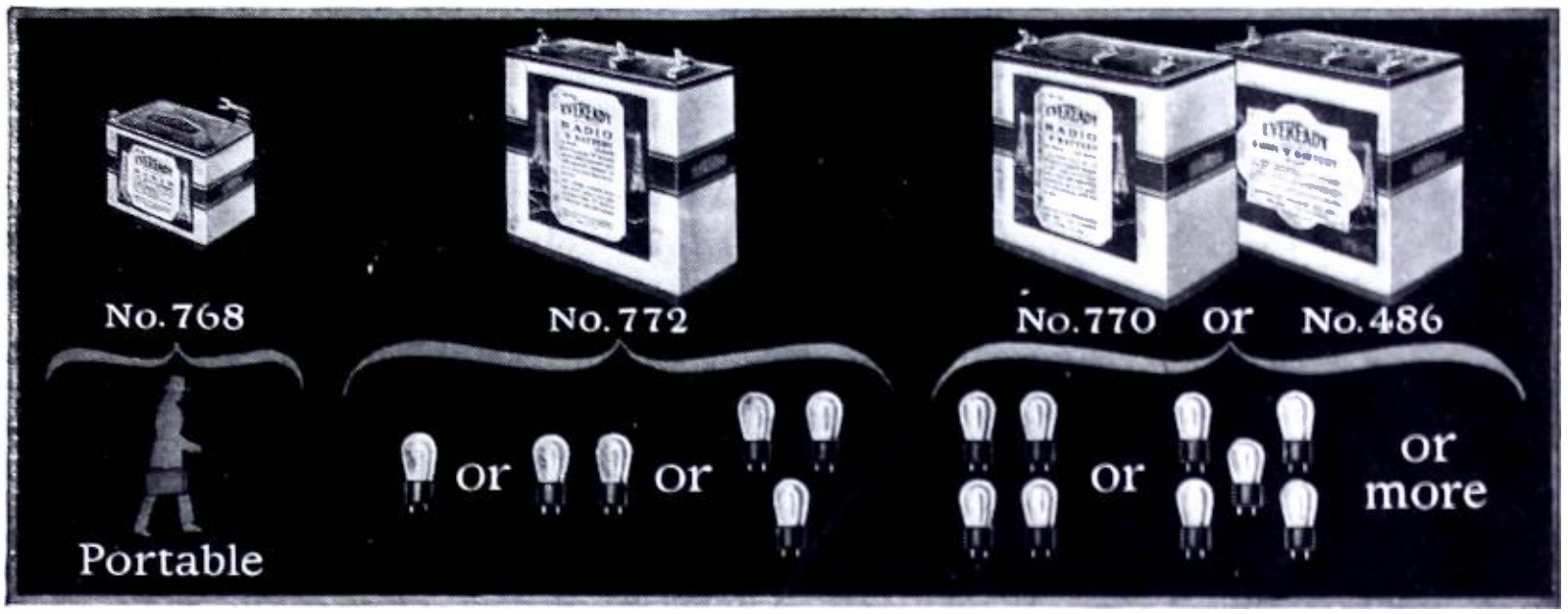
KFXB Rim of the World Station, Big Bear Lake, Pine Knot, Calif. 202.6 meters, 1480 kilocycles, 500 watts, class A. Daily ex Sun, 5-5:30 pm, news, road bulletins, lectures, music. Pacific standard time. Slogan: "The Rim of the World Station."

KFXC Santa Maria Valley Railroad Co., Santa Maria R. R. Bldg., Santa Maria, Calif. 209.7 meters, 1430 kilocycles, 100 watts, class A. Pacific time.

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

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

Perhaps you, too, can cut your "B" battery costs in half. Just follow the chart. It gives you the secret of "B" battery economy.



THOUSANDS of people have made the discovery that Eveready "B" Batteries, when used in the proper size, and on sets equipped with a "C" battery*, are a most economical, reliable and satisfactory source of radio current.

Here is the secret of "B" battery economy, reliability and satisfaction:

On all but single tube sets —Connect a "C" battery. The length of service given below is based on its use.*

On 1 to 3 tubes—Use Eveready No. 772. Listening in on the average of 2 hours daily, it will last a year or more.

On 4 or more tubes—Use the Heavy-Duty "B" Batteries, either No. 770 or the even longer-lived Eveready Layerbilt No. 486. Used on the average of 2 hours daily, these will last 8 months or longer.

These figures are based on the average use of receivers, which a country-wide survey has shown to be two hours daily throughout the year. If you listen longer, of course, your batteries will have a somewhat shorter life, and if you listen less, they will last longer.

Eveready's give you their remarkable service to the full only when they are correctly matched in capacity to the demands made upon them by your receiver. It is wasteful to buy batteries that are too small. Follow the chart.

In addition to the batteries illustrated, which fit practically all the receivers in use, we also make a number of other types for special purposes. There is an Eveready Radio Battery for every radio use. To learn more about the entire Eveready line, write for the booklet, "Choosing and Using the Right Radio Batteries," which we will be glad to send you on request. There is an Eveready dealer nearby.

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New York San Francisco

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*NOTE: A "C" battery greatly increases the life of your "B" batteries and gives a quality of reception unobtainable without it. Radio sets may easily be changed by any competent radio service man to permit the use of a "C" battery.

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Tuesday night means Eveready Hour —8 P. M., Eastern Standard Time, through the following stations:

WEAF—New York
WJAR—Providence
WEEI—Boston
WTAG—Worcester
WFI—Philadelphia
WGR—Buffalo
WCAE—Pittsburgh
WCAE—Cincinnati
WWJ—Detroit
WCCO—Minneapolis; St. Paul
KSD—St. Louis

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

KFXJ Mountain States Radio Distributors, Inc., 917 14th St., Denver, Colo. (Portable.) 215.7 meters, 1390 kilocycles, 10 watts, class A. Mountain time.

KFXM Neches Electric Co., 259 Crockett St., Beaumont, Tex. 227 meters, 1320 kilocycles, 10 watts, class A. Central standard time.

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

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

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

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

KFYO Texarkana, Tex. 209.7 meters, 1440 kilocycles.

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

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

KGO General Electric Co., 5555 E. 14th St., Oakland, Calif. 361.2 meters, 830 kilocycles, 5000 watts. Sun, 11 am, 6:30 & 9 pm, services & concert orchestra. Daily ex Sun & Mon, 10:45 am, literary hour. Mon, 5:30 pm, KGO Kiddies Klub. Mon, Tues, Wed, Thurs & Fri, dinner concert. Mon, Tues, Thurs & Sat, 8 pm, studio program. Daily ex Sat & Sun, 6:55 pm, news items, weather, baseball scores, agricultural market & stock reports. Friday, 11:10 am, Prudence Penny; 11:30 am, luncheon concert; 12 noon, time signal; 12:30 pm, U. S. weather forecast; 1:30 pm, stock market and weather report. Tues, 5:30 pm, "As a Woman Thinketh." Wed, 5:30 pm, Mr. Fix It. Thurs, 5:30 pm, Boys' hour. Friday, 5:30 pm, Radio Girls (KGO). Sat, 10 pm, dance program.

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

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

KHJ Times Mirror Co., 1st and Broadway, Los Angeles, Calif. 405.2 meters, 740 kilocycles, 500 watts, class B. 7-8 pm, First M. E. church; 8-10 pm, Orpheus Four male quartet. Pacific time.

KHQ Louis Wasmer, Excelsior Motorcycle & Bicycle Co., Seattle, Wash. 273 meters, 1100 kilocycles, 100 watts, class A. Pacific time.

KJBS Julius Brunton & Sons Co., 1380 Bush St., San Francisco, Calif. 220 meters, 1360 kilocycles, 5 watts, class A. Sun, 5-6:30 pm. (Summer schedule—Silent.) Mon & Wed, 9-11:30 am, 2-4 pm, 8-10 pm. Tues, Thurs & Sat, 9-11:30 am, 2-4 pm. Slogan: "San Francisco's Baby Station."

KFQW Photo Radio & Electric Shop, North Bend, Wash. 215.7 meters, 1390 kilocycles, 50 watts, class A. Thurs, 8-9 pm. Sun, 8:45-10 pm. Pacific time. Slogan: "At the Western Entrance of Snoqualmie, Pass."

KFQZ Taft Products Co., 5653 De Longpre Ave., Hollywood, Calif. 226 meters, 1330 kilocycles, 250 watts, class A. Tues, Fri, 9-11 pm, musical program. Pacific standard time.

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

KFRC City of Paris Dry Goods Co., Geary and Stockton Sts., San Francisco, Calif. 268 meters, 1120 kilocycles, 50 watts, class A. Daily ex Sun & Mon, 6:30-8 am, exercises. Daily ex Sun, 5:30-6:30 pm, children's hour, 6:30-10 pm, Mon & Thurs. Tues & Fri, 6:30-11 pm, concert. Wed, 6:30-12 pm. Sat, 6:30 pm-1 am, dance music. Sun, 6:30-10 pm, 10-12 pm. Pacific standard time.

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

KFRU Stephen's College, Broadway, Columbus, Mo. 499.7 meters, 600 kilocycles, 500 watts, class B. Mon, Tues, Thurs, Fri, 6:15 pm, dinner program. Wed, 9 pm, studio program. Fri, 12 midnight, organ and instrumental music. Sun, 7:30 am, sunrise service; 9:20 am, Burrall Bible Class; 7:30 pm, church service. Central standard time. Slogan: "Stephens College KFRU, Where Friendliness is Broadcast Daily."

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

KFRY New Mexico College of Agriculture and Mechanic Arts, State College, N. Mex. 266 meters, 1130 kilocycles, 50 watts, class A. No regular schedule. Mountain time.

KFRU Etherical Radio Co., 115 W. 6th St., Bristow, Okla. 394 meters, 760 kilocycles, 500 watts, class B. Central standard time.

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

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

KFSY Van Blaricon Co., 20 S. Main St., Helena, Mont. 248 meters, 1210 kilocycles, 10 watts, class A. Mountain time.

KFUJ Hoppert Plumbing & Heating Co., Hoppert Radio Electric Co., Breckinridge, Minn. 242 meters, 1240 kilocycles, 50 watts, class A. Daily ex Sun, 10:30 am & 5:40 pm. Also Mon & Wed, 8-9 pm. Slogan: "Where the Red River of the North Finds Its Source."

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

KFUO Concordia Theological Seminary of the Lutheran Church, 3645 S. Jefferson Ave., St. Louis, Mo. 541.1 meters, 550 kilocycles, 500 watts, class B. Sun, 9:15 pm. Mon, 9 pm. Wed, 9:15 pm. Central standard time. Slogan: "The Gospel Voice."

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

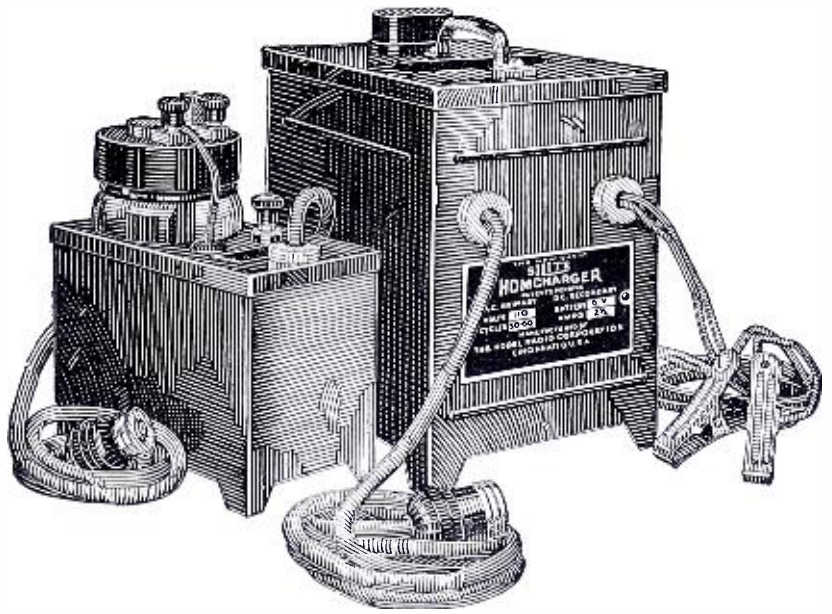
A-B & C Radio Power
from your light socket

SILITE

TRICKLE CHARGER

.6 ampere charging rate. Absolutely noiseless—no bulbs—makes a power unit of your battery.

$10.00



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HOMCHARGER

Charges at 2½-3 ampere. Absolutely noiseless—no bulbs—can be used while set is operated.

$19.50

Your battery troubles are over at last! Now ALL radio power is in your light socket, for ALL circuits, A, B, and C.

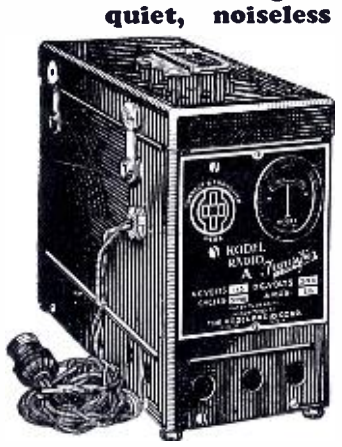
Silite, the marvelous new metallic glass rectifying element, provides perfect rectification of light socket current into "A" battery power. Leave the Silite Trickle Charger permanently connected to your storage battery and on charge—then forget battery charging forever. Silite Trickle makes a power unit of your battery—insures constant, never-failing "A" current that operates your set at highest efficiency. For very large sets, where a higher charging rate is necessary, Silite Homcharger is recommended. Either model may be used while the set is operated.

Kodel A&B Transifiers

Kodel A and B Transifiers actually supply all A, B, and C current direct from the light socket—no batteries of any kind are needed. Just plug the Transifiers into the wall socket and turn on your receiver—smooth, uniform A, B, and C power operates your set as it has never operated before. Watch the new life, new pep it gives your set—the longer range, the much greater volume. Transifiers give quiet, noiseless reception that was never before possible, even with fresh, new batteries.

Vastly different from and superior to the ordinary power units, Transifiers consume electric current only while you operate the set—maintenance cost is much less—it costs less than one-half cent for every hour the set is operated, for all A, B, and C power.

Ask any radio dealer to show you the Silite Chargers and Kodel Transfiers.



MODEL 10 "A" TRANSIFIER—Supplies 2, 4, or 6-volt "A" current direct from the light socket. For sets using up to 10 tubes $42.50

MODEL 10 "B" TRANSIFIER—22½ to 150 volts "B" current; 4 to 10 volts "C" current for any size set. Operates power tubes $42.50

MODEL 61 "B" TRANSIFIER—22½ to 90 volts noiseless "B" power for sets up to 6 tubes..... $28.50

(Bulbs extra)

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

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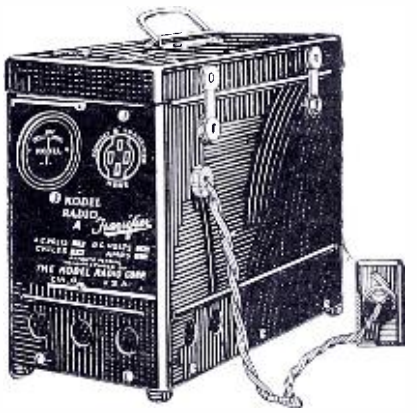

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KODEL

Radio Receivers Loud Speakers

POWER SPECIALISTS SINCE 1912

KFUR Peery's Egyptian Theatre (H. W. Peery, Mgr.), Ogden, Utah. 224 meters, 1340 kilocycles, 100 watts, class A. Tues, Thurs, Sat, 9:50-11:50 pm, dance music. Mountain time.

KFUS Gospel Radio, 529 28th St., Oakland, Calif. 259 meters, 1290 kilocycles, 50 watts, class A. Tues, 2:30-3:30 pm, Educational; 8-9 pm, 6:30-7:30 pm, sacred studio program. Wed & Fri, 8-9 pm, sacred program. Thurs, 4:30-5 pm, educational; 5-5:30 pm, children's program. Sun, 9-9:30 am, S.S. lesson; 3:30-4:30 pm, sacred program. Pacific standard time.

KFUU Mathewson Motor Co., Inc., and Oakland Times, Oakland, Calif. 220 meters, 1363 kilocycles, 100 watts, class A. Mon, Wed, Fri, 6:30-7:30 pm, 8-10 pm. Tues & Thurs, 8-10 pm. Sat, 6:30-7:30, 8-11 pm.

KFVD McWhinnie Elec. Co., San Pedro, Calif. 205.4 meters, 1460 kilocycles, 50 watts, class A. Pacific time.

KFVE Romaine Fielding, Film Corp. of America, 6800 Delmar Blvd., University City, Mo. 240 meters, 1250 kilocycles, 500 watts, class A. Daily ex Sun & Thurs, 9:15 pm. National amusement review, studio entertainers, & orchestra music. Central standard time.

KFVF Clarence B. Juneau, 8091 Santa Monica St., Hollywood, Calif. 208 meters, 1440 kilocycles, 10 watts, class A. Pacific time.

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

KFVH Whan Radio Shop (Herbert Whan), 221 Poyntz St., Manhattan, Kan. 218.8 meters, 1370 kilocycles, 15 watts, class A. Daily ex Sun, 12 m, markets. Central time.

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

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

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

KFYF Carl's Radio Len (Carl Newcomb), Oxnard, Calif. 205.4 meters, 1460 kilocycles, 10 watts. Mon, Tues, Wed, 5-6 pm, crop reports, news, music. Thurs, 5-6 pm, crop reports, news, music; 8-11 pm, music. Fri & Sat, 5-6 pm, crop reports, news, music. Slogan: "The Baby Super Station."

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

KGY St. Martins College, Lacey, Wash. 246 meters, 1220 kilocycles, 50 watts, class A. Tues, Thurs, Sun, 8:30-9:30, PST concert. Pacific standard time. Slogan: "Out Where the Cedars Meet the Sea."

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

KHQ Louis Wasmer, Inc., Spokane, Wash. 394.5 meters, 760 kilocycles, 1000 watts. Daily ex Sun, 12:30 pm, weather, stocks. Mon, Tues, 2-3 pm, 7-9. Tues, 9-10. Thurs, Fri, 2-3 pm, 8-10. Sat, 2-3 pm, 9-10. Sun, 11 am, 7-8:30 pm. Every other Mon, 11-12 midnight. Pacific time. Slogan: "In the Friendly City."

KIAF Steele Co., Sihtipoc, Minn. 422.3 meters, 710 kilocycles, 500 watts. Mon, Wed, Fri, 7-8 pm. Sun, 2-3 pm. Central time. Slogan: "Far from the Maddening Crowd."

KJBS Julius Brunton & Sons Co., San Francisco, Calif. 220.4 meters, 1360 kilocycles, 5 watts. Daily ex Sun, 9-10:40 am, 2-2:30 pm. Mon, Wed, 8-10 pm. Fri, 8-11:30 pm. "Royal Order of Smoked Herring." Sun, 5-6:30 pm. Pacific time.

KJQ C. O. Gould, 615 E. Main St., Stockton, Calif. 248 meters, 1210 kilocycles, 5 watts, class A. Pacific time.

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

KJS Bible Institute of Los Angees, Inc., 536 S. Hope St., Los Angeles, Calif. 293 meters, 1020 kilocycles, 750 watts, class B. Pacific time.

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

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

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

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

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

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

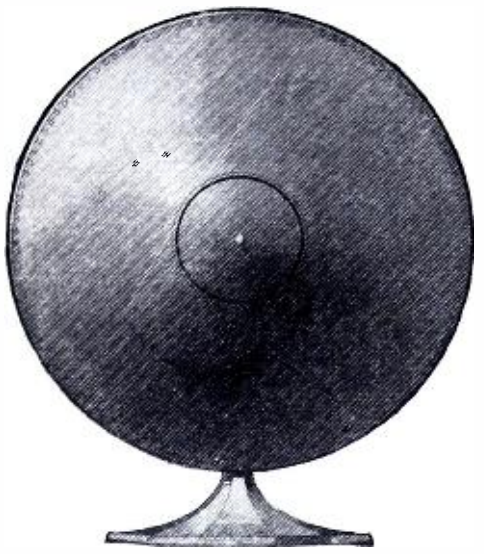
KMMJ The Old Trusty Station, Clay Center, Neb. 229 meters, 1000 watts. Sun, 9:15 pm. Mon, Tues, 10 am, 1:30 pm, 8 pm. Thurs, Fri, Sat, 10 am, 1:30 pm, 8 pm. Slogan: "The Old Trusty Station."

KMO Association Station (Love Electric Co.), Tacoma, Wash. 250 meters, 1199 kilocycles, 10 watts, class A. Pacific time.

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

The Trimm Line is Ready

It is Complete—A Speaker For Every Purpose



The New Trimm Cone

It reproduces with true definition every instrument, every tone, every pitch of voice or instrument, throughout the entire scale of audible sound. It brings to radio the deeper and higher tones so frequently missing from radio amplification.

The Trimm Cone embodies an entirely new principle of vibratory transmission, here used for the first time. Unquestionably the last word in radio reproduction. This will be the season's biggest money maker for every retailer and jobber.

$16

More Advertising

The Trimm Sales and Advertising Program is as complete as the line. As always, The Trimm Line will be heavily advertised, to trade and public, local newspaper advertising placed when representation permits. Consumer demand and acceptance for Trimm Products, built up for years, will be still further increased.

The Trimm Line for 1926-27 offers as always a real opportunity for substantial, profitable Speaker Business. There is a Trimm Speaker particularly suited to every set, a complete line of all accepted types—at prices to meet the wishes of all buyers.

Better Values Than Ever

Since the beginning of this business Trimm Speakers have been noted as outstanding values—giving the radio user more for his dollar than he could possibly get elsewhere, yet always and at all times returning to the trade, wholesale and retail, a satisfactory and substantial margin of profit. This year Trimm Speakers, refined and still more improved, are greater values than ever and your profit is assured.

Trimm Policies Protect You

The Trimm Policies of providing adequate distribution and stocks advantageously located, makes overloading unnecessary and Trimm control on current stocks and production assures maintenance of dealers' profits and the complete elimination of any possibilty of Factory dumping.

A lifetime guarantee on our products, full dealer support and a fair and square deal for trade and public, make Trimm Speakers easiest to sell and keep sold.

Let us send you full information as to our line, prices, policies and sales program. It will pay you. Write us today.

HEADSETS

Professional	$5.50
Dependable	4.40

PHONODAPTERS

Giant Unit	$10.00
Little Wonder	4.50

SPEAKERS

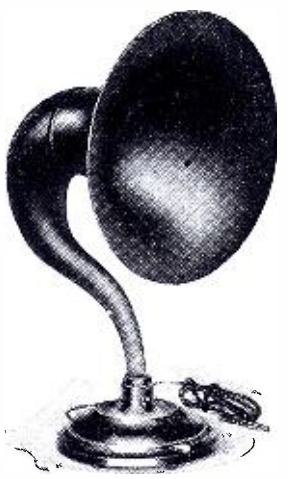
Trimm Cone	$16.00
Concert	25.00
Entertainer	17.50
Home Speaker	10.00

(Prices slightly higher west of Rocky Mountains)

Trimm Concert

The leading high grade horn reproducer, still further refined and improved for this season. Extra large diaphragm. Reproduces faithfully and with tremendous volume and beautiful tone every note of voice or instrument. No finer Horn Type Radio Reproducer has ever been made. Volconite Horn, 22 inches high—15 inch bell. Famous Trimm Adjustment for tone and volume.

$25



Trimm Entertainer

Slightly smaller than the Trimm Concert, a quality reproducer medium priced. Also has Volconite Horn, goose neck type, stands 19½ inches high, 12 inch bell. Large diaphragm gives marvelous sweet, full musical tone and wonderful volume. Trimm Lever Adjustment for tone and volume.

$17.50

Trimm Homespeaker

The most popular low priced goose neck speaker ever produced. Tens of thousands in use and every user pleased. It out-performs speakers selling at prices twice or more the price of Homespeaker. Big volume, fine tone—a thoroughly satisfactory speaker at a wonderful price. Stands 18 inches high, has 12 inch bell, real Volconite Horn. Factory adjusted unit, no blasting, distortion or false tones. You can make money on this one.

$10

TRIMM
RADIO MANUFACTURING COMPANY
24 So. Clinton St.
CHICAGO
U.S.A.
MEMBER RMA

Send this Coupon Now!

K39

TRIMM RADIO MFG. CO.
24 So. Clinton St., Chicago, Ill.

Send me at once full information covering the complete Trimm Line for 1926-27.

Name .....

Address .....

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

KMTR Echophone Mfg. Co., Los Angeles, Calif. 238 meters, 1260 kilocycles, 500 watts.

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

KNX The Los Angeles Evening Express Broadcasting Station, 6116 Hollywood Blvd., Los Angeles, Calif. 337 meters, 890 kilocycles, 500 watts. Sun, 10 am-10:30 pm, classical program. Mon, 7:30 am-12 midnight, semi and classical. Tues, 7:30 am-1 am, semi and classical. Wed. 7:30 am-12 midnight, semi and classical. Thurs, 7:30 am-12 midnight, semi and classical. Fri, 7:30 am-12 midnight, semi and popular. Sat, 7:30 am-2 am, semi, popular and classical. Slogan: "The Voice of Hollywood."

KOA General Electric Co., Rocky Mountain Broadcasting Station, 1370 Krameria St., Denver, Colo. 322.4 meters, 930 kilocycles, 5000 watts, class B. Daily ex Sun, 11:45 am, weather & news reports; 12:15 noon, luncheon musical; 6 pm, stock markets; 6:30, dinner concert; 7:30, expression period; 8 pm, instrumental program; 8:15 pm, studio program. Daily ex Sat & Sun, 6 pm, news & markers; 6:30 pm, dinner concerts. Tues, Thurs, Fri, 3:30 pm, 4 & 4:14 pm. Mon, Tues, Wed, Fri, 7:30 & 8 pm. Wed & Sat, 10 pm, dance music. Sun, 10:55 am or 11 am & 5:30 pm, organ recital; 8 pm, musical hour. Mountain standard time.

KOAC Oregon Agricultural College, Corwallis, Ore. 280.2 meters, 1180 kilocycles, 500 watts, class B. Mon, agriculture night service talks and information lecture. Wed, Information lectures & music. Fri, Information lectures & music. Pacific standard time. Slogan: "Science for Service."

KOB New Mexico College of Agriculture & Merchants Arts, State College, N. M. 348.6 meters, 860 kilocycles, 5000 watts, class B. Mon, 11:55 am-12 pm, time signals; 9:55-10 pm, time signals; 12-12:02 n, weather reports; 12:02-12:10 pm, New Mexico road reports; 12:10-12:30 pm, news briefs. Wed, 9:55-10 pm, standard mountain time signals; 10-10:02 pm, U. S. W. B. reports; 10:02-10:10 pm, New Mexico road reports. Mountain standard time. Slogan: "The Sunshine State of America."

KOCH Central High School, Omaha, Neb. 258 meters, 1160 kilocycles, 500 watts, class A. Sun, 3-5 pm, classical. Mon, Tues, Thurs, & Sat, 8:30-10 pm, musical. Central standard time. Slogan: "The Voice of 2000 Students."

KOCW Oklahoma College for Women, Chickasaw, Okla. 252 meters, 1190 kilocycles, 100 watts, class A. Mon, Tues, Thurs & Fri, 12-1 pm, educational talk & music. Tues, Fri & Sat, 8-9 pm, musical program. Wed, 10-10:40 am, chapel services; 12-1 pm, musical. Sun, 11 am-12 n, church services; 2:30-3:30 pm, musical. Central standard time.

KOIL Mona Motor Oil Radio Station, 1124 6th St., Council Bluffs, Iowa. 305.9 meters, 1080 kilocycles, 500 watts, class B. Sun, 11 am-12 n, church services; 7-9 pm; 11-midnight. Daily ex Sun, Mon, & Wed, 12 n-1:15 pm; 6-9 pm; 11-12 midnight. Mon, 12 n-1:15 pm; 6-midnight. Slogan: "Station of Service."

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

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

KOWW Blue Mountain Radio Association, 711 Baker Bldg., Walla Walla, Wash. 256 meters, 1170 kilocycles, 500 watts. Daily ex Tues & Sun, 7-7:30 pm, news, markets & weather; 8-12 pm, studio & orchestra. Tues, 7-7:30 pm, news, markets & weather.

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

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

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

KPRC Houston Post-Dispatch, Houston, Texas. 296.9 meters, 1010 kilocycles, 500 watts, class B. Daily ex Sun, Fri, 10:55 am, time signals; 12 pm, concert; 5:30 pm, kiddies' hour; 7:30-9:30 pm, concert. Wed, 11 pm-midnight, concert. Fri, 12 n, concert. Sat, 11 pm-midnight. Sun, 10:45 am, 7:30 pm, church services; 9:30 pm, concert. Central standard time. Slogan: "Kotton Port Rail Center."

KQP H. B. Read & Co., 441 Sixth St., Portland, Ore. 231 meters, 1410 kilocycles, 500 watts, class A. Daily ex Sun, 5:30-6 pm. Mon, Wed, Thurs, Fri, 8-9 pm. Mon, Tues, Wed, Thurs, 2:30-3:30 pm. Pacific standard time.

KQW First Baptist Church, San Jose, Calif. 230.6 meters, 1300 kilocycles, 500 watts.

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

KRE Berkeley Daily Gazette, Berkeley, Calif. 256 meters, 1170 kilocycles, 100-250 watts, class A. Daily ex Sun, 7:30 am, Good Thought service; 11:15 am, physical exercise for women; 7 pm, current news. Mon, 8-10 pm. Tues, 9-11 pm, musical. Wed, 5-6 pm, children's hour; 9-12 pm, musical. Thurs, 8-11 pm. Fri, 9-12 pm. Sat, 8 pm-1 am, dance programs. Sun, 10-11 am, church; 6:30-7:30 pm, concert; 8:15-10 pm, sacred music concert. Pacific standard time. Slogan: "Looking Thru the Golden Gate."

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

KSMR Santa Maria Valley Railroad, Santa Maria, Calif. 209.8 meters, 100 watts. Tues, Thurs, Sat, 7-10 pm, market news, education & musical. Mon, Wed & Fri, 7:45 pm, market & news reports.

KSD St. Louis Post-Dispatch, 12th and Olive Sts., St. Louis, Mo. 545.1 meters, 550 kilocycles, 500 watts, class B. Daily ex Sun, 9:40 am-3:40 pm. Sun, 6:15-9:15 pm. Mon, 7-8 pm, 9-11 pm. Tues & Thurs, 6:55-10 pm. Wed, 7-9:15 pm. Fri, 7-11 pm. Sat, 7-10:30 pm. Central standard time.

KSL Utah Radio Service Corp., Salt Lake City, Utah. 300 meters, 1000 kilocycles, 100 watts, class B. Daily ex Sun, 7:30-11 am, 4-11:30 pm. Sun, 10:50 am-12 noon, 4-11:30 pm, classical & religious program. Fri, 6-11:30 pm. Mountain standard time. Slogan: "The Inter-Mountain Empire."

KSO A. A. Berry Seed Co., 8th and Logan Sts., Clarinda, Iowa. 241.8 meters, 1240 kilocycles, 500 watts, class A. Daily ex Sat & Sun, 9:30 pm, musical. Daily ex Sun, 12 noon. Central standard time. Slogan: "Keep serving others."

KTAB Tenth Avenue Baptist Church, Oakland, Calif. 302.8 meters, 990 kilocycles, 1000 watts, class B. Daily ex Sat & Sun, 9:45 am-12:30 pm, 7:45-9:30 pm, church services; Mon, Tues, Fri, 8:30-9:30 am, 7-7:30 pm, 8-10 pm. Wed & Thurs, 8:30-9:30 am, 6-6:30 pm, 7-7:30 pm, 8-10 pm. Sat, 8:30-9:30 am, 6-6:30 pm, 7:7:30 pm. Slogan: "Truth, Knowledge and Beauty."

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

A Low-Priced But High Grade Cabinet

MADE BY

THE SOUTHERN TOY COMPANY, Inc.

HICKORY, NORTH CAROLINA

N. Eng. 6.
ADDRESS BUREAU OF ENGINEERING NAVY DEPARTMENT
AND REFER TO No

NAVY DEPARTMENT,
ENCLOSURES BUREAU OF ENGINEERING,
WASHINGTON, D C.

16 November 1925.

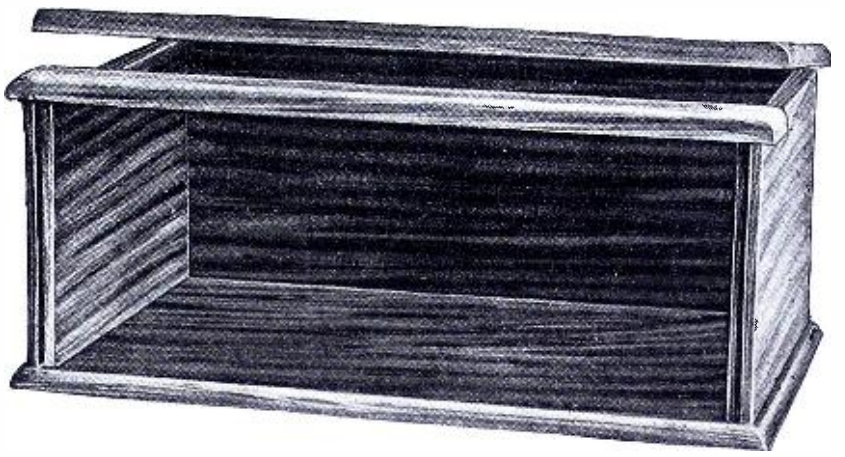
Southern Toy Company,
Hickory, N. C.

Gentlemen:-

It is a pleasure indeed to send the enclosed check in amount of $5.50 as payment in full for the two cabinets which you forwarded with such promptness. The cabinets were entirely satisfactory and received such favorable comment from those who inspected them in this office, that you may expect some additional orders in the near future.* * * *

Signed_____
(name on request)

We challenge anyone to show us as good at such a low price. Sold direct to you. No jobber's or dealer's profits for you to pay—(the jobber usually gets 15% and the dealer from 30% to 50%—you save all this).

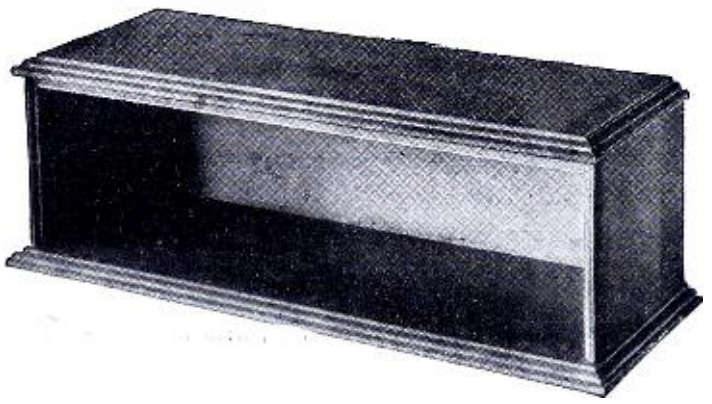


"PIEDMONT"

A new way to sell cabinets. Your choice of our stock sizes at the same price. It is a little secret among manufacturers that there is only a few cents difference in the factory cost of different sizes of this type, and we are the first to discard the old way of pricing.

The price is very low and we will make only a few cents on each cabinet, **BUT WE EXPECT TO SELL A LARGE QUANTITY OF THEM.**

SPECIFICATIONS



"IVEYLINE"

Hardwood with mahogany finish. Three coats of the new lacquer finish and then rubbed down to a smooth, glossy, piano-like finish that is very hard and durable.

Nickel plated hinges—2.

Made only in the following sizes and mahogany finish:

7"x18"x10" deep
7"x21"x10" deep
7"x24"x10" deep
7"x26"x10" deep

Your choice $2.65 ea., f.o.b. Hickory Cash with order. No C. O. D. at this price

Thousands of Set Builders Last Season Stopped Paying Fancy Prices and Bought Our Cabinets—Why Not You?

Shipped direct to you and you save jobber's and dealer's profits

Made in both hardwood, mahogany finish rubbed and solid walnut.
Lid splined both ends to prevent warping.
Nickeled piano hinge, full length.
Nickel lid support, fancy design.
Rubber anti-vibration feet.
The same cabinet that others charge double our price.

SIZES AND PRICES

	Hardwood Rubbed Mahogany Finish	Solid Black American Walnut
7x18x7½ or 10 in. deep	$3.50	$5.00
7x21x7½ or 10 in. deep	3.75	5.25
7x24x7½ or 10 in. deep	4.00	5.50
7x26x7½ or 10 in. deep	4.75	6.25
7x28x7½ or 10 in. deep	5.50	7.00
7x30x7½ or 10 in. deep	6.00	8.00

REMEMBER that we give each cabinet two coats of fine varnish over shellac and then rub to a smooth, glossy finish.

FREE with each cabinet a ½-inch non-warping BASEBOARD. Cabinets are rabetted for 3/16, panel. Panel is screwed to both ends and top of cabinet, making a strong, rigid job. If your panel is less than 3/16, back it up with cardboard until it is flush.

PHONE PLUG. Add only 20 cents for an "E-Z" plug, one of the best on the market.

CASH WITH ORDER or C. O. D. if half price is sent with order. We ship by express as it is usually cheaper and the Express Company is responsible for any damage in transit.

SEND FOR NEW CATALOGUE—IT'S FREE

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

KTBR Brown's Radio Shop, 393½ Yamhill St., Portland, Ore. 263 meters, 1140 kilocycles, 50 watts, class A. Mon & Wed, 11 am-12 noon, 1:30-2:30 pm, 6-7:30 pm, 8:30-9:30 pm. Tues, 11 am-12 noon, 1:30-2:30 pm, 7-7:30 pm. Thurs, 11 am-12 noon, 1:30-2:30 pm, 6-7:30 pm. Fri, 11 am-12 noon, 1:30-2:30 pm, 6-9 pm. Sat, 11 am-12 noon, 3-4 pm, 7-9:30 pm.

KTCL KTCL Broadcasting Station, New Washington Hotel, Seattle, Wash. 305.9 meters, 980 kilocycles, 1000 watts, class B. Daily ex Sat, Sun, 9:30-10:30 am. Mon, 7-8 pm, 8-9 pm, musical. Tues, Thur, 12:30-1:30 pm, concert. Tues, 8-9 pm. Wed, 7:30-9:30 pm, musical. Fri, 8-10 pm, musical. Sat, no definite hours. Sun, 1-2 pm, 3-4 pm, 7:50-9:10-10:10 pm. Pacific standard time. Slogan: "Know the Charmed Land."

KTHS New Arlington Hotel, Hot Springs, Ark. 374.8 meters, 800 kilocycles, 1000 watts, class B. Sun, 11 am-12:15 pm, 9-12 pm, music. Daily ex Sun & Tues, 12:30-1:30 pm, markets; 9 pm-12 midnight, music. Central standard time. Slogan: "Kum to Hot Springs."

KTNT Calliphone Co., Muscatine, Iowa. 333.1 meters, 1170 kilocycles, 500 watts, class B. Daily ex Sat & Sun, 6:30-8 pm; home folk's program, 12-12:30 pm. Sun, 6:30-7:30 pm. Central standard time. Slogan: "Calliphone Studio KYNT First New Tone in 40 Years."

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

KUO San Francisco Examiner, San Francisco, Calif. 434.7 meters, 690 kilocycles, 150 watts, class A. Daily ex Sun, 9 am, 10 am, 12:30 pm, 2 pm, 4 pm, 6:30 pm. Sun, 9 am, 4 pm. Pacific standard time.

KUOA University of Arkansas, Fayetteville, Ark. 399.8 meters, 10,000 kilocycles, 750 watts, class B. Sunday services occasionally. Mon, 7:30 pm, farmers' program; Tues, 8 pm, musical program; Thurs, 8 pm, University Extension lectures.

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

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

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

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

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

KWH W. G. Patterson, Shreveport, La. 273 meters, 1100 kilocycles, 500 watts, class A. Central standard time.

KWG Portable Wireless Telephone Co., 530 E. Market St., Stockton, Calif. 247.8 meters, 1210 kilocycles, 50 watts, class A. Daily ex Sun, Tues, Fri, 4-5 pm. Tues, Fri, 4-5 pm, 8-9 pm. Pacific time.

KWKH W. K. Henderson Iron Works & Supply Co., Shreveport, La. 261 meters, 1000 watts. Mon, Thurs, 8-9 pm, musical. Tues & Sat, 9-12 pm, dance program. Sun, 9:30-10:30 am, Bible class program; 5-6 pm, musical. Central standard time. Slogan: "Shreveport on the Air—Shreveport Everywhere."

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

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

KWUC Western Union College, Le Mars, Iowa. 252 meters, 1190 kilocycles, 50 watts, class A. Sun, 3 pm, vesper service. Fri, 7 pm, musical entertainment. Mon, 7 pm. Wed, 8 pm. Central standard time. Slogan: "Voice of Western Union College."

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

KYW Westinghouse Elec. & Mfg. Co., 500 S. Michigan Ave., Chicago, Ill. 535.4 meters, 560 kilocycles, 3500 watts, class B. Daily every half hour, ex from 2-8 am. News, reports, music and readings. Central standard time.

KZIB I. Beck, Inc., Manila, P. I. 249.9 meters, 1200 kilocycles.

KZKZ Electrical Supply Co., 109 Plaza Moraga, Manila, P. I. 270 meters, 1110 kilocycles, 100 watts, class A.

KZM Preston D. Allen, 13th and Harrison Sts., Hotel Oakland, Oakland, Calif. 240 meters, 1240 kilocycles, 100 watts, class A. Daily ex Sun, 6:30-8 pm, Hotel Oakland dinner orchestra. Pacific standard time.

KZRQ Far Eastern Radio, Inc., Manila, P.I. 222 meters, 1350 kilocycles, 500 watts, class A.

KZUY F. Johnson Elser, Manila, P. I. 370 meters, 810 kilocycles, 500 watts, class B.

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

WAAB Valdemar Jenson, 137 S. St. Patrick St., New Orleans, La. 268 meters, 1120 kilocycles, 100 watts, class A. Central standard time.

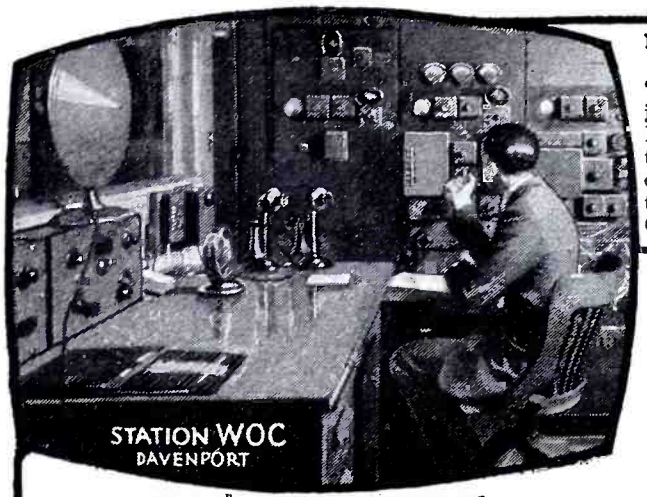
WAAC Tulane University, New Orleans, La. 273 meters, 1100 kilocycles, 100 watts, class A. Central standard time.

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

WAAF Chicago Daily Drovers Journal, 836 Exchange Ave., Chicago, Ill. 278 meters, 1080 kilocycles, 200 watts, class A. Daily ex Sun & holidays, 8:45 am, markets; 10:30 am, weather; 10:50 am, markets; 11 am, estimated receipts of following day; 12:30 pm, weather; 12:50 pm, markets; 3 pm, markets; 4:30 pm, eastern meat trade conditions. Sat, 12:30 pm, final weather and market reports. Central standard time.

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

WAAW Omaha Grain Exchange, 19th & Harney Sts., Omaha, Neb. 384.4 meters, 780 kilocycles, 500 watts, & 278 meters, 1030 kilocycles, class A. Daily ex Sun, 9:30 am-8:30 pm. Sat, 12 noon. Central standard time. Slogan: "Where Agriculture Accumulates Wealth."



Now Owns a Radio Store

"The Radio business is rushing just now. Building many Super Heterodynes, also doing installation and repairing. To your course I owe all my success in the Radio profession." A. J. Ommodt, Bowman, N. Dak.

Controls First Car by Radio

"I operate the portable broadcasting station in rear car, driving front car by Radio control. Will operate this car from New York to Frisco—13 months trip. Then we take the car around the world—a three years' tour. I owe it all to you." Leo Paul, New York City.

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Get into the great new Big-pay Industry—Radio. If you're earning a penny less than $50 a week, clip coupon now. Send for AMAZING FREE BOOK, "Rich Rewards in Radio." Why go along at $25 or $35 or $45 a week, when you could earn $50 to $250 in the same six days, as a Radio Expert? Hundreds of N. R. I. trained men are doing it—why can't you? I'll train you just as I trained them—just as I trained the men whose letters you see on this page. I'll teach you quickly at home in your spare time to be a Radio Expert, and draw down big money for the easiest and most fascinating work in the world.

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"Please communicate with my two junior operators here who want to increase their knowledge of Radio. Being a graduate of your course I know they could do nothing better for themselves than study it for it is the way to success in this profession." John E. Fetzer, Chief Engineer, Station WEMC, Berrien Springs, Michigan.

Photo shows Graduate E. F. Spadoni in his own Radio store at Chicago, Ill. "Your course gets the credit," says Spadoni.

These Instruments Given FREE of Extra Cost

All instruments shown here and others sent to all my students free of extra cost under short time special offer. Clip coupon now—find out all about this big unequalled offer while you still have time to take advantage of it. This training is intensely practical—these instruments help you do the practical work.

My Radio Training is the "Famous Course That Pays for Itself"

Make more money quick when you take up this practical course.

I show you how to increase your earnings almost from the start of your course through practical pointers I give you.

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 St., Kaukana, Wis., made $500. These records not unusual—these men are a few of hundreds.

And when you graduate, my big Free Employment Department helps you get the job. You get just the same preparation and assistance toward success we gave C. C. Gielow, Chief Operator of the Great Lakes Radio Telegraph Co., E. W. Novy, Chief Operator of Station WRNY, Erle Chambers, Radio Engineer for Stewart-Warner, J. E. Fetzer, Chief Engineer of Station WEMC. The National Radio Institute, established 1914, today offers you the same opportunity these men had under a bond that guarantees you full satisfaction or money refunded. It's your big chance to get into the great Radio field—mail coupon TODAY for my big Free Book and proof!

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"I am in business for myself and recently made $70 in one day. I was an electrician of rich experience and was occupying a splendid position as telephone superintendent when I enrolled with your course believing it would open up greater opportunities—have not been disappointed. Estimate that Radio will be worth tens of thousands of dollars to me in the next few years." T. M. Wilcox, Belle Island, Newfoundland.

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"Accepted a position with the Chicago Daily News Station WMAQ. **My income practically doubled,** thanks to your fine course. I handle all consultation also do operating." Keith Kimball, Station WMAQ, Chicago, Ill.

Promoted to Big Job

"Just been made Sales Manager of this Radio firm—received a very good increase in pay. Up to present have been getting salary which in 3 months enabled me to purchase a new car.." R. Jones Bay City Mich.

WABA Lake Forest College, Lake Forest, Ill. 227 meters, 1320 kilocycles, 100 watts, class A.

WABB Harrisburg Sporting Goods Co., Harrisburg, Pa. 266 meters, 1130 kilocycles, 10 watts, class A.

WABC Asheville Battery Co., Inc., 19 Haywood St., Asheville, N. C. 275 meters, 1090 kilocycles, 50 watts, class A. Sun, 11 am-12:30 pm, 7:30-9 pm. Central standard time.

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

WABL Connecticut Agricultural College, Storrs, Conn. 275 meters, 1090 kilocycles, 100 watts, class A. Eastern standard time.

WABO Lake Ave. Baptist Church, Rochester, N. Y. 278 meters, 1080 kilocycles, 100 watts, class A. Eastern standard time.

WABQ Haverford College, Dept. of Engineering, Haverford, Pa. 261 meters, 1150 kilocycles, 1000 watts, class A. Mon, Fri, regularly 11 pm-12:30 am, organ recital. Alt. Mons, 8-8:30 pm, lectures. Fri, 8 pm, varied musical programs; 10:15-12 pm, every third Sun, musical programs. Eastern standard time. Slogan: "Designed, Built, and Operated by Engineering Students at Haverford College."

WABR Scott High School, Toledo, Ohio. 263 meters, 1140 kilocycles, 100 watts, class A. Schedule variable. Eastern standard time.

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

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

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

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

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

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

WAGM A. G. Miller Furniture & Radio Store, 113 West 4th St., Royal Oak, Mich. 225.4 meters, 1330 kilocycles, 50 watts, class A. Mon, 8 pm-12:30 am. Wed, Fri, 8-10:30 pm, musical program. Central standard time.

WAHG A. H. Grebe & Co., Inc., 70 Van Wyck Blvd., Richmond Hill, L. I., N. Y. 315.6 meters, 950 kilocycles, 500 watts, class B. Daily ex Sun, prior to 10 am; 11 am-1:30 pm; 4-6 pm. Mon, Wed, Fri, 7:30 pm, to close. Sat, 12 pm-2 am. Sun, 10 am-1 pm; 7:30-9:30 pm. Eastern standard time. Slogan: "Wait And Hear Grebe."

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

WAIU American Insurance Union, Columbus, Ohio. 293.9 meters, 1020 kilocycles, 500 watts, class B. Mon, Wed, Fri, 10-11 am, 12-1 pm, 3-4 pm, 6-7 pm, 8-10 pm. Tues, Thurs, 12-1 pm, 3-4 pm, 6-7 pm. Sat, 12-1 pm, 9-11 pm. Sun, 3-4 pm. Eastern standard time.

WAMD Hubbard & Co., 12 W. Grant St., Minneapolis, Minn. 244 meters, 1230 kilocycles, 500 watts, class A. 7:15 pm, classical hour; 9 pm, Gayle Wood, pianist; 10 pm, Skyrocket Frolic, etc. Central standard time.

WAPI Alabama Polytechnic Institute, Auburn, Ala. 247.8 meters, 1210 kilocycles, 1000 watts, class B. Mon, Wed, 12-1 noon. Tues, Thurs, 8-9 pm. Central standard time.

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

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

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

WBAK Pennsylvania State Police, 18th & Herr Sts., Harrisburg, Pa. 275 meters, 1090 kilocycles, 500 watts, class A. Daily ex Sun, 10 am-1 pm, 5:45 pm-12 midnight. Special programs 7:30 pm, Mon, Tues, Wed. Eastern standard time.

WBAL Baltimore, Md. 245.8 meters, 1220 kilocycles. 6:30-7:30 pm, dinner orchestra; 7:30-8:30 pm, WBAL concert orchestra; 8-9, trio; 9-10, dance orchestra. Eastern standard time.

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

WBAP The Star Telegram and Record Telegram, Fort Worth, Texas. 475.9 meters, 630 kilocycles, 5000 watts, class B. Daily ex Sat & Sun, 9 am through 6 pm; orchestra, 7:30 to 8:30 pm; classical varied Hawaiian, 9:30 pm to 11 pm; popular classical orchestral & varied, 11 to 12 pm. Mon, Wed & Fri, 11 pm, popular music, Sat, 7:30 pm. Sunday School class, Sun, 11:30 am; church, 1:30 pm; 5 to 6 pm, sacred; 9:30 to 11 pm, popular. Central standard time. Slogan: "Daytime on the Hour, Nighttime on the Half."

WBAR Kopp Radio Co., Sisiht, Wis. 270.1 meters, 1110 kilocycles, 500 watts. Mon, 9-10 pm. Wed, 8-9 pm. Thurs, 7:30-8:30. Sun, 10-11 pm. Central standard time.

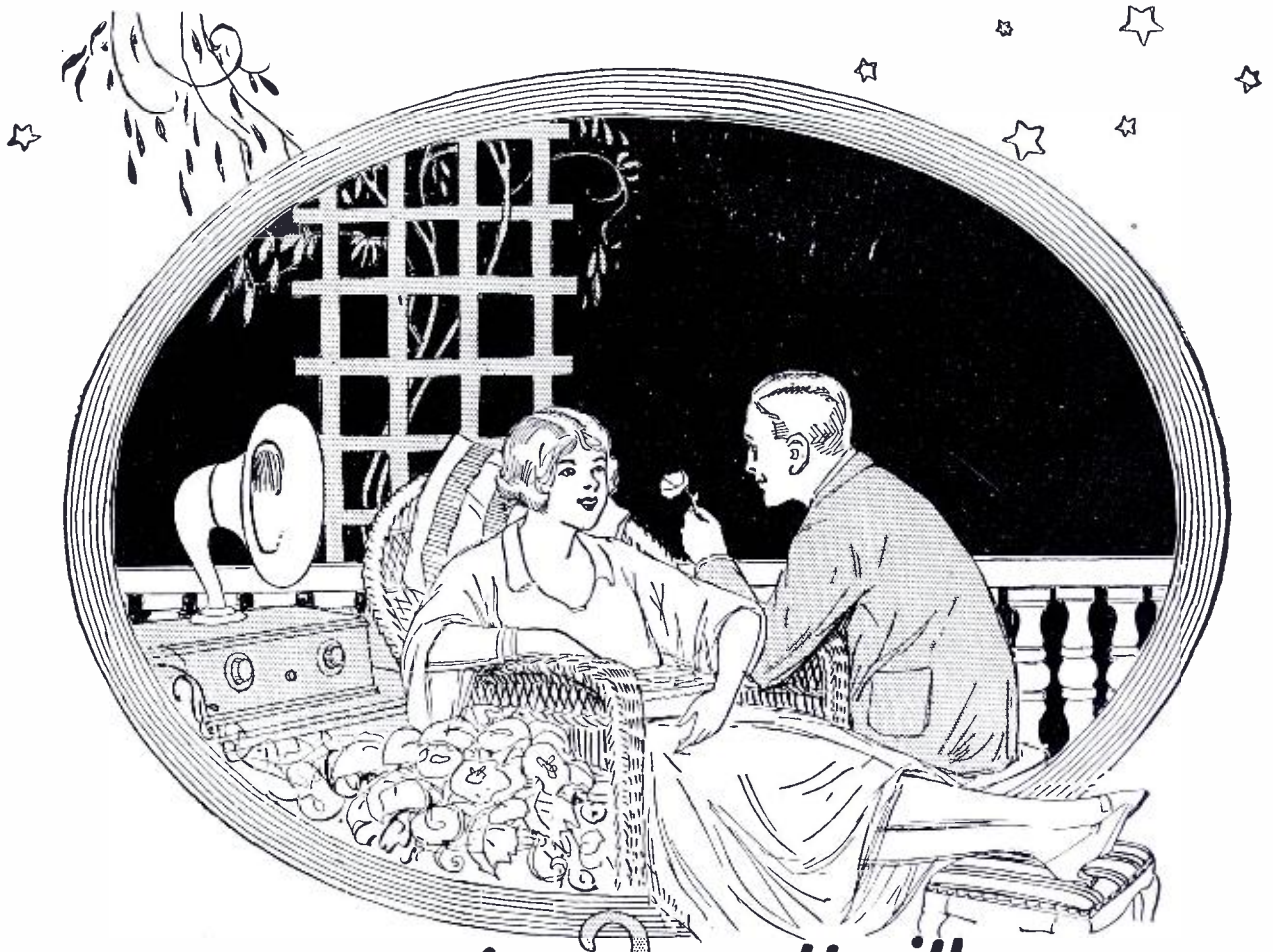
WBAV Erner & Hopkins Co., 146 N. Third St., Columbus, Ohio. 293 meters, 1020 kilocycles, 500 watts, class B. Eastern standard time.

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

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

WBBA Plymouth Congregational Church, Newark, Ohio. 225 meters, 1330 kilocycles, 20 watts, class A. Eastern standard time.

WBBG Irving Vermilya, 24 Vermilya Ave., Mattapoisett, Mass. 248 meters, 1210 kilocycles, 500 watts, class A. Eastern standard time.



do you want a *new thrill* from *radio* " " " "

Give that set of yours the power it needs—power for any variation in tone. Then you'll have a new appreciation of radio. You will have one delightful program after another—summer evenings—winter evenings—***all the time!*** That's when your set is equipped with Majestic "B" Current Supply. Your set seems ***alive*** with marvelous energy. You sense a new joy in radio.

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delivers pure direct current From your light socket

All the Majestic "B" Current Supply units are manufactured complete in our factory and are equipped with the famous Raytheon Tube (endorsed by numerous radio engineers and editors) which is a non-filament tube with full wave rectification, no acids or back surge. Tests of the Majestic "B" on the oscillograph demonstrate that all A-C hum is entirely eliminated.

GO TO THE DEALER FROM WHOM YOU BOUGHT YOUR SET or any other reliable dealer and get a Majestic "B" Current Supply.

Attach it to your set. If you are not fully satisfied your money will be refunded by your dealer. Fully guaranteed. Its low purchase cost and the saving it will mean to you in just a short time makes it an investment that soon pays for itself.

The new model—the Master-B, is especially adapted for sets not only using the regular power tubes UV-112 or UV-120, but also for the new super power tubes UV-171 requiring 180 volts. Unequalled for sets having a very heavy current draw. These three models will take care of practically ***any*** set on the market.

Don't delay — see your dealer at once or write us for free booklet.

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Majestic Master-B Current Supply
Rating 60 mils at 150 volts. Particularly adapted for Radiola 25-28-&-30 and super heterodynes. Will operate all power tubes, also the new super power tube UV-171 (180 volts). Unequalled for sets having a very heavy current draw.
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Economical, powerful—lasts as long as any receiver. No Filament to Burn Out. No Acid.

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

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

WBBP Petoskey High School, Petoskey, Mich. 238 meters, 1260 kilocycles, 200 watts, class A. Tues, 9 pm, popular programs. Fri, 8 pm, athletics. Sun, 10:30 am, church service; 3 pm, sacred concert. Central standard time. Slogan: "There's Only One Petoskey."

WBBR Station WBBR, "The Watchtower," 124 Columbia Heights, Brooklyn, N. Y. 272.6 meters, 1100 kilocycles, 500 watts, class A. Daily, 8-8:10 pm, Walter Stoll tenor; 8:20 pm, Bible lecture; 8:40, tenor; 8:50, violinist. Sun, 10-1130 am; 9-10:30 pm. Eastern standard time. Slogan: "Watchtower."

WBBS First Baptist Church, 3400 St. Charles St., New Orleans, La. 252 meters, 1190 kilocycles, 50 watts, class A. Central standard time.

WBBU Jenks Motor Sales Co., Monmouth, Ill. 224 meters, 1340 kilocycles, 10 watts, class A. Central standard time.

WBBW Ruffner Junior High School, Norfolk, Va. 222 meters, 1350 kilocycles, 50 watts, class A. Mon, 6:45-7:15 pm, boys' program. Wed, 10:30-11:15 am, school assembly. Thurs, 9:30-10:30 pm, musical. Eastern standard time.

WBBY Washington Light Infantry, 240 King St., Charleston, S. C. 268 meters, 1120 kilocycles, 20 watts, class A. Irregular through week. Sat, 7-12 pm, orchestra, vocal, instrumental and talks. Eastern time. Slogan: "The Seaport of the Southeast."

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

WBCN Southtown Economist Station, Foster & McDonnell, 730 W. 65th St., Chicago, Ill. 266 meters, 1130 kilocycles, 500 watts, class B. Daily ex Sun, 10-11 am. Mon, Wed, Sat, 3-6 pm. Daily ex Mon & Sun, 7-8 pm. Daily ex Sat & Sun, 5-15 pm. Tues, Wed, Fri & Sat, 10-12 pm. Tues, 12 pm-2:30 am. Thurs, 10 pm-1 am. Sun, 10:30-12 am, church; 4-6 pm, music; 7:45-9:15, church. Central standard time. Slogan: "World's Best Community Newspaper."

WBDC The Baxter Laundry Co., 747 Fountain St. N. E., Grand Rapids, Mich. 256.4 meters, 1170 kilocycles, 50 watts, class A. Central standard time.

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

WBNY Shirley Katz, 145 West 45 Tilmar Bldg., New York, N. Y. 322.4 meters, 930 kilocycles, 1000 watts, class A. Daily ex Sun, 7-11 pm. Sun, 2:30-7 pm. Eastern standard time. Slogan: "The Voice of the Heart of New York."

WBOQ A. H. Grebe & Co., Inc., 70 Van Wyck Blvd., Richmond Hill, L. I., N. Y. 236 meters, 1270 kilocycles, 500 watts, class A. Unlimited schedule. Eastern standard time.

WBRC Bell Radio Corp., 1913 5th Ave. N., Birmingham, Ala. 248 meters, 1210 kilocycles, 50 watts, class A. Mon, Wed, 8-9:30 pm. Sat, 9-12 pm. Central standard time.

WBRE Baltimore Radio Exchange, 17 W. Washington St., Wilkes-Barre, Pa. 231 meters, 1300 kilocycles, 100 watts, class A. Wed, Fri, 8:30 pm-midnight. Sun, 9-midnight, classical. Eastern standard time.

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

WBT C. C. Coddington, Realty Bldg., Charlotte, N. C. 275 meters, 1090 kilocycles, 500 watts. Sun, 11 am & 8 pm, church services. Tues & Thurs, 9 pm, organ recital. Daily, 7:30 pm, organ recital. Eastern standard time. Slogan: "The Queen City of the South."

WBZ Westinghouse Elec. & Mfg. Co., 625 Page Blvd., East Springfield, Mass. 333.1 meters, 90 kilocycles, 2000 watts, class B. Daily ex Sun, 6:30-10:30 pm (Thurs, 11 pm). Sun, 10:50 am, 7 pm, 8 pm. Eastern standard time. Slogan: "The Broadcasting Station of New England."

WBZA Westinghouse Electric & Mfg. Co., Hotel Brunswick, Boston, Mass. 242 meters, 1240 kilocycles, 250 watts, class A. Eastern standard time.

WCAC Connecticut Agricultural College Storrs, Conn. 275 meters, 1090 kilocycles, 500 watts, class A. Mon, Wed, Fri, 7:20 8:20 pm, farm lectures & music. Eastern standard time. Slogan: "Voice From the Nutmeg State."

WCAD St. Lawrence University, Canton, N. Y. 263 meters, 1140 kilocycles, 250 watts, class A. Daily ex Sun, 11-11:15 am; Wed, 8-11 pm; Thurs, 11-11:15 am, 6 pm, rebroadcasting of WGY. Eastern standard time. Slogan: "The Voice of the North Country."

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

WCAJ Nebraska Wesleyan University, University Place, Nebr. 254 meters, 1180 kilocycles, 500 watts, class A. Mon, Tues & Thurs, 4:30 pm, radio forecasts weather & news. Wed, 4:30 pm, news, weather; 8 pm, music, lectures. Fri, 4:30 pm, news weather; 7 pm, Bible study hour. Central standard time.

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

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

WCAP Chesapeake & Potomac Tel. Co., 725 13th St. NW., Washington, D. C. 469 meters, 500 watts, class B. Sun, 11 am, service; 4 pm, service; 7:30-10:15 pm, concert. Mon, 6:30-10 pm. Wed, 7-12 pm. Fri, 6-12 pm. Eastern standard time.

WCAR Southern Radio Corp. of Texas, 101 West Pecan St., San Antonio, Texas. 263 meters, 1140 kilocycles, 6000 watts, class A. Daily ex Sun, 11 am, stock reports; 3 pm, late stock reports & news items; 8-10 pm, musical program. Central standard time. Slogan: "Down in Sunny San Antonio."

WCAT South Dakota State School of Mines, Rapid City, S. Dak. 240 meters, 1240 kilocycles, 50 watts, class A. Mountain time.

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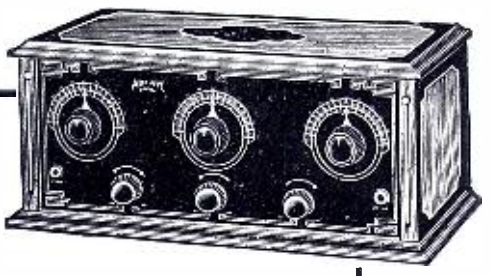

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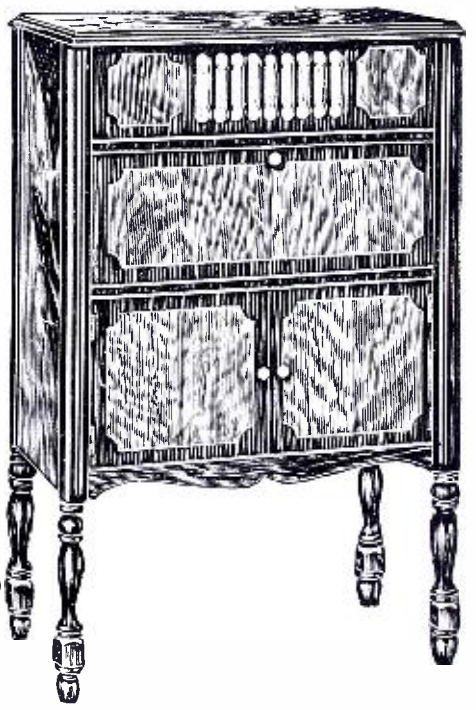

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Chicago, Illinois

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

WCAU Universal Broadcasting Co., Hotel Pennsylvania, 39th & Chestnut Sts., Philadelphia, Pa. 277.6 meters, 1080 kilocycles, 500 watts, class A. Sun, 11 am-1 pm, 5-9 pm. Mon, 7:30-12 pm, musical. Tues, 7:30-12 pm, musical. Wed, 7:30-12 pm. Thurs, 6:30-12 pm. Fri, 7:30-12 pm. Eastern standard time. Slogan: "Where Cheer Awaits U."

WCAX University of Vermont, Burlington, Vt. 252 meters, 1200 kilocycles, 100 watts, class A. Fri, 7:30-8:30 pm, educational & entertainment. Eastern standard time. Slogan: "The Voice of the Green Mountains."

WCBA Queen City Radiophone Station WCBA, 1015 Allen St., Allentown, Penna. 254 meters, 1180 kilocycles, 45 watts, class A. Wed & Fri, 8:15-11 pm, musical programs. Sat, 9:30-11 pm, dance program. Sun, 10 am, 5:30 pm, 7 pm, church services. Eastern standard time.

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

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

WCBH University of Mississippi, University P. O., Miss. 242 meters, 1240 kilocycles, 50 watts, class A. Mon, 9 pm., music & entertainment. Thurs, 9 pm, music & entertainment. Central standard time. Slogan: "The Voice of Ole Miss."

WCBK E. Richard Hall, St. Petersburg, Fla. 266 meters, 1130 kilocycles, 500 watts, class A. Eastern standard time.

WCBM Hotel Chateau, Baltimore, Md. 229 meters, 1310 kilocycles, 50 watts, class A. Sunday, vocal & instrumental, 9:45 to 11 am. Mon & Thurs, 10 to 1 am, dance orchestra.

WCBQ First Baptist Church, Nashville, Tenn. 236 meters, 1270 kilocycles, 100 watts, class A. Central standard time.

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

WCBT Clark University, Worcester, Mass. 238 meters, 1260 kilocycles, 250 watts, class A. Eastern standard time.

WCBU Arnold Wireless Supply Co., Arnold, Pa. 220 meters, 1360 kilocycles, 50 watts, class A. Eastern standard time.

WCBX The Radio Shop, Newark, N. J. 233 meters, 1290 kilocycles, 100 watts, class A. Eastern standard time.

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

WCFL Chicago Federation of Labor, Chicago, Ill. 491.5 meters, 610 kilocycles, 250 watts. Daily ex Sun, 6-10 pm. Central.

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

WCLS Boston Store, 301 Jefferson St., Joliet, Ill. 214.2 meters, 1400 kilocycles, 150 watts, class A. Central standard time.

WCMA Culver Military Academy, Culver, Ind. 222.1 meters, 1350 kilocycles, 100 watts.

WCOA City of Pensacola, Municipal Broadcasting Station, Pensacola, Fla. 222 meters, 500 watts. Daily, 7 to 10 pm, approximately. Slogan: "The Breezy Boy from the Gulf."

WCSH Henry P. Rines, Congress Square Hotel, Portland, Maine. 256.3 meters, 1170 kilocycles, 500 watts, class A. Sun, 10:30-12 noon, 1:30-2:30 pm, 7:30 to 10:15 pm. Mon, 10 to 11 am, 12-2 pm, 3-4 pm, 6-11 pm. Daily ex Sun same as Mon. Slogan: "The Voice from Sunrise Land."

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

WCTS C. T. Sherer Co., 44 Front St., Worcester, Mass. 268 meters, 1120 kilocycles, 100 watts, class A. Eastern standard time.

WCWS Charles W. Selen (Portable), 69 Exchange St., Providence, R. I. 209.7 meters, 1430 kilocycles, 100 watts, class B. Eastern standard time.

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

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

WDAE Tampa Times, Tampa, Fla. 273 meters, 1100 kilocycles, 250 watts, class A. Eastern standard time.

WDAF The Kansas City Star, Kansas City, Mo. 365.6 meters, 820 kilocycles, 1000 watts, class B. Mon, Wed, Fri, 8-8:30 pm, 11:45 pm, 1 am, Nighthawk frolic. Tues, Thurs, Sat, 3:30-4:30 pm, musical matinee; 6-7 pm, talks & music; 11:45 pm-1 am, Nighthawk frolic. Central standard time. Slogan: "Enemies of Sleep," Nighthawk slogan.

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

WDAH Trinity Methodist Church, El Paso, Tex. 267.7 meters, 1120 kilocycles, 50 watts.

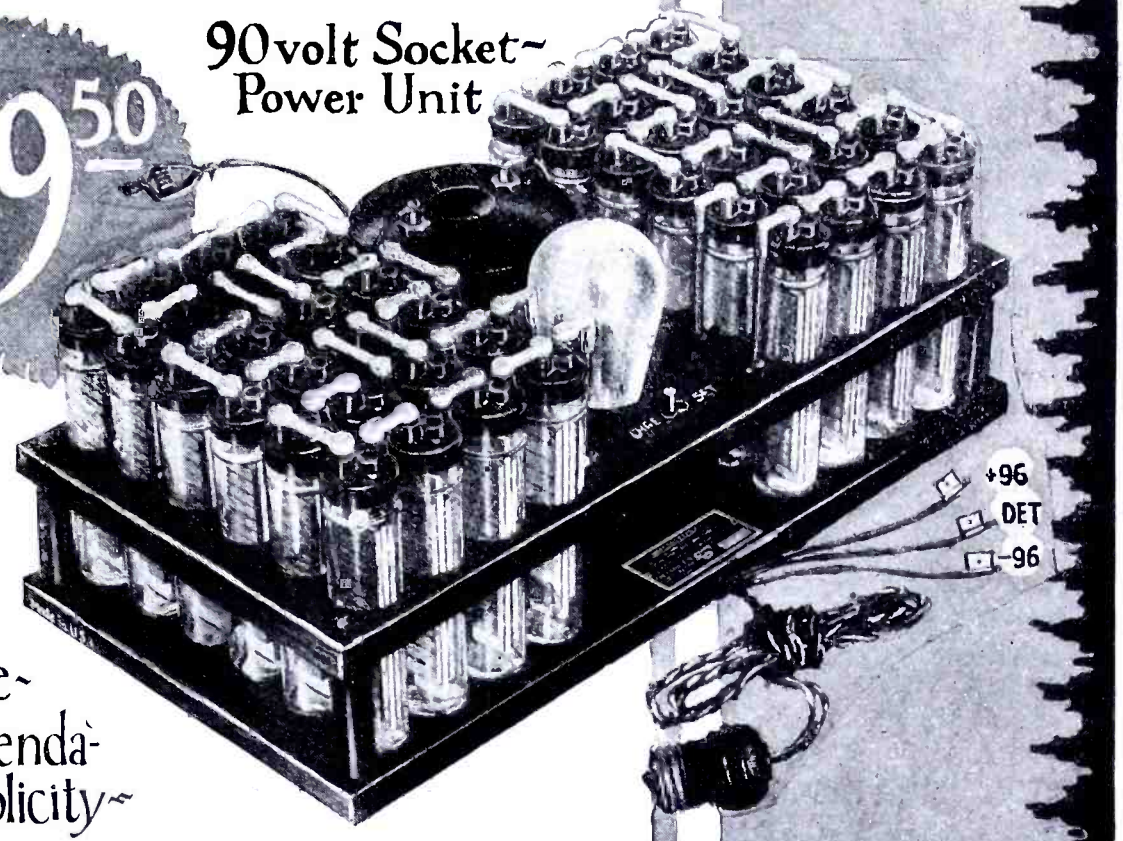
WDAY Radio Equipment Corporation, 119 Broadway, Fargo, N. Dak. 261 meters, 1150 kilocycles, 50 watts, class A. Limited commercial. Daily ex Tues, Thurs & Sat, 7:30 pm, musical program. Mon, 10 am, markets; 11 am, markets; 12:30 pm, markets; 12:30 pm, Blue Valley Radio Farm School; 1:10 pm, markets; 2 pm, markets & 5 pm, musical program. Sun, 10:30 am, church services; 4 pm, musical program; 7:30 pm, church. Central standard time.

WDBC Kirk, Johnson & Co., Lancaster, Pa. 258 meters, 1160 kilocycles, 50 watts, class A. Eastern standard time.

Fulfillment of every wish~

$29.50

90 volt Socket~ Power Unit



for
..economy~
..convenience~
..“B” power dependability *and* simplicity~

Good reception is not possible unless one has constant and efficient "B" power supply.

The indirect socket power principle is the efficient answer to perfect reception.

A. C. hum, line surges and dry battery static are positively eliminated in the Graynie because a perfect direct B current is taken from a stored supply altho unit is permanently connected to the house current. The mere throwing of a switch at convenient intervals, replaces the current used.

The unit frame constructed of steel has rubber feet and is beautifully finished in Duco.

A cabinet which completely encloses the unit and makes it conveniently portable can be furnished at an extra cost of $3.75.

The convenient Storage "B" battery

The Graynie single unit storage battery requires less space than dry cells and charging at intervals of approximately one month is simply accomplished in the same manner as the charging of an "A" battery. The Graynie battery is constructed with extra heavy glass cells with patented brown glazed porcelain tops. The special design of the cells and cell tops positively assure a clean battery even after years of service.

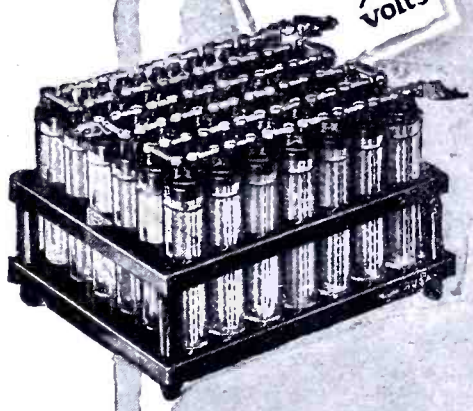
The cells are firmly and positively supported with a Duco finished steel frame. Water need be added only at intervals of about three months.

This unit is built in two sizes, 90 volts listing at $19.85, and 135 volts listing at $32.50.

All Graynie B units are guaranteed for two years.

Be sure to specify GRAYNIE when purchasing devices for "B" current. Your dealer has them or will glaldly order them.

$19.85 90 volts



GRAYNIE

The Graynie Corporation
323 W. Jackson Blvd., Chicago

Sales Dept., The Zinke Co.
1323 S. Mich. Ave., Chicago

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

WDBE Gilham Schoen Elec. Co., 35 Cone St., Atlanta, Ga. 270 meters. 1000 kilocycles, 100 watts, class A. Tues, 7-8 pm, 9C. S. T. Central standard time.

WDBJ Richardson Wayland Elec. Corp., 106 Church St., S. W., Roanoke, Va. 229 meters. 1310 kilocycles, 50 watts, class A. Sun 8-9 pm. Daily ex Sun 12-1 pm & 5:30-6 pm. Wed. & Sat 12-1 pm; 9-11 pm. Eastern standard time. Slogan: "Down in Old Virginia."

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

WDBO Rollin College, Inc., Box 344, Winter Park, Fla. 240 meters, 1250 kilocycles, 500 watts, class A. Daily ex Sun, 7:30 pm, markets; 9 pm, musical programs. Sun, 10:30 am, church service. Eastern standard time. Slogan: "The Voice of Central Florida."

WDBQ The Morton Radio Supply Co., Salem, N. J. 234 meters, 1280 kilocycles, 10 watts, class A. Eastern standard time.

WDBS The S. M. K. Radio Corp., 39 E. 3rd St., Dayton, Ohio. 275 meters, 1090 kilocycles, 5 watts, class A. Central standard time.

WDBY North Shore Congregational Church, 1011 Wilson Ave., Chicago, Ill. 258 meters, 1160 kilocycles, 500 watts, class A. Central standard time.

WDBZ Ulster County Council, Boy Scouts of America, Kingston, N. Y.

WDCH Dartmouth College, Hanover, N. H. 256 meters, 1170 kilocycles, 100 watts, class A. Eastern standard time.

WDEL Wilmington Electric Specialty Co., 405 Delaware Ave., Wilmington, Del. 266 meters, 1130 kilocycles, 100 watts. No regular schedules at present.

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

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

WDRC Doolittle Radio Corp., 115 Crown St., New Haven, Conn. 268 meters, 1120 kilocycles, 100 watts, class A. Sun, 11 am-12 pm. Thurs, 8 pm-9 pm. Summer schedule. Eastern standard time.

WDS Penna. Power & Light Co., Pottsville, Pa. 137 meters, 2180 kilocycles. Eastern standard time.

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

WDZ James L. Bush, Tuscola, Ill. 278 meters, 1080 kilocycles, 100 watts, class A. Central standard time. Daily except Sun & Sat, grain markets, 9 am-2:30 pm, each half hour. Sat, 8 am-1 pm, each half hour.

WEAF American Telephone & Tele. Co., 195 Broadway, New York, N. Y. 491.5 meters, 610 kilocycles, 5000 watts, class B. Daily ex Sun, 6:45-9 am; 6 pm-12 midnight. Daily ex Sun, 4-5 pm. Mon, Wed, Fri, 11 am-1:15 pm; 12 noon. Tues, Thurs, 12:45-1:45 pm. Sat, 4-6 pm; Sun, 3-10:15 pm. Standard eastern time.

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

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

WEAN The Shepard Stores, Westminster St., Providence, R. I. 270 meters, 1110 kilocycles, 500 watts, class B. Daily ex Sun, 12-1 am, 4-5 pm, musical program; 6:30 pm, dinner dance; 8 pm, concert. Tues & Thurs, 10 am, home service talk. Wed, 9:30 dance program. Sun, 10:30 am or 11 am, church service; 1:30 pm & 4 pm, concert program. Eastern standard time. Slogan: "We Entertain a Nation."

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

WEAR The Goodyear Tire & Rubber Co., 2026 Union Trust Bldg., Cleveland, Ohio. 389.4 meters, 770 kilocycles, 1000 watts, class B. Daily ex Sun, 11 am-12:15 pm, weather, markets. Daily ex Sat & Sun; 3:30-4 pm, weather, markets. Mon, Wed & Sat, 7-8 pm, musical. Tues, Thurs & Fri, 7-11 pm, musical. Sun, 3:30-5 pm, musical; 7-10 pm, musical. Eastern standard time. Slogan: "Goodyear Tires—WEAR."

WEAU Davidson Bros. Co., Sioux City, Iowa. 275 meters, 1090 kilocycles, 100 watts, class A. Daily except Monday, 8:35-9:35, 10:35-11:35 am, 12 noon-12:35 pm, 3:30-5 pm. Tues also, 6:30 pm. Central standard time.

WEAY Iris Theater, 612 Travis St., Houston, Texas. 270 meters, 1110 kilocycles, 500 watts, class A. Central standard time.

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

WEBE Roy W. Waller, 319 Wall St., Cambridge, Ohio. 234 meters, 1280 kilocycles, 10 watts, class A. Sun, 7 pm, church services. Fri, 7:30 to 9 pm, news, market & music. Central standard time.

WEBD Electrical Equipment & Service Co., Anderson, Ind. 246 meters, 1220 kilocycles, 15 watts, class A. Central standard time.

WEBH Edgewater Beach Hotel, Chicago Evening Post, 5300 Sheridan Road, Chicago, Ill. 3702 meters, 810 kilocycles, 1000 watts, class B. Daily ex Sun, Mon, 7-8 pm, 9-10 pm, 11 pm-1 am (Sat, 11 pm-2 am). Sun, 10:40 am-12 noon, church service; 5-6 pm, 7-9 pm, musical program. Central standard time. Slogan: "Where Everybody's Happy."

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

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

What I would do if I wanted more money

By J. MATHESON BELL

FIRST of all I'd make up my mind definitely that I was going to get it.

I don't believe any man living can get things worth while without ***firmly believing*** that he can. Determination will conquer failure anytime, anywhere.

"Busted" and Blue

I'll work harder on my present job to make the boss feel that he owes me more.

But I won't stop there.

I'll put my spare time to work.

I'll quit losing money by making my evenings pay.

I wouldn't give up my present job but I'd make more money by working longer hours.

I'd find something that could be sold evenings, either in my home or some one else's home.

That something would have to be a little out of the ordinary because it would have to be of special interest in the evening.

That would be the time of day when both the man and his wife are at home so I'd find something that would be of interest to both of them.

Decides to Work Harder

I feel sure that such an article would have to be something for the home, something they would both use and enjoy.

So far so good, but what will that something be.

Piano?

Fine, but come to think of it I can't even play one myself so that's out.

Automobile—

Sounds better, guess I could learn how, but seems to me that everybody I know has one. At any rate the auto sounds good—let's see if there is anything better.

Phonograph—

Doesn't sound near so good as the auto.

Vacuum Sweeper—

How Can I Make More?

Not so much interest to the man and I don't see just how I'd show up dust at night.

Radio—

Why, the Sam Hill didn't I think of that before, but let's see if it will do—let's see what its good points are as well as its bad ones.

True—I don't know anything about radio, but I have lots of friends who have learned something about it, so I think I could. What sounds good to me is, that I can demonstrate in the home in the evening, the very time of the day for me, and that's just when all the music is being broadcasted.

I'll have competition. I expect it. I'll have to know just what my demonstration will do that the other fellow's won't, so lets see what would make the biggest appeal.

Thinks Hard!

Of course, they would be impressed with music from our nearby stations but I feel sure that if I bring in great distances they will be more impressed. It will have to bring in music loud enough so they can sit away back in the room and enjoy it. It must have volume.

They may be satisfied with music from nearby stations, but they'll ask me for distance, so I must be able to get "by" our powerful nearby station. The radio I want must be selective so I can tune out our nearby station if I desire.

I can picture myself in some prospect's home with a radio that will do that, but I wonder if that is enough—maybe my competitor will be there also—maybe he can do all those things as well as I can.

Then where am I?

I've got it—I'll tell you what my radio must do—I want one that my prospect can do all the tuning, so that ***he*** will get the thrill of bringing in the music from a distance ***clear*** and ***loud*** and with a tone that will please.

After all he is the one who is going to operate it, so why wouldn't it be better and best if all he had to do was sell himself. I'll admit I'm not much of a salesman, so if I find a radio that will sell itself then I'll not only whip competition but I'll do it easily.

Gets An Idea—

Best of all, I'll make that extra money I want.

Who knows, I may be so successful at it that I can give up my present job and give it all my time—Gee that sounds too good to be true, but other men have done it so why can't I—I can and I will.

But what radio can I sell that will do what I want and yet sell at a reasonable price—I don't want one so high that my people can't buy—but it must be a good one.

Then when I do sell it, they will want me to fix anything that goes wrong so somebody must teach me how to service radio—that's something I can't afford to overlook.

Where is such a radio?

Where is a manufacturer who will teach me how to sell and how to demonstrate—where I can learn this business, both selling and servicing radio — there must be someone.

Writes to Mr. Bell

There is—Ozarka Incorporated of Chicago—the sign of the long distance goose—they have a 64-page book "The Ozarka Plan" which they will send me if I tell them about myself and mention the name of my county. Where is my pen and some paper? I'm going to make ***more money*** and I'm going to start ***right now*** by writing for this book.

10-28

Use This Coupon!

J. Matheson Bell,
Pres., OZARKA, Inc.
122 Austin Avenue M,
Chicago, Illinois

I am greatly interested in the FREE Book, Ozarka Plan No. 100, telling how I can establish myself in the radio business and increase my present income.

Name.....

Address.....City.....

County..... .....State.....

OZARKA INCORPORATED

122 Austin Avenue M
Chicago, Illinois

122 Austin Avenue M
Chicago, Illinois

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

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

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

WEBR H. H. Howell, Bramson Bldg. 1, Buffalo, N. Y. 244 meters, 1230 kilocycles, 100 watts, class A. Mon, Wed & Sat, 8:30-11:30 pm, musical program. Sun, 10:30 am-7:30 pm, church. Sat, specials. Eastern standard time. Slogan: "We extend Buffalo Regards."

WEBT The Dayton Co-operative Industrial High School, Dayton, Ohio. 256.4 meters, 1170 kilocycles, 5 watts, class A. Irregular schedule. Central standard time.

WEBW Beloit College, Beloit, Wis. 268 meters, 1120 kilocycles, 500 watts. Sun, 4:25-5:30 pm, vesper services. Mon, 8-9 pm, concert. Central standard time.

WEBY Beloit, College, Beloit, Wis. 268 meters, 1120 kilocycles, 500 watts, class A. Sun, 4:25-5:30 pm. Mon, 8-9:30 pm. Central standard time.

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

WEEI Edison Elec. Illuminating Co., Boston, Mass. 348.6 meters, 500 watts. Daily ex Sun, 6:45 am, exercises; 7:45, watch. Mon, 4 pm, 5:30, 6:30-10:30, 10:30. Tues, 3 pm, 4, 6:30-10, 10. Wed, 4 pm, 6:30-10, 10. Thurs, 4 pm, 6:30-10:10, 10. Fri, 4 pm, 6:30-10, 10. Sun, 10:05 am, 12:30 pm, 2, 3, 5:30, 7:20, 9:20. Eastern time.

WEHS Robert E. Hughes, Evanston, Ill. 202.6 meters, 1480 kilocycles, 10 watts.

WEMC Emanuel Missionary College, Berrin Springs, Mich. 285.5 meters, 1050 kilocycles, 500 to 5000 watts, class B. Sun, 11 am-8:15 pm, studio chapel service. Mon & Wed, 8:15 pm. Fri, 9 pm. Central standard time. Slogan: "The Radio Lighthouse."

WENR All-American Radio Corp., 4201 W. Belmont Ave., Chicago, Ills. 266 meters, 1130 kilocycles, 1000 watts, class A. Sun, 8-9 pm, popular music. Daily ex Sun, Mon, 8-9, popular program. Tues, 8-9 pm, Dunas. Fri, 1:30-3 pm, 9-10 pm, popular program. Central standard time.

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

WFAA Dallas News & Journal, Dallas, Tex. 475.9 meters, 630 kilocycles, 500 watts, class B. Daily, 6:30 am to 3 pm, weather, news, markets. Wed, silent after 3 pm. Sun, 6-7 pm, Bible class; 9:30-11 pm. Central standard time.

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

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

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

WFBD Vande Walle Music & Radio Co., 208 W. 2nd St., Seymour, Ind. 234 meters, 1280 kilocycles, 5 watts, class A. Eastern standard time.

WFBE Vande Walle Music & Radio Co., 208 W. 2nd St., Seymour, Ind. 225 4/10 meters, 1330 kilocycles, 10 watts, class A. Mon, Wed & Fri, 7 to 9 pm. Central standard time.

WFBG Wm. F. Gable Co., Altoona, Pa. 277.8 meters, 1080 kilocycles, 100 watts, class A. Sun, 10:45 am, church; 2:30 pm, chapel; 4 pm, dinner music; 7:30 pm, church; 9:15 pm & 11:15 pm. Mon, 7:30 pm, Uncle Ed. Tues, 12:15 pm, organ; 3-6:30-8:30 pm. Wed, 12:15-3-6:30-8:30 pm. Fri, 12 noon, 3-6:30-8:30-11:15-9:30. Sat, 3-6:30-7:30-8:30-9:30. Eastern standard time. Slogan: "The original Gateway to the West and we wish you the best."

WFBH Concourse Radio Corp., Hotel Majestic, 72nd St. & Central Park West, New York City, N. Y. 272.6 meters, 1010 kilocycles, 500 watts, class A. Daily, 11:30 pm. Mon, Tues & Fri, 2-7 pm; Wed, Thurs & Sats, 2-8 pm; Sun, 5-8 pm. Eastern standard time. Slogan: "Voice of Central Park."

WFBI Galvin Radio Supply Co., 516 Broadway, Camden, N. J. 236 meters, 1300 kilocycles, 500 watts, class A. Mon, Wed, Fri, 9 pm-12 midnight. Eastern standard time. Slogan: "Camden, the City of Opportunity."

WFBJ St. Johns University, Collegeville, Minn. 236 meters, 1270 kilocycles, 50 watts, class A. Sun, 7-7:30 pm. Central standard time. Slogan: "In the Heart of the Landscape Paradise."

WFBK Dartmouth College, Hanover, N. H. 256 meters, 1172 kilocycles, 100 watts, class A. Eastern standard time.

WFBL The Onandaga Hotel, Syracuse, N. Y. 252 meters, 1190 kilocycles, 100 watts, class A. Mon, Wed, Fri, 3-4 pm, 6-8 pm. Tues, 3 to 4 pm, 6 to 10:30 pm. Thurs, 3 pm through 12:30 am. Sat, 2 to 5 pm, 6 to 8 pm, 9 to 12 n. Sun, 3 to 4:30 pm, 5 to 8:30 pm. Eastern standard time. Slogan: "When Feeling Blue Listen."

WFBM Merchants Heat and Light Co., Indianapolis, Ind. 267.7 meters, 1120 kilocycles, 250 watts. Slogan: "The Convention City of America."

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

WFBZ Knox College, Galesburg, Ill. 254 meters, 1180 kilocycles, 20 watts, class A. Central standard time.

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

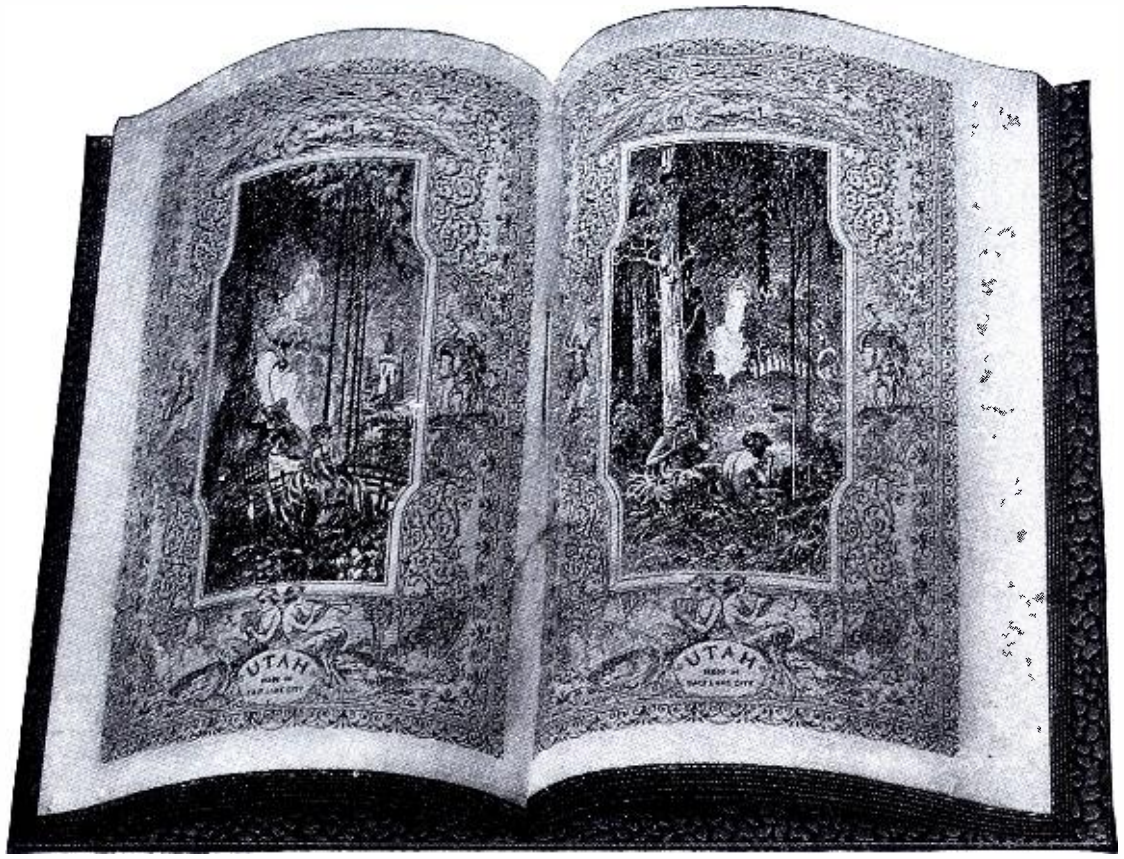
WFI Strawbridge & Clothier, Philadelphia, Pa. 394.5 meters, 760 kilocycles, 500 watts, class B. Mon, Wed & Fri, 10:15 am-1 pm, markets & reports, recital & Betty Crocker; 3 pm, S & C tea room ensemble, market reports & recital; 6:40 pm, concert programs. Tues, Thurs & Sat, 10:15 am, market reports; 1-3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

WFKB Francis K. Bridgman, 4536 Woodlawn Ave., Chicago, Ill. 217.3 meters, 1380 kilocycles, 500 watts, class A. Daily ex Sun, Mon, 7-10 pm, classical & semi-classical music. Wed & Sat, children's stories. Central standard time. Off air for summer.

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

The UTAH Book
Sensation of 1926

$19 **$19**



The Open Book of Radio

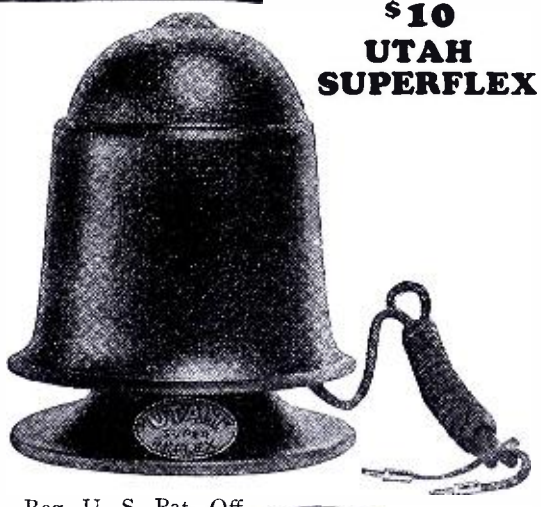
TRY a UTAH Book Speaker, the newest Radio development. Looks like an open book—ornamental, efficient. If it does not produce clearer reception than any other speaker using same kind of construction in diaphragm regardless of price, return it and your money will be cheerfully refunded. Has greater tone range than any other speaker using the paper diaphragm. Brings out all low tones as well as high tones. Stands strongest amplification without blasting or distortion. Ask your dealer about the Utah line — sold on the unconditional Utah guarantee.

GUARANTEE
Buy a **Utah** and use it for two weeks. Compare its tone with the best the others are able to produce. **If the Utah does not give better reception** return it to your dealer and **he will refund your money.**

Utah Radio Products Co.
1421 S. Michigan Ave., Chicago, Ill.

UTAH
Made in Salt Lake City
Trade Mark Registered

$10
UTAH SUPERFLEX



Reg. U. S. Pat. Off.

$22.50
UTAH STANDARD

The speaker with the golden throat
14-Inch Bell

UTAH JUNIOR
$12.50
11-Inch Bell

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

WGAM Galvin Radio Supply Co., Camden, N. J 236.1 meters, 1270 kilocycles, 500 watts.

WGAQ W. G. Patterson, Shreveport, La. 263 meters, 1140 kilocycles, 150 watts, class A. Central standard time.

WGBB Harry H. Carman, 217 Bedell St., Freeport, N. Y. 244 meters, 1230 kilocycles, 100 watts, class A. Mon, Wed, Fri, 8-11 pm, musical program. Sun, 10:40 am to 12 noon. Church services, Freeport M. E. Church. Eastern standard time. Slogan: "The Voice of Long Island."

WGBC First Baptist Church, Memphis, Tenn. 278 meters, 1130 kilocycles, 10 watts, class A. Sun, 9:55 am & 7:30 pm, church service. Central standard time.

WGBF The Finke Furniture Co., 307 Upper Seventh St., Evansville, Ind. 236.1 meters, 1270 kilocycles, 500 watts, class A. Daily ex Sun, 7:15 am, morning worship service; 10:30 am, cooking lessons; 12:10 pm, news, markets, weather, etc.; 12:20 pm, music. Tues & Fri, 7-10 pm, musical program. Fri, 11-12 pm, midnight program. Sun, irregular schedule. Central standard time. Slogan: "We Grow By Fairness."

WGBG Breitenbach's Radio Shop, Thrifton, Va. 226 meters, 1330 kilocycles, 100 watts, class A. Eastern standard time.

WGBI Frank S. Mcgargee, 608 Linden St., Scranton, Pa. 240 meters, 1250 kilocycles, 15 watts, class A. Wed, 5:30 to 6:30 pm, musical 8-9 pm, golden hour; 9-12 midnight, dance. Thurs, 5:30-6:30 musical hour; 6:30-7:30 pm, songs; 7:30-8:30 pm, Home Lovers' Hour; 8:30-10:30 pm, classical. Sat, 5:30-6:30 pm, musical hour; 9-12 midnight, dance; 10 pm, news dispatch. Eastern standard time.

WGBK Lawrence W. Campbell, Johnstown, Pa. 248 meters, 1210 kilocycles, 5 watts, class A. Daily ex Sun, 5-6:30 pm. Sat, 8:45-11:45 pm. Sun, 3-5 pm. Eastern standard time.

WGBM Theodore N. Saaty, 92 Dover St., Providence, R. I. 234 meters, 1280 kilocycles, 100 watts, class A. Mon, Fri, 10-12 pm. Wed, 7-10 pm. Eastern standard time.

WGBQ Stout Institute, Menominee, Wis. 234 meters, 1290 kilocycles, 20 watts, class A. Central standard time.

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

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

WGBT Furman University, Greenville, S. C., 236 meters, 1270 kilocycles, 15 watts, class A. Central standard time.

WGBU Chamber of Commerce, Ful-ford-by-the-Sea, Fla. 270 meters, 1139 kilocycles, 500 watts, class A. Mon, Tues, Thurs, Fri, 12-1 pm, 6:30-7:30 pm, 11 pm-2 am. Wed & Sat, 12-1 pm, 6:30-7:30 pm, 10 pm-1 am. Sun, 9:30-11 pm. Eastern standard time.

WGBW Valley Theater, 100 Erie St., Spring Valley, Ill. 256 meters, 1170 kilocycles, 10 watts, class A. Central standard time.

WGBX University of Maine, Orono, Maine. 252 meters, 1190 kilocycles, 100 watts, class A. Sun, 2 pm, musical. Wed, 7:30 pm, musical & educational. Eastern standard time.

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

WGES Coyne Electrical School, Inc., 1300 W. Harrison St., Chicago, Ill. 250 meters, 1200 kilocycles, 500 watts, class A. Mon, 5-7 pm, pipe organ musical. Tues, Wed, Thurs, Fri & Sat, 5-7 pm, semi-classical; 8-9 pm, 11-1 am, musical. Sun, 10:15-12 am, 5-7:40 pm, 11-12 pm, religious pipe organ music. Central standard time. Slogan: "World's Greatest Electrical School."

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

WGHP George Harrison Phelps, Inc., 110 Rowena St., Detroit, Mich. 270 meters, 1110 kilocycles, 1500 watts, class B. Mon, Tues, Wed, 8-10 pm, musical. Thurs, 10-12 pm, the Midnight Mariners aboard the "Skylark." Fri, 10-12 pm, popular program. Eastern standard time.

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

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

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

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

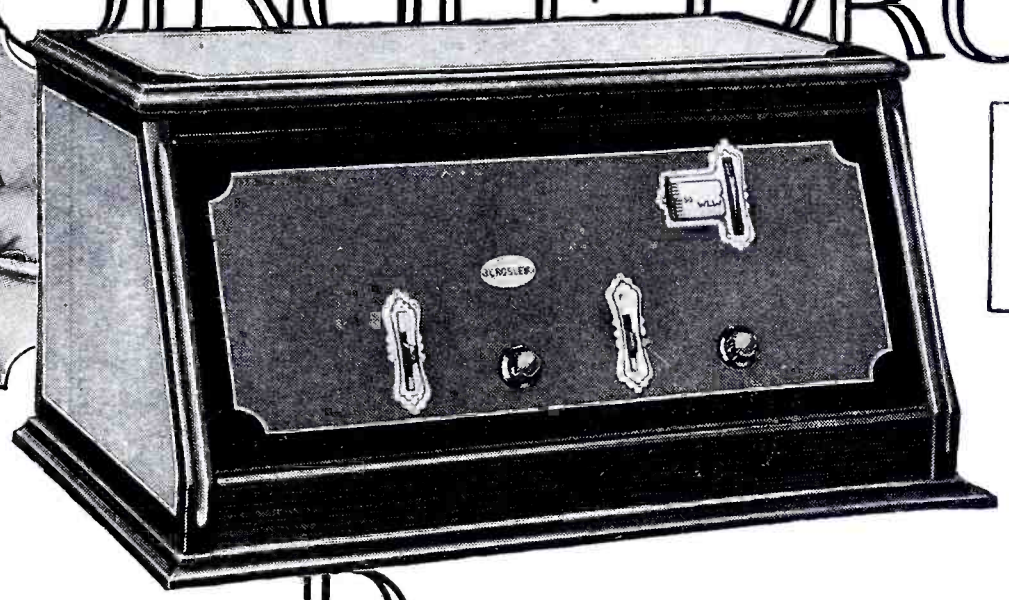
WGST Georgia School of Technology, Atlanta, Ga. 270 meters, 1110 kilocycles, 500 watts, class A. Mon, 9-10 pm, "Tech Nite" program. Thurs, 7-8 pm, "Artist Series" program. Central standard time. Slogan: "The Southern School with the National Reputation."

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

WHA University of Wisconsin, Madison, Wis. 535.4 meters, 560 kilocycles, 750 watts, class B. Mon, Fri, 7:45-9 pm, musical, & educational talks. Wed, 9-10 pm, musical, & educational talks. Central standard time.

WHAD Marquette University, Milwaukee, Wis. 275.1 meters, 1090 kilocycles, 500 watts, class A. Daily ex Sun, 12-12:45 pm, 3-6 pm, baseball; 6-7:10 pm, dinner music. Sun, 3:15-5:15 pm. Mon, 8:30-10:30 pm. Tues, 8:30-11:30 pm. Thurs, 8:30-10:30 pm. Wed, 8-10, band concert. Central standard time. Slogan: "The Voice of Wisconsin."

5 tube SINGLE DRUM STATION SELECTOR RADIO RECEIVER



6 Other Crosley Radio Achievements

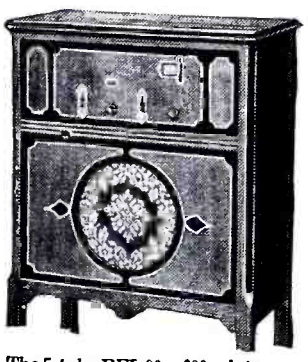
The Crosley 1-tube "Pup"—$9.75—a double-circuit set, with which laymen have heard radio signals probably the greatest distances.

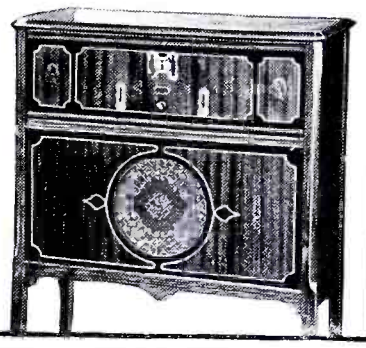
The 4-tube 4-29—$29—a 4-tube receiver of amazing efficiency. Already proven its right to a permanent position in the Crosley line. CRESCENDON equipped!

The 5-tube 5-38—$38. The 5-tube tuned radio frequency set incorporating the CRESCENDON—a spectacularly popular model.

The 5-tube RFL 75—$65—true cascade amplification: non-oscillating—non-radiating, regardless of how it may be mishandled.

The 5-tube 5-75—$75—embodying the 5-tube single control, with drum station selector, as offered in a table model at $50. SOLID MAHOGANY cabinet. Musicone built-in—41 inches high.



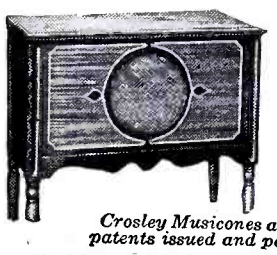


The 5-tube RFL 90—$90—introducing the double drum station selector! Solid mahogany cabinet. Musicone built-in—ample room for batteries and all accessories, 41 inches high, 30 1-2 inches wide.

Prices slightly higher West of the Rockies.

Crosley manufactures radio receiving sets which are licensed under Armstrong U. S. Patent No. 1,113,149 or, under patent applications of Radio Frequency Laboratories, Inc., and other patents issued and pending.

The CROSLEY MUSICONES



The announcement of the new Super-Musicone is predicated on the success of the Regular (12 inch cone) Crosley Musicone in replacing hundreds of thousands of old type loud speakers. **Musicone Regular 12 inch cone $12.50. Super-Musicone 16 inch cone $14.75. Musiconsole with built in Musicone $32.00.**

Crosley Musicones are manufactured under basic patents issued and pending, controlled by Crosley.

$50.

Contrast the surpassing performance of this new type of Crosley Radio with what has hitherto been considered radio perfection.

The cabinet is solid mahogany, beautifully finished in two-tone and striped in gold. Metal fittings are rose gold finish.

The metal shielded chassis is divided into three compartments. The units shielded from each other, prevent interstage as well as external coupling. This improves stability of circuit and increases selectivity. This has never before been offered in sets of moderate price.

Crescendon Control affords unusual volume from distant stations.

Heretofore single dial control sacrificed selectivity. By means of the Acuminators, very sharp tuning is accomplished where the reception from local stations spreads broadly over the dial. Under average conditions, when once adjusted, these acuminators do not have to be touched again.

With the Graphic Station Selector, Stations from one end of the wave band to the other, are easily brought in at all times—IN THE SAME PLACE.

CROSLEY · RADIO

BETTER ... COSTS LESS

Write Dept. 41, CROSLEY RADIO CORPORATION, CINCINNATI, O.

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

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

WHAP F. P. Cooke Sons, The Hotel Seaside, Atlantic City, N. J. 275 meters, 1090 kilocycles, 500 watts, class B. Daily ex Sun & Wed, 2 pm, 8-11 pm. Sun, 10:45 am-2:15 pm, 2:45, 7:50-9 pm. Tues & Fri, 2 pm, 7-8 pm. Eastern standard time. Slogan: "Pioneer Broadcasting Station of Atlantic City."

WHAR Wm. H. Taylor Finance Corp., 393 Seventh Ave., New York, N. Y. 431 meters, 697 kilocycles, 500 watts, class A. Daily ex Sat & Sun, 6:30-11 pm. Sun, 2:30-4:15 pm. Eastern standard time. Slogan: "The Station for Public Service."

WHAS Courier Journal & Louisville Times, Louisville, Ky. 399.8 meters, 750 kilocycles, 500 watts, class B. Daily ex Sun, 3-5 pm, concert, police, markets. Sun, 9:57-10:40 am, church services; 4:30-5:40, vesper services. Central standard time. Slogan: "Old Kentucky Home."

WHAV Wilmington Electrical Specialty Co., Inc., Wilmington, Delaware. 266 meters, 1160 kilocycles, 100 watts, class A. Irregular schedule. Eastern standard time.

WHAZ Rennsslaer Polytechnic Institute, Troy, N. Y. 379.5 meters, 790 kilocycles, 500 watts, class B. Mon, 8-11:30. Second Mon of each month a special transcontinental & trans-Atlantic test program from 12 midnight-1:30 Tues am. Eastern standard time. Slogan: "Transcontinental & International Broadcasting Station Located at the Oldest College of Science and Engineering in America."

WHB Sweeney Automotive & Electrical School, Kansas City, Mo. 356.6 meters, 820 kilocycles, 500 watts, class B. Mon, Wed, Fri, 8:25 am-3 pm, markets; 2-3 pm, music; 7-8 pm, educational. Tues, Thurs, 8:25 am-3 pm, markets; 2-3 pm, 7-7:45 pm & 8-10 pm, musical. Sat, 8:25 am-1:25 pm, markets. Sun, 9:40-10:45 am, 11 am-12:15 pm, 8-9:15 pm, services; 11:15-1 am, organ concert. Central standard time. Slogan: "The Heart of America."

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

WHBB Hebal's Store, 328 McCulloch St., Stevens Point, Wis. 240 meters, 1249 kilocycles, 50 watts, class A. Central standard time.

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

WHBD Chas. W. Howard, 110 Chillicothe St., Bellefontaine, Ohio. 222 meters, 1350 kilocycles, 20 watts, class A. Sun, 10:45 am, 7:30 pm. Daily ex Sun & Sat, 7:30-9 pm. Eastern standard time.

WHBF Beardsley Spec. Co., Inc., 217 18th St., Rock Island, Ill. 222 meters, 1350 kilocycles, 100 watts, class A. Mon, Wed, Sat, 9-11 pm. Sat, 2-4, 7-9 pm. Central standard time.

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

WHBH Culver Military Academy, Culver, Ind. 222.1 meters, 1350 kilocycles, 100 watts, class A. Mon, 8:30-9:30 pm, musical, vocal & instrumental. Sat, 7:15-7:45 pm, jazz orchestra. Central standard time.

WHBJ The Lauer Auto Co., 2315 So. Calhoun St., Ft. Wayne, Ind. 234.4 meters, 1280 kilocycles, 50 watts, class A. Mon, Tue, Wed, Thurs, 6 pm, chimes concert. Mon, 1-2 pm, musical. Tue & Fri, 8-12 pm, musical. Wed, 3-4 pm, musical. Sun, church services. Central standard time.

WHBK Franklin St. Garage, Inc., 3 McKenzie Ave., Ellsworth, Maine. 231 meters, 1300 kilocycles, 10 watts, class A. Eastern standard time.

WHBL James H. Slusser, 1214 Erie Ave., Logansport, Ind. 215.7 meters, 1360 kilocycles, 50 watts, class A. Central standard time.

WHBM O. L. Carrell (Portable), 1506 No. American Bldg., 36 So. State St., Chicago, Ill. 233 meters, 1290 kilocycles, 20 watts, class A. Central standard time.

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

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

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

WHBR United Engineering Laboratories, 1745 Reading Road, P. O. Box 618, Cincinnati, Ohio. 215.7 meters, 1390 kilocycles, 300 watts, class A. Mon, 8-10 pm, 11 pm-12:30 am. Wed, 9:30-12 pm. Thurs, 2-4 pm, 10-12 pm. Sats, 8:30-10:30 am, 2-4 pm, 6-8 pm. Sun, 2-4 pm, 8-10:30 pm. Central standard time. Slogan: "That's Us."

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

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

WHBY St. Norbert's College, College Ave., West De Pere, Wis. 250 meters, 1200 kilocycles, 50 watts, class A. Sunday, 5 to 6 pm, religious program. Mon & Tue, 5 pm, weather report, market; 8-1 pm, music. Central standard time.

WHDI Dunwoody Institute, 818 Superior Blvd., Minneapolis, Minn. 278 meters, 1080 kilocycles, 500 watts, class A. Mon, 8-9 pm, educational. Wed, 9-10, musical; Big Hat Prize Programs. Fri, 9-10 pm, educational & musical.

WHEC Hickson Elec. Co., 36 South Ave., Rochester, N. Y. 258 meters, 1160 kilocycles, 100 watts, class A. Daily ex Sun, 6:30-10 pm; dinner concert, children's hour; 6:30 pm, dinner concert. Sat, 10:30-12 pm, dance music. Eastern standard time. Slogan: "The City of Varied Industries."

WHK The Radiovox Co., 1025 Boliver St., Cleveland, Ohio. 272.6 meters, 1100 kilocycles, 1000 watts, class A. Daily ex Sun, 6:30-7:30 pm. Sun, 10:30 am; church; 6:15-7:15 pm, 7:15-9 pm, church 9-9:30 pm. Eastern standard time. Slogan: "Cleveland, the Convention City."

BE A RADIO EXPERT!

The Opportunity of a Lifetime

Amazing money-making possibilities—Big Salaries—fortunes and independence await wide-awake, ambitious men entering the Radio field

Earn $3,000 to $10,000 a year

Everyone knows that the men who got in on the ground floor opportunities of the locomotive, the telephone, electricity, the automobile, moving pictures, etc., have been handsomely rewarded—many of them made millions. Now science contributes the greatest opportunity of the age—a discovery so marvelous and so easily within the means of all that even the humblest home seeks its possession and benefits.

From a business and money-making standpoint Radio fairly staggers the mind of anyone who gives it a moment's thought. Even men with little or no knowledge of its principles are making $3,000 to $10,000 a year. Radio is the fastest growing industry in the world. Everywhere people are crying for radios. Manufacturers are swamped with orders that cannot be filled. And yet anyone of average intelligence can learn at home in spare time how to construct, install, repair and sell dependable sets.

Train at Home in Three Months

If you are in a routine job with poor pay and no future, here is truly *the chance of a lifetime.* Don't miss it. In a few short months at home by mail we can make you an expert representative of our Association. Become the radio expert of your town or neighborhood. Find out how the Radio Association of America throws the doors of opportunity wide open for you. We will show you the way to swing big salary jobs or to get into business for yourself and be your own boss.

No Previous Experience Necessary

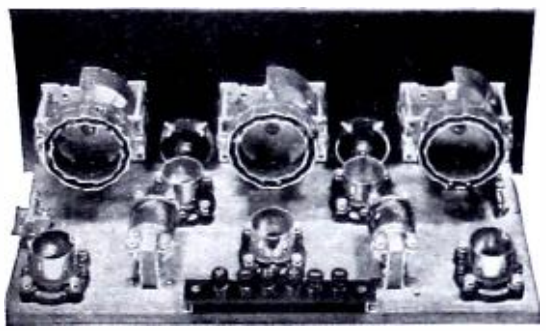
Get your share of the big money to be made in the most rapidly growing business of all time. Mail the coupon below for our big free book, which tells how in your spare time at home, without giving up your present position or losing a dollar of pay, you can become a thoroughly trained radio expert in a few short months.

No previous experience is necessary. For the man who prefers a salary, big pay jobs are waiting with the U. S. Government, Steamships, Railroads, and thousands of corporations and business houses. For the man who wants to start in business on a full or spare time basis, with little or no capital, grow and become independent, Radio offers an easy way to unlimited money-making opportunities. In no other line can ambitious men find an easier road to success.

You can train under one of America's leading Radio authorities. Read Mr. A. G. Mohaupt's offer to train you personally in everything about constructing, installing, repairing and selling Radio Sets and Accessories. By enrolling with us now, you get the benefit of the direct personal guidance of this well-known Radio expert.

A. G. MOHAUPT, B.A., M.S.
Head of the Radio Association of America, Graduate Electrical Engineer, University of Wisconsin, Former Radio Instructor for U. S. Government. Author of "Practice and Theory of Modern Radio."

"I give my personal attention to every student taking my course. Your individual problems and questions are answered by myself. I work with you at every stage of the course, guiding you, directing you to your goal to be a Radio Engineer in the big-pay class. My course prepares you to successfully pass Gov't examination for Operator's License."



FREE—FIVE-TUBE TUNED RADIO FREQUENCY KIT

This set when completed has a range of over 1,000 miles on the loud speaker. It is very selective and gives excellent tone quality. Given free to every member taking our course. The building of this set gives you excellent practical experience—it combines the theory of the course with actual practice. The set becomes yours, and you can sell it at a price that will practically pay the cost of your training. Write about it now.

Get the Facts—Mail Coupon

Our training is not only easy and interesting, and supplies knowledge you can always use in operating your own set, but is the most cashable knowledge a man can possess. Let us prove to you that there is nothing difficult about Radio—that any intelligent person can easily learn it right at home by mail under our simplified and approved methods. Mail the coupon now for our big, free Radio Book, which gives all the facts. Let us prove that Radio is easier to learn and offers bigger money than any other business or profession you can get into. Don't wait—act while our Free Ocer of a 1000-mile radio oufit is still in effect.

A. G. MOHAUPT, Radio Engineer
RADIO ASSOCIATION OF AMERICA
4513 Ravenswood Avenue **Chicago, Ill.**

Radio Association of America,
4513 Ravenswood Avenue
Dept. G-9
Chicago, Ill.

Please send me your free book telling all about Radio opportunities and your Expert Home Training Plan and offer to representatives, also your offer of a 5-Tube Tuned Radio Frequency Kit FREE.

Name.....

Address.....

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

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

WHN Geo. Schubel, Loews State Theatre Bldg., 1540 Broadway, New York, N. Y. 361 meters, 830 kilocycles, 500 watts, class B. Sun, 11:30 to midnight. Mon, Wed & Fri, 2:15-5:30 pm, 6-12:30 am. Tue & Thurs, 12:30-1 pm, 3:15-4:30 pm, 6:30 pm-12:30 am. Sun, 12:30-1 pm, 2-4:30 pm, 5-5:30 pm, 7:30-9:45 pm, 10:45-11:15 pm, 12-12:30 am. Daily, 12:30 pm. Mon, 11 am. Eastern standard time. Slogan: "The Voice of the Great White Way."

WHO Bankers Life Co., 1110 Liberty Bldg., Des Moines, Iowa. 526 meters, 570 kilocycles, 5 kw, class B. Daily ex Sun, 9:45-12 noon & 2 pm, markets; 7:30 to 9 pm, musical; 11 to 12 pm, musical reports, talks. Sun, 11 to 12:30 pm, 11 pm-midnight, musical programs. Central standard time. Slogan "WHO (WHO) Bankers Company, Des Moines, Iowa."

WHT Radiophone Broadcasting Corp., Wrigley Bldg., 410 N. Michigan Blvd., Chicago, Ill. 238 and 399.8 meters, 1260 and 750 kilocycles, 2500 watts, class B. Sun, 12 noon-3:45 pm, 5:30-11:30 pm. Daily ex Sun, 10 am-2 pm, 6-7:30 pm. Daily ex Sun & Mon, 7:45 pm-1 am. Central standard time. Slogan: "Write Home Tonight."

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

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

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

WIBC L. M. Tate Post, No. 39, Veterans of Foreign Wars, 434 2nd Ave. No., St. Petersburg, Fla. 222 meters, 1350 kilocycles, 100 watts, class A. Mon, Wed, 8-10:30 pm. Sat, 8-9 pm; 10:30-12 pm. Eastern standard time.

WIBD N. L. Radio Service, 223 Van Buren St., Joliet, Ill. 200 meters, 1500 kilocycles, 50 watts, class A. Central standard time.

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

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

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

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

WIBK University of the City of Toledo, cor. 11th & Ill. Sts., Toledo, Ohio. 205 meters, 1460 kilocycles, 100 watts, class A. Eastern standard time.

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

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

WIBP First Presbyterian Church, 10th & 23rd Ave., Meridian, Miss. 209.7 meters, 1430 kilocycles, 5 watts, class A. Central standard time.

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

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

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

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

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

WIBX Grid-Leak, Inc., 236 Genesee St., Utica, N. Y. 205.4 meters, 1460 kilocycles, 150 watts, class A. Sun, 11 to 12 am, church. Mon, Wed & Sat, 12-1 pm, luncheon music. Tues, Thurs, Fri, 6:30-9 pm, dinner music, talks, solos. Eastern standard time. Slogan: "Pride of Mohawk Valley."

WIBZ A. D. Trum, 217 Catoma St., Montgomery, Ala. 40 meters, 1300 kilocycles, 10 watts, class A. Tues & Fri, 8-11 pm, regular program. Central standard time.

WIL St. Louis Star and Benson Radio Co., St. Louis, Mo. 273 meters, 1099 kilocycles, 250 watts, class A. Tues, Thurs & Sat, 4-5 pm. Thurs, 8-12 pm. Sat, 10-12 pm. Central standard time. Slogan: "Watch It Lead."

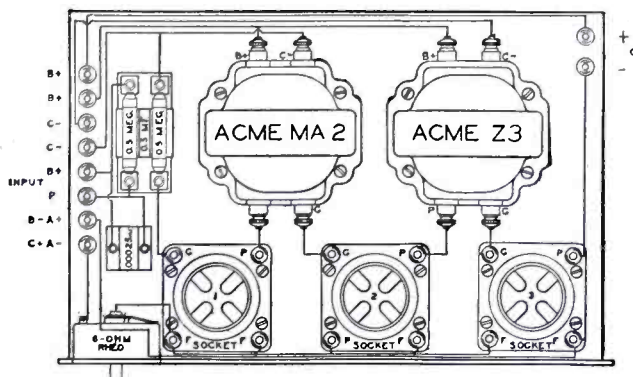
WIOD Carl G. Fisher, Miami Beach, Fla. 247.8 meters, 1210 kilocycles, 1000 watts. Slogan: "Wonderful Isle of Dreams."

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

WJAD Jackson's Radio Eng. Laboratories, Waco, Texas. 352 meters, 850 kilocycles, 500 watts, class B. Mon & Fri, 8:30-10 pm. Central standard time.

WJAK "The Radio Parson," Greentown, Ind. 254.1 meters, 1180 kilocycles, 50 watts, class A. Mon, 11:45 am, weather, markets & radio chapel service; 7:30 pm, "Hour of Music." Tues, Thurs & Sat, 11:45 am, chapel service. Central standard time. Slogan: "One of Indiana's Most Beautiful Little Cities and the Home of the First Automobile."

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



LAYOUT & WIRING DIAGRAM

HIGH QUALITY AUDIO AMPLIFER

RESISTANCE TRANSFORMER RESISTANCE WITH IMPEDANCE LEAK

ACME *for amplification*

The slogan "Acme for amplification" has become a promise that Acme can be depended upon for amplification without distortion. In the research laboratories here at Cambridge we have made countless experiments on audio amplification and the diagram above gives the latest results of these endeavors. This audio amplifier is of three stages, first resistance coupling, second transformer coupling and last resistance coupling with impedance leak. On account of the high B-voltages now in common use one of the objections to resistance amplification has been overcome but with the impedance leak the last objection has been swept aside. Without this leak rectification occurs in the amplifiers making all speech and music fuzzy and indistinct.

Power tubes such as the UX 171 can be very successfully used in the last stage of this amplifier and orchestra volume be obtained without the desire to turn it down.

Add this amplifier to any set after the detector and radio broadcasting will bring you new thrills, all the notes, tones, and inflections can be produced. You will then realize that after all, "How well you can hear" is the only thing that really counts.

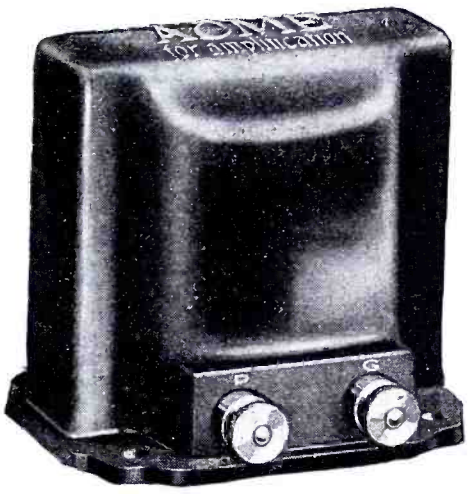
More amplification
—without distortion

With the Acme MA-2 transformer more amplification without distortion can be had than with any other transformer. This transformer is enclosed in a metal case and has a ratio of 5 to 1.

MA-2 A. F. Transformer.....$6.00
A-2 A. F. Transformer..... 3.00
Z-3 A. F. Resistance and Impedance.... 5.00

Many people are turning to Acme for amplification so that the extremely and extremely high frequencies can also be amplified. The Acme impedance amplifier shown is just right.

Z-2 Amplifying Impedance.....$4.50



Now! add "balloon tires and shock absorbers" to your own radio set

YOURS is probably one of the 5,000,000 radio sets that's passed its first birthday—maybe its second or third.

Like your old car, it's worth more to you in pleasure and value, than the price some one else would pay to buy it. And, like the old car, you hate to give up such a loyal old friend.

It really isn't necessary—less necessary than in the case of your car. Balloon tires and *real* shock absorbers have made your car ride as comfortable as any in the land. We can show you how to make your old set as free from noise and distortion as a church at 4 A. M.

Our method is that of "more amplification without distortion" (shown above).

Write for your copy of the 13th edition of "Amplification without Distortion," a little book written by a prominent radio engineer in non-technical, easily followed style. 500,000 friends of Acme have found the first twelve editions valuable—the thirteenth contains the facts on the newest methods of securing strong, clear radio reception—of eliminating causes of distortion. It describes in particular the new Acme amplification method, and in addition includes details of the new Acme free edge cone speakers and A, B and C power supply units (which can make your set a lamp socket receiver—overnight). Write your name on the margin of this page, and mail it with a dime, to cover costs of your copy, to Acme Apparatus Company, pioneer radio and transformer engineers and manufacturers, Dept. 07, Cambridge, Mass.

ACME *~for amplification*

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

WJAS Pittsburgh Radio Supply House, 963 Liberty Ave., Pittsburgh, Pa. 275 meters, 1090 kilocycles, 500 watts, class A. Daily ex Sun, 7-8 pm, 8-11 pm. Sun, 2 pm. Eastern standard time. Slogan: "World's Jolliest Aerial Station."

WJAX Municipal Radio Broadcasting Station, Jacksonville, Fla. 336.9 meters, 1000 kilocycles. Eastern standard time. Slogan: "The Voice of Florida."

WJAZ Zenith Radio Corp., 310 S. Michigan Ave., Chicago, Ill. 329.8 meters, 910 kilocycles. Sun, 7 to 9 pm, instrumental progress. Tues, Wed, Thurs, Fri, 9 pm to 12 midnight, diversified program. Sat pm to 1 am, diversified program. Eastern standard time. "All schedules are given in Chicago daylight saving time."

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

WJBB The Financial Journal, Inc., 126 13th St. N., St. Petersburg, Fla. 254 meters, 1450 kilocycles, 10 watts, class A. Eastern standard time. Slogan: "Land of Perpetual Sunshine."

WJBC Hummer Furniture Co., Second & Joliet Sts., La Salle, Ill. 234 meters, 1180 kilocycles, 100 watts, class A. Daily ex Sun, 12:30-1:30 pm. Mon, 8-10 pm, music. Thurs, 6:15-7:15 pm, musical. Central standard time. Slogan: "Better Homes Station."

WJBG Interstate Radio, Inc., 7 W. 4th St., Charlotte, N. C. 224 meters, 1340 kilocycles, 10 watts, class A. Central standard time.

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

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

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

WJBN St. John's Ev. Lutheran Church, 108 E. Exchange St., Sycamore, Ill. 256 meters, 1170 kilocycles, 10 watts, class A. Mon, 8-10 pm; Sun, 7-7:30 am, 1-1:40 pm, 7:45-9 pm. Central standard time.

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

WJBQ Bucknell University, Lewisburg, Pa. 211.1 meters, 1420 kilocycles, 100 watts, class A. Schedule not arranged. Eastern standard time.

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

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

WJD Denison University, Dept. of Physics, Granville, Ohio. 217.3 meters, 1380 kilocycles, 50 watts, class A. Wed, 7:30-9 pm, musical program. Eastern standard time. Slogan: "The College on the Hill."

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

WJJD Loyal Order of Moose, Mooseheart, Ill. 370.2 meters, 810 kilocycles, 1000 watts, class B. Daily ex Mon & Sun, 12-2 pm, 2-3 pm, 4-5 pm, 5:45-7 pm, 8-9 pm, 10-11 pm, 12:30-1:30 am, musical & talks. Sun, 7:45 am, Catholic Church; 9:40 am, Protestant Church; 3 pm, musical. Central standard time. Slogan: "Every Child Is Entitled to a High School Education and a Trade."

WJZ Radio Corporation of America, 33 W. 42nd St., New York. N. Y. 454.3 meters, 660 kilocycles, 50 watts, class, none. Sun, 6 to 10:30 pm. Daily ex Sun, 1-2 pm, 4-6 pm, 7-11:30 pm, miscellaneous program. Eastern standard time.

WJY Radio Corporation of America, 33 W. 42nd St., New York, N. Y. 405.2 meters, 740 kilocycles, 5000 watts, class B. Tues, Thurs, Fri, 7:30-11:30 pm. Sun, 8:15-10:30 pm. Eastern standard time.

WKAF Kesselman-O'Driscoll Hotel Antlers Station, Hotel Antlers, Milwaukee, Wis. 261 meters, 1050 kilocycles, 500-5000 watts, class A. Sun, 4-6 pm, studio program. Mon, Wed & Fri, 10-11 pm, studio program. Wed, 9-10 pm, popular hour. Fri, 11-12, frolic hour. Central standard time. Slogan: "Wisconsin's Only Super-Power Station."

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

WKAR Michigan Agricultural College, East Lansing, Mich. 285.7 meters, 1050 kilocycles, 1000 watts, class B. Daily ex Sun, 12 noon to 12:30 pm, weather forecast, stock market report, etc. Eastern standard time.

WKAV Laconia Radio Club, 480 Main St., Laconia, N. H. 224 meters, 1340 kilocycles, 50 watts, class A. Fri, pm. Sun, 10:30 am, 6:30 pm. Eastern standard time.

WKBB Sanders Bros., 607 Jefferson St., Joliet, Ill. 214.2 meters, 1400 kilocycles, 100 watts, class A. Wed, 6-8:30 pm, dinner program. Thurs, 8:30-12 pm, good time program. Sun, 3-5 pm, classical; 8:30-12 pm, frolics. Central standard time.

WKBE K. & B. Electric Co., 59 Emerald Ave., Webster, Mass. 231 meters, 1300 kilocycles, 100 watts, class A. Mon, 8-11:30 pm. Eastern standard time.

WKBK Miss Shirley Katz, 52nd & Broadway, New York, N. Y. 209.7 meters, 1430 kilocycles, 500 watts, class A. Eastern standard time.

WKJC Kirk Johnson & Co., 16-18 W. King St., Lancaster, Pa. 258 meters, 50 watts, class A. Sun, 9-10:30 pm. Mon, Wed, Fri, 8-10 pm. Sat, 3-4:30 pm.

WKRC The Kodel Radio Corp., Cincinnati, Ohio. 325.9 & 422.3 meters, 920 & 920 kilocycles, 1000 watts, class B. Sun, 6:45-7:30 pm, religious; 10-12 pm, musical. Mon, Wed, 6-7 pm, dance music; 8-10 pm, 12 midnight, frolic. Tues, Thurs, Sat, 10-12 pm, dance & classical music. Central standard time.

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

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

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

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

WLBL Wisconsin Dept. of Markets, Stevens Point, Wis. 278 meters, 1080 kilocycles, 500 watts, class A. Daily, 8:45-9:45 am, 10:45-11:45 am, weather, markets; 12:30-1:45 pm, weather, markets; 6-7 pm, 8-10 pm, musical program every Tuesday. Fri, 6-7 pm, organ recital. Sat, 8-10 pm, musical program. Central standard time. Slogan: "Wisconsin, Land of Beautiful Lakes."

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

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

WLS Sears Roebuck Agricultural Foundation, Chicago, Ills. 345 meters, 870 kilocycles, 5000 watts, class B. Sun, 10:45-12, U. of C.; 12-1 pm, organ; 7-9 pm, Little Brown Church. Mon, 6:30, 7-7:30, 7:45, markets; 9-9:30-10-10:30-11-11:30-11:45-1-1:25-2. Tues, Thurs same as Mon, also, 2:30, Home Makers' Hour; 6:9, musical program. Wed, Fri, same as Tues evening programs, 6-12 pm. Sat same as Wed, with exception of Homemakers' hour. Chicago daylight saving time.

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

WLTS Lane Technical High School, 1225 Sedgwick St., Chicago, Ill. 258½ meters, 1160 kilocycles, 100 watts, class A. Fri, 1-2 pm. Central time.

WLW The Crosley Radio Corp., 3401 Colerain Ave., Cincinnati, Ohio. 422.3 meters, 709 kilocycles, 5000 watts, class B. Daily ex Sat, 7:30 am, health exercises; 8 am, morning worship auspices of Y. M. C. A. Sun, 9:30 am, Sunday School; 10:45 am, weather, markets; 11 am & 7:30 pm, church services; 3 pm, organ music; 8:30 pm, concert. Mon, 8 am-10 pm. Tues, 7:30-8:15, popular; 8:15 minstrel show; 9 Fornical Orchestra. Wed, 7-8 pm, Hotel Gibson Branch; 10-12, midnight, dance program. Thurs, same as Wed; also 12:15 am, Crosley Pups. Sat, 7-8 pm, organ; 8 pm, story children; 8-10 pm, dance. Slogan: "What Listeners Want."

WLWL Missionary Society of St. Paul the Apostle, 425 W. 59th St., New York, N. Y. 288.3 meters, 1040 kilocycles, 5 kw, class B. Sun, 8 pm, Paulist Choristers, sermon, benediction. Mon, Thurs, 9-11 pm, music talks & songs. Tues & Fri, 9-11 am, shopping talks. Wed, 8:30-11 pm. Eastern standard time.

WMAC Broadcasting Station WMAC, Fernwood, Cazenovia, New York. 275 meters, 1090 kilocycles, 100 watts. Sun, 10 am-1 pm; 7-11 pm. Mon, 10-11 am, 12 noon-1 pm, 4-5 pm, 6-11 pm. Tues, Wed, Thurs & Fri, same as Mon. Sat, 10-11 am, 12 noon-1 pm, 2:30-5 pm, 7-12 midnight.

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

WMAK Lafayette Broadcasting Studios, Inc., Hotel Lafayette, Buffalo, N. Y. 265.3 meters, 1130 kilocycles. 7 pm, Churchill Tabernacle; 7:30-8:15 pm, WGY orchestra; 8:15-10:30 pm, WGY players.

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

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

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

WMAY Kingshighway Presbyterian Church, St. Louis, Mo. 248 meters, 1215 kilocycles, 100 watts, class A. Sun, 11 am-12 pm, 8-9 pm, church services. Central standard time.

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

WMBB American Bond & Mortgage Co., 6201 Cottage Grove Ave., Chicago, Ill. 250 meters, 1200 kilocycles, 500 watts, class B. Daily ex Sun. Mon, 7-8 pm, 9-11 pm, musical. Sun, 3-5 pm, 7-8 pm, 9-11 pm. Central standard time. Slogan: "World's Most Beautiful Ballroom."

WMBC Michigan Broadcasting Co. (F. G. Siegel), Hotel Addison, Detroit, Mich. 256 meters, 1170 kilocycles, 100 watts, class A. No definite schedule arranged. Eastern standard time.

WMBF The Fleetwood Hotel, Miami Beach, Fla. 284.4 meters, 928 kilocycles, 5 kw, class B. Daily, 7-8:30 pm, 10 pm-1 am, concert music, dance. Fri, midnight-1 am, nut club in studio. Eastern standard time. Slogan: "Down Where It's Always June, Folks—Down Where You'd Like to Be."

WMC Commercial Appeal, Memphis, Tenn. 499.7 meters, 600 kilocycles, 500 watts, class B. Daily ex Sun & Wed, 8:30-9:30 pm. Sun, 11 am-12 pm, church service. Daily ex Sun & Wed, 7:15 pm, bedtime stories. Tues & Fri, 11 pm-midnight. Mon, 12 noon-1 pm, 8:30 pm, musical talk; 7:30 pm, talk. Tues, 8:30-9:30 pm, 11-12 pm, musical; 7:30 pm, talk. Wed, 12 noon-1 pm, musical. Thurs, 8:30-9:30 pm, musical. Fri, 8:30-9:30 pm. musical. Sat, 8:30-9:30 pm, musical. Central standard time. Slogan: "WMC Memphis Down in Dixie."

WMCA Hotel McAlpin, New York, N. Y. 340.7 meters, 500 watts, class B. Sun, 10:15 am, 11 am to 12:15 pm, 7 to 7:30 pm. Mon, Tues & Wed, 10:25 am to 4:45 pm, 6:30 to 12:15 am. Thurs, 10:25 am to 4:45 pm, 630 to 1 am. Fri, same as Mon, Tues & Wed. Sat, 10:25 am to 1 pm, 6:30 to 12:15 am. Slogan: "Where the White Way Begins."

WMSG Madison Square Garden, New York, N. Y. 212.6 meters, 1410 kilocycles, 500 watts.

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

WNAC The Shepard Store, Winter St., Boston, Mass. 430.1 meters, 697 kilocycles, 500 watts, class B. Mon, 10:30-11:30 am, Women's Club; 4-5 pm, 6-7:30 pm & 8:10 pm. Sun, 10:55 am, church service; 6:45 pm, church service. Tues, 1-2 pm, luncheon concert; 4-5 pm, concert dance. Wed, 6-6:30 pm, Children's Hour; 6:30-7:30, Children's Hour. Thurs, 8-10 pm, concert. Fri, 10:05-11 pm, dance music. Sat, 11:30-1:30-4:30 & 7:30 pm, news. Eastern time.

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

WNAL R. J. Rockwell, 5019 Capital Ave., Omaha, Nebr. 258 meters, 1160 kilocycles, 50 watts, class A. Tues, Fri, 7:30-9 pm. Central standard time. Slogan: "Pioneer Station of Omaha."

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

WNAT Lensing Bros. Co., Spring Garden & Ninth St., Philadelphia, Pa. 250 meters, 1200 kilocycles, 100 watts, class C. Sun, 4:30-5:30 pm & 6:30 to 7:30 pm, church services. Wed, 6:50 pm until midnight, musical. Sat, 8 pm until midnight. Eastern standard time. Slogan: "We Never Are Tired."

WNAV Peoples Telephone & Telegraph Co., 313 Commerce Ave., Knoxville, Tenn. 233 meters, 1290 kilocycles, 500 watts, class A. Central standard time.

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

WNBH New Bedford Hotel, Pleasant St., New Bedford, Mass. 261 meters, 1150 kilocycles, 250 watts, class A. Mon, Wed & Fri, 10:30 pm, musical. Sun, 11 am-12:15 pm, church services. Tues, Thurs & Sat, 7-7:30 pm. Eastern standard time.

WNJ Radio Shop of Newark, 89 Lehigh Ave., Newark, N. J. 252 meters, 1290 kilocycles, 150 watts, class A. Daily ex Mon & Thurs, 6-6:30 pm, 8:30-12 pm, dance music. Eastern standard time. Slogan: "The Voice of Newark."

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

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

WOAI Southern Equip. Co., San Antonio, Texas. 394.5 meters, 760 kilocycles, 1500 watts, class B. Central standard time. Mon, Wed & Fri, 3 pm, musical concert. Tues, Wed & Fri, 8:30-9:30 pm. Sun, 7:45-8:45 pm.

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

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

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

WOC The Palmer School of Chiropractic, Davenport, Iowa. 483.6 meters, 620 kilocycles, 5000 watts, class B. Sun, 1 to 2 pm, symphony; 8-8:30 pm, church; 9:30 to 10:30, symphony. Mon, 12:57 to 1:10 pm, time signals & markets; 3-3:30 pm, Aunt Jane Home Management; 5:45 pm, chimes; 6 pm, baseball; 12:50 to 6 pm, 6:30 to 8 pm, 8-9 pm, musical. Wed, 12:57-3:30, 4-4:45, 5:45 pm, chimes; 6 pm, baseball; 7-7:30, WEAF; 9:30 to 10:30 music. Fri, 12:57 to 6 pm, same as Wed; 8-8:30, WEAF; 8:30 to 9:30 pm, music from WOC. Sat, 12:57 to 1:10 pm, time signals, markets; 5:45 pm, chimes; 6, baseball; 9 to 10 pm, music from WOC. Central standard time. Slogan: "Where the West Begins and in the State Where the Tall Corn Grows."

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

WODA James K. O'Dea Radio & Victrola Shop, Paterson, N. J. 224 meters, 1340 kilocycles, 500 watts, class B. Daily ex Sun, 12-1 pm, 4:30 pm. Mon, Tues, Fri, 8-11 pm. Wed, Sat, 8-10 pm. Thurs, 8 pm-2 am, the Silk City Night Owls on Parade. Eastern standard time. Slogan: "Voice of the Silk City."

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

WOK Neutrowound Radio Mfg. Co., 1721 Prairie Ave., Chicago, Ills. 217 meters, 1380 kilocycles, 5000 watts, class B. Daily ex Sun & Mon, 4:30 to 7 pm, dance & string ensembles; 10 am to 1:30 pm, dance orchestra by remote controls Capital Theatre Organ. Sun, 6:30-8:30 pm. Central standard time.

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

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

WOOD Hotel Rowe, Grand Rapids, Mich. 242 meters, 1240 kilocycles, 1000 watts, class B. Mon, 9-10 am, classical; 10-11 am, presentation; 11-12 noon, popular; 12-1 pm, Woodworkers' Club. Tues, 9-10 am, 10-11 am, specialty; 11-12 noon, popular. Wed, 9-12 noon, popular. Thurs, 10 am, weather, silent night. Fri & Sat, 9-10 am, classical; 10-12 midnight, dance. Central standard time. Slogan: "The Furniture Capital of America."

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

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

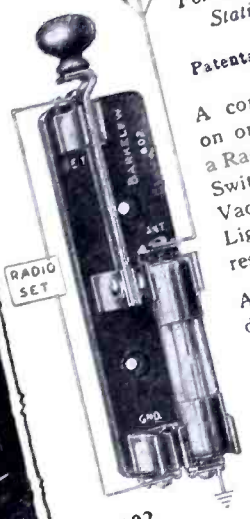
WORD Watch Tower Radio (Peoples' Pulpit Assn., Brooklyn, N. Y.), Webster Hotel, Chicago, Ill. 275 meters, 1090 kilocycles, 5000 watts, class B. Tues, Wed, Fri, 7-8 pm, 9-10 pm, 11-12 pm. Thurs & Sat, 8-10 pm. Sun, 10-11 am, 7-8 pm & 9-10:30 pm. Central standard time. Slogan: "The Watch Tower."

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

BARKELEW
RADIO ACCESSORIES

LIGHTNING ARRESTER SWITCH
For Receiving Stations

Patents Pending



A combination on one base of a Radio Ground Switch and a Vacuum Tube Lightning Arrester.

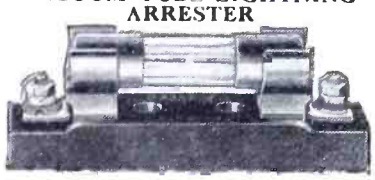
A distinctive device for those who know and demand the best lightning protection.

Price $2.50

No. 602

Approved by the Underwriters Laboratories.

VACUUM TUBE LIGHTNING ARRESTER



No. 606 **Price $1.50**

Required on the antenna of every Receiving Station. Approved by the Underwriters Laboratories.

GROUND SWITCH

No. 600 **Price $2.50**

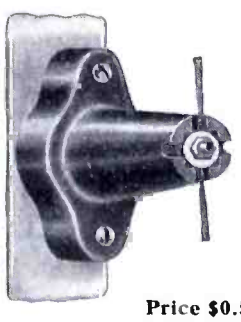
Required on all Transmitting Stations—Built of 60 Ampere Copper.

"LEAD-IN" INSULATOR
For Receiving Stations

No. 612 **Price $0.60**

Spaces the "Lead-In" Wire 5 inches out from the wall.

PORCELAIN PEDESTAL
Brown Glaze



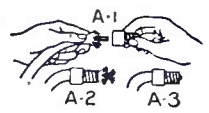
No. 611 **Price $0.50**

An insulator with a rigid clamp for the lead-in wire. A pedestal for spacing Ground Switches or other apparatus, 5 inches clear of the mounting surface.

Screw Grip
DONT SOLDER
Cord Tips!

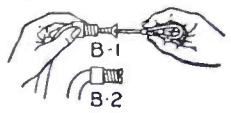
PATENTS PENDING

PIN TIP No. 630
Price 5c each



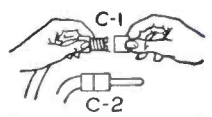
The Universal Sleeve "A" has an internal thread. Screw it on end of wire.

EYE TIP No. 631
Price 7½c each



Expose ¼" of bare wire. Insert wood screw "B" locking wire to sleeve.

FORK TIP No. 632
Price 7½c each



Screw on any of our standard Screw Grip Tips shown at left.

A cord tip that requires no solder, no wrapping of the insulation and no tools other than a pen knife and a small screw driver.

CONFIDENCE

THE annual increase in the number of dealers selling Barkelew Accessories expresses the confidence of the Radio Public in our product.

Special attention is called to the No. 605 Antenna Selector Switch and the Screw Grip Cord Tips. Both items were introduced late last year but will have their best run during the present season.

All radio material is packed in paper cartons and well labeled, making excellent shelf stock.

The design is good, materials are carefully selected and workmanship by skilled mechanics.

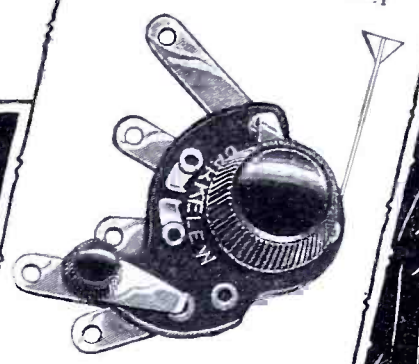
Prices and discounts are right for a fast moving line. This means a profitable stock.

For full description of each item, see our new Radio Catalog at your dealer. If he hasn't his copy, we have one for him.

The Barkelew Electric Mfg. Co.
Middletown, Ohio, U. S. A.

BOSTON, 31 Bedford St.
WASHINGTON, D. C., Mills Bldg.
ATLANTA, GA., 180 Spring St.
CHICAGO, 15 S. Clinton St.
DENVER, Denham Bldg.
MINNEAPOLIS, 1017 Lumber Exchange
SEATTLE, 1041 Sixth Ave. S.
SAN FRANCISCO, 75 Fremont Street
LOS ANGELES, 443 S. San Pedro St.
TORONTO, 20 Bloor St., W.

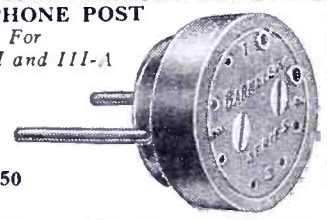
ANTENNA SELECTOR SWITCH
For Radiola III and III-A



No. 605 **Price $1.00**

The entire range of antenna adjustments may be obtained by simply turning the two knobs, without loosening a nut. The antenna wire attaches to the one binding post on the rear.

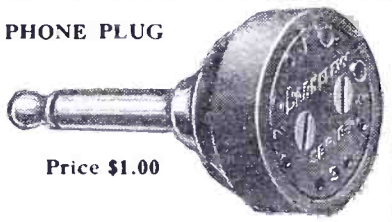
FOUR PHONE POST
For Radiola III and III-A



No. 624
Price $0.50

The prongs on this post fit through phone holes in the face of panel. It takes one to four head-sets in series.

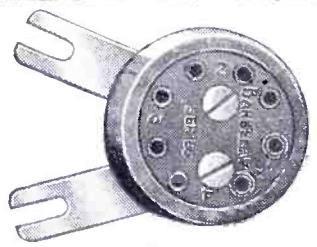
FOUR PHONE PLUG



No. 616 **Price $1.00**

Connects one to four head-sets in Series to any Radio set using telephone jacks.

FOUR PHONE POST

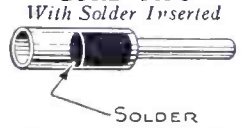


No. 628

Price $0.50

For binding post mounting. Connects one to four head-sets in series to the more common types of brass phone posts.

CORD TIPS
With Solder Inserted



No. 623 **Price $0.05 ea.**

The wire hole is tinned and half full of solder. Heat and insert the wire.

PLAIN CORD TIPS

No. 627 **Price $0.01 ea.**

A nickel plated tip for those who can do their own soldering.

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

WOWL Owl Battery Co., 901 Carondelet St., New Orleans, La. 270 meters, 1110 kilocycles, 10 watts, class A. Daily ex Sun, 11:30 am-12:30 pm, musical; 4:30-6:30 pm, musical and features. Tues & Fri, 8:30-10:30 pm, novelty. Sun, 7:45-9 pm, church services. Central standard time. Slogan: "Where Owl Batteries Are Made."

WOWO The Main Auto Supply Co., 215 W. Main St., Fort Wayne, Ind. 227 meters, 1320 kilocycles, 1000 watts, class B. Sun, 10-12 am, church services. Mon & Thurs, 8-12 pm, concert. Tues, Wed, Thurs & Fri, 12 noon-1 pm, musical. Wed, 7:15 pm to 12 pm. Central standard time. Slogan: "The Voice of the Middle West."

WPAJ Doolittle Radio Corp., 115 Crown St., New Haven, Conn. 268 meters, 1120 kilocycles, 100 watts, class A. Eastern standard time.

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

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

WPDQ The Norwood Station, Hiram L. Turner, 124 N. Sacred Ave., Buffalo, N. Y. 205.4 meters, 1460 kilocycles, 50 watts, class A. Tues, Wed & Sat, 8-12 pm. Sat, 12:30 pm-1:30 am. Eastern standard time.

WPG Municipality of Atlantic City, Atlantic City, N. J. 299.8 meters, 1000 kilocycles, 5000 watts, class B. Sun, 8:15 pm until 2 am/night, summer schedule. Mon, Tues, Thurs, Fri & Sat, 1:30 pm to midnight. Eastern standard time.

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

WPSC Pennsylvania State College Dept. of Elec. Engineering, State College, Pa. 261 meters, 1150 kilocycles, 500 watts, class A. Mon, Wed & Fri, 7-11 pm. Eastern standard time. Slogan: "The Voice of the Titany Lion."

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

WQAC Gish Radio Service, 108 E. 8th St., Amarillo, Texas. 361 meters, 1280 kilocycles, 100 watts, class A. Sun, 11:30 to 12:30 am; 3 to 4:30 pm; 7:30 to 9:30 pm. Central standard time. Slogan: "The Bible, the Whole Bible and Nothing But the Bible."

WQAE Moore Radio News Station, 41 Main St., Springfield, Vt. 246 meters, 1212 kilocycles, 50 watts, class A. Sun, 10:30 am, church services. Eastern standard time.

WQAF The Sandusky Register, Sandusky, Ohio. 240 meters, 1250 kilocycles, 5 watts, class A. Central standard time.

WQAM Electrical Co., 42 NW 4th St., Miami, Fla. 263 meters, 1140 kilocycles, 750 watts, class A. Sun, 10:45 am-12 & 8 to 9 pm, church service. Mon, 11:45 am to 12:15 pm, weather forecast, news & Capital Theatre Organ. Tues, Thurs & Sat, 7:30 to 9:15 pm, band concert. Wed, 11:45 to 12:15 pm, 8 to 9 pm, studio program. Slogan: "Most Southern Radio Broadcasting Station in U. S."

WQAN Scranton Times, 222 Spruce St., Scranton, Pa. 250 meters, 1200 kilocycles, 100 watts, class A. Daily ex Sun, 12:30-1 pm; 4:30-5 pm. Tues & Fri, 8-10:30 pm. Sat, 2:30-12 pm. Eastern standard time. Slogan: "The Voice of the Anthracite."

WQAO Calvary Baptist Church, 123 W. 57th St., New York, N. Y. 361 meters, 833 kilocycles, 500 watts, class B. Wed, 8-9 pm, mid-week evening services. Sun, 11 am-12:30 pm, church services; 3-4:30 pm, Bible study class; 7:45-9:30 pm, evening services. Eastern standard time.

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

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

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

WRAM Lombard College, Galesburg, Ill. 243.8 meters, 1230 kilocycles, 10 watts, class A. Mon, 7 pm, bedtime stories; 8 pm, educational; 9-11 pm, musical. Central standard time.

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

WRAW Avenue Radio & Electric Shop, 460 Schuyler Ave., Reading, Pa. 235 meters, 1260 kilocycles, 10 watts, class A. Tues, 9 pm, EST entertainment. Thurs, 10 pm, Eastern standard time. Slogan: "The Schuyler Valley Echo."

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

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

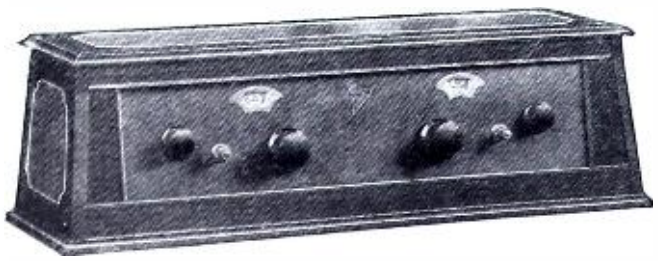
WRC Radio Corporation of America, 14th & Park Road, N. W., Washington, D. C. 468.5 meters, 640 kilocycles, 1000 watts, class B. Sun, 11 am-12:30 pm, church services; 4-5:30 pm, church; 6:20-10:15, musical. Mon, Tues, Wed, Thurs, Fri & Sat, 6:45 am to 11 pm, varied. Eastern standard time. Slogan: "The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

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

WREC Wooten's Radio & Elec. Co., Coldwater, Miss. 254 meters, 1180 kilocycles, 10 watts, class A. Sat, 9:30-10:30 pm. Sun, 4-5 pm. Central standard time. Slogan: "The Most Powerful 10-Watt Station in the World."

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

These Valley Units Mean Better Radio



The Valleytone Receiver
Model 52

Model 52 Valleytone Radio Receiver is a two-dial control, five-tube, tuned radio frequency receiver.

Employing the exclusive Valley Potential Balance method of suppressing oscillation and distortion, the Valleytone provides reception which is clear and mellow—free from the howls and squeaks and the thin, hard, metallic sounds which have been the plague of radio.

The tone quality of the Valleytone is indeed unusual, and so good that we welcome the opportunity to have it compared with any other receiver, regardless of price. The Valleytone thrives on comparison.

The true two-dial control of the Valleytone is so accurately assembled that the set can be tuned with precision and sharpness. The selectivity of the Valleytone is one of its best known features.

The Model 52 is equipped with an antenna control which is operated by the small switch on the left of the panel. With this control, super selectivity is possible among the stations on the lower wave lengths, and on the higher wave lengths, distance and volume are assured.

A striking feature of the Model 52 Valleytone is the provision for the use of a power tube in the last stage. A simple switching arrangement built into the set makes the use of the power tube optional. The change from regular to power tube or back again can be made in a moment at any time.

In appearance, the Valleytone is distinctly a step ahead. A beautiful panel contains the controls mounted symmetrically.

The two dials are set behind the panel. The dial readings show through art metal windows. Two large knobs, comfortable and satisfactory to the touch, turn the dials and condensers. Of the two smaller knobs, one controls the filament of the two radio frequency tubes and the detector. The other governs the volume control which may be set at any desired point. Two small switches complete the panel assembly. The loud speaker connection is made through the rear of the set.

The Valleytone is mounted in a solid walnut cabinet finished in two tones with inlaid narrow gold stripes.

Price .....$90.00 F.O.B. St. Louis

The Valley B Power Unit
(Raytheon Tube Type)

The Valley B Power Unit or B-Eliminator provides B voltage from the house lighting circuit, absolutely without hum.

This unit provides the plate voltage for all standard tubes such as the 201-A. It is also wired to provide the higher plate voltage necessary when a power tube is used in the second audio stage.

The unit is equipped with "high" and "low" taps to be used as follows: The "low" tap is plugged in for all ordinary five tube sets and smaller sets; the "high" tap is plugged in for sets using the power tube or for larger than five-tube sets.

Because the Raytheon Tube is essential to satisfactory operation. we have designed the Valley B Power Unit to use only this tube.

Mounted in a handsome black grained metal case. Toggle switch controls flow of line current into unit. Detector and Intermediate controls, marked "Det" and "Int", are mounted at the bottom. The terminal panel extends vertically at the left of the unit.

Price, Complete with Raytheon tube, $40.00 F.O.B. St. Louis

A Step Ahead in Radio

Not just to keep abreast of the times, but to keep a step ahead—that has been and is the ideal and policy of the Radio Division of the Valley Electric Company.

And this year, as in former years, that policy has produced improvements in Valley Radio products which constitute a distinct advance in radio.

The Valley Charger
(Type T.B.C.—Twin Bulb)

The new Valley Type TBC Charger embodies a new feature of bulb type charger design. The twin bulb construction overcomes the only objection to this type of charger, i.e., the slow charging rate.

The twin bulb design of this Valley Charger produces a charging rate of 5 amperes—about as high as the charging rate should be carried.

It has this added advantage: Where a charging rate of only 2½ amperes is satisfactory, only one bulb need be bought and used.

Simple. Absolutely noiseless. Minimum current draw. Indicating ammeter shows rate of charge. Black grained metal case.

Price, with bulbs, $15.00 F.O.B. St. Louis
Bulbs, $4.00 each

Valley Type ABC Charger

The universal vibrating type charger charges 6-volt A batteries at 6-ampere rate and 12-volt batteries at 3-ampere rate. Contact points are adjustable and can be replaced easily and cheaply.

The pioneer of radio battery chargers. The fundamental principles of this charger were in successful operation in Valley Chargers long before radio became popular. Now there are nearly a quarter of a million of them in use.

Price, complete, $19.50

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

DISTRICT OFFICES: Boston, Chicago, Cleveland, Indianapolis, Kansas City, Minneapolis, New York, Philadelphia, San Francisco, Toronto

Valley Electric

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

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

WRK Doron Bros. Elec. Co., Hamilton, Ohio. 270 meters, 1110 kilocycles, 200 watts, class A. Fri, 8:15 pm, music, lectures. Sun, 10:15 am, 7:30 pm, church services. Central standard time. Slogan: "The Oldest Station in Existence."

WRL Union College, Schenectady, N. Y. 560 meters, 833 kilocycles, 500 watts. Eastern standard time.

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

WRNY Experimenter Publ. Co., Madison Ave. & [illegible] St., New York, N. Y. 374.8 meters, 800 kilocycles, 500 watts, class A. Daily ex Sun, 12 midnight [illegible] am, [illegible] pm. Mon, 11 am to 1 [illegible] pm, [illegible] 11 pm. Eastern standard time. Slogan: "The Radio News Magazine Station."

WRMU A. H. [illegible] & Co., Inc., Motor Yacht "Mu", New York, N. Y. (Portable). 2[illegible] meters, [illegible] kilocycles, 100 watts, class A. Unlimited schedule. Eastern standard time.

WRR City of Dallas, Dallas, Tex. [illegible] meters, [illegible] kilocycles, [illegible] watts. Daily ex Sun. Wed, [illegible] [illegible] Mon, 11 [illegible] midnight [illegible] Wed, [illegible] pm. Thurs, [illegible] Slogan: "City of Achievements."

WRST Radio [illegible] Co., Inc., [illegible] East Ave., Bay Shore, N. Y. [illegible] meters, [illegible] kilocycles, [illegible] watts, class A. Daily ex Sun, [illegible] pm. Mon, Wed & Fri, [illegible] concerts. Tues & Thurs, [illegible] pm. Sat, [illegible] pm, [illegible] pm. Sat, 11 am, 2-4 pm, church services; [illegible] pm, musical [illegible]. Eastern standard time. Slogan: "Radio [illegible] Sure [illegible]."

WRVA Larus & Brothers Co., Inc., Richmond, Va. [illegible] meters, [illegible] kilocycles, 1000 watts, class B. Mon, Thurs & Fri, [illegible] 10-12 pm. Wed, 12:30 to 1:30 pm. [illegible] 12 pm. Eastern standard time.

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

WSAG Norfolk Daily News, Norfolk, Neb. 270 meters, 1120 kilocycles, 200 watts. Mon, Tues, Wed, Thurs, Fri & Sat, 12:15 pm. Slogan: "World's Greatest Country Daily."

WSAI The U. S. Playing Card Co., Cincinnati, Ohio. 325.9 meters, 920 kilocycles, 5000 watts, class B. Mon, 8-10 am, musical; 7 pm, New York program; 7:30 pm, studio program. Tues, 5:30-10 pm, 12-12:30, studio program; 8 pm, Ever Ready; 9 pm, studio program. Wed, 6:40-12 pm, studio program. Thurs, 6:30-10 pm. Sat, 7-10 pm, 12 pm-1:30 pm. Sun, 3-4:30 pm, 7:45-10:15 pm. Central standard time. Slogan: "The Gateway to Dixie."

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

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

WSAP The City Temple, New York, N. Y. 263 meters, 1140 kilocycles, 250 watts, class A. Eastern standard time.

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

WSAU Camp Marienfeld (R. In. U. Howard), Chesham, N. H. 229 meters, 1310 kilocycles, 10 watts, class A. Daily, 1-2 pm, [illegible] pm. Eastern standard time. Slogan: "Where the White Mountains Begin."

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

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

WSB The Atlanta Journal, care Biltmore Hotel, Atlanta, Ga. 428.3 meters, 700 kilocycles, 1000 watts, class B. Daily ex Sun, 12-1 pm, music, weather; 2:30 pm, reports; 5 pm, 8-9 pm (ex Wed); 10:45-12 pm, concerts. Sun, 5-6 pm; 7:30-9:15 pm, church services. Central standard time. Slogan: "The Voice of the South."

WSBC World Battery Co., 1219 South Wabash Ave., Chicago, Ill. 209.7 meters, 1430 kilocycles, 1000 watts, class A. Central standard time.

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

WSBT South Bend Tribune, South Bend, Ind. 275 meters, 1090 kilocycles, 500 watts, class B. Mon, 7:15 to 10 pm, C. S. Wed, 7:15 to 9:15 pm, 12 midnight to 1 am. Fri, 7:15 pm to 9:30 pm. Slogan: "Voice of the Hoosier State."

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

WSKC World's Star Knitting Co., Bay City, Mich. 261 meters, 1150 kilocycles, 100 watts, class A. Mon, Wed, 8-11 pm, musical. Sat, 11 pm-1 am, club program. Eastern standard time. Slogan: "Where the Summer Trails Begin."

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

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

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

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

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

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

WSUI State University of Iowa, Capitol & Washington Sts., Iowa City, Iowa. 484 meters, 620 kilocycles, 500 watts, class B. Mon, Tues & Thurs, 12:30 pm, educational; 8 pm, music lecture; 11:15 pm, organ. Wed, 9 am, high school assembly program; 12:30 pm. Fri, 12:30 noon, musical program. Mon, Wed & Sat, 7:30 pm, musical program. Sun, 9 pm, familiar hymns. Central standard time. Slogan: "The Voice of Old Gold."

WSVS Seneca Vocational School, Seneca & Hydraulic Sts., Buffalo, N. Y. 218.8 meters, 1370 kilocycles, 50 watts, class A. Mon, 9 to 9:30 am, announcements, musical program. Wed & Fri, 9 to 10:30 pm, musical program. Slogan: "Watch Seneca Vocational School." Eastern standard time.

WSWS Bligh-Whittington Co., Straus Bldg., 310 S. Michigan Ave., Chicago, Ill. 275.8 meters, 1090 kilocycles, 1000 watts. 6 to 7 pm, classical and semi-classical concert program; 8 to 9 pm, semi-classical and popular radio artists; 10 to 11 pm, dance music and feature entertainment; 12 mignight to 1 pm, radio round table entertainment. Sun, 11 am to 12:30 pm, morning church service conducted by Moody Church; 3:30 to 5 pm, afternoon popular service, Rev. Philpott; 7 to 9:30 pm, evening song service, Rev. Philpott. Mon, silent night. Daylight saving time.

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

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

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

WTAC Penn Traffic Co., Washington St., Johnstown, Pa. 267.8 meters, 1430 kilocycles, 100 watts, class A. Mon & Fri, 7:30-10 pm. Eastern standard time.

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

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

WTAL Toledo Radio & Elec. Co., 316 Jackson St., Toledo, Ohio. 252 meters, 1190 kilocycles, 10 watts, class A. Daily ex Sun, 7:30-8 pm. Eastern standard time. Slogan: "Up in Ohio."

WTAM Willard Storage Battery Co., 246 E. 13th St., Cleveland, Ohio. 389.4 meters, 770 kilocycles, 1000 watts, class B. Sun, 6-9:30 pm, musical program; 11 am to 12:30 pm. Daily ex Sun, 12:30-1:30 pm, 6-12 pm, musical. Eastern standard time. Slogan: "The Voice from the Storage Battery."

WTAP Cambridge Radio & Elec. Co., Cambridge, Ill. 242 meters, 1240 kilocycles, 100 watts, class A. Central standard time.

WTAQ S. H. Van Gordon & Son, Eau Claire, Wis. 254 meters, 1180 kilocycles, 100 watts, class A. Daily ex Sun, 10:30 am, 12:15 pm, 6:15 pm, weather, markets; 6:30 pm, code. Tues, 8 pm, Fri & Sun, 7:30 pm. Central standard time. Slogan: "The Voice of the Wilderness."

WTAR Reliance Elec. Co., Inc., 519 W. 21st Ave., Norfolk, Va. 261 meters, 1150 kilocycles, 100 watts, class A. Daily ex Sun, 6 pm, weather, markets & news. Eastern standard time. Slogan: "Down in Old Virginia."

WTAW Agricultural & Mechanical College of Texas, College Station, Texas. 270 meters, 1110 kilocycles, 500 watts, class A. Wed & Fri, 8-9 pm. Sun, 11 am. Central standard time.

WTAX Williams Hardware Co., 115 S. Vermillion St., Streator, Ill. 231 meters, 13,000 kilocycles, 50 watts, class A. Tues, 8 to 10 pm. Thurs, 8 to 12 pm. Central standard time.

WTAZ Thomas J. McGuire, Lambertville, N. J. 261 meters, 1150 kilocycles, 15 watts, class A. Mon, 8-10 pm, musical. Eastern standard time.

WTHS Flint Senior High School, Crapo St., Flint, Mich. 218 meters, 1370 kilocycles, 250 watts, class A. Central standard time.

WTIC The Travelers Insurance Co., 700 Main St., Hartford, Conn. 475.9 meters, 630 kilocycles, 500 watts, class B. Mon, 11-12 noon, 5:30-10:30 pm. Wed, 5:30-10 pm. Thurs, 6:30-10 pm. Fri, 5:30-11 pm. Sat, 6:30-8:30 pm. Slogan: "The Insurance City."

WWAD Wright & Wright, Inc., 2215 N. Broad St., Philadelphia, Pa. 250 meters, 1260 kilocycles, 250 watts, class A. Mon, 7-12 pm, varied. Thurs, 7 pm-1 am, varied. Sun, 9:30-12, classical. Eastern standard time. Slogan: "Penn City Station."

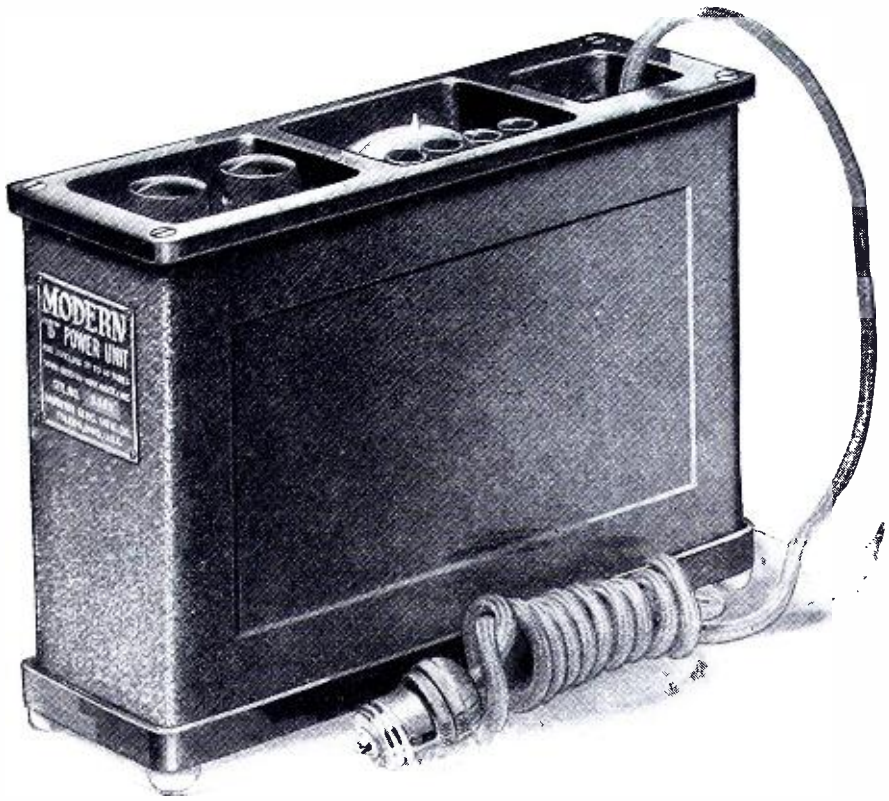
WWAE Electric Park (L. J. Crowley), Plainfield, Ill. 242 meters, 1240 kilocycles, 5,000 watts, class A. Dailey ex Sun, 12:30-1:30 pm, 9-12 midnight. Sun, 10:50-12:15 pm, church; 3:30-4:30 pm, musical. Central standard time.

WWAO Michigan College of Mines, Houghton, Mich. 263 meters, 1140 kilocycles, 250 watts, class A. Daily ex Sun, 12-12:30 pm. Wed, 8-10 pm. Central standard time.

WWGL Radio Eng. Corp., 8501 124th St., Richmond Hill, N. Y. 212.6 meters, 1410 kilocycles, 500 watts, class A. Eastern standard time.

WWJ The Detroit News, Detroit, Mich. 352.7 meters, 850 kilocycles, 1000 watts, class B. Sun, 10 & 11 am, church service; 2 pm, orchestra concert; 6:20-8:15 pm, varied musical program. Mon, Wed, Fri, 7:30-9:30-10:25-11:55 am-noon-3-3:30-4-6-7:30-9 pm, varied. Tues & Thurs, 9:30-10:25-11:55-noon-3-3:50-4-6-7 pm, varied.

WWL Loyola University, New Orleans, La. 275 meters, 1090 kilocycles, 100 watts, class A. Sat, 7:30-8:30 pm. Central standard time.



The MODERN "B" Power Supply Solves Your Battery Problems!

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"B" Power Supply Unit will operate any receiver

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"B" Power Supply Unit is economical. It pays for itself

MODERN
"B" Power Supply Unit improves reception

MODERN
"B" Power Supply Unit is ideal for DX

MODERN
"B" Power Supply Unit is scientifically constructed

MODERN
"B" Power Supply Unit is unqualifiedly guaranteed

MODERN
"B" Power Supply Unit is bought on competitive tests

The Modern "B" Power Supply Unit was developed, tested, and perfected in our laboratories. It goes to you as a finished product. It is unqualifiedly guaranteed.

It will operate any receiver satisfactorily, even improving in most instances the tonal quality. All types and designs of receivers, from the "super" to the neutrodyne, have been operated from it. The four-tube Reflex, which is the stumbling block for the ordinary power supply unit, performed beyond all expectations from the Modern.

Ask your dealer to perform this test: Disconnect your ground and aerial; turn on your receiver; and then hold a Western Electric Speaker close to your ear. If your power supply unit is a Modern you will ***not*** be able to tell the difference; if your power supply unit is not a Modern you will perhaps hear a hum.

The Modern "B" Power Supply Unit can supply 150 volts, thereby permitting the use of the big power tubes. It has an extra 90-volt tap for radio frequency tubes. Optional connections are provided. The customary difficulties that beset the average power supply unit are totally absent from the Modern. Moisture seepage is prevented; electrical depreciation of the elements is completely overcome; each Modern "B" Power Supply Unit is thoroughly tested at 2,500 volts; and it is housed in an attractive, highly polished steel cabinet.

Furthermore, the Modern "B" Power Supply Unit is built by radio manufacturers of national reputation, manufacturers of standard equipment. List price, $50.00 west of the Rockies.

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Manufacturers of Standard Radio Equipment
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RAYTHEON

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

U. S. Broadcasting Stations Listed by States

Alabama:
Auburn, WAPI, WSY •
Birmingham, WBRC
Montgomery, WIBZ

Alaska:
Fort St. Michael, WXT
Juneau, KFIU
Nushagak, KLJ
Yacutaga Beach, KYJ

Arizona:
Flagstaff, KFXY
Phoenix, KFAD, KFCB
Tucson, KFDH

Arkansas:
Arkadelphia, KFWD
Bentonville, KFVX
Conway, KFKQ
Fayetteville, KFMQ, KUOA
Hot Springs, KTHS
Little Rock, KFMB

California:
Avalon, KFWO
Alma (Holy City), KFQV
Bakersfield, KDZB
Berkeley, KRE
Big Bear Lake, KFXB
Burlingame, KFQH, KFOB
Chico, KFWH
Fresno, KMJ
Hollywood, KFQZ, KFVF, KFWB, KNX
Holy City, KFQU
Long Beach, KFON
Los Angeles, KFI, KFPG, KFPR, KFSG, KHJ, KJS, KMTR, KNRC, KNX, KTBI
Oakland, KFUS, KFWM, KGO, KLS, KLX, KTAB, KZM, KFUU
Oxnard, KFYF
Pasadena, KPPC, KPSN
Sacramento, KFBK, KFVK
San Diego, KDPT, KFBC, KFVW
San Francisco, KFRC, KFUQ, KFVZ, KFWI, KGTT, KIBS, KPO, KUO
San Jose, KFAF, KQW
San Leandro, KFUU
San Pedro, KFVD
Santa Ana, KFAW
Santa Maria, KFXC, KSMR
Stockton, KJQ, KWG
Taft, KFQC
Upland, KFWC

Colorado:
Boulder, KFAJ
Colorado Springs, KFXF, KFUM
Denver, KFAF, KFDL, KFEL, KFUP, KFVR, KLZ, KOA, KFXJ
Edgewater, KFXJ
Greeley, KFKA
Gunnison, KFHA
Trinidad, KFBS

Connecticut:
Hartford, WTIC
New Haven, WDRC, WPAJ
Storrs, WABL, WCAC

Delaware:
Wilmington, WHAV

District of Columbia:
Washington, WBES, WCAP, WMAL, WRC, WRHF

Florida:
Clearwater, WGHB
Fulford-by-the-Sea, WGBU
Jacksonville, WJAX
Miami, WQAM
Miami Beach, WIOD, WMBF
Pensacola, WCOA
St. Petersburg, WBHX, WJBB
Tampa, WDAE
Winter Park, WDBO

Georgia:
Atlanta, WDBE, WGST, WSB
Macon, WMAZ
Savannah, WEBZ

Hawaii:
Honolulu, KGU

Idaho:
Boise, KFAU, KFDD
Kellogg, KFEY
Moscow, KFAN

Illinois:
Batavia, WORD
Cambridge, WTAP
Carthage, WTAD
Chicago, KYW, WAAF, WBBM, WBBZ, WBCN, WDBY, WEBH, WENR, WFKB, WGES, WGN, WGO, WHBL, WHBM, WHT, WIBJ, WIBL, WIBM, WIBO, WJAZ, WLIB, WLS, WLTS, WMAQ, WMBB, WOK, WPCC, WQJ, WSAX, WSBC
Decatur, WBAO, WJBL
Evanston, WEHS
Galesburg, WFBZ, WRAM
Harrisburg, WEBQ
Joliet, WCLS, WIBD, WJBA, WKBB
Lake Forest, WABA
La Salle, WJBC
Monmouth, WBBU
Mooseheart, WJJD
Plainfield, WWAE
Rockford, KFLV
Rock Island, WHBF
Spring Valley, WGBW
Streator, WTAX
Sycamore, WJBN
Tuscola, WDZ
Urbana, WRM
Wooddale, WSWS
Zion, WCBD

Indiana:
Anderson, WEBD, WHBU
Culver, WHBH
Evansville, WGBF
Fort Wayne, WHBJ, WOWO
Greentown, WJAK
Indianapolis, WFBM
LaPorte, WRAF
Logansport, WHBL, WIBW
Seymour, WFBE
South Bend, WSBT
Valparaiso, WRBC
West Lafayette, WBAA

Iowa:
Ames, WOI
Anita, KFLZ
Boone, KFGQ
Burlington, WJAS
Cedar Falls, KFJX
Cedar Rapids, KFLP, WJAM, WKAA
Clarinda, KSO
Council Bluffs, KOIL
Davenport, WOC
Des Moines, WHO
Fort Dodge, KFJY
Iowa City, KFQP, WSUI
Lamoni, KFEV
LeMars, KFCY, KWUC
Marshalltown, KFJB
Muscatine, KFYD, KTNT
Oskaloosa, KFHL
Shenandoah, KFNF, KMA
Sioux City, KFMR, WEAU

Kansas:
Independence, KFVG
Junction City, KFJC
Lawrence, KFKU
Manhattan, KFVH, KSAC
Russell, KFQO
Wichita, KFH, KFOT, WEAH

Kentucky:
Louisville, WHAS, WLAP

Louisiana:
Baton Rouge, KFGC
New Orleans, WAAB, WAAC, WABZ, WBBS, WCBE, WOWL, WSMB, WWL, WJBO
Pineville, KFWU
Shreveport, KFDX, KWH, KWKH, WGAQ

Maine:
Bangor, WABI
Ellsworth, WHBK
Orono, WGBX
Portland, WCSH

Maryland:
Baltimore, WBAL, WCAO, WCBM, WFBR
Tokoma Park, WBES

Massachusetts:
Boston, WATT, WBZA, WDBR, WEEI, WNAB, WNAC, WSSH
Dartmouth, WMAF
Fall River, WSAR, WTAB
Mattapoisett, WBBG
Medford Hillside, WARC, WGI
New Bedford, WIBH, WNBH
South Dartmouth, WMAF
Springfield, WBZ
Taunton, WAIT
Webster, WKBE
Worcester, WCBT, WCTS, WTAG

Michigan:
Bay City, WSKC
Berrien Springs, WEMC
Dearborn, WWI
Detroit, WCX, WDYC, WGHP, WJR, WMBC, WWJ
East Lansing, WKAR
Escanaba, WRAK
Flint, WFDF, WTHS
Grand Rapids, WBDC, WEBK, WOOD
Houghton, WWAO, KFMW
Houston, KFMW
Lansing, WREO
Mt. Clemens, WABX
Owosso, WSMH
Petoskey, WBBP
Pontiac, WCX
Port Huron, WAFD
Royal Oak, WAGM
Ypsilanti, WJBK

Minnesota:
Breckenridge, KFUJ
Collegeville, WFBJ
Fairmount, KFVX
Minneapolis, KFDZ, KFMT, WAMD, WCCO, WDGY, WHDI, WLB, WRHM
Northfield, KFMX, WCAL
St. Cloud, WFAM
St. Paul, KFOY, WCCO
Welcome, KFVX

Mississippi:
Coldwater, WREC
Meridian, WIBP
Oxford University, WCBH

Missouri:
Cape Girardeau, KFVS
Carterville, KFPW
Columbia, KFRU
Independence, KLDS
Jefferson City, WOS
Kansas City, KWKC, WDAF, WHB, WOQ
Kirksville, KFKZ
Moberly, KFEP, KFOJ
St. Louis, KFQA, KFUO, KFVE, KFWF, KSD, WEW, KMOX, WIL, WMAY, WPE, WSBF

Montana:
Havre, KFBB
Helena, KFCC, KFSY
Missoula, KUOM

Nebraska:
Clay Center, 228.9
Clay Center, KMMJ
David City, KFOR
Hastings, KFKX
Lincoln, KFAB, WFAV
Norfolk, WJAG
Oak, KFEQ
Omaha, KFCZ, KFOX, KOCH, KUPR, WAAW, WNAL, WOAW
University Place, WCAJ

New Hampshire:
Chesham, WSAU
Hanover, WDCH, WFBK
Laconia, WKAV

New Jersey:
Atlantic City, WHAR, WPG
Camden, WFBI
Elizabeth, WIBS
Gloucester City, WRAX
Lambertville, WTAZ
Newark, WAAM, WBS, WCBX, WGCP, WNJ, WOR
New Brunswick, WEBA
North Plainfield, WEAM
Paterson, WODA
Red Bank, WJBI
Salem, WDBQ
Trenton, WOAX

New Mexico:
Albuquerque, KFLR, KFVY
State College, KFRU, KOB

New York:
Bay Shore, WRST
Brooklyn, WBBR, WFRL, WHAP
Buffalo, WEBR, WGR, WJBP, WMAK, WSUS, WPDQ
Canton, WCAD
Cazenovia, WMAC
Flushing, WIBI
Freeport, WCBB
Ithaca, WEAI
Jamestown, WOCL
Kingston, WDBZ
Lockport, WMAK
New York City, WBAY, WBNY, WDBX, WEAF, WEBJ, WEBL, WFBM, WFBH, WFBM, WGBS, WGMU, WHN, WHAP, WIBT, WGCP, WJY, WJZ, WKBK, WLWL, WMCA, WMSG, WNYC, WOKO, WQAO, WRMU, WRNY, WSAP, WSDA
Richmond Hill, WAHG, WBOQ, WGMU, WRMU, WWGL
Rochester, WABO, WHAM, WHEC
Rossville, WBBR
Schenectady, WGY, WRL
Syracuse, WFBL
Tarrytown, WRW
Troy, WHAZ
Utica, WIBX

North Carolina:
Asheville, WABC
Charlotte, WBT, WJBG
Greensboro, WNRC
Raleigh, WFBQ, WRCO

North Dakota:
Agriculture College, WPAK
Bismark, KFYR
Devils Lake, KDLR
Fargo, WDAY, WPAK
Grand Forks, KFJM

Ohio:
Akron, WADC
Bellefontaine, WHBD
Cambridge, WEBE
Canton, WHBC
Cincinnati, WAAD, WHBR, WKRC, WLW, WMH, WSAI
Cleveland, KDPM, WDBK, WEAR, WHK, WTAM
Columbus, WAIU, WBAV, WEAO, WMAN
Dayton, WDBS, WEBT, WSMK
Granville, WJD
Hamilton, WRK, WSRO
Newark, WBBA
Pomeroy, WSAZ
Sandusky, WQAF
Springfield, WCSO, WNAP
Toledo, WABR, WJBK, WTAL
Wooster, WABW
Yellow Springs, WRAV

Oklahoma:
Bristow, KFRU, KVOO
Chickasaw, KOCW
Norman, WNAD
Oklahoma City, KFJF, KFXR, WKY
Tulsa, WLAL

Oregon:
Astoria, KFJI
Corvallis, KFDJ, KOAC
Hood River, KQP
Portland, KFEC, KFIF, KFJR, KFWV, KGW, KQP, KTBR

Pennsylvania:
Allentown, WCBA, WSAN
Altoona, WFBG
Arnold, WCBU
Butler, WBR
East Pittsburgh, KDKA
Elkins Park, WIBG
Grove City, WSAJ
Harrisburg, WABB, WBAK, WHBG, WPRC
Haverford, WABQ
Johnstown, WGBK, WHBP, WTAC
Lancaster, WDBC, WGAL
Lewisburg, WJBQ
Oil City, WHBA
Parkersburg, WQAA
Philadelphia, WABY, WCAU, WFBD, WFI, WHBW, WIAD, WIBG, WIP, WLIT, WNAT, WOO, WWAD
Pittsburgh, KQV, WCAE, WJAS
Pottsville, WDS
Reading, WRAW
Scranton, WGBI, WQAN
State College, WPSC
Wilkes-Barre, WBAX, WBRE

Porto Rico:
San Juan, WKAQ

Philippine Islands:
Manila, KZKZ, KZRQ, KZUY

Rhode Island:
Cranston, WDWF, WKAP
Providence, WCBR, WCWS, WEAN, WGBM, WJAR

South Carolina:
Charleston, WBBY
Clemson College, WSAC
Greenville, WGBT

South Dakota:
Brookings, KFDY
Rapid City, WCAT
Vermillon, KUSD
Yankton, WNAX

Tennessee:
Chattanooga, WDOD
Knoxville, WFBC, WNAV, WNOX
Laurenceburg, WOAN
Memphis, WGBC, WHBQ, WMC
Nashville, WCBQ, WDAD, WSM

Texas:
Amarillo, WDAG, WQAC
Austin, KUT
Beaumont, KFDM, KFXM
Beeville, KFRB
Brownsville, KWWG
College Station, WTAW
Dallas, WFAA, WRR
Denison, KFQT
Dublin, KFPL
El Paso, WDAH, KFXH
Fort Worth, KFJZ, KFQB, KFRO, WBAP
Galveston, KFLX, KFUL
Greenville, KFPM
Houston, KFVI, KPRC, WEAY, WSAV, KFYJ
San Antonio, WCAR, WOAI
San Benito, KFLU
Waco, WJAD

Utah:
Logan, KFXD
Ogden, KFUR, KFWA
Salt Lake City, KDYL, KFOO, KFPT, KFUT, KSL

Vermont:
Burlington, WCAX
Springfield, WQAE

Virginia:
Arlington, NAA
Norfolk, WBBW, WTAR
Richmond, WBBL, WRVA
Roanoke, WDBJ
Thrifton, WGBG

Washington:
Everett, KFBL
Lacey, KGY
North Bend, KFQW
Olympia, KFRW
Pullman, KFRX, KWSC
Seattle, KFOA, KHQ, KJR, KTCL, KTW
Spokane, KFIO, KFPY, KHQ
Tacoma, KMO
Walla Walla, KFCF, KOWW
Yakima, KFIQ

West Virginia:
Weirton, WIBR

Wisconsin:
Beloit, WEBW
Camp Lake, WCLO
Fond du Lac, KFIZ
Eau Claire, WTAQ
Madison, WHA, WIBA
Marshfield, WGBR
Menominee, WGBQ
Milwaukee, WHAD, WKAF, WSOE
Omro, WJBR
Osseo, WTAQ
Poynette, WIBU
Stevens Point, WHBB, WLBL
Superior, WEBC
West De Pere, WHBY

Wyoming:
Laramie, KFBU

U. S. Broadcasting Stations

LISTED BY WAVELENGTHS

Meters	Call	Town
40	WIBZ	Montgomery, Ala.
137	WDS	Pottsville, Pa.
200	WIBD	Joliet, Ill.
202.6	KFXB	Pine Knott, Calif.
202.6	KFXB	Big Bear Lake, Calif.
202.6	WIBS	Elizabeth, N. J.
202.7	WEHS	Evanston, Ill.
205	WIBK	Toledo, Ohio
205.4	KFVD	San Pedro, Calif.
205.4	KFXD	Logan, Utah
205.4	KFXY	Flagstaff, Ariz.
205.4	KFYF	Oxnard, Calif.
205.4	WFRL	Brooklyn, N. Y.
205.4	WIBX	Utica, N. Y.
205.4	WPDQ	Buffalo, N. Y.
206.8	WJBA	Joliet, Ill.
206.8	WABW	Wooster, Ohio
207	KGTT	San Francisco
208	KFVF	Hollywood, Calif.
208	KNRC	Los Angeles
209.7	KDZB	Bakersfield, Calif.
209.7	KFXC	St. Maria, Calif.
209.7	KFYO	Texarkana, Texas
209.7	WCWS	Providence, R. I.
209.7	WKBK	New York, N. Y.
209.7	WIBP	Meridian, Miss.
209.7	WSBC	Chicago, Ill.
209.8	KSMR	Santa Maria, Calif.
210	WIBH	New Bedford, Mass.
211.1	KFWC	Upland, Calif.
211.1	KFWO	Avalon, Catalina Island, Calif.
211.1	WJBU	Lewisburg, Pa.
211.1	WIBT	New York, N. Y.
211.1	WJBQ	Lewisburg, Pa.
212.5	KFWV	Portland, Ore.
212.6	WMAL	Washington
212.6	WMSG	New York, N. Y
212.6	WWGL	Richmond Hill, L. I.
214.2	KFWF	St. Louis, Mo.
214.2	KFXR	Oklahoma City, Okla.
214.2	WCLS	Joliet, Ill.
214.2	WKBB	Joliet, Ill.
215.6	WPRC	Harrisburg, Pa.
215.7	KFQW	North Bend, Wash.
215.7	WBBZ	Chicago, Ill.
215.7	KFXJ	Denver, Colo.
215.7	WIBL	Chicago, Ill.
215.7	WIBR	Cincinnati, Ohio
215.7	WIBJ	Chicago, Ill.
215.7	WIBM	Chicago, Ill.
215.7	WRST	Bay Shore, N. Y.
215	WIBW	Philadelphia
217	KFRX	Pullman, Wash.
217.3	KFAF	San Jose, Calif.
217.3	KFQU	Alma (Holy City), Calif.
217.3	WFKB	Chicago, Ill.
217.3	WJD	Granville, Ohio
217.3	WOK	Chicago, Ill.
218	WTHS	Flint, Mich.
218.8	KFJC	Junction City, Kan.
218.8	KFQW	Olympia, Wash.
218.8	KFVH	Manhattan, Kans.
218.8	WIBU	Anderson, Ind.
218.8	WIBI	Flushing, N. Y.
218.8	WJBI	Red Bank, N. J.
218.8	WSVS	Buffalo, N. Y.
220	KFUU	Oakland, Calif.
220	KJBS	San Francisco
220	WCBU	Arnold, Pa.
220	WIBW	Logansport, Ind.
220	WQAA	Parkersburg, Pa.
222	KZRQ	Manila, P. I.
222	WBBW	Nortolk, Va.
222	WCOA	Pensacola, Fla.
222	WIBD	Bellefontaine, O.
222	WIBF	Rock Island, Ill.
222	WIBH	Culver, Ind.
222	WIBG	Elkins Park, Pa.
222	WIBC	St. Petersburg, Fla.
222	WIBU	Poynette, Wis.
222.1	WBES	Tacoma Park, Md.
222.1	WCMA	Culver, Ind.
223.7	KFQP	Iowa City, Ia.
223.8	WRAF	Laporte, Ind.
224	KFRC	San Diego, Calif.
224	KFBL	Everett, Wash.
224	KFUR	Ogden, Utah
224	KFVS	Cape Girardeau, Mo.
224	WBBU	Monmouth, Ill.
224	WJBC	Charlotte, N. C.
224	WKAV	Laconia, N. H.
224	WODA	Paterson, N. J.
225	WBBA	Newark, Ohio
225.4	WAGM	Royal Oak, Mich.
225.4	WBBM	Chicago, Ill.
225.4	WFBE	Seymour, Ind.
226	WFBM	New York, N. Y.
226	WEBQ	Harrisburg, Ill.
226	KFGQ	Boone, Ia.
226	KFIU	Juneo, Alaska
226	KFKZ	Kirksville, Mo.
226	KFOR	David City, Neb.
226	KFOB	Burlingame, Calif.
226	KFQZ	Hollywood, Calif.
226	WDAD	Nashville, Tenn.
226	WGBG	Thrifton, Va.
226	WIBO	Chicago, Ill.
227	KFNX	Beaumont, Texas
227	KFVN	Welcome, Minn.
227	WABA	Lake Forest, Ill.
227	WDBK	Cleveland, Ohio
227	WOWO	Ft. Wayne, Ind.
227.1	WJBR	Omro, Wis.
228.9	KPPC	Pasadena, Calif.
229	KFLV	Rockford, Ill.
229	KMMJ	Clay Center, Neb.
229	WAIT	Taunton, Mass.
229	WBBL	Richmond, Va.
229	WCBM	Baltimore, Md.
229	WDBJ	Roanoke, Va.
229	WGBR	Marshfield, Wis.
229	WSAJ	Grove City, Pa.
229	WSAN	Allentown, Pa.
229	WSAU	Chesham, N. H.
230.6	KFDX	Shreveport, La.
230.6	KQW	San Jose, Calif.
230.6	WIBG	Harrisburg, Ill.
231	KDLR	Devils Lake, N. D.
231	KFAN	Moscow, Idaho
231	KFDZ	So. Minneapolis, Minn.
231	KFOT	Wichita, Kan.
231	KFPR	Los Angeles
231	KFQC	Taft, Calif.
231	KUT	Austin, Tex.
231	KQP	Portland, Ore.
231	WBRE	Wilkes-Barre, Pa.
231	WIBK	Ellsworth, Me.
231	WKBE	Webster, Mass.
231	WTAX	Streator, Ill.
233	KFEY	Kellogg, Idaho.
233	KFON	Long Beach, Calif.
233	WCBX	Newark, N. J.
233	WHBM	Chicago, Ill.
233	WHBQ	Memphis, Tenn.
233	WJBK	Ypsilanti, Mich.
233	WNAV	Knoxville, Tenn.
233	WOKO	New York City
234	KFUS	Denver, Colo.
234	KNJ	Fresno, Calif.
234	WDBQ	Salem, N. J.
234	WEBE	Cambridge, Ohio
234	WFBD	Seymour, Ind.
234	WFDF	Flint, Mich.
234	WGBM	Providence, R. I.
234	WGBQ	Menominee, Wis.
234	WJBC	LaSalle, Ill.
234	KFUZ	San Francisco, Calif.
234.4	WHBJ	Ft. Wayne, Ind.
235.4	KYW	Chicago, Ill.
236	KFLI	San Benito, Tex.
236	KFOO	Salt Lake City
236	KFUX	Bentonville, Ark.
236	KFVG	Indepcendence, Kan.
236	KWKC	Kansas City, Mo.
236	WBOQ	Richmond Hill
236	WFBI	Camden, N. J.
236	WFBJ	Collegeville, Minn.
236	WGBF	Evansville, Ind.
236	WGBT	Greenville, S. C.
236	WRMU	Richmond Hill, N. Y. (yacht)
236	WGMU	Richmond Hill
236	WTAD	Carthage, Ill.
236	WIBA	Madison, Wis.
236.1	WBAW	Nashville, Tenn.
236.1	WCAM	Camden, N. J.
238	KFGP	Los Angeles, Calif.
238	KFYJ	Houston, Tex.
238	KFCB	Phoenix, Ariz.
238	KFWU	Pineville, La.
238	KFBS	Trinidad, Colo.
238	WBBP	Petoskey, Mich.
238	WCBT	Worcester, Mass.
238	WHBN	St. Petersburg
238	WHT	Chicago, Ill.
238	WRAW	Reading, Pa.
239.9	KFUM	Colorado Springs
240	KFHL	Oskaloosa, Ia.
240	KFLX	Galveston, Tex.
240	KFVE	University City, Mo
240	KFVI	Houston, Tex.
240	KZM	Oakland, Calif.
240	WABI	Bangor, Me.
240	WCAT	Rapid City, S. D.
240	WDBO	Winter Park, Fla.
240	WGBI	Scranton, Pa.
240	WHRB	Stevens Point, Wis
240	WOAX	Trenton, N. J.
240	WOAF	Sandusky, Ohio
240	WSMH	Owosso, Mich.
241.8	KSO	Clarinda, Ia.
242	KFFP	Moberly, Mo.
242	KFOJ	Moberly, Mo.
242	KFPM	Greenville, Tex.
242	KFUJ	Breckenridge, Minn
242	KFXH	El Paso, Tex.
242	WABY	Philadelphia
242	WBZA	Boston, Mass.
242	WCBI	Oxford, Miss.
242	WEBC	Superior, Wis.
242	WOOD	Grand Rapids
242	WTAP	Cambridge, Ill.
242	WWAE	Plainfield, Ill.
243	WATT	Boston, Mass.
243.8	WRAM	Galesburg, Ill.
244	KDPT	San Diego, Calif.
244	KFVR	Denver, Colo.
244	KUOM	Missoula, Mont.
244	WEBR	Buffalo, N. Y.
244	WGBB	Freeport, N. Y.
244	WNAX	Yanktown, S. D.
244	WAMD	Minneapolis
244	WSAZ	Pomeroy, Ohio
245.8	KFVW	San Diego, Calif.
245.8	WSOE	Milwaukee, Wis.
245.8	WBAL	Baltimore, Md.
245.8	WBR	Dallas, Texas
246	KDYL	Salt Lake City
246	KFJI	Astoria, Ore.
246	KFJY	Fort Dodge, Ia.
246	KFRO	Ft. Worth, Texas
246	KGY	Lacey, Wash.
246	WABX	Mt. Clemens, Mich.
246	WEBD	Anderson, Ind.
246	WIBR	Weirton, W. Va.
246	WQAE	Springfield, Vt.
247.7	KFYR	Bismarck, N. D.
247.8	KFBK	Sacramento, Calif.
247.8	WIOD	Miami Beach, Fla.
247.9	KFYR	Bismarck, N. D.
248	KFCC	Helena, Mont.
248	KFEC	Portland, Ore.
248	KFIF	Portland, Ore.
248	KFJB	Marshalltown, Ia.
248	KFOX	Omalia, Neb.
248	KFRB	Beeville, Tex.
248	KFSY	Helena, Mont.
248	KJQ	Stockton, Calif.
248	KWG	Stockton, Calif.
248	WAPI	Auburn, Ala.
248	WBBG	Mattapoisett, Mass.
248	WCSO	Springfield, Ohio
248	WGAL	Lancaster, Pa.
248	WGBK	Johnstown, Pa.
248	WMAY	St. Louis, Mo.
248	WNAP	Springfield, Ohio
249.9	KZIB	Manila, P. I.
250	KFEV	Lamoni, Ia.
250	KFKQ	Conway, Ark.
250	KFVY	Albuquerque
250	KFWI	San Francisco, Calif.
250	KFXF	Colorado Springs
250	KLS	Oakland, Calif.
250	KMO	Tacoma, Wash.
250	WFBC	Knoxville, Tenn.
250	WGES	Chicago, Ill.
250	WQAN	Scranton, Pa.
250	WNAT	Philadelphia
250	WHBA	Oil City, Pa.
250	WHBY	W. De Pere, Wis.
250	WIAD	Philadelphia
250	WLAL	Tulsa, Okla.
250	WMBB	Chicago, Ill.
250	WSY	Auburn, Ala.
250	WWAD	Philadelphia
250	KFHA	Gunnison, Colo.
250	KFOY	St. Paul, Minn.
250	KFPL	Dublin, Tex.
250	KFQT	Denison, Texas
250	KFWB	Hollywood, Calif.
250	KOCW	Chickasaw, Okla.
250	KWFC	Lemars, Ia.
250	WBBS	New Orleans, La.
250	WBS	Newark, N. J.
250	WCAX	Burlington, Vt.
250	WFBL	Syracuse, N. Y.
250	WGBX	Orono, Me.
250	WGCP	Newark, N. J.
250	WNJ	Newark, N. J.
250	WRCO	Raleigh, N. C.
250	WRHM	Minneapolis
250	WSRO	Hamilton, Ohio
250	WTAL	Toledo, Ohio
254	KFEL	Denver, Colo.
254	KFLR	Albuquerque
254	KFMB	Little Rock, Ark.
254	KFWH	Chico, Calif.
254	WABC	Asheville, N. C.
254	WCAJ	University Place, Neb.
254	WCBA	Allentown, Pa.
254	WEAL	Ithaca, N. Y.
254	WFBR	Baltimore, Md.
254	WFBZ	Galesburg, Ill.
254	WHBC	Canton, Ohio
254	WIAS	Burlington, Ia.
254	WJBB	St. Petersburg
254	WNAD	Norman, Okla.
254	WREC	Coldwater, Miss.
254	WSAR	Fall River, Mass.
254	WTAQ	Eau Claire, Wis.
254.1	KEJZ	Ft. Worth, Tex.
254.1	WIAK	Greentown, Ind.
256	KFCF	Walla Walla, Wash
256	KFIQ	Yakima, Wash.
256	KFYD	Muscatine, Ia.
256	KOWW	Walla Walla
256	KRE	Berkeley, Calif.
256	WBAX	Wilkes-Barre, Pa.
256	WDCH	Hanover, N. H.
256	WDOD	Chattanooga
256	WFBK	Hanover, N. H.
256	WGBW	Spring Valley, Ill.
256	WHBP	Johnstown, Pa.
256	WJBN	Sycamore, Ill.
256	WRVA	Richmond, Va.
256.3	WCSH	Portland, Me.
256.3	WRAK	Escanaba, Mich.
256.4	WBDC	Grand Rapids
256.4	WEBT	Dayton, Ohio
256	WMBC	Detroit, Mich.
258	KFJX	Cedar Falls, Ia.
258	KFPW	Carterville, Mo.
258	KFUL	Galveston, Tex.
258	WKJC	Lancaster, Pa.
258	KOCH	Omaha, Neb.
258	WAAD	Cincinnati, O.
258	WADC	Akron, Ohio
258	WDBC	Lancaster, Pa.
258	WDBY	Chicago, Ill.
258	WHEC	Rochester, N. Y.
258	WLTS	Chicago, Ill.
258	WNAL	Omaha, Neb.
258	WPCC	Chicago, Ill.
259	KFUS	Oakland, Calif.
261	KFAJ	Boulder, Colo.
261	KFPT	Salt Lake City, Utah
261	KFOO	Russell, Kans.
261	KFJF	Oklahoma, Okla.
261	KFMR	Sioux City, Ia.
261	KFUT	Salt Lake City
261	KFWA	Ogden, Utah
261	KWKH	Shreveport, La.
261	WABQ	Haverferd, Pa.
261	WARC	Medford Hillside, Mass.
261	WDAY	Fargo, N. D.
261	WEAM	North Plainfield, N. J.
261	WGI	Medford Hillside, Mass.
261	WKAF	Milwaukee, Wis.
261	WMAZ	Macon, Ga.
261	WNBH	New Bedford, Mass.
261	WPSC	State College, Pa.
261	WSKC	Bay City, Mich.
261	WSSH	Boston, Mass.
261	WTAR	Norfolk, Va.
261	WTAZ	Lambertville, N. J.
263	KFJR	Portland, Ore.
263	KFMT	Minneapolis, Minn.
263	KFMW	Houghton, Mich.
263	KTBR	Portland, Ore.
263	WABR	Toledo, Ohio
263	WAAM	Newark N. J.
263	WCAD	Canton, N. J.
263	WCAR	San Antonio, Tex.
263	WCBE	New Orleans, La.
263	WDAG	Amarillo, Tex.
263	WDGY	Minneapolis, Minn.
263	WEBZ	Savannah, Ga.
263	WGAQ	Shreveport, La.
263	WQAM	Miami, Fla.
263	WRAV	Yellow Springs, O.
263	WSAP	New York, N. Y.
263	WSDA	New York City
263	WWAO	Houghton, Mich.
265.3	WMAK	Lockport, N. Y.
266	KFPY	Spokane, Wash.
266	KFRY	New Mexico
266	KFWD	Arkadelphia, Ark.
266	WABB	Harrisburg, Pa.
266	KLZ	Denver, Colo.
266	WBCN	Chicago, Ill.
266	WCBK	St. Petersburg, Fla
266	WDEL	Wilmington, Del.
266	WENR	Chicago, Ill.
266	WGHB	Clearwater, Fla.
266	WHAV	Wilmington, Del.
266	WTAB	Fall River, Mass.
267.7	WDAH	El Paso, Texas
267.8	WTAC	Johnstown, Pa.
268	WAAB	New Orleans, La.
268	WBBY	Charleston, S. C.
268	WCTS	Worcester, Mass.
268	KFRC	San Francisco
268	KFEQ	Oak, Neb.
268	KFH	Wichita, Kan.
268	WDRC	New Haven, Conn.
268	WEBY	Beloit, Wis.
268	WEBW	Beloit, Wis.
268	WFBM	Indianapolis
268	WJAM	Cedar Rapids, Ia.
268	WJBO	New Orleans, La.
268	WNOX	Knoxville, Tenn.
268	WPAJ	New Haven, Conn.
268	WRAX	Gloucester, N. J.
268	WSAX	Chicago, Ill.
270	KDPM	Cleveland, Ohio
270	KFBU	Laramie, Wyo.
270	KGU	Honolulu
270	KZKZ	Manila, P. I.
270	WBAO	Decatur, Ill.
270	WEAY	Houston, Texas
270	WDBE	Atlanta, Ga.
270	WEAN	Providence, R. I.
270	WGBU	Fulford-by-the-Sea, Fla.
270	WGHP	Detroit, Mich.
270	WGST	Atlanta, Ga.
270	WJAG	Norfolk, Neb.
270	WJBL	Decatur, Ill.
270	WOI	Ames, Ia.
270	WOWL	New Orleans, La.
270	WRK	Hamilton, Ohio
270	WTAW	College Station, Tex.
270.1	WBAR	Sisilt, Wis.
272.6	WBBR	Brooklyn, N. Y.
272.6	WEBJ	New York City
272.6	WFBH	New York City
272.6	WRW	Tarrytown, N. Y.
272.6	WHK	Cleveland, Ohio
273	KFAD	Phoenix, Ariz.
273	KFDY	Brookings, S. D.
273	KFIZ	Fond du Lac, Wis.
273	KFKA	Greeley, Colo.
273	KFLZ	Atlantic, Ia.
273	KHQ	Spokane, Wash.
273	KWH	Shreveport, La.
273	WAAC	New Orleans, La.
273	WBAA	W. Lafayette, Ind.
273	WDAE	Tampa, Fla.
273	WFAM	St. Cloud, Minn.
273	WIL	St. Louis, Mo.
273	WRM	Urbana, Ill.
273	WSBF	St. Louis, Mo.
275	WABL	Storrs, Conn.
275	KFBB	Havre, Mont.
275	KFKU	Lawrence, Kan.
275	KFSG	Los Angeles
275	KQV	Pittsburgh, Pa.
275	WABZ	New Orleans, La.
275	WAFD	Port Huron, Mich.
275	WBAK	Harrisburg, Pa.
275	WBT	Charlotte, N. C.
275	WCAC	Storrs, Conn.
275	WCAO	Baltimore, Md.
275	WDBS	Dayton, Ohio
275	WEAU	Sioux City, Ia.
275	WFAV	Lincoln, Neb.
275	WLAP	Louisville, Ky.
275	WORD	Batavia, Ill.
275	WPAK	Fargo, N. D.
275	WSBT	South Bend, Ind.
275	WJAS	Pittsburgh, Pa.
275	WWL	New Orleans, La.
275.1	WIAD	Milwaukee, Wis.
275.1	WKY	Oklahoma City, Okla
275.2	WSMK	Dayton, Ohio
275.2	WMAC	Cozenovia, N. Y.
275.2	WOCL	Jamestown, N. Y.
275.8	WSWS	Chicago, Ill.
277.6	WLB	Minneapolis, Minn.
277.6	WCAU	Philadelphia
277.6	WRBC	Valparaiso, Ind.
277.8	WFBG	Altoona, Pa.
278	WABO	Rochester, N. Y.
278	WMAN	Columbus, Ohio
278	KFJM	Grand Forks, N. D.
278	KUSD	Vermillion, S. D.
278	KWCR	Cedar Rapids, Ia.
278	KWWG	Brownville, Tex.
278	WAAF	Chicago, Ill.
278	WDZ	Tuscola, Ill.
278	WGBC	Memphis, Tenn.
278	WHAM	Rochester, N. Y.
278	WIDI	Minneapolis
278	WLBL	Stevens Point, Wis.
278	WOQ	Kansas City, Mo.
278.6	KFDD	Boise, Idaho
280	KFAW	Santa Ana, Calif.
280	KFQA	St. Louis, Mo.
280.2	WNAB	Boston, Mass.
280.2	KFAU	Boise, Idaho
280.2	KMOX	St. Louis, Mo.
280.2	KOAC	Cowallis, Ore.
282.8	WOAN	Lawrenceburg, Tenn.
282.8	WSM	Nashville, Tenn.
284.4	WMBF	Miami Beach, Fla.
285.5	WKAR	East Lansing, Mich.
285.5	WREO	Lansing, Mich.
285.5	WEMC	Berrien Springs, Mich.
288.3	WLWL	New York City
293	KJS	Los Angeles, Calif.
293	WBAV	Columbus, Ohio
293.9	WAIU	Columbus, Ohio
293.9	WEAO	Columbus, Ohio
294	KTBI	Los Angeles
296.9	KPRC	Houston, Tex.
299.8	KFMQ	Fayetteville, Ark.
299.8	WPG	Atlantic City
300	KSL	Salt Lake City, Utah
302.8	WGN	Chicago, Ill.
302.8	KTAB	Oakland, Calif.
302.8	WLIB	Chicago, Ill.
305.9	WJAR	Providence, R. I.
305.9	KOIL	Council Bluffs, Ia.
305.9	KOMO	Seattle, Wash.
305.9	KTCL	Seattle, Wash.
309	KDKA	Pittsburgh, Pa.
315.6	KFDM	Beaumont, Tex.
315.6	KPSN	Pasadena, Calif.
315.6	WAHG	Richmind Hill, L. I.
315.6	WGBS	New York City
319	KOIN	Portland, Ore.
319	WGR	Buffalo, N. Y.
319	WSMB	New Orleans, La.
322.4	WBNY	New York, N. Y.
322.4	KOA	Denver, Colo.
325.9	KFWM	Oakland, Calif.
325.9	WKRC	Cincinnati, Ohio
325.9	WSAI	Cincinnati, Ohio
329.5	WJAZ	Chicago, Ill.
331.1	WBZ	Springfield, Mass.
333.1	KTNT	Muscatine, Ia.
336.9	KFMX	Northfield, Minn.
336.9	KNX	Los Angeles
336.9	WCAL	Northfield, Minn.
336.9	WJAX	Jacksonville, Fla.
340.7	KFAB	Lincoln, Neb.
340.7	KSAC	Manhattan, Kan.
340.7	WKAQ	San Juan, Porto Rico
340.7	WMCA	New York City
344.6	WCBD	Zion, Ill.
344.6	WLS	Chicago, Ill.
348.6	KOB	State College, N. M.
348.6	KWSC	Pullman, Wash.
348.6	WEEI	Boston, Mass.
352	WJAD	Waco, Tex.
352.7	WWJ	Detroit, Mich.
356.6	WHB	Kansas City, Mo.
360	WEW	St. Louis, Mo.
360	WRL	Schenectady, N. Y.
361	WQAC	Amarillo, Texas
361	WQAO	New York City
361	WHN	New York City
361.2	KGO	Oakland, Cal.
365.3	KFIO	Spokane, Wash.
365.6	WDAF	Kansas City, Mo.
370	KZVY	Manila, P. I.
370.2	WEBH	Chicago, Ill.
370.2	WJJD	Mooseheart, Ill.
374.8	KTHS	Hot Springs Nat'l Park, Ark.
374.8	KVOO	Bristow, Okla.
374.8	WRNY	New York, N. Y.
379.5	WGY	Schenectady, N. Y.
379.5	WHAZ	Troy, N. Y.
384.4	KJR	Seattle, Wash.
384.4	WAAW	Omaha, Nebr.
389.4	WEAR	Cleveland, Ohio
389.4	WTAM	Cleveland, Ohio
394	KFRU	Bristol, Okla.
394.5	KHQ	Spokane, Wash.
394.5	WFI	Philadelphia, Pa.
394.5	WOAI	San Antonio, Tex.
395	WLIT	Philadelphia, Pa.
399.8	KUOA	Fayetteville, Ark.
399.8	WHAS	Louisville, Ky.
405.2	WOR	Newark, N. J.
405.2	KHJ	Los Angeles
405.2	WJY	New York, N. Y.
412	KFOB	Ft. Worth, Texas
416.4	WCCO	St. Paul, Minneapolis
422.3	KIAF	Sihtipac, Minn.
422.3	WKRC	Cincinnati, Ohio
422.3	WLW	Cincinnati, Ohio
428.3	KPO	San Francisco, Cal.
428.3	WSB	Atlanta, Ga.
430.1	WNAC	Boston, Mass.
431	WHAP	New York, N. Y.
434	AT9	Ft. Bragg, N. C.
434.5	NAA	Arlington, Va.
434.7	KUO	San Francisco, Calif.
440.9	KLDS	Independence, Mo.
440.9	WDWF-WLSI	Cranston, R. I.
440.9	WLSI	Providence, R. I.
440.9	WMAF	Dartmouth, Mass.
440.9	WOS	Jefferson City, Mo.
447.5	WMAQ	Chicago, Ill.
447.5	WQJ	Chicago, Ill.
454	KTW	Seattle, Wash.
454.3	KFOA	Seattle, Wash.
454.3	WJZ	New York, N. Y.
461	KFNF	Shenandoah, Iowa
461	KMA	Shenandoah, Iowa
461.3	WCAE	Pittsburgh, Pa.
467	KFI	Los Angeles, Calif.
468.5	WRC	Washington, D. C.
469	WCAP	Washington, D. C.
475.9	WBAP	Ft. Worth, Texas
475.9	WFAA	Dallas, Texas
475.9	WTIC	Hartford, Conn.
484	WSUI	Iowa City, Ia.
491.5	KGW	Portland, Ore.
491.5	WCFL	Chicago, Ill.
491.5	WEAF	New York, N. Y.
499.7	KFRU	Columbia, Mo.
499.7	WMC	Memphis, Tenn.
508.2	KLX	Oakland, Calif.
	KMTR	Los Angeles, Calif.
508.2	WIP	Philadelphia, Pa.
508.2	WOO	Philadelphia, Pa.
516.9	WCX	Detroit
516.9	WJR	Detroit, Mich.
526	WHO	Des Moines, Ia.
526	WOAW	Omaha, Neb.
526	WNYC	New York, N. Y.
534.7	KUO	San Francisco, Calif.
535.4	KYW	Chicago, Ill.
535.4	WHA	Madison, Wis.
545.1	KFUO	St. Louis, Mo.
545.1	KSD	St. Louis, Mo.
545.1	WTAG	Worcester, Mass.

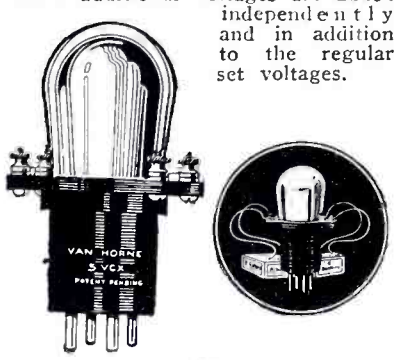
Van Horne Tubes are manufactured in both the Selected and Certified brands.

The Van Horne Certified tube is wrapped in a glassine wrapper and sealed. A characteristic curve sheet, covering the actual readings of the tube, being enclosed.

They are in a number of types for all receiving purposes, part of them being illustrated below.

*Adapted Mogul 5 VCX, 5 Volt .50 Ampere Audio Amplifier

To eliminate any necessity of changing set wiring the Mogul 5 VCX is equipped with a Patented Adapter to which additional voltages are added independently and in addition to the regular set voltages.



5 VC, 5 Volt .50 Ampere Audio Amplifier

This model is not equipped with the patented Van Horne Adapter found on the model 5 VCX.

It is designed for those receiving sets in which provision has been made in the circuit for the use of the power tube at extra voltages in the last audio stage.

5 VAX, 5 Volt, ¼ Ampere Detector Amplifier

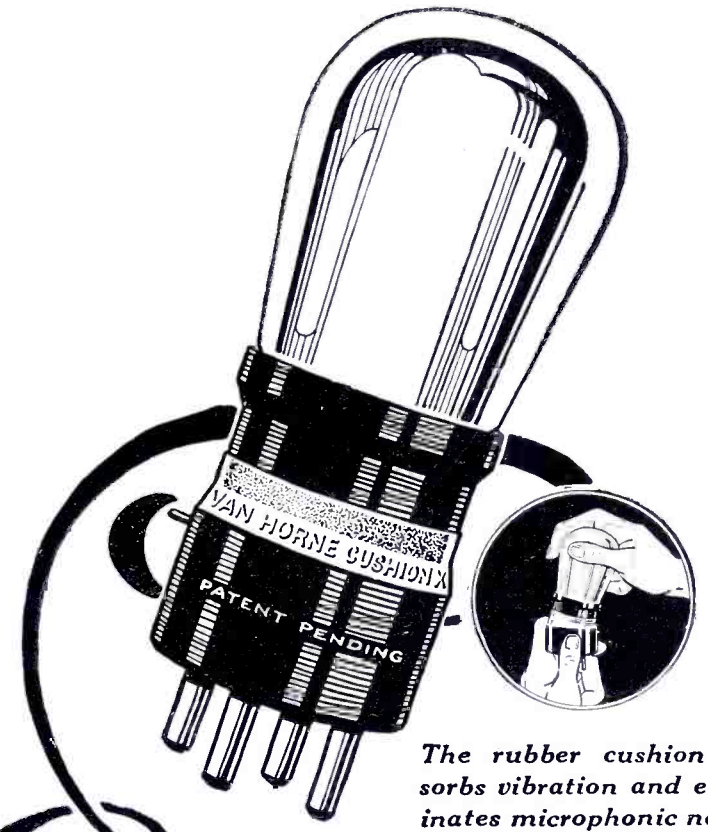
The improved manufacturing process, the use of patented thoriated wire and the precision and care with which this tube is made and tested makes it noticeably superior. Packed in both Selected and Certified Brands.

3 VBX Dry Cell Detector Amplifier

An unusually high reading dry cell tube due to the use of patented thoriated tungsten filament. Exceptionally satisfactory where volume with clearness and signal carrying capacity is desired.

NOTE

All Van Horne Tubes are Unconditionally Guaranteed.



The rubber cushion absorbs vibration and eliminates microphonic noises

Cushioned

to stop vibration— that's why the Cushion Base Tube makes such a wonderful improvement in reception

Knowing how much tube vibration impairs the tone quality of reception, fans everywhere are equipping their sets with Cushion Base tubes.*

Equip your set with Cushion Base tubes and note the surprising softness and fullness of tone of reception that follows the elimination of vibration. Order your set from your dealer today.

*These two unusual tubes, the Adapted Mogul 5 VCX Power tube and the Cushion Base tube, offer the greatest possible improvement in reception. They are manufactured exclusively by the Van Horne Company under patents pending to J. S. Van Horne.

For a great many years the Van Horne Company has manufactured vacuum products. The highly skilled workmanship that goes into every Van Horne tube is the result of years of experience and is one of the factors that make Van Horne tubes the highly efficient and dependable tubes that many thousands of users have found them to be. You are urged to become acquainted with the complete line of Van Horne Selected and Certified tubes. Your dealer will supply you with further information—or write for descriptive matter.

THE VAN HORNE COMPANY, Inc.

1000 CENTER STREET, FRANKLIN, OHIO

Steady "B" power without batteries

Pure full tone is possible only with "B" voltage kept constantly *up to standard;* All-American "Constant-B" *gives it to you*

YOU'VE had your "B" battery troubles; everybody has. Here's a permanent end to them—install an All-American "Constant-B," attach it to a light socket, and turn on the switch. You get a dependable, permanent supply of uniform, constant plate current; insuring full, pure tone.

There's no acid to ruin things; no annoying hum. And all inside units are permanently sealed against atmospheric conditions.

"Constant-B" has taps for 135, 90 and 67½ volts; and a 10 to 60 volt tap varied in output by a "Detector" control.

PRICE
$37.50
Complete with Raytheon Tube

The "High-low" switch insures uniform voltage, regardless of the number of tubes used; "Low" for 2 to 5 tube sets, "High" for sets with 6 tubes or more.

"Constant-B," after passing the highest laboratory tests, carries the seal of approval of the Popular Science Institute of Standards and other testing laboratories. It measures up in every way to All-American's high standards of painstaking workmanship and satisfying performance.

Descriptive folder and interesting booklet showing how to build a "B" Power Supply similar to "Constant-B" sent free on request. Specify bulletin B-82.

ALL-AMERICAN RADIO CORPORATION
4221 BELMONT AVE., CHICAGO, U. S. A.

Station WENR—266 *Meters—is owned and operated by the All-American Radio Corporation*

Tune them out and KEEP *them out with* Filtrola STATION ELIMINATOR

This attractive compact unit, complete in itself, makes it a simple matter to tune out interfering stations you don't want—even the most powerful. No tubes, batteries or other units to install. A typical All-American product in its precision and quality of workmanship.

Price $15

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

Foreign Radio Broadcasting Stations

	Call Letters	Wave-lengths, meters,	Power, watts
ALASKA			
Anchorage: Chovin Supply Co.	KFAD	280	100
Juneau: Alaska Electric Light & Power Co.	KFIU	226	10
ALGERIA			
Algiers: Colin & Fils.	8DB	310	100
ARGENTINA			
Buenos Aires: No data. Received at Pernambuco and Valparaiso	LOO	250	1000
Argentine Association of Broadcasters	LOR	400	500
No data	LOT	272.7	1000
Francisco J. Brusa	LOV	352	1000
Grand Splendid Theatre	LOW	325	1000
Radio Cultura Magazine	LOX	375	500
Radio Nacional	LOY	313	100
University of La Plata		425	1000
AUSTRALIA			
New South Wales			
Bathurst	2MK	288	100
New Castle	2HD	288	100
Northbridge: Otto Sandel	2UW	263	500
Sydney: Burgin Electric Co.	2BE	326	100
Broadcasters Sydney Ltd.	2BL	353	5000
Farmer & Co. Ltd. Labor Party	2FC	11,100	10,000
Electrical Utilities Supply Co.	2UE	297	250
Victoria			
Brighton: Projected. No data	3PB	.....	.....
Melbourne: Associated Radio Co. of Australia Pty. Ltd.	3AR	484	1600
Broadcasting Co. of Australia Pty. Ltd.	3LO	371	5000
O. J. Nilson & Co.	3UZ	319	100
L. J. Hellier: Wangaratta Sports Depot	3WR	303	100
Mildura: R. J. Egge	3EO	286	100
Queensland			
Brisbane: Dr. V. McDowell. Under construction	4CM	278	250
Radio Manufacturers Ltd. Projected	3MB	337	260
Queensland Government	4QG	385	5000
Rockhampton: Queensland Govt. Projected	4RN	323	500
Toowoomba: Gold Radio Elec. Service	4GR	294	100
Tasmania			
Hobart: Association Radio Co. of Australia Ltd. to be replaced by a 3000-watt (Input) station to be operated by the Tasmanian Broadcasting Pty. Ltd.	7ZL	525	250
South Australia			
Adelaide: Central Broadcasting Co.	5CL	395	5000
E. J. Hume. Operated by 5DN Pty. Ltd.	5DN	313	500
Millswood Auto & Radio Co.	5MA	.....	.....
Marshall & Co.	5MC	273	500
Western Australia			
Perth: Westralian Farmers, Ltd.	6WF	1250	5000
AUSTRIA			
Vienna: Oesterreichischer Radioverkehrs A. G. broadcasts three 2-hour programs daily, including music (opera and popular), weather and market reports and news. Reception reported at Antwerp, Teheran Smyrna, Tunis	ORV	530	1500
Oesterreichischer Radioverkehrs A. G. Testing; to replace above station in the near future	ORV	488	10,000
Graz: Oesterreichischer Radioverkehrs A. G.		404	500
(Note: The Oesterrichischer Radioverkehrs A.G. has had stations projected for Bregenz, Innsbruck, Klagenfurt, Linz and Salzburg for some time, though reports do not show that any action toward construction has been taken.)			
BELGIUM			
Brussels: Radio Belgique station owned and operated by the Radio Belgique Co.	BAV	486	1500
Liege: Radio Wallonie station		285	.....
Radio Central station		205	.....
BRAZIL			
Bahia: Radio Sociedade do Bahia		250	500
Bello Horizante: National Telegraph Service		400	500
Fortaleza: Radio Club		.....	30
Pernambuco: Radio Club. One hour daily and two hours three days each week		310	300
Port Alegre: Radio Society. Broadcasts one hour daily. To be replaced by 50-watt station		380	80
Radio de Janeiro: Radio Society. Daily programs by local artists		400	1000
National Telegraph Service. Praia Vermelha Station. Operated by Radio Club. Daily news and concerts		312	500
Rio de Janeiro: No data. Phonograph records broadcast 2 to 4 pm daily, concerns from 7 to 9 pm three or four days each week		.....	10
Santos: No data		.....	10
Sao Paulo: Dias Carneiro & Co., operated by the Radio Club of Sao Paulo		400	100
Radio Club of Sao Paulo Broadcasts Hotel Terminus orchestra and phonograph records daily		350	10

	Call Letters	Wave-lengths, meters,	Power, watts
CANADA			
Nova Scotia			
Halifax: (Carlton Hotel station, Northern Electric Co., Ltd.)	CHNS	322	100
Prince Edward Island			
Summerside: R. T. Holman, Ltd.	CHLC	268	25
New Brunswick			
Moncton: Canadian National Railways	CNRA	322	500
Quebec			
Montreal: Northwestern Electric Co., Ltd.	CHYC	411	750
E. Fontaine	CHRC	341	5
Nova Scotia			
Halifax: Carlton Hotel Station Elec. Co., Ltd.	CHNS	322	100
Charlottetown: Island Radio Co.	CYCY	312.3	50
Prince Edward Island			
Summerside: R. T. Holman, Ltd.	CHLC	268	25
New Brunswick			
Moncton: Canadian National Railway	CNRA	322	500
Quebec			
Montreal: Northern Electric Co., Ltd.	CHYC	411	750
E. Fontaine	CHRC	341	5
La Presse Publishing Co.	CKAC	410.7	1200
Canadian Marconi Co.	CFCF	410.7	1650
Canadian National Railways. Uses equipment of other local stations	CNRA	.....	.....
Ontario			
Hamilton: Jack V. Elliott, Ltd.	CFCU	340.7	500
Wentworth Radio Supply Co.	CKOC	340.7	50
Brantford: Brant Radio Supply Co., Ltd.	CFGC	297	50
Huntsville: A. Staples	CHCO	248	25
Iroquois Falls: Abitibi Power & Paper Co.	CFCH	499.7	250
Kingston: Monarch Battery Co.	CYMC	267.7	20
Queens University	CFRC	267.7	500
Kitchener: O. Rumpel	CJCF	248	25
Burketon Junction: Canadian Broadcasting Corp. Projected		329.5	5000
London: London Free Press Printing Co., Ltd.	CJGC	330	500
Ottawa: J. R. Booth, Jr.	CHXC	434.5	250
Canadian National Railways	CNRO	434.5	500
Dr. G. M. Geldert. (For Ottawa Radio Assn.)	CKCO	435	100
Prescott: Radio Association of Prescott	CFLC	297	50
Preston: Wallace Russ	CKPC	248	7½
Scarboro Station: Universal Radio Co. of Canada	CJYC	291	500
Toronto: Star Publishing & Printing Co.	CFCA	356.9	500
Toronto Radio Research Society	CHNC	356.9	500
E. Eaton Co.	CJCD	356.9	50
Dominion Battery Co., Ltd.	CKCL	356.9	500
Canadian Broadcasting Corp. Projected	CKNG	329.5	5000
Northern Electric Co. Uses equipment of other local stations	CHIC		
Jarvis Street Baptist Church. Uses equipment of other stations	CJBC		
Evening Telegram. Uses equipment of local stations	CJSC		
Canadian National Railways. Uses equipment of CKY	CNRT		
Thorobold: D. J. Fendell. Suspended		247.8	75
Manitoba			
Winnipeg: Manitoba Telephone System	CKY	384.4	500
Canadian National Railways. Uses equipment of CKY	CNRW	.....	.....
Saskatchewan			
Regina: R. H. Williams & Sons, Ltd.	CHWC	297	15
Leader Publishing Co., Ltd.	CKCK	297	500
Manitoba Telephone System	CKY	384.4	500
Canadian National Railways. Uses Station CKCK equipment	CNRR	297	.....
Canadian National Railways. Uses equipment of CKY	CNRW	.....	.....
Saskatoon: The Electric Shop	CEQC	329.5	500
International Bible Students' Association	CHUC	329	500
Wheayon Electric Co.	CJWC	329.5	250
Canadian National Railways. Uses equipment of other local stations	CNRS	.....	.....
Unity: Horace N. Stovin	CHSC	356.9	250
Alberta			
Calgary: W. W. Grant Radio, Ltd.	CFCN	435	1800
Calgary Herald	CFAC	434.5	500
Canadian National Railways. Uses equipment of other local stations	CNRC	.....	.....
Edmonton			
Edmonton: International Bible Students' Assn.	CHCY	517	250
Radio Supply Co., Ltd.	CFCK	516.9	100
Edmonton Journal	CJCA	516.9	500
Canadian National Railways. Uses equipment of other local stations	CNRE	.....	.....
Lethbridge: J. E. Palmer	CJOC	268	50
British Columbia			
Burnaby: International Bible Students' Assn.	CFVC	411	500

	Call Letters	Wavelengths, meters,	Power, watts
Kamloops: N. S. Dagleish & Sons and Weller & Weller	CFJC	268	15
New Westminster: Westminster Trust Co.	CFXC	291.1	20
Vancouver: A. Holmstead & William Hanlon	CFDC	411	10
Radio Corporation of Vancouver	CFYC	410.7	10
Daily Province	CKCD	410.7	1000
First Congregational Church	CKFC	410.7	50
Canadian National Railways	CNRV	291.1	500
Sprott-Shaw Radio Co. Suspended	CFCQ	410.7	.....
Pyramid Temple Society. Uses equipment of other local stations	CUKC	....	.....
CHILE			
Antofagasta: Senor J. Pedreny	CHAO	.....	200
Santiago: El Mercurio, newspaper		360	1200
Fratelli Castagneto		320	100
Chilean Broadcasting Society	CRC	385	350
Commercial Radio Co.		350	30
Tacna: Chilean Government	CRCT	550	1000
Valparaiso: Antonio Cornish	ACB	400	50
CHINA			
Shanghai: Kellogg Switchboard & Supply Co. Operates four hours daily between 9:45 am and 11 pm		365	100
(Note: Stations have been reported in other Chinese cities, but the present operation is very doubtful. The above station is the only one mentioned in more recent reports.)			
CHOSEN			
Seoul: Under construction	JODK	.....	.....
COSTA RICA			
San Jose: Government. Under construction		.....	.....
CUBA			
Central Ekia: Elia Sugar Co.		300	500
Salvador Rionda	7SR	350	500
Cienfuegos: Jose Ganduxe	6BY	260	200
Habana: Cuban Telephone Co.	PWX	400	500
Bernardo Barrie	2BB	250	15
Frederick W. Borton	2BY	260	100
El Pais	2EP	355	400
Credito y Construction Co.	2HP	295	100
Jose Lara	2LR	235	50
Manuel y Guillermo Salas	2MG	284	20
Mario Garcia Velez	2OK	360	100
Columbia Radio & Cycle Co.	2OL	225	100
Raoul Karman	2RK	315	20
Roberto E. Ramirez	2TW	270	20
Benito Vieta Ferro	2UF	265	10
Santiago: Alberto Ravelo	8BY	250	100
Tuinucu: Frank H. Jones	6JK	272	100
Frank H. Jones	6KW	340	100
CZECHOSLOVAKIA			
Prague: (Strasnice station)		.....	.....
Radio Journal	OKP	372	5000
Brunn: (Radio Journal station)		.....	.....
Radio Journal	OKB	521	500
CANARY ISLANDS			
La Laguna: Servando Ortoll Delmotte	EAJ5	280	50
Las Palmas: Canary Islands Radio Club		300	6
Club Radio Canarias		300	6
Teneriffe: Servando Ortoll Delmotte	EAR5	120	100
CEYLON			
Colombo: Ceylon American Wireless Association		800	2000
DENMARK			
Copenhagen: Copenhagen Radio Broadcasting station (Government owned)		348	500
Hjorring: Relay station (Government owned)		1250	500
Olense: Relay station (Government owned)		810	250
Soro: Ministry of War. Replaced station at Ryvang		1150-2400	1000
ESTHONIA			
Tallinn		350	.....
EGYPT			
Morocco			
Casablanca: Radio Club de Maroc	CNO	250	500
Senegal			
St. Louis Radio Club Senegalaise (Projected)		300	100
Tunisia			
Tunis: French Army	OCTU	50	500
Cairo: Amateur station: unknown		300	6
FINLAND			
Jyvaskyla: Nuoren Voiman Liiton Radioyhdistys		561	200
Bjorenborg: Under construction by the Nuoren Voiman Liiton Radioyhdistys		255.3	.....
Hango: Nuoren Voiman Liiton Radiohdistys		259.6	200
Helsingfors: Finnish Civil Guard. Broadcasts concerts daily and special programs. Reception reported at Tallinn (Esthonia)		522	500
Military station at Skatudden, a suburb, supported by the public. Broadcasts concerts and other programs irregularly. Reception reported at Tallinn		318	750
Mikkeli: Nuoren Voiman Liiton Radioyhdistys		561	100
Pori: Nuoren Voiman Liiton Radioyhdistys		255.3	100
St. Michael: Nuoren Voiman Liiton Radioyhdistys, under construction		561	500
Tammerfors: Nuoren Voiman Liiton Radioyhdistys. Broadcasts concerts and other programs irregularly	3NB	393	250
Tampere		373	250
Uleaborg		233	100

	Call Letters	Wavelengths, meters,	Power, watts
FRANCE			
Angen: Department of Lot et Garonne	2BD	318	250
Angers: Ministry of Posts, Telegraphs and Telephones		250	500
Bordeaux: Ministry of Posts, Telegraphs and Telephones		330	500
Caen		332	.....
Grenoble: Ministry of Posts, Telegraphs and Telephones		380	150
Issy-les-Moulineaux: Ministry of War	QGA	1800	500
Lyon: Dubanchet & Trolliet, Station Radio Lyon		280	2000
Ministry of Posts, Telegraphs and Telephones, Station La Doua, named for suburb in which located	YN	482.3	500
Marseilles: Ministry of Posts, Telegraphs and Telephones		351	300
Mont de Marsen		390	300
Montpellier: Radio Montpellier station		220	200
Paris: Eiffel Tower station. Ministry of Posts, Telegraphs and Telephones	FL	2650	5000
Journal Petit Parisian	5NG	333	500
Petit Parisian. Reception reported at Rome			
Societ Francais Radioelectrique	FL	345	500
Societe Francais Radioelectrique	8AJ	1780	100
Cie. Francais de Radiophonie. Reception reported at Teneriffe, Jerusalem, Brussels, Rome, Teheran, Smyrna, Barcelona		1750	4000
Superior School of Ministry of Posts, Telegraphs and Telephones. Reception reported at Rome	FPTT	459.4	500
Pic du Midi		350	.....
St. Etienne: Radio Club Forezien		220	50
Strasbourg: Radio Club	8GF	200	100
	8GH	200	100
Toulouse: La Radio. Reception reported at Rome, Barcelona		435.1	2000
Ministry of Posts, Telegraphs and Telephones. Aerodrome station	MRD	280	2000
(Note: The Ministry of Posts, Telegraphs and Telephones has had stations under construction at Angers, Bordeaux, Lille, Nice and Strasbourg for some time.)			
GERMANY			
Berlin: Postal Authorities. Konigswusterhausen station. Relays Vox Haus programs. Reception reported at Rome, Constantinople, Bergen, Algiers		1300	5000
Postal Authorities. Vox Haus station		507	2250
Magdeburger Platz		571	400
Konigswusterhausen station	AFT	1300	1600
Bremen: Nordische Rundfunk A. G. Relays Hamburg programs		279	700
Breslau: Schlessische Funkstudde. Received at Rome. To be replaced by station with 10,000 watts input		414.8	4000
Dortmund: Mitteldeutscher Rundfunk A. G. Relays Leipzig programs		283	300
Dresden: Mitteldeutscher Rundfunk A. G. Relays Leipzig programs		292	300
Elberfeld: Suspended		259	300
Frankfurt-on-the-Main: Sudwestdetuscher Rundfunkdienst		470	300
Hamburg: Norcischer Rundfunk A. G.		392	2000
Kassel: Sudwestdeutscher Rundfunkdienst.		233	300
Kiel		233	300
Konigsberg: Ostmarken Bundfunk A. G.		463	300
Leipzig: Mitteldeutscher Rundfunk A. G.		454	300
Muenster: Westdeutscher Funkstunde A. G.		410	600
Munich: Deutsche Stunde in Bayern		485	300
Gleiwitz: Projected, to relay Breslau programs		.....	1500
Hanover: Nordischer Rundfunk A. G. Relays Hamburg programs		296	1500
HAWAII			
Honolulu: Marion A. Mulrony	KGU	270	500
HAITI			
Port au Prince: Government projected		.....	.....
HUNGARY			
Budapest: Meugeyetemi Radio Magyar Tavirati Iroda. Broadcasts market reports and news		1050	2000
Reykiavik		430	500
INDIA			
Bombay: Bombay Presidency Radio Club	2FV	387	220
Walter Rogers & Co.	2AX	226	.....
Calcutta: Radio Club of Bengal	2BZ	800	500
Owner not reported	5AF	425	.....
Karachi: Karachi Radio Club		425	40
Madras: Crampton		220	120
Rangoon: Radio Club of Burma and Wireless Club of Burma. Broadcasts musical programs every Sunday		450	40
IRISH FREE STATE			
Dublin: Government	2RN	390.9	1500
ITALY			
Rome: Unione Radiofonica Italiana. Broadcasts concerts and news, 8:30 to 11 o'clock pm daily. Receptions reported at Antwerp, Jerusalem, Lille, Smyrna, Damascus, Barcelona, Tunis and Alexandria. This is at present the station best received throughout the Levant. To be replaced by a station now under construction, of 2600 watts power	IRO	434	1200
Milan: Unione Radiofonica Italiana		308	1200
(Note: The Unione Radiofonica Italiana has stations at Florence, Naples and Palermo projected or under construction.)			
LATVIA			
Riga		480	2000
MEXICO			
Chihuahua: Federal Government State Capital station	CZF	325	250

	Call	Wave-length, meters	Power, watts
Guadalajara: Federal Military Command	FAM	490	1000
Radio Club		280	10
Mazatlan: Castulo Llamas	CYR	475	250
Mexico City: Elfrian R. Gomez	CYA	300	500
Jose J. Reynosa, operated by El Buen Tono, cigarette factory	CYB	275	500
Miguel S. Castro, operated by Le High Life, newspaper	CYH	375	100
Raoul Azcarraga, operated by Universal	CYL	400	500
Martinez y Zetina	CYO	425	100
El Excelsior—Parker	CYX	325	500
Department of Education	CZE	350	500
Monterey: Roberto Reyes	CYM	275	100
Constantino de Tarnava. Under construction	CYS	.....	.....
Oaxaca: Frederico Zenilla	CYF	265	100
Puebla: Augustin del P. Zaenz	CYU	312	100
Tampico: El Mundo. Suspended		.....	10
Cipriano Sagaon S en C	CYQ	322	100
Vera Cruz: Manuel Angel Fernandez. Recently inaugurated for broadcasting advertising of an American product	CYC	337	50
Yucatan: Partida Socialista del Sureste	CYY	548	100
JAPAN			
Nagoya: Nagoya Radio Broadcasting Co. Broadcasts daily 9 am to 9 pm; Sundays and holidays, 12m to 9 pm. Program consists of music, weather and market reports, etc.	JOCK	360	1500
Osaka: Osaka Radio Broadcasting Co. Programs in English and Japanese. 1500-watt station projected	JOBK	385	500
Osaka Broadcasting station (Proj.)	JIBK	385	1000
Tokyo: Tokyo Radio Broadcasting Co. Programs in English and Japanese. 155-watt	JOAK	375	1000
KWANTUNG			
Dairen: Government Bureau of Communications employs a commercial station. Daily programs broadcast, consisting of music, educational and entertainment numbers		400	.....
LUXEMBURG			
Luxemburg		1200	250
MOROCCO			
Casablanca: Radio Club of Morocco: Omega Station	CNO	250	500
NETHERLANDS			
Hilverman: Netherlandsche Seintoellen Fabriek and Hilversum Dreadloze Omroep. Reception reported at Teheran		1050	1000
NEW ZEALAND			
Auckland: Newcome (Ltd.)	1YL	260	500
Auckland Radio Service	134	260	200
La Gloria Gramophone	1YB	260	50
Christchurch		.....	500
Dunedin: Otago University	4XO	140	.....
British Electrical & Engineering Co.	4YA	310-370	500
Radio Supply Co.	4YO	370	500
Gisborne: Gisborne Radio Co.	2YM	335	500
Wellington: Broadcastings (Ltd.)	2YB	275	15
Dominion Radio Co.	2YK	275	500
NORWAY			
Oslo: Broadcasting Company A. S.		381.2	1500
Bergen: Bergen Broadcasters		358	500
Bergen Broadcasters. Projected		358	1500
PERU			
Lima: Peruvian Broadcasting Co. (Ltd.)	OAX	360	1500
PORTUGAL			
Lisbon: Grandes Armazens de Chiado. Suspended	PAA	320	500
PHILIPPINES.			
Manila: I. Beck Department Store	KZIB	260	20
PORTO RICO			
San Juan: Radio Corporation of Porto Rico	WKAQ	340	500
SALVADOR			
San Salvador: Division of Telephones and Telegraphs broadcasts concerts Monday & Friday nights at 8:15		.....	500
SENEGAL			
St. Louis: Senegal Radio Club projected		300	100
SPAIN			
Barcelona: Radio Barcelona Station. Associated Nacional Radiofusion	EAJI	325	200
Bilbao: Radio Carlton Station. Radio Club Vizcaya	EAJ9	315	200
Radio Vizcaya Station. Don Armando de Otera	EAJ11	418	400
Vizcaya Radio Broadcasting Station broadcasts music, provided by local talent, and considerable advertising from 10 to 12 pm daily		418	200
Cadiz: Don Francisco de la Liesca	EAJ3	360	550
Don Jan Jaborra	EAJ10	330	1000
Cartagena: Don Enrique de Orbe	EAJ16	335	150
Madrid: Don Antonio Castilla	EAJ4	340	1000
Radio Iberica Station	EAJ6	347	1000
Union Radio	EAJ7	372.4	1000
Don Vicente Coyonecho, projected	EAJ12	.....	200
Association of Radio	EAJ15	490	1000
Radio Espana		334	300
Malaga: Cia Iberica de Telecomunicacion	EAJ25	325	1000
Oviedo: Don Arburo Cima	EAJ19	340	1000
San Sebastian: Don Sabino Ucelayeta	EAJ8	344.6	500
Seville: Seville Radio Club	EAJ5	350	150
Don Manuel Garcia Ballesta	EAJ17	330	100
Don Jorge la Riva, projected	EAJ21	.....	1000
Valencia: Radio Corporation	EAJ14	400	500
Under construction	EAJ24	360	.....

	Call	Wave-length, meters	Power, watts
STRAITS SETTLEMENTS			
Amateur Wireless Society of Malaya: 2-hour program broadcast each Sunday evening, and children's concert on Wednesdays. Received at Colombo, Ceylon		270	100
SWEDEN			
Drebo	SMTI	237	250
Boden: Radiotjanst	SASE	1200	1000
Eskilstuna: Radio Club. Relays Stockholm programs 4 days each week, broadcasts local programs other days	SMUC	243	150
Falun: Radio Club. Relays Stockholm programs 4 days each week, broadcasts local programs other days	SMZK	250	250
Gavle: Radio Club. Relays programs 4 days each week, broadcasts local programs other days	SMXF	208	250
Goteburg: Radiojanst	SASB	290	500
Helsinborg		253	250
Jonkopings: Jonkopings Runradiostation. Relays Stockholm programs 4 days each week, broadcasts local programs other days	SMZD	199	250
Kalmar		253	.....
Kalmas		253	250
Karlsborg: Radiojanst. Relays Stockholm programs 4 days each week, broadcasts local programs other days	SASF	1365	1000
Karlstrona: Relays Stockholm programs 4 days each week, broadcasts local programs other days		196	200
Karlstad: Karlstads Runradiostation. Relays Stockholm programs 4 days each week, broadcasts local programs other days	SMXG	233	80
Linkoping: Radio Club. Relays Stockholm programs 4 days each week, broadcasts local programs other lays	SMUV	467	350
Malmo: Radiotjanst	SASC	270	500
Norrkoping	SMVV	260	250
Orebro: Suspended	SMTI	218	.....
Saffle		245	500
Stockholm: Radiotjanst	SASA	427	100
Sundsvall: Radiotjanst	SASD	545	500
Trollhattan: Trollhattans Runradiostation	SMXG	345	50
Varberg		385	100
Umea: Relays Stockholm programs 4 days each week, broadcasts local programs at other times, irregularly		.....	180
SWITZERLAND			
Basel: Aerodrome. Projected		900-1300	300
Berne: Radio Berne Station, Radio Club of Berne		435	1500
General Post and Telegraph Office		302	1500
Geneva: Radio Broadcasting Society of Geneva. Broadcasts music and news		760	500
Lausanne: Champ de l'Air Station (Societe Romande de Radiotelephonie Lausanne)	HB2	850	600
Zurich: Hoengg Station. Radio Genossenschaft Zurich University. Reception reported at Antwerp, Brussels, Rome, Vienna	RGZ	515	500
TUNISIA			
Tunis: French Army. Two musical programs broacast each week	TUA-OCTU	1450	500
French Army. Two musical programs broadcast each week	OCTU	45	
TURKEY			
Stamboul. Station reported projected		.....	.....
URUGUAY			
Montevideo: Crandon Institute		.....	500
UNION OF SOUTH AFRICA			
Cape Town: Cape Publicity Association	WAMG	400	500
Durban: Town Council		350	500
Grahamstown		400	.....
Johannesburg: Assn. Scientific and Tech. Societies	JB	450	500
Cape Town: Cape Peninsula Broadcasting Assn.. Broadcasts 54 hours per week, programs by paid orchestra and local talent		375	1200
UNITED KINGDOM			
Aberdeen	2BD	491.1	1500
Belfast	2BE	438.7	1500
Birmingham: Received at Antwerp, Brussels, Rome	5IT	476.6	1500
Bournemouth: Received at Antwerp, Teneriffe, Jerusalem	6BM	385	1500
Cardiff: Received at Antwerp and Rome	5WA	351.6	1500
Daventry: Received throughout Europe, northern Africa and Asia Minor	5XX	1600	16,000
Dundee	2DE	330.5	200
Edinburgh	2EH	328	200
Glasgow	5SC	421.6	1500
Hull	6KH	335	200
Leeds-Bradford	2LS	343.5	310
Liverpool	6LV	313	200
London: Received at Teneriffe, Strasbourg, Brussels, Rome, Barcelona, Tunis	2LO	362	.....
Manchester: Received at Rome	2ZY	376.8	1500
New Castle: Received at Brussels, Rome	5NO	403.9	1500
Nottingham	5NG	326	1500
Plymouth	5PY	338	200
Sheffield	6FL	303.5	200
Stoke on Trent	6ST	306	200
Swansea	5SX	482	200
VENEZUELA			
Caracas: Empress Venezolana de Radiotelefonia. Under construction		360	1000
Colombo: Ceylon Government. Replaced private station; new equipment, placed in use in January, 1926		365	100
YUGOSLAVIA			
Belgrade	HFF	1650	2000
Zagreb: Under construction		.....	.....

RADIO CELEBRITIES

SINCE its introduction over two years ago, extreme distance getting ability has always been associated with the name Browning-Drake, and the good-will of a hundred thousand Browning-Drake fans we consider our greatest asset.

The research at the Cruft laboratory of Harvard University, begun in the summer of 1923 by Glenn H. Browning and Frederick H Drake, has set the mathematical standard of design for radio frequency transformers and is universally recognized as the scientific authority on this most important subject, justly called the "heart of any circuit."

One stage of scientifically designed radio frequency, followed by tickler feedback detector and three stages of resistance-coupled audio has yet to be improved upon for range, selectivity and tone quality. Our research facilities are such that minor refinements are constantly being made without the necessity of yearly models becoming obsolete.

We produce one model, fairly priced, and handled by the highest grade dealers and jobbers. Consistent performance has produced country-wide confidence in the Browning-Drake name and its standards, with the knowledge that it represents a laboratory standard of development which will not be superseded or radically changed for many years.

For further information address the Browning-Drake Corporation, Brighton, Mass.

The
BROWNING-DRAKE FIVE

BROWNING-DRAKE

Jack Nelson, Announcer and Director of WJJD, Mooseheart, Ill. A native of Chicago; 28 years of age and married. Became famous as an announcer over WDAP. Mr. Nelson has also written a number of song hits

Max Steindel, Orchestra Conductor, KSD, St. Louis, Mo. Born in Stutthart, Germany. He is also solo cellist of the St. Louis Symphony Orchestra. 32 years of age and single

Floyd Neale, Chief Announcer WGBS, N. Y. City. Native of Waterbury, Conn. Graduate of Harvard of 1911. Previous to radio work was in the advertising business. 35 years of age and single

Mrs. Lena Milam, Violinist of Station KFDM, Beaumont, Tex. was formerly supervisor of music in city schools, orchestra director and violin teacher

Gayle V. Grubb, Chief Announcer of KFAB, Lincoln, Neb. Known as "Gloomy Gus." Formerly in vaudeville

Victor Saudek, Director of Little Symphony Orchestra, KDKA, Pittsburgh, Pa. Native of Milwaukee, Wis. He has been a member of various symphony orchestras and still retains his position on the faculty of Carnegie Inst. of Technology

Miss Gladys Harned, Violinist of Station KFDM, Beaumont, Texas. Miss Harned is a native of Adams, Tenn.

Freeman H. Talbot, Program Manager and Studio Director of KOA, Denver, Colo. He is a Canadian by birth and won a wide reputation as executive director of the Denver Music Week Association before joining KOA

Frank Cook, heard from WCAU Philadelphia, Pa., singing the songs of yesterday. Previous to broadcasting, appeared in vaudeville and musical comedies. He is now resident manager of Benn's Orient Theater, W. Philadelphia

Rex Bettis, Announcer of WOQ Kansas City, Mo. Native of Enid, Okla. 25 years of age and single

V. A. L. Jones (Mrs. A. T. Campbell), Chief Announcer and Program Director for KSD, St. Louis, Mo. Has the distinction of being the first woman announcer and program director in America. Has been identified with KSD since April, 1922. A native of Virginia. Before taking up radio work she was a magazine writer, publicity and concert director

Howard Wade Kimsey, Announcer and Singer over WQAO, N. Y. City. Native of Missouri. Has been Concert, Church and Chautauqua singer since 1906. Four years as Army Song Leader during the war

Edwin L. Olds, Announcer of KTHS, Hot Springs, Ark. Native of Chicago. Previous to radio work he was in the U. S. Navy. Formerly identified with stations WPA, WBAP. Known as "The Golden Voiced Announcer"

Miss Goldie Funk, Hostess of Station WOAW, Omaha, Neb. Twenty-three years of age; formerly a stenographer

George D. Hay, Announcer and Director of Station WSM, Nashville, Tenn. His home town is Attica, Ind. and previous to radio, he was a newspaper man, known as "The Solemn Old Judge" Formerly connected with Stations WMC and WLS

Russell Pratt, the "Topsy Turvy Time Man" of WMAQ, Chicago. Conducts a radio club for boys and girls; over 125,000 members in six months. Have their own daily newspaper, "Topsy Turvy Times," which appears each day in the Daily News. Is 36, married and has four little "TTT's"

Arthur B. Church, Announcer of KLDS, Independence, Mo. Native of Lamoni, Iowa. 30 years of age and married

Miss Helen Wethrell, who gives home service talks over KSD, St. Louis, Mo. Is a native of Massachusetts

L. B. Gough, Announcer of KFDM, Beaumont, Texas. Known as "Gasoline Gus." He is Mgr. of Service and Employment Depts. the Magnolia Petroleum Co.

Frank Westphal, Studio Director of Station WENR, All-American Radio Corp., Chicago. Also leader of the All-American Pioneers, famous for their jazz music. Native of Chicago. Has spent many years on the vaudeville stage. Formerly associated with Stations WQJ, WLS, KYW and WTAS

Francis S. Chamberlin, the Announcer for WMC, Memphis, Tenn., who insists on letting people know what station they are listening to. Gives the call letters twice on each announcement with "Memphis, Down in Dixie. He is a native of Burlington, Iowa, 24 years of age and single. Graduated from Yale in 1924

H. C. Castitaw, known as "Castor Oil Clarence" of station KFDM, Beaumont, Tex. Native of Brookhaven, Miss. Harmonica entertainer

Thorman B. Groth, Baritone Soloist of WCAL, Northfield, Minn. Known as "Fat." Has also been a choir singer for several years. Formerly an automobile and implement salesman

J. R. Foster, Chief Announcer and Studio Manager of WBCN, Chicago. Native of Winnipeg, Canada. Formerly connected with Station CJCG

Miss Edwyl Redding, Pianist of KFHA, Gunnison, Colo. Native of Montrose, Colo. Is also head of the piano, organ and harmony departments of the Western State College of Colo.

Rosaline Greene. Leading Lady of the WGY Players, Schenectady, N. Y. since 1924. 20 years of age and single

Ada Morgan O'Brien, Musical Director of KTAB, Oakland, Calif. Native of Warwickshire, England. Formerly with stations KFDB, KPO

W. L. Kadderly, Announcer of Station KOAC, Corvallis, Ore. Graduated from Oregon Agric. College in 1916 and connected with the Extension Service of the College since 1917. KOAC is a part of this Extension Service

J. C. Jensen, Announcer of WCAJ, University Place, Neb. Was a war-time radio instructor in training camp. Native of Utica, Neb. 45 years of age and married

Mrs. W. C. Edwards, Announcer and Story Teller for Children's Half Hour over KFDM, Beaumont, Tex. Known as "Miss Magnolia Blossom." 30 years of age, married and has one daughter. Formerly a welfare worker and teacher of expression and music

Elsie Shaw, Reader and Pianist over KFJF, Oklahoma City, Okla. Native of Washington, D. C. Previous to radio work, she was a professional teacher of elocution and also did concert work. 30 years of age and married

Llewelyn David Evans, Announcer of Station KJBS, San Francisco, Calif. Native of Vancouver, B. C. Spent six years as radio operator on ships. 25 and married

Raymond B. Meader, Announcer of Station WSSH, Boston, Mass. Radio Operator in U. S. Navy during war. 28 and married. "Announcer and studio manager." Native of Rochester, N. H.

J. L. Fox, Announcer of KFH, Wichita, Kan. Formerly a musician and salesman of musical instruments. Native of Green, Kan. 37 and married

Franklin Ford, Announcer and Studio Manager of WHAP, N. Y. City. Native of Allegheny, Pa. Graduate of Princeton University of 1913. Formerly in the newspaper and advertising game. Is also a music composer and writer

Miss Vanna G. Patterson, Piano Soloist and accompanist of Station KFPW, Carterville, Mo. Known as "Pat." Formerly piano teacher. 20 years of age and single

George S. Carson, Jr. Announcer of KFQP, Iowa City, Iowa

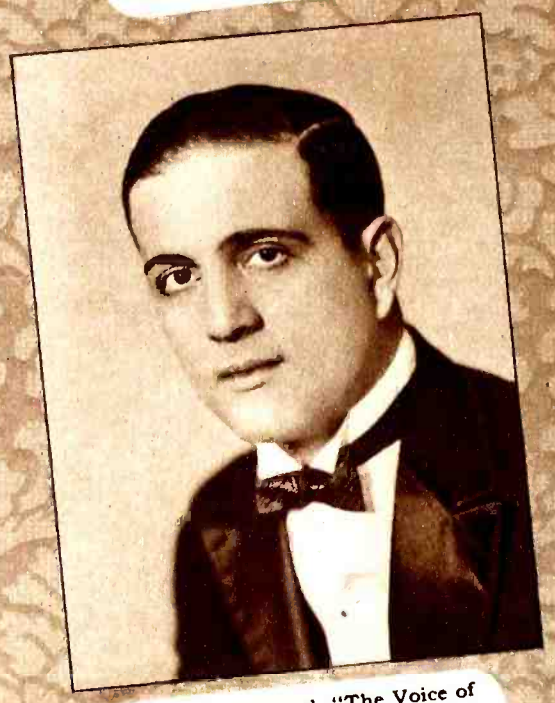
A. R. Meier, Announcer of KFQO, Russell, Kan. Known as "Marconi." Formerly motion picture operator. 22 and single

Edward P. Dempsey, Singer heard over WBCN, Chicago. Known as "The Chauncey Olcott of Radio." 34 and married

Edgar Harold Twamley, Announcer and Studio Director of WOC, Davenport, Iowa. Native of Dublin, Ireland. Thirty years of age and married. Formerly a newspaper man in China and the Far East

L. R. Tucker, Big Brother of KPO, San Francisco, Calif. Conducts an educational kids' hour which he originated three years ago. Previous to radio work was a sales manager. 34 years of age and single

C. Leonard Hoglund, Announcer and violinist of WCAL, Northfield, Minn. Member of St. Olaf String Quartet and the St. Olaf Symphony Orchestra. When not broadcasting, Mr. Hoglund is engaged in the banking business



C. G. Livengood, "The Voice of the Hoosier State," South Bend, Ind., Station WSBT. Was formerly a newspaper man. Age 34 and married. Identified with stations WGAZ & WSBT since 1923

G. Wm. Haverty, Announcer of WHDI, Minneapolis, Minn. Known as "Friday." Also instructor in Vocational School, Dunwoody Institute, 27 and single

Capt. Alfred Thomas, Jr., Engineer in Charge of KOA, Denver, Colo. Widely known as a veteran radio instructor, government inspector and ship operator. Favorite diversions are fishing and fancy dogs. Is married and has three children

Dr. Geo. W. Young, Owner of Station WDGY, Minneapolis, Minn. Is a jeweler and optometrist when he is not broadcasting. Formerly identified with Stations KFMT, WHAT and WGWY

Harry Everist Shultz, Baritone heard over Station KUOA, Univ. of Arkansas, Fayetteville, Ark. Native of Clinton, Ky. Has a wide experience as concert and recital singer. Educated in U. S. and Europe. Formerly connected with Stations WBAP, WFAA, KTHS

Robert Whitney, Announcer of WMAQ, Chicago, Ill. 22 years of age and single. Is also pianist and composer

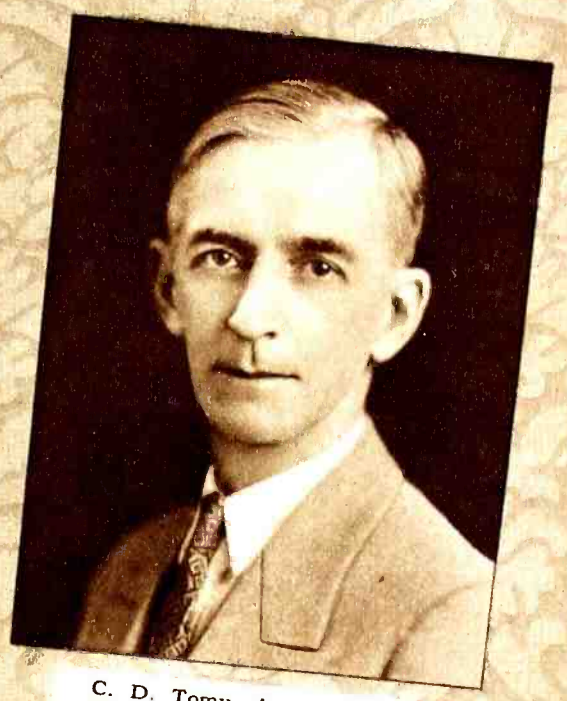
Richard V. Haller, Announcer and Station Director of KGW, Portland, Ore. Native of Wooster, Ohio. Formerly newspaper writer. 32 and married

G. B. Nichols, Spanish Announcer of KFDM, Beaumont, Tex. Known as "Static." Native of Chariton, Iowa. 49 and married

J. G. Cummings, Announcer of WOAI, San Antonio, Tex. Known as "Silent Joe." 40 and married

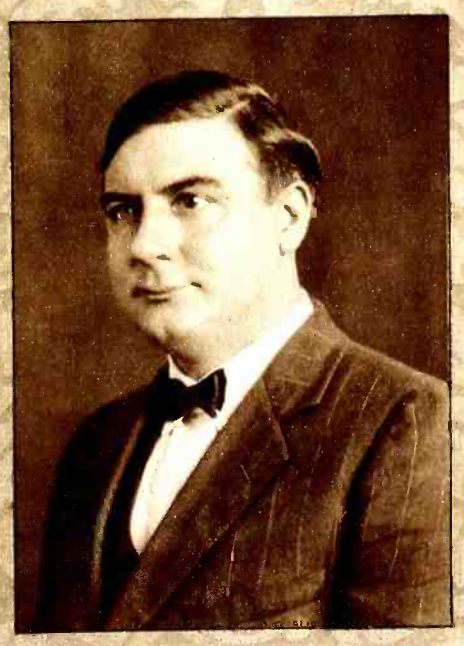
Dave Ablowich, Jr. Announcer and Program Director of Station KFPM, Greenville, Texas. Formerly connected with Station WOAF. 22 and married

Sydney Peck, Announcer and violinist of Station KSMR, Santa Maria, Calif. Native of Cleveland, O. Known as "Sir Syd." Also a writer and violin teacher



C. D. Tomy, Announcer of WCX, Detroit, Mich. Also organizer and Chief of Red Apple Club. Native of Fairfield, Iowa. Known as "The Chief." Formerly newspaper editor

Paul R. Heitmeyer, Announcer and Publicity Director of KGW, Portland, Ore. Formerly a commercial radio operator. 21 and married



Dirk Van Enmerik, Orchestra Director of Station WGHP, Detroit, Mich. Native of The Hague, Holland. Has been soloist with the Detroit Symphony Orchestra since 1920. Previously connected with well known European Orchestras. 40 years of age and married

Daniel Earl Noble, Announcer and Director of Station WCAC, Storrs, Conn. Student of the Conn. Agric. College. 24 and married

Forrest P. Wallace, Announcer and Assistant Program Director of Station WWJ, The Detroit News, Detroit, Mich. A native of Lansing, Mich. Formerly identified with stations WHAL and WABM. Served as radio operator in the World War. Married and 27 years of age

J. H. DePew, Announcer and Manager for WCBD, Shiloh Park, Zion, Ill. Is a native of Sherman, Texas. Previous to broadcasting he acted as Confidential Investigator for Gen. Geo. W. Goethals of Panama Canal

Howard E. Clark, Announcer and Station Manager for KQV, Doubleday-Hill El. Co., Pittsburgh, Pa. Twenty-five years of age and married. Known over the radio as "Howdy." Gave up a career as a newspaper and advertising man to take up broadcasting

Jack Perlman, Violinist regularly heard over Station WNAT, Philadelphia, Pa. A concert violinist of exceptional merit and leader of the Maze Cafe Dance Orchestra

Reuben A. Benson, Announcer and Banjo Soloist over WCAL, St. Olaf College Station, Northfield, Minn. Twenty-one years of age and a student. Known over the radio as "Ben"

Walter Hermann, 'Cellist with the U. S. Playing Card Station WSAI, Cincinnati, O. Native of Frankfort, Germany. Thirty-six years of age and married. Was conductor of Base Hospital Symphony Orchestra at Camp Sheridan, Ala. Makes guest appearances at WLW and WKRC

Charles D. Isaacson, Program Director for WRNY, N. Y. City. A native of Brooklyn. Was formerly a music critic and lecturer

Leatha Wenke, Announcer of Station WEMC, Berrien Springs, Mich. "The Radio Lighthouse"

Ernest Pack, Announcer of WSAI, Cincinnati, O. Thirty-nine years of age and single. Native of Prague, Czechoslovakia. Was formerly identified with Station WLW. Previously concert master of the Odessa City Opera, Russia

Linwood T. Pitman, Announcer and Manager of Station WCSH, Portland, Me. Was formerly a newspaper reporter. The first newspaper man to interview the around the world flyers on their landing on U. S. soil at Mere Point, Me.

Kenneth McCullough Fickett, Chief Announcer of Station WGR, Buffalo, N. Y. Native of Rochester, N.Y. He is "Pat" of the Radio Team of Pat and Moe 24 and single

James B. Jackson, Announcer and Soloist of WDAD, Nashville, Tenn. "Jimmy" is a native of Nashville and was formerly on the staff of WCBQ of that city. He was also Director and Pianist for the Tennessee Ramblers Orchestra. He is 19 years of age

Orville Andrews, who sings over KFAB, Lincoln, Neb. Is known as "The Buick Warbler." He is 22 years of age and to quote his own statement, "is married and happy." Before taking up broadcasting Mr. Andrews says, "Have been everything from a guide in Wisconsin and motion picture operator in Louisiana to gravedigging in a cemetery at Lincoln." Was formerly identified with station IFH

Dolph Thomas, Announcer and Director of Station KOIN, Portland, Ore. Has had years of experience and training as a singer and actor in light opera; also well fitted for radio work from a technical standpoint as he is a graduate in electrical engineering. President of the Portland Light Opera Association

Herbert B. Glover, Sports Announcer and Publicity Manager for Station WJZ, N. Y. City. Twenty-seven years of age and married. Formerly a writer. Was awarded the 1925 title by the Radio Voice Technique Committee as the best radio announcer for that year. Native of Brooklyn, N. Y.

Katherine E. Nelson, Assistant Announcer of Station WMC, Memphis, Tenn. Known as "Miss Kitty." Gives Home Economics lectures, in addition to announcing. Was formerly a stenographer

Wayne Myers, Announcer for WIBO, Chicago. Before taking up broadcasting was a salesman. Formerly with WEBH

Karl Scheurer, violinist of WCCO, Minneapolis, Minn. Native of Cologne, Germany. Formerly concert master of Minneapolis Symphony Orchestra, also head of violin Dept., of University of Minn.

auline Steffen Atlass of WBBM, Chicago, ho was formerly head of Violin Depart- ent of Southern College. Graduate of orthwestern University. Native of Kansas

Stan Lee, popular Announcer for WCAU, Philadelphia; 28 years of age and married. Before taking up broadcasting Mr. Lee was an actor

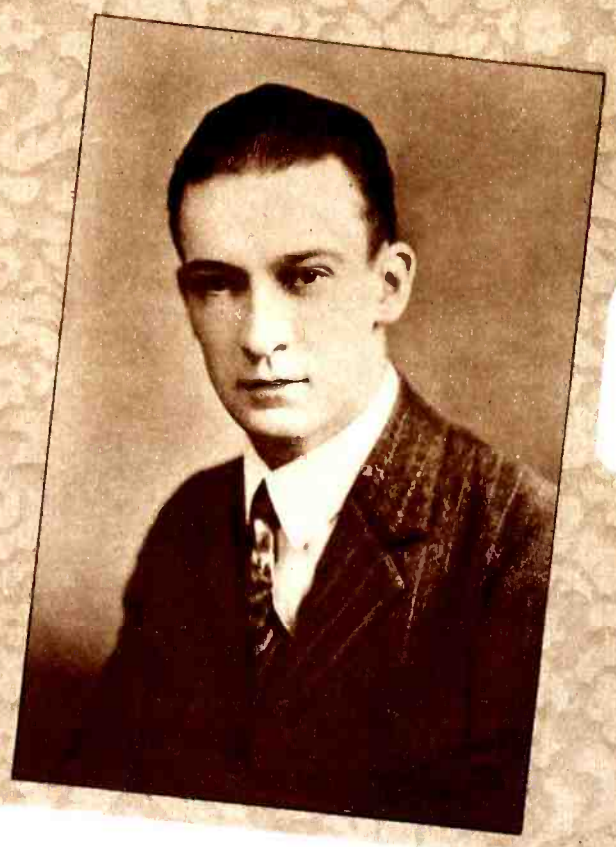
Miss Ina Rains, Soloist and Director of housewives' matinees over KOA, Denver, Colo. Miss Rains is the youngest church soloist in the Rocky Mountain West. She has a trace of Sioux Indian blood in her veins

Paul M. Oberg, Staff Pianist and Accompanist of WCCO, Minneapolis, Minn. Twenty-two years of age and single. Is also Church organist. Hobbies are tennis and golf

Kess B. Holeman, Announcer KSMR, Santa Maria, Calif. Formerly general manager of the Santa Maria Valley R. R. Also a newspaperman. Native of Smith Center, Kan. 47 and married

E. L. Tyson, Chief Announcer of WWJ, The Detroit News, Detroit, Mich. Native of Tyrone, Pa. Educated at Pennsylvania State College. Identified with college theatricals and later with local talent productions. Played semi-pro football and baseball for a number of years. Served in France and Belgium in the World War. "Ty" is 38 years of age and married

Luther J. Jensen, Chief Announcer, Studio and Program Director of KFOA, Seattle, Wash. Native of St. Paul, Minn. Formerly concert manager and press agent. 25 and married



Wilfred K. Bert, Announcer and Director of KFOA Seattle, wash. Also assistant radio editor of the Times. Native of San Francisco. Previous to radio work, he was radio instructor with U. S. Signal Corps in France. Known for clear enunciation of daily news bulletins. Remote control expert, arranging and announcing football and crew-race broadcasts

Miss Norma V. Carle, Pianist of WSVS, Buffalo, N. Y. Miss Carle is only 18 years of age and is studying piano with the intention of becoming a concert pianist. Formerly identified with stations WGR, WMAK, WEBR. Known over the radio as "Little Girl"

Allan N. Fairchild, Announcer of KNRC., L
Angeles. Calif. Native of New York. 37 years
age and married. Previous to broadcasting w
in the real estate business

Geo. W. Phillips, Minister of 10th Ave. Baptist Church, Oakland, Calif. Station KTAB. Native of Jamaica, West Indies. The church membership financed the building of Station KTAB and services are broadcasted every Sunday morning

Miss Helen Cutter, Soprano Soloist with KPO, San Francisco, Calif. She is a native of Meadville, Pa., and has been heard over Stations KFUU, KFWM, KTAB and KLX. 19 and single. Has also had some musical comedy and comic opera experience

Edward Ellingson, Tenor heard over KFAB, Lincoln, Neb. He is the "Eddie" half of the Harmony Boys "Gloomy and Eddie." 23 years of age and single. Native of Cambridge, Neb.

Mrs. Frederick Crowe, Program Director of Station KPO, San Francisco, Calif. Mrs. Crowe was formerly a concert pianist

Merton H. Bories, Pianist of KPO, San Francisco, Calif. Composer of popular songs. Native of Seattle, Wash. Formerly a realtor. 28 and single. Has been identified with all San Francisco Stations. Known as "Mert"

Edward James Ludes, Chief Announcer and Technical Director of Station KJBS, San Francisco, Calif. Native of Salina, Kan. Known as "Watts." Formerly connected with Stations KJQ, KFOB and KFRC. 21 and married

Dr. Frederick W. Pepper, Dentist in charge of the Health and Toothbrush Club of WHDI, Minneapolis, Minn. Native of Minneapolis, 47 years of age and single

Willard A. Darrow, Announcer and Violinist of Station WNAD, Norman, Okla. Is also a teacher of violin in the University of Oklahoma

Henry Field, Announcer and Manager of Station KFNF, Shenandoah, Iowa. Also Pres. of the Henry Field Seed Co. Mr. Field is 54 years of age; was born in Shenandoah; is married and has a family of eleven children. Held second place in contest for popular announcers in 1925

Clarence I. Dreisbach, Announcer and Studio Manager of Station WCBA, Allentown, Pa. Twenty-three years of age and single. Native of Union Hill, Pa. Known over the country as Larry. Is also an enthusiastic amateur operator

G. A. Rietz, Announcer of Station KFDY, S. Dakota State College, Brookings, S. Dakota. Twenty-one years of age and single

Karl Stefan, Announcer for Station WJAG, Norfolk, Neb. Home of the "Printer's Devil. Forty-one years of age and married. Formerly a newspaper reporter, telegrapher and world traveler

Charlie Middleton, Owner and Announcer of WRAF, La Porte, Ind. Joined the army when he was 15; soldiered in Philippines; fired tramp steamers; motorman on street cars and railroad telegrapher. Native of Decatur, Ind.

Fred E. Exum, Announcer for WDAD, Nashville, Tenn. A native of Ouray, Colo. Known as "Radio Dad"; 34 years of age and married

Harry F. Paar, Announcer and Owner of KWCR, Cedar Rapids, Iowa. "The Voice of Cedar Rapids." Was formerly in the furniture and hotel business. Native of Kansas City, Mo. Formerly identified with Station WKAA. 40 and married

Leonore Shetz, Assistant Announcer and Director and regular station pianist, WNAT, Philadelphia, Pa. Formerly leader of the Nomad Dance Orchestra. 19 and single

Charles A. Hayner, Announcer of KWCR, Cedar Rapids, Iowa. Native of Ft. Atkinson, Wis. Forty-three years of age and married. Formerly identified with Station WKAA. Known as "Charlie"

John W. Lovellette, Announcer KWCR, Cedar Rapids, Iowa. Thirty-eight years of age and married. A native of Chicago

W. I. Griffith, Program Director of WOI, Iowa State College, Ames, Iowa. Was formerly Supt. of Schools

F. A. Fish, Director of Station WOI, Iowa State Coll... Ames, Iowa. Is head of the Dept. of Electrical Engin... ing. Native of Milan, Ohio; married and 51 years of

Ferguson

IN MANY receivers one may experience excellent "tone quality." With FERGUSON you are conscious of something more: a degree of *fullness* that gives you *each* note from *every* instrument in perfect timbre. Not mere music, but the *soul* of the artist seems to come into your living room.

One Tuning Control—Calibrated in Meters gives you, in a moment, the program to suit your mood.

Complete shielding of all tuning elements gives this 6-tube Receiver its marked selectivity.

See, hear, compare!

J. B. FERGUSON, INC.

225 West 57th Street
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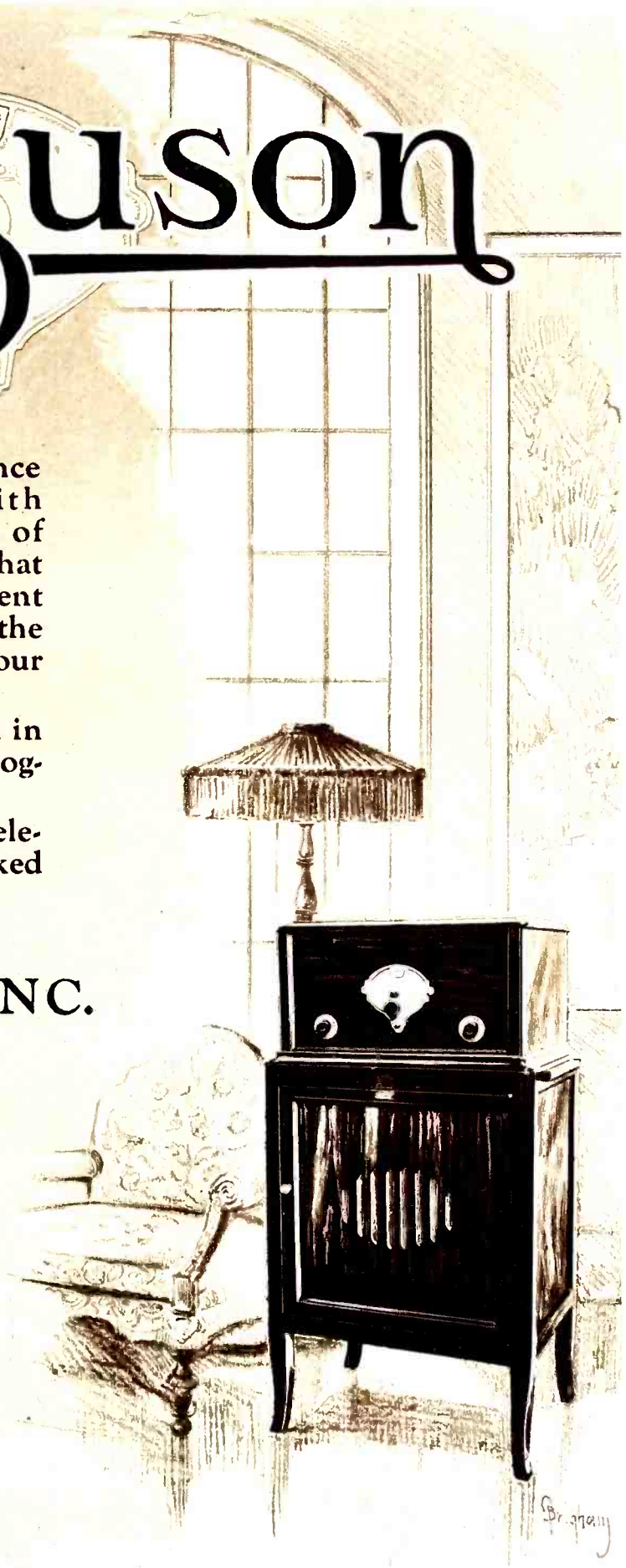
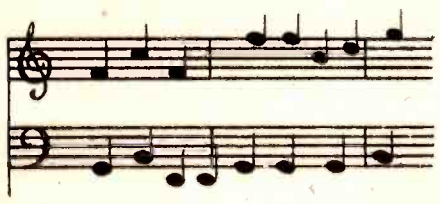
The FERGUSON
Model Ten $110.00
With table, as shown, 147.50
(Ten per cent increase west of the Rockies)





No Seasonal Models—
Continually Developing Refinements

The Gold Standard of Radio Receivers

Miss Bertha Brainard, Assistant Manager of Station WJZ, N. Y. City

Stanley W Barnett, Announcer of Station WBAL, Baltimore, Md. 28 years of age and married. Native of Pittsburgh, Pa. Formerly U. S. Naval Radio Operator and Announcer for WOC

Grace Adams East, Cornetist with Station KTAB, Oakland, Calif. Formerly heard from Stations KGO, KPO and KLX

Harry B. Sidles, Associate Announcer and studio director of Station KFAB, Lincoln, Neb. Was formerly a salesman. Known as "The Red Headed Announcer." 23 years of age and single

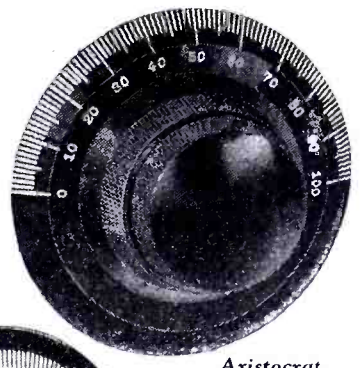
Ralph Freese, Announcer and Lyric Tenor, heard over Station KOA, Denver, Colo. Native of Kansas. Formerly a newspaper man. A keen student of North and South American history and a lover of the outdoors

Ada Allen, Lyric Soprano of Station WOK, Homewood, Ill. Was previously a concert artist. She is a native of Ohio

H. Dean Fitzer, Announcer and Director of Station WDAF, Kansas City, Mo. Also, Chief of the Nighthawks. Is known as the singing announcer. Formerly a newspaper man. Age 28 and married

An *amazing* Advancement!

Aristocrat Pointer Knob



Aristocrat E-Z TOON Vernier Dial

Aristocrat E-Z TOON Vernier Pointer

The NEW "*Aristocrat*" Vernier Port Dial

SINCE the birth of radio, Kurz-Kasch has been foremost with all important improvements—the leader in the field of plastic mouldings. The name *Aristocrat* has always signified radio parts—dials, knobs, pointers, etc.—of unsurpassed quality and efficiency.

Our newest improvement—the latest addition to the noteworthy *Aristocrat* family is no exception! This Vernier-Port Dial is of Bakelite. It will improve the appearance and efficiency of any set a hundredfold.

The vernier ratio is 14 to 1. There are no gears, no cogs, no chains—*no backlash possible!* Nothing to wear out or get out of order. Easily installed—in a few minutes! The famous Kurz-Kasch split bushing fits any condenser shaft.

In three beautiful, attractive finishes—black, walnut or mahogany. If you are to build your own radio, be sure to select this *Aristocrat* Vernier-Port Dial if you want and expect best results.

If you already operate a radio with old-fashioned dials—or dials of doubtful quality and origin—replace them with this improved, modern Vernier-Port Dial. You'll be surprised at the difference in appearance and you will enjoy better reception due to more accurate tuning—bringing in countless stations you've never heard before.

You'll find the *Aristocrat* Vernier-Port Dial at all better dealers—$2 each—in the color and finish you select!

More than 200 manufacturers use and endorse Kurz-Kasch Products because of their uniform high quality, efficient design and precision. Kurz-Kasch mouldings bear this insignia—(K-K)—your guarantee of unequaled quality and unsurpassed craftsmanship. When you see the (K-K) trade mark of quality on any plastic moulding, you may be sure that quality has not been compromised in other important constructional details.

THE KURZ-KASCH COMPANY, *Moulders of Plastics*, Dayton, Ohio

OFFICES: New York, Chicago, San Francisco, Los Angeles, Portland, Spokane, Denver

KURZ KASCH

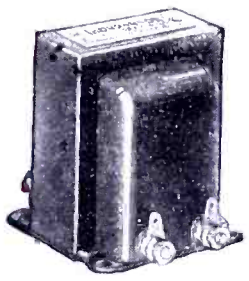
Aristocrat Dials and Knobs

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

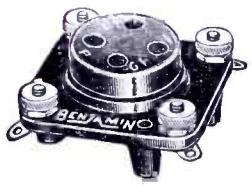
EXACTLY

the miracle receiver you have been hoping for!

Intermediate frequency transformers manufactured at St. James Laboratory, 845 Washington Blvd., Chicago, Ill.



Audio frequency transformers manufactured by Thordarson Electric & Mfg. Co., Chicago, Ill.



Sockets manufactured by Benjamin Electric Mfg. Co., 120 S. Sangamon St., Chicago, Ill.

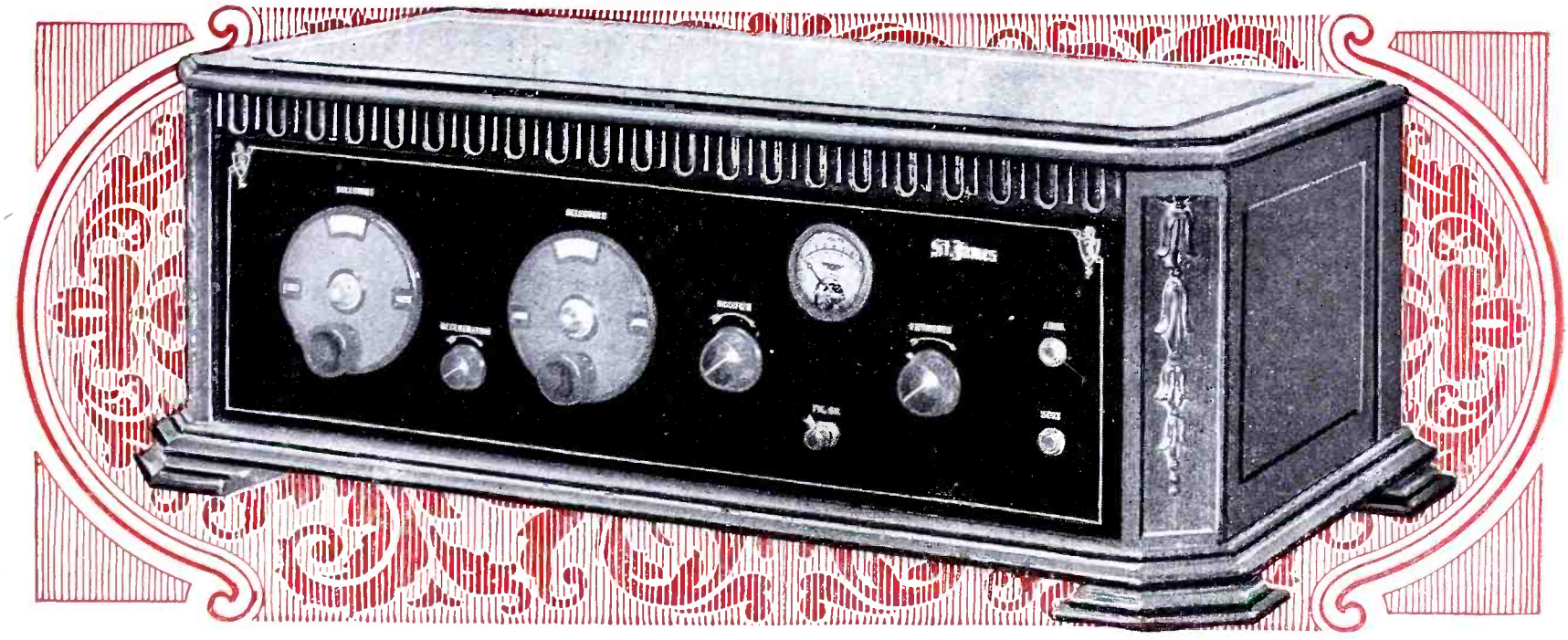
Amplification—so many kinds—radio frequency—audio frequency, the kind the golfer uses, the fisherman and neighbor with the one tube set, and the manufacturer who, "considerably off his wave," guarantees anything. Too bad that all this wasted energy cannot be utilized, but,

Suppose that you were me, and after continuous association with Radio since the time that Marconi made his first trans-Atlantic tests at Wellfleet, Mass., and you wanted the finest Receiver that could be devised, to use in your own home, and point with justifiable pride to its outstanding performance. You would have the same one that is described in this article, **exactly.**

St.

2—

And suppose that recognized authorities in the radio field subjected this set to all sorts of adverse conditions, in the tropics, competitively in the laboratory, on moving trains, U. S. Naval vessels and motor cars, and wrote in detailed reports on its exceptional performance, would this not be satisfactory evidence for you?



Add to this hundreds of letters from enthusiastic builders, some who stated that this was the first set that they ever built; but the majority those who have pursued the more expensive trail and after many changes have found their ideal rested not on promises, but an earnest endeavor on the part of responsible manufacturers to supply well engineered devices. A letter received just before this copy goes to the printer is reproduced as follows:

LAW OFFICE
ROBERT McMICHAEL
ASBURY PARK, N. J.

July 19th 1926.

St. James Laboratories, Inc.,
845 Washington Boulevard,
Chicago, Ill.

Gentlemen:-

Kindly send me at your earliest convenience one St. James Rated Condenser to use across the primary of your input transformer. Send same Parcel Post C.O.D. I do not know price.

I would like to take this opportunity to commend your transformers and your oscillator system. I have made myself a 'Super' using your products and the results are as nearly perfect as one would wish and the set has been highly praised by local engineers of the Western Electric Co.

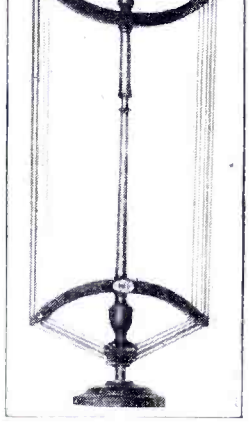
Thanking you in advance for your prompt attention to this order and for past courtesies, I am,

Very truly yours,

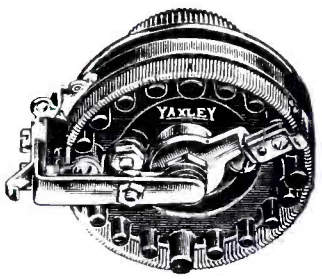
RMcM/t.

James —40

All of the manufacturers represented on this page are substantial, responsible, and anxious to be of service. Each of them have adequate and comprehensive facilities to produce the best in what they have to offer. Descriptive folder "B" will bring a prompt and courteous reply to you, giving you the information that you want, **exactly.** Just state that you are interested in the new St. James Two-Forty.



"Fiat" Loop manufactured by Radio Appliance Lab., 4884 N. Clark St., Chicago, Ill.



Rheostat manufactured by Yaxley Mfg. Co., 9 S. Clinton St., Chicago, Ill.

The St. James Super with a New Type of Dehydrated Intermediate Frequency Transformer

This receiver was designed and all illustrations prepared by the Citizens Radio Laboratory

THE super-heterodyne type of receiver is generally recognized as the most efficient of radio receiving sets. It is sensitive and selective, easy to operate and capable of bringing in distant stations with good volume and excellent reproduction.

Today a receiver must have several attributes which have been largely decided upon by the discriminating buyer, and foremost is the matter of quality. The super-heterodyne receiver, described herewith, is outstanding in this respect, due principally to the method employed in building up the signal before it enters the audio frequencies.

The principles underlying the operation of the super-heterodyne have been too exhaustively described to warrant an extended explanation here. Briefly, the circuit transforms the incoming signals to a predetermined and higher wavelength. It demands transformers which will give maximum amplification at this wavelength.

The St. James intermediate frequency transformer is very unique in design and is the only one of its kind now manufactured. Two air-core coils, wound in a special manner to reduce inter-turn capacity to a minimum, are mounted on bakelite tubing. The coil terminals are silver-soldered to terminal wires running to the transformer terminals.

The bakelite tubing carrying the coils is mounted in a high lead-content glass casing, the coils are then completely dehydrated by the repeated addition and subtraction of dehydrated air. When delicate electrical tests prove that the last possible vestige of moisture is removed, the transformers are sealed.

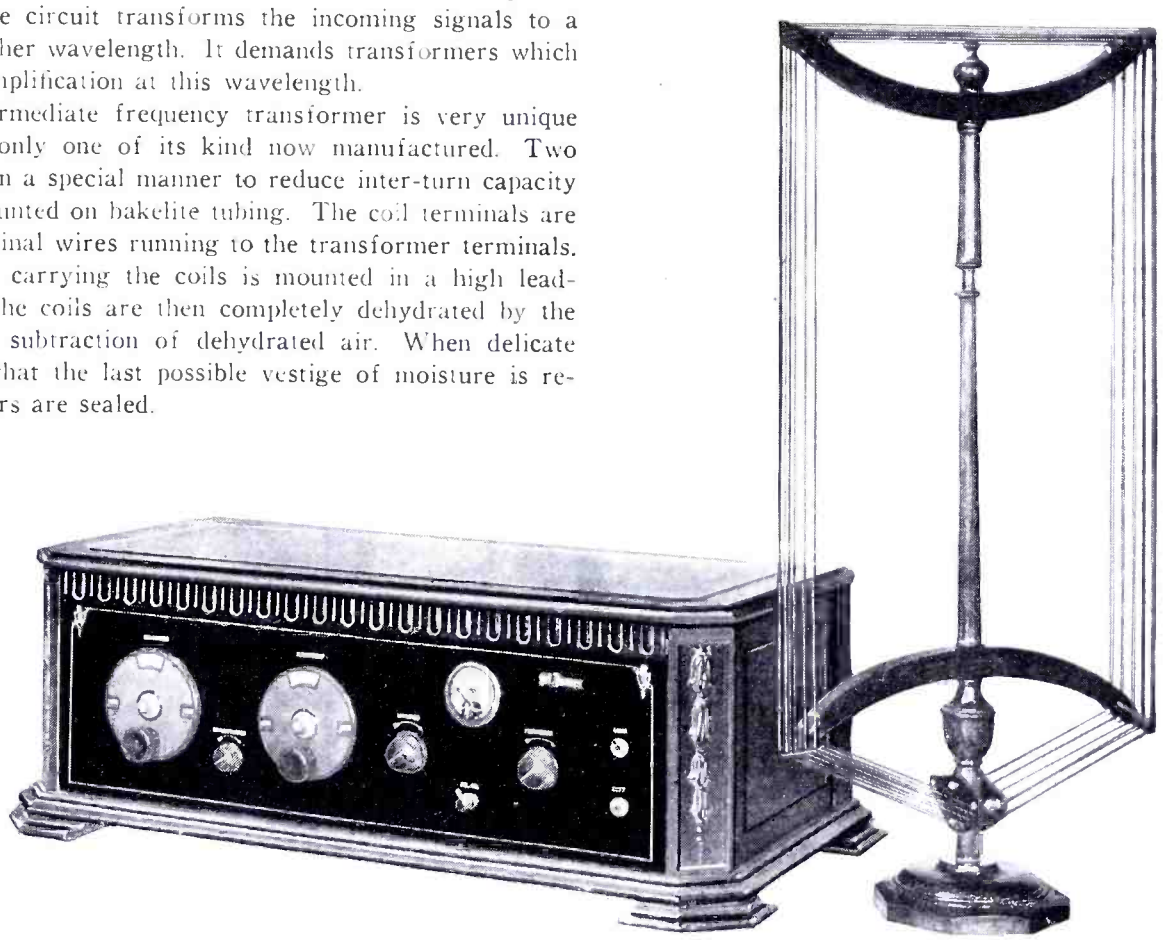


Photo A. Front view of receiver mounted in cabinet with loop

It is instantly apparent that the one outstanding handicap of the air-core transformer has been completely and permanently overcome The added efficiency due to the complete absence of moisture must be experienced to be appreciated, the satisfaction of knowing that your set is completely immune to even the most extreme humidity changes will be especially realized by those who are located on the sea coast or in the tropics.

The diameter of the largest coil used in the St. James transformers is slightly under 7/8-inch. This unusually small size, together with the effect of the vacuum treatment and the shielding effect of the high lead-content glass, combine to produce a magnetic field so concentrated that the hand may be placed directly around any of the transformers while the set is in operation, without the slightest de-tuning effect. When the fact that the complete receiver is built on a baseboard only 23 inches long, is taken into consideration, it is apparent that the fields of the transformers are extremely small. This practice of placing the parts as close together as possible is recommended as it not only permits minimum length of leads but also adds to the compactness of the set.

The manner of final checking of the intermediates insures limits of variation far below a one kilocycle limit, and the final dehydration of the coils, and their sealing off from further moisture effects precludes future changes in their electrical characteristics. With intermediates operating at 240 k.c., oscillator repeats are reduced to a minimum, and, with a total lack of inherent harmonics, the set functions smoothly without hissing or distortion even when supplying full volume to the speaker.

The circuit used in the St. James Super-Heterodyne consists of a Hartley oscillator, using a St. James Oscillector, 1st detector, four stages of intermediate radio frequency amplification, 2nd detector and two stages of transformer coupled audio amplification.

UX201A tubes or their equivalent are used throughout the receiver with the exception of the last stage of audio. Here a UX112 power tube handles the output of the audio amplifier, thereby allowing 135 volts "B" battery to be used, giving maximum volume and without sacrificing tone quality.

Thordarson Type R-200 amplifying transformers are used in the audio amplifier. With a good cone speaker music and speech are reproduced with unusual fidelity, even the slightest shading of tone,

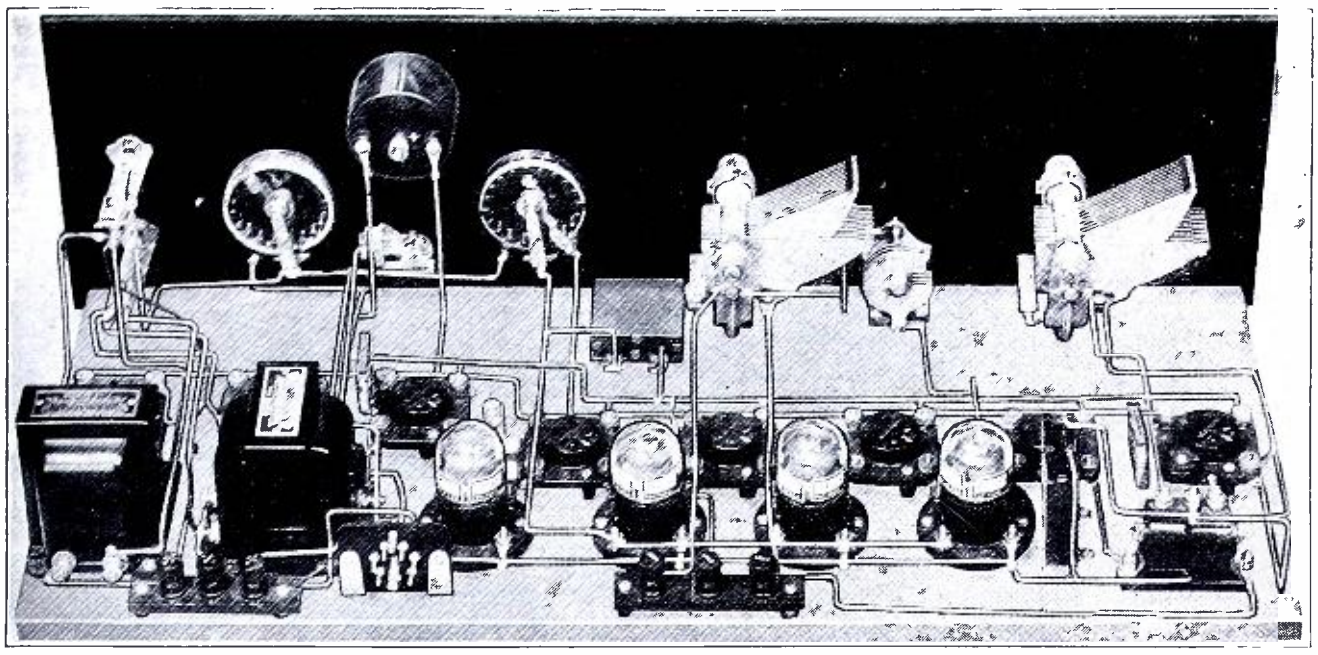


Photo B. Rear view of receiver completely wired

volume, timbre and range. They have a wide range of amplification, giving good reproduction of notes from well into the bass up past the upper limits of audible frequency.

Two major controls are used; one for tuning the loop to the desired wavelength and the other for establishing resonance between the oscillator circuit and the intercepted signal. Regeneration, so helpful in receiving distant stations, is accomplished by inserting a .000045 mfd. variable midget condenser in the plate circuit of the first detector tube. The two major controls are .0005 mfd. Hammarlund variable condensers with a straight-line frequency tuning characteristic.

The St. James Oscillector is conveniently mounted by installing it on a Electrad grid leak mounting.

Benjamin UX cushion sockets are used throughout the receiver. A minimum amount of tube or microphonic noises will be experienced with this type of socket.

A Yaxley two-ohm air-cooled rheostat controls the first six tubes. The Jewell voltmeter shows, at all times, the voltage applied to the filaments of these tubes. Fixed resistances regulate the audio tubes.

Separate binding posts are provided for the "C" battery establishing the grid bias on the audio tubes. All battery leads are connected to the receiver by means of a Yaxley cable connector.

Figure 1 is the layout of the front panel giving the location of all holes as well as the necessary engraving.

Figure 2, the baseboard layout, gives the location of all parts mounted on the baseboard. All terminals on apparatus are plainly shown and indicated so that the various pieces of apparatus bear a correct relation to each other.

In Figure 3 is shown the schematic wiring diagram of the complete receiver. A filament control jack is used in the last stage of audio. The filament circuit of the last tube is completed only when a loud speaker is plugged in.

Little or no difficulty will be had in assembling and hooking up the receiver if the layout shown in the various illustrations is followed. Parallel high frequency leads should be carefully avoided. Short grid and plate leads are automatically provided for if the apparatus is placed as shown on the baseboard layout.

Carefully check all connections against the large graphic illustration. Make corrections in hook-up where necessary and test with "A" battery with tubes in sockets. If tubes light and are controlled by the proper resistances try connecting the "A" battery across other battery terminals. When tubes only light when "A" battery is properly connected it is safe to connect the remaining batteries, hook up the loop and plug in the speaker.

With the rheostat set just under five volts on the meter, advance the potentiometer toward the negative side until the set goes into oscillation. This will be evidenced by a click or thud in the loud speaker and can be checked by touching the oscillator condenser with the finger, a double thud when the finger is touched and removed will be evidence of oscillation. Then retard the potentiometer setting until the oscillation point is just passed. The receiver is now in its most sensitive condition. Starting with both condensers at the lower end of the scale, slowly rotate the loop tuning condenser until a rushing or blowing sound is heard to which any background noise such as local motor sounds, static, etc., will be added. The receiver is now in resonance. Slowly, very slowly, rotate both condensers so as to keep this background noise present until a station is heard. A slight

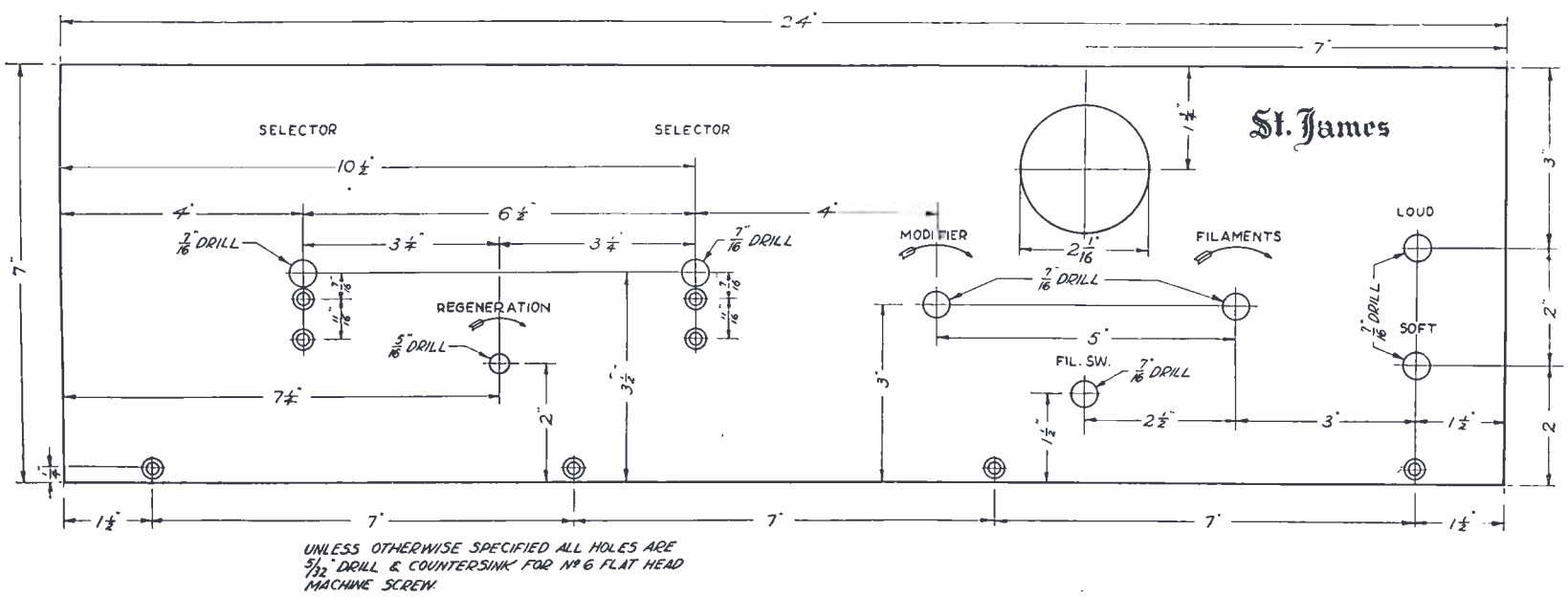


Figure 1. Front view of panel showing size of holes and engraving

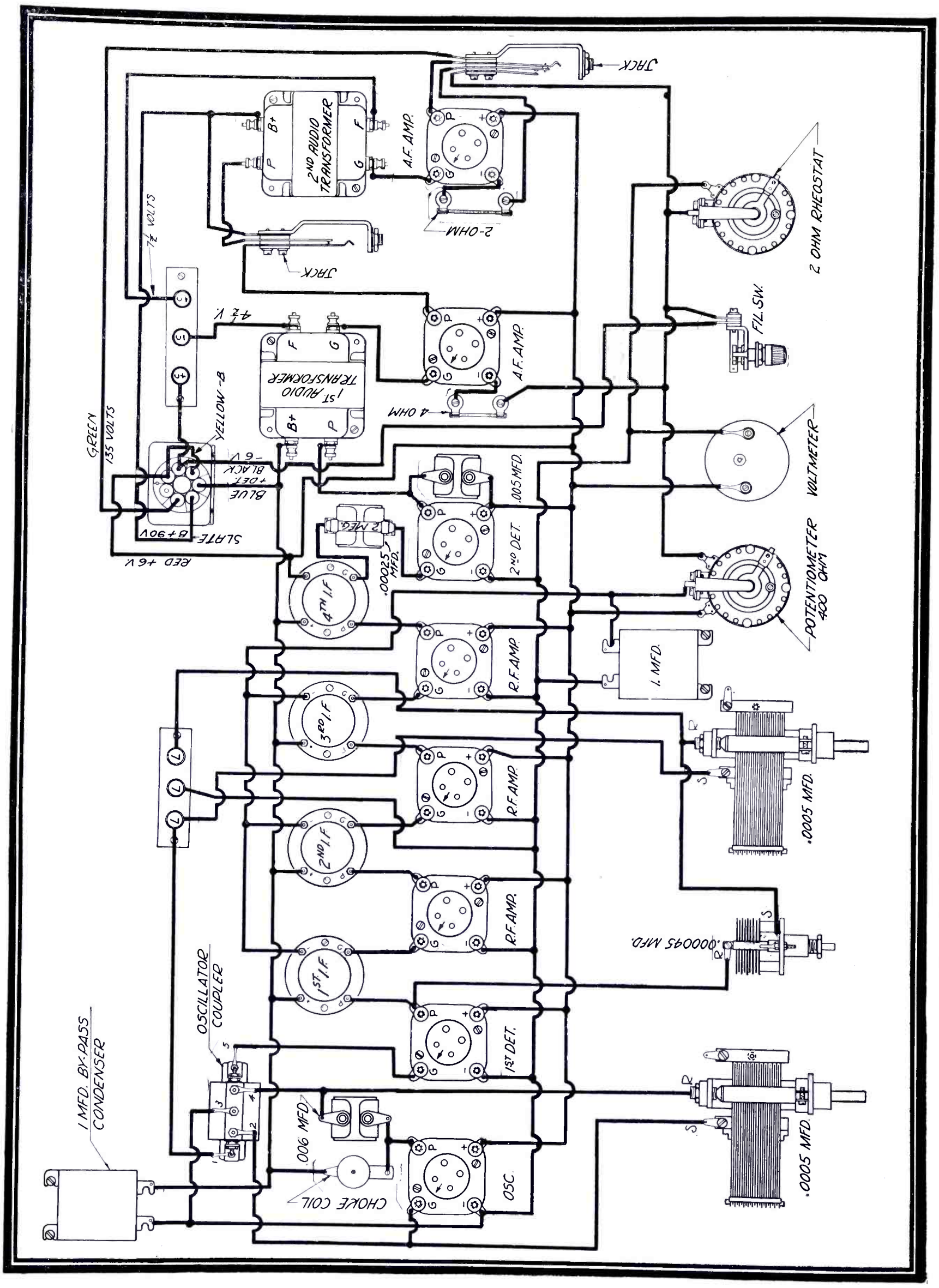


Figure 4. This diagram is a graphic illustration showing every connection in entire receiver

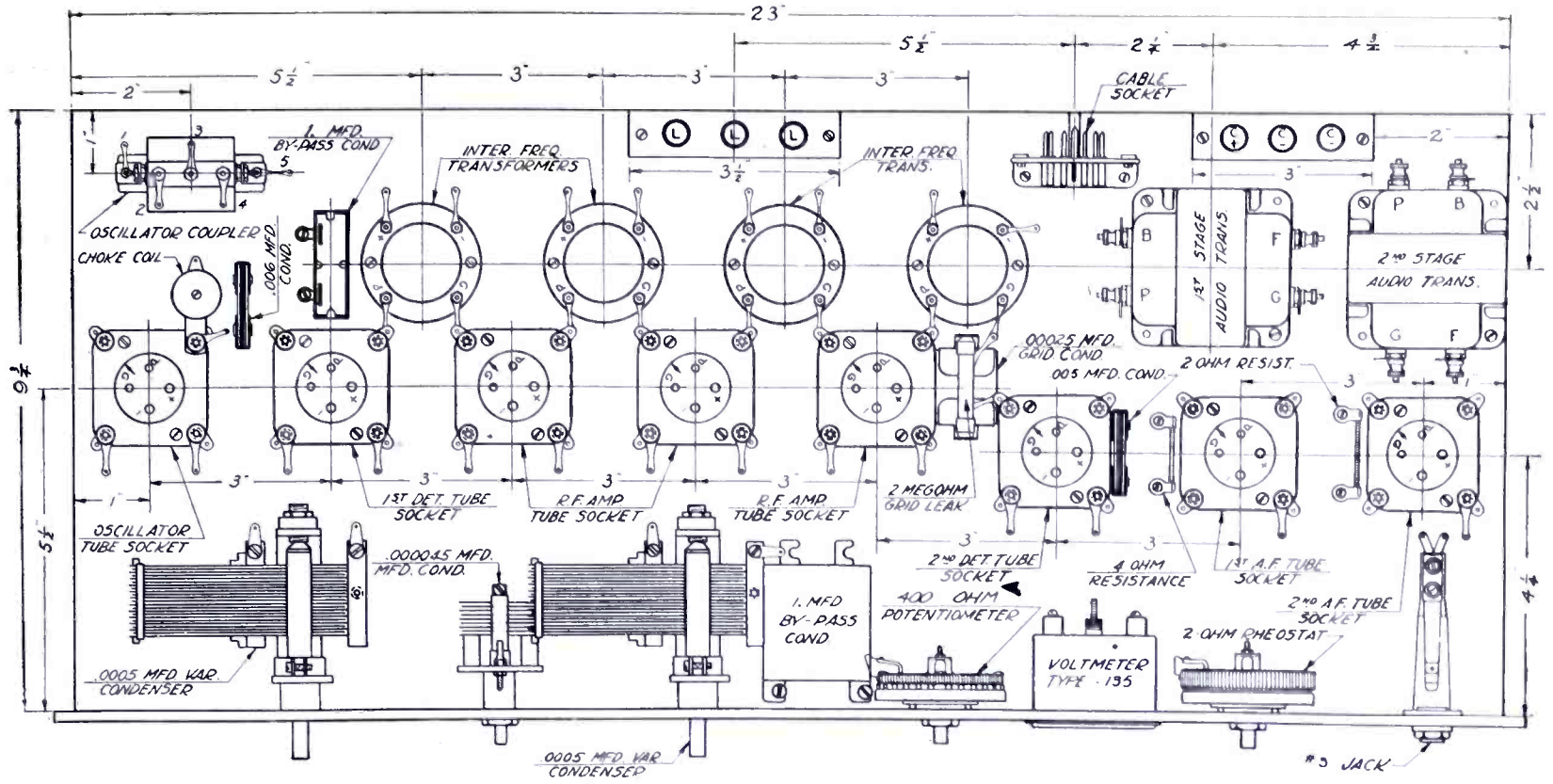


Figure 2. Baseboard layout showing arrangement of parts

readjustment of the dials and the potentiometer may be necessary to secure full volume.

The regeneration control is adjusted for maximum sensitivity while the set is in operation. This is found only by trial. It will be found that less regeneration is needed on the lower wavelengths than on the upper.

On account of the variance in tube characteristics they should be checked according to a simple method furnished by the St. James Laboratories in their instruction sheet.

List of Parts

These parts or their equivalent will give satisfactory results:

1—Formica Engraved Panel 7"x24"x3/16"
1—Jewell Pattern No. 135 0 to 8 Volts Voltmeter
1—9"x23"x½" Wood Baseboard
2—Marco Vernier Dials.
1—Hammarlund .000045 mfd. Midget Variable Condenser
2—Hammarlund .0005 mfd. Variable Condensers
1—Yaxley 2-ohm Rheostat
1—Yaxley 400-ohm Potentiometer
1—Yaxley No. 10 Battery Switch
1—Yaxley 2-ohm Fixed Resistance
1—Yaxley 4-ohm Fixed Resistance
1—Yaxley No. 3 Jack
1—Yaxley No. 2 Jack
1—Yaxley No. 660 Cable Connector and Plug
4—St. James Intermediate Frequency Transformers
1—St. James Oscillector
1—St. James Choke Coil
1—Electrad Single Grid Leak Mounting
8—Benjamin UX Cushion Sockets
2—Thordarson R-200 Audio Transformers
2—Dubilier 1 mfd. By-Pass Condensers
1—Dubilier No. 601 mfd. Grid Condenser
2—Dubilier No. 601 mfd. Condenser
1—Dubilier 2-megohm Grid Leak
2—Formica Terminal Strips 1"x3"x3/16"
6—Eby Engraved Binding Posts
1—Package Kester Radio Solder
4—Dozen Tinned Soldering Lugs
5—Dozen No. 5x½" Round Head Wood Screws
50—Feet Belden No. 12 Tinned Copper Hook-up Wire.

The St. James Super-Heterodyne Receiver is simple to operate. It is unfair to expect phenomenal results the first time the set is on the air. A little patience in tuning in conjunction with a willingness to learn the little eccentricities of the particular receiver will bear a just reward of distant stations received consistently.

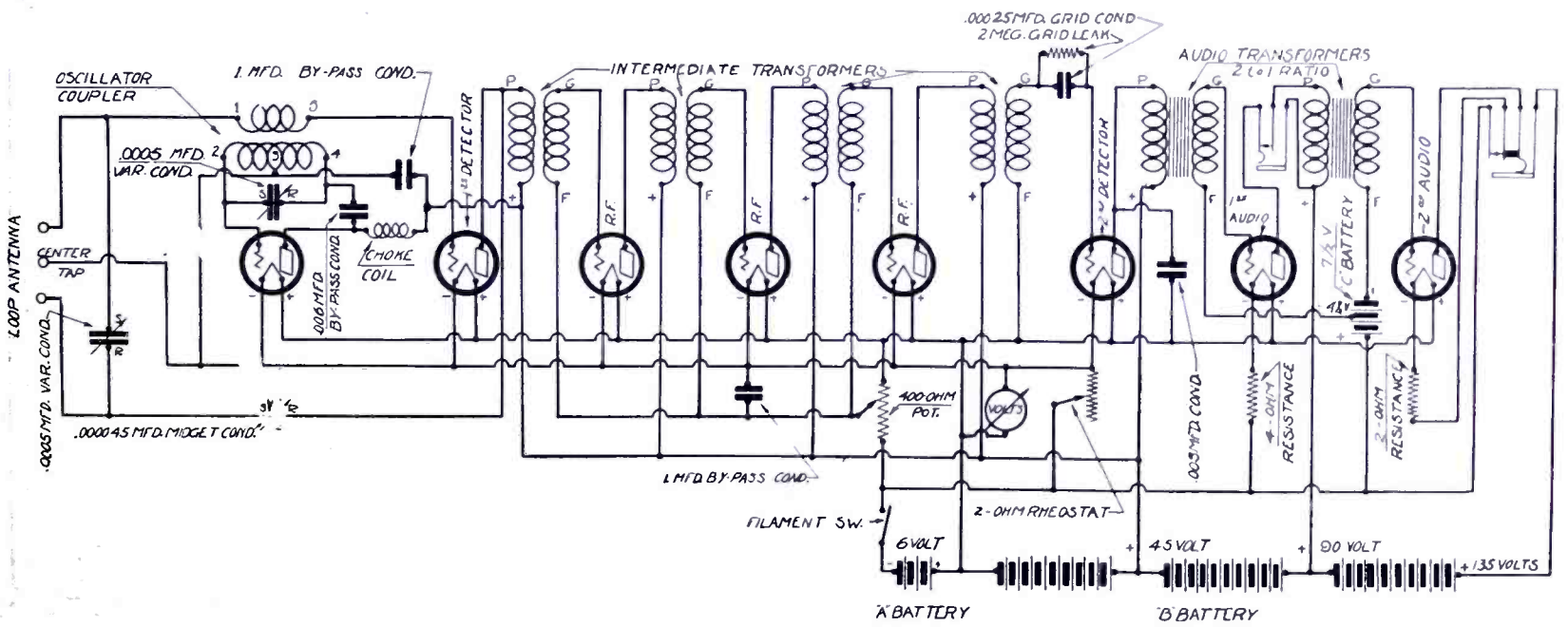


Figure 3. Schematic wiring diagram

The Qualitone Receiver

Here Is a Very Efficient Tuned Radio Frequency Set That Looks Like a Factory-Built Product, but Can Easily Be Constructed at Home by Following These Specifications

Design and All Illustrations Prepared by the Citizens Radio Laboratory

THE continued and rising popularity of the various tuned radio frequency circuits is no doubt the result of the untiring efforts on the part of the different manufacturers in their extensive experimentation, development and new design of radio frequency transformers. No field of radio has seen such a tremendous amount of energy, time and effort applied to as has the research in radio frequency transformers. Time has shown the gradual development from the original types of air core transformers, enclosed in a wooden case, which had windings on small fiber spools, to the present types of high precision air core transformers of low distributed capacity and high inductive value, which have windings of the familiar green wire, mechanically placed and entirely self-supporting with no enclosure of any kind. Recent types of radio frequency transformers have been very efficient in their way, but because of the characteristics of their respective fields it was necessary to mount them at a certain angle to prevent interstage coupling and feed-back effects. Usually the angle was one of precision and virtually impossible for the home builder to maintain.

Among the very recent developments in the design of radio frequency transformers has been that of the so-called "figure-eight" coils. The primary and secondary are mechanically interwoven over a form which insures the correct spacing of the coils. After a small amount of "dope" is applied at certain points on the winding, the form is withdrawn and a self-supporting coil is the result. A mounting is provided by which the coil may be placed securely in position and connections made to the proper terminals. The fact that the coils are wound with mechanical accuracy produces a transformer with uniform electrical characteristics and provides a uniformly high inductance, low distributed capacity and low resistance with consequent low losses. In addition to these desirable qualities, this type of transformer is very compact and does not require extreme spacing or angular mounting; it permits exact nullification for tube and stray capacity without guesswork or tedious testing; maximum coupling and high ratio of voltage increase, due to special low loss construction and concentrated field; minimum supporting insulation in the field of the coils and selectivity with maximum transfer of controlled energy to succeeding grid circuit. The peculiar construction of these coils eliminates interference usually picked up by ordinary transformers from nearby stations. It also eliminates magnetic feedback in multi-stage radio frequency circuits, thus removing one of the causes for howling.

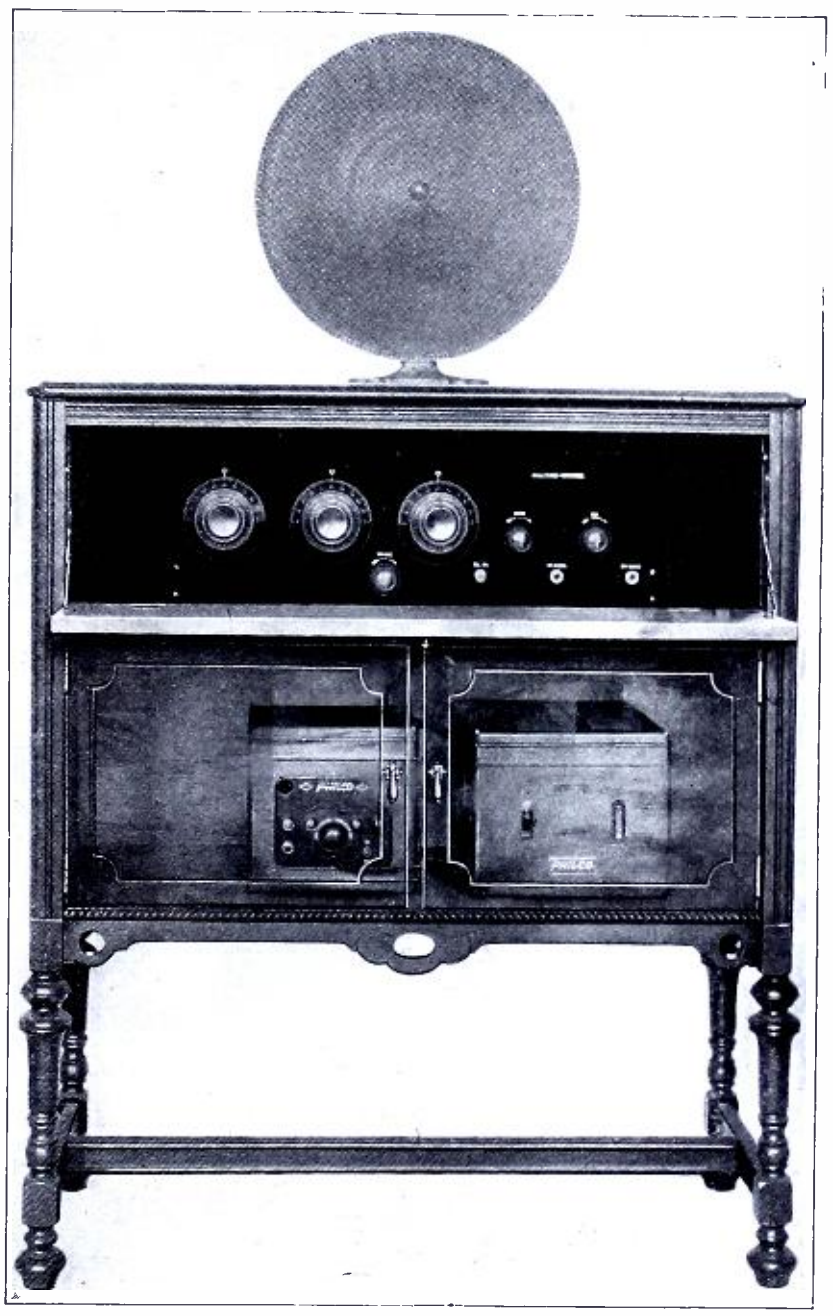


Photo A—Front view of receiver in console with suggested accessories

This particular type of transformer will operate fairly efficiently with any .00035 mf. variable condenser, but investigation shows that by combining the "Lekeless" transformer with a Benjamin .00035 mf. condenser more satisfactory reception will result because a wider tuning range with greater volume and clarity is obtainable than with other equipment. It may be interesting to note that the condenser was designed especially for the "Lekeless" transformer.

It is a well known fact that the receiver constructed in the home workshop cannot be compared with the receiver that is built in a well equipped factory. Very often the home-constructed set will perform in a manner superior to that of the factory-constructed receiver, but invariably the manufactured receiver will be chosen in preference to the home-built set. The commercial receiver has the instruments mounted upon a sub-panel, the wiring is almost wholly concealed, a well balanced panel graces the front of the cabinet and certain mechanical niceties are apparent which cannot be incorporated in the home-constructed receiver. On the other hand, the receiver as made at home is usually a conglomeration of radio parts mounted on a wooden baseboard with a poor job of wiring. It has been the view in designing this receiver to incorporate all the very desirable features usually found in a factory made set in an excellent tuned radio frequency receiver which may be constructed by the average radio fan.

The circuit used is a standard tuned radio frequency receiver using two stages of tuned radio frequency amplification, a detector and two stages of transformer coupled audio frequency amplification with a few changes made in the interest of better selectivity and reception. The primary of the antenna coupler is not grounded, and two ½ mf. by-pass condensers are placed in between the plate circuit of each of the two radio frequency tubes and their respective negative filaments. The unique arrangement

of the antenna coupler allows greater selectivity and eliminates interference and induction noises from nearby power lines to a great degree. The condensers by-pass any excess radio frequency currents which may be present in the radio frequency transformers and prevent them from causing interstage coupling and effecting the very sensitive grid circuits which are in the vicinity of the transformers. In other words, the condensers localize the high frequency currents present in the coils so that their energy is held to the correct circuit instead of straying into audio frequency circuits and causing poor quality of tone and volume. It is therefore apparent that there will be a minimum of oscillatory conditions caused by leakage of high frequency currents which in combination with the ease of operation and tuning make this a very desirable receiver.

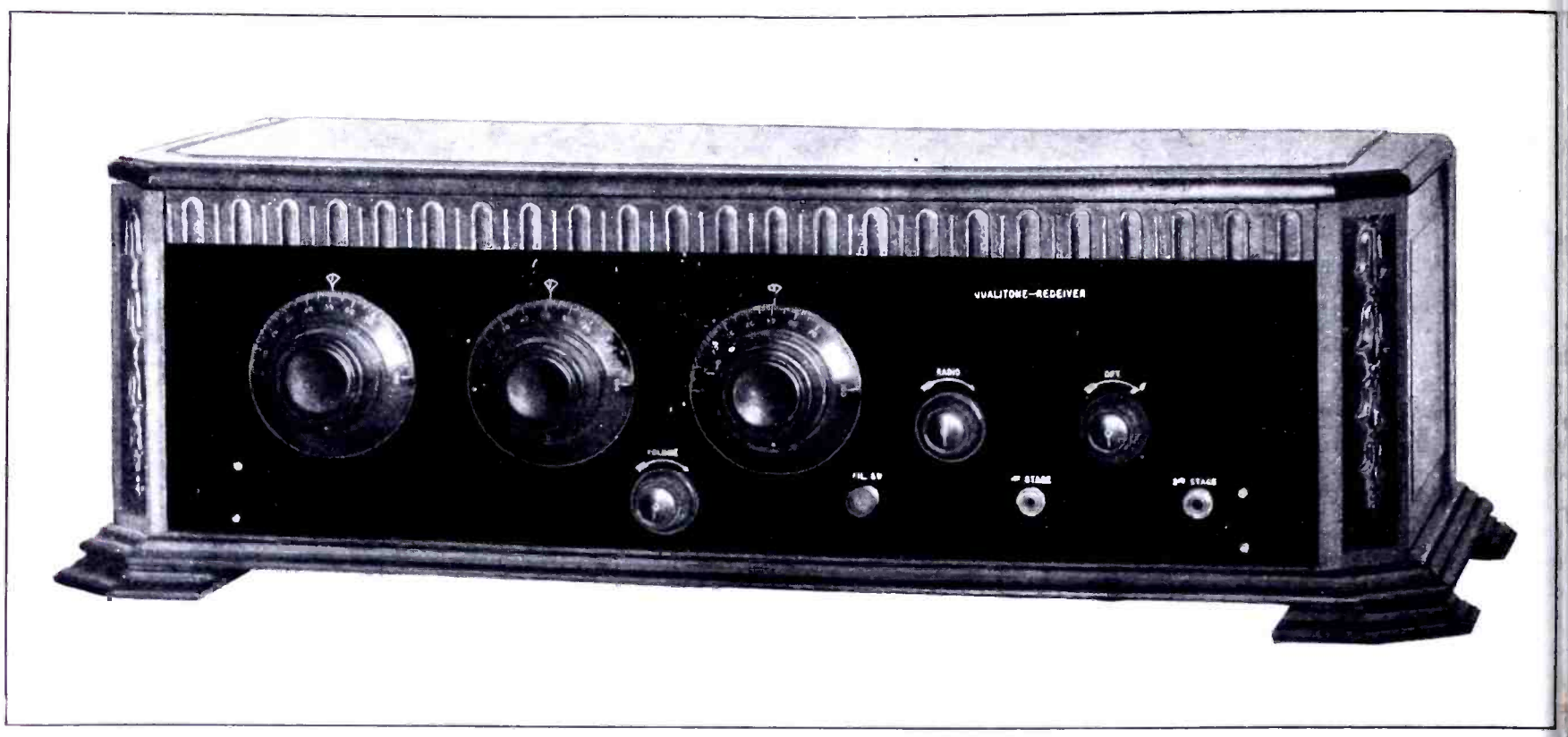


Photo B, front view of receiver mounted in cabinet

As may be gathered from the illustrations accompanying the description of this receiver, most of the parts are mounted on a sub-panel. This arrangement allows all wires with only a few exceptions to be placed under the sub-panel. The sub-panel has a complete layout of all the holes necessary for the mounting of the parts in their correct relation to each other as well as the holes through which the wires pass when making the necessary connections between the apparatus above and below the sub-panel. Two sizes of holes are used in the sub-panel; the larger hole is 5/32 inch in diameter, while the smaller hole is 3/32 inch diameter. The holes for mounting the multiplug socket, brackets, fixed resistors controlling the last two tubes, by-pass condensers and one of the holes for mounting the grid condenser are all countersunk from the top side of sub-panel for No. 6 flat head

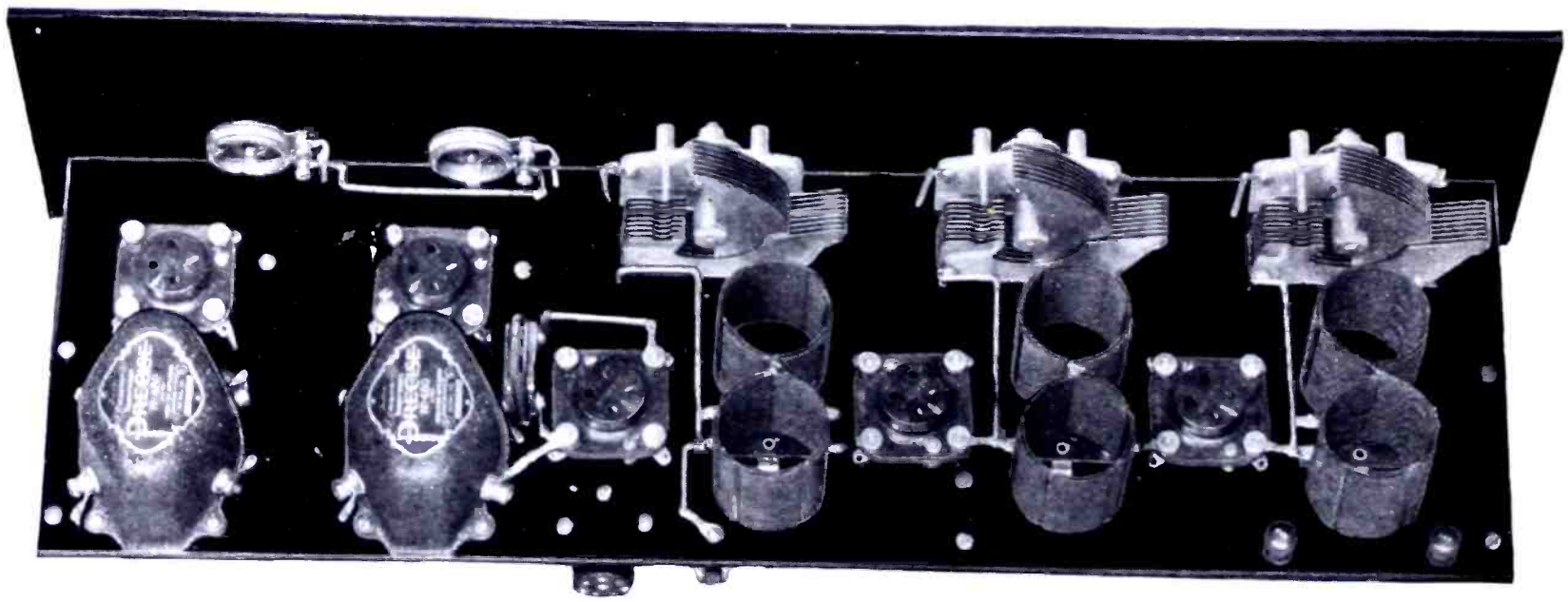


Photo C, rear view of receiver. Notice the absence of any unsightly wiring

achine screws. These holes are shown with an extra heavy ne around the actual hole. Two holes are shown which have dotted line around them instead of a solid line. These holes e countersunk from the reverse side of the sub-panel.

No difficulties will be experienced in wiring up this receiver, though the work will be expedited by mounting the apparatus

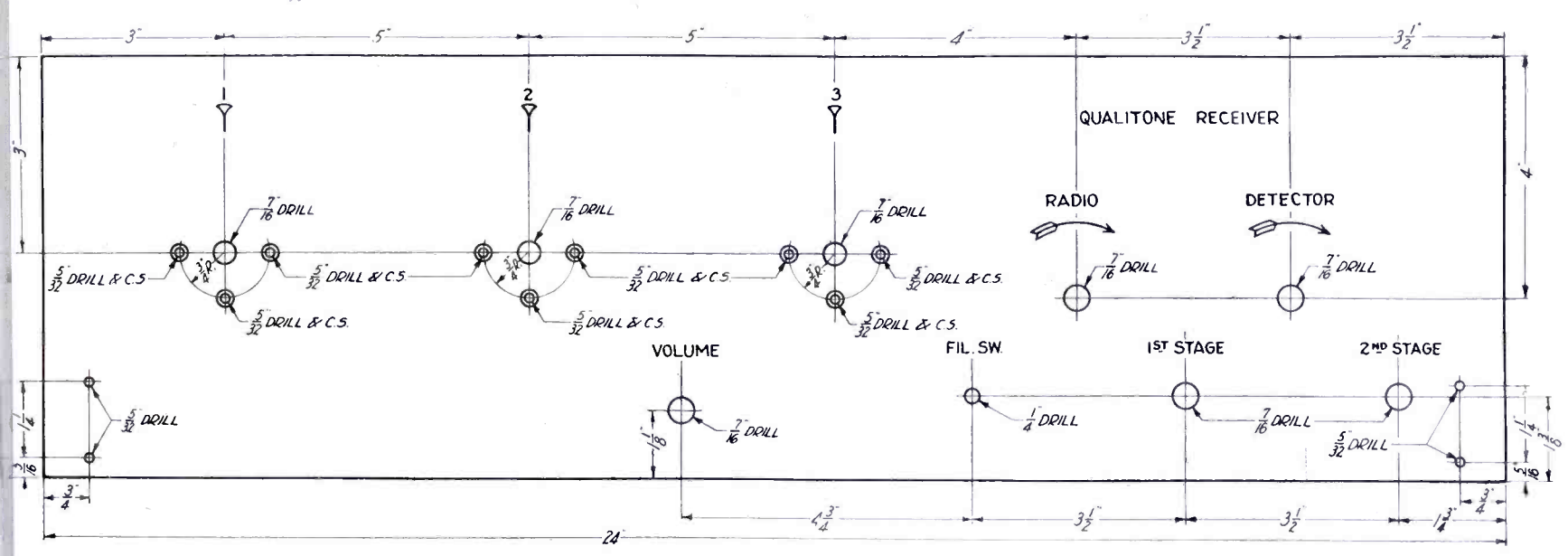


Figure 1. Panel layout showing suggested engraving

n the sub-panel only and making all connections possible and en mounting the front panel and with a few drops of solder mplete the wiring.

UX sockets are used in this receiver and are of the non-micro-onic type, which eliminates a great deal of tube noises. The dio transformers are of two different ratios; the first stage nsformer has a 5 to 1 ratio, while the second stage transformer s a 2 to 1 ratio. These transformers amplify the lower fre-encies very efficiently and should give excellent reproduction th a good cone speaker. The rheostat and variable resistance e of a very small size, allowing them to be mounted in a posi-on which does not detract from the balanced appearance of the ont panel since they do not interfere with the sub-panel.

for antenna and ground connections are cut off about eight inches from the plug proper. The back wire is connected to the positive of the "C" battery, and the brown is connected to the negative of the "C" battery.

There are no adjustments to be made after assembling, to place the receiver in proper working order. The volume may be modified by adjusting the 500,000 ohm variable resistance until the proper strength of signal is obtained. Experimentation has shown that an antenna of from 60 to 80 feet long, including lead-in, is the most efficient kind for this receiver.

The results with this five tube receiver are both gratifying and surprising as to quality and distance. The stations will always be found at the same dial settings, provided their respective wavelengths do not change.

As the tendency of construction leans towards consoles more than cabinets, we have shown the completed Qualitone receiver in both console and cabinet.

In the console model you will find a Philadelphia Storage Bat-

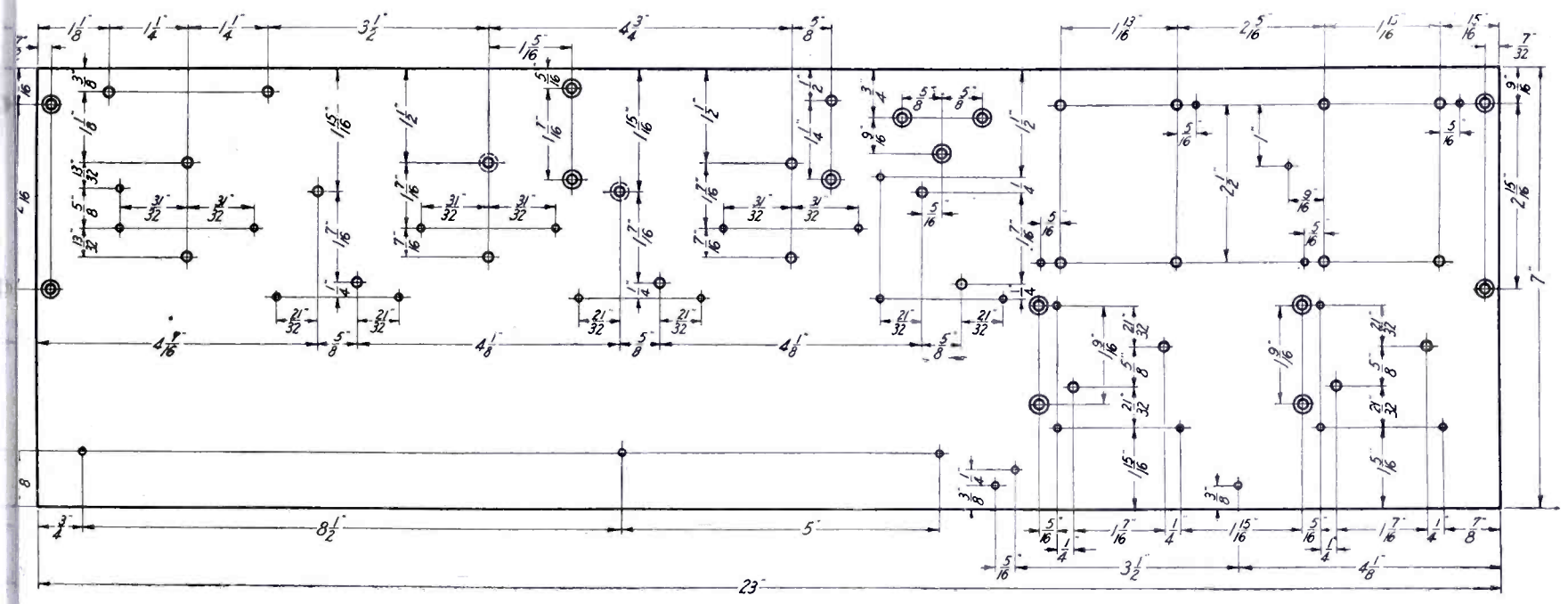
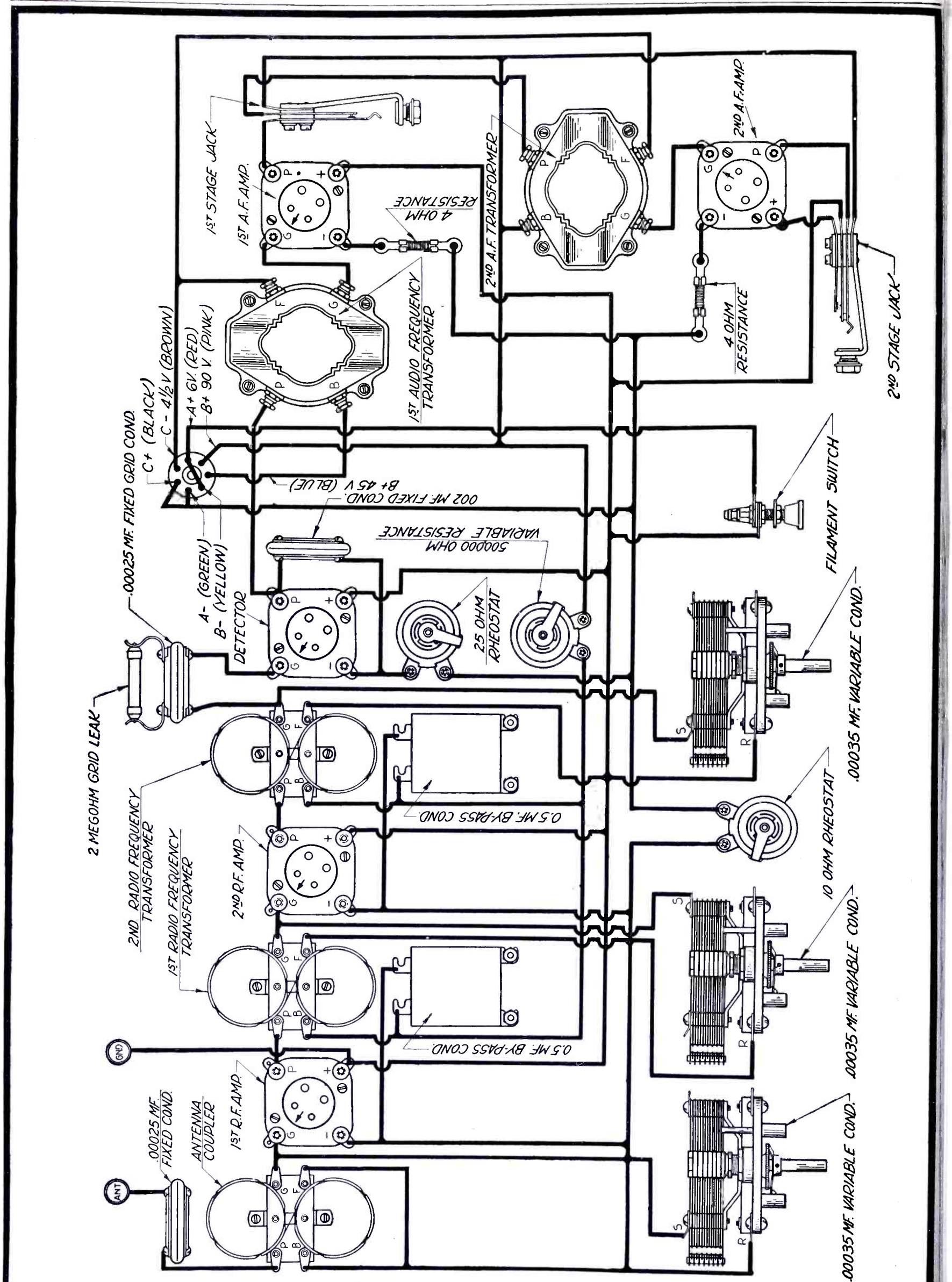


Figure 2. Sub-panel layout

A four ohm fixed resistance controls each of the last two tubes. he two radio frequency tubes are controlled by a 10 ohm rheo-at, while the detector tube is controlled by a 25 ohm rheostat. he receiver requires the 201A or equivalent type of tubes. All tteries are connected to the Jones Multiplug, including the " battery. The black and brown leads which are usually used

tery Company's combination A and B power plant that is connected into any convenient electric light socket and when plugged in it needs very little further attention. This unit will supply all the necessary voltages, and if you desire any further information regarding this product, a letter to the Philadelphia Storage Battery Company, Philadelphia, Pa., will bring the desired in-



formation.

The loud speaker shown in the illustration is the Tower Manufacturing Company's new cone type speaker.

The console is the No. 10 style manufactured by the Charlotte Furniture Company, Charlotte, Mich., and is finished in Zapon;

1—Carter 500,000 ohm Variable Resistance.
1—Carter 102A Radio Jack.
1—Carter 103 Radio Jack.
2—Carter 4 ohm Fixed Resistances.
3—Kurz-Kasch 4 in. Dials.

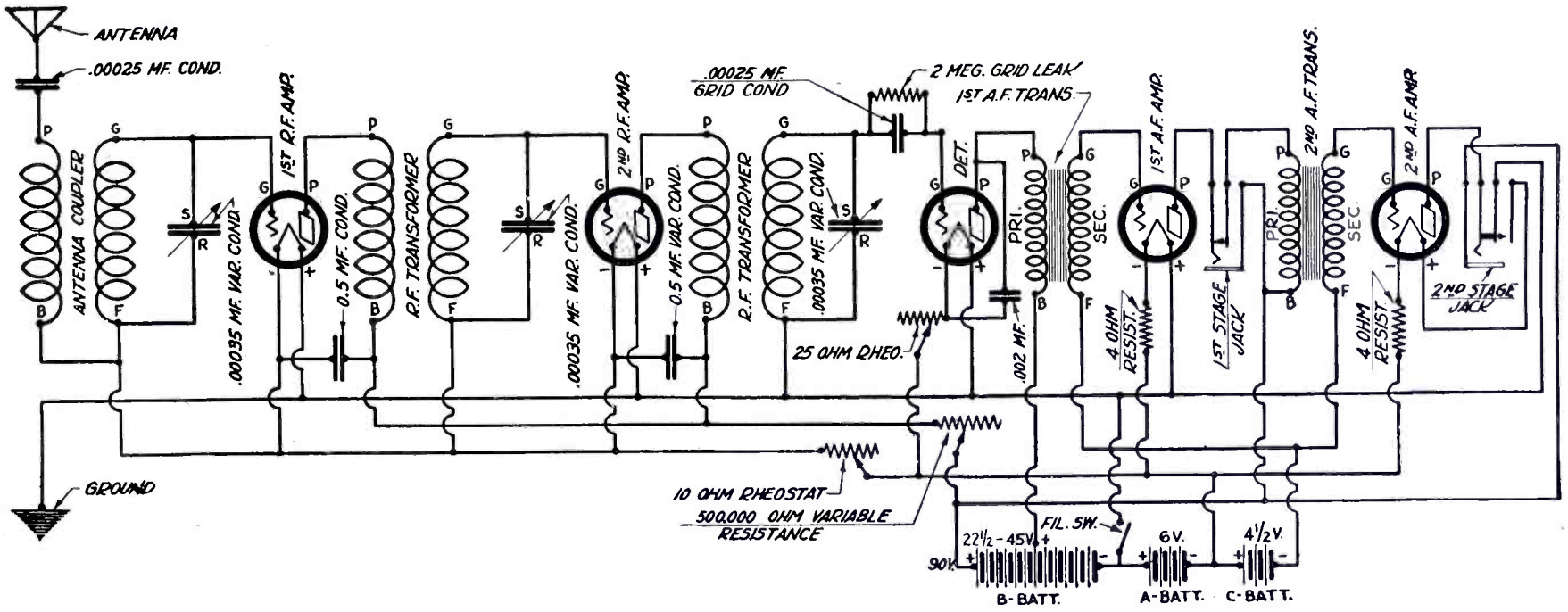


Figure 3. Schematic diagram giving values of different parts

will not scratch or mar easily; hot dishes or steaming liquids will **not hurt it.** It will always look fresh and bright.

List of Parts

These parts or their equivalent will give satisfactory results:

1—Drilled and Engraved Insuline Panel.
1—Drilled Insuline Sub-Panel.
3—Benjamin No. 9072 "Lekeless" Transformers.
1—Precise 5 to 1 Audio Frequency Transformer.
1—Precise 2 to 1 Audio Frequency Transformer.
1—Jones Type BM Multiplug.
1—Sangamo .00025 mf. Grid Condenser with Clips.
1—Sangamo .00025 mf. Fixed Condenser.
1—Sangamo .002 mf. Fixed Condenser.
2—Sangamo 0.5 mf. By-Pass Condensers.
1—Daven 2 Megohm Grid Leak.
1—Blackburn Ground Clamp.

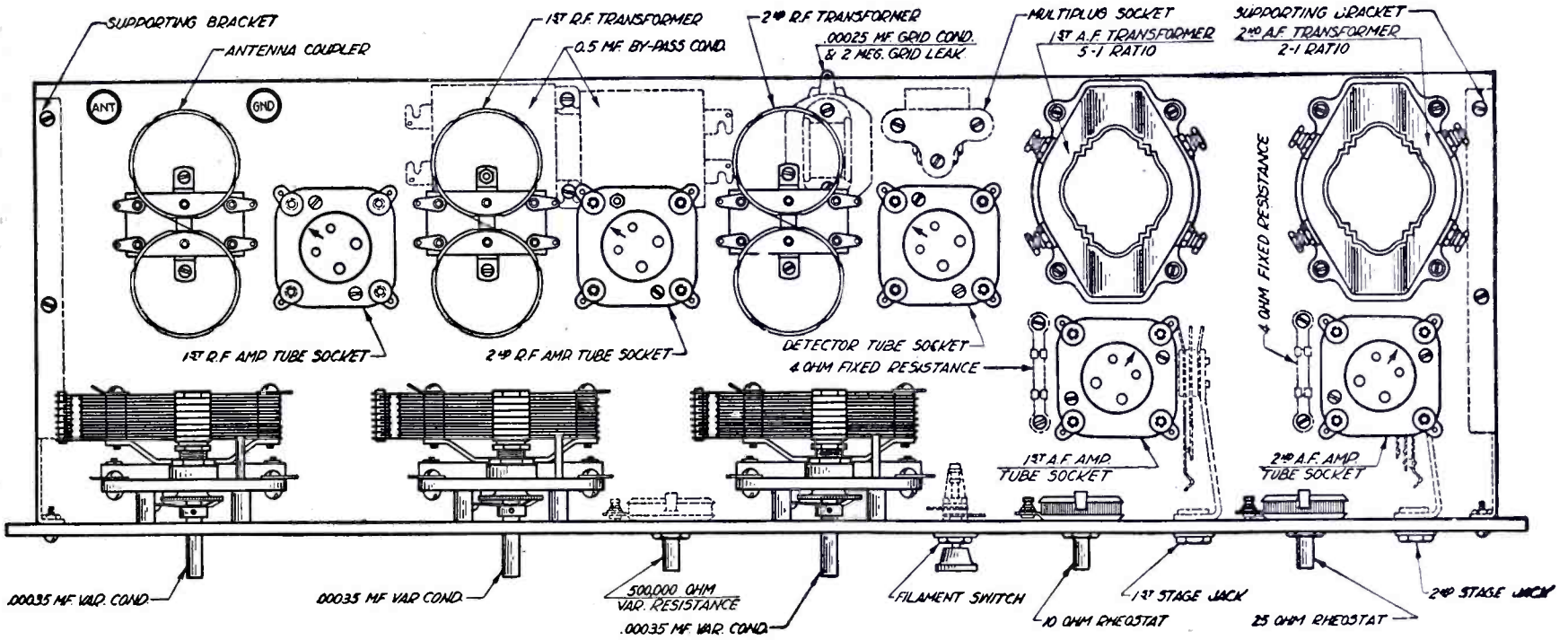


Figure 5. Top view of receiver showing arrangement of parts on sub-panel. Apparatus shown in dotted lines is mounted on under side of sub-panel

3—Benjamin No. 9061 .00035 mf. Variable Condensers.
2—Benjamin No. 8629 Self-Supporting Brackets.
5—Benjamin No. 9040 Cle-Ra-Tone UX Sockets.
1—Benjamin No. 8640 Battery Switch.
1—Carter 10 ohm. Imp Rheostat.
1—Carter 25 ohm Imp Rheostat.
2—Eby Engraved Binding Posts.
36—Kellogg Tinned Soldering Lugs.
24—No. 6x1 in. R. H. Brass Machine Screws.
20—No. 6x¾ in. R. H. Brass Machine Screws.
35—Feet Belden No. 12 Tinned Copper Wire.
1—Package Kester Solder.

A 15 to 550-Meter Receiver Using a System of Interchangeable Coils

This Receiver Was Designed and All Illustrations Prepared in the Citizens Radio Laboratory

THE outstanding trend in radio research during the last two years has been towards short wave transmission and reception. Amazing distances using extremely low power have been covered by using short waves and with the uncanny reliability of this type of radio communication it bids fair to revolutionize broadcasting.

This particular receiver is different from other high frequency receivers which have been described from time to time in that an interchangeable coil system is used by which the entire range from 15 to 550 meters is covered efficiently. The interchangeable coil and associated receiving system were designed by F. J. Marco, consulting engineer, for Aero Products, Inc., Chicago. The system consists, briefly, of five interchangeable coils, each unit comprising a grid and plate inductance. A suitable base is provided, on which is mounted an adjustable primary coil, which may be fixed for best results. The design of the interchangeable coils are such has been found that the most satisfactory results are obtained when using this type of coil when the grid tuning condenser is a .00014 MF and the feedback control is a .00025 MF straight-line-frequency condenser.

The circuit is of the familiar "fixed tickler" and capacity controlled type, which has been found most suitable for short wavelengths. The controls are two, tuning and feedback, and since the feedback is quite constant over a fairly wide band, operation is very simple. Two variable condensers are used. It

Photo A—Front view of receiver

The coils will cover, when used with 201A tubes and the above

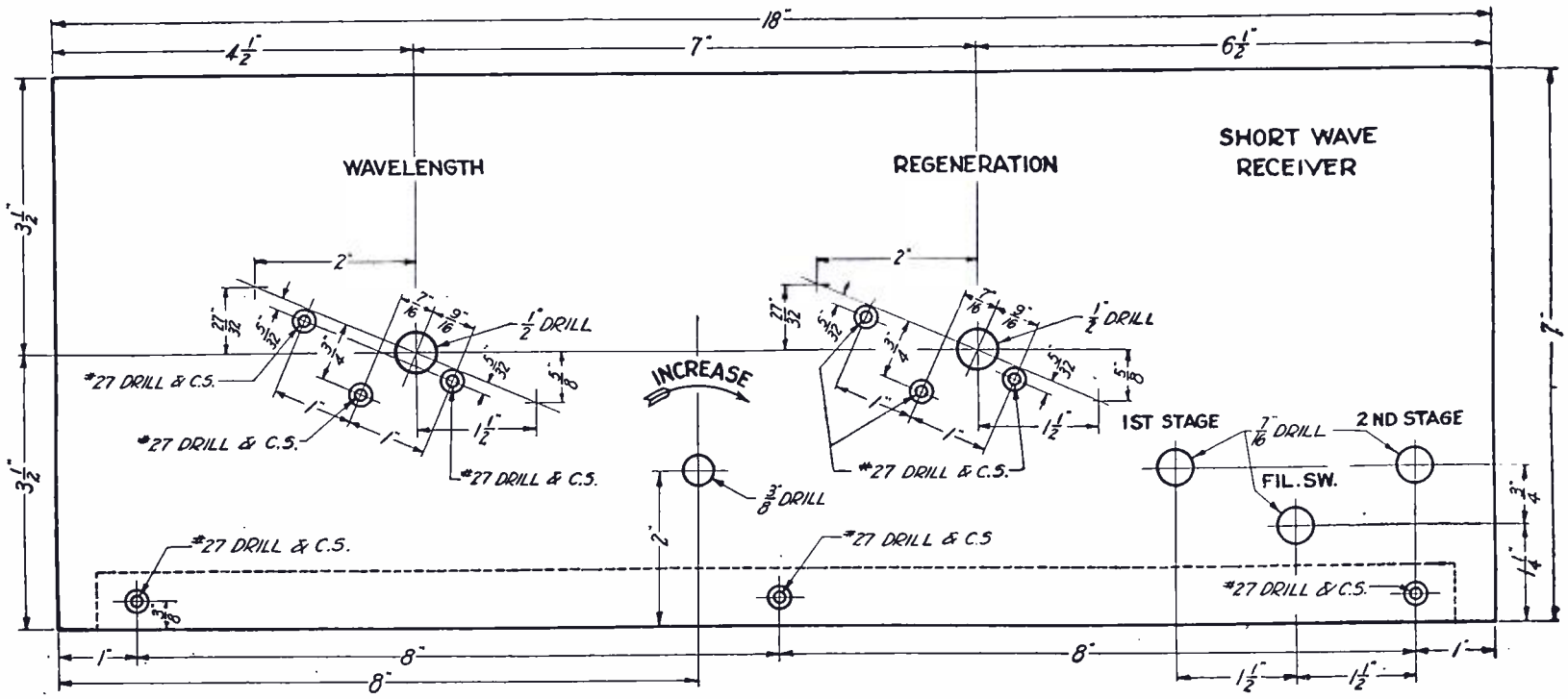


Fig. 1—Panel Layout

mentioned capacities in tuning and feedback condensers, 15 to 33.5 meters, 31.5 to 68 meters, 57 to 133 meters, 125 to 250 meters, and 235 to 550 meters respectively. This may vary slightly, due to the length of leads and tube capacities, but should allow the operator to find a particular wave-band easily.

As may be seen from the illustrations accompanying this article, two stages of audio frequency amplification are used in this receiver which allows a loud speaker to be used on all signals. This is obviously advantageous as being preferable to using headphones.

In view of the fact that a short wave receiver is subject to microphonic noises from the tubes, cushion sockets have been specified to prevent this very undesirable condition. The sockets are of the new UX type which are now considered as standard.

A No. 51 Daven Mounting is provided by which various grid leak and condenser combinations may be tried until the best signals are found. Experimentation has shown that a grid leak of 8 megohms and a grid condenser of about .0001 mfd. is the best combination in this particular type of receiver. If good results are not obtained from these values the combination must

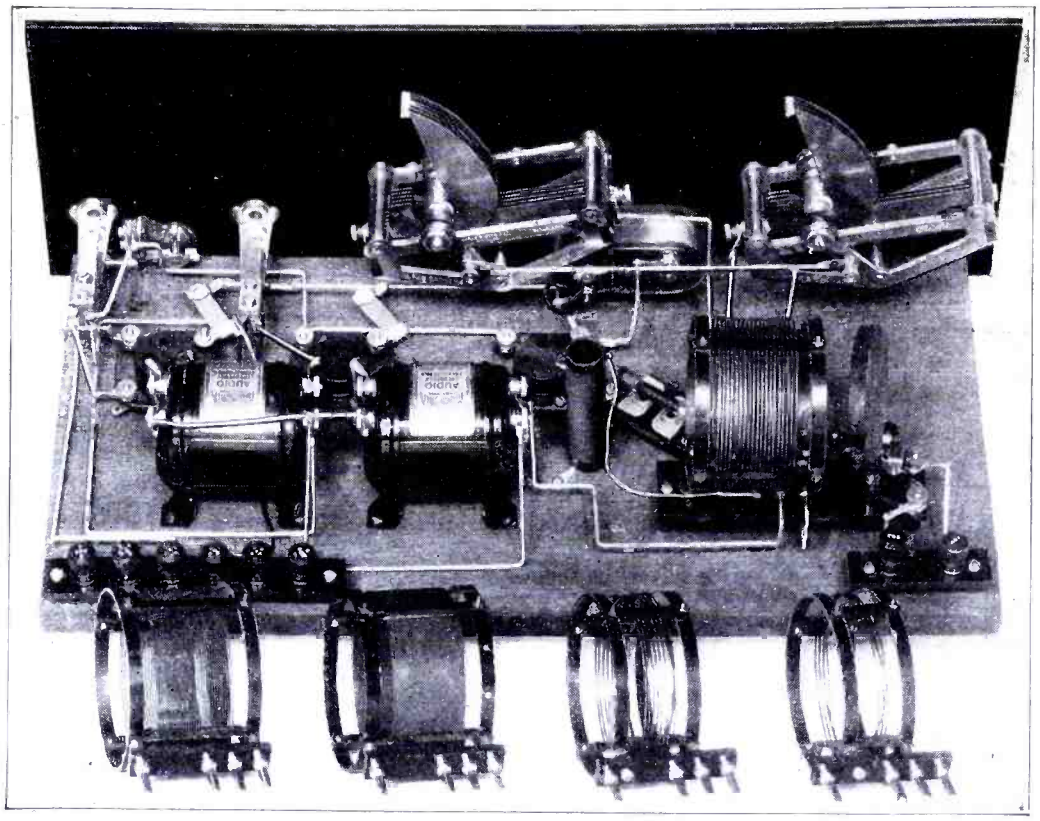


Photo B—Rear view of completed receiver, showing complete set of Aero interchangeable coils

of this receiver to wind one himself. Procure a piece of Bakelite tubing ¾" outside diameter, 3½" long. Drill two holes in each end of the tube wall about ¼" apart, about 1/32" in diameter. Fasten end of No. 28 DCC wire through two holes and allow about six inches to project, wind 200 turns around tube and anchor other end through remaining two holes, again allowing six inches to project. A spool of No. 28 wire, ¼ pound in weight is sufficient.

It will be found that by making the grid return on the detector interchangeable from positive to negative better signals will result when proper polarity is established. The filament circuit may or may not be grounded. This lead is shown in the diagrams as a dotted line, as conditions vary. In some installations a good deal of AC hum is found when filaments are grounded. Other times again, heavy interference may be encountered which may be eliminated to a great degree by allowing the filaments to remain ungrounded. In either case of grounding, or not grounding, body capacity will be absent.

No difficulty should be experienced in assembling and wiring this receiver, although care should be taken that all leads be as

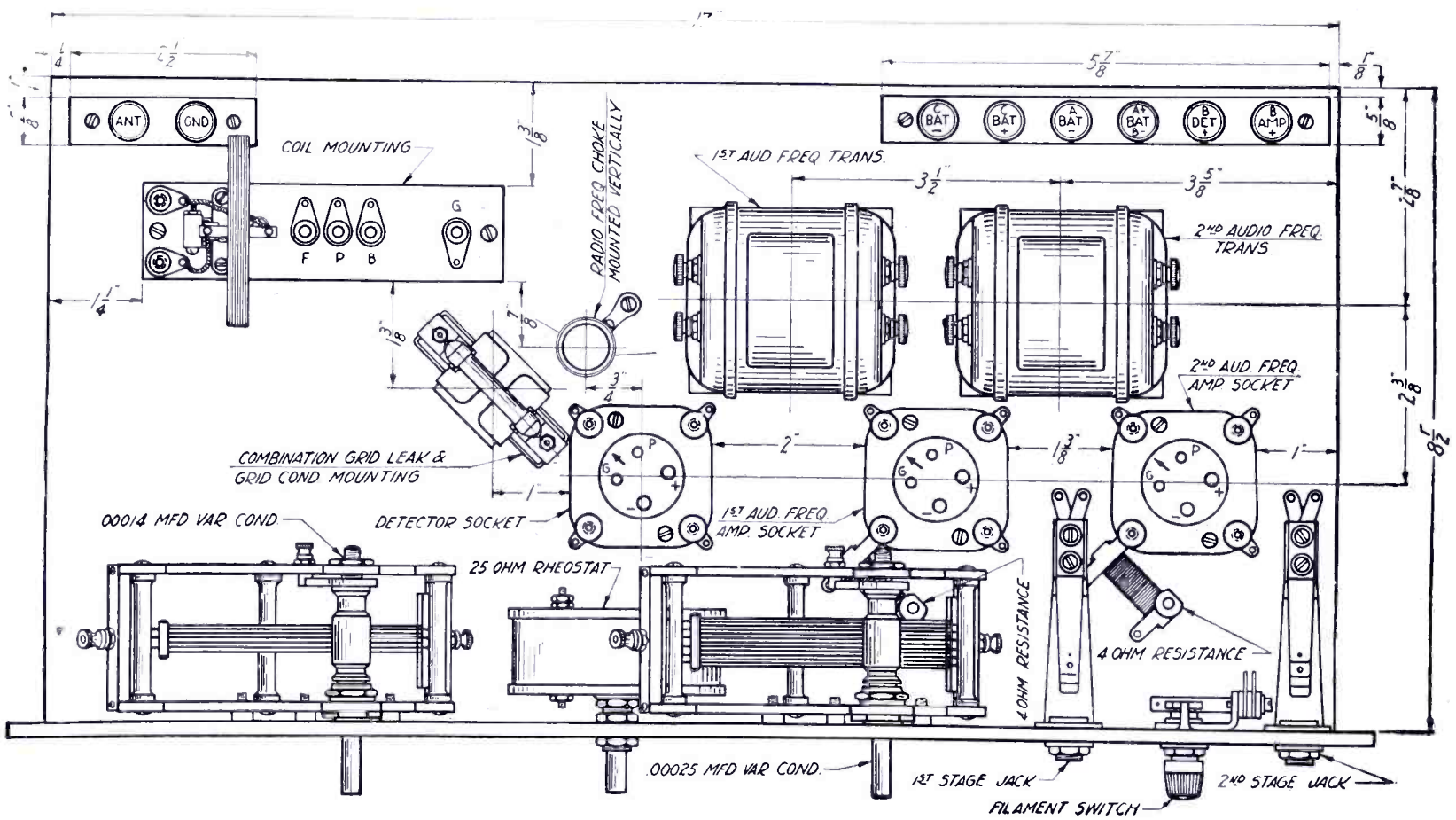


Fig. 2—Baseboard Layout

be altered until best results are obtained.

It has been found that a radio frequency choke is necessary before the first audio transformer. This choke is not manufactured at the present time and it is necessary for the constructor short as possible. Insulation on any of the wires is not necessary and is not advised since research has shown that poor results in reception will follow if insulated leads are used. Very high ratio vernier dials have been selected for the tuning controls in this

ceiver in view of the fact that a very minute adjustment is eded in tuning in the short wave transmitters.

It will be noticed that the Karas Condensers are provided with th a large mounting nut fitting around the condenser shaft d a series of three screw holes in the frame. The large nut not used in mounting the condensers, and care should be used that no part of the threaded portion surrounding the condenser aft projects beyond the face of the panel. Using the flat head achine screws supplied with the condensers and inserting the all spacers, also supplied between the condenser frame and the nel the variable condensers may be easily mounted in place. will be found that it is advisable that the mounting holes for

on all wavelengths with the antenna and ground connected. For the best results the antenna should have a maximum length of not more than 50 feet including the lead-in. If dead spots are encountered on any short wavelengths, loosen antenna coupling. If this does not eliminate the dead spot remove from 5 to 10 turns from the radio frequency choke.

In operating the receiver, always keep it oscillating gently for CW reception and just below the point of oscillation for phone reception. It is altogether proper that a word of caution be placed here in reference to the fact that this type of receiver re-radiates when oscillating too freely and great care should be taken that the operator does not enter the ranks of the "Bloopers"

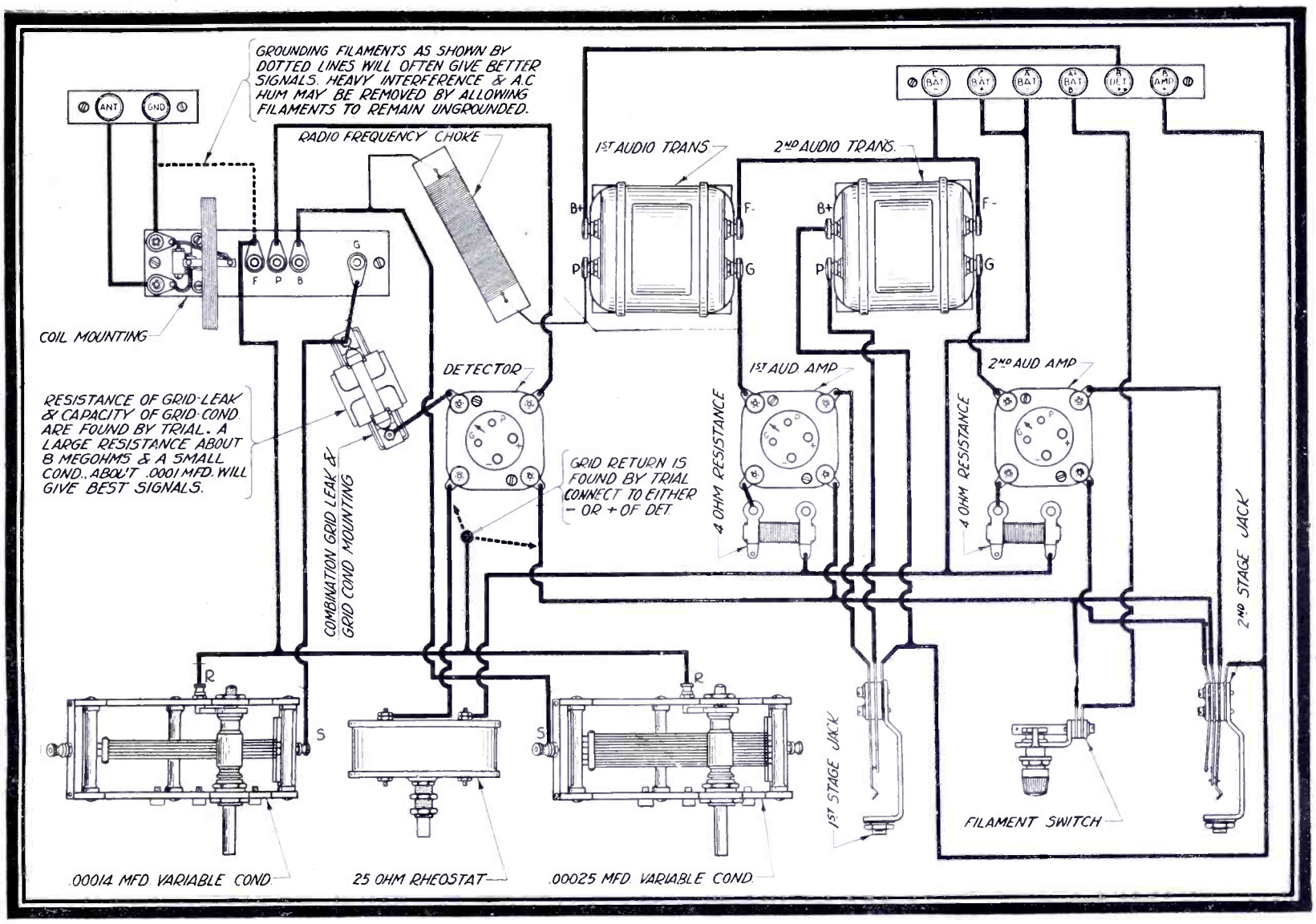


Fig. 3—Graphic illustration showing each connection

e condensers be liberally countersunk so that the heads of the ounting screws will be below the surface of the panel. The rnier dials are actuated by a felt disk which must bear directly ainst the panel, and it is therefore obvious that any mechanism ojecting beyond the panel face will seriously interfere with the eration of the vernier controls, if not altogether rendering em ineffective.

After assembling the receiver, carefully check over the wiring, rrect mistakes if any have been made, and then connect the tteries to the receiver. Insert the third largest coil, disconnect e antenna and with a flexible lead make grid return of detector e positive or negative and try various combinations of grid ks and grid condensers. This procedure is almost absolutely cessary as tubes vary and short wave receivers are prone to into oscillation with a bang or howl instead of the conventional ss. About .0001 mfd., and 8 megohms will probably be found be the best. However, if howling is encountered, the capacity ust be raised and the grid leak lowered. Sometimes changing e detector grid return will clear the trouble.

When the best grid return, grid condenser, and grid leak have en found, check all of the coils and make certain the receiver n be made to oscillate smoothly from maximum to minimum especially when he is listening in on the 200 to 550 meter wave-band. Using both hands for tuning will give best results. A swinging signal may be followed by adjusting the feedback condenser as it detunes very slightly when moved. This detuning is convenient for this purpose, but is not sufficient to disturb logging.

LIST OF PARTS

These parts or their equivalent will give satisfactory results.

1 7"x18"x3/16" Drilled and Engraved Formica Panel
1 5/8"x2½" Formica Terminal Strip
1 5/8"x5" Formica Terminal Strip
1 8½"x17" Wooden Baseboard
2 Karas Harmonik Audio Transformers
1 Karas .00014 mfd. SLF Variable Condenser
1 Karas .00025 mfd. SLF Variable Condenser
3 Benjamin Type 9040 Cleartone Sockets
2 Yaxley 4 Ohm Fixed Resistances
1 Yaxley Type 2-A Jack
1 Yaxley Type 3 Jack
1 Yaxley Filament Switch
1 Daven No. 51 Mounting

1 Daven 8 Megohm Grid Leak
1 Dubilier .0001 mfd. Fixed Condenser
1 25 Ohm E. E. E. Rheostat
1 Set of Aero Interchangeable Coils—Range of from 15 to 550 Meters
1 Piece Bakelite Tubing ¾", 3½" long
1 Quarter Pound Spool of No. 28 DCC Copper Wire
1 Foot Insulated Flexible Wire. (For finding grid return, grounding filaments, etc.)
Miscellaneous Screws, Wire, Lugs, etc.
1 Package Kester Solder
1 Blackburn Ground Clamp
25 feet No. 12 Belden Copper Tinned Wire.

The broadcast listener will find KDKA on 64 meters practically every evening during the week. WGY broadcasts experimental programs at irregular times on wave lengths between 105 and 15 meters, 2YT, at Poldhu in Ireland, is on 94 meters with experimental work. G2NM, at London, on about 44 meters, may be heard most

	HOLLAND	Kilocycles	Wavele
PCMM	Kootwijck	8328	36
PCUU	Kootwijck	7890	38
PCLL	Kootwijck	6518	46
	SWEDEN		
SAJ	Karlsborg	5996	50
	UNITED STATES OF AMERICA		
2XS	Rocky Point, N. Y.	20082	14.93
2XAW	Schenectady, N. Y.	19988	15
NKF	Anascostia, D. C.	18738	16
2XAD	Schenectady, N. Y.	14991	20
NAL	Washington, D. C.	14991	20
NKF	Anascostia, D. C.	14414	20.8
WIK	New Brunswick, N. J.	13628	22
NKF	Anascostia, D. C.	11758	25.5
2XI	Schenectady, N. Y.	9994	30
NAL	Washington, D. C.	9798	30.6
NAJ	Great Lakes, Ill.	8630	34
WQO	Rocky Point, N. Y.	8560	35.03

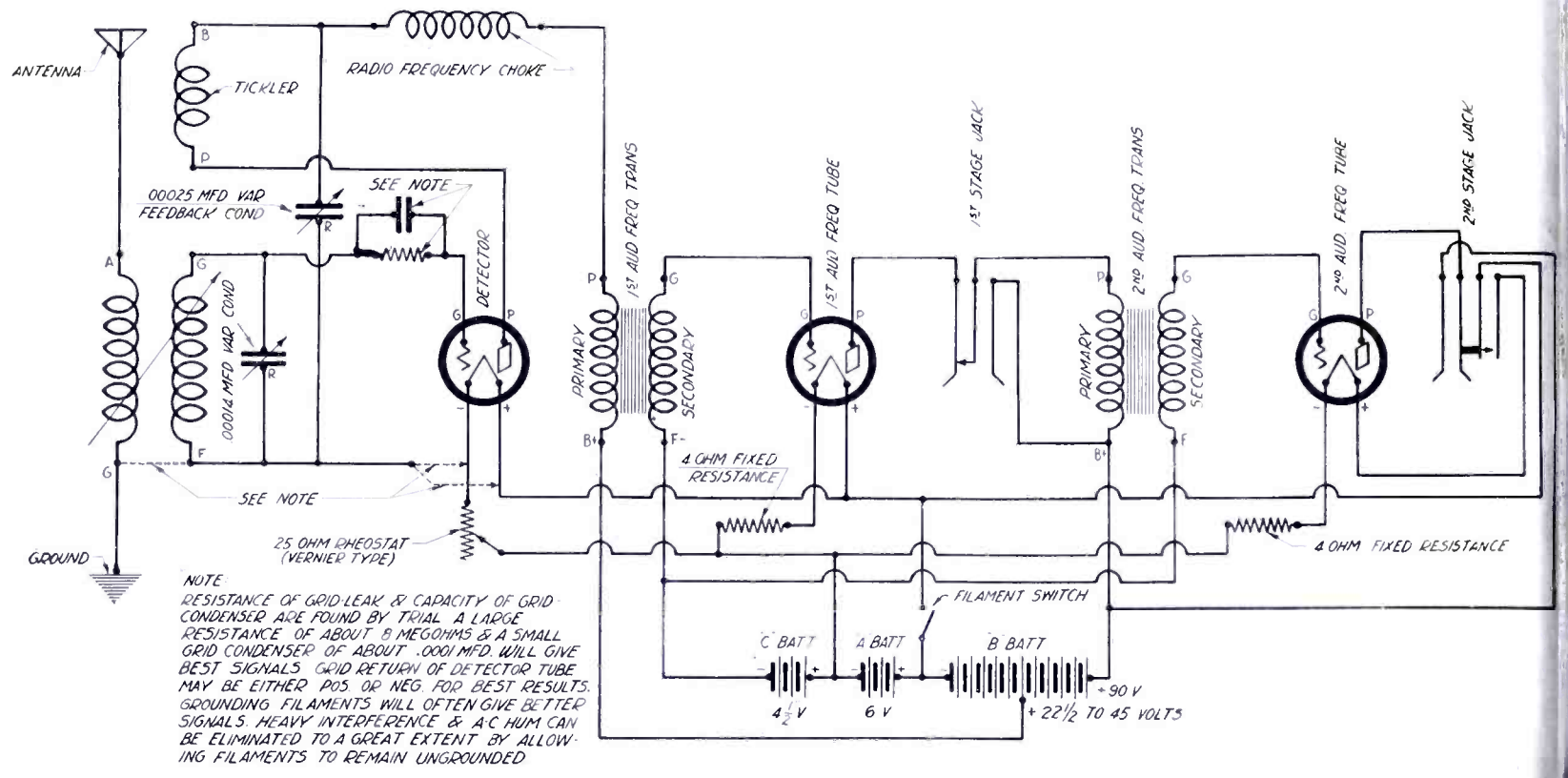


Fig. 4—Schematic Diagram

nights after 11 p. m. CST. Several Australian, European and South American stations may be heard on voice between 30 to 50 meters, as well as dozens of American broadcast station harmonics on short waves. Below will be found a partial list of the short wave stations of the United States and Europe.

LIST OF THE SHORT WAVE STATIONS OF THE WORLD

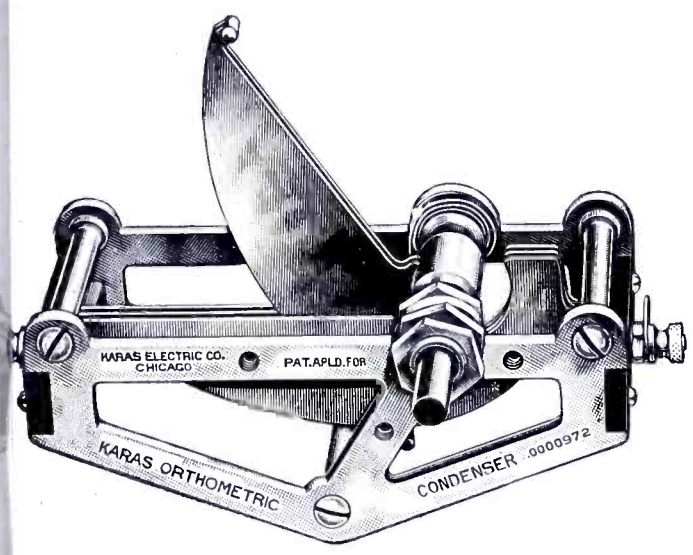
	ENGLAND	Kilocycles	Wavelength
2YT	Chelmsford	17636	17
2YT	Poldhu	11993	25
2YT	Poldhu	9369	32
2YT	Poldhu	4997	60
2BR	Poldhu	3190	94
	GERMANY		
POF	Nauen	22209	13.5
POF	Nauen	18738	16
POF	Nauen	16657	18
POY	Nauen	14991	20
AGA	Nauen	11993	25
POW	Nauen	11532	26
POX	Nauen	10708	28
POX	Nauen	4283	70
POF	Nauen	2998	100
	FRANCE		
FW	Sainte Assise	11993	25
FW	Sainte Assise	7139	42
SFR	Paris	3998	75
SFR	Paris	3527	85
FL	Paris	2607	115

NAS	Pensacola, Fla.	7496	10
NAJ	Great Lakes, Ill.	7496	40
NPG	San Francisco, Calif.	7496	40
NRRL	USS Seattle	7496	40
2XAC	Schenectady, N. Y.	7496	40
NKF	Anascostia, D. C.	7260	41.3
2XAF	WGY—Schenectady	7160	41.88
5XH	New Orleans, La.	7139	42
WIZ	New Brunswick, N. J.	6970	43.02
WQO	Rock Point, N. Y.	6814	44
KZA	Los Angeles, Calif.	6814	44
KZB	Los Angeles, Calif.	6814	44
2XAD	Schenectady, N. Y.	5996	50
WQN	Rock Point, N. Y.	5822	51.5
NBA	Canal Zone, Balboa	5552	54
NKF	Anascostia, D. C.	5511	54.4
KFKX	Hastings, Neb.	5354	56
1XAO	Belfast, Me.	5354	56
KDKA	East Pittsburgh, Pa.	5100	58.79
KDKA	East Pittsburgh, Pa.	4759	63
8XS	East Pittsburgh, Pa.	4475	67
2XAO	Belfast, Me.	4283	70
NERM	USS Los Angeles	4283	70
NKF	Anascostia, D. C.	4205	71.3
WIR	New Brunswick, N. J.	4052	74
2XK	Schenectady, N. Y.	3748	80
NKF	Anascostia, D. C.	3679	81.5
NKF	Anascostia, D. C.	3569	84
NERM	USS Los Angeles	3548	84.5
KIO	Kahuku, Hawaii	3331	90
WHU	SS Big Bill	2855	105
2XK	Schenectady, N. Y.	2751	109
1XAO	Belfast, Me.	2677	112

KARAS—Choice of the Experts

IN the construction of a *short wave* receiver the choice of parts used is most important. Frequencies are so great that every detail of materials and assembly must be perfect for satisfactory results. Karas apparatus has been the choice in practically every short wave receiver yet presented to set builders by radio publications. Sleeper in *Radio Engineering*—Schnell in *Q. S. T.*—Marco in *Radio*—Hill in *Radio Age*—Ryan in *Radio Digest*—ALL specified Karas.

In this issue of Citizen's Radio Call Book is the description of a long range short wave receiver requiring Karas 7 and 11-plate Orthometric condensers and two Karas Harmonik audio frequency transformers. The Victoreen super-heterodyne, also described in this issue, requires two Karas 23-plate condensers. In the oscillator circuit of a "super," a high quality condenser is absolutely essential. The experts *know*—they have testing apparatus and get the laboratory reports. Wise set builders will follow the experts' choice.



Karas Orthometric Condenser

With the Karas Orthometric condenser, stations are spaced equally over the dial by kilocycles, which is the basis on which the government assigns stations their wave lengths. No crowding on the shorter waves, no useless spreading on the longer ones.

The solid brass plates, soldered at points of support, have the lowest losses known. The pig-tail assures a continuous electrical path to the weak currents; pig-tail on the 5-plate is insulated to prevent contact noises. Skeletonized brass end plates place the least possible metal in the effective field; the dialectric of hard rubber is placed well without the field and neither leaks nor absorbs energy. Karas bearings allow the rotor to turn evenly and smoothly.

Orthometric 5-plate .0001 mfd., $6.50; 7-plate .00014 mfd., $6.50; 11-plate .00025 mfd., $6.50; 17-plate .00037 mfd., $6.75; 23-plate .0005 mfd., $7.00; special 17-plate with extended shaft for Equamatic System, $7.00.

Karas Micrometric Dial

Karas Micrometric Vernier Dial is a precision instrument that tunes accurately to the thousandth (1/1000th) part of an inch and has a ratio of 63 to 1. It turns easily with a liquid-like smoothness. The gear arrangement by which this extremely fine adjustment is accomplished is a recent achievement of Karas engineers. There is no possibility of even the slightest "back-lash." Micrometric turns ***instantly*** in either direction, at any point, by the lightest touch on the vernier knob. Rough tuning is done with the larger knob.

It is a genuine pleasure to tune with such a dial. The large diameters of the knobs to be grasped prevent cramping of the fingers when going after DX several hours at a stretch. It is unnecessary to drill an extra hole for mounting. Dial markings and numerals are gold inlay; 200 divisions on the 180 degree type—400 on the 360 degree rotation models. Outside diameter is 4½ ins. Price $3.50 each.

Karas Harmonic Transformer

By amplifying ALL frequencies nearly equally—low tones—middle tones—high tones—and the many harmonics and overtones of all audible sounds—Karas Harmonik audio frequency transformer delivers pure, natural, undistorted musical reception to which it is delightful to listen. At the same time, in the Harmonik, Karas presented the set building public with a transformer of higher efficiency—one that gives a far greater voltage amplification per stage. Price $7.00 each.

Karas Equamatic System

The circuit sensation of the 1926-27 season is the Equamatic System. Using Equamatic apparatus as made by Karas you get maximum and equal sensitivity and amplification on ***all*** wavelengths—high, low and medium. You get greater selectivity without distortion or loss of the harmonics of musical selections. These long-sought features are actually obtained since no "losser" methods whatever are employed.

The essential parts for the building of an Equamatic Receiver are made by Karas. Complete instructions for assembly and wiring, including drilling layouts, are available. The Equamatic booklet, fully explaining the Equamatic System and what it does, will be sent on receipt of 10c in stamps or coin.

Karas Condensers in the 23, 17 and 11 plate sizes are sold by good Radio Parts Dealers in most cities. The 7 and 5 plate sizes are not so widely stocked by dealers. Orders for any parts mentioned above will be filled direct, or may be placed through your dealer and his jobber. Send no money. Just pay the postman the price plus a few cents postage.

KARAS ELECTRIC CO.

Factory: N. Rockwell St. Offices: 1126 Assn. Bldg., Chicago

Karas Electric Co., 1126 Association Bldg., Chicago, Ill.
Please send me

.....Karas Harmonik Transformers
.....Karas Orthometric Condensers
.....Karas Micrometric Dials

sizes as checked below. I will pay the postman the price plus postage upon delivery. It is understood that I have the privilege of returning these condensers, dials and transformers for full refund any time within 30 days if they do not prove entirely satisfactory.

..... 5 plate; ..... 7 plate; ..... 11 plate
..... 17 plate; ..... 23 plate

Dials.....O-Right; .....O-Left; .....180° .....360°

Name.....

Address.....

If you send cash with order we'll ship condensers, dials and transformers postpaid.

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

The Nine in Line Super

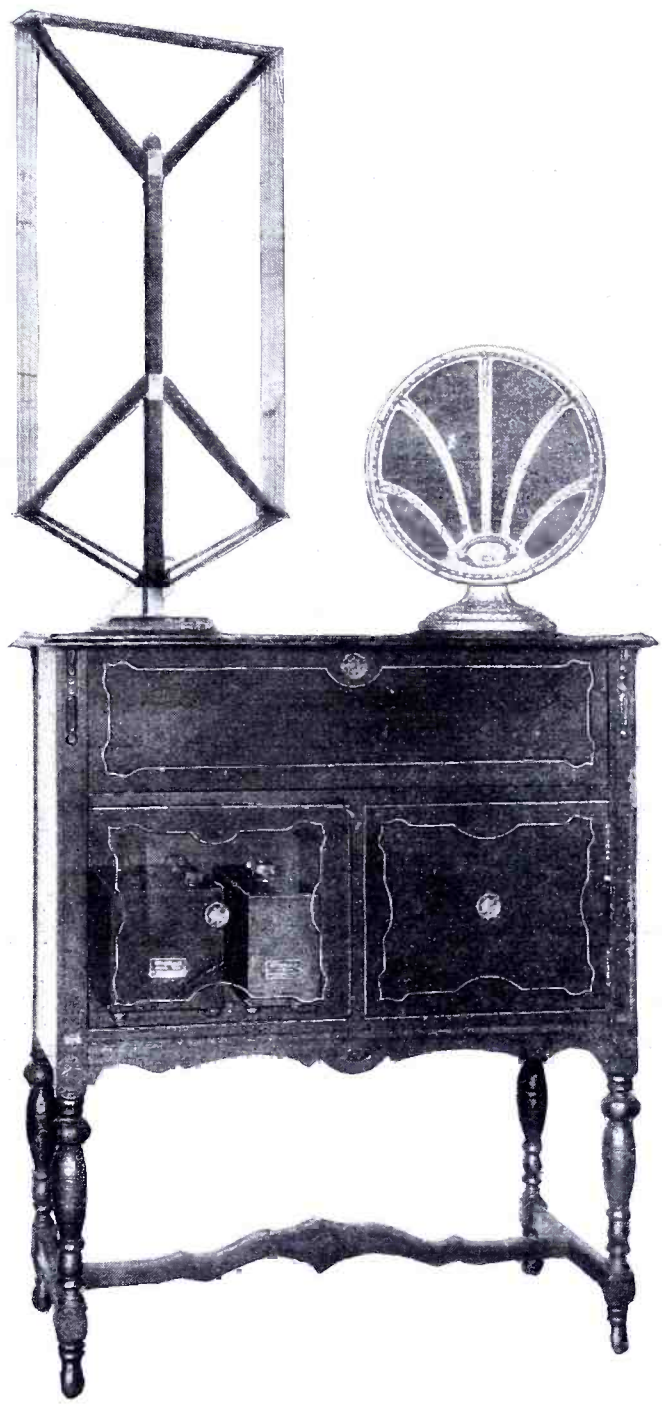
This receiver was constructed and designed in the Citizens Radio Laboratory. Its performance was more than satisfactory under the most severe conditions

THE 1926-27 radio season finds itself confronted with new problems in building receivers. Decisions in cases of "pirating" of the air have created a confusion in broadcast conditions without precedence, and congested cities will ve ten to twenty stations broadcasting simultaneously, the latter t even being forced to keep to their assigned wave length. We arn of increase of power in the output of most of the stations, us being unable to separate them on the erage receiver, and many radio enthusits will lose courage and leave their reivers untouched for weeks.

However, the developments in receiver nstruction have foreseen the conditions cing the radio public. Quality and effiency have always been the requirements receiving instruments, and this article ill deal with a set which will satisfy the uilder even under the new broadcast contions. The receiver, designed in the labotory of the Citizen's Radio Call Book, us proven that it is possible to overcome l present difficulties. Hair-sharp selecvity, tremendous power and highest qualy of tone are combined with simplicity tuning and economical cost of operaon.

One important item should be emphazed for receivers constructed for the nateur set builder. This is appearance. oday the amateur will be eager to demonrate the set, not only for efficiency, but so for simple symmetrical layout, and e receiver to be described is a proof at it is possible to construct a highest ade receiving instrument at home.

The startling efficiency of the set was early demonstrated in Chicago. While local, mostly super-power, stations were oadcasting, it was the simplest matter to ne in on a score of long distance staons on an average midsummer night, and was even possible to reach 600 miles ith full loud speaker volume during the ytime. The fully balanced system asres an extremely quiet operation and ere are no regenerative howls or oscilations. It is acknowledged that the superterodyne circuit is the only receiving stem where extreme selectivity can be tained. However, it was comparatively fficult to combine selectivity with tone, d our laboratory has been experimenting r many months to construct this receiver, hich will be superior in efficiency under e most favorable conditions.



View showing how receiver can be mounted in a console with suggested accessories

We have selected the H. F. L. Transformer units, originally signed for long wave receivers, and have succeeded in incorporating stages of intermediate frequency, with 2 tuned stages—an periment which was never carried out successfully in previous ceivers.

Figure 2 shows the assembly of the apparatus on a bakelite se panel, the latter being drilled according to the dimensions ven in this drawing. After the set is assembled in the manner advised, small holes should be drilled through the filament terminals of the sockets in the base panel, as the entire wiring is made underneath, and the necessity will arise to reach the socket terminals from there. The grid and plate terminals of the transformer are directly bridged to the respective terminals of the sockets, except the grid of the 6th and 7th transformers. The latter are bent up and 4/32x5/8-inch screws are placed through the eyelet holes of these units and connected under the base panel to the respective leads. The same is done on the battery and filament terminals of all transformers.

The radio frequency choke unit has but three connections, the terminal F not being made use of. The L-430 Radio Frequency Transformer, used as oscillator, is mounted on the lower part of the base panel. The entire wiring is done, as mentioned, under the base panel, and all connections are made as short as possible. The "B" battery leads of the transformers are run closely together into the prongs of the cable bracket, and they should be connected according to the colors shown in Figure 3. This figure gives a clear view of the entire wiring system, and the schematic diagram of Figure 4 will be an aid in checking the connections.

Two by-pass condensers, 3 mica condensers, a filament ballast for the audio tubes and the midget condenser are also placed under the base panel. The photograph shown in Photo C will give a clearer explanation of the assembling and wiring system under the sub-panel.

It is emphatically advised to select the very best material for this receiver and to use extreme care in connecting the various parts. Perfect solder joints will assure least resistance and hence better reception.

A common "C" battery is used for all grid returns, and a voltage of 4½ to 6 volts recommended. It will be noted that this "C" battery will provide the necessary bias also for the second detector tube, so that rectification will be accomplished on the negative side of the static characteristic curve of this tube.

The oscillator and the two detector tubes are operated with a common rheostat, mounted on the left end of the front panel. This arrangement creates an additional helpful tuning control for lower wave signals where the oscillator dial might tune too sharp. The 4 WX12 intermediate frequency tubes are connected in series and controlled by a 25-ohm rheostat placed in the center of the front panel. This rheostat acts as a volume control. The right-end knob operates a 200,000-ohm centralab radiohm, connected across the secondary of the first audio transformer, and will serve as an audio frequency modulator.

The arrangement of the tubes from left to right are as follows:

1st Detector 201A

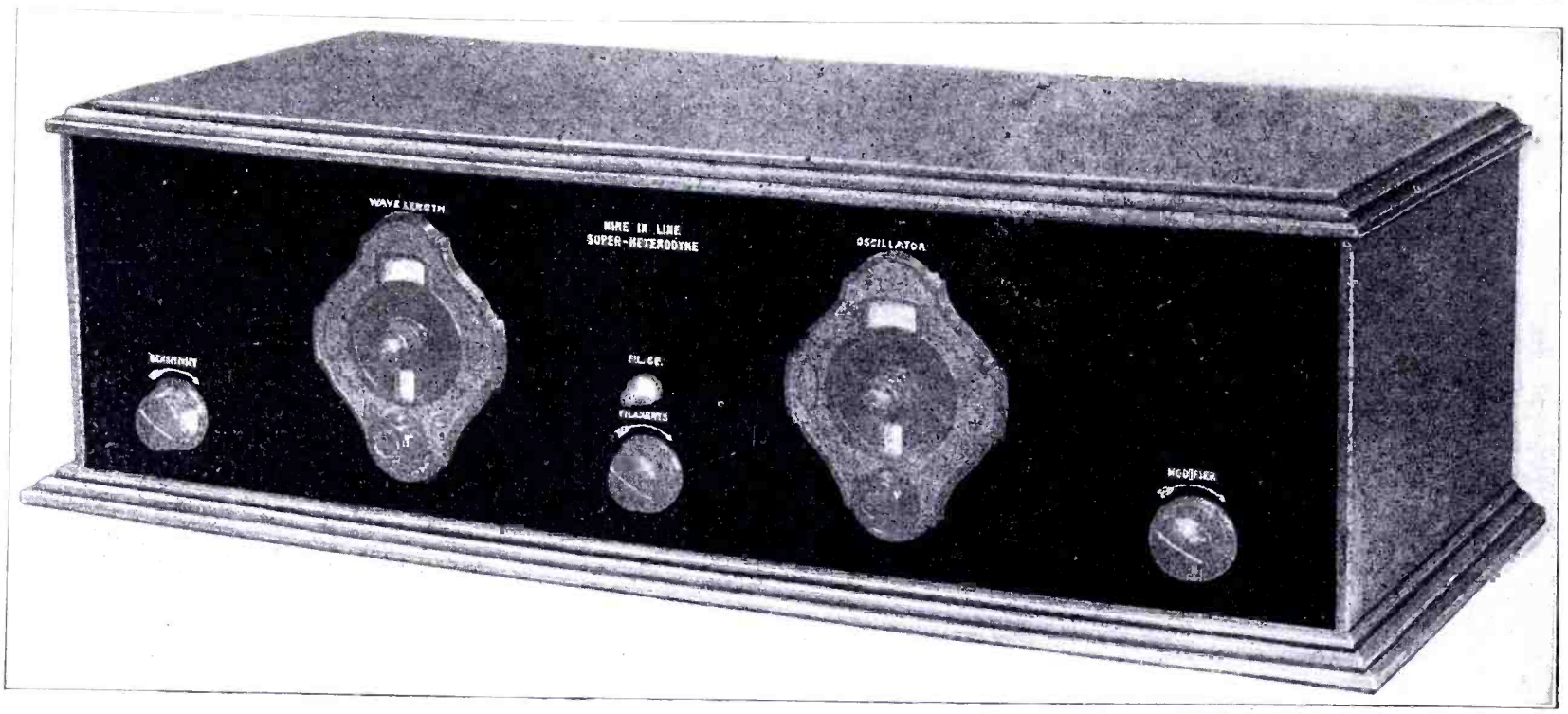


Photo A. Front view of receiver mounted in cabinet

4	Intermediate frequency	WX12
2nd	Detector	201A
1	Oscillator	201A
1st	Audio	201A
2nd	Audio	LIX112

List of Parts

The following parts will assure perfect operation of the receiver:

3—H.F.L. H.210 Transformers
2—H.F.L. H.215 Transformers
2—H.F.L. F.320 Transformers
1—H.F.L. L.325 Radio Frequency Choke Unit
1—H.F.L. L.330 Radio Frequency Transformer
9—Amsco Cushion Sockets
2—Rembler .0005 Tuning Condensers
2—Mydar Vernier Dials
1—Chelten .000045 Midget Condenser
2—Tobe 1 mfd. By-Pass Condenser
2—Dubilier .0005 Mica Condensers
1—Dubilier .002 Mica Condenser
1—Culver-Stearns Filament Switch
1—Radiall ¾-ampere Filament Ballast
1—Yaxley Battery Cable, complete
1—Frost 6-ohm Rheostat
1—Frost 25-ohm Rheostat
5—Yaxley Pup Jacks
1 Pair Benjamin Brackets
1—Radion 7x26-inch Front Panel
1—Radion 7x24-inch Base Panel
4/32-inch and 6/32-inch Screws and Nuts, Bus Bar Wire, Spaghetti and Solder Lugs
1—Southern Toy Cabinet.

It will be useful to give a brief explanation of the reasons why this receiver has given results never achieved yet with other radio sets.

Experimenters familiar with the super-heterodyne circuit have probably experienced that the use of more than 3 stages of intermediate frequency will meet great difficulties and therefore they have never been successful with inserting more intermediate frequency transformers. The average super-heterodyne combines 1 filter and 3 untuned stage transformers. However, passing the highly amplified I. F. signals through a second tuned stage will permit a considerable increase of selectivity, and this can be accomplished if the 2 tuned stages are very closely peaked, possibly within 1 per cent. The untuned stages in this case should have a very flat resonance curve. They act merely as intermediate frequency amplifiers. This can be accomplished by a coil of high capacity (paper section coil) and a heavy, closed iron core with a large surface, that is, a great number of very fine high silicon steel laminations. An intermediate frequency untuned transformer of this design will have a fairly uniform amplification factor within a range of 6 to 8 kilocycles and thus create less tendency to I. F. oscillations and distortion. The signal carried through 2 transformers of this type will enter the first tuned stage on a very broad band, and this band tightened

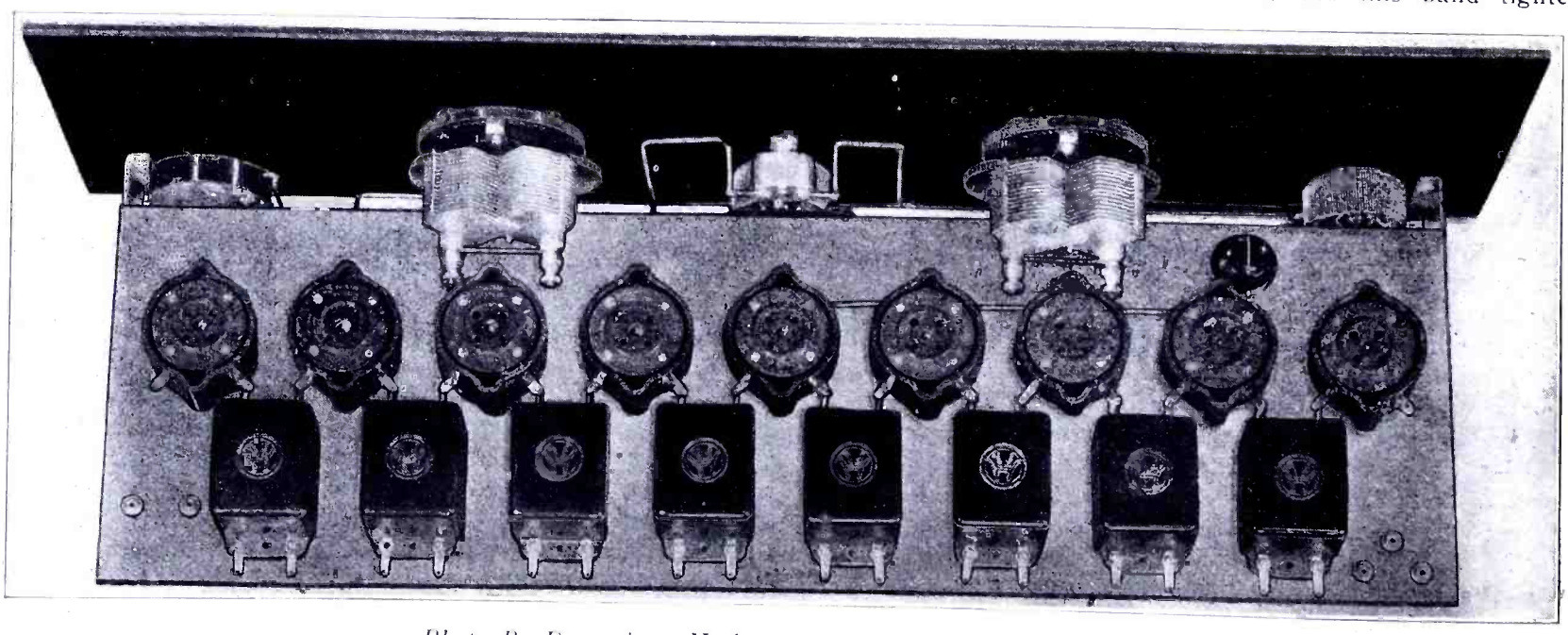


Photo B. Rear view. Notice the neat arrangement of parts

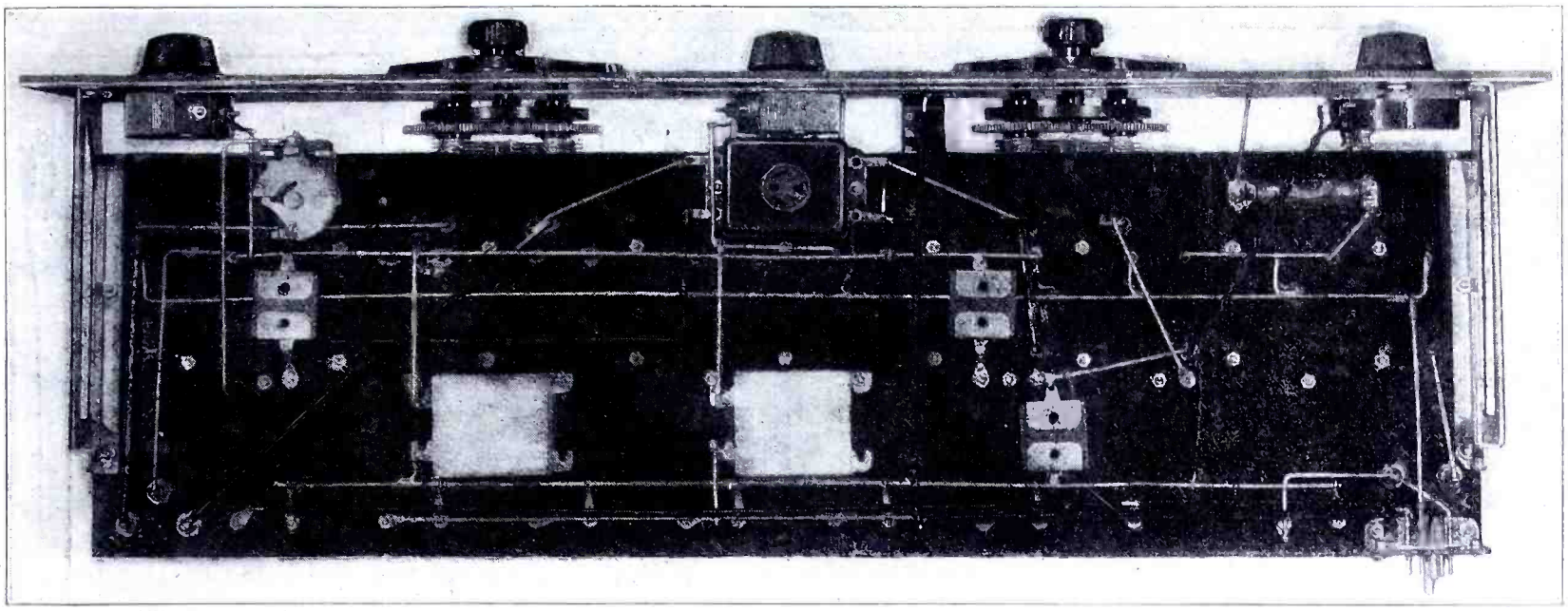


Photo C. Bottom view showing arrangement of parts under subpanel

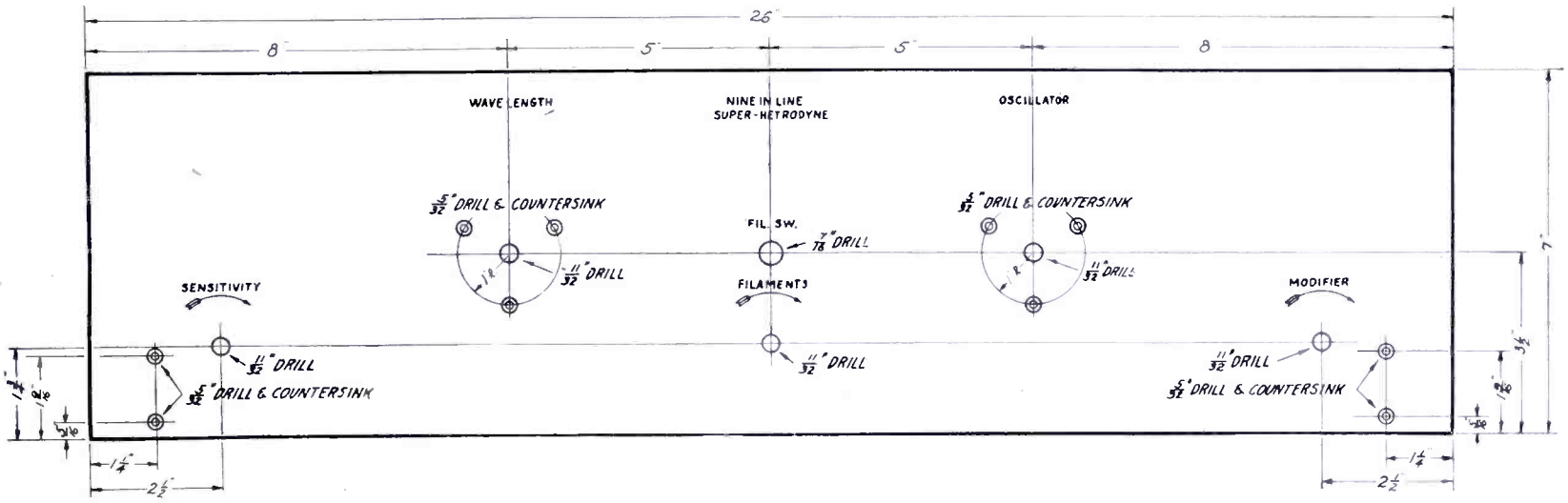


Fig. 1. Panel layout

through a filter stage will go through another amplification stage before it passes through the second filter into the detector.

Nevertheless, a so highly amplified intermediate frequency signal will have the tendency to feed into the audio frequency amplifying stages. It has proven that for high power, long wave input to the audio stages, transformer coupled amplification will perform best, and therefore all super-heterodyne constructions have decided for this type of amplifiers instead of resistance or impedance coupling. Therefore care has to be taken to prevent feed of the intermediate frequency signals into the audio, as a sensitive human ear will still detect oscillations up to 20,000 cycles. The audio transformers of this receiver is of the very smallest dimensions, wound with the smallest gauge wire available for winding purposes, and has a specially shaped core of very thin laminations. The high impedance secondary of this construction with its comparatively high capacity effect will create a sharp decline of the amplification curve over 10,000 cycles and thus not amplify the entering intermediate frequencies to the volume of audibility. In this way one of the greatest disadvantages of super-heterodyne receivers is eliminated.

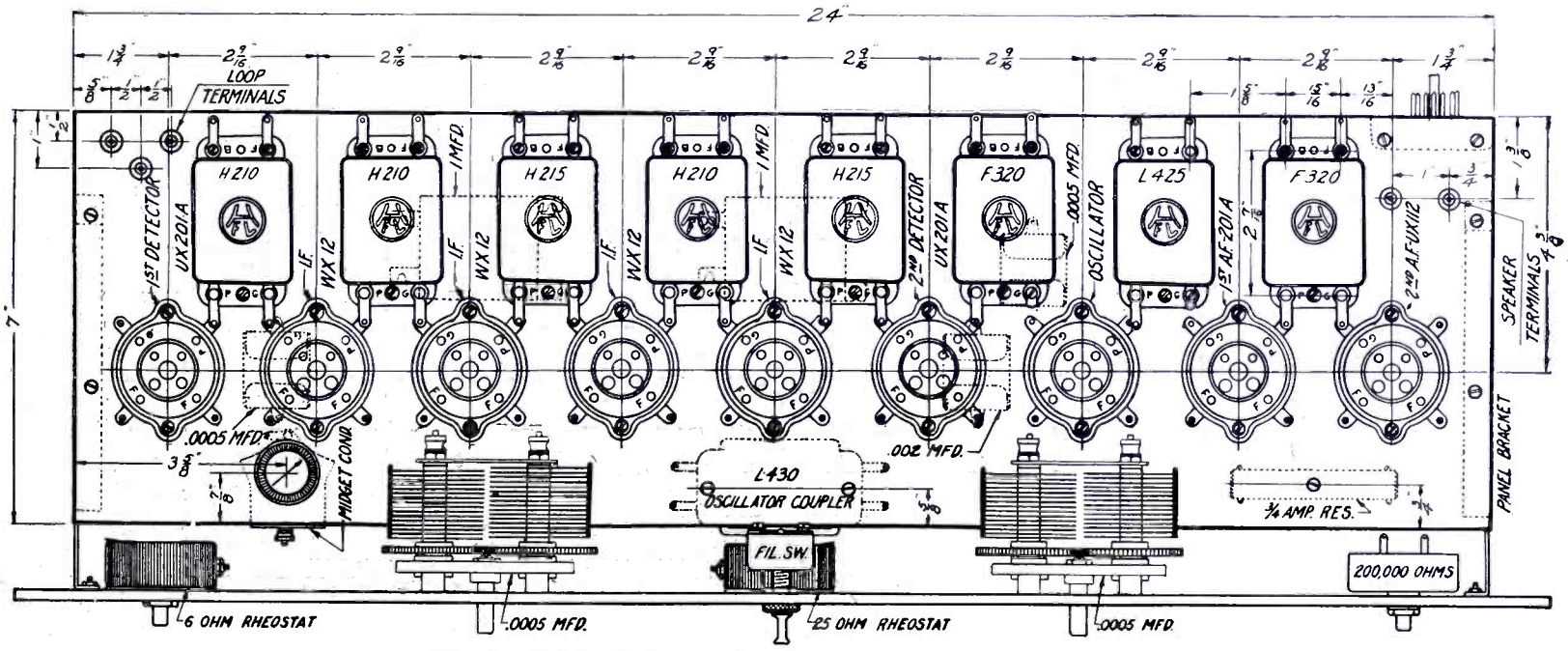


Fig. 2. Subpanel layout showing arrangement of apparatus

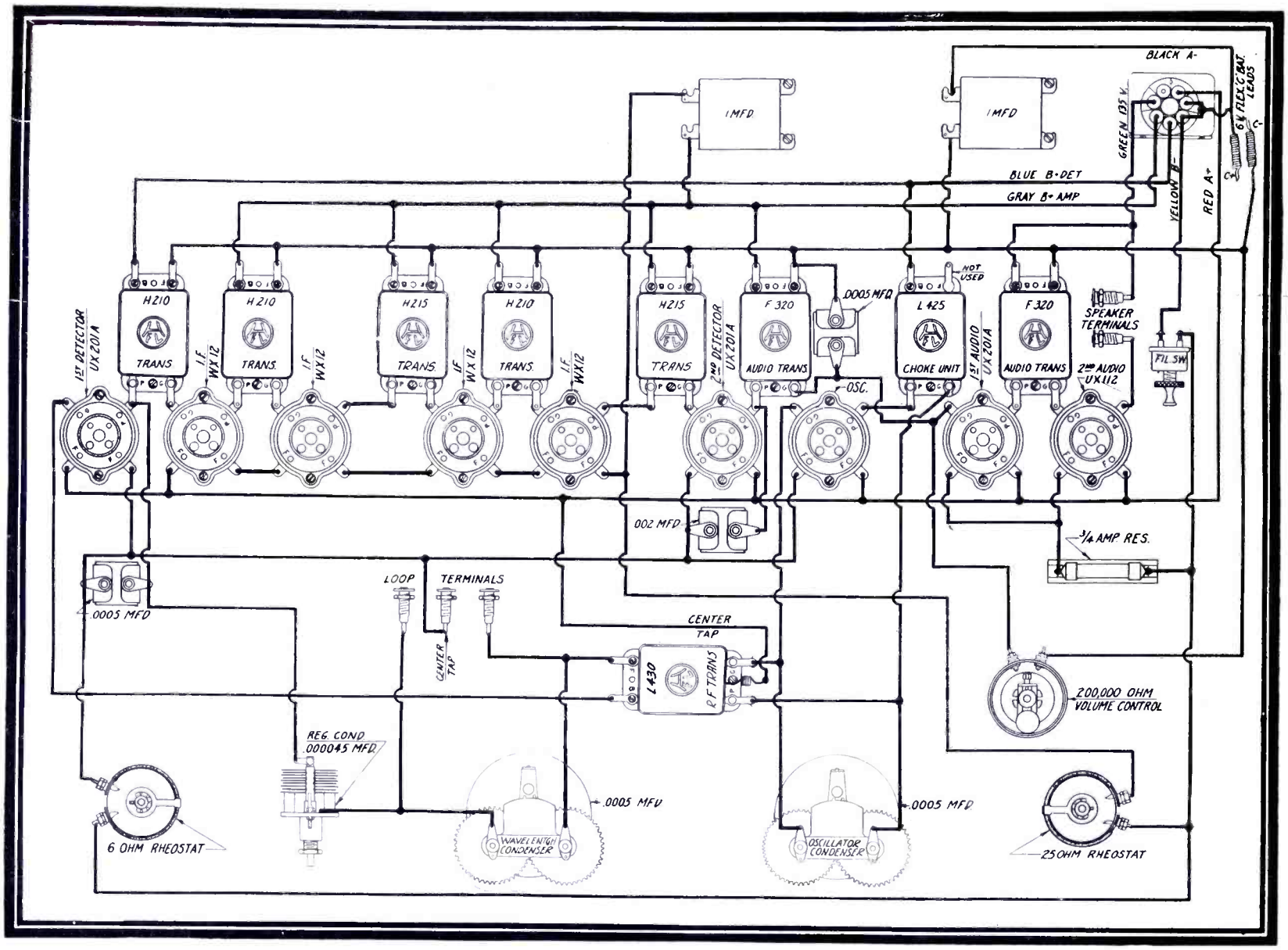


Fig. 3. Graphic illustration showing every lead in entire receiver

Another important factor in balancing super-heterodyne circuits is the oscillator energy. The so widely emphasized "low loss" expression is not of great importance in this case. The oscillator has to range within the broadcast wave band and its output energy has to match that of the loop circuit, in order to prevent overloading of the first detector grid with one of the two power sources. The input circuit will be more efficient if a complete balance is created.

The accessories shown consist of:

A complete "A" and "B" Power Plant. The "A" delivers 6 volts and "B" all necessary voltages, which are variable, to operate detector and amplifier circuits. Connects into any convenient a.c. light socket. Manufactured by Storad Manufacturing Co., Cleveland, Ohio.

The Speaker is the new Thorola cone type, dual diaphragm. Manufactured by Reichman Co., Chicago.

The Loop is the new Qualitone, made by the Duro Metal Products Co., Chicago.

The Console is one of the many types made by the Chillicothe Furniture Co., Chillicothe, Mo.

(If any information is desired regarding any of the accessories listed, please write manufacturer direct.)

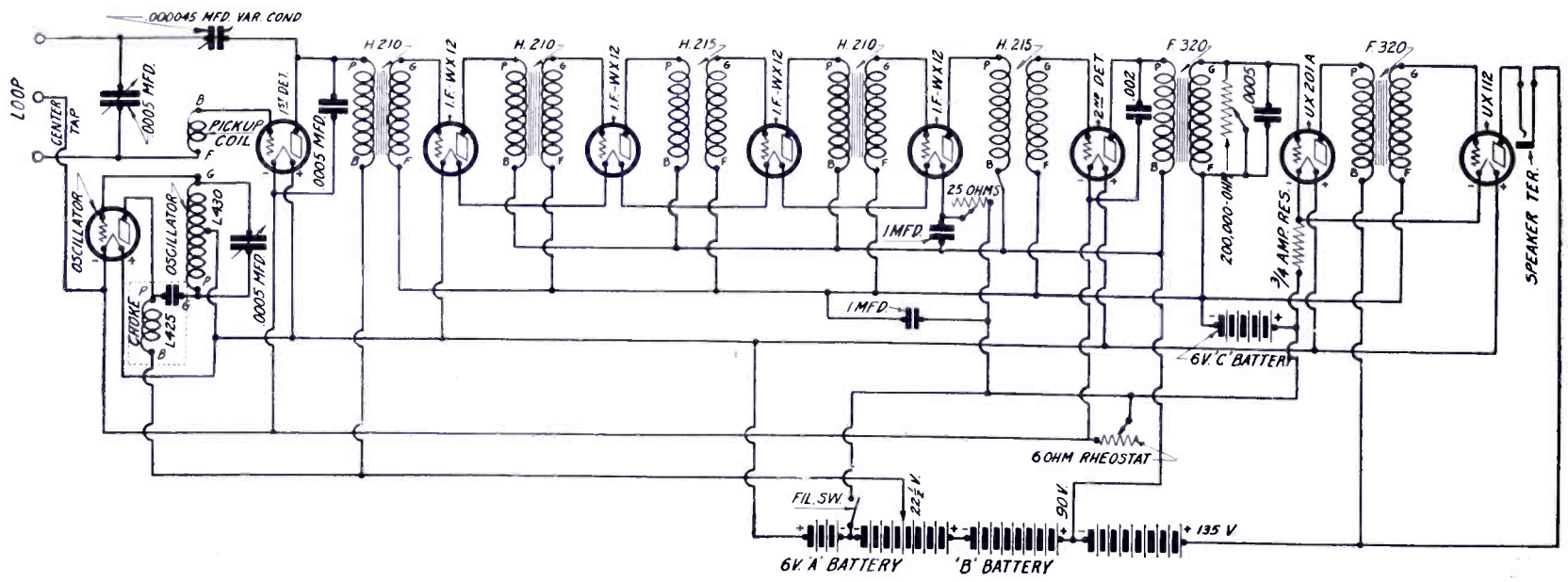


Fig. 4. Schematic wiring diagram

Quali-Tone

SPEAKERS LOOPS UNITS

for the finest Radio Reception

Quali-Tone No. 4

Quali-Tone Speakers FOUR MODELS

Quali-Tone Speakers represent at the one time the utmost in quality and performance at low cost and extraordinary beauty of appearance and design. THE JUNIOR QUALI-TONE is ideal for portable receivers and for use wherever space is limited. It is finished in black crystal, equipped with the popular Quali-Tone adjustable unit . . . height 13 in. Bell 8½ in. Price $7.50. . . .

QUALI-TONE Model No. 2 is most artistically designed, finished in a semi-dull black leather pattern that is exceedingly attractive. It is slightly larger than the Junior, being 15 in. high with a 10 in. Bell. Price $10.00. . . .

Quali-Tone No. 3 has an 11½ in. Bell of Bakelite polished to a deep black lustre that delights the eye. Sound chamber and base have a dull black Morocco leather finish that harmonizes with any surroundings. It is 19½ in. high and is equipped with the justly famous QUALI-TONE DeLuxe Unit. Price $15.00. . . .

QUALI-TONE Model No. 4—the Speaker Supreme—has a polished Bakelite Bell while the sound chamber and base have a dull black Morocco finish. Like No. 3, this marvelous Speaker is also equipped with the QUALI-TONE De Luxe Unit that assures a quality of tonal reproduction altogether beyond expectations. Height, 22½ in. Bell, 14 in. **Price $25.00.**

Quali-Tone De Luxe Unit

Extremely powerful concert type. Finished in black crystal enamel with nickel trimming. Constructed to handle extra heavy volume. Adaptable to any standard make of phonograph or console set. **Price $7.50.**

Quali-Tone Phonograph Radio Unit

With adapter will transform any standard phonograph into a loud speaker. Sturdy construction and fine adjustment reproduce light and heavy tones with equal exactness. Adaptable to consoles with built-in speakers. **Price $6.00.**

Quali-Tone Loop

Holds 2 world's records. Brought in stations 8,000 miles distant.

Collapsible Aerial With the Exclusive Thumbscrew Adjustment

Quali-Tone Loop

The Quali-Tone's new thumbscrew adjustment keeps the loop wires taut always—an improvement that contributes largely to the startling performance of this remarkable loop. Then, too, the long vertical strands of the Quali-Tone result in a greatly increased efficiency that adds appreciably to the distance range obtainable. The Quali-Tone will outperform any loop on the market and will invariably produce a decided improvement in the operation of any receiver.

Guaranteed

The Quali-Tone is thoroughly guaranteed in every respect against defective workmanship. Construction is of the very highest quality throughout. The loop woodwork is walnut finish. All the metal fittings are heavily nickel-plated. The wire spacers are made of the highest quality insulating material, eliminating the losses that are commonly found in loop aerials. Only the best grade of stranded wire, well insulated and covered with silk braiding, is used.

A heavy, substantial walnut base is provided, felt-padded at the four corners to prevent scratching. Three long, flexible leads with phone tips facilitate quick connection of the loop to the receiver. Size, open, 16 in. x 34 in. Size, folded, 14 in. x 6½ in. x 3 in. All loops have the center tap terminal for .0005 variable condenser. **Price, $10.00.**

Recommended

Radio Editors, Engineers and Fans alike proclaim the Quali-Tone superior to all others. Mr. E. H. Scott, designer of the World's Record Super Nine, attributes the record-breaking performance of his renowned receiver in great part to the Quali-Tone Loop he always used.

DEALERS: Write for discounts. JOBBERS: Send for circulars on Quali-Tone Products today!

Patented

NOTE: Quali-Tone Exclusive Thumbscrew Adjustment keeps loop wires always taut.

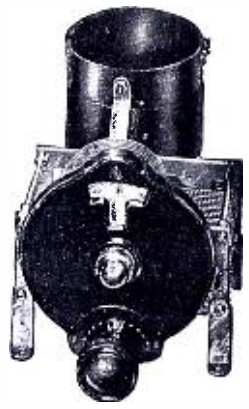
Price $10.00

Duro Metal Products Co.

2649 N. KILDARE AVENUE CHICAGO

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

NATIONAL RADIO PRODUCTS

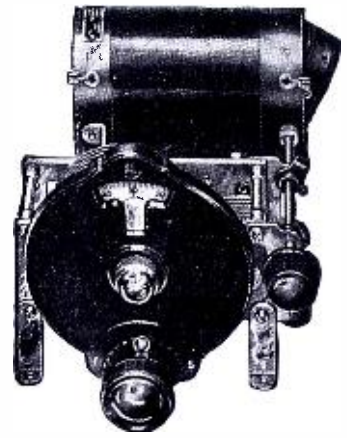


B D-1B With "B" Dial

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

Price **$10.25**
With illuminated Type C Dial.. **10.75**

Also furnished with NATIONAL Equimeter (SLW) Condenser at $1.00 less than above list.



B D-2B With "B" Dial

The B D-2B NATIONAL Tuning Unit combines a Browning-Drake Spacewound Transformer with a .00025 NATIONAL "EQUICYCLE" Condenser. This condenser gives clean-cut separation of stations on all wavelengths. The NATIONAL VELVET-VERNIER, Type B Dial included with the unit is known to every Radio enthusiast from coast to coast for its perfection and constancy of action. It is now made as Type C, with an illuminated dial.

Price—B D-2B, with Type B Dial **$13.75**
With Type C Dial..... **14.25**

Also furnished with NATIONAL Equimeter (SLW) Condenser at $1.00 less than above list.

E M-500 With "A" Dial

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

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

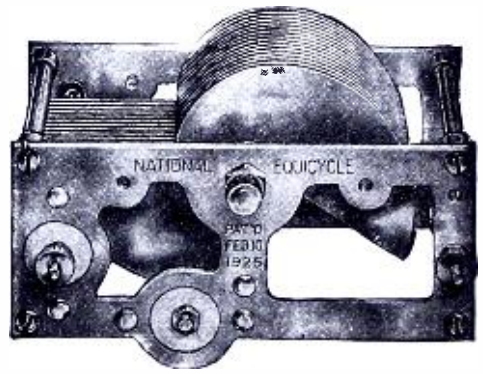
Price— 50 MMF..... **$5.00**
250 MMF..... **6.00**
500 MMF..... **6.50**

The NATIONAL VELVET-VERNIER Dial, Type C, is essentially the same as Type B Dial as far as perfection of construction and operation, beauty of appearance and ease of attachment are concerned. It has the same variable ratio of from 6-1 to 20-1.

But it is designed with a tiny invisible 6-volt lamp which illuminates the dial directly. This lamp can either be separately switched or placed in the filament circuit to act as a tell-tale for the tubes. Extra 6-volt lamps, **$0.20**. 4½-volt lamps, **$0.35** each.

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

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



The NATIONAL "EQUICYCLE" Condenser is a true straight-line frequency Condenser, with three-quarters of a turn instead of one-half. The construction is patented. The entire condenser is built of aluminum, with brass working parts and Isolantite insulation. Volney D. Hurd, Radio Editor, THE CHRISTIAN SCIENCE MONITOR, has said of this condenser: "It changes a mob into an orderly procession and lengthens the line of march." This quality of great separation of stations is not to be disregarded in these days of shifting wavelengths and overcrowded frequency bands. Prices include either Type A or Type B NATIONAL VELVET-VERNIER DIAL. Add 50c for Type C illuminated dial.

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

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

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

Price—NATIONAL IMPEDAFORMERS,
Type B, each..... **$5.50**

The NATIONAL Radio set essentials listed above, may be easily built by you into a modern receiving set, capable of distance, able to separate stations sharply, of fine appearance, easy to operate and easy to listen to. Send for Bulletin 116-CB. Be sure you get the genuine NATIONAL products.

NATIONAL COMPANY, Inc.

W. A. READY, Pres.

110 BROOKLINE STREET *Engineers and Manufacturers* CAMBRIDGE, MASS.

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

A Browning-Drake Receiver with Impedance Coupled Amplification

This Is a Very Popular Circuit for Home Construction and if the Following Construction Data Is Carefully Followed Will Give Very Satisfactory Results

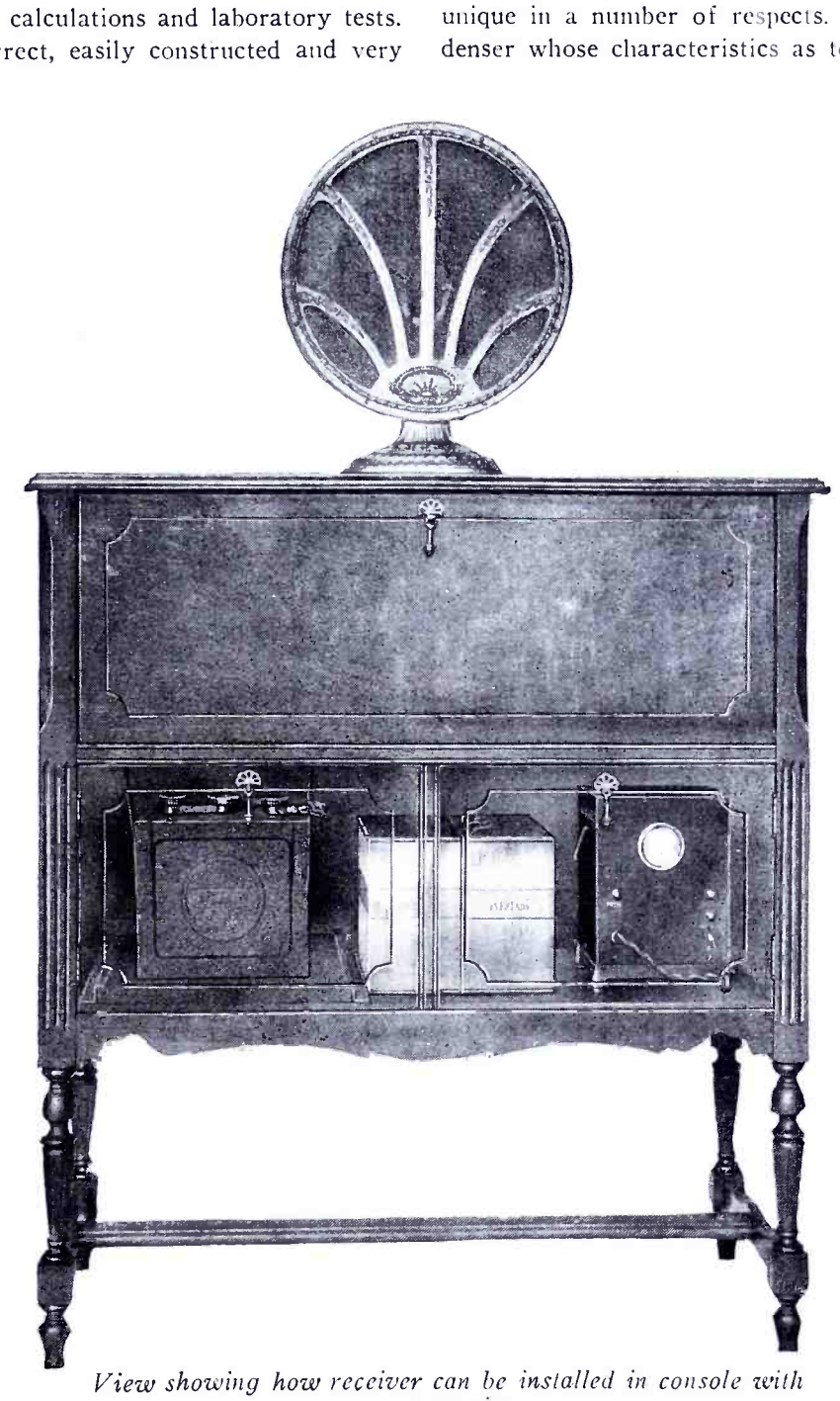
This Receiver and All Illustrations Prepared in the Citizens Radio Laboratory

NE of the few circuits which have been the most prominent in their popularity with the home constructor is the Browning-Drake. This remarkable receiver was designed by G. H. Browning and F. H. Drake of Harvard University, and he result of careful mathematical calculations and laboratory tests. e fact that it is scientifically correct, easily constructed and very cient accounts for its popularity.

Continued experimentation on part of the manufacturers of Browning-Drake tuning units, h the improvement of the same view, has developed a new type unit which, while different from original, incorporates new de- n and methods which combine to ke the performance of the new paratus superior to that of the .

The primary of the new type of nsformer is wound on a short gth of Bakelite tubing which has ontinuous groove across its out- e surface in a manner similar a screw thread. The wire con- uting the primary rests in this oove. The short length of tub- bearing the primary is inserted hin a larger tube upon which is und the secondary, also in a oove. The winding on the an- na coupler is identical in me- anical construction to the sec- dary of the transformer. The essary connections are made thin the units and the tap and ds of the windings are soldered the combination eyelets and sol- ing lugs which in the case of transformer hold the two tubes the correct position so that their oper inductive relation is main- ned at all times.

The advantages of winding the ils by this method are obvious. hard drawn copper wire is used ich has a flexible enamel baked on its surface. Unlike the for- r wire, using a dyed vegetable re insulation, the enameled wire s an extremely low skin resistance to radio frequency currents. In dition the wire is mechanically spaced upon the tube and rests in a oove which prevents slipping and establishes a snug job of wiring thout the use of an adhesive. Vegetable fibre insulated wire is bject to absorption and drying out of water vapor as well as being excellent collector of dust. In as much as the enameled wire can- t be affected by water vapor and since the dust gathering upon the coil may be easily wiped off, the superiority of an enameled wire over an insulated wire is self-evident.



View showing how receiver can be installed in console with accessories

Another improvement in the units is the replacing of the tuning condenser by an Equicycle variable condenser. This new condenser is unique in a number of respects. It is a straight line frequency condenser whose characteristics as to capacity, when used in conjunction with the correct inductive value, are such that the waveband between 200 and 600 meters, or 1500 kilocycles, is within its tuning range. The shape of the plates of the condenser are such that the stations as "tuned in" will be evenly spaced according to the numbers appearing on the dial face. This feature in itself is not new but in this new design the total rotation of the rotary plates is 270 degrees instead of the customary 180 degrees which has been the practice in condenser construction. The added ninety degrees allows a wider spacing of the high frequency stations. The high efficiency of this new type of condenser is no doubt the result of insulating the stator from the rotor by using a newly discovered dielectric material, known as "Isolantite." This substance was only developed after long research and is now recognized as one of the best insulators of radio frequency currents.

The circuit used in the new Browning-Drake receiver is identical to the original circuit. The tuner consists of one stage of balanced tuned radio frequency amplification and a regenerative detector. Sufficient signal strength is obtained by amplifying the detector output by passing it through three stages of impedance coupled audio frequency amplification. This receiver is ideal for any locality due to its selectivity and the wonderful tone quality.

Most types of amplifiers and loud speakers at present reproduce most efficiently sounds about two octaves above middle "C." Above and below this pitch the response is much less. At 200 and 5,000 cycles practically no sound will be heard. This difference between the efficiency at about 1,000 cycles and other points above and below is responsible for the harsh and "tinny" quality so frequently experienced in the average receiver.

The impedance coupled amplifier is so nearly uniform in efficiency

throughout the audible range of frequencies that all the notes from the lowest qualities of human voice and of musical instruments are preserved. The impedance units used in this receiver permit perfect reproduction of tones as low as 25 cycles per second. Thus the mellow harmonious background of the contra basses and cellos is not lost, and the full effect of an orchestra or organ made available. Impedance coupled amplification will become more popular with the constructors of receivers, as its superiority in tonal color and musical range is better appreciated. In all tests with this circuit a cone speaker gave the best reproduction.

The Impedaformers used in the Browning-Drake receiver, described herewith, have the correct value of stopping condenser and resistance supplied with the unit and connected to the proper terminals inside of the container. One unit is marked "1st Stage" and can only be used for that purpose. A .001 mfd. fixed condenser is shunted across the "B Positive" and "P" terminals of the first Impedaformer.

Amperites are used to control all tubes with the exception of the detector tube. The radio frequency tube has a rheostat in addition to the Amperite to modify its filament current, while the detector has only a rheostat controlling it. This arrangement allows either UX 201A or UX 199 tubes to be used. The only change necessary to modify the receiver so that 199 tubes may be used is to replace the Amperites with those rated for 199 tubes operated from a 4-volt battery. The rheostat controlling the detector tube and the radio frequency tube rheostat are not changed. A power tube is used in the last stage of audio in both cases. With the 201A tubes a UX 112 tube is used, while a UX120 tube is used with the 199 tubes. The correct "C" battery bias for either of the power tubes will be found on the circular supplied with the tube.

The radio frequency amplifier is a UX 199 tube regardless of whether 4- or 6-volt tubes are used. This is necessary for best results with this receiver, as it is easier to balance and neutralize this type of tube.

If you want this circuit to work properly, be very careful when you neutralize the radio frequency tube. Insert the phone plug in the speaker jack, thereby connecting the speaker to the output of the amplifier, with the radio frequency tube in its socket. Tune in a strong signal placing the tickler coil just below the point of oscillation. Remove the Amperite controlling the R. F. tube and with a long-handled screw driver or piece of formica sharpened at one end, turn the set screw on the Variodenser counter-clockwise as far as it will go. Now, turn the screw clockwise until a "pluck" is heard in the speaker. At this point the signal that you previously tuned in should be at a minimum. Replace the Amperite. If the receiver howls, turn the screw on the Variodenser clockwise slightly until the howling disappears.

Photo A shows a front view of the completed receiver. It will be noticed that there are two major controls for wavelength and one control for regeneration. Of course, the best results and the greatest sensitivity are obtained when the tickler coil is kept just below the point of oscillation. A tap is provided on the antenna coil for short or long antenna. This is controlled by a jack switch shown in the lower left hand corner of the panel. For all practical purposes the position of the switch can best be determined by experiment. A filament switch is provided to turn on all the tubes at once. Figure 1 shows the drilling and engraving necessary on the panel.

Photo B is a rear view of the completed receiver. It will serve as a guide for the constructor so that he will not experience any trouble in connecting up the instruments. Figure 2 shows the baseboard layout

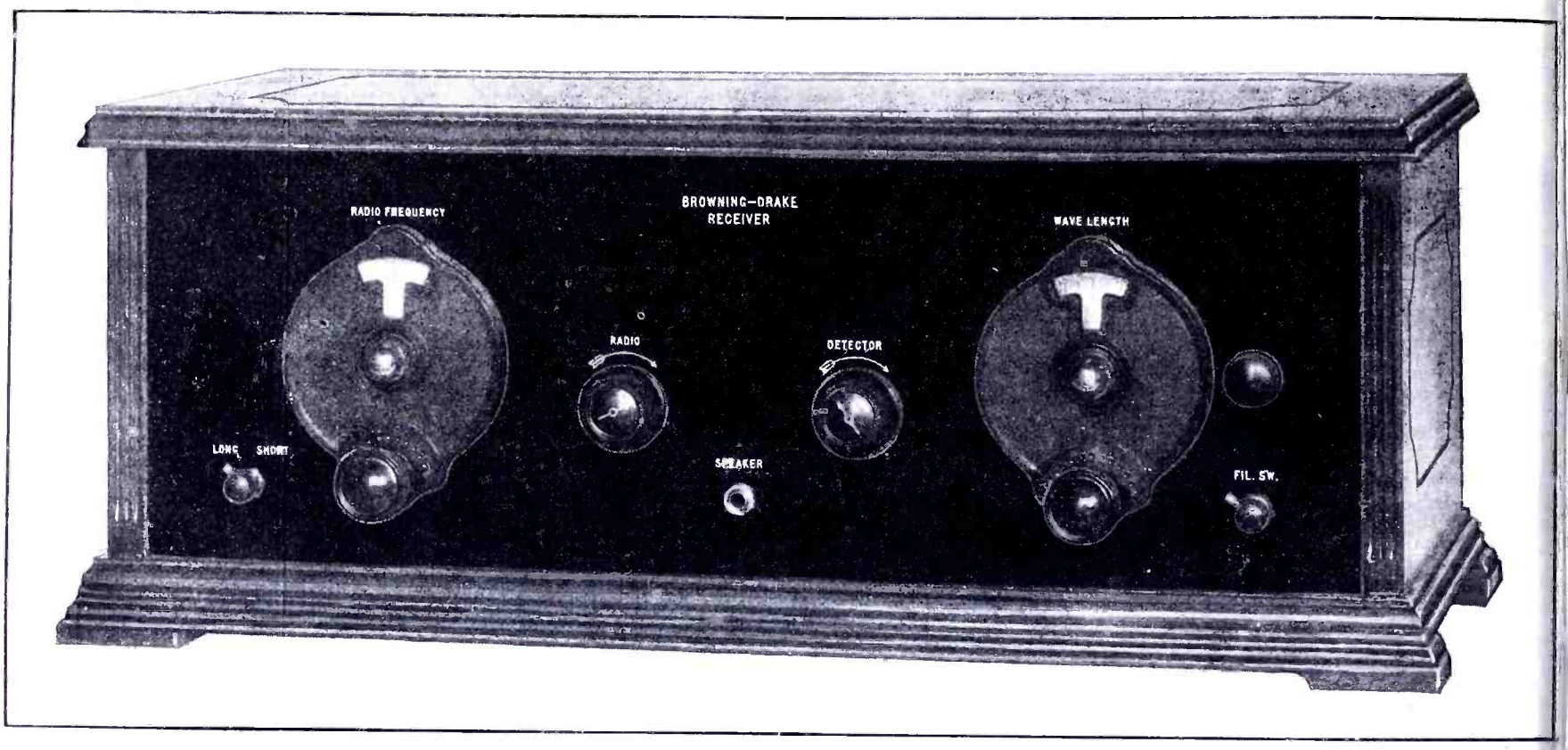


Photo A. Front view of receiver in cabinet

giving all dimensions. We suggest that you follow this arrangement of apparatus to insure a neat job of wiring. No difficulty should be encountered by the builder if he mounts all the baseboard apparatus first and makes all the connections possible. Next the panel assembly should be completed and all connections made that are possible. Then by mounting the panel on the baseboard a few drops of solder will complete the job.

Figure 3 is a graphic illustration showing every connection in the entire circuit. It is advisable to check back against this diagram when the wiring is complete and make sure that every connection is made as specified. For the fans who are more experienced, the diagram in Figure 4 will carry an especial appeal.

A Central Laboratory Modulator plug is used to vary the volume of the speaker. The different stages do not employ separate jacks, as the modulator plug can be varied to eliminate the strongest signal without detuning the receiver.

The new Browning-Drake receiver has been designed with the utmost care, and it is only fair then, that the constructor use care in his workmanship when he assembles the set. It is not possible to make any design proof against carelessness. No set can be made successful unless the instructions are followed accurately, the correct parts used, and real thought and care put into the work.

The original model as constructed in our laboratory has been wonderfully successful in its operation, and these results can be duplicated by anyone who will follow instructions. If, however, the parts are

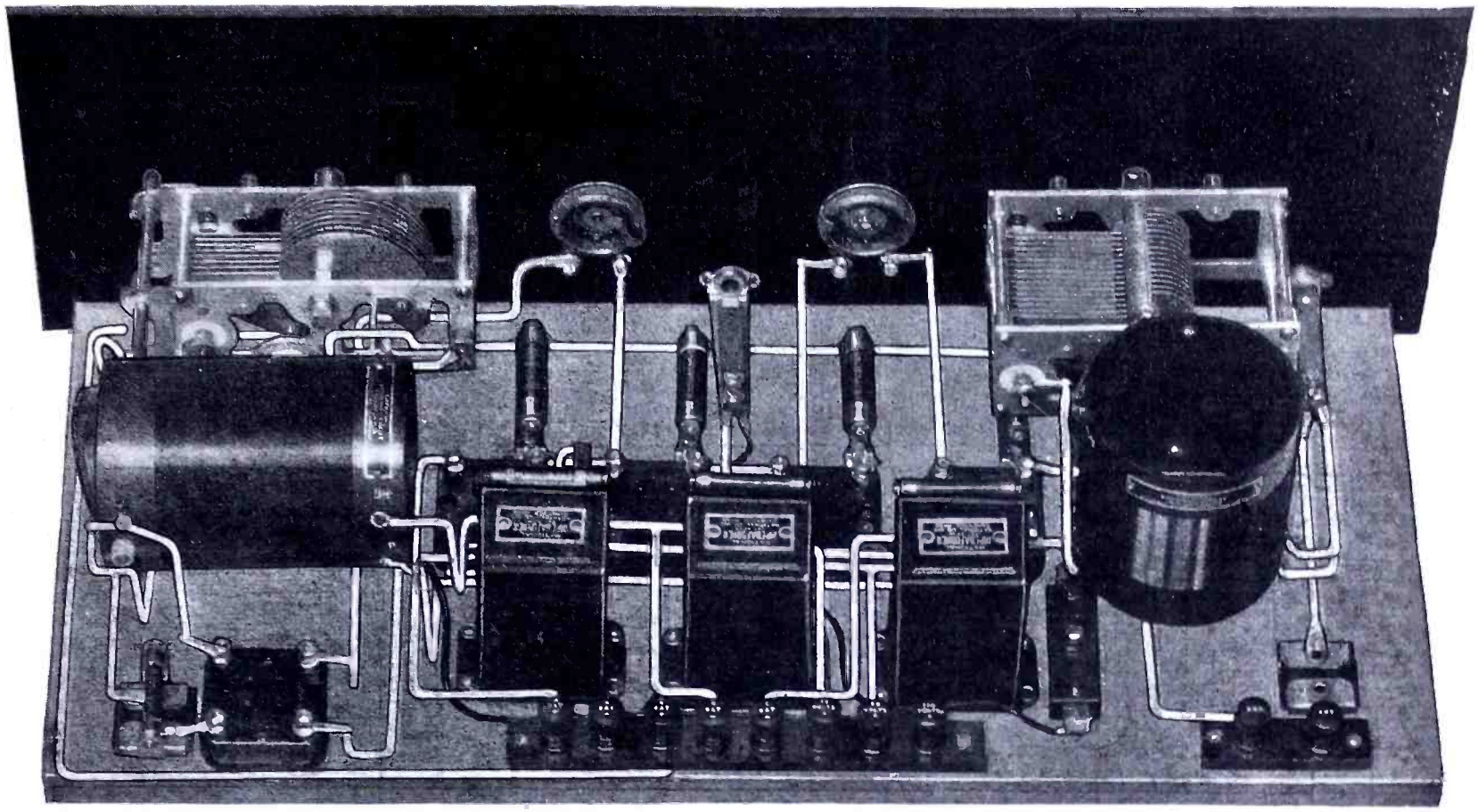


Photo B. Rear view of completed receiver

nnected together in an experimental form, it is not fair to complain you are disappointed in the results.

LIST OF PARTS

These parts or their equivalent will give satisfactory results:

—Drilled and Engraved Micarta Panel.
—6¾"x¾" Micarta Terminal Strip.
—2½"x¾" Micarta Terminal Strip.
—Frost No. 530 UX Sockets.
1—Carter Imp Filament Switch.
2—Carter 25 Ohm Imp Rheostats.
1—Carter No. 3 Jack Switch.
1—National Tuning Unit B-D1B complete with National Vernier Dials and Equicycle Condensers.
1—National Unit B-D-2B.
1—Dubilier No. 601 .0001 mfd. Condenser.
1—Dubilier No. 601 .00025 mfd. Grid Condenser.
1—Dubilier No. 601 .001 mfd. Condenser.

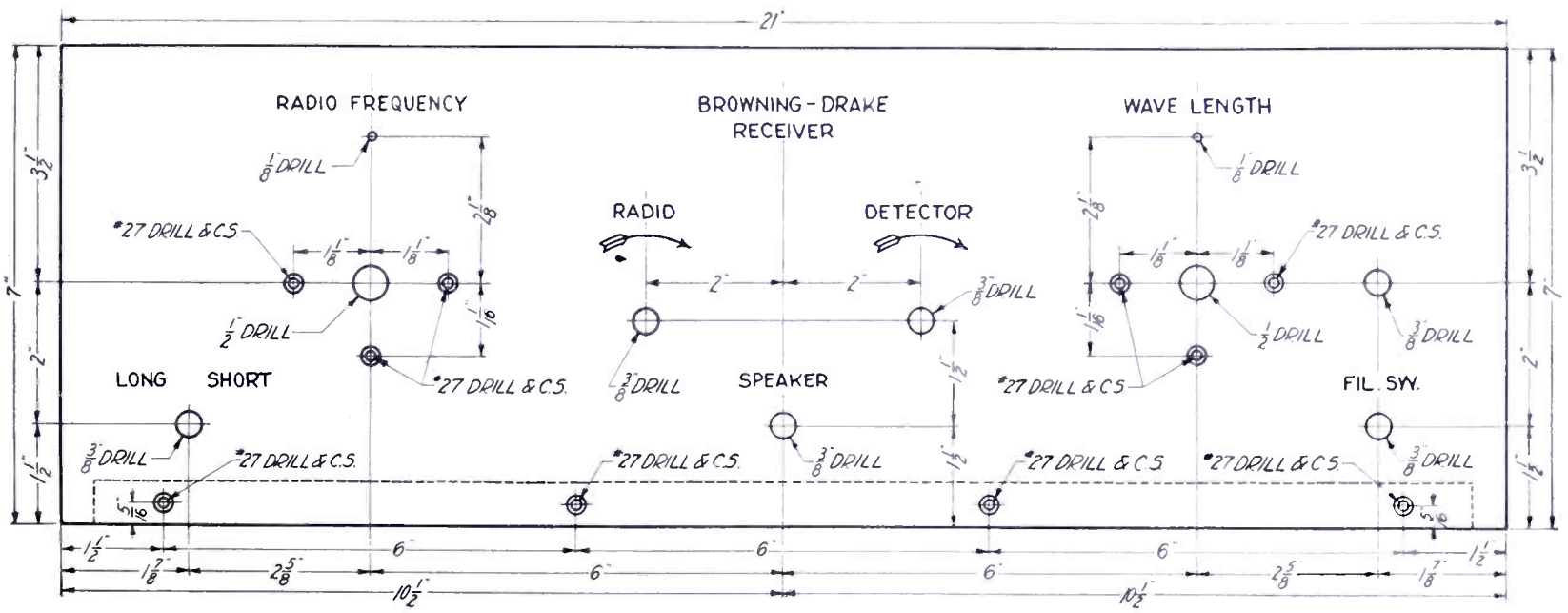
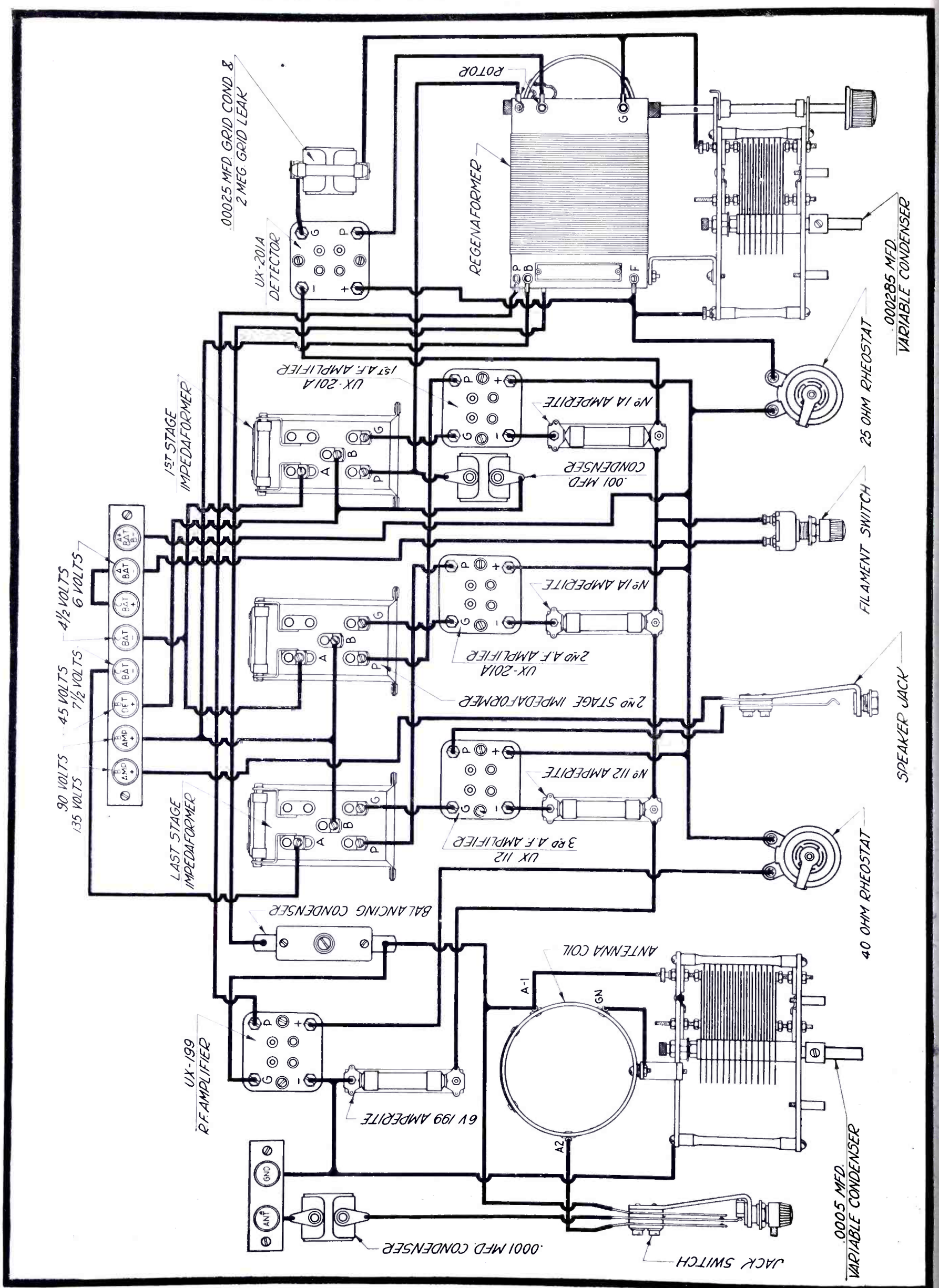


Fig. 1. Panel layout giving size of holes

—No. 112 Amperite.
—No. 6V 199 Amperite.
—No. 1A Amperites.
—Carter Type 101 Radio Jack.
10—Eby Engraved Binding Posts.
1—X1 Model "N" Variodenser.
3—National Type "B" Impedaformers, including one "input stage."
3—1/10 Megohm Lynch Grid Leaks.



1—2 Megohm Grid Leak.
1—Central Laboratory Midulator Plug.
1—20"x9" Wooden Baseboard.
4—doz. large Kellog Soldering Lugs.

One 6-volt 120 ampere hour Willard storage battery, manufactured by Willard Storage Battery Company, Cleveland, Ohio.

One Interstate A battery charger, for re-charging 6V battery from house current, manufactured by Interstate Electric Company, St.

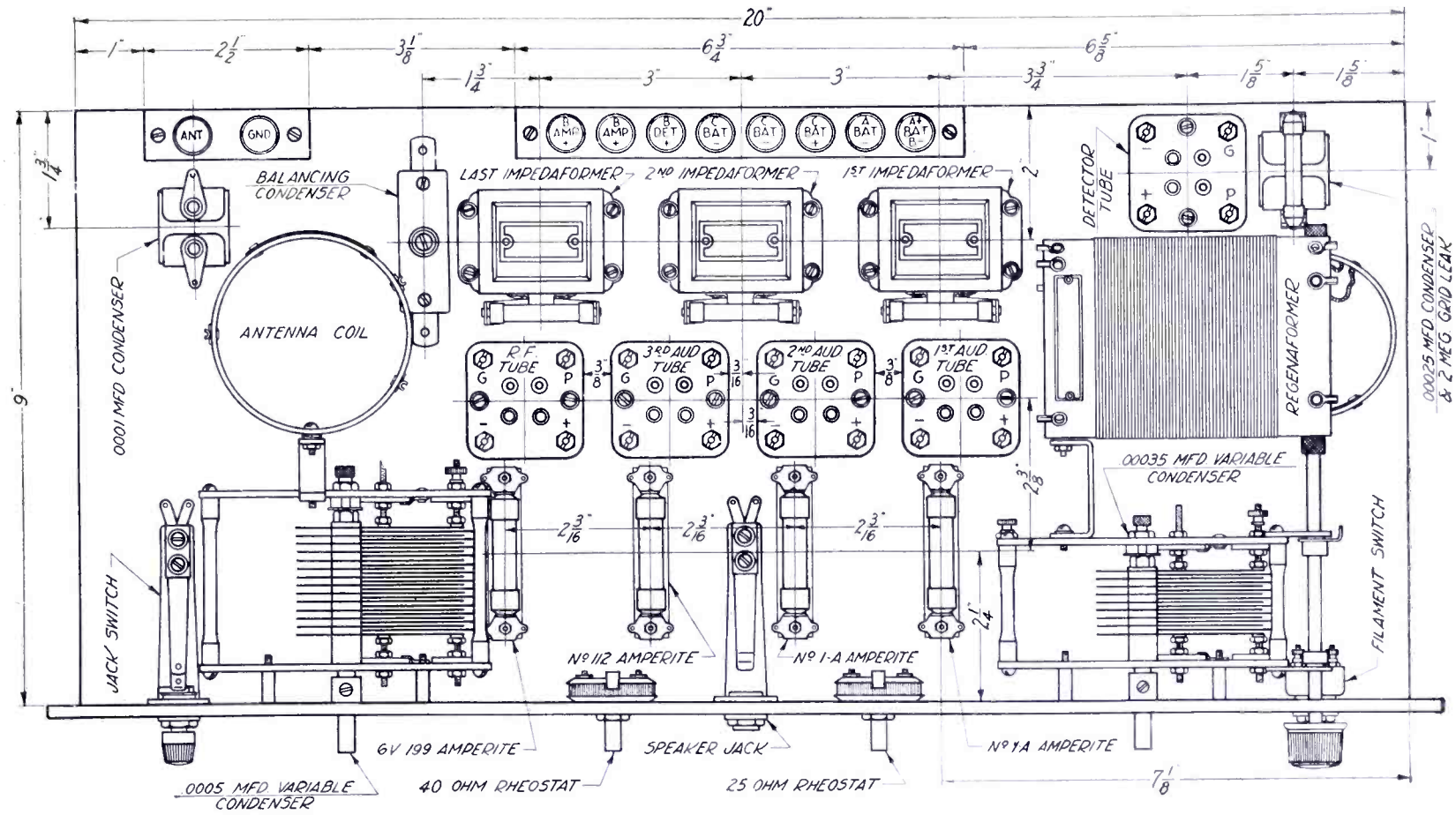


Fig. 2. Baseboard layout showing correct arrangement of apparatus

3—doz. No. 5x5/8" Round Head Nickel Plated Wood Screws.
0—Feet No. 12 Tinned Belden Wire.
4—No. 6x1" Flat Head Wood Screws.
1—Blackburn Ground Clamp.
1—Package Kester Radio Solder.

The accessories shown in this article consist of:

Two 45-volt heavy duty Ever-Ready B batteries, manufactured by he National Carbon Company.

Louis, Mo.

The loud speaker shown is the new Model 9 Thorola cone type with dual diaphram, manufactured by Reichman Company, Chicago.

The console is by the Chillicothe Furniture Co., Chillicothe, Mo.

(*Any of the manufacturers of the above accessories will be glad to supply you with literature further describing these products. Write them direct.*)

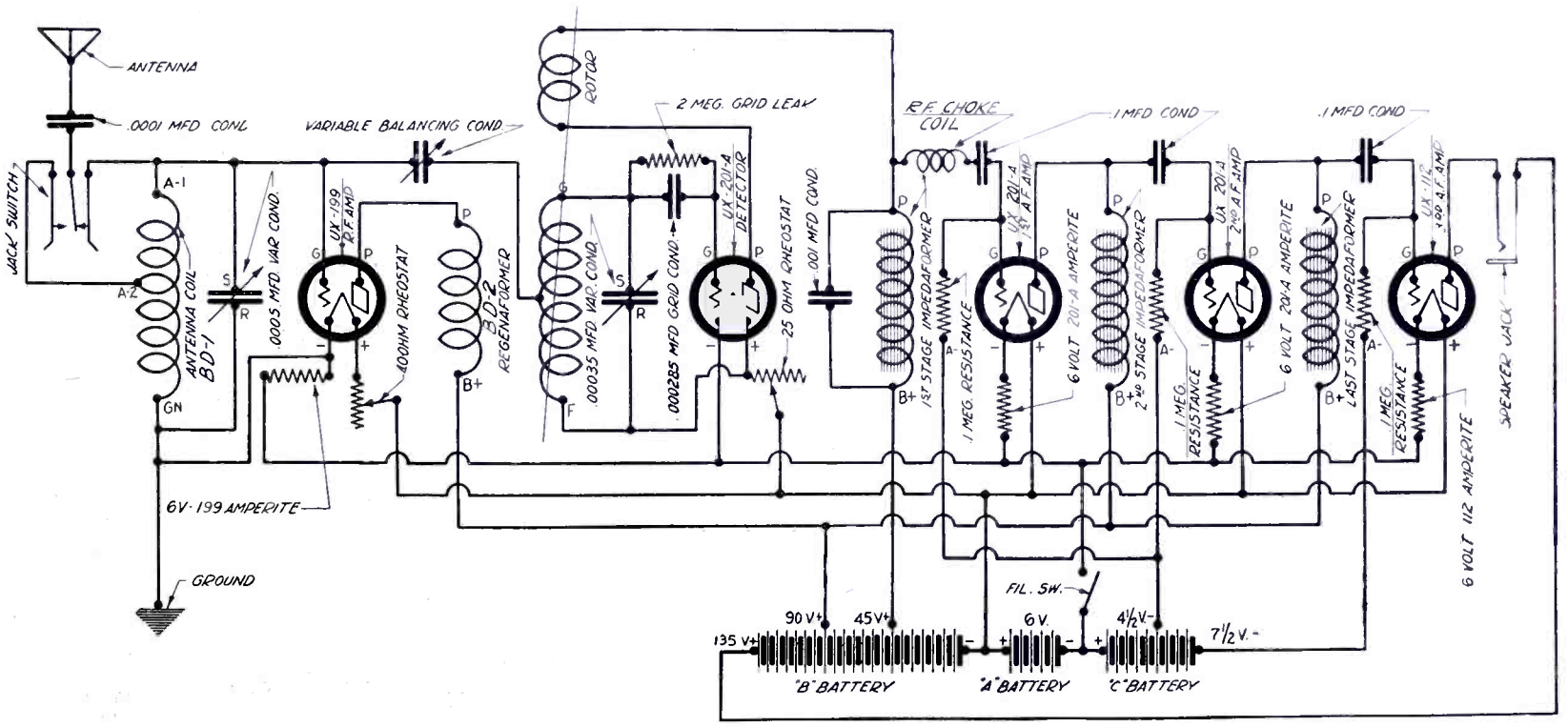


Fig. 4. Schematic wiring diagram

How to Build the Shielded Six

THE receiver pictured in the accompanying photographs is probably the first type of thoroughly shielded tuned radio frequency receiver ever made available to the fan public that might be satisfactorily constructed in the kitchen workshop. The design itself in its more general aspects is certainly not new; for any of the leading receivers as produced by the country's finest set manufacturers incorporate the major points evident in the construction of this particular outfit, which is known as the Silver Shielded Six.

The Shielded Six receiver contains six tubes, three functioning as radio frequency amplifiers, one as a detector, and two as audio frequency amplifiers. In this respect the receiver is unique; for up until this year it has been considered impossible by engineers to construct a receiver containing three stages of tuned radio frequency amplification which could be made to operate stably and efficiently. This the Six does by virtue of certain unusual features in its design which will be described in succeeding paragraphs, and thus it permits of the realization of an ideal in an entirely different direction at the same time, for but two controls are used to operate the entire receiver.

The receiver is mounted upon a seven by twenty-one inch walnut finished brass panel most artistically yet simply decorated. This panel carries practically no equipment and is used merely to conceal the "works" of the receiver behind it. At the left appears one of the major tuning dials which controls the antenna circuit of the receiver, while at the right is a similar dial marked "Station Selector II," which controls the tuning of the second and third radio frequency stages and the detector circuit. Below and to the center is a volume control which also serves to regulate the sensitivity of the receiver. At the right is a small switch turning the entire outfit on and off, while at the left a similar switch allows the use of either a long or short antenna at will, or it may be used to coarsely regulate the degree of selectivity of the receiver.

Behind this panel and fastened to it is a heavy steel sub-base. The sub-base and panel are fastened together by means of the volume control resistance and the on-off and antenna switches, which pierce both the panel and the front edge of the sub-base. This sub-base carries at the left a terminal strip to which the loud speaker cords, the antenna and ground wires and all battery wiring are connected. Thus no wires whatsoever appear upon the front of the panel, even the loud speaker connections being taken from the rear.

At the front of this sub-base are four aluminum stage shields, each containing one of the four radio frequency circuits of the receiver. This type of shielding is particularly advantageous, for not only does it prevent entirely coupling of the various circuits housed in the separate shields as well as eliminate entirely the pick-up of outside disturbances, but it does this in a much more effective way than ordinary shielding. This is because, where two circuits are isolated only by a single thickness of metal, circulating currents are frequently set up in the metal shielding by

Photo A. Front view of completed receiver

one circuit and transmitted to the second circuit. In the case of the Shielded Six, due to the use of two separated walls between each circuit, the possibilities of circulating currents in one shield being communicated through another shield to the other circuits is very effectively obviated.

In each one of these stage shields is contained a specially constructed type of condenser which gives practically straight line frequency tuning over the upper range of the dial or on the lower wavelengths and gradually verges into straight line wavelength tuning on the lower dial readings, or the higher wavelengths. This type of tuning allows of maximum ease of adjustment both in the hands of experienced and inexperienced users. The particularly interesting feature about these condensers is their extreme uniformity, which is absolutely necessary if effective gang control of three circuits is to be accomplished. These condensers are very solidly fastened to the steel sub-base as well as to the bottom section of the stage shields in such a manner that their positions cannot alter and that their capacities may not change appreciably over long periods of time.

The inductance coils used in the receiver are also built for extreme uniformity and, in fact, their inductance will vary in stock production less than one-quarter of one per cent, which is a far greater accuracy than is required for the successful construction of the Shielded Six. These coils are interchangeable

and are plugged into six-contact sockets located in the respective stage shields. Thus if a coil is damaged or in any way injured, it may easily be removed and a new one substituted. Further, the possibility for seasoned experimenters of constructing special coils, say, for the European wavelength ranges, is thus left open.

In each of the three left-hand or RF amplifier shield compartments there are located in addition to the tuning condensers and inductance coils a tube socket, a by-pass condenser and a stabilizing resistance. The function of the stabilizing resistance will be considered in connection with the discussion of the circuit and its operation. In the right-hand compartment practically the same equipment is located except that instead of the stabilizing resistance there is a small choke coil which aids in isolating the radio frequency and audio frequency portions of the circuit.

The audio frequency amplifier is of the transformer coupled type and consists of two stages and an output transformer. Because of the characteristics of this amplifier, it is safe to say that the quality obtained from the entire receiver will more than equal

using one or the other of the two positions of the antenna switch in operation. The secondary winding of this antenna coupling coil marked with the numbers 3 and 1 is exactly similar to the secondaries of all the RF transformers and consists of a winding of enameled wire upon six supporting ridges upon a bakelite coil form. These ridges are threaded and the turns of the winding are thus spaced. The shape of the coil is such that practically maximum advantage is taken of every possible factor contributing to efficiency. One very interesting features is the location of this coil directly upon the bottom of the stage shield separated and from it only by the thickness of the coil socket. This spacing has been very carefully worked out and results in effective oscillation control at the lower end of the wavelength range and a pronounced increase in efficiency toward the higher end of the wavelength range; for the radio frequency resistance of the grid circuit actually is lower at 500 meters with the coils shielded than it is with the coils unshielded.

Two methods of securing uniform amplification over the entire

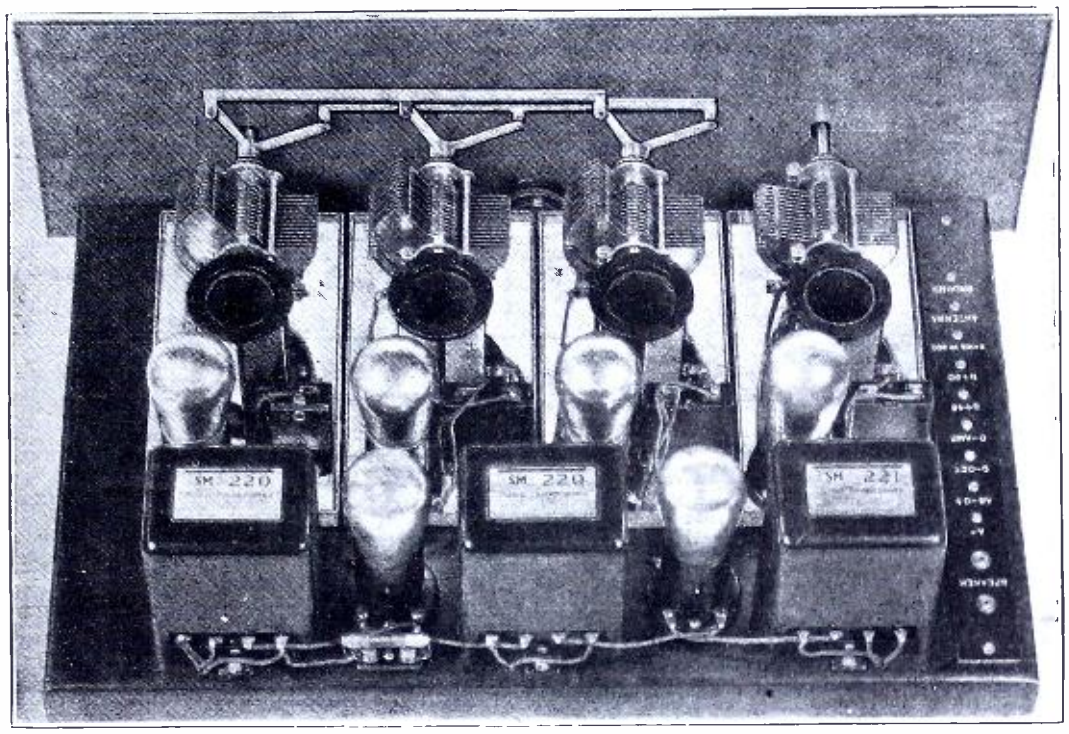


Photo B. Rear view with shields removed

that of any manufactured receiver upon the American market during the 1926-27 season.

The circuit diagram for the receiver is shown schematically and pictorially. For the present, however, only the schematic diagram will be considered in explaining the operation of the circuit and the functions of the various parts. It will be noted in this diagram that there are four dotted line sections marked "631 Shields." Inside each one of these shields appears a certain amount of wiring and certain parts such as coils, condensers, tubes, etc. Beginning at the left of the diagram appears the antenna stage, while next to it is the second radio frequency stage. To the right successively appear the third radio frequency stage and the detector stage, while in the unshielded portion of the diagram to the extreme right appear the first and second audio stages.

An examination of the radio frequency portion of the cricuit will indicate that each stage circuit is completely shielded. Thus in the first or left-hand compartment we find that the shield itself (as are all other shields and metal work in the receiver) is grounded. The antenna lead feeds in through the small antenna control switch at the left of the front panel to the primary of the antenna coupling coil No. 116A. By means of a tap on this coil, adjustment can be made for either long or short antenna. This also means that if only one size of antenna is used, the selectivity of the receiver can be altered at will within certain limits by

wavelength range of the receiver are employed together with a variable control, the purpose of which will be considered later. The first of these methods is by means of a resistance which is included in the grid circuit of each RF amplifier tube. This resistance combines two effects—one inductive and the other resistive. The theory of the operation is that in any tuned RF receiver as the wavelength at which it is operated decreases, the tendency to oscillate increases. This is obviously an undesirable condition inasmuch as maximum amplification will be obtained only with a uniform amount of regeneration at all wavelengths, which is impossible without some means of compensation. The first means employed in the Six is the grid resistance, the radio frequency resistance of which increases fairly rapidly as the wavelength at which the receiver is operated decreases. Thus these resistances serve to even up the amplification over the entire wavelength range and to allow the receiver to be operated in an extremely sensitive condition both at the high and low ends of its range.

The resistances alone are not depended upon for adequate oscillation control, however. A small tickler winding "2" and "6" is used in each stage which serves to control regeneration in the stage since each stage is individually so designed that without the resistance considered it would be in an oscillating condition. With, however, a very careful balance worked out through months of laboratory work, the combination of the grid resistance and

small tickler coil results in a receiver which is not only stable over its entire wavelength range but operates at practically peak efficiency at all wavelengths.

Inasmuch, however, as there are a large number of set users who desire the absolute limit of sensitivity from a receiver, an adjustable regeneration control has been incorporated in the receiver which terminates in the small knob appearing in the lower center of the panel. This resistance controls the sensitivity of the first RF amplifier stage without appreciably reacting upon the adjustments of the second, third and detector stages. The method by which this is accomplished is very interesting and would in itself deserve a lengthy discussion, which would be impossible here. Suffice it to say that as the sensitivity of the first stage is increased, its effective load upon the balance of the receiver decreases and the tendency to oscillate becomes very pronounced. By means of this volume control which cuts resistance into one circuit sumultaneously as it cuts it out of another, the sensitivity and stability of all circuits except the first is maintained constant, while the sensitivity of the first circuit can easily be moved up gradually toward critical regeneration. The value of this adjustment is evident to anyone who has ever operated a radio set.

Each RF circuit is very definitely localized within its shield excepting only the leads carrying energy from one shield to another. By-pass condensers are located in each stage compartment effectually preventing undesirable coupling through B battery or filament wiring. In the detector stage a small choke coil is employed together with a .002 by-pass condenser, which prevents any of the radio frequency component of the detector circuit leaking through into the audio frequency amplifier.

Inasmuch as the antenna characteristics to be encountered under a variety of operating conditions cannot be pre-determined, and as they react upon the tuning of the circuit with which they are associated, the antenna stage of the receiver is controlled directly and without respect to the other circuits. However, the second, third and detector stages have their condensers varied together by a positive link motion, which enables all three circuits to be simultaneously tuned by a single dial. Thus the receiver has but two major operating controls and the finding of a station becomes a surprisingly simple matter, for both of these dials will have practically the same readings for a given wavelength.

The audio frequency amplifier incorporates a pair of extremely heavy audio transformers designed with a rising low frequency characteristic. This means that they will provide maximum amplification and maximum power handling capacity at low frequencies in the neighborhood of 30 cycles and that the amplification will fall off gradually as the frequency increases. The reason for this is that in modern broadcasting equipment an exactly opposite tendency is evident which results in distortion with amplifiers which will give practically perfect amplification of themselves (and of which practically none exist). With the transformers used, these variations in broadcasting and further discrepancies in loud speaker design are compensated for with the result that surprisingly faithful reproduction is obtained from the receiver, as judged by the human ear. The use of an output transformer allows a power tube to be employed with practically any plate voltage that the builder may desire. This output transformer prevents the overloading of loud speakers, preserves and improves their efficiency and further compensates for their very poor performance at low frequencies—the average loud speaker will hardly produce a sound with quite a strong signal applied at 30 cycles.

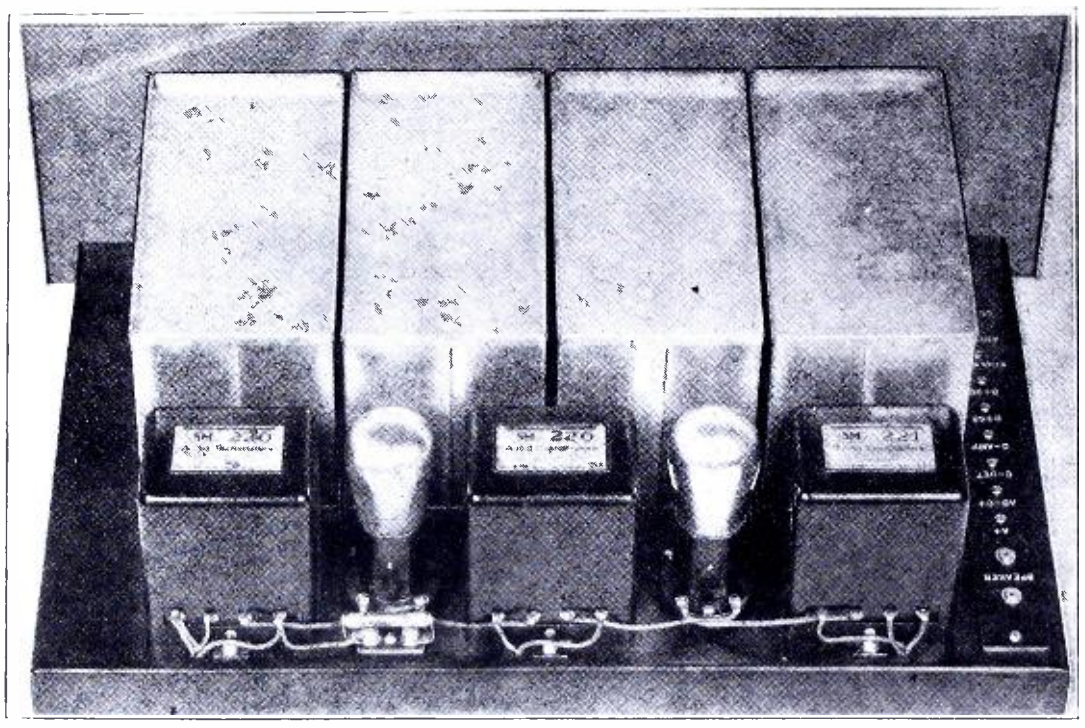


Photo C. Rear view of receiver completely wired with shields in place

The output transformer, by virtue of its design, does much to correct this condition.

In all of the circuits UX201A tubes are used except in the first or second audio amplifier. In the first audio amplifier either a UX201A or UX112 tube is used, whereas in the second audio amplifier a UX171 or UX210 tube should be used with the highest available plate voltage in order that maximum quality of reproduction may be obtained. No provision is made for adjusting the volume of the received signal in the audio amplifier, this being taken care of by the small volume control knob at the center of the panel.

The parts needed for constructing the Shielded Six are listed below and may be procured in complete kit form.

It is essential in any event that the coils, coil sockets, stage shields, tuning condensers and link motion be procured in kit form, as unless this is done they will not be carefully measured for operation together and will not operate satisfactorily. When the parts are purchased in kit form, they have all been laboratory tested and will operate together without any trouble.

Parts List

4—SM 631 Stage Shields
2—SM 316A Condensers
2—SM 316B Condensers—Long Shaft

4—SM 515 Coil Sockets
2—SM 411 RR Dials
3—SM 115A Coils
1—SM 116A Coil
6—SM 511 Tube Sockets
1—SM 275 Choke
2—SM 220 Transformers
1—SM 221 Transformer
1—Polymet .002 Condenser
5—Polymet 1 mf. Condensers
1—632 Link Motion
2—Carter Tip Jacks
1—Terminal Strip with Terminals
1—Crowe Metal Panel, Pierced

tionary plates in a central position and that there is no tendency on the part of the rotor plates to come close to or scrape on the sides of the stationary plates.

The various parts may be mounted upon the steel sub-base as indicated in the different photographs. All parts should be placed on the sub-base in the positions as indicated from the different photographs and the panel should not be fastened to the sub-base except as one of the last operations.

There is only one caution that need be observed, particularly in mounting the parts—that is with respect to the variable condensers. It is barely possible that after they have been mounted a strain may have occurred which will pull the plates slightly out of alignment, although they are constructed to prevent just this. If it is noticed that as the rotary plates are adjusted there is a tendency for them to come closer to one side of the stationary plates than the other, it will be necessary to adjust the positions

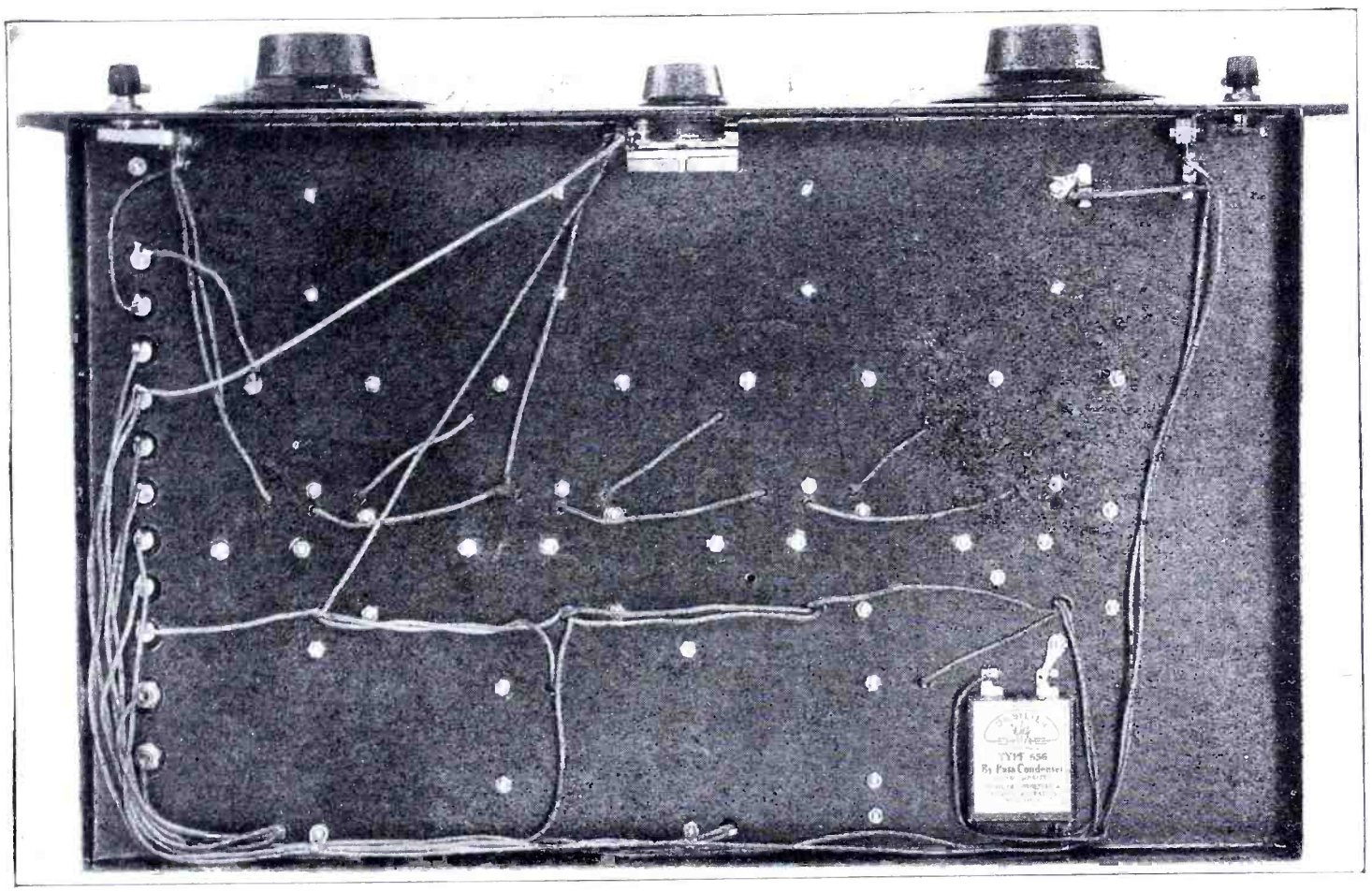


Photo E. Bottom view of metal sub-panel showing arrangement of leads

1—Steel Base, Pierced
1—Yaxley No. 10 Switch
1—Yaxley Special Antenna Switch
1—Carter 25,000 Hiohm
1—Carter .5 Ohm Resistor
3—Carter 200 Ohm Resistors
1—Coil Hook-up Wire
1—Assortment Misc. Parts
1—Polymet 2/10 Meg. Resistance
1—Polymet Grid Leak Mounting

After these parts have been procured, they should be carefully xamined for minor troubles which may have developed in transit nd handling. The jacks and switches should be examined for ood contact as should the tube sockets and coil sockets. The oils should be examined to make sure that the windings have ot been damaged or crushed in any way. The variable conensers should be most carefully inspected to make sure that as he rotary plates are adjusted they interleave between the stator plate sections so that each rotor plate will center up between its two adjacent stator plates when viewed from above. The necessary adjustment of the position of the stator plate sections may be made by loosening the nuts to be found on either side of the bakelite supporting strips, these nuts being actually on the tie-bars of the stator plates. This will allow of shifting the entire stator plate sections to any desired position where they may be locked by means of these same nuts.

The parts having been mounted on the sub-base, the wiring may be put in place using a soldering iron and Belden flexible rubber-covered hook-up wire. No difficulty will be encountered in wiring, as the numbers on the schematic diagram correspond exactly with those on the various instruments. It is advisable either that the wire have its insulation scraped and the ends fastened beneath the terminal screws of the parts or that they be soldered to lugs in turn fastened beneath the terminal screws.

One precaution must be observed in wiring. It will be noticed that two leads run from the left-hand stage shield under the sub-base to the one next to it and from this to the next shield to the right, and, in turn, from this shield to the extreme right shield. These two wires must be kept free and away from all other

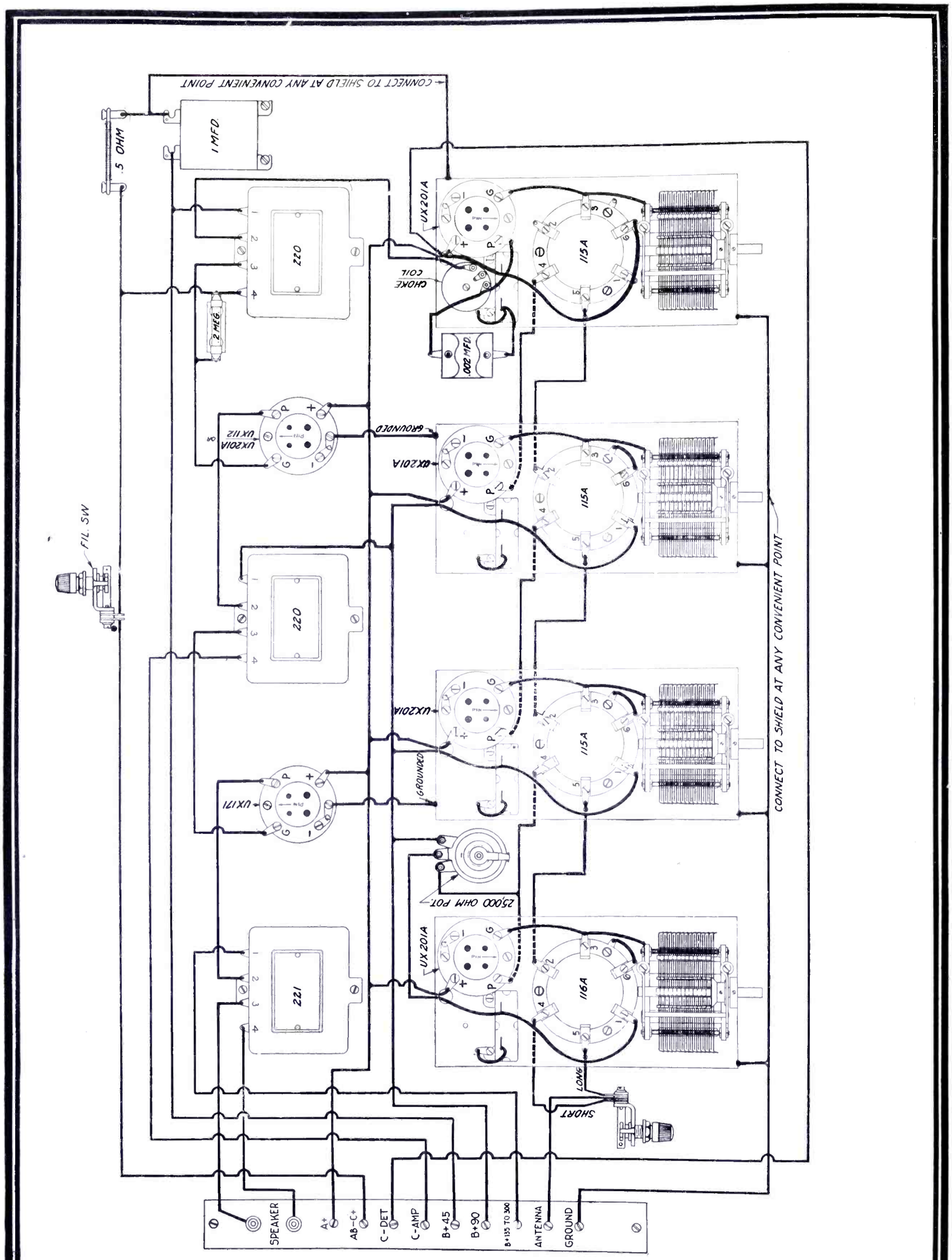


Figure 1. Graphic illustration showing each connection in entire receiver. In the three left shields, the 200 ohm resistors take the place of the connecting wire from "G" to "3"

wiring of the set. This can easily be arranged by carrying all wiring along the back of the sub-base, then around and down along the terminal strip toward the front. This precaution applies to the wiring which is located beneath the sub-panel. The wiring in each stage shield should be made as short as possible, the placement of the individual connections being evident from the photographs. In every case the negative filament connection and the negative B battery connection is made through the shield and metal sub-base. It may be found in assembly that a poor contact will be made and one or more of the tubes may not light due to the lacquering of the sub-base. If this condition is encountered, it may be corrected by removing the lacquer from the bottom of the sub-base at the points where the screws used both for holding down the tube sockets and making the negative filament connections run through the shields and sub-base into their fastening nuts.

After all wiring has been done on the sub-base, the front panel may be attached after the three right-hand condensers have first been ganged. The method of ganging them is to push the link motion over their shafts as illustrated in the photographs. The condensers should then be set so that their rotor plates are just about to interleave with the stator plates, but so that to the eye

135 Volts of B Batteries
C Batteries as Required by Tubes
5—UX201A Tubes
1—UX171 Tube

The batteries should be connected to the terminals marked for them and a 4½ volt C battery used on the detector tubes, though it may be found that 3 volts will give somewhat better results. With the UX171 tube a 22½ volt C battery will be required for the audio amplifier in addition.

The tubes should be placed in their sockets and the coils in their respective sockets. The type 116A coil goes in the antenna or extreme left-hand socket, the 115A coils in the other sockets, while the UX171 tube goes in the socket between the 221 and 220 transformer at the left of the set.

In operating the receiver the filaments of the tubes should be turned on by means of a switch at the right-hand end of the panel, the loud speaker cord tips inserted in the jacks marked for them, and an antenna, either indoor or outdoor and from 30 to 60 feet long, connected to the receiver, as well as a wire termining in a ground clamp on a water, gas or steam pipe. With

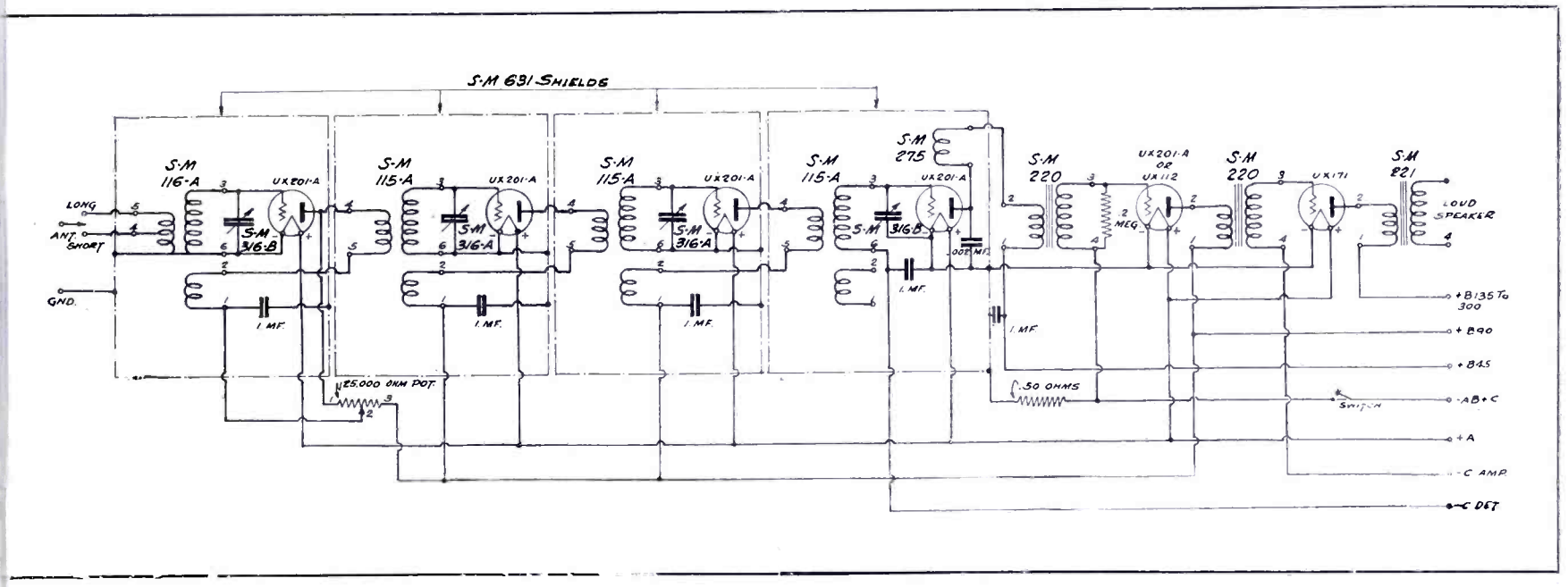


Figure 2. Schematic wiring diagram. In the three left shields the 200 ohm resistors act as the connections from "S" to the tube's grid

there is a tiny gap between them. This gap should be set so that it is uniform on all three condensers and the monkey motion then locked in position in such a fashion that the condensers can be turned only about 1/16 of an inch further out in each case, but so that if the shaft of one is rotated the other three will be carried to the full interleaved position due to the link connection. This having been done, the panel may be attached by means of the two switches at either end and the volume control at the center. The volume control should have been put in previously, before the stage shields went into place. Two washers will be found with the volume control, made of fibre. One of these should be placed on the inside of the sub-base and one on the outside of the sub-base so that no metallic contact will exist between the volume control and the metallic panel. It will be necessary to center the shaft of the volume control resistance in the over-sized holes in both panel and sub-base in order that there will be no connection between the shaft bushing and the panels.

The receiver having been completely wired, it is ready to be put in operation and will require the following accessories:

Accessories

1—Loud Speaker with Plug
1—Antenna and Ground System
1—6-Volt Storage Battery

the antenna switch set in the "long" position the two dials should be varied slowly throughout their range, keeping them in approximately the same relation. Once a station has been found by this method—and it is ridiculously simple—the dial readings should be written down and saved for future reference.

If the selectivity of the receiver is insufficient for congested local conditions, this may be easily corrected by throwing the antenna switch to the short position. No filament rheostat is used on the tubes, a fixed resistor keeping them at a satisfactory operating voltage throughout the normal charge life of the storage battery. No provision is made for adjusting the volume of the receiver by cutting in or out tubes, but rather by the small volume control knob at the center of the panel.

In operating the receiver, if the volume control knob is turned all the way to the right, squeals will probably be heard and the receiver may possibly howl as a signal is being received. It will be found that with this knob set so in the middle of its range, no squealing will be experienced and the receiver may be operated using only the two large dials. If, however, this control knob is set so that the receiver is just ready to squeal, maximum sensitivity for distant stations will be obtained. This is practically always unnecessary where reception from stations with a one hundred mile radius is required under average conditions.

Thus the control for normal operation lies in but two adjustments—the two major tuning dials.

The Madison-Moore Super-Heterodyne Receiver Using 199 Tubes

This "Super" was designed in the Citizens Radio Laboratory and its performance has been quite satisfactory

THERE have been many requests from the readers during the last few months for information and hookups of a Madison-Moore Super-Heterodyne using 199 tubes instead of the 201A type. These requests have paralleled experimental work in our laboratory that has developed and now offers a Super-Heterodyne Receiver operating from UX199 tubes and a UX120 power tube, using the new Type "MM" Madison-Moore transformers designed especially for the small tube. It is in every way a satisfactory set in so far as distance, selectivity, volume and tone quality are concerned, and has the advantage of being built in a much smaller cabinet and due to the frequency used (92,500 kc.) has a much lower noise level than the transformers operating at lower frequencies.

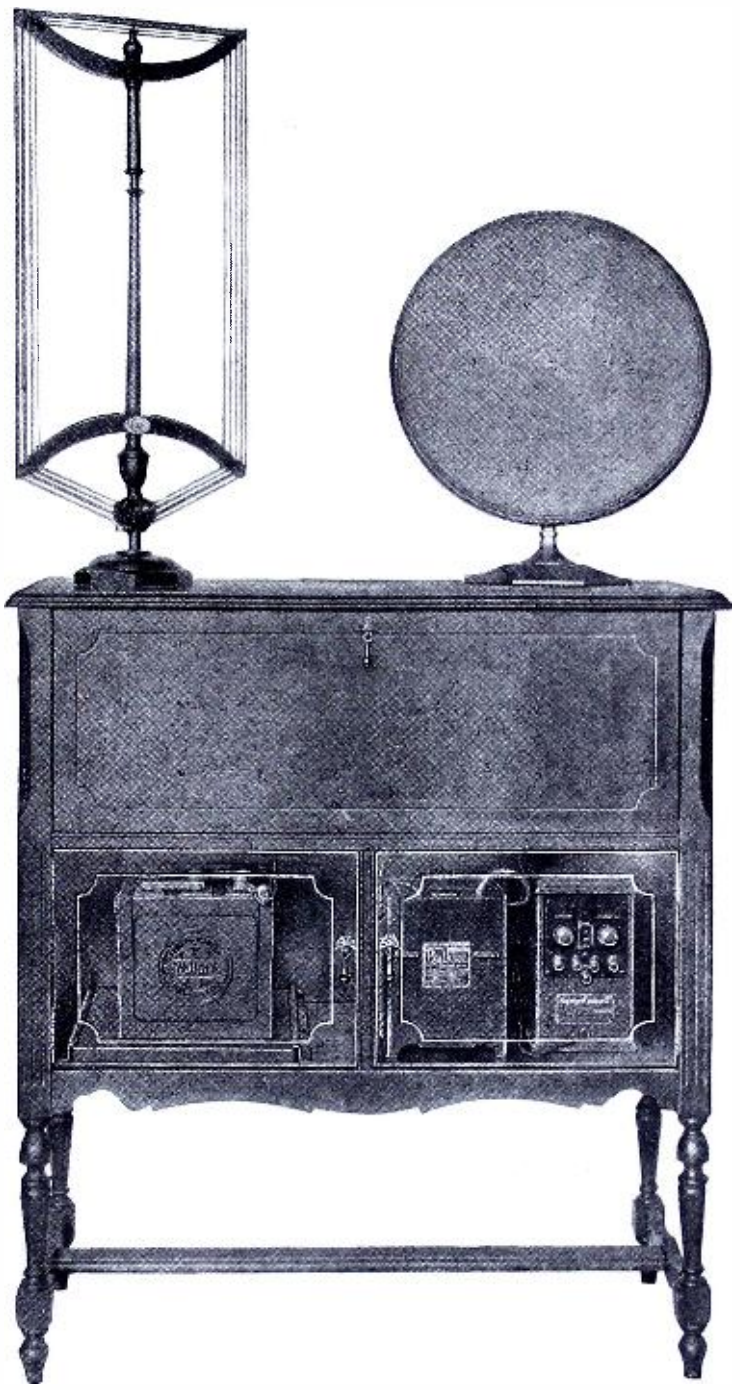


Photo A. Front view showing how receiver can be placed in a console, with suggested accessories

In this receiver, as in the one previously described in the last issue of the "Call Book," using 201A tubes, the first tube is made to act as a partial detector by the 6-volt "C" battery in its grid return circuit. This tube amplifies the signal several times, depending on the character of the tube used and its filament temperature. The No. 1 unit is used as an oscillator, and when tuned with a .0005 mfd. variable straight frequency condenser, it will cover all wave lengths from 200 to 600 meters, and delivers an even output throughout its entire range. The output of this No. 1 unit is not mixed with the signal in the grid circuit of the first tube as is the customary practice. This is a step forward and an original and decided improvement over the old method. The continuous wave current generated by the oscillator is mixed with the partially rectified and amplified signal in the correct amount to replace that taken out by the first tube. This amount is regulated by the position of the rheostat in the filament circuit of the second or oscillator tube. The position of the rheostat for the first and second tube can be determined and left in that position for best reception and quality of tone unless another tube is substituted.

The signal is passed from Unit No. 1 to the primary of Unit No. 2, which is a coupling unit and transfers the energy to tubes and Units Nos. 3, 4 and 5. These units act as intermediate frequency amplifiers and have a peak frequency of 92,500 cycles or a wave length of approximately 3240 meters.

Figure 5 shows the schematic wiring diagram of the receiver. Both the loop and oscillator circuit are turned by .0005 mfd. straight frequency variable condensers. These condensers, the Cardwell Taper Plate Type "E," are a new departure in condenser design, and a short description of them will be interesting. Unlike the average variable condenser of straight frequency characteristics, the rotating plates are concentric in shape and have their weight concentrated close to the rotor shaft, where it exerts but a short leverage. Instead of the usual metal punching, the plates are die cast and machined into a taper which, when the condenser is assembled, allows the rotor to dovetail into the stator in such a manner that the spacing varies as the condenser is rotated. As the rotor is turned out from the stator, the spacing increases, and with this increase there is a decrease in capacity, since the capacity is at all times inversely proportional to the amount of dielectric. The taper is so calculated that the tuning characteristic approximates Straight Frequency over the lower part of the dial but the curve falls off sufficiently to give a slightly greater separation on the longer wave lengths than absolute Straight Frequency would secure.

The filament temperature of the oscillator tube is controlled by a 40-ohm rheostat. While the voltage applied to the oscillator tube is not very critical, a slight excess will cause undesirable oscillations. The first detector tube is regulated by a 40-ohm rheostat. A 20-ohm rheostat controls the three intermediates whose filaments are connected together in parallel. The voltage applied to the radio frequency tube is indicated by the Weston Voltmeter mounted on the front panel. The normal operating voltage of the intermediates is from 2¼ to 2¾ volts. Poor tubes may require a slightly higher operating voltage. A 25-ohm Yaxley variable resistance is used to control the second detector tube. It is adjusted once for best results while the receiver is in operation and then allowed to remain set. Each of the audio tubes is regulated by a fixed resistance, the first audio tube by a 15-ohm and the second by a 10-ohm. It will also be noticed that the cases of the two audio transformers and the last Madison-Moore unit (No. 5) are connected to the negative of the "A" battery. The other Madison-Moore units are automatically connected to the negative "A" when they are inserted into the circuit.

UX 199 tubes are used throughout the receiver with the excep-

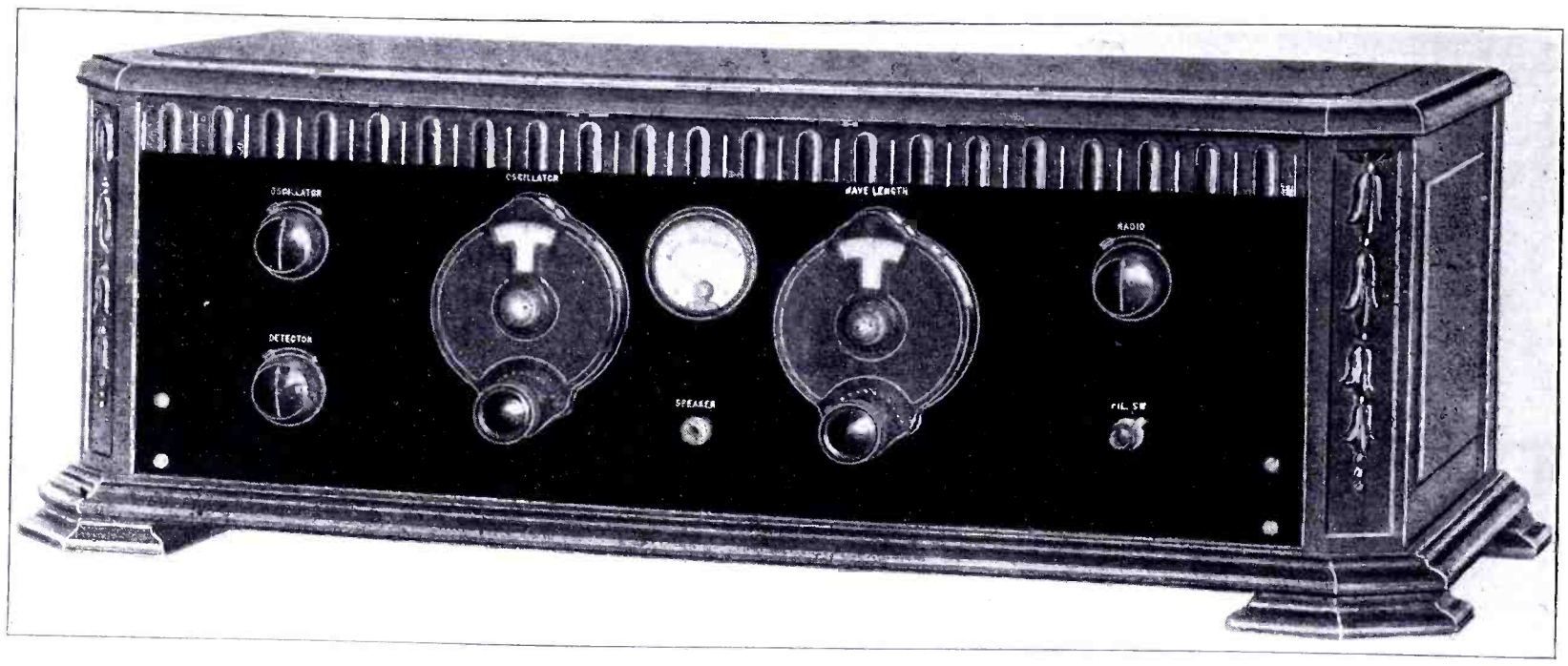


Photo B. Front view of receiver mounted in a cabinet

tion of the last stage of audio; that tube is a UX 120 power tube. The necessary "C" battery voltage is clearly shown on the schematic wiring diagram and the large graphic illustration. The first stage of audio has a negative bias of 4½ volts. Using "C" battery bias allows greater voltage to be used without distortion and brings about a considerable saving in "B" battery current.

All batteries with the exception of the two "C" batteries are connected to the receiver by means of a Jones Multiplug and Cable. The regular color code supplied with the cable is utilized with the exception that the brown is disregarded, and the black, which is usually used for the ground, supplies the receiver with 135 volts "B" potential. The two "C" batteries are connected to the receiver by separate binding posts along the rear edge of the sub-panel.

Figure 1 is a layout of the front panel of the receiver. The correct location of all of the holes is shown, as well as the necessary engraving. In the lower corner at each end of the panel is a pair of holes provided for the correct mounting of the Benjamin brackets which support the sub-panel.

In Figure 2 is shown a layout of the sub-panel. Two sizes of holes are shown. Those holes by which the apparatus is mounted into position are all 5/32-inch drill. Ten holes have an extra circle around them. They are countersunk for No. 6 flat head machine screws and are for mounting the Jones Type BM plug, the supporting brackets, the 1 mfd. by-pass condenser, under the sub-panel, and the Frost jack, which while mounted on the front panel is fastened to the sub-panel with a screw and helps support it. Two more holes are shown with a dotted circle around them. These holes are also countersunk for No. 6 screws, but from the under side of the sub-panel. They are used for mounting the Madison-Moore Unit No. 3 into place. The remaining smaller holes, which appear black, are the holes through which the wires pass from one side of the panel to the other. If the constructor does not wish to lay-out the wire holes he can just drill the apparatus mounting holes and then fasten the various parts to the sub-panel, after which the necessary wire holes may be drilled with a small hand drill as they are required.

It is a comparatively simple matter to assemble and completely wire the Madison-Moore Super-Heterodyne Receiver. By referring to Figure 3, the Baseboard Layout, the correct placing of the parts may be easily accomplished. Care should be taken that the apparatus be mounted in such a manner that the terminals bear a correct relation to the other parts. The apparatus shown mounted on the sub-panel is clearly marked for this purpose. The Madison-Moore units are fastened into place first. Then the Jones Plug, the three by-pass condensers, the supporting brackets, the grid leak and condenser and the two fixed resistances should be mounted under the sub-panel. The remaining parts which mount on the top surface of the sub-panel are then screwed down. The front panel is also assembled, but is not fastened to the brackets.

It is advisable that soldering lugs be placed under all terminals to facilitate soldering and assure a positive contact. Insulated wire may be used in hooking-up the receiver, although it is not

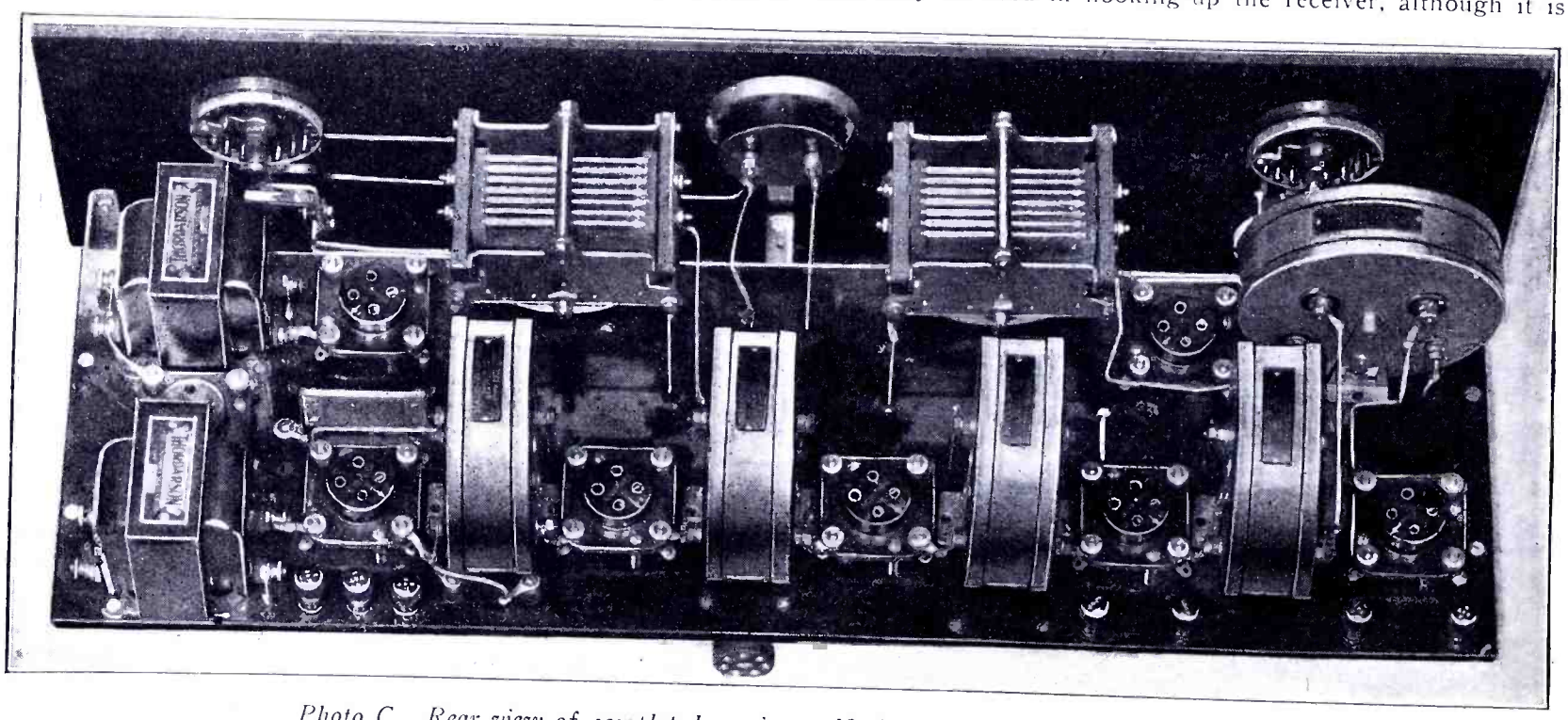


Photo C. Rear view of completed receiver. Notice the neat arrangement of parts

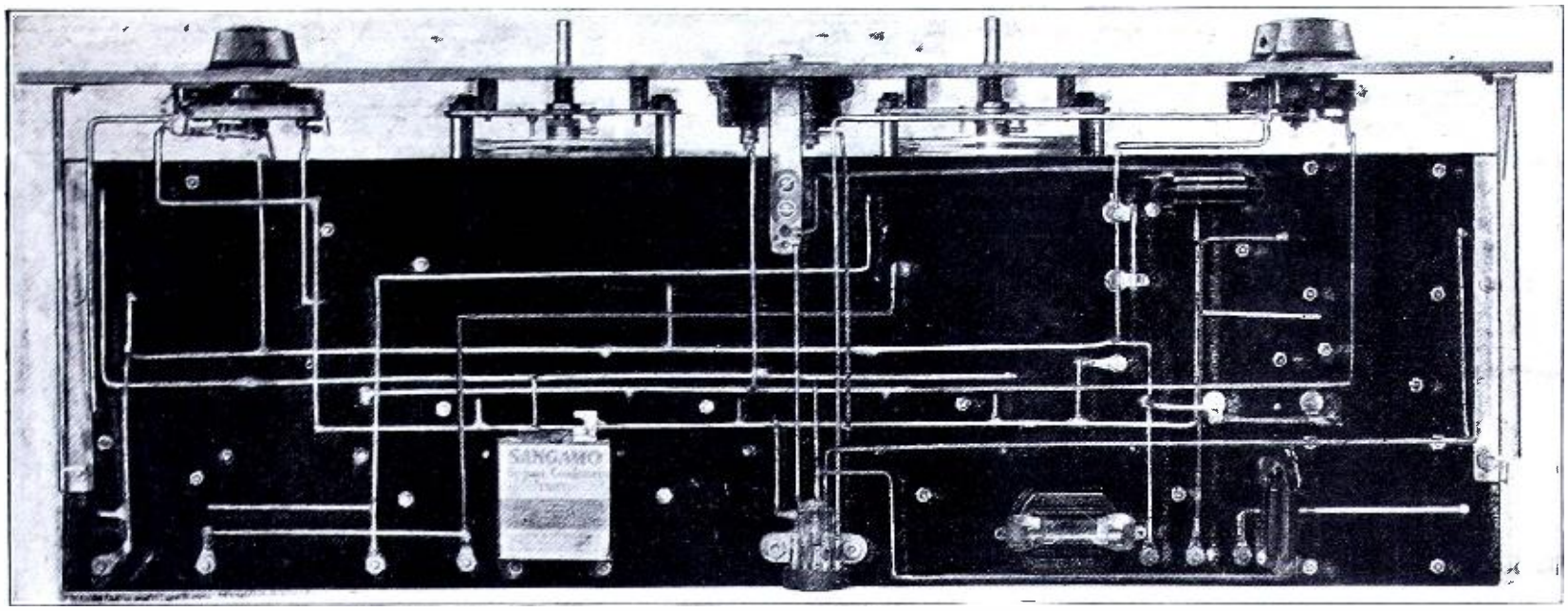


Photo D. Bottom view of sub-panel showing how all leads can be neatly arranged

necessary. Practically all connecting wires are below the sub-panel. Those plate and grid leads which must be short are above the panel. The wiring under the sub-panel is kept against it as much as possible. The constructor will have no difficulty in hooking up the receiver and making a neat job of it, if he follows the various photographs and illustrations accompanying the article. After all possible connections have been made on the sub-panel assembly, the front-panel is fastened into place and the wiring finished.

After all wiring has been completed, carefully check all connections by referring to Figure 4. Make those corrections which are necessary and then connect a 4-volt "A" battery to the proper terminals and insert the tubes in their sockets. Test all tubes as to operation; observe whether they are controlled by the proper rheostat or resistance. Touch the "A" positive battery wire to each of the other terminals on the Jones Plug. If the tubes do not light up except when the "A" battery is applied to the proper terminals, it is safe to connect the "B" and "C" batteries. However, if any of the tubes light up it is an indication that something is wrong and a mistake has been made in the wiring. Carefully recheck all connections until the mistake is found. Repeat the "A" battery test and connect the other batteries, the loop and the speaker to the receiver.

If a station is on the air the receiver should respond at once.

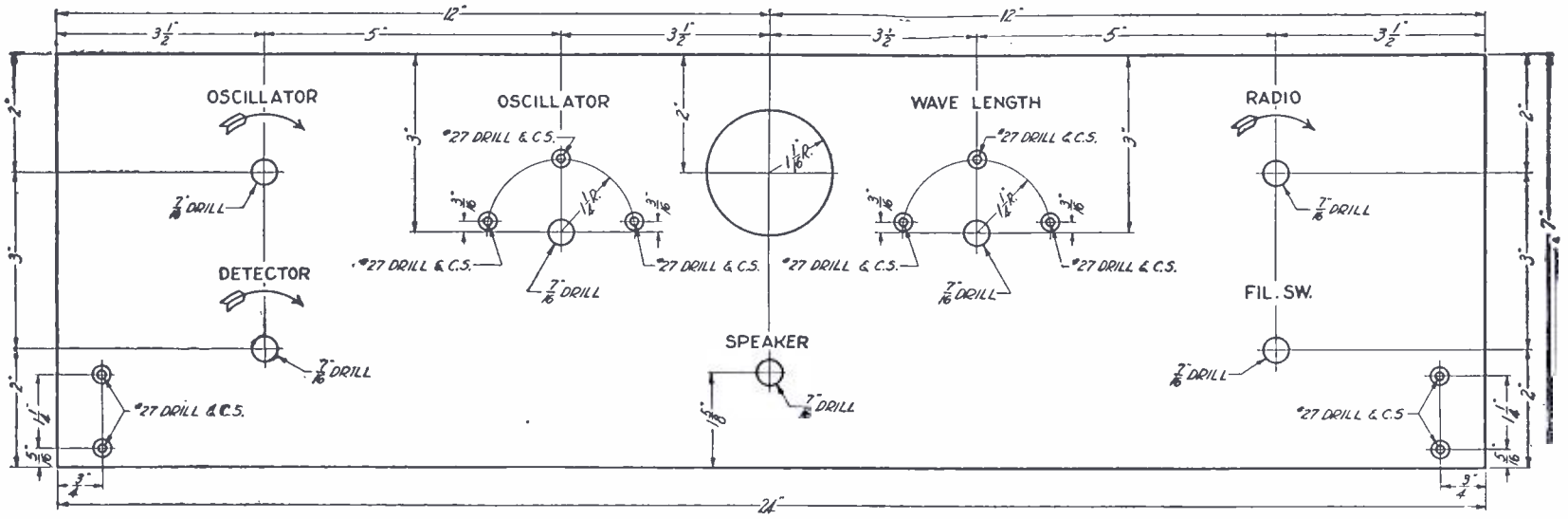


Figure 1. Panel lay-out, showing size of holes to drill, and suggested engraving

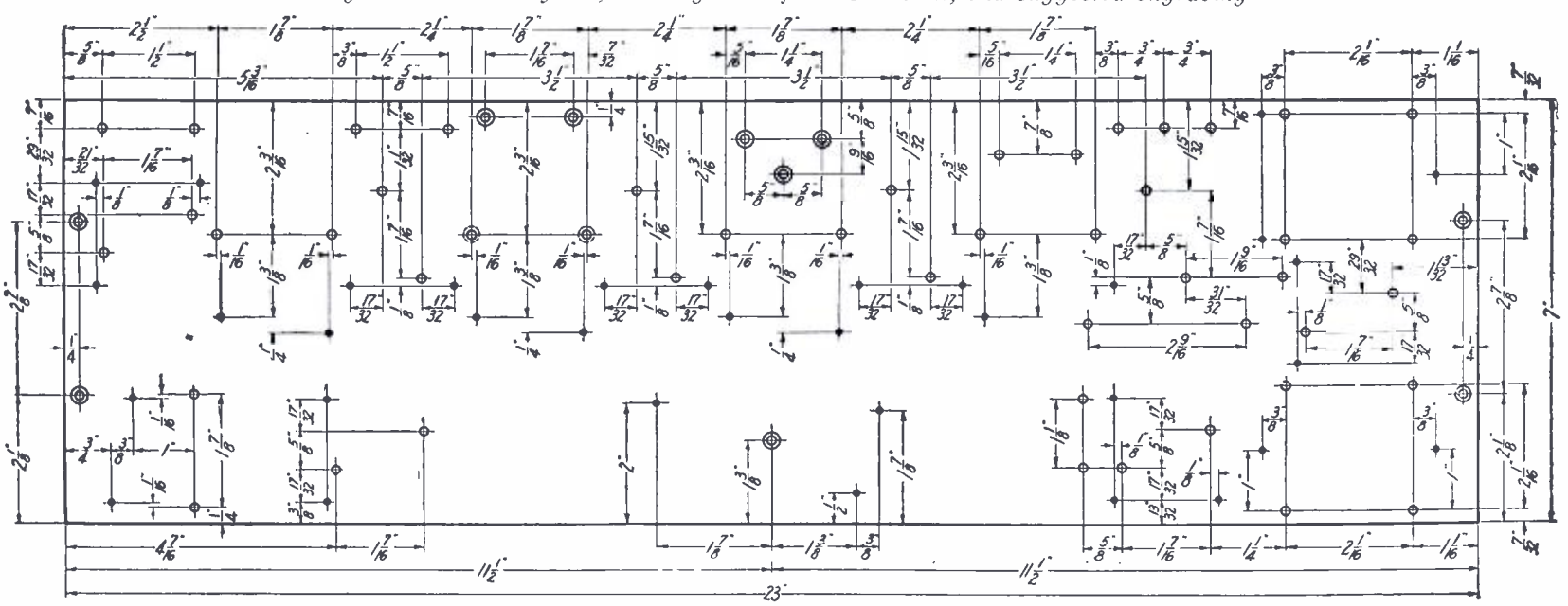
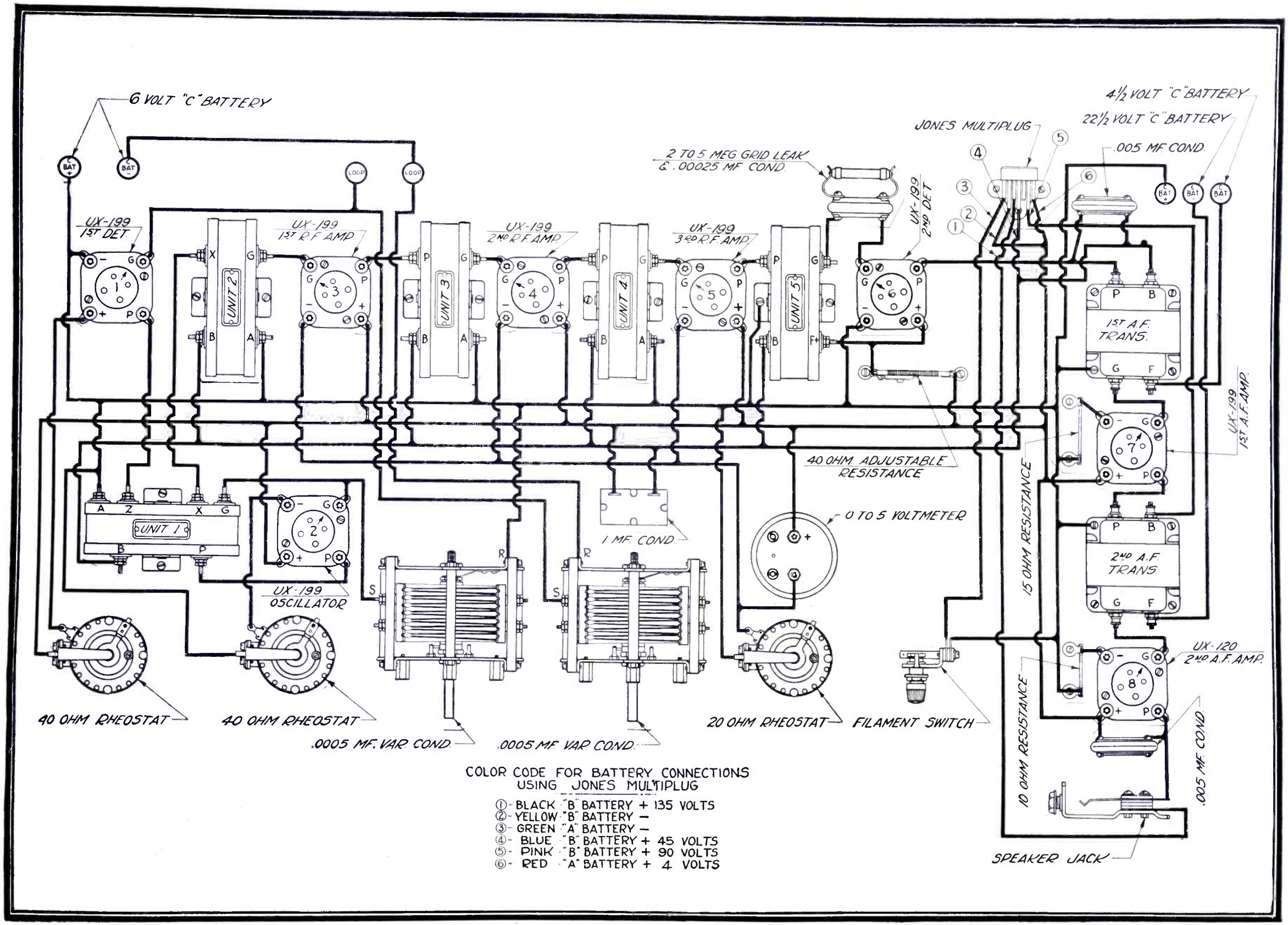


Figure 2. Sub-panel template showing how to drill holes for mounting apparatus and running wires through sub-panel to make connections



COLOR CODE FOR BATTERY CONNECTIONS
USING JONES MULTIPLUG

① - BLACK "B" BATTERY + 135 VOLTS
② - YELLOW "B" BATTERY −
③ - GREEN "A" BATTERY −
④ - BLUE "B" BATTERY + 45 VOLTS
⑤ - PINK "B" BATTERY + 90 VOLTS
⑥ - RED "A" BATTERY + 4 VOLTS

Figure 4. Graphic wiring diagram showing all connections

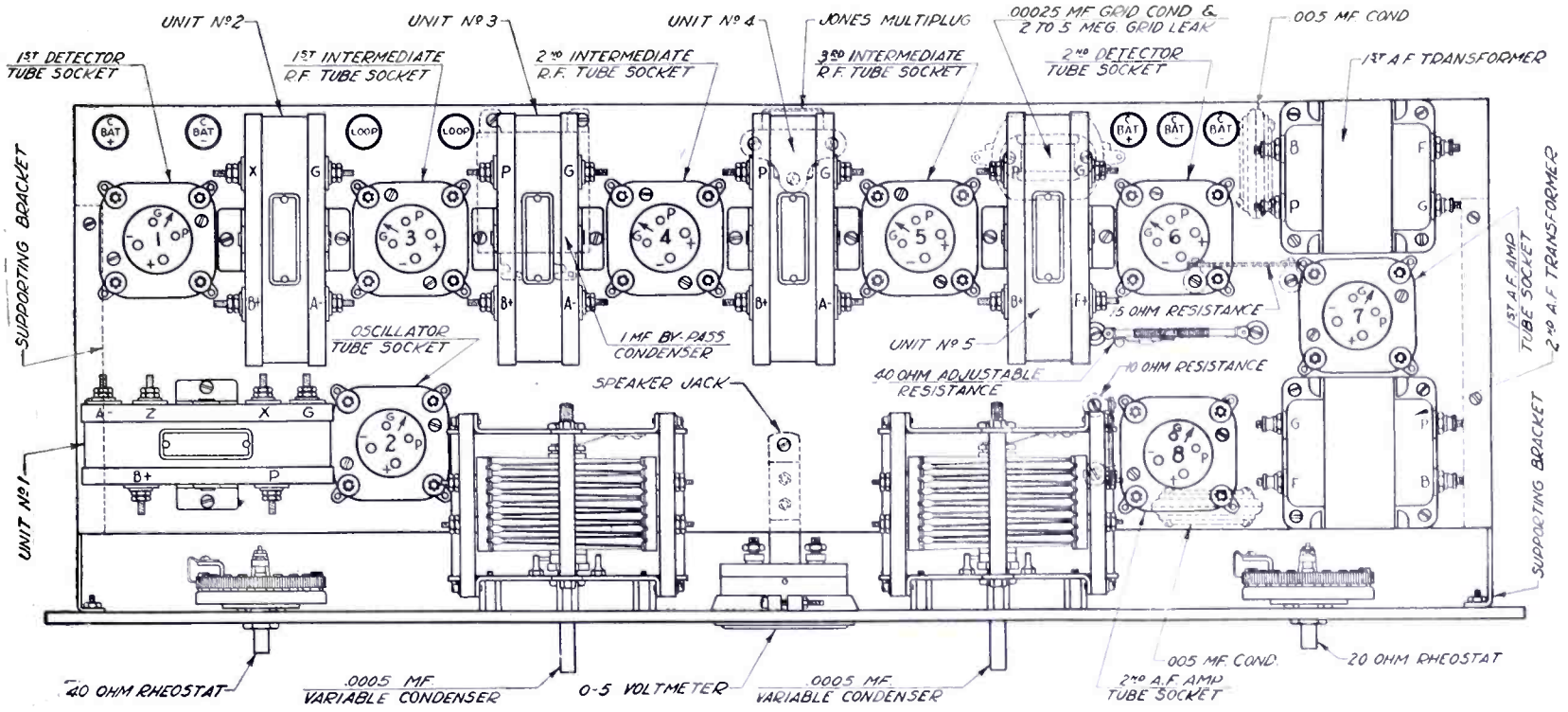


Figure 3. Top view of receiver showing arrangement of parts on sub-panel

he tuning of the Madison-Moore receiver is similar to that of y other good super-heterodyne receiver. Each set has its own ning peculiarities which must be thoroughly understood and astered before the fullest degree of efficiency and satisfaction ll result.

LIST OF PARTS

The Madison-Moore Super-Heterodyne Receiver

These parts or their equivalent will give satisfactory results.

—7x24x3/16" Drilled and Engraved Formica Panel
—7x23x3/16" Drilled Formica Sub-Panel
Set of Madison-Moore Type "MM" Precision Units (Five)
—Thordarson Type R200 Audio Transformers
—Benjamin Type 9040 Cle-Ra-Tone UX Sockets
—Benjamin Type 8629 Shelf Brackets
—Eby Engraved Binding Posts
—Yaxley Type 120K Air-Cooled Rheostat
—Yaxley Type 140K Air Cooled Rheostat
—Yaxley 40-ohm Variable Resistance
—Yaxley 10-ohm Fixed Resistance
—Yaxley 15-ohm Fixed Resistance
—Yaxley Type 10 Battery Switch
—Weston Model 506 0 to 5 volts Voltmeter
—National Type "B" Velvet Vernier Dials
—1½" Kurz Kasch Bakelite Knob
—Frost Open Circuit Pan-Tab Jack
1—Jones Type "BM" Plug and Cable
1—Sangamo .00025 mfd. Grid Condenser with Clips
2—Sangamo .005 mfd. Fixed Condenser
1—Sangamo 1 mfd. By-Pass Condenser
1—Lynch 2-megohm Grid Leak
1 Package Kester Solder
50 Feet Belden Tinned Hookup Wire
18—No. 6x¾" Round Head Brass Wood Screws
30—No. 6x½" Round Head Brass Wood Screws
16—No. 6x½" Flat Head Wood Screws
2—Cardwell Type "E" .0005 mfd. Taper Plate Variable Condensers

Photo A shows receiver installed in an Excello console, manufactured by Excello Products Corp., Chicago. The eliminator is a new Majestic standard "B" Raytheon tube eliminator, manufactured by Grigsby-Grunow-Hinds Co., Chicago. A standard 6-volt Willard radio battery supplies the "A" power, made by Willard Storage Battery Co., Cleveland, Ohio. A Balkite charger is shown which will keep the "A" battery charged. This is manufactured by the Fansteel Products Co., North Chicago, Ill. The loop is a new design of the well-known Fiat, manufactured by the Radio Appliance Laboratories, Chicago. The speaker is the Western Electric 540AW cone. The super cabinet shown in Photo B is made by D. H. Fritts Co., Hearst Square, Chicago.

(Any information regarding these accessories may be obtained by writing direct to the manufacturers.)

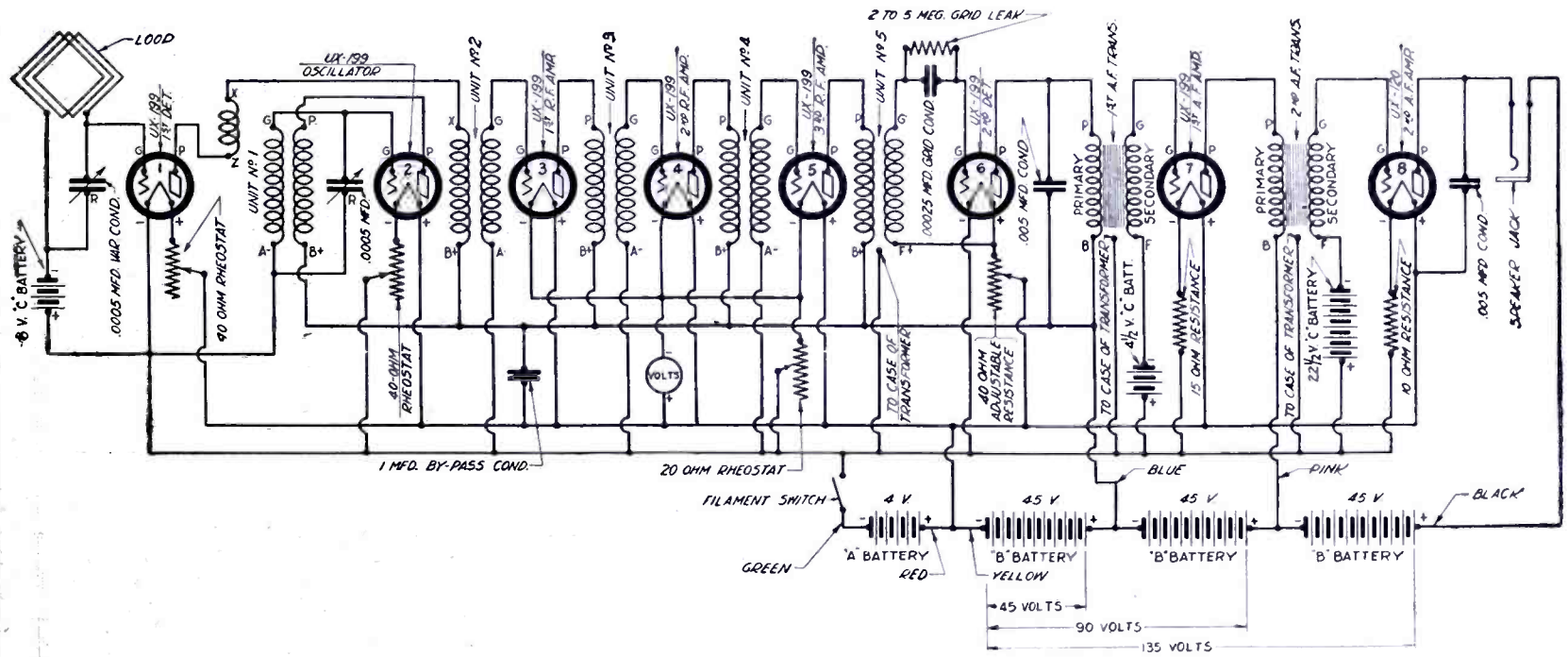
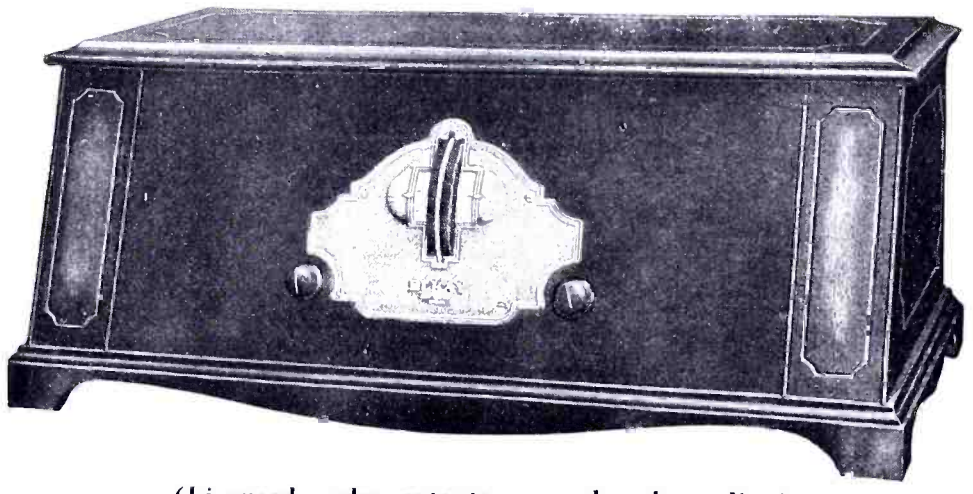


Figure 5. Schematic wiring diagram



(Licensed under patents granted and pending)

The New ELKAY Receiver

TRADE MARK REG.

WITH DONLE TRUPHONIC AUDIO AMPLIFICATION

for the man who has heard the best in reception and still says, "I guess I'll wait till they get it right; then I'll buy!"

In beauty of tone—in uniform volume on all waves—and in "needlepoint" selectivity in congested areas, the new ELKAY represents the very utmost in radio—totally regardless of price!

—it embodies the new DONLE TRUPHONIC SYSTEM OF AUDIO AMPLIFICATION, plus the Elkay Synauto R. F., which give it a pure tone and a very high amplification from 200 to 580 meters, *uniformly*.

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

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

—a new Uni-Control has the flexibility of three dials; very simple to tune, no sub-controls.

—"floating" sockets mounted on Bakelite sub-panel; all important insulated and wearing parts, genuine Bakelite.

—all connections from a common cable, plainly tabbed.

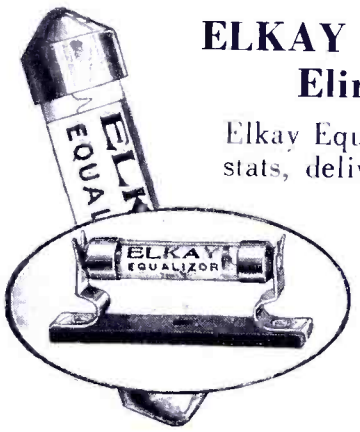
—in a beautiful sloping-front cabinet of brown, antique Duco finished natural grain mahogany.

—$125 list.

The Elkay 5-Tube Set

Compares favorably in appearance, selectivity, volume, distance and tone with sets at twice its price. Has one stage R. F., detector, one stage of transformer coupled amplification and two resistance coupled amplifiers. A radio frequency choke permits the same smooth operation on low or high wave lengths. Has the Elkay Equalizor System, which permits the use of any combination of tubes, and a device for controlling selectivity which is an Elkay patent. Retail, $80.

Exclusive Elkay Franchises to the Trade



ELKAY TUBE EQUALIZORS
Eliminate Rheostats

Elkay Equalizors replace variable rheostats, delivering correct voltage to any type of tube *automatically*. To use any combination of tubes in the same set, merely insert an Equalizor of the correct value; there is one for every tube made. 50c list; 75c mounted.

Elkay Suppressors, made in the same form as Elkay Equalizors, are non-inductive, noiseless resistances for the grid circuit of R. F. tubes. They suppress regeneration in the grid circuit at just the right point to insure greatest sensitiveness. 75c list; $1.00 mounted.

Elkay Locatrol Condensers are double or triple condensers of variable type, ganged together to be operated from the new vertical, Unicontrol dials, identical with those in the new Elkay 6-tube set. Prices on application.

Quantity Prices to Manufacturers

The Langbein-Kaufman Radio Co., Dept. C, 62 Franklin St., New Haven, Conn.

A Synchronized Tuned Radio Frequency Receiver Employing Donle Truphonic System of Amplification

IN designing this new six tube receiver there has been kept in mind the following important needs:

1. Absolute faithful reproduction.
2. Good and uniform sensitivity from 200-550 meters.
3. A machine that will never be obsolete through the advent of better tubes, either audio, radio or detector.
4. Economical use of batteries.
5. Simple tuning arrangement with every flexible possibility, relative to ease in tuning.
6. Freedom from extraneous noises and good selectivity at control (shielding).
7. High grade parts and a neat, pleasing appearance.

This year the most cardinal demand will be quality. Every radio periodical, every manufacturer, every engineer has quality on his tongue tip. Many claim to have true reproduction and attempt to prove their claim by frequency output curves.

Unfortunately, frequency-output curves show very little of the true value of audio amplification, as distortion can be easily introduced at a single fundamental frequency. The truth is that for true, faithful reproduction not only a constant amplification for varied frequency is necessary, but a straight line increase in amplification must be obtained for increase in load. In other words, the load-amplification curve must be constant at given frequencies.

Donle has combined transformer and total impedance in a single stage, resulting in a division of load and absolute reproduction without loss of amplification.

Distortion may also arise in output tubes, and it is equally essential to use an output tube in the last stage. For ordinary use the UX 171 and UX 112 are ideal.

Up to the present there has been very little change in radio frequency amplification; namely, fixed induction between grid and plate with methods of neutralization and suppression of regeneration.

Fans have long realized that in designing primaries for R. F. transformers they were much impressed with the fact that a few turns worked best for low waves and a large number of turns for long waves. When they used large coupling, the receiver was a knockout for 450 up, but below that it squealed like a pig. Or if a few turns were used, it was found that results from 400 up were poor.

This receiver utilizes a split primary mechanically connected to the condensers, in order to give uniform amplification over the broadcast range from 200 to 550 meters. The maximum amplification over the complete range of a receiver is obtained if the set is designed to operate just below the point of oscillation. The regeneration should change with the increase in capacity and wavelength, and in order to keep these two factors uniform the coupling should be varied in proportion.

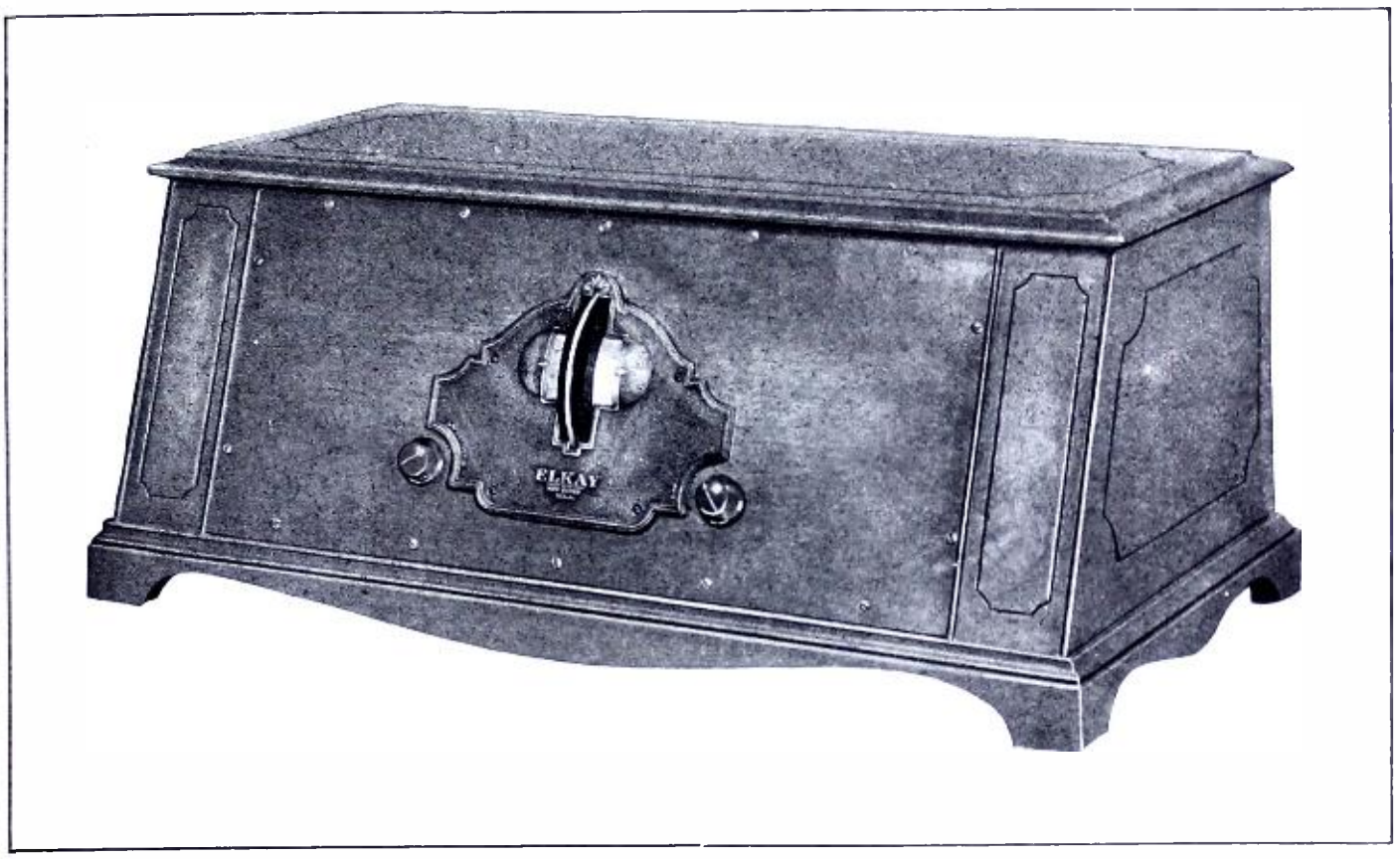


Photo A. Front view of completed receiver showing tuning controls

The tendency to burst into oscillation is critical and the engineers have further smoothed out the circuit by using a non-inductive resistance, which chokes the regeneration in the grid circuit. Suppressors are in cartridge form so that varied degrees of sensitivity may be obtained by increasing or decreasing their value.

Shielding is also employed to prevent interstage coupling or outside electro-static or electro-magnetic pickup.

In spite of the perfection of B battery eliminators, it is essential to keep the plate currents as low as possible, as in this manner only can real quality and results be obtained. Proper C bat-

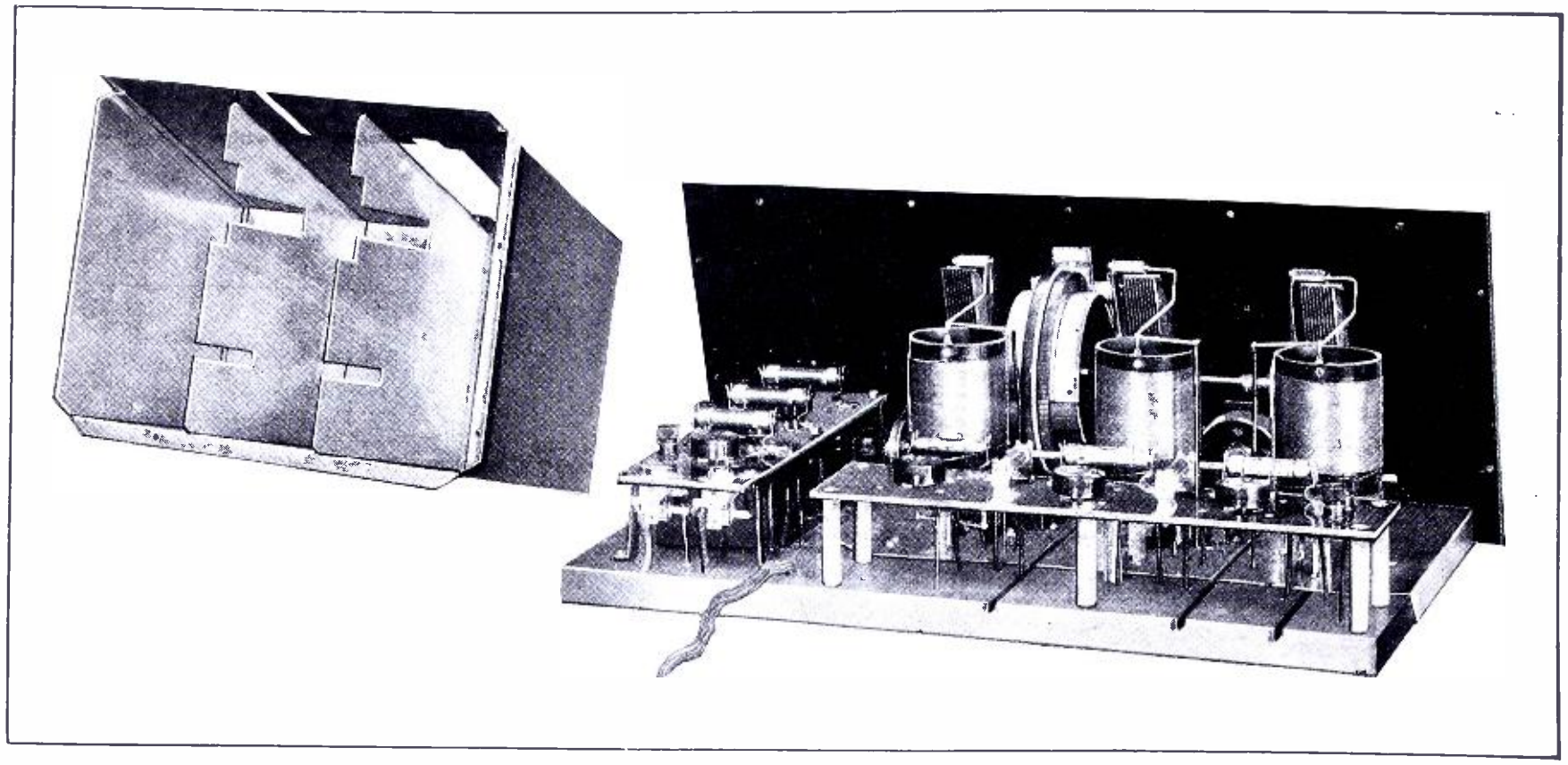


Photo B. Rear view of receiver with shield removed

tery provision and the impossibility of increasing filament emission over normal values does this for the receiver.

The modern receiver must have ease of tuning, the ability to swing from one station to another without delicate adjustments. Yet the reliable receiver must have sufficient controls to have everything at the thumbs' tips. A simple ingenuous tuning arrangement is employed permitting the operator to tune as a one, two or three dial set actually at your thumbs' tips. It permits tuning or detuning at will.

Shielding is no longer a fancy, but an actual necessity in real radio receivers. Proper shielding prevents inter-stage coupling, allowing each radio stage to operate at maximum efficiency. Electro-magnetic and electro-static coupling is reduced to practically zero, with the result that the removal of the aerial kills reception immediately. The result is that in congested regions small antennas may be employed with great selectivity. Even in rural territories it is possible with the sensitivity obtained with the UX 200-A and Donle S-7 to receive on indoor and spring aerials, even over long distances. Shielding, too, cuts down local noises and permits easy adaption to A, B and C eliminators.

In localities where there is an abundance of large powerful broadcasting stations the 201-A tube will not be able to handle the output of this receiver. It is advisable to use a power output tube in the last stage. At the time of publication of these instructions, types R. C. A. 112, 171, and Daven MU 6 tubes have been tested and found satisfactory for output tubes. In inserting these tubes into the machine be sure the proper Equalizor is inserted. Information on this will be found in the instruction book. It is to be remembered that increased C battery will be necessary with these tubes and with a higher voltage.

In rural territories, or in fact wherever long distance reception is desired where the locals are off, a very sensitive detector tube may be employed. The R. C. A. UX 200-A may be ideally employed in the six tube machine, resulting in simplified tuning and increased distance. A slight hiss accompanies the increased amplification, which is not serious.

The ideal arrangement of tubes for a receiving set near large broadcasting stations would be five 201-A tubes and one 112 tube in the output. In rural territories where distance is a prime necessity it is recommended that 201-A tubes be used in the R. F., a 200-A in the detector, a 201-A in the first two audios and a 112 in the last audio.

There are available various types of R. F. and intermediate tubes which may be employed in the six tube Elkay, provided the proper Equalizor is inserted and the proper voltages adjusted. Experimenters should only use these at their own risk and with

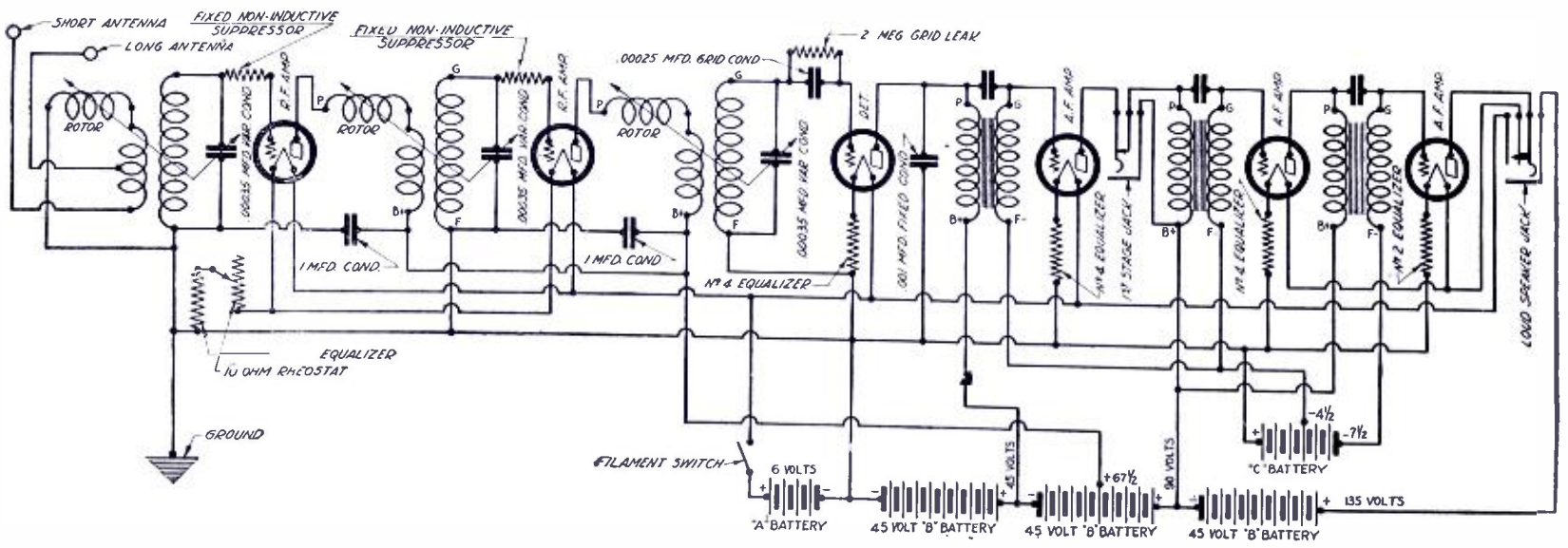


Figure 1. Schematic wiring diagram of receiver

results depending upon their ability to adjust tubes to their local condition.

Long aerials may be employed in the Super-Selector and lengths up to 150 feet may be used with increased results, provided it does not materially affect selectivity. Bear in mind that a large aerial always tends to decrease the selectivity or the ability to separate stations, but at the same time increase the volume and the ease of reception.

The machine is provided with two aerials, one marked "Short Antenna" and the other "Long Antenna." When first installing always connect the short antenna unless it is found that selectivity is lacking. Then a long antenna should be used.

In localities like New York, Chicago, Philadelphia and Boston, where there are quite a number of powerful broadcasting stations, it is desirable to keep the length of the antenna down. One of 80 feet is desirable in such congested territories.

In dealing with the aerial and ground due consideration must be given and it should be realized that the success of the six tube receiver, or in fact any receiver, rests in the proper erection of these two necessities.

The aerial and ground constitute the energy pickup system delivering the weak signals to your receiver. Unless they are carefully erected, doubtful results will always be obtained.

The standard aerial is one of 100 feet long, excluding the lead-in. It should be as high and as clear from surrounding objects as is possible to erect it. The lead-in should be brought as direct to the receiver as is possible. Always tap the aerial away from conducting or interfering objects. Lead it direct through the wall or window to the machine. Bear in mind that all connections should be soldered, for unless a good connection can be made by slipping them into clips, eventually the joint will become corroded and useless.

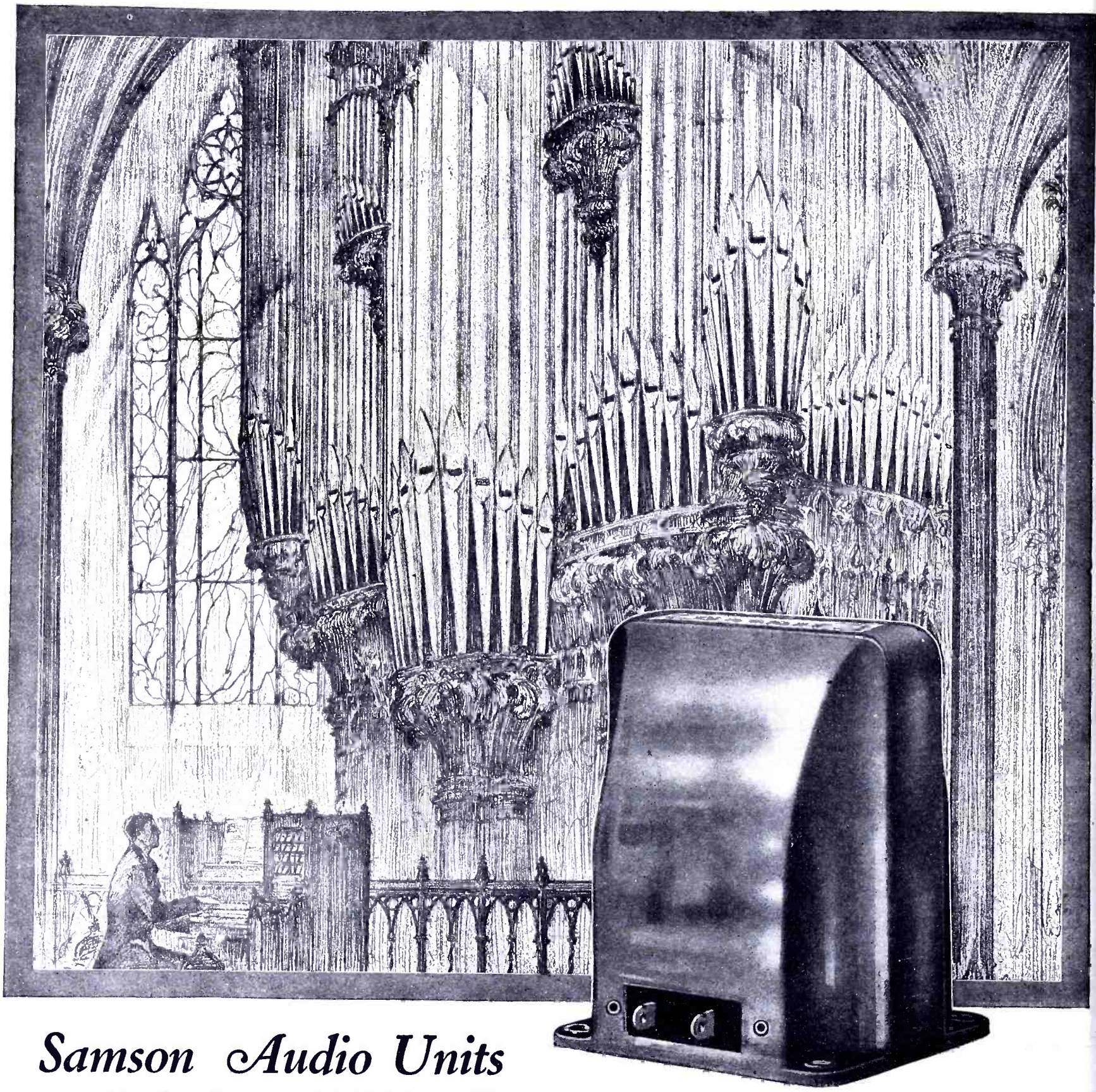
A good ground is as valuable as a good aerial. Ordinarily a water pipe or radiator which leads directly to the water system is recommended. Be sure a good ground clamp is used and that the pipe is carefully scraped before application. A good outside ground may be also used by driving a good clean pipe into moist ground. This is to be used as a second resort.

Short ground and aerial lead-ins are advocated, as these particular parts actually add resistance to the signal without material pickup.

List of Parts

These parts or their equivalent will give satisfactory results:

1—Elkay baseboard—drilled and slotted.
1—Elkay special 3-compartment copper interstage shield—two pieces.
1—Elkay three gange condenser and dial unit—fingertip control—complete.
1—Set Elkay Syn-Auto coils (three) with shafts and pulleys.
2—½ mfd. 1000 volt by-pass condensers—Dubilier.
1—Elkay radio frequency unit with three spring sockets. Equalizer, suppressor and grid leak clips—mounted.
1—Micamold .00025 grid condenser.
1—Three stage Tru-Phonic Audio amplifier unit enbloc—Alden.
1—Audio amplifier panel with three spring sockets; Equalizor clips.
1—.002 by-pass mica condenser.
1—No. 955 Frost gem jack—filament control.
1—No. 954 Frost gem jack—closed circuit.
1—Pacent rheostat, 6 ohm.
1—Elkay Resistance.
1—Six wire six-foot Battery cable—American Braid.
5—Eby binding posts.
5—Elkay Equalizers.
2—Elkay Suppressors No. 700.
1—Lynch three meg. grid leak—Gastor.
1—Yaxley No. 20 switch.
2—K. K. No. 17¼ knobs.
1—Elkay panel and cabinet (optional).



Samson Audio Units

are capable of uniform and faithful amplification well in excess of the most exacting broadcast requirements.

Their range extends from the lower fundamentals through the higher harmonics enabling them to reproduce, with equal clarity, the dull rumble of the tom-tom or the thin shrill of the flute.

This ability to reproduce the harmonics or higher multiple frequencies is what gives tone-color or background to sound—is what permits the listener to distinguish notes of the same pitch but from different instruments—results not possible with audio units which cut off at comparatively low frequencies.

In a word—with a loud speaker of corresponding range—

Samson Audio Units

insure the sort of radio you've hoped to hear—the quality of radio that will make you think you've been translated from a broadcast listener to one of an audience which is listening, firsthand, to a speech or to music.

For 1926-27 the Samson Electric Company offers eleven different audio units:

Symphonic Transformers		**$9.00**
Push-Pull Input Transformer	**Type X**	**5.50**
Standard Transformers	**Type IIW-A3 Ratio 2-1, 3-1, 6-1**	**5.00**
Dual Impedance	**Type D (Donle Design)**	**5.00**
Output Impedance	**Type O**	**5.00**
Push-Pull Output Impedance	**Type Z**	**5.00**
Plate Impedance	**Type P**	**4.50**
Grid Impedance	**Type G**	**4.50**
Audio Frequency Choke	**Type No. 3**	**3.00**

Our book—"Audio Amplification"—already accepted as a manual of audio design by many radio engineers—contains much original information of greatest practical value to those interested in bettering the quality of their reproduction. Sent upon receipt of 25c

MEMBER RMA

SAMSON ELECTRIC COMPANY

Main Office, Canton, Mass. **Factories at Canton and Watertown, Mass.**

Manufacturers Since 1882

A De Luxe Five Tube Tuned Radio Frequency Receiver

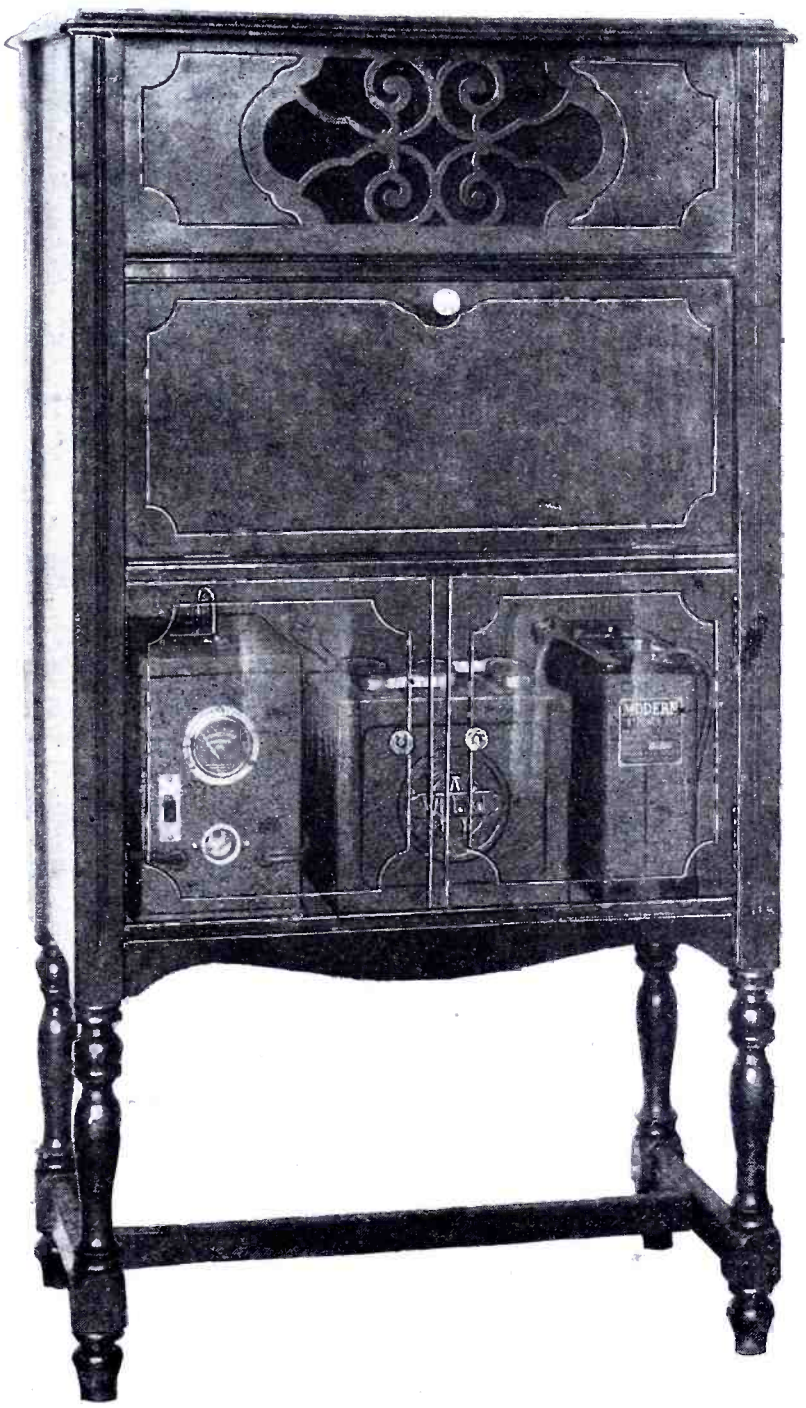
This Receiver Was Designed and Tested in the Citizens Radio Laboratory

THE difference in this receiver as compared to other tuned radio frequency receivers is largely in the neutralization of the radio frequency tube. This is accomplished by a method somewhat different from that ordinarily employed. new design of neutralized condenser having a very precise adtment, varied by a small knob on top of the condenser case, is ced between the grid return and the plate of the radio frency tube. Between the grid urn and the negative filament of radio frequency tube is inted an 85 millihenry radio frency choke coil with a .0001 d. fixed condenser across it.

The question naturally arises as why a condenser, which allows io frequency currents to pass, shunted across the choke coil, igned especially to stop the lio frequency currents. With the jority of radio frequency chokes w sold on the market, the disbuted capacity is quite high and ows a great deal of the radio quency to pass. The choke coil d in this circuit has an exmely low distributed capacity l therefore does not pass suffint current to permit the proper eration of the circuit. The conser acts as a gate or valve and mits the necessary amount of lio frequency to pass through. The combination of the choke l its associated condenser bale the radio frequency circuit such a manner that the only ustment necessary to place the eiver in proper working order the setting of the neutralizing ndenser. Evidence that the rever is properly neutralized will found in the absence of a resonce check in the speaker when two tuning controls are operd together. Proper neutralizan of the receiver absolutely events any reradiation and conquent annoyance to neighbors.

Unlike the ordinary tuned radio quency receiver using regenerain, this set makes use of a double or coupler. One rotor is the ckler" or regeneration control; other the primary of the radio quency transformer, and is used as a selectivity control.

In fact, the receiver is ideal in any locality. In metropolitan as, where the air congestion is severe, its selectivity may be reased so that interference is reduced to a minimum. On the er hand, in suburban districts, where interference is negligible, receiver may be tuned broadly without sacrificing volume or tance. With the primary rotor in a vertical position, maximum ectivity is obtained, and vice versa. The selectivity control ed not be varied after it has once been set according to the gree of selectivity desired by the operator.



View of receiver mounted in console with suggested accessories

Figure 2 is a schematic wiring diagram of the complete receiver. It will be noticed that all tubes are controlled by Elkay Equalizers. This method allows the maximum efficiency to be realized from each tube without manual control. Loud speaker volume is controlled by the "tickler." If the operator desires a more sensitive control, a Centralab 500,000-ohm variable resistance may be shunted across the secondary of the first dual impedance, or a Centralab Modu-Plug used for the loud speaker.

A new system of audio amplification is used in this receiver. It combines the advantages of all types of coupling with the exclusion of the disadvantages. Being more efficient than either impedance or resistance coupling, it permits a quality of reproduction equal to the very best of either under the most favorable conditions, as well as affording a greater amount of amplification. The disagreeable characteristic of transformer coupling, amplifying only weak signals excessively, is not found in this new system, nor is there the slightest tendency toward audio regeneration or howling. The amplifying units appear similar to audio transformers. However, their electrical characteristics and construction are entirely different. Two windings are placed upon a single iron core. A by-pass condenser is shunted across the plate and grid ends of the windings and sealed into the case at the factory.

In operation the unit functions in a manner similar to a resistance unit. Instead of a leak of high resistance, one of impedance is used. By this method a high impedance is presented to the alternating signal coming from the plate of the preceding tube, but a very low resistance to the charge leaking off from the grid of the following tube. Tests have shown that this system of amplification has a very high efficiency for all signal intensities.

In Figure 1 is shown a layout of the front panel of the receiver. The correct location of all mounting holes is accurately shown, as well as the necessary engraving. The two holes for mounting the antenna coupling are not shown. They are located 5¼ inches from the bottom of the panel at the left end. One hole is ½ inch and the other is 3¾ inches from the left end of the panel. The holes are each ⅛ inch in diameter and are drilled only ⅛ inch deep. Using a No. 6-32x⅛-inch round head machine screw as a tap, the hole may be easily tapped. The antenna coupler may then be easily mounted into position.

Figure 3, the baseboard layout, shows the location of all parts mounted on the baseboard and panel. The parts are properly

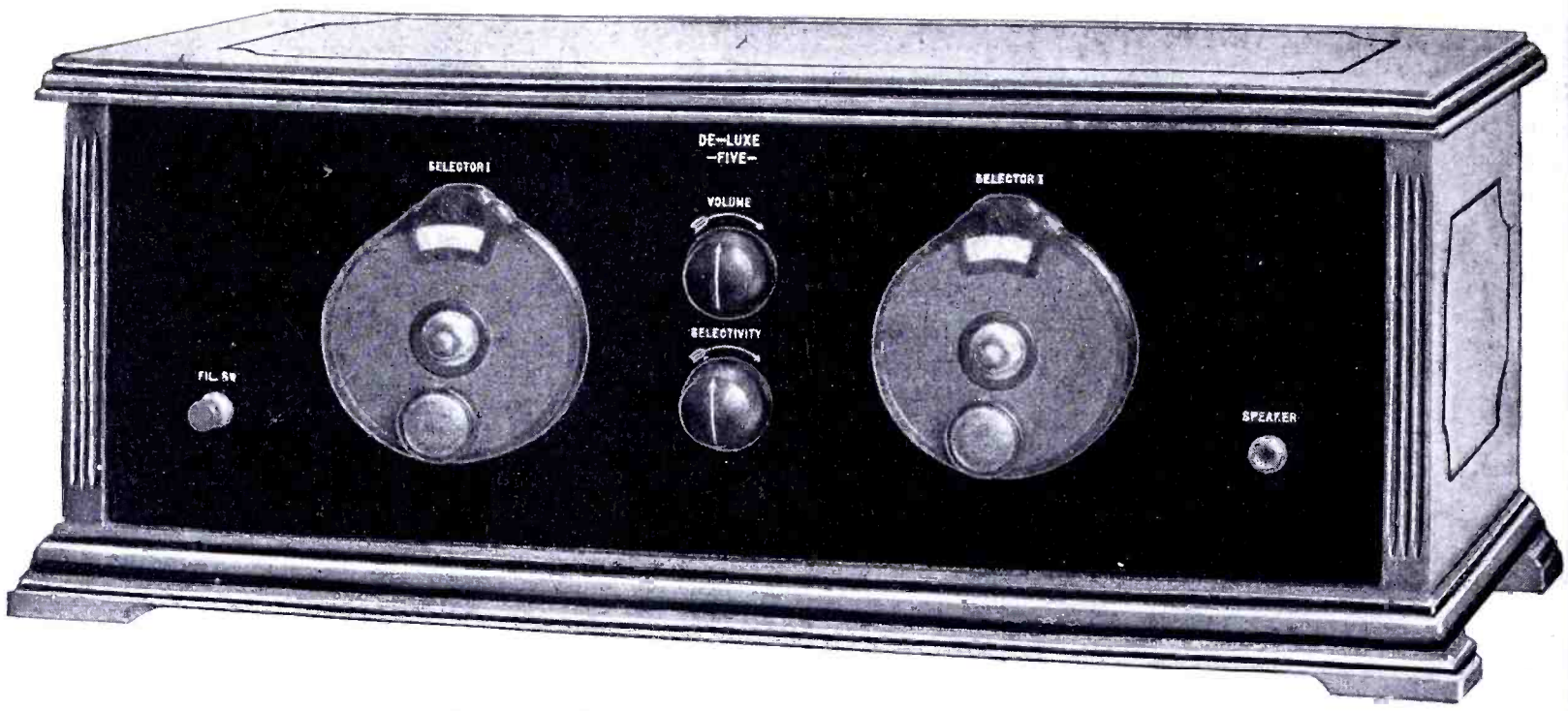


Photo A. Front view of receiver mounted in a cabinet

located, with all terminals plainly marked so that the apparatus may be mounted in the correct position with their respective terminals bearing a correct relation to other apparatus. Photo "B" will help materially in properly locating those parts on the baseboard which are not shown in Figure 3, due to other apparatus hiding them.

The accessories shown consist of a Modern "B" battery eliminator, which will deliver all necessary voltages to operate the detector and amplifying tubes and is manufactured by the Modern Electric Co., Toledo, Ohio. A Willard standard six-volt radio battery is shown as the "A" supply. The Sterling charger shown will keep the "A" battery charged and may be connected to any electric socket having 60 cycle alternating current. The console contains a built-in Utah loud speaker. This is manufactured by the Radio Products Corporation, Chicago, Ill. *(If any information is desired regarding these accessories, please write the manufacturers direct.)*

LIST OF PARTS. :These parts or their equivalent will give satisfactory results:

1—7x21x3/16-inch Drilled and Engraved Radion Panel
1—9x20x½-inch Wooden Baseboard
1—¾x2¼x3/16-inch Terminal Strip
1—¾x7½x3/16-inch Terminal Strip
5—Eby UX Sockets
4—Amperites Type 1-A
1—Amperite Type 112
1—Samson Type No. 41 Antenna Coil
1—Samson Type No. 31 Double Rotor Coupler
2—Samson Type No. 67 .0005 mfd. Variable Condenser
2—Samson Type No. 85 Radio Frequency Chokes
1—Samson Type No. 61 Neutralizing Condenser
1—Samson Type No. HW-A3 Audio Transformer
2—Samson Type No. D Dual Impedance
2—Samson Universal Verniers
1—Frost No. 608 Battery Switch
1—Electrad .0005 mfd. Grid Condenser
1—Electrad 2-megohm Grid Leak
1—Electrad .001 mfd. Fixed Condenser
1—Electrad .0001 mfd. Fixed Condenser
11—Eby Engraved Binding Posts
1—Frost No. 953 Open Circuit Gem Jack
3 Dozen No. 6x⅝-inch Round Head Wood Screws
½ Dozen No. 5x½-inch Round Head Wood Screws
30 Feet No. 12 Belden Tinned Copper Wire
1—Blackburn Ground Clamp
1 Package Kester Radio Solder

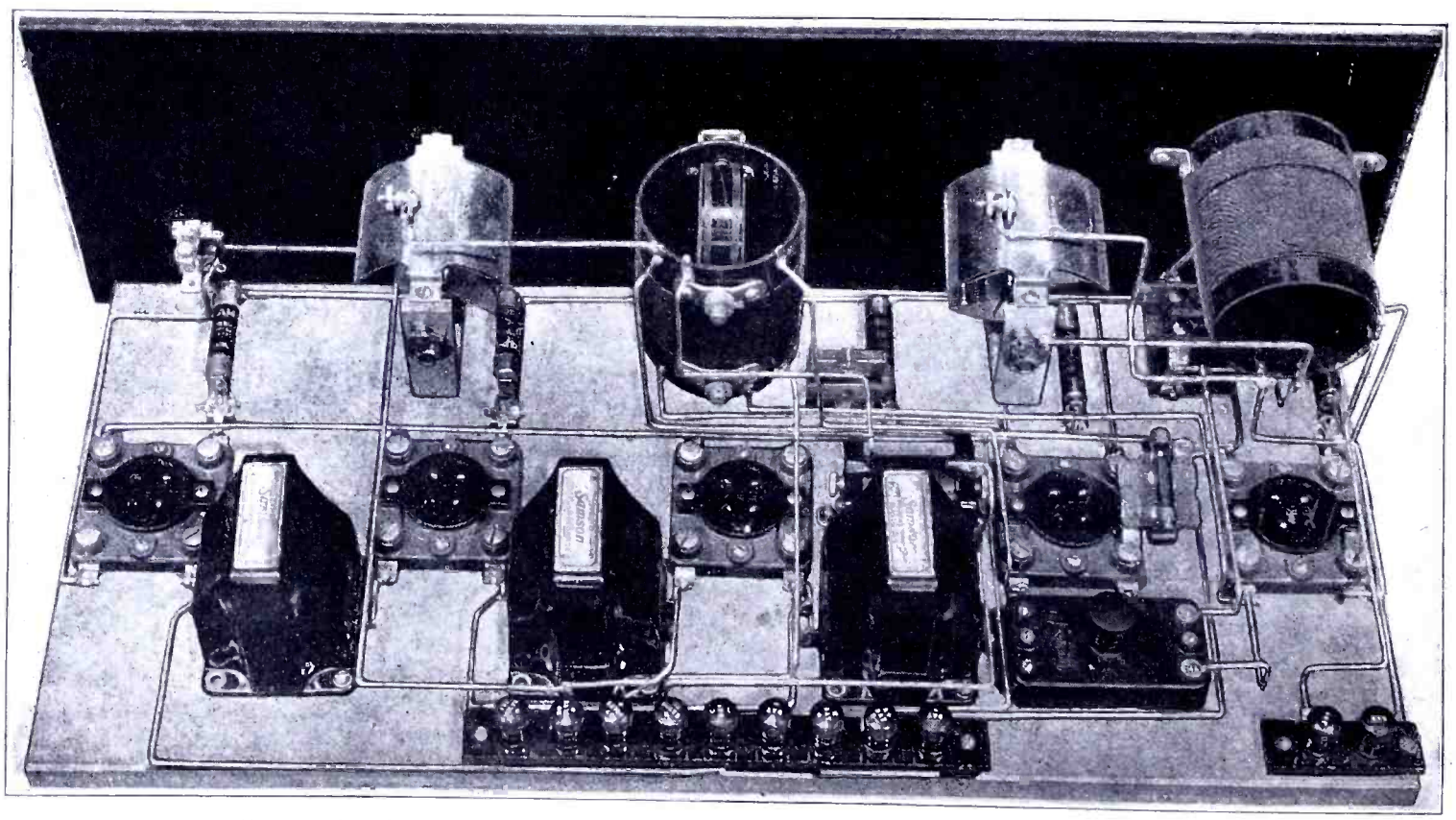


Photo B. Rear view of completed receiver. Note the neat arrangement of parts

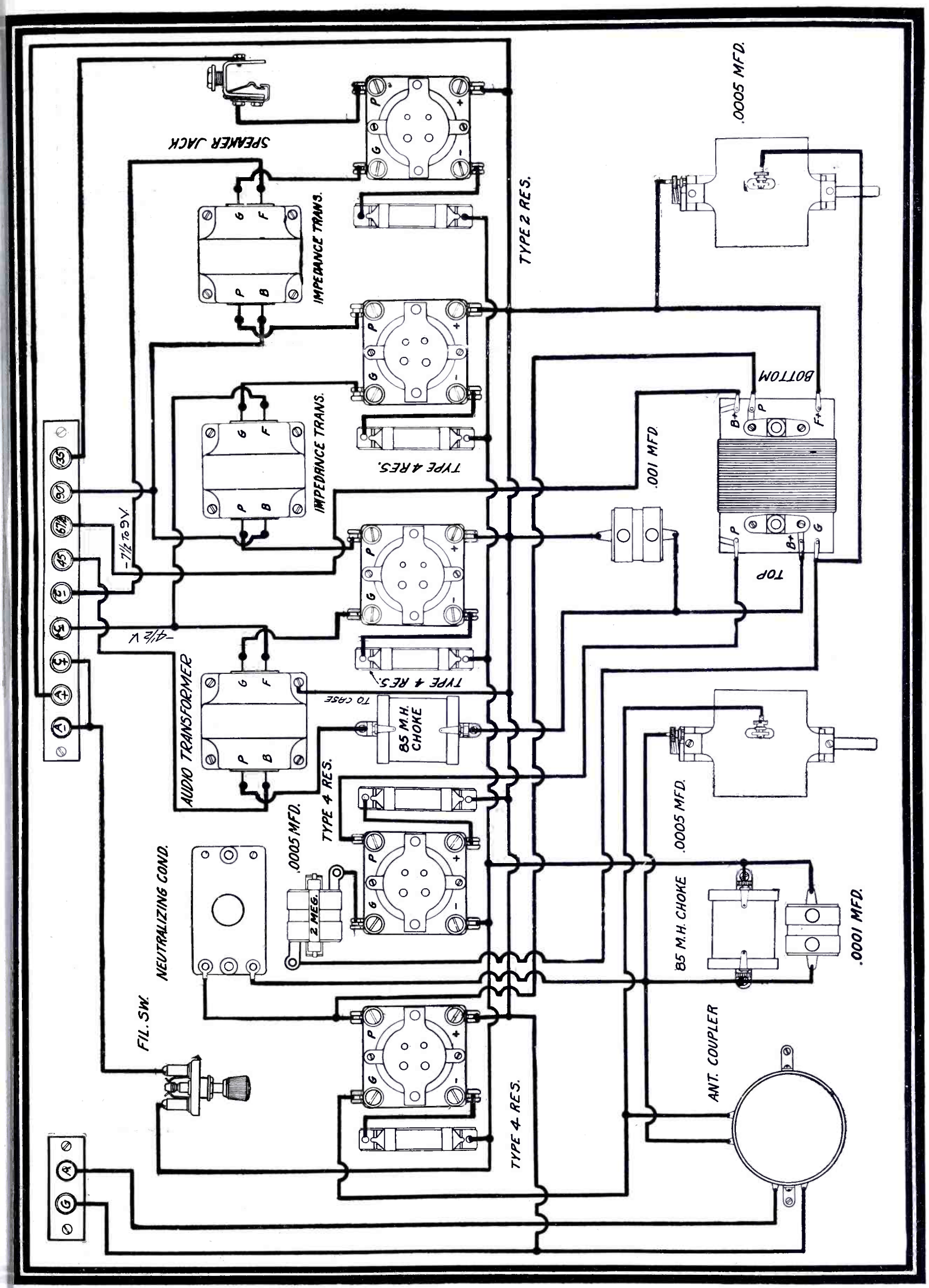


Fig. 4. Graphic illustration showing every connection in an entire receiver. Check this carefully against finished job.

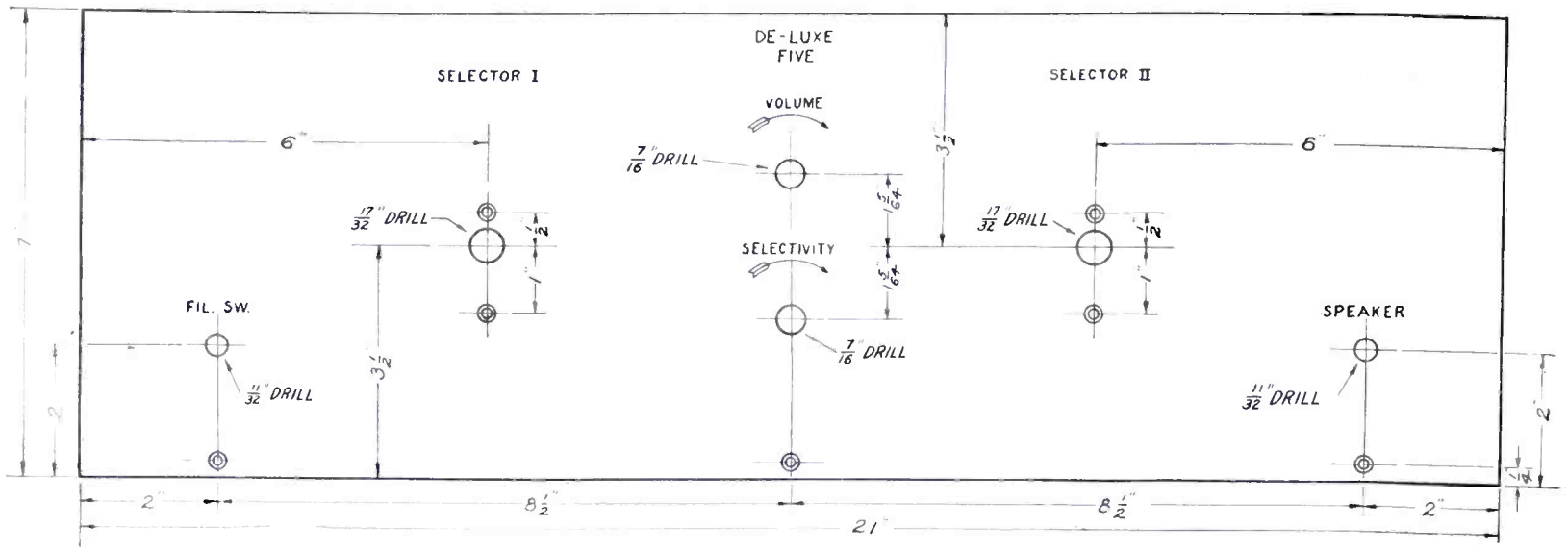


Fig. 1. Panel layout with suggested engraving

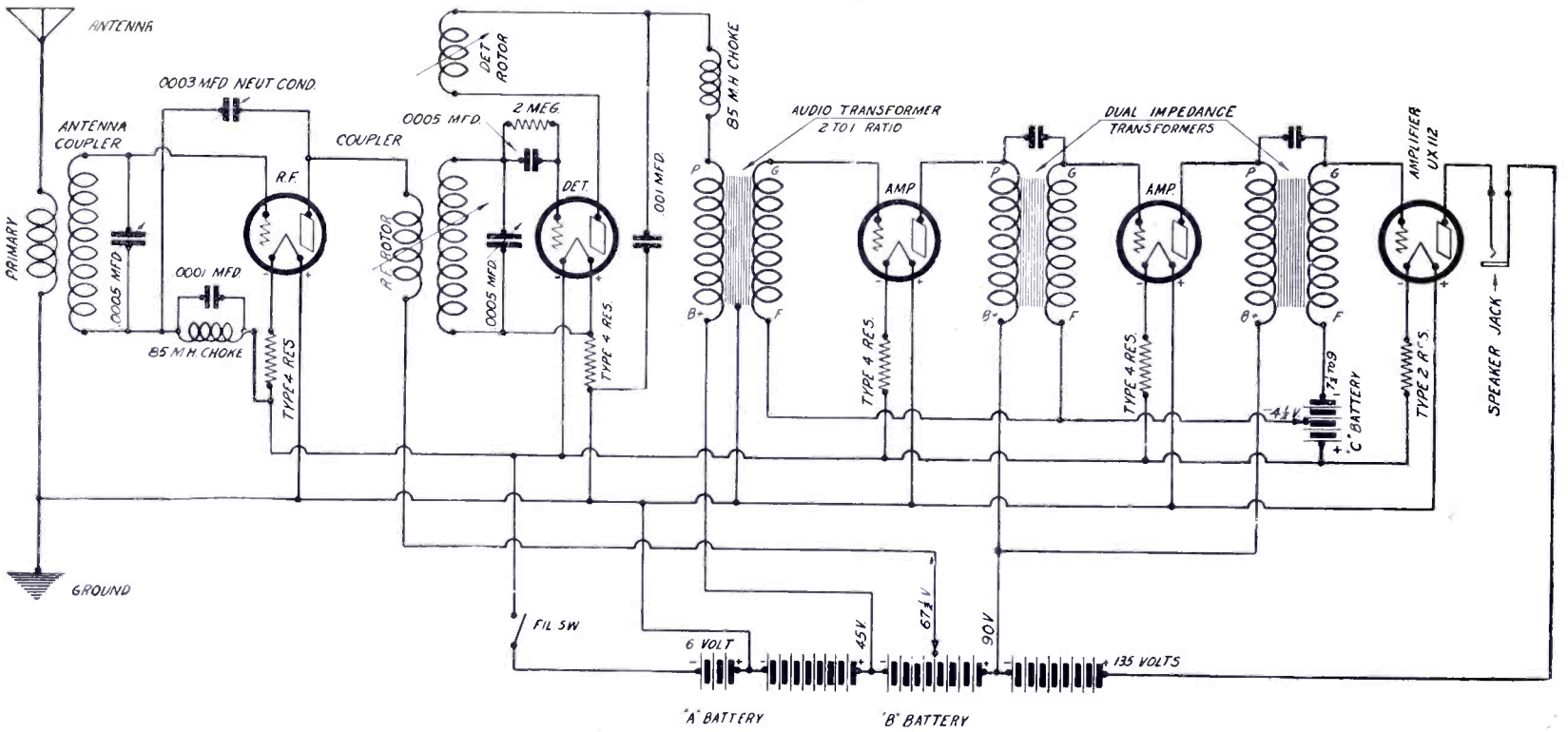


Fig. 2. Schematic wiring diagram

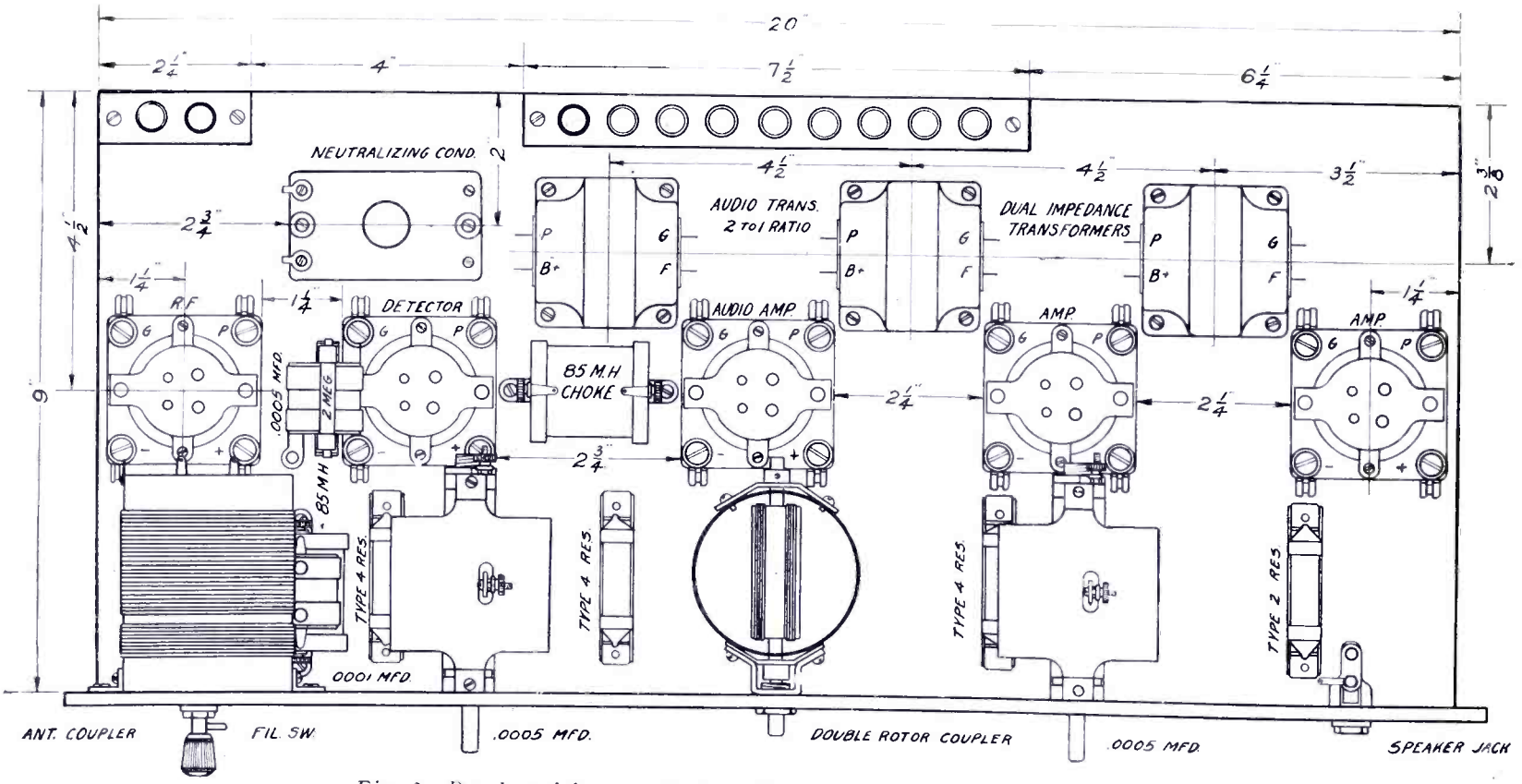


Fig. 3. Baseboard layout. Follow dimensions carefully for neat layout

Samson Radio Products

Samson Radio Products show the results of nearly half a century manufacturing experience. They are built to a standard and not to a price.

Samson Radio Products, when used with other high-grade standard parts, produce results that are unequalled for tone quality, selectivity and sensitivity.

What's Behind Samson Radio Products?

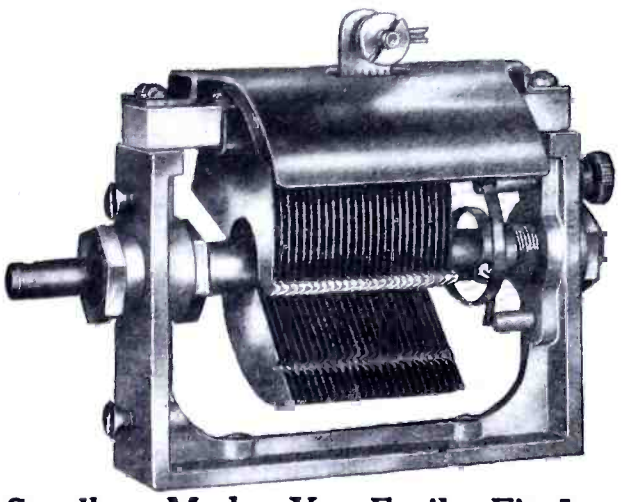
When doorbells were first rung, Samson Batteries rung them—dependably.

When fishermen first sought waterproof ignition systems, Samson supplied ignition—dependably.

When the U. S. Government enlisted fire alarm systems for the world war, Samson Systems proved—dependable.

When radio set manufacturers standardize on Samson Radio Parts they gain quality and—dependability.

Samson Radio Products carry no wild claims in their advertising but they are—dependable.



Smallest Made, Yet Easily Fit Into Present Sets

Samson Uniform Frequency Condensers

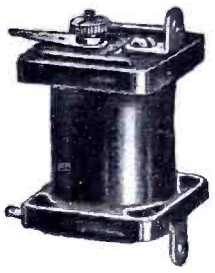
With them you can easily do away with the crowding of stations on your present receiver having ordinary condensers—where 85 out of 100 come in below 50 on the dial.

Mathematically proportioned plates assure uniform station spacing at both low and high ends of the scale as well as in the middle.

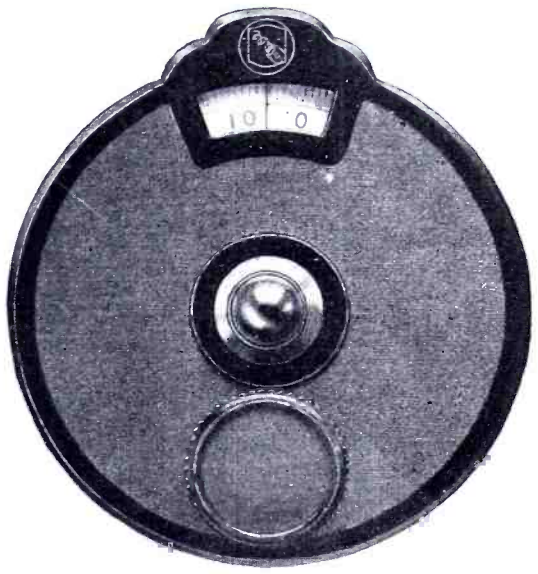
Samson Uniform Frequency Condensers are built to a tolerance of 1/1000 inch.

These grounded rotor type instruments have losses lower than the average laboratory standards.

This condenser, due to its design, does not have the defects caused by either solid metal or dielectric end plates. Samson Uniform Frequency Condensers have a one-hole mounting. They can be mounted vertically or horizontally, and are guaranteed accurate within plus or minus 1% of their rated capacitances. 500 mmf, $7.50; 350 mmf, $7.25; 250 mmf, $7.00; 125 mmf, $7.00; 75 mmf, $7.00.



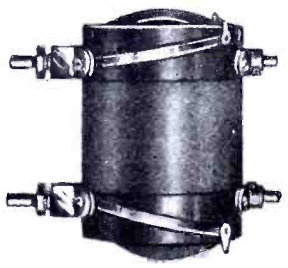
Samson Radio Frequency Choke Coils keep high radio frequency currents out of—or in—a particular portion of a circuit, preventing overloading of tubes with consequent distortion. They are also used where a high radio frequency impedance is desired. Their helical winding gives inimitable operation as a choke over an unusually wide band of frequencies. Write for Bulletin No. 27. Price of coils, No. 85, $1.50, and No. 125, $2.00.



Samson Vernier Dial

Samson Vernier Dial is universal—suitable for right or left hand rotation—and non-microphonic. It has an adjustable tension and a hair line close to split degree dial. This permits engineering instrument accuracy in readings. The dials are easily assembled without "play" or "shake" and will wear indefinitely without loosening. Price $2.50.

Samson Neutralizing Condenser is variable by fine gradations and stays permanently where adjusted. Minimum capacity .00002 mfd. Maximum capacity .0003 mfd. Price $1.75.



Samson Double Rotor Coupler gives a selectivity instantly adjustable from broad to "razor edge" and can be used as a coupler and R. F. transformer in many circuits. Price $7.50.

Samson Audio Frequency Choke No. 3 stabilizes and suppresses distortion in audio frequency amplifiers. Its patented helical winding gives an extremely low self capacitance for its size. Properly used, it prevents "motor boating" or "putting" due to "B" Eliminators, and makes "B" batteries last much longer. Send for Bulletin No. 28. Price of choke $3.00.

MEMBER RMA

Samson Electric Company
Canton, Mass.

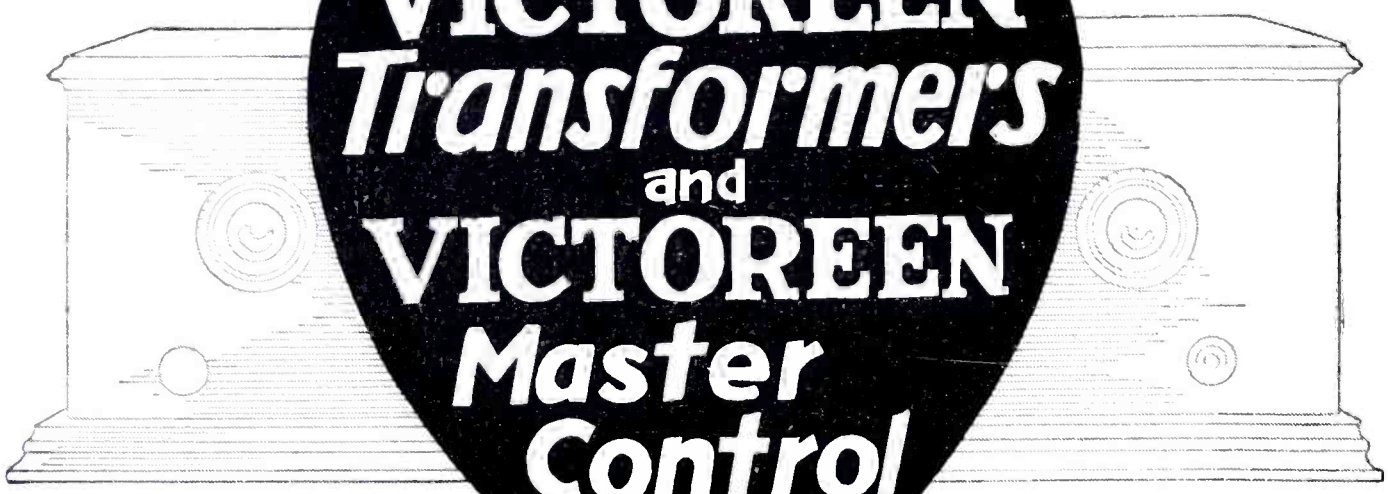
Manufacturers of Electrical Products Since 1882

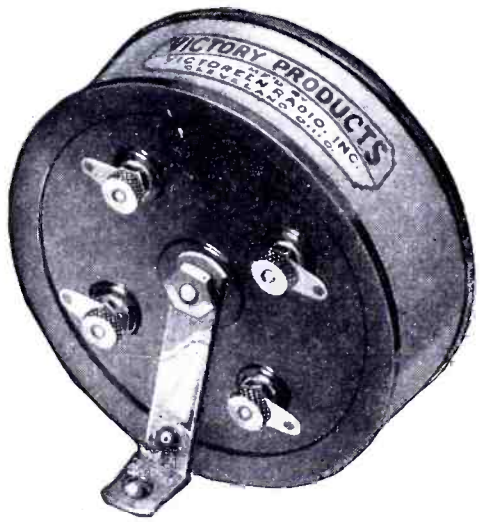
Sales Representatives in Thirty Leading American Cities

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

The Heart of the Circuit

VICTOREEN Transformers and VICTOREEN Master Control Unit





Victoreen No. 170 R. F. Transformer—neat and compact—3 in. in diameter, 1 in. thick.

Victoreen R. F. Transformers

are made with air core construction. They are not merely "matched," but are actually tuned to a guaranteed precision of 1/3 of 1%.

Victoreen Super sets are free from oscillations, howls or squeals—no matching of tubes is necessary.

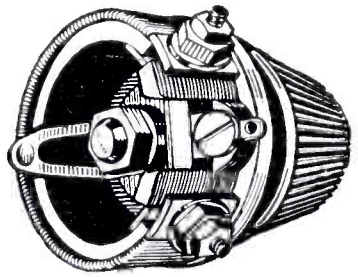
The "B" battery consumption is exceptionally low—8 to 10 milliamps with potentiometer at negative side—less than some 3 tube sets.

For range, clarity, volume, selectivity and ease of operation, a Victoreen Super cannot be excelled.

The Heart of the Circuit

4 Victoreen No. 170 R. F. Transformers, each (No. 171 Transformers when dry cells are used)	$7.00
1 Victoreen No. 150 Coupling Unit, each	5.50
Should the use of aerial be preferred to loop, Victoreen No. 160 Antenna coupler is required, each	3.50
1—400 ohm Victoreen Potentiometer	1.50
2—6 ohm Victoreen Rheostats, each	1.20
2—30 ohm Victoreen Rheostats, each	1.20
1—Type V. S. Master Control Unit	19.50

Get a complete list of necessary parts from your dealer or write us direct. Your dealer will be able to supply all parts. The free Victoreen folder and hook-up answers all questions about the Victoreen circuit.



Victoreen Manganin Rheostats

The only Rheostat with zero temperature coefficient—no matter how warm the unit becomes the resistance remains absolutely constant.

Victoreen Rheostats have double the number of turns of wire used on ordinary Rheostats—that means twice as fine adjustment.

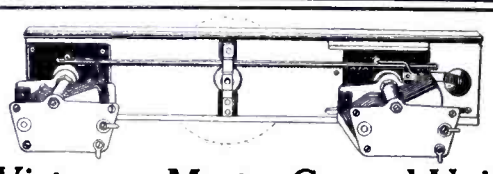
Genuine Manganin wire used in all Victoreen Rheostats.

This three terminal Rheostat simplifies wiring.

Made with 5 resistances—2, 6, 10, 20, 30 ohms—$1.20 each.

Victoreen Potentiometers

200 and 400 ohm resistances, $1.50 each.



Victoreen Master Control Unit

A completely assembled convenient single control unit for use in any circuit employing 2, 3 or 4 condensers.

Easy to mount and can be used on any lay-out without changing the wiring. Standard unit has 2 condensers. One or two more can be added, or it can be rearranged by the fan to suit his requirements.

Simplifies tuning—stations can be logged to one dial setting, whether loop or aerial is used.

Unit as shown:

For Victoreen Super or any 2—.0005 MF condenser set	$19.50
Extra condenser ready to mount	4.50

THE GEORGE W. WALKER CO.

6528 Carnegie Avenue, Dept. A — **Cleveland, Ohio**

BRANCH OFFICES:

Suite 961—50 Church St., New York City

90 Abbotsford Rd., Brookline (Boston), Mass.

919 Raymond St., Philadelphia, Pa.

133 Riverview Ave., Pittsburgh, Pa.

8550 Dumberton Road, Detroit, Mich.

421 East Avenue, North, Waukesha, Wisconsin

710 Union Central Life Bldg., Cincinnati, Ohio

808 Guaranty Bldg., Indianapolis, Ind.

P. O. Box 551, Nashville, Tenn.

Whitney Central Bldg., New Orleans, La.

2006½ Commerce St., Dallas, Texas

P. O. Box 66, Rock Island, Ill.

409 N. Y. Life Bldg., Minneapolis, Minn.

1020 Main St., Little Rock, Ark.

5553 Vernon Ave., St. Louis, Mo.

308 East 17th St., Kansas City, Mo.

508 So. Dearborn St., Chicago, Ill.

202 Sugar Bldg., Denver, Colo.

P. O. Box 321, Boise, Idaho

383 Brannan St., San Francisco, Calif.

443 So. San Pedro St., Los Angeles, Cal.

Room 911, Terminal Sales Bldg., Seattle, Wash.

421 East Ave., N., Waukesha, Wis.

615 East First South St., Salt Lake City, Utah

The Victoreen Super-Heterodyne Receiver

The super-heterodyne circuit is generally considered by most radio engineers as well as the radio public as the most efficient, sensitive and selective radio set of today. A superior receiver will appear only when an extremely radical achievement is made in the science of radio

THE distinguishing feature of the super-heterodyne receiver, which sets it apart in the classification of receiving circuits, is the use of intermediate frequency amplification. More than usual care must be exercised in the selection of proper intermediate frequency transformers, since the success or failure of the receiver is primarily dependent upon them. It is sometimes necessary for the builder to match the intermediate frequency transformers and resort to various devices for suppressing undesirable oscillations as well as selecting a set of tubes with approximately the same characteristics before the set will function properly. However, in the Victoreen Super-Heterodyne Receiver, described herewith, the tedious and expensive matching processes and the oscillation suppressing methods are eliminated, due to the excellent design of the intermediate frequency transformers.

These transformers are very unique in design, and a short description will be interesting. Due to the fact that there is no iron used in the core, the amplification constant curve is sharply peaked at 3400 meters, 88,000 cycles. This wave length or frequency was selected because it offers the least trouble from harmonics, which will be experienced in any receiving set of this nature. The aircore is two inches in diameter, thereby allowing a minimum amount of wire to be used to establish the proper inductance and at the same time keeping the field in close proximity to the coils, thereby eliminating feed-back and enabling the transformers to be placed in close relation to each other. The secondary is tuned by a small fixed condenser of approximately .00025 mfd. capacity which reduces the radio frequency resistance of the circuit. The condenser is adjusted at the factory by means of an oscillator and two radio frequency tubes and sealed to prevent any change or detuning which may occur through handling. Since the condenser is shunted across the secondary winding of each transformer, the grid-filament capacity of the tube is small in comparison, and has a negligible detuning effect. Any good tubes available may therefore be used without bothering to match them to the transformers.

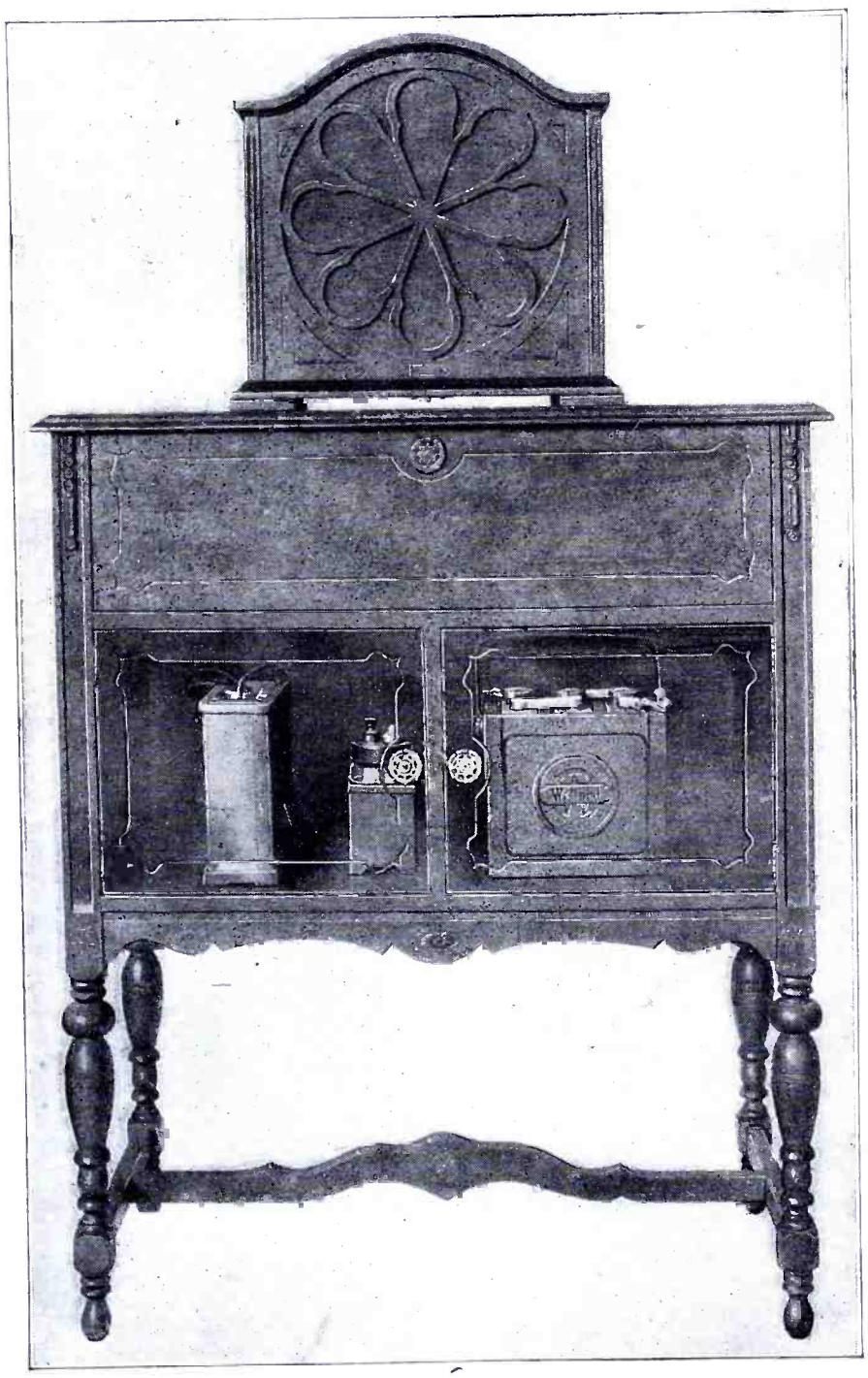


Photo A. View showing how receiver can be placed in a console with suggested accessories

A second adjustment is made at the factory which gives each transformer exactly the same amplification constant. This prevents interstage coupling with attendant oscillations which materially reduce the sensitivity of the receiver and destroy the clarity of signals. This extreme care in "peaking" the transformers allows a precision of ⅓ of 1% to be maintained at all times in the production of the coils, and speaks well for the rigid specifications under which the transformers are manufactured.

The circuit used in the Victoreen Super-Heterodyne Receiver is a well established hookup consisting of an oscillator, first and second detectors, intermediate frequency amplifiers and two stages of audio frequency amplification arranged for the use of a power tube in the last stage.

As may be observed from the illustrations, a switch is provided by which either a tapped loop or antenna and ground may be used. When the switch is thrown to the right, to operate the receiver on the loop, the wavelength condenser is automatically connected to the outside terminal of the loop and the tap to one end of the primary of the oscillator coupler, which places a positive bias on the first detector tube. At the same time the .000045 mfd. midget condenser is inserted in the plate circuit of the first detector tube and allows regeneration to be used when operating the receiver with a loop. The midget condenser is a very precise control over regeneration and serves as an excellent regulator over both sensitivity and selectivity. However, when the switch is thrown to the left, to operate the receiver with antenna and ground, the wavelength condenser is connected to the secondary of the antenna coupler which it tunes, and the outside terminals of the loop are automatically disconnected from the wavelength condenser. The midget condenser is also removed

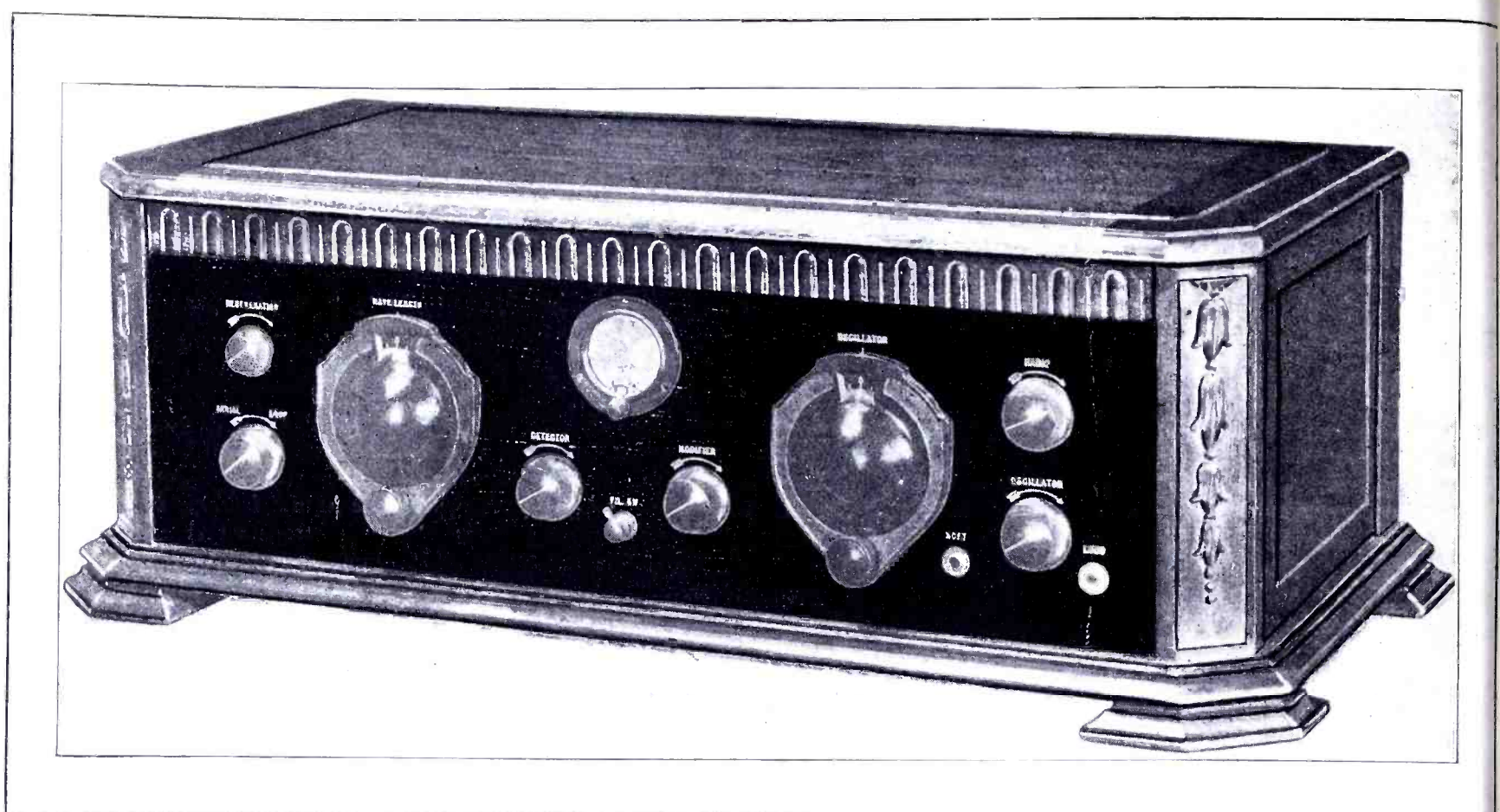


Photo B. Front view of receiver mounted in cabinet

from the circuit, since regeneration is not used while the set is operating from an antenna and ground system. A common "A" positive lead is used for both the tap on the loop and one end of the secondary of the antenna coupler.

When the loop is being used it is advisable to disconnect both antenna and ground, and vice versa. Push-type binding posts are provided to facilitate a quick change. Slight regeneration may be observed when using the antenna. This is caused by the small capacity in the change-over switch, but does not affect the operation of the receiver.

While a potentiometer is used in the circuit, its purpose is not that of an oscillation control, but serves as a useful and desirable control over the grid voltage of the radio frequency tubes and is used as a volume control. Under no circumstances will the receiver oscillate, regardless of the position of the arm on the potentiometer.

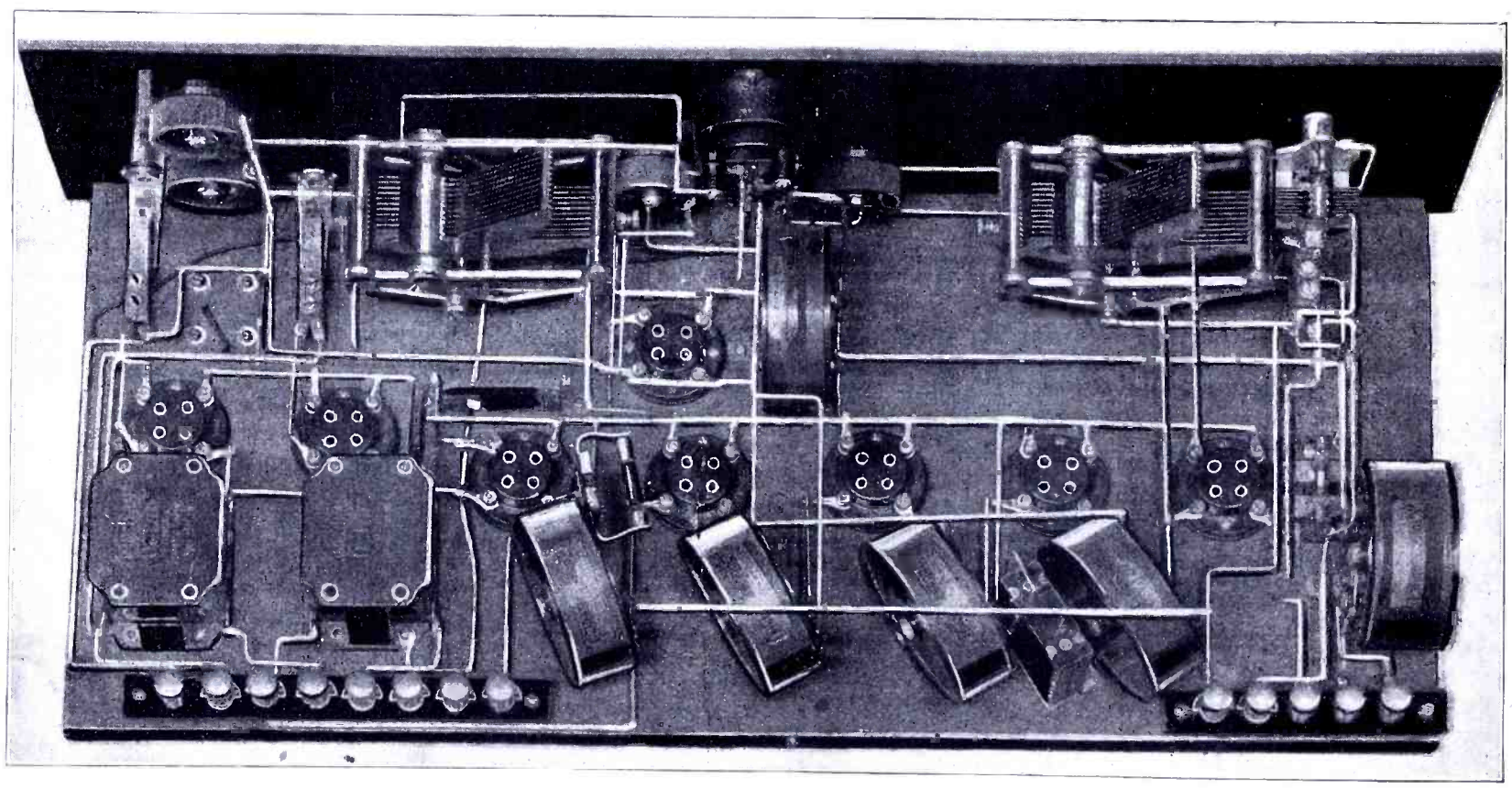


Photo C. Rear view of receiver after wiring has been completed

Greater clarity and much less tube noises are also obtained, d together with the fact that the grid voltage can be controlled nveniently to that point on the negative side, which gives best ults, a greater reduction in "B" battery consumption is tained.

first detector tube. A 6-ohm rheostat regulates the filament temperature of the three intermediate frequency tubes. The second detector tube has a 25-ohm variable resistance in the negative filament lead which is adjusted until the best results are obtained and then allowed to remain set. Each of the audio tubes have

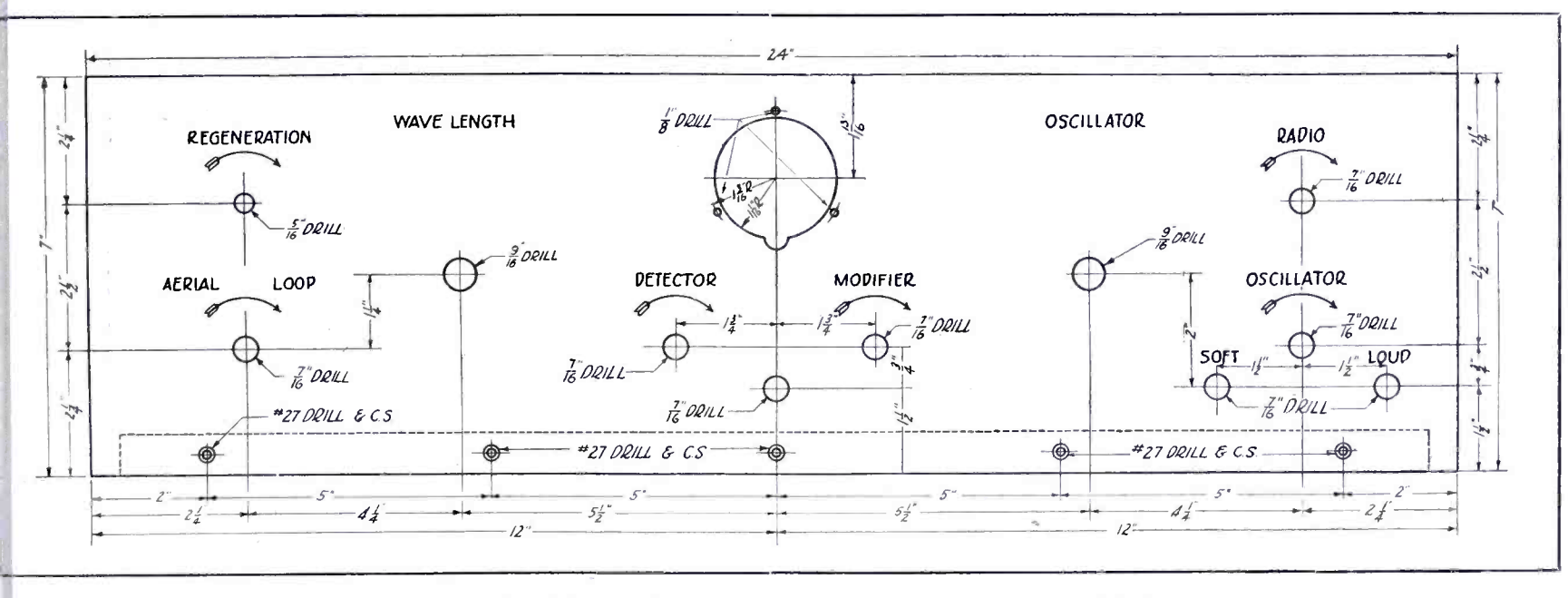


Figure 1. Panel layout showing suggested engraving and size of holes

UX 201 A tubes or their equivalent are used throughout the ceiver with the exception of the last stage of audio, where a X 112 power tube is used. If it is desired to use UX 199 tubes in nection with 171 Victoreen transformers it will be necessary to ert a 1½ volt "C" battery in series with the "F" terminals of intermediate frequency transformers and the arm of the potentioter. The negative lead of the "C" battery goes to the "F" terminals and the positive lead to the arm of the potentiometer. Also

fixed resistances in their negative filament leads, the 4-ohm unit controls the first audio tube, while the 2-ohm resistance controls the UX 112 power tube. A filament control jack is used in the output of the last stage of audio. This jack automatically lights the power tube when a plug is inserted into it.

Karas Orthometric Condensers have been selected in this receiver to assure an even spacing of stations over the entire dial range. The new Kurz Kasch Bakelite disc Aristocrat Vernier

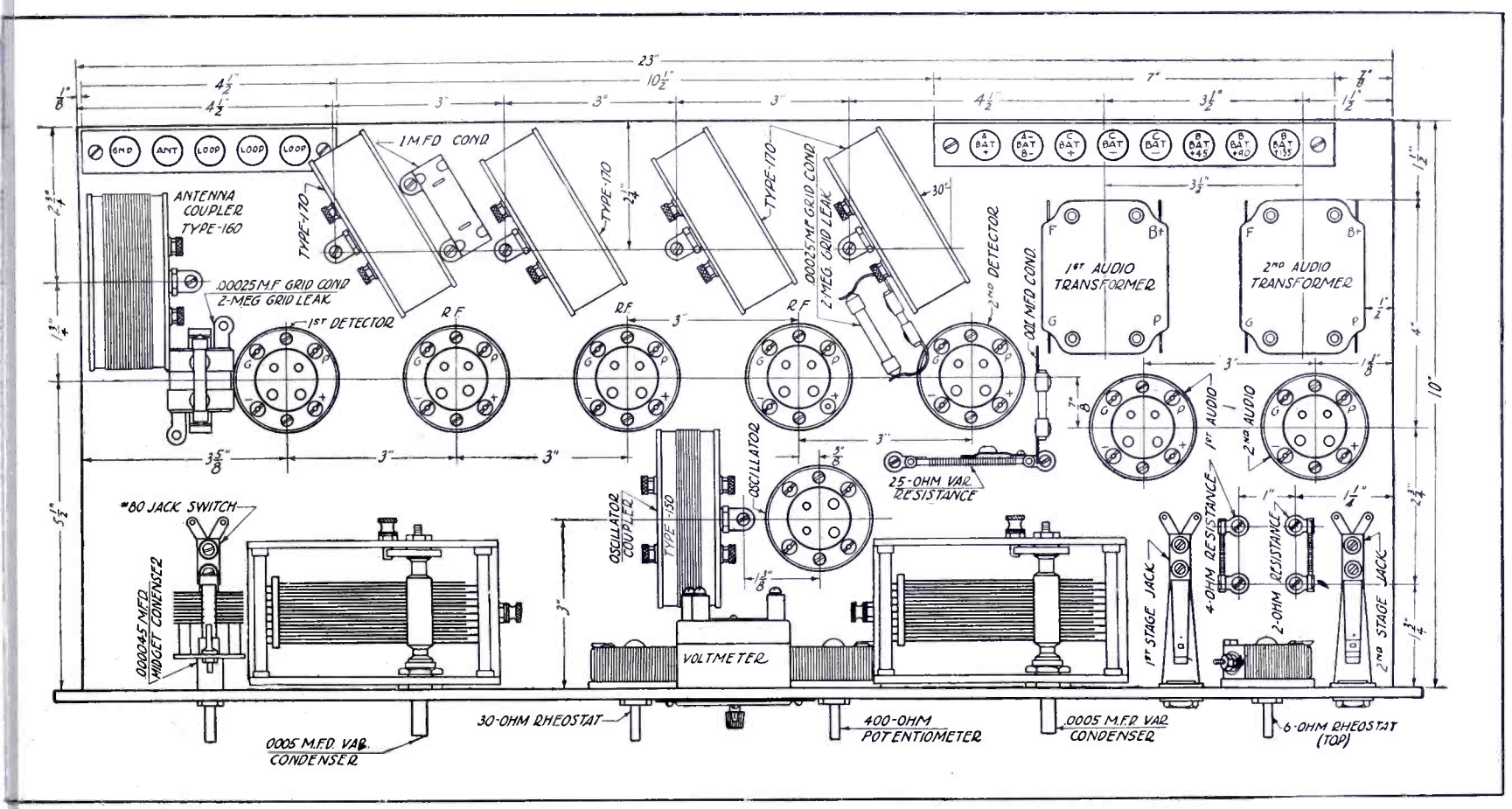
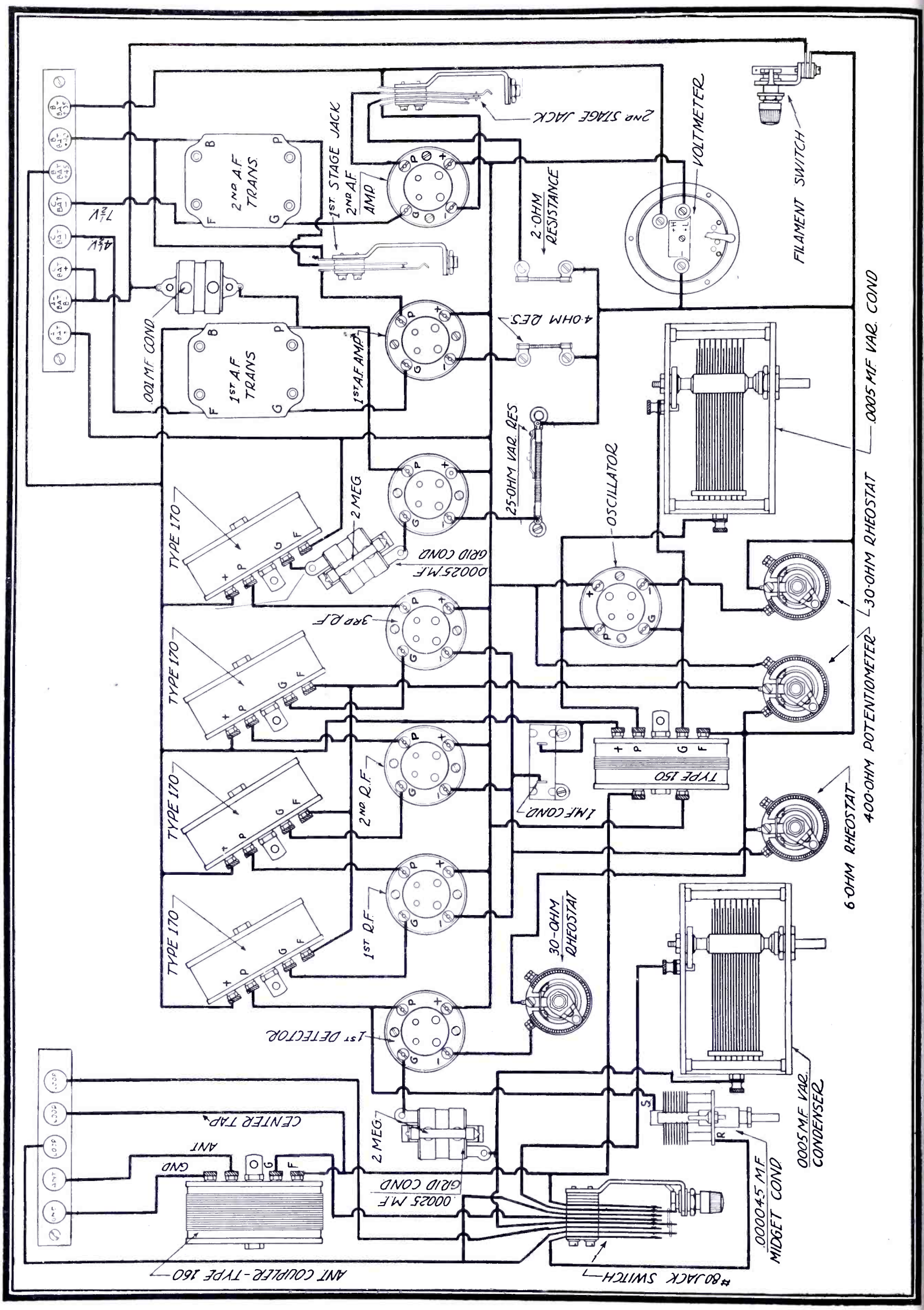


Figure 2. Baseboard layout showing arrangement of apparatus. If dry cell tubes are used Victoreen 171 RF transformers are required

nge rheostats and resistance units to accommodate the new tubes. a noisy output is found, it may be cleared up by inserting a bys condenser of 1 mfd. capacity across the B and B 135 volt minals.

The oscillator tube is controlled by a 30-ohm rheostat as is the

Dials are used in conjunction with the tuning condensers and help eliminate body capacity. AmerTran DeLuxe audio transformers are used in the audio end of the receiver. They possess an unusual straight line frequency characteristic whose range extends below the lowest note now broadcast, in addition to the faithful amplifi-



on of the higher frequencies.

o trouble should be experienced in mounting the parts in their ective locations and connecting them in the proper manner. various photographs and the baseboard layout will show the t location of parts and help considerably in making a neat of wiring. When the receiver is completely wired it is best arefully check the wiring against the large graphic illustra-

Make those corrections which are necessary and then con- the "A" battery and test out one tube in each socket, before necting the "B" batteries. If each tube lights and is controlled he proper rheostats it is safe to connect the "B" batteries. n again go over the receiver as before, one tube in a socket, when you are sure everything is O.K. light up all tubes with "A" and "B" batteries connected. Then plug in the speaker connect the loop to its proper terminals and throw the switch

1—10x23x¾" Wooden Baseboard
2—Karas Orthometric .0005 mfd. Variable Condensers
1—Jewell No. 140 Double Scale Meter 0-7.5 and 0-150 Volts
1—Yaxley No. 3 Filament Control Jack
1—Yaxley No. 2A Two Circuit Jack
1—Yaxley No. 10 Midget Battery Switch
1—Yaxley No. 80 Jack Switch
1—Yaxley 25-ohm Adjustable Resistance
1—Yaxley 4-ohm Fixed Resistance
1—Yaxley 2-ohm Fixed Resistance
2—Electrad .00025 mfd. Grid Condensers
2—Electrad 2-megohm Grid Leaks
1—Electrad 1 mfd. By-Pass Condenser
1—Hammarlund .000045 mfd. Midget Condenser
1—AmerTran De Luxe 1st Stage Audio Transformer

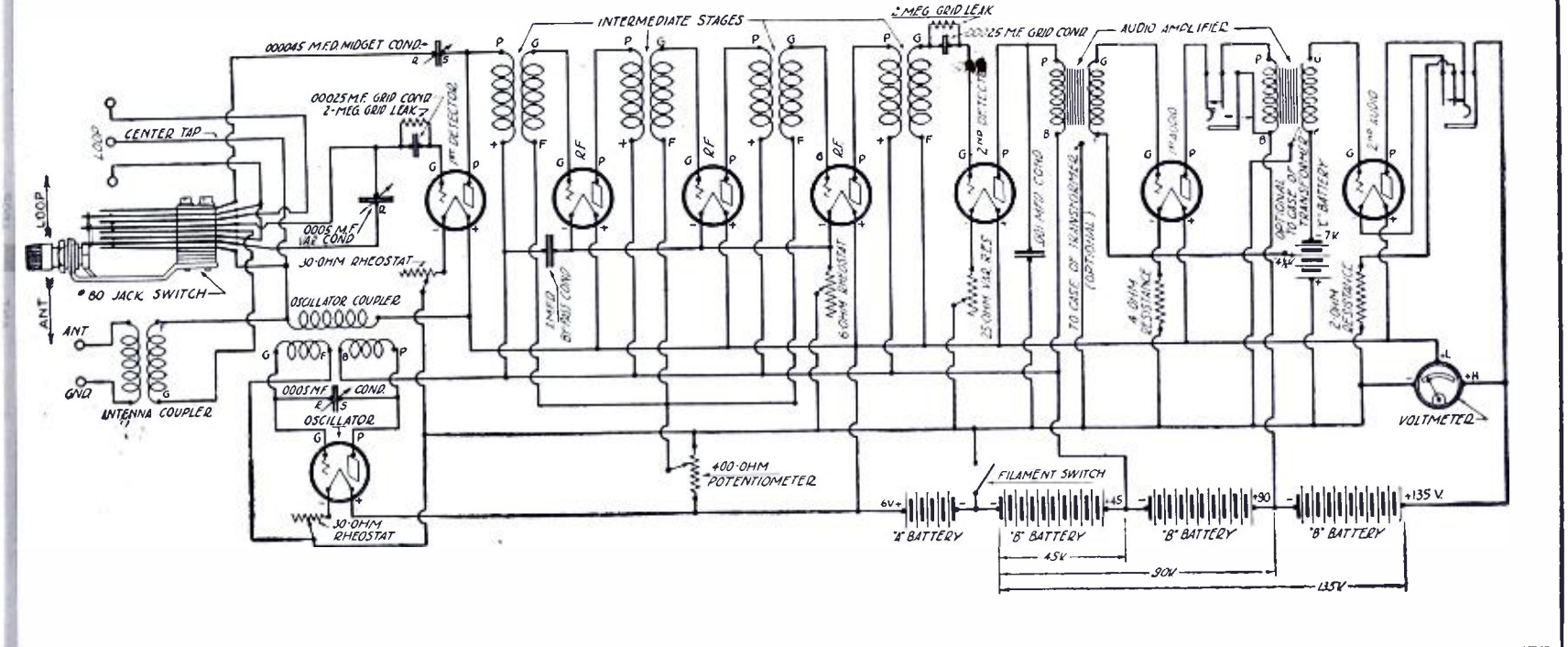


Figure 4. Schematic wiring diagram

he right. The potentiometer arm should be about three- ters of the way toward the negative side.

he Victoreen Super-Heterodyne differs little in operation from r super-heterodyne receivers. Careful tuning is a prime requi- since it is an extremely selective receiver and the operator "skip" over the stations if care is not used. To tune the iver proceed as follows: With all tubes burning turn the lator dial slowly one degree at a time. For each setting of dial, turn the wavelength dial slowly in either direction. If tation is heard, advance the oscillator dial up one or two ees and repeat the movement of the wavelength dial. Con- this procedure until signals are heard. Then carefully rotate oscillator dial until the maximum strength of signal is obtained, which time the wavelength condenser is also adjusted for imum signal strength. Sometimes the strength of the signal be improved by changing the tubes around until the best lts are obtained. Like any other receiver, this one has its little peculiarities which must be understood before the very results can be expected. For antenna operation a single 40 feet long, including lead-in, will give excellent reception. use of an antenna somewhat broadens tuning, and the shorter antenna, the better.

Jewell double scale voltmeter is provided to ascertain the and "B" voltages at all times.

LIST OF PARTS (Victoreen)

7x24x3/16" Drilled and Engraved Insuline Panel
¾x4⅝x3/16" Terminal Strip
¾x7⅛x3/16" Terminal Strip
-XL Push Binding Posts
1—AmerTran De Luxe 2nd Stage Audio Transformer
1—Electrad .001 mfd. Fixed Condenser
1—Victoreen Manganin No. 6— 6-ohm Rheostat
1—Victoreen Manganin No. 30— 30-ohm Rheostat
1—Victoreen Manganin No. 400—400-ohm Potentiometer
4—Victoreen No. 170 Radio Frequency Transformers
1—Victoreen No. 150 Oscillator Coil
1—Victoreen No. 160 Antenna Coupler
8—NaAld Bakelite UX Sockets
2—Kurz-Kasch Aristocrat Vernier Dials
10 Dozen Kellogg Tinned Soldering Lugs
1 Package Kester Radio Solder
2 Dozen No. 5x¾" Round Head Wood Screws
3 Dozen No. 5x½" Round Head Wood Screws
50 Feet Belden Tinned Copper Hookup Wire

The Acme "B" eliminator shown in the Console has a switch for high or low voltage and a variable resistance for obtaining the correct voltage on the intermediate frequency tubes and detectors.

A Kodel trickle charger, manufactured by the Kodel Radio Corp., Cincinnati, Ohio, is shown connected to a standard 6-volt radio battery made by the Willard Storage Battery Co., Cleveland, Ohio.

The new Acme Double Disc, Type K-2, cone speaker, is shown. This is shown in a finished walnut cabinet also manufactured by Acme Apparatus Co., Cambridge, Mass.

The Console shown is manufactured by the Chillicothe Furniture Co., Chillocothe, Mo.

The Super Cabinet shown in Photo B is made by D. H. Fritts & Co., Hearst Square, Chicago.

(Any information regarding these suggested accessories can be obtained by writing direct to the manufacturers.)

The Universal Receiver

This Is a New Design of a Very Popular Circuit. By Following These Specifications Excellent Results Will Be Obtained

OUR READERS are continually requesting information and details of a receiver which is easy to construct, economical in price and operation, and contains a minimum number of tubes consistent with loud speaker reproduction of good quality over long distances. In addition to this, many desire a receiver in which either dry cell or storage battery tubes may be used.

Many receivers have appeared from time to time and were reputed to possess all of these desirable features. A careful test of the performance of the completed receiver would usually show that those features which were claimed to be present were very conspicuous by their absence.

In our search for a receiver which would fulfill the requirements, our attention was attracted by many excellent circuits. Each was carefully experimented with and a selection made. We now offer our readers a receiver which we consider to be the ultimate in four tube possibilities. The Universal Receiver, as it is known, is comparatively new and while it has been described before in other publications, various changes and modifications have been made in the interest of increased sensitivity and selectivity as well as appearance and ease of wiring.

A combination of one stage of balanced tuned radio frequency amplification, a regenerative detector with a tickled tickler and two stages of first grade transformer coupled audio amplification with a power tube in the last stage make up the circuit in this unique receiver. Figure 5 shows a schematic wiring diagram of the complete receiver. It will be observed that a .0001 mfd. variable condenser is in series with the antenna. This small condenser in the antenna system, when used in conjunction with the type 277-C coil, allows extreme selectivity with maximum sensitivity. If local broadcast interference is experienced, tuning may be sharpened by adjusting the capacity of the condenser toward minimum. For all-round reception the capacity of the condenser should be set at maximum. The type 277-C coil is the antenna coil, tapped to establish a bias on the radio frequency tube, and tuned by a .00035 mfd. variable condenser. The remaining major control is also a .00035 mfd. variable condenser tuning the type 277-D coil, which is a radio frequencly transformer of the auto-transformer type, with a fixed tickler. A 500- to 50,000-ohm variable non-inductive resistance is in series with the tickler and adjusts it electrically. A pilot light operated from the "A" battery and controlled by the filament switch indicates at all times whether or not the tubes are burning. In the first stage of audio a 6-1 ratio audio transformer is used, the second stage using a 2-1 ratio audio transformer. These transformers when used with a good cone type of loud speaker will reproduce the audio frequencies as broadcast today as well as the highest, with a very excellent tone quality. A first stage jack is not necessary, since the variable resistance in the tickler circuit acts as a very efficient volume control.

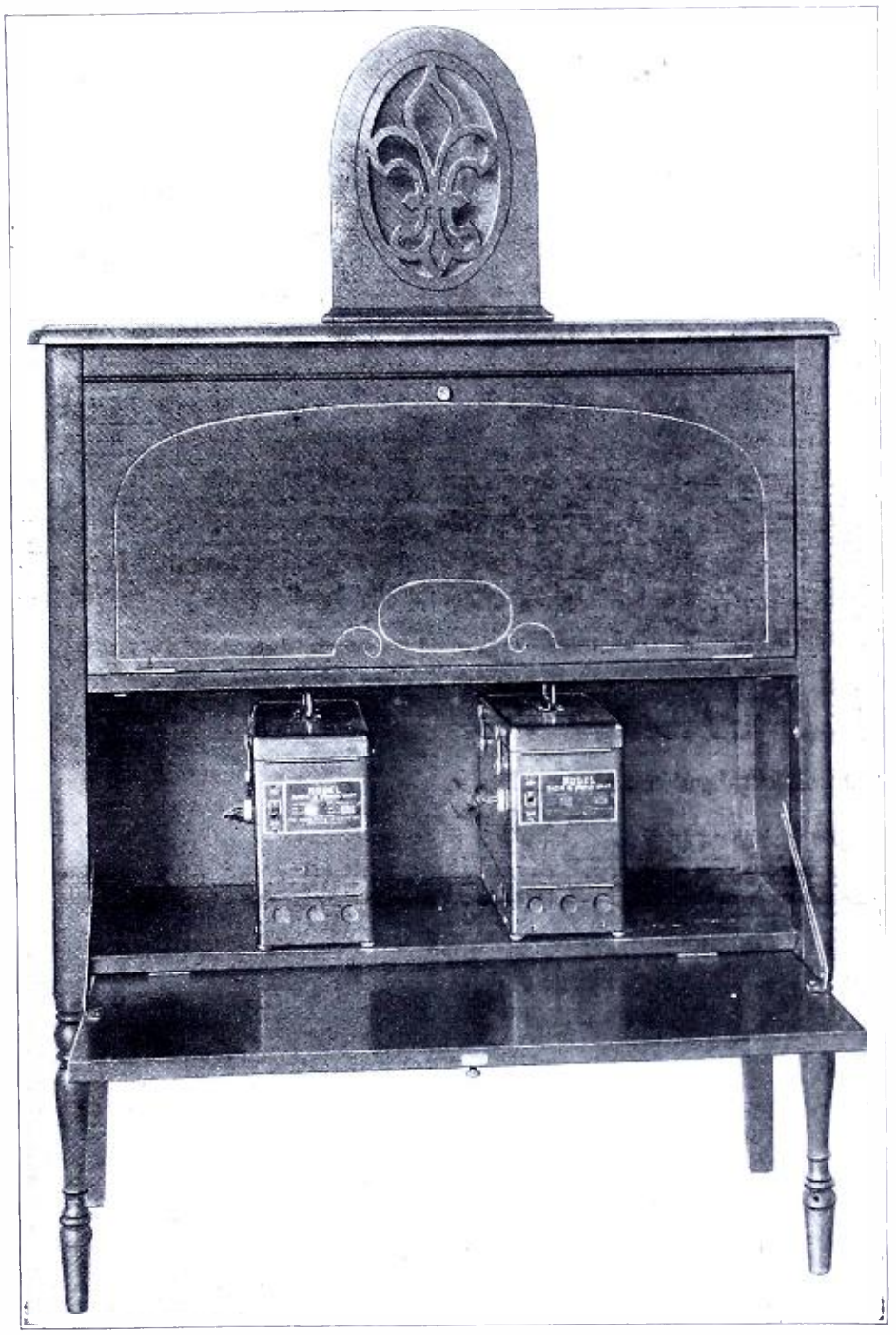


Photo A. View showing how receiver can be placed in a console with suggested accessories

The Universal Receiver as described herewith is designed to operate from a 6-volt storage "A" battery, using three UX 201-A tubes and one UX 112 power tube in the last stage of audio. To convert the receiver into one which operates on 4½ volts, substitute the UX 201-A tubes with UX 199 tubes and the UX 112 with a UX 120 power tube. Also remove the No. 112 and No. 1-A Amperite units and replace them with a No. 120 and 4V 199 Amperite unit respectively. Circulars are supplied with the various tubes explaining their correct working voltage.

In the event that a UX 200-A detector tube is used instead of the 201-A, it will be necessary to change the grid return on the detector tube from positive to negative. This may be easily done by soldering that wire, normally connecting the grid leak to the positive filament terminal of the detector socket to the negative filament terminal of the detector socket.

List of Parts

These parts or their equivalent will give satisfactory results:

1—7x21x3/16" Drilled and Engraved Formica Panel
1—7x20x3/16" Drilled Formica Sub-Panel
1—Pair type M-V Pan-Brackets
2—General Radio Type 247-H .00035 mfd. Variable Condensers
2—General Radio Type 310 Dials
1—General Radio Type 285 6-1 Ratio Audio Transformer
1—General Radio Type 285-L 2-1 Ratio Audio Transformer
4—General Radio Type 349 Sockets
1—General Radio Type 277-C Coil
1—General Radio Type 277-D Coil
1—General Radio Type 301 12-ohm Rheostat
1—General Radio Type 301 25-ohm Rheostat
1—General Radio Type 368 Midget Condenser
1—General Radio Type 236 .5 mfd. Paper By-Pass Condenser

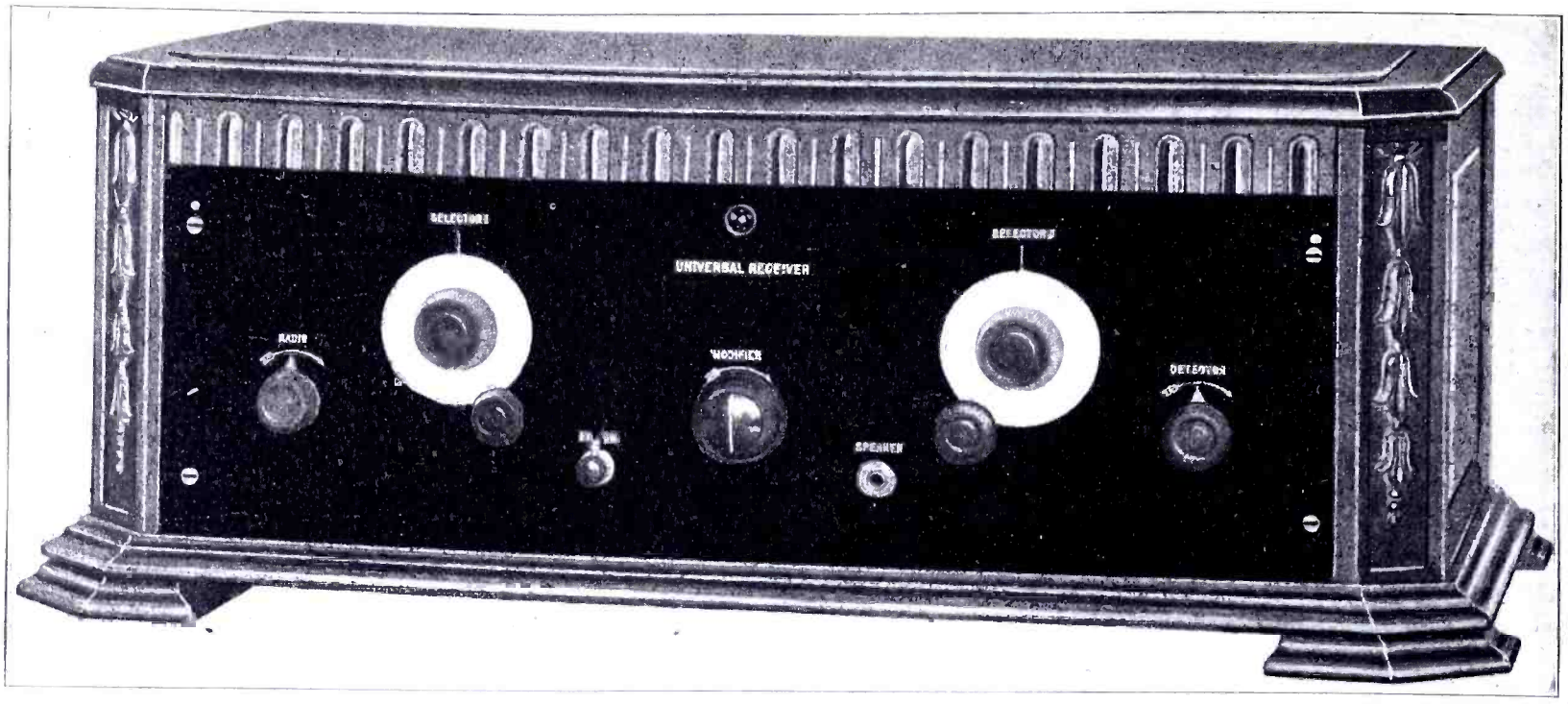


Photo B. Front view of receiver in cabinet

1—Yaxley Type 310 Pilot Light Bracket
1—Yaxley Type 701 Open Circuit Midget Jack
1—Yaxley Type 10 Filament Switch
1—CRL 50,000-ohm Variable Non-Inductive Resistance
1—Precise Type 940 .0001 mfd. Variable Condenser
13—Eby Marked Binding Posts
1—Lynch Single Resistor Mounting
1—Lynch 3-megohm Grid Leak
1—Amperite Type No. 112
1—Amperite Type No. 1-A
1—Micamold .0001 mfd. Fixed Condenser
1—Micamold .00025 mfd. Grid Condensor (without leak mounting)
3 Dozen No. 6x32x½" Round Head Brass Machine Screws
1 Dozen No. 6x32x1½" Flat Head Brass Machine Screws
3 Dozen Kellogg Tinned Soldering Lugs
1—Blackburn Ground Clamp
1 Package Kester Radio Solder
50 Feet Belden No. 12-gauge Tinned Copper Hookup Wire
1 Foot Flexible Insulated Wire

1 Brach De Luxe Senior Aerial Outfit

Figure 1 is a panel layout and shows all of the apparatus location and size of all holes. Necessary engraving is also shown in its correct position. Templates are supplied with the variable condensers to aid in locating the mounting holes properly. When other brackets than those specified are used, care should be taken that all mounting holes are correctly located, as well as to observe whether the apparatus mounted on the front panel has sufficient clearance to be operated properly.

Figure 2 is a baseboard layout and shows all of the apparatus mounted into place upon the sub-panel and front panel. It is best that each panel be assembled separately and all possible wiring completed before fastening the panels together with the brackets. The antenna coil is mounted into place, about ¼ inch above the sub-panel, by a small brass bracket. The bracket is made of 1/16-inch material, ½ inch wide and 2 inches long. A ¾-inch bend is formed on one end and a 5/32-inch hole drilled in its center. Two more holes, also 5/32-inch drill, are made 5/8 inch apart in the long arm with the bottom hole 5/8 inch from the outside of the bend. Holes for mounting purposes are pro-

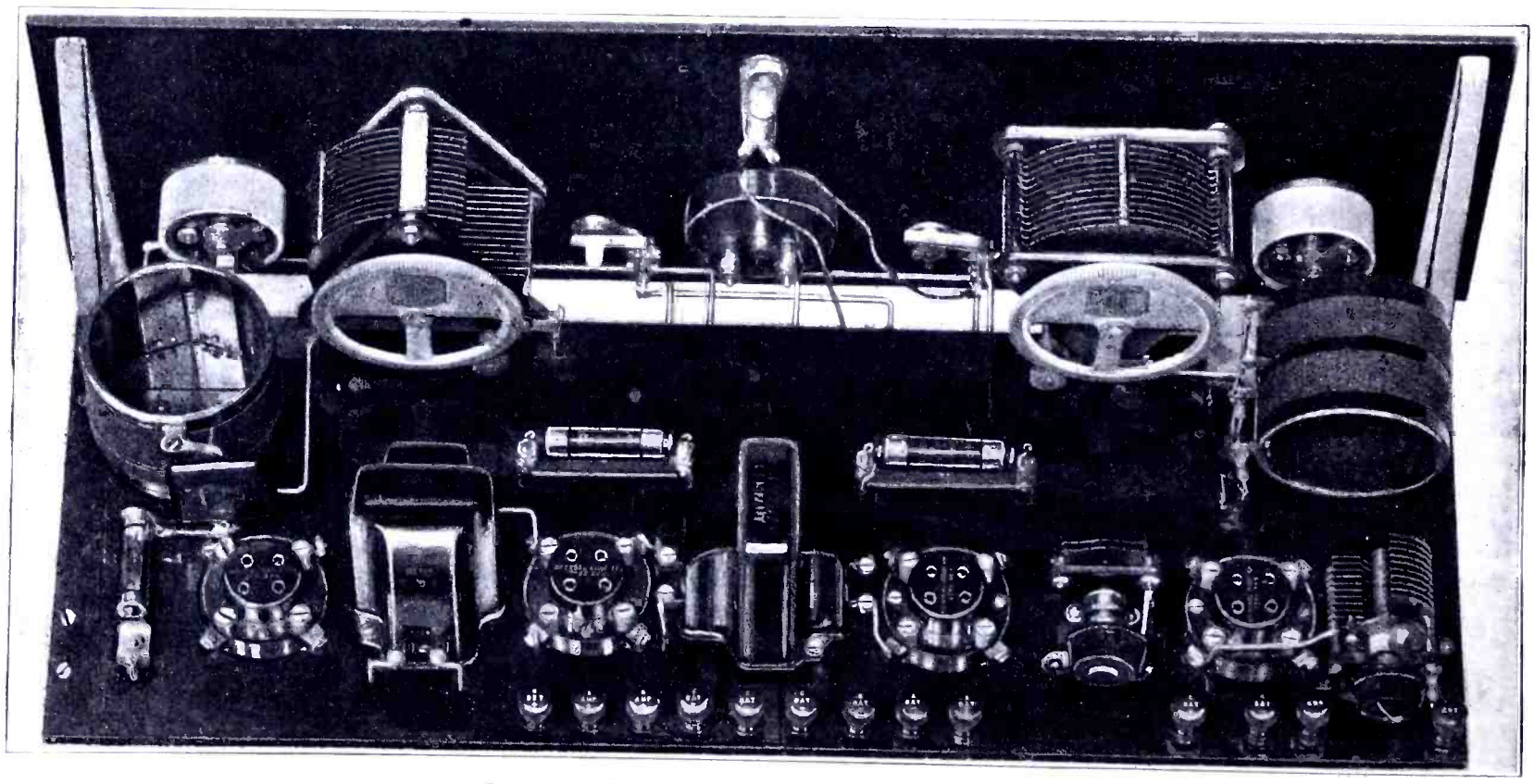


Photo C. Rear view of receiver completely wired

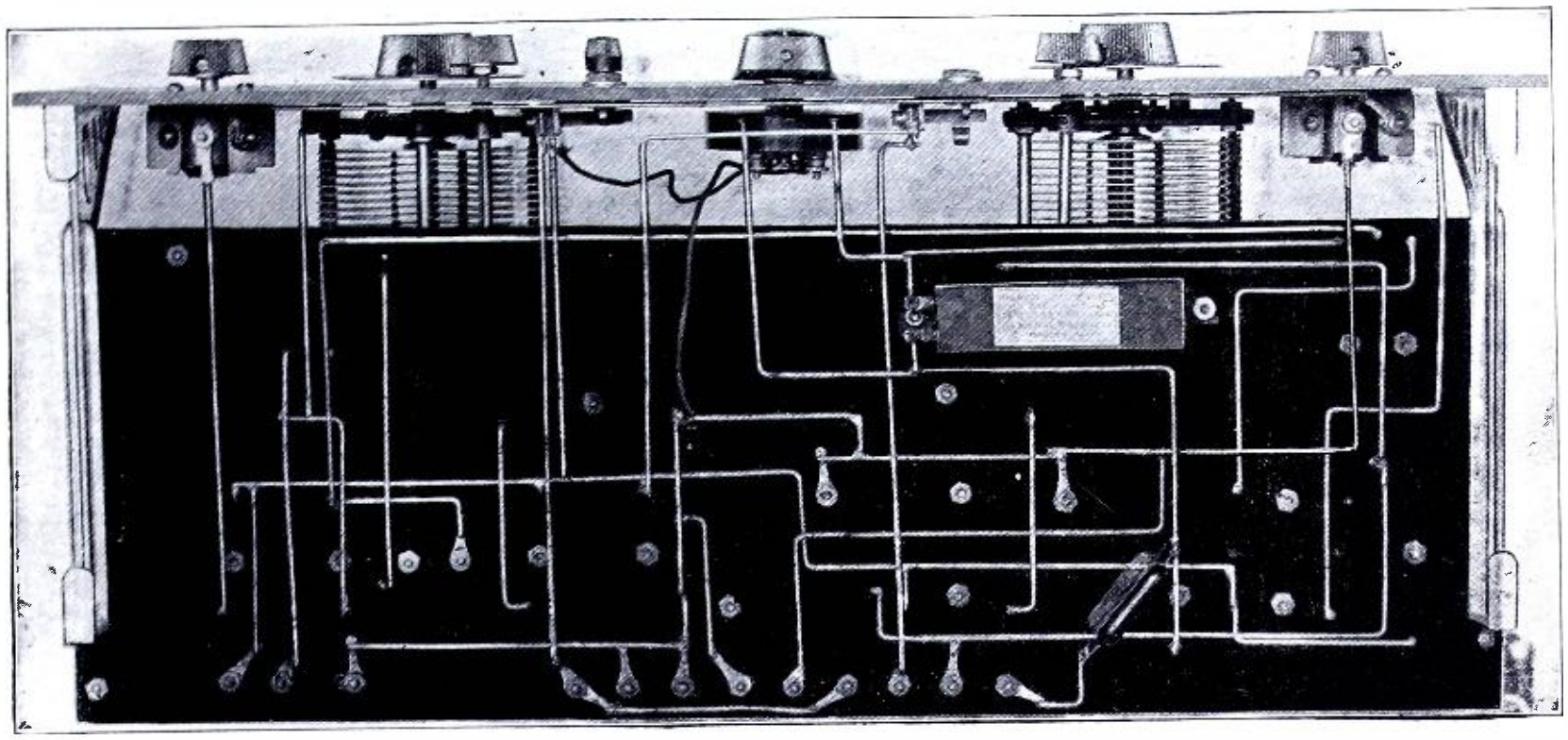


Photo D. Bottom view of sub-panel. Note the neat arrangement of wiring

vided in the coil frame. The .0001 mfd. condenser in series with the antenna is held in place by a soldering lug, clamped upon the upper surface of the sub-panel by the antenna binding post, and the wire running to the plate terminal of the radio frequency tube. A 21-inch front panel is used to permit plenty of room to remain between apparatus and assist the builder to make a neat job of wiring. The constructor is strongly advised against making any change in the layout of parts in the receiver. The circuit used is quite critical and it is obvious that if changes are made the highest degree of efficiency and satisfaction cannot be expected. No difficulty should be experienced in hooking up the circuit if the wiring as shown in the photographs is carefully followed. The .0001 mfd. fixed condenser across the primary of the first audio transformer is placed under the sub-panel directly below the transformer and soldered into position.

A feature of the receiver as built is that separate binding posts are brought out for the "C" battery connections necessary to establish the bias in the radio frequency tube. In addition to this, separate terminals are provided so that plate and grid bias voltages of the audio amplifiers may be varied for the best results as well as allowing any type of audio tube to be used.

After assembling the receiver and completely wiring it, carefully check all connections against Figure 3, the graphic illustration. Correct mistakes in wiring, if any, and connect the "A" battery alone to the receiver. Using only one tube, try each socket and observe whether the tube lights and is controlled by the proper resistance. Then connect the "B" and "C" batteries, if tubes light properly, and again try a single tube at a time and note whether each tube operates normally. When each tube functions properly it is safe to insert all tubes in their respective sockets and connect the antenna and ground as well as plug in the loud speaker in the output jack.

The batteries used in the operation of this receiver must be fully charged and up to their rated voltage. Squealing and distorted reception will result if batteries are used which have their current exhausted to any degree.

If the wiring is correct the Universal Receiver will respond as soon as it is placed into operation, if there is any broadcasting going on. A single wire antenna approximately 50 feet long will give excellent results in metropolitan areas. The use of a longer antenna is advised only when the nearest broadcasting is 25 miles away.

The only adjustment necessary to place the receiver in proper working order is the neutralization of the radio frequency circuit. This is accomplished as follows: With the detector oscillating, tune in some broadcast signal of moderate strength whose fre-

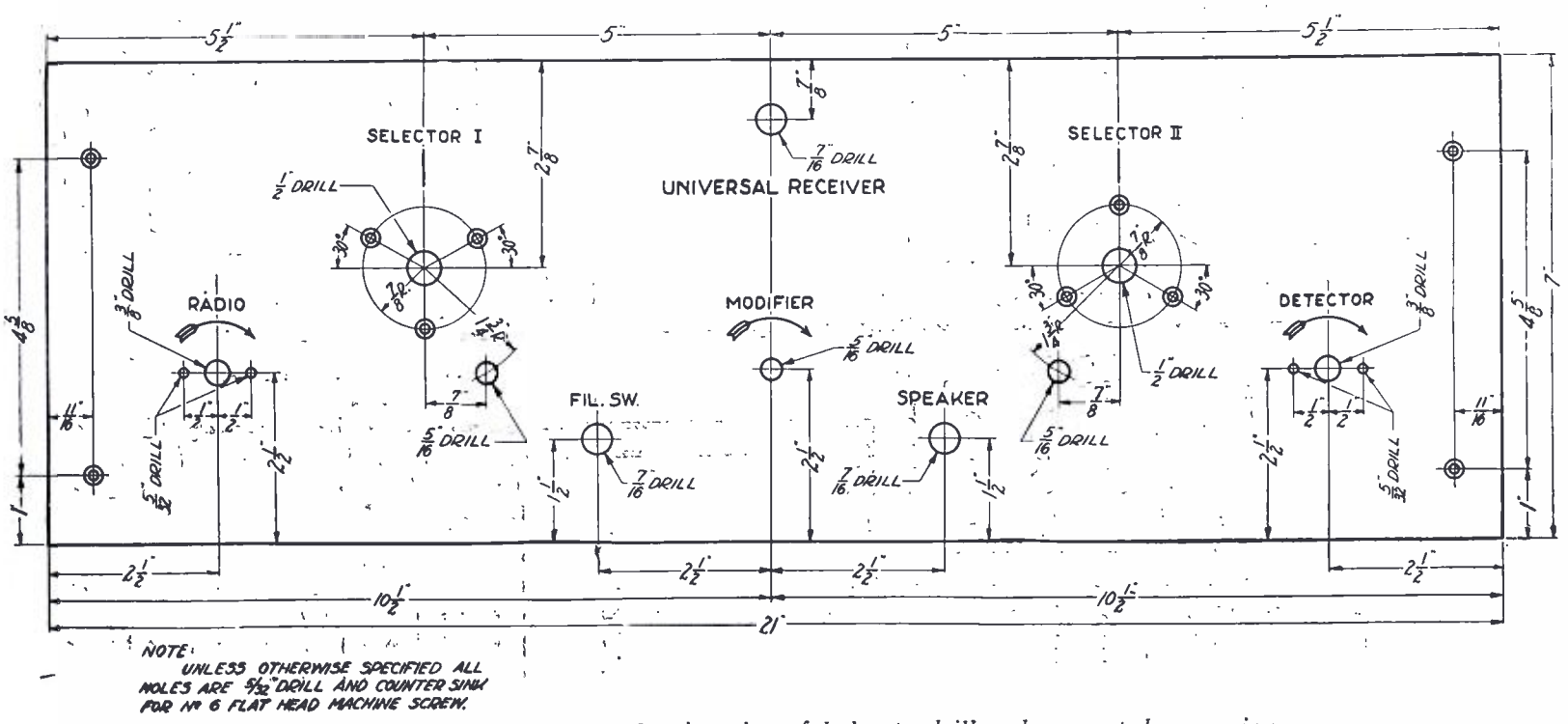


Figure 1. Panel template showing size of holes to drill and suggested engraving

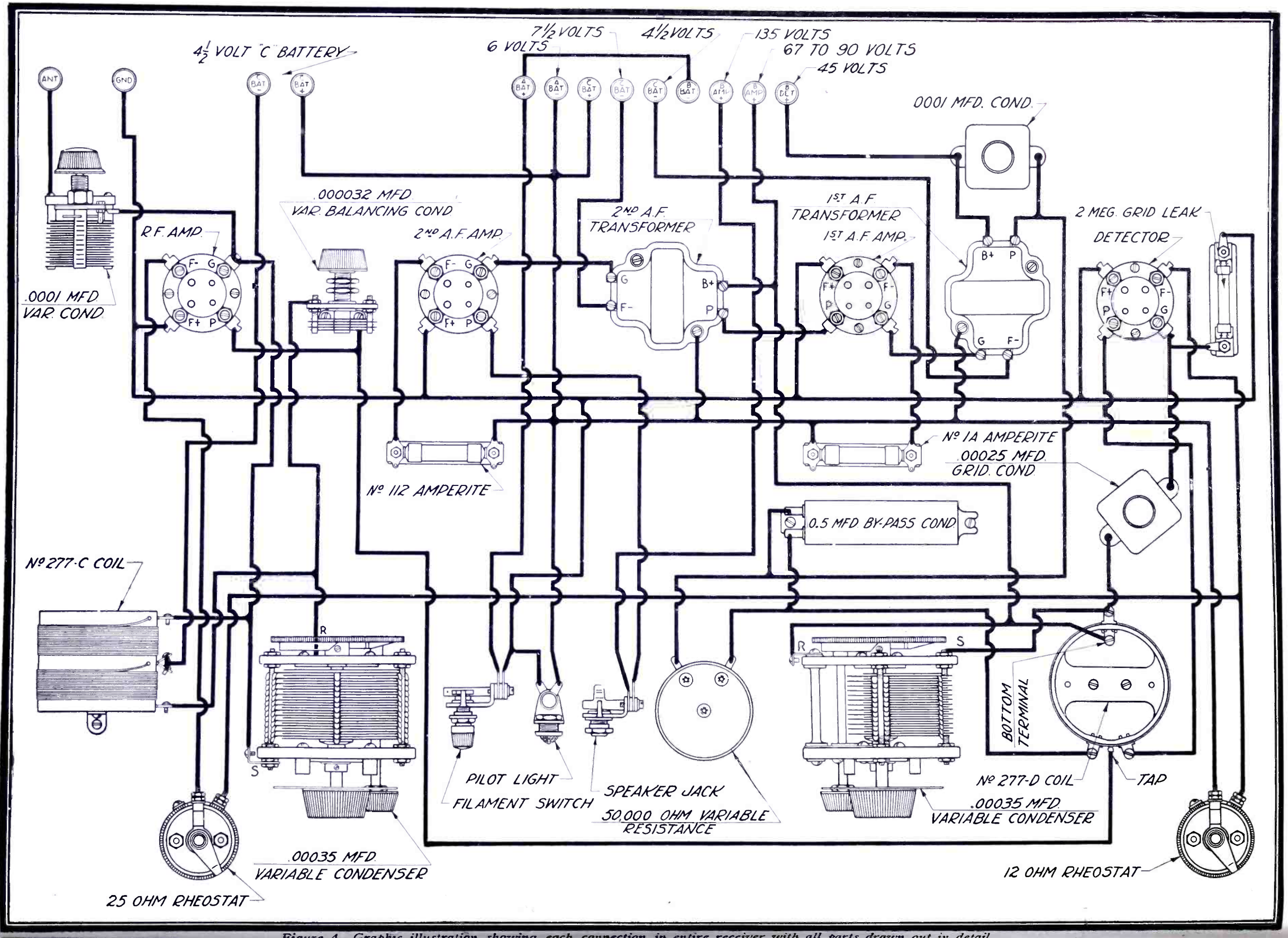


Figure A. Graphic illustration showing each connection in entire receiver with all parts drawn out in detail

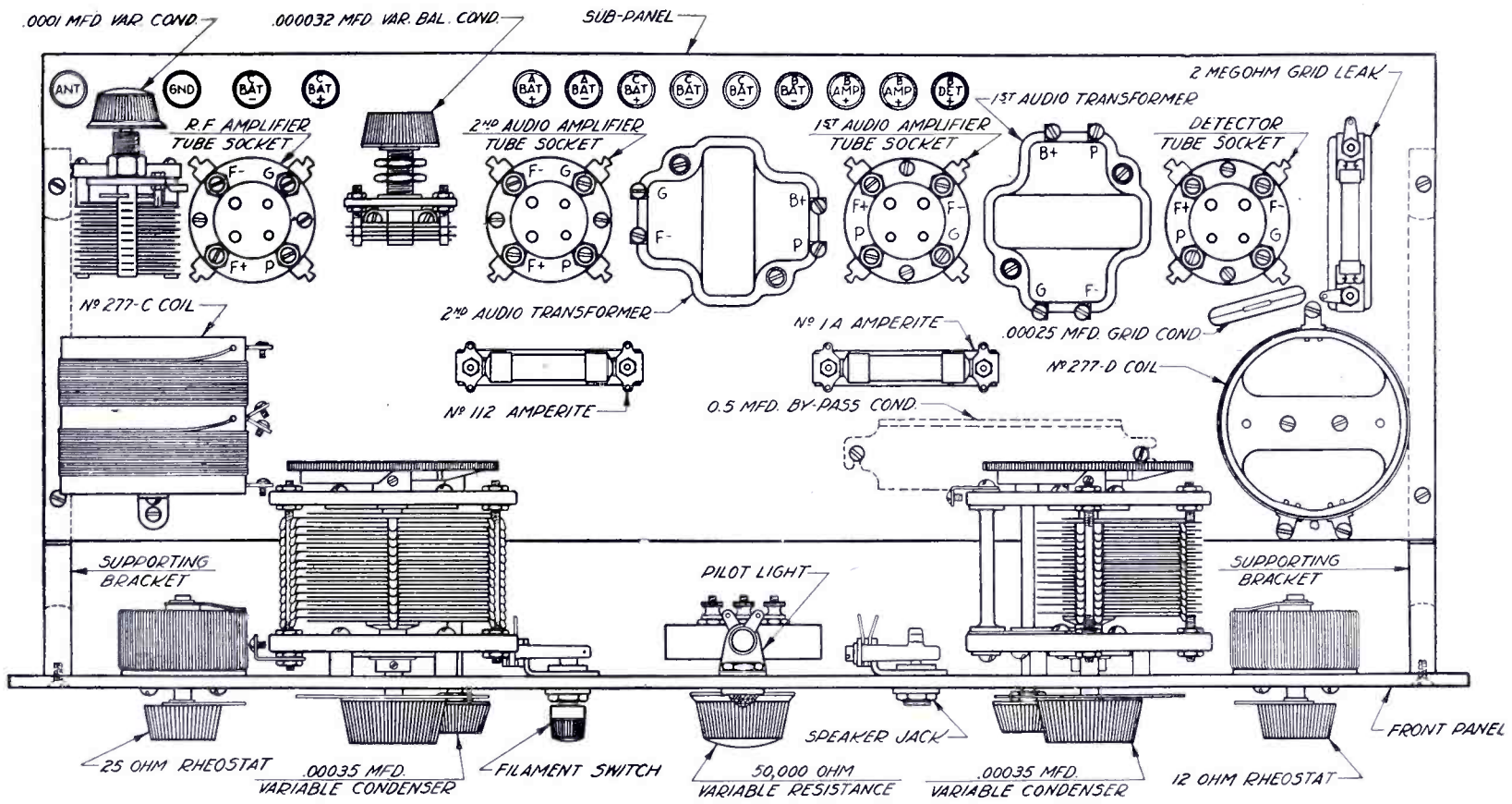


Figure 2. Drawing showing top view of receiver with arrangement of parts

uency is about 1000 kc. (300 meters). The detector condenser Selector II) should be turned until the whistle is quite loud. f the antenna condenser (Selector I) is varied, a change in the itch of the whistle will be observed. To properly neutralize the eceiver it is necessary to adjust the balancing condenser until uch a condition exists where the whistle does not change in pitch. Moving the neutralizing condenser a little at a time, the antenna ondenser is varied and the pitch of the whistle noted. The pitch ill lower in frequency when below the neutralization point and ise in frequency when above. The listener can therefore easily nd the correct point of neutralization by noting at which point he whistle does not change.

The two major controls will tune approximately alike over the ntire dial range if properly adjusted when attached to the con- enser shafts. The adjustment of the rheostats when the set is in operation is not critical, although every effort should be made to burn the tubes at the lowest filament operating temperature.

Reception results with this four tube receiver will be both gratifying and satisfactory.

Photo A shows a Kodel "A" power unit and "B" eliminator when connected in any convenient 110-volt A. C. socket will supply all necessary voltages for operating all tubes. These units are manufactured by the Kodel Radio Corp., Cincinnati, Ohio.

The speaker is a Brandes, new model cone type, made by Brandes, New York City.

The super cabinet shown in Photo B is made by D. H. Fritts Co., Hearst Square, Chicago.

(Any inquiries regarding these accessories should be directed to the manufacturers.)

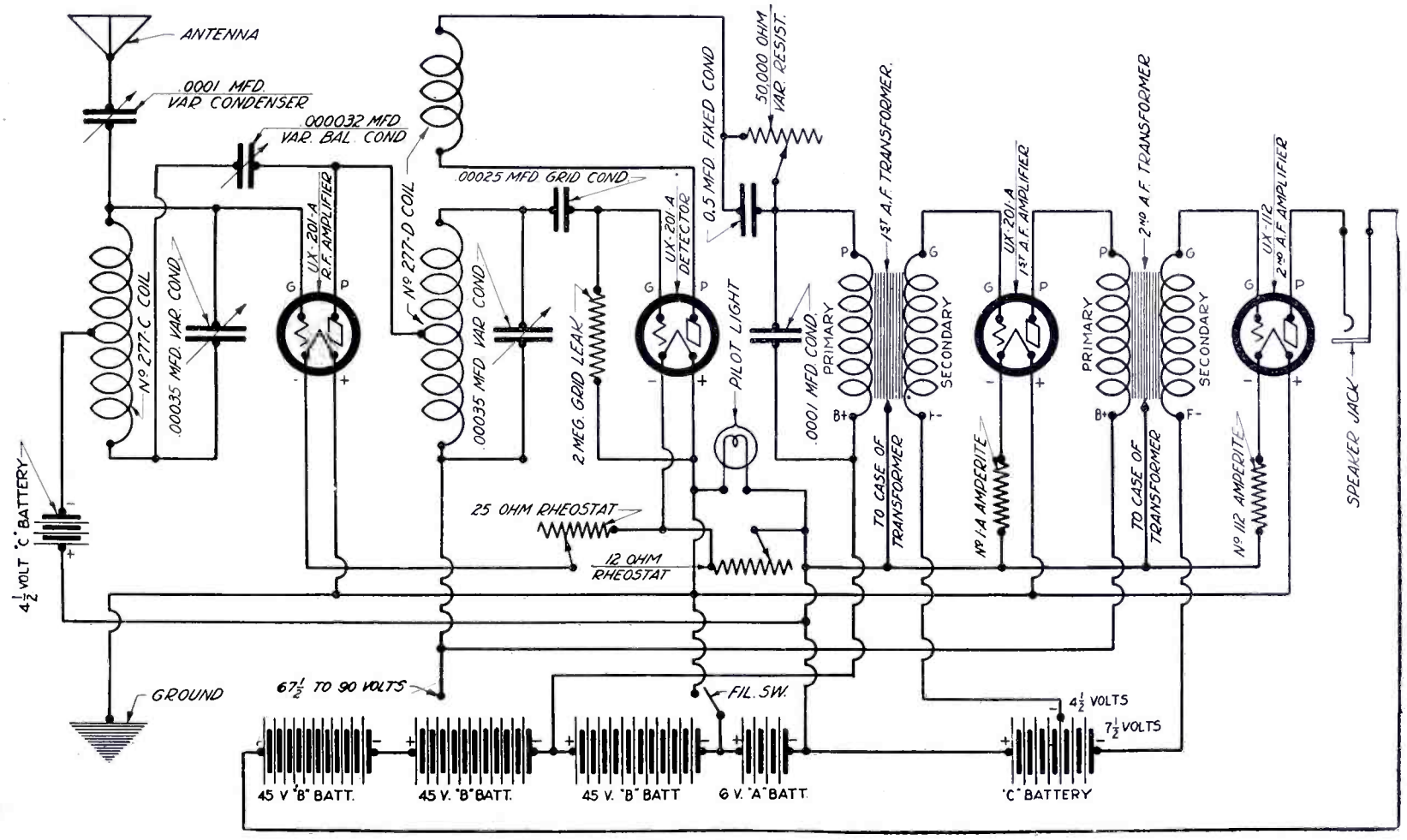


Figure 4. Schematic wiring diagram

Building the "Aero-Dyne"

Here Is a Receiver Whose Parts Are of the Highest Quality and Whose Engineering Design Has Been Carefully Planned

THE "five tube set" has become so popular with the home builder during the past two radio seasons that there are few who have not attempted the construction of one of this variety. Some have given satisfaction, others have not, all according to the merit of the manufacturers product and the skill with which they were put together by the builder himself.

The "Aero-Dyne" is a receiver employing five tubes, two stages of radio frequency, a detector and two of audio, but there its similarity to the average receiver stops. The inductances, the heart of any radio set, are designed in an original and unique style, giving several points of superiority. These are straight solenoids, wound with heavy, white cotton covered wire on a skeleton framework which is built up of thin strips of bakelite, giving a strong, low resistant and consequently sharp-tuning coil. The primary of each inductance is placed inside, at the filament end, and is slightly spaced to give a high co-efficient of coupling to the secondary with a minimum number of turns; a desirable feature in this class of circuit. The antenna circuit is coupled to the first grid coil by means of a variable primary which may be adjusted for tight or loose coupling, adopting it to long and short aerials or local interference conditions.

The tuning controls are three, one for each inductance, and the oscillation and volume of reception are controlled by means of a variable high resistance in the plate circuit of the radio-frequency tubes. This gives just the right B-battery voltage for each wavelength and allows the set to be pushed to the limit of distance and selectivity by virtue of regenerative action. Thus is combined tuned radio frequency and regeneration, another desirable feature.

The builder of the receiver should refer to the front and rear photos of the set and the schematic diagram shown here. Any good make of .00035 variable condensers of straight-line-frequency or wavelength pattern may be used, but those shown in the list of parts are to be recommended. All other parts should be of the highest quality to carry out the effectiveness of the receiver.

A completely engraved panel especially for this set is on the market and a detailed set of colored, step-by-step diagrams wit necessary blue-prints, is included with the kit of coils.

List of Parts

These parts or their equivalent will give satisfactory results:

9—XL Marked Binding Posts
1—Sangamo .00025 MF Grid Condenser with Clip
1—Sangamo 1 MF By-Pass Condenser
1—Sangamo .001 MF Fixed Condenser
1—Lynch 2 to 5 Megohm Grid Leak

Photo A. Front view of completed receiver

1—Yaxley Open Circuit Jack
1—Yaxley Closed Circuit Jack
1—Yaxley 15 Ohm Rheostat
1—Yaxley 20 Ohm Rheostat
1—Set Aero TRF 120 Coils
1—Formica 7x28 Sub-Panel
1—Formica 7x28 Aero-Dyne Panel
5—Benjamin Sockets
3—Kurz Kasch Dials
1—CRL 200,000 Ohm Variable Resistance
2—Thordarson 3½ to 1 Audio Transformers
1—No. 112 Amperite
3—Karas .00035 MF Variable Condensers
1 Package Kester Solder
50 Feet No. 12 Belden Tinned Copper Wire

After drilling the panel and sub-panel for the larger parts, the should be connected together with the panel brackets and th parts mounted. Now the filament wiring is run, from the batter binding post through all sockets and rheostats (the audio on th fixed resisfance) back to the other battery post. The switch an rheostats should control the filaments of the tubes. The coil should now be connected to the condensers and tube element and the B battery wiring run, the RF line through the high re

tance on the front panel. Be careful to connect the by-pass ndensers exactly as shown, as much trouble may be eliminated observing this fact.

In order to put the set in operation five standard UX 201A pes are required, although somewhat superior results may be d by using the new 200A in the detector socket. In order to

When first tuning up, set the three dials at approximately the same position in about the middle of the scale, light the tubes to average brilliancy and adjust the volume control. If everything has been correctly done, the set will go into oscillation, as evidenced by a slight click or roar, as the knob is turned clockwise. Just under this point of oscillation is the best place to operate

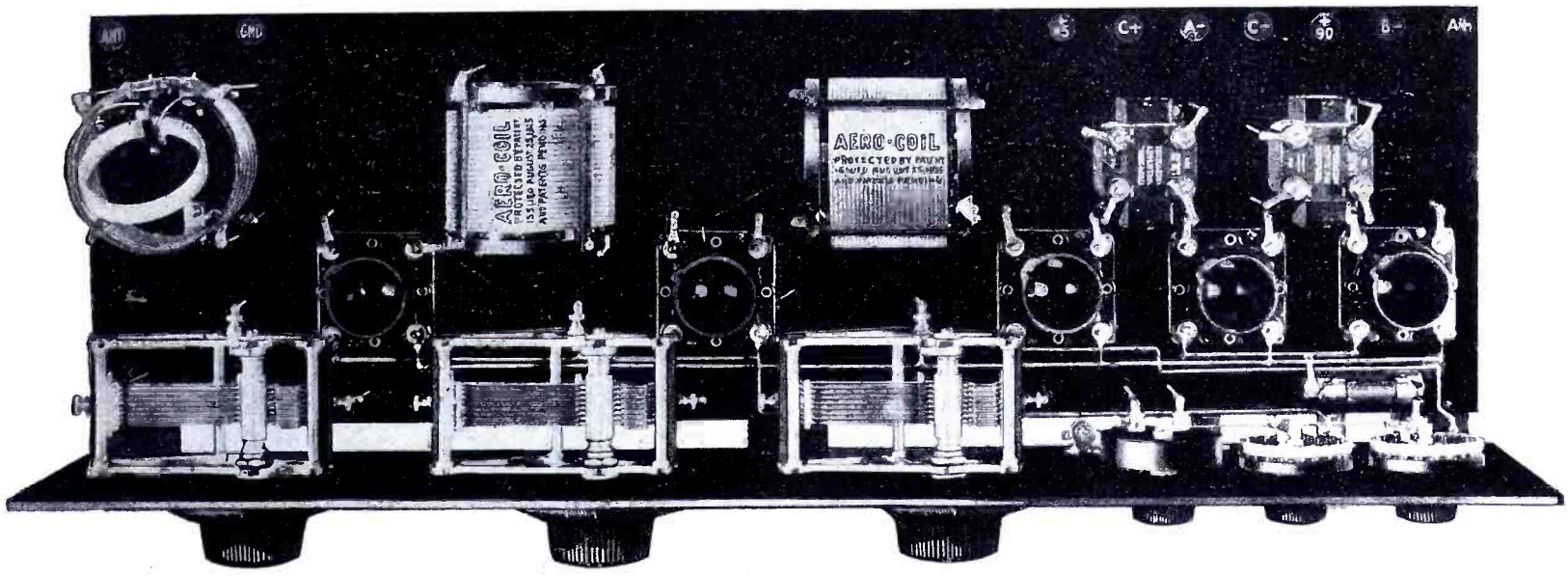


Photo B. Top view of receiver showing arrangement of parts

e this tube as a detector the grid return should be made nega- e rather than positive, as shown in the figures. This stops the jectionable hiss when a gas tube of the 200A type is desired. little experimenting with grid leaks is always productive of tter results. The length of the aerial may be anything from

for distance, although locals will be found of ample volume with far less adjustment of the control. Now sweep the scale, keeping all three dials about the same reading and thereby all three circuits in resonance. Even if you do not hear a station at every dial adjustment, you will soon learn to recognize the resonant

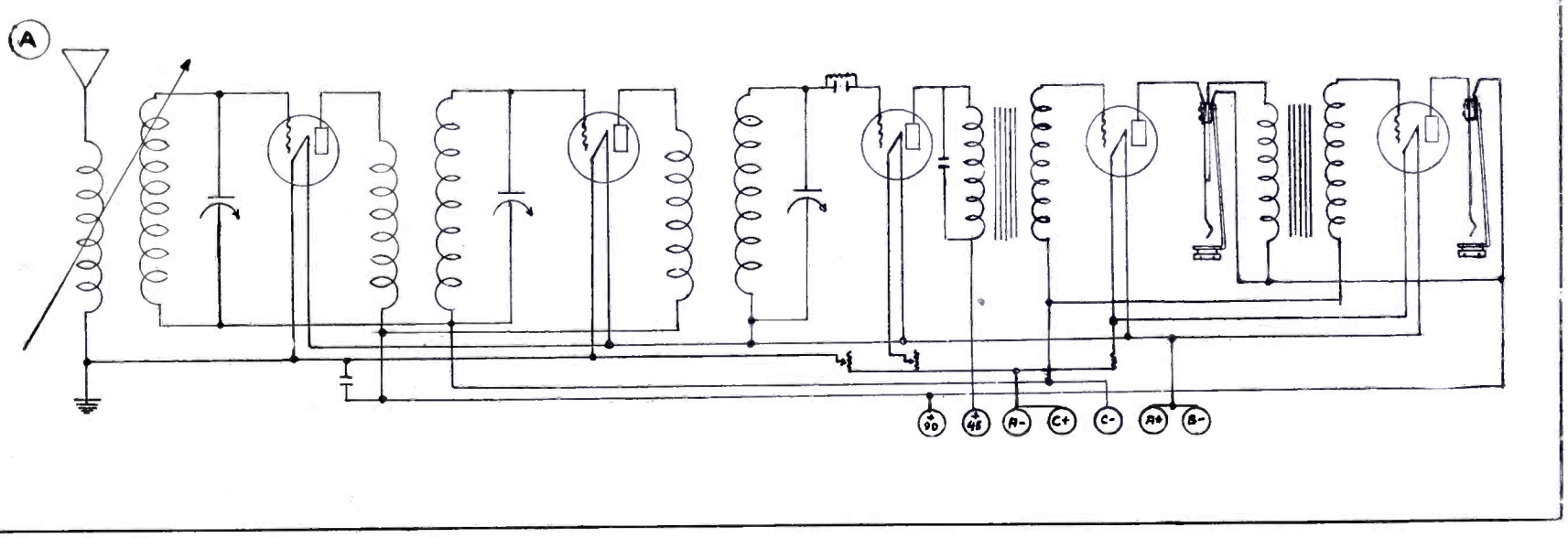
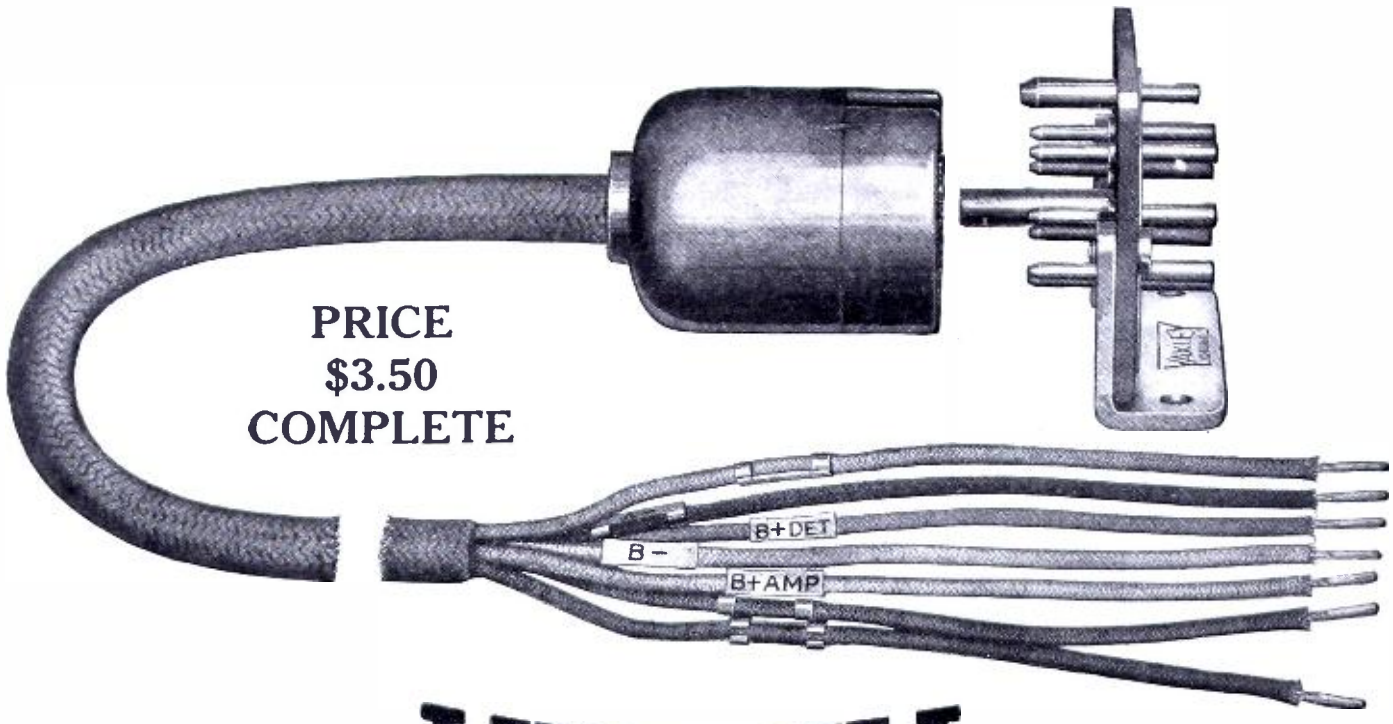


Figure 1. Schematic wiring diagram

) to 100 feet, although the longer is preferable because of louder gnals on distance, although it will not tune as sharply. A good round is an asset. You will note that a C battery is used on oth RF and audio stages; this greatly increases the selectivity nd cuts down the B battery drain. It also makes the set operate ore smoothly and allows better oscillation control.

condition, as there is always a slight amount of atmospheric noise which will only be heard when the set is in an operating condition. A little practice on locals will soon equip you to hunt for distance and some slight adjustment of the variable primary on the antenna coil will allow more volume or better selectivity, as local conditions warrant.

Connect Your Set This Modern Way



YAXLEY
APPROVED RADIO PRODUCTS

Cable Connector Plug

Here is the new Yaxley Cable Connector Plug with the Bakelite construction for connecting your set to battery leads quickly, easily and **correctly.** You cannot go wrong. These features tell you why you should buy this plug:

THE PLUG

Phosphor bronze double contact springs, seated in Bakelite—assure perfect contact always. Cannot work loose. Shorting impossible. Plug cannot be used incorrectly.

THE CONNECTOR PLATE

Contact pins are seated in Bakelite—not affected by heat of soldering iron. Pins are brass, tinned for soldering. The Connector Plate mounts by means of convenient bracket which is reversible or bracket may be removed entirely for sub-panel mounting—an exclusive feature. Color Code (Standard RMA Colors) also plainly marked with battery designations, permanently attached for proper connections.

THE CABLE

Extra quality, seven strand, 5 foot cable (RMA Colors) furnished, A and B strands marked with Yaxley Metal Cable Markers that snugly hug wires. Six extra markers packed with each plug. Wire ends tinned for soldering.

Buy one of these Cable Connector Plugs today and get a new enjoyment out of your radio set. If your dealer cannot supply you, send the coupon now.

No. 660—Cable Connector Plug as illustrated **$3.50**

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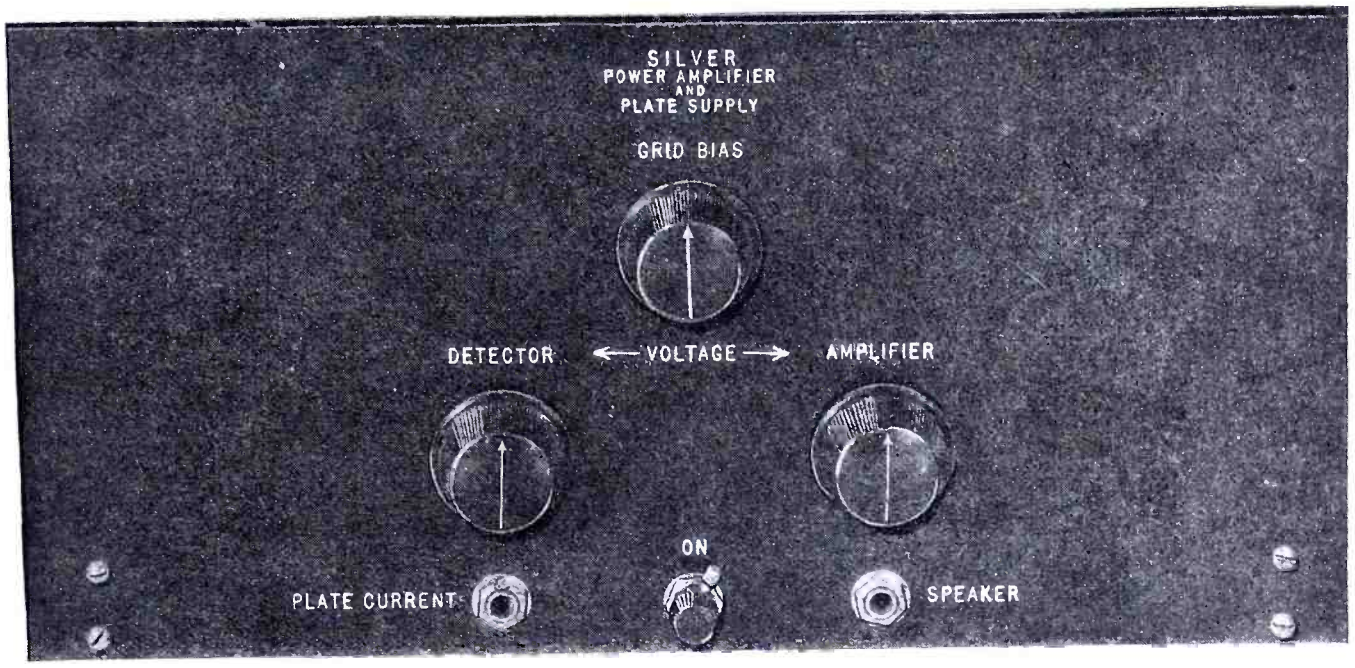


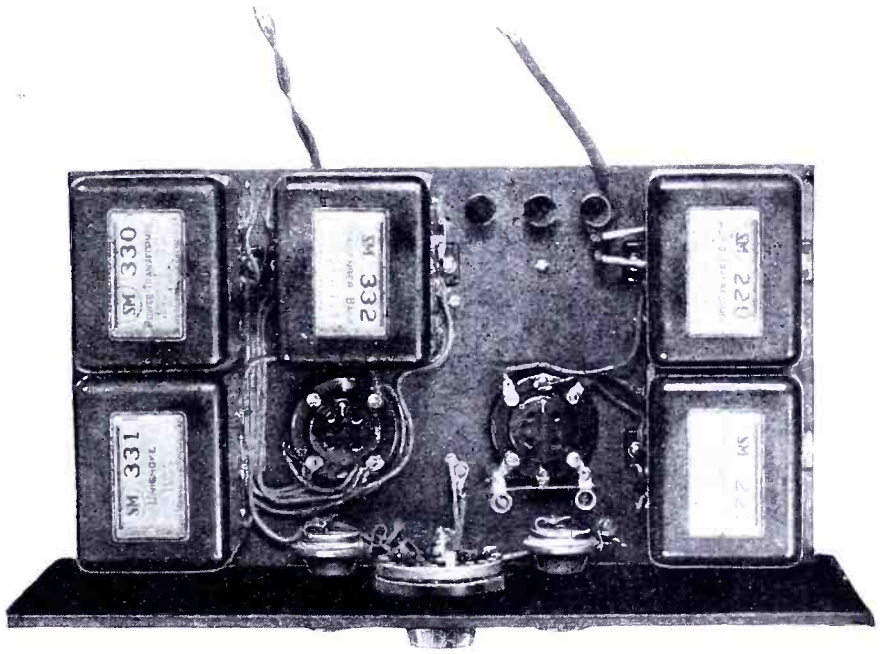
Front view of completed unit

F one were to compare receivers of the 1926-27 season with receivers in a similar class of one or two years ago, a rather interesting circumstance would be evident in view of the reputed tremendous progress that has been made in receiver design in recent months. This fact is that practically all the difference that may be found between good receivers of today and several years ago lies in improvements that have been made in audio amplification and simplification of tuning control. Thus, we find the popular receiver of today incorporating two stages of tuned radio frequency amplification, a detector and two stages of audio amplification. If we look back for several years, we can find exactly the same receivers and types of design, excepting the two points mentioned above.

A good neutrodyne or tuned radio frequency as produced in 23, 24 or 25 is for all practical purposes just as good as a receiver of similar type produced in the 1926 and 1927 season, so far as the actual production of results is obtained. Where the difference lies, if any, is in the ease with which the receiver may be operated. Three or more tuning controls were customary in the past, whereas one and two are the vogue now. So far as selectivity and sensitivity go, that is, ability to bring in a station when wanted, the receivers of different vintages are much on a par. It is true that this year sees a number of shielded receivers, but the shielding contributes, in many cases, only to more satisfactory quantity production in the final analysis. It also contributes to stability, a feature, not very serious, in which many of the older receivers were lacking. In one or two cases the additional third stage of radio frequency amplification allows of greater sensitivity, but it is hardly to be imagined that the hundreds of thousands of owners of good five-tube receivers a year or two old have any intention of discarding them for newer types which boast of only a slightly greater degree of sensitivity, when these owners of the older sets are getting all the stations that they desire.

The single vital argument for the 1926-27 receivers is quality of reproduction. In this matter there is no argument in the minds of those who know that would gainsay the fact that the quality of this season's broadcast receivers will be far and away ahead of that of those of previous seasons. For real strides have been made in audio reproduction in recent months.

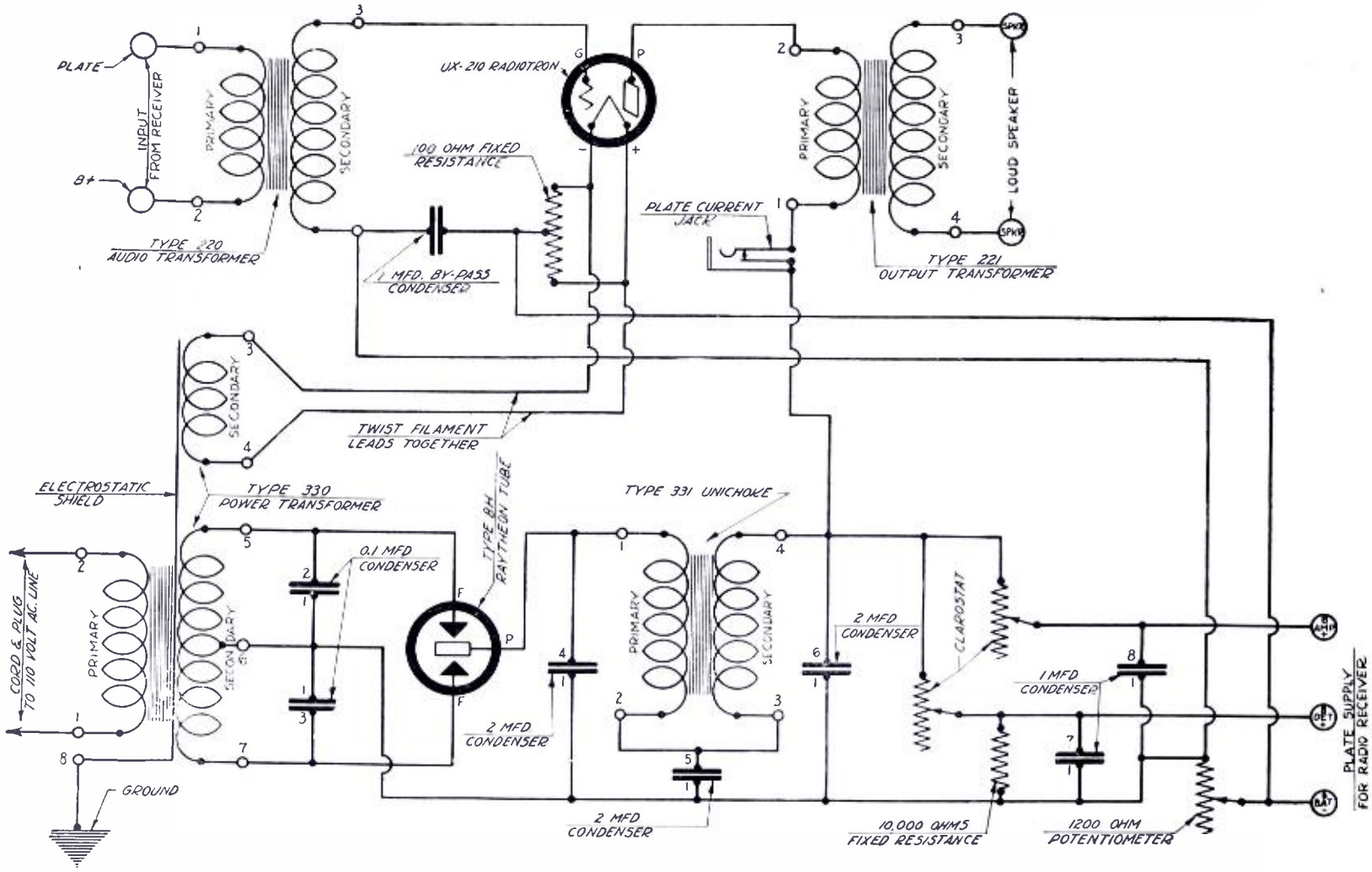
The purpose of this article is to show how the many owners of perfectly satisfactory receivers of all types (satisfactory except for audio quality) may bring their receivers up to date—up to the very last notch of perfection, and enjoy with these tried and true sets which they have used for several years, and which have become fixtures in their homes, the very finest reproduction. At the same time it is a very simple matter with properly designed equipment to eliminate the necessity for dry "B" batteries to operate these older receivers, thus allowing the user to have almost an entirely AC operated receiver, in that the storage bat-



Top view showing arrangement of parts

tery with its charger requires only intermittent attention and no actual battery replacement, while the bug-a-boo of running down "B" batteries is completely done away with.

The instrument illustrated in the photographs herewith consists of a single stage of power amplification together with a supply device which furnishes A, B and C power to it directly from the home lighting circuit. At the same time this power supply device furnishes all "B" battery potential for the radio receiver. Thus, with this instrument attached to any existing receiver, not only are all "B" batteries done away with, but the quality of repro-



Schematic wiring diagram showing all connections

duction is tremendously improved. Let the owner of a five-tube neutrodyne, built in the days when transformer manufacturers did not admit the existence of notes below 200 cycles, imagine, if he can, the experience of sitting before his favorite receiver, stripped of all "B" batteries, and listening to an organ recital, the low notes of which are the same as when one listens to them n a church.

The Power Amplifier and Plate Supply, as it is called, is illustrated by the two accompanying photographs. The front view shows only a plain panel carrying two jacks, three control knobs and an on-off switch. The upper knob controls the grid bias, or grid potential of the UX210 amplifier tube, and is a 1200 ohm potentiometer connected in series with the negative "B" supply line. Thus, as this resistance is varied, the voltage across it varies, and the actual adjustment for proper operating grid potential is very easily obtained.

The two lower knobs control the detector and amplifier plate voltage for the receiver respectively; the small jack marked "plate current" is for testing purposes only, and its use will be explained later. The jack at the right receives the loud speaker plug, while the small switch in the center turns the entire assembly on and off.

A rear view of this instrument shows at one end the type No. 220 audio transformer, No. 221 output transformer, and at the other end the type No. 331 unichoke and the 330 power transformer. In the rear center is the 332 condenser bank. The sockets for the two tubes, one a Raytheon type B.H., and the other a UX210, are plainly visible, together with the resistances on control panel. A small resistance connected across the filament binding posts of the UX210 tube socket is used to balance out the AC hum, as this filament is lighted directly from alternating current. The three binding posts at the rear of the subbase are for the negative, plus detector and plus amplifier, leads from receiver.

The audio transformer used has a rising low frequency characteristic. This means that as the frequency decreases the response of the transformer goes up, thus giving greatest amplification on low notes. This is a very valuable characteristic, as it compensates for exactly the opposite tendency in broadcast transmission, loud speaker design and average audio amplifier characteristics. The output transformer has a similar characteristic and is designed to couple the output of the power tube to a standard type of good cone type loud speaker. The design is such that the impedances of tube and speaker are approximately matched at 30 cycles.

The use of a UX210 tube, operating at from 250 to 300 volts plate potential, insures ample handling capacity for the last stage and a volume output far in excess of that obtainable in an ordinary second stage amplifier without distortion. As the plate current in this tube is rather high, it is effectively kept out of the loud speaker, which it not only might paralyze but might possibly damage as well, by means of the output transformer type 221. Using such an amplifier as this the quality obtained with it following a rather poor first stage, such as would be found in the older receivers, would actually be better than that obtainable from the first stage of the receiver alone. Thus, this amplifier actually overcomes some of the deficiencies of the older receivers themselves when they are operated together.

The power supply portion of the circuit is extremely interesting, as the filter presents an absolutely new principle in eliminator design. Instead of the customary brute force filter, a selective system is employed which effectively eliminates the unpleasant hum which frequently gets through from the AC lighting line in a poorly designed supply set. Further, the power output of this supply set is much higher than that obtainable with ordinary systems, thus permitting it to furnish not only A, B and C potential for the power amplifier, but the "B" potential for the receiver itself.

In constructing this amplifier the following parts will be necessary:

1—S-M No. 220 Audio Transformer
1—S-M No. 221 Output Transformer
1—S-M No. 330 Power Transformer
1—S-M No. 331 Unichoke
1—S-M No. 332 Condenser Bank
2—S-M No. 511 Tube Sockets
1—Yaxley 1200 Ohm Potentiometer
2—Clarostats

1—Aerovox 10,000 Ohm Resistance
1—Yaxley No. 10 Switch
1—Yaxley No. 1 Jack
1—Yaxley No. 2 Jack
1—Yaxley 100 Ohm Resistance
3—Eby Binding Posts
1—Phone Cord and Plug
1—Pair S-M No. 540 Brackets
1—Formica 7x18x3/16" Panel
1—Formica 7x17x3/16" Panel

The layout of the construction is very clear from the photographs and it should be a simple matter indeed to drill the necessary panels and mount the parts upon them. The wiring is all done with flexible Belden hookup wire, either fastened under the instrument's binding posts or soldered to lugs. There is little point in going into the details of wiring, as they are perfectly evident from the wiring diagram and photographs. There are, however, certain precautions to be observed in the construction and operation of the outfit which it is well to consider.

In wiring the outfit, it is necessary that terminal No. 8, the electro-static shield of the power transformer, go directly to ground—preferably to the same ground to which the receiver filaments are connected (if a loop set is used it will probably be necessary on this, as on other supply sets, to ground the filament circuit in order to eliminate hum). The resistance R-5 must be a potentiometer of at least 1,000 ohm resistance, preferably 1,200 ohm. If a 1,200 ohm potentiometer cannot be procured, then a 400 ohm type, with a fixed resistance of 400 to 800 ohms in series with it must be used.

The resistance R-2 may be of a standard potentiometer of any value if the fixed 100 ohm type cannot be obtained. Its center top need only be located approximately, but its purpose is to eliminate hum which might get through from the power transformer. It is necessary to twist the lower tube filament leads to the 330 transformer exactly as shown in the diagram, in order to localize their field.

In operating the outfit, a slight hum may be experienced, if the cord and plug connecting to terminals 1 and 2 of the No. 220 transformer have been reversed, since unless the cord is properly plugged into the set a hum will result.

In testing the amplifier a strong signal should be tuned in, say, as strong a one as will be received. Then the grid bias resistance should be adjusted for best quality. This adjusting can be facilitated if a low reading millimeter is available, which may be plugged into the jack marked "plate current." If this is done then the proper adjustment of the grid bias will be when the meter flickers a minimum amount on the strongest signal to be received.

In operating an outfit of this character, no endeavor should be made to use more than one stage of audio amplification preceding it. If two stages are used, continual howling will probably result that can only be eliminated by resistances on the order of 10,000 ohm connected across the secondaries of all audio transformers, which will serve to load them and produce a comparatively stable condition.

There is little or nothing to wear out in an outfit of this type, assuming the tubes not to be damaged, for both the Raytheon B.H. and the UX210 will last a very considerable length of time in normal use. The clarostat resistances may occasionally have to be readjusted to obtain a proper operating voltage to the receiver, but this can be done quite simply, the ear being the judge of the proper adjustment.

A New Ten Tube Receiver Using the Remler Infradyne Amplifier

PERHAPS the most striking recent example of a radical departure in radio design is the development of the Infradyne Intermediate Amplifier, having a peak frequency of 3,200 kilocycles or 95 meters. This design of intermediate frequency amplifier employs a hitherto neglected principle of heterodyning.

If a locally generated oscillating current is mixed in a circuit with an incoming frequency, two new frequencies are generated. One of them, the beat or difference frequency, is utilized in super heterodyne receivers. The other, known as the sum frequency, is used in the Infradyne amplifier incorporated in the receiver described herewith.

Research endeavoring to develop a sum frequency amplifier has been neglected due to the inherent difficulty of efficiently amplifying the extremely high frequencies. However, extensive experimentation has disclosed a means by which any frequency may be amplified to the same degree.

Actual tests under ordinary reception conditions have proven that only one oscillator dial setting is used for each station, as the method employed in the amplifier, when properly balanced, has the ability of eliminating harmonics of double or treble the station's wave length. Since the intermediate amplifier is very sharply peaked at 95 meters, it follows that maximum efficiency will be found only at that frequency. Therefore, tube noises and other interference, being at a higher wave length, will only be slightly amplified, making a much quieter receiver than heretofore possible.

When the condenser of the tuned radio frequency amplifier is adjusted to the peak of the incoming signal the tuning of the oscillator condenser will be slightly broader. This can be overcome by readjusting the tuning condenser so that it is not tuned directly to the peak of the incoming signal. If too long an antenna is used it may be necessary to insert a .00025 mfd. fixed condenser in series with it.

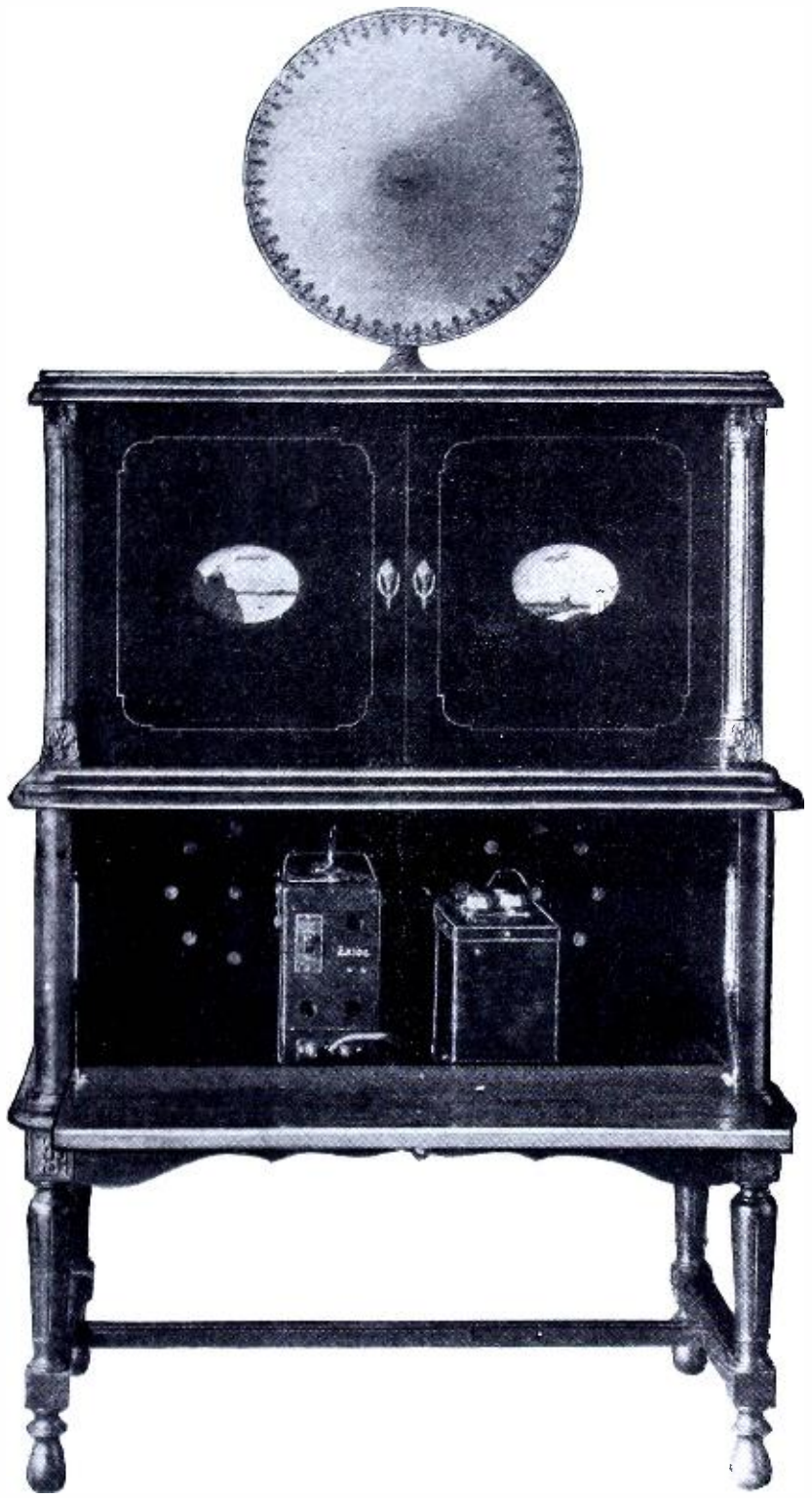


Photo A. Front view showing how receiver can be mounted in a console with suggested accessories

The receiver described herewith consists of two stages of tuned radio frequency with a detector, an oscillator circuit, three stages of 95 meter amplification, a second detector and two stages of audio frequency amplification.

Figure 4 shows a schematic wiring diagram of the complete receiver. A standard tuned radio frequency circuit tuned by a triple gang condenser, each of .00035 mfd. capacity, is used before the detector. To enable the constructor to insert a pair of phones in the circuit to properly test and balance the tuned radio frequency end of the receiver, a single closed circuit jack is inserted in the output of the first detector.

To receive distant stations when using the first three tubes only, it may be necessary to temporarily shunt a .001 or .002 mfd. fixed condenser across the terminals of the head phones.

The oscillator coupler is wound on a tube 1½ inches in diameter and 2 inches long in the following manner, using a No. 24 D. S. C. wire throughout. The detector plate coil, the oscillator plate coil and the oscillator grid coil consisting of 8, 14 and 14 turns respectively are wound in that order upon the tube. A space of 3/16 inch separates the detector plate and oscillator plate coils, while only 1/16 inch separates the oscillator and grid coils. The ends of each coil are securely anchored and a short length of wire allowed to project to facilitate connections. The tube is mounted in a vertical position with the 8 turn coil at the top. The ends of the coils are numbered as follows: Starting at the top, the beginning of the detector plate coil is number 1, and the end is number 2; the beginning of the oscillator plate coil is number 3, and so forth up to 6. This numbering is important, since all diagrams show the various terminals marked. Care should be taken that all three coils are wound in the same direction and the proper numbering applied to their respective terminals. If the constructor does not have the facilities to properly wind a coupler and desires a manufactured product, he may obtain a standard coupler, designed especially for this circuit.

A .0005 mfd. fixed condenser is in series with the plate lead of the .00035 mfd. oscillator condenser. This decreases the capacity of the variable condenser to approximately .000212 mfd., which is the correct capacity for maximum efficiency. This will prevent the burning out of any of the tubes in case the plates of the variable condenser happen to be "shorted."

Figure 1 is the front panel layout, plainly showing all mounting holes and the necessary engraving. The pair of countersunk holes in the lower corner at each end of the panel are for mounting the brackets supporting the sub-panel.

The baseboard layout shown in Figure 2 shows the location of

all apparatus in the completed receiver. Particular attention should be paid to the proper position of each part so that its terminals bear a correct relation to the terminals on other pieces of apparatus. This is very important and makes short leads possible. All terminals are plainly marked for this purpose.

purposes. This jack is also mounted under the sub-panel.

The assembling and wiring of the receiver is no difficult ta Just mount the sub-panel on the two supporting brackets. Th turn the amplifier unit over on its face and place a piece of s wood, 4 inches long, 2 inches high and ¾ inch thick against t

Photo B—Front view of receiver installed in cabinet

Figure 3, the sub-panel layout, shows the correct location of all holes. Those holes which are shown solid black are 3/32 inch drill. These holes are provided for the wires which pass through the sub-panel. The holes with the extra circle around them are 5/32 inch drill and countersunk for No. 6 flat head brass machine screws. These holes are provided for the mounting, under the sub-panel, of the Jones Multiplug, the supporting brackets, the two 1 mid. by-pass condensers and the two blocks of wood supporting the Infradyne Amplifier. The sub-panel is cut out so that the unit may be easily inserted into position and fastened into place.

case under each projecting flange. Carefully transfer the loc tion of the mounting holes in the flange to the wood, using small punch or pencil. Then drill a shallow hole at each ma and liberally countersink it. Replacing the blocks, insert a N 5x1 inch flat head wood screw into each hole and slowly tu it until the soft copper is drawn down into the depression arou the hole and the screw is flush or under-flush with the botto Turning the unit right side up, it may be easily inserted into t slot and securely fastened into place using four flat head wo screws through the sub-panel.

Next remove the two angle brackets on each Duoformer whi

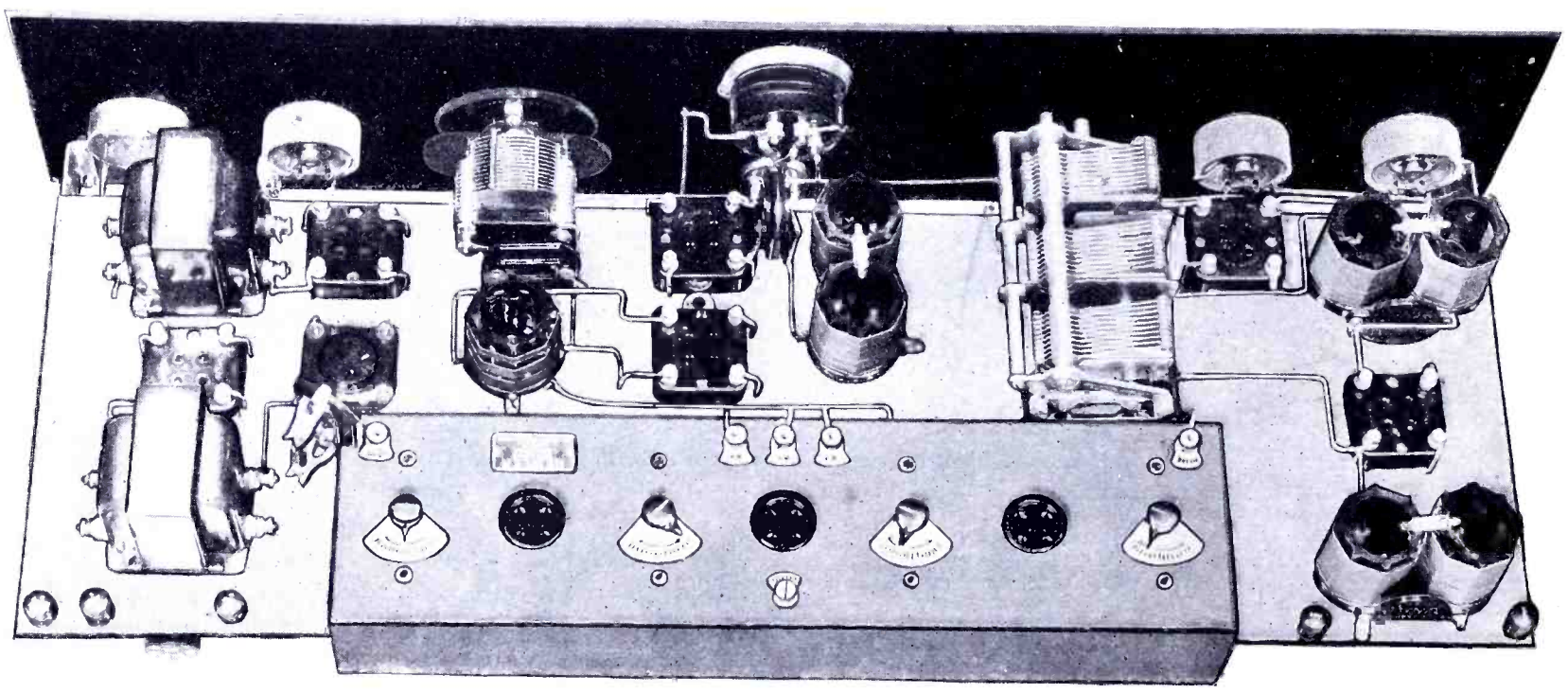


Photo C—Rear view of completed receiver

Nine holes are shown with a dotted circle around them. They are all ⅛ inch drill and tapped for a No. 6-32 machine screw. These holes are provided for mounting the four Carter fixed resistances and the Lynch grid leak mounting under the sub-panel.

The 5/16 inch hole near the center of the sub-panel is provided for the Frost No. 954 Three Spring Gem Jac used for testing

are normally used for mounting purposes. Replace the outsi lugs on the terminals marked 1 and F negative on the anten coil and the outside lugs on the terminals marked B positive a F negative on the two radio frequency transformers with t brackets. This arrangement allows soldering lugs to be plac under the nuts below the sub-panel in such a manner that

direct connection is made to the coils through the mounting screws, thereby obviating the necessity of drilling extra holes through the panel for the passage of wires. Great care must be exercised in the replacement of the terminals so that the ends of the windings are not broken from the inside lugs.

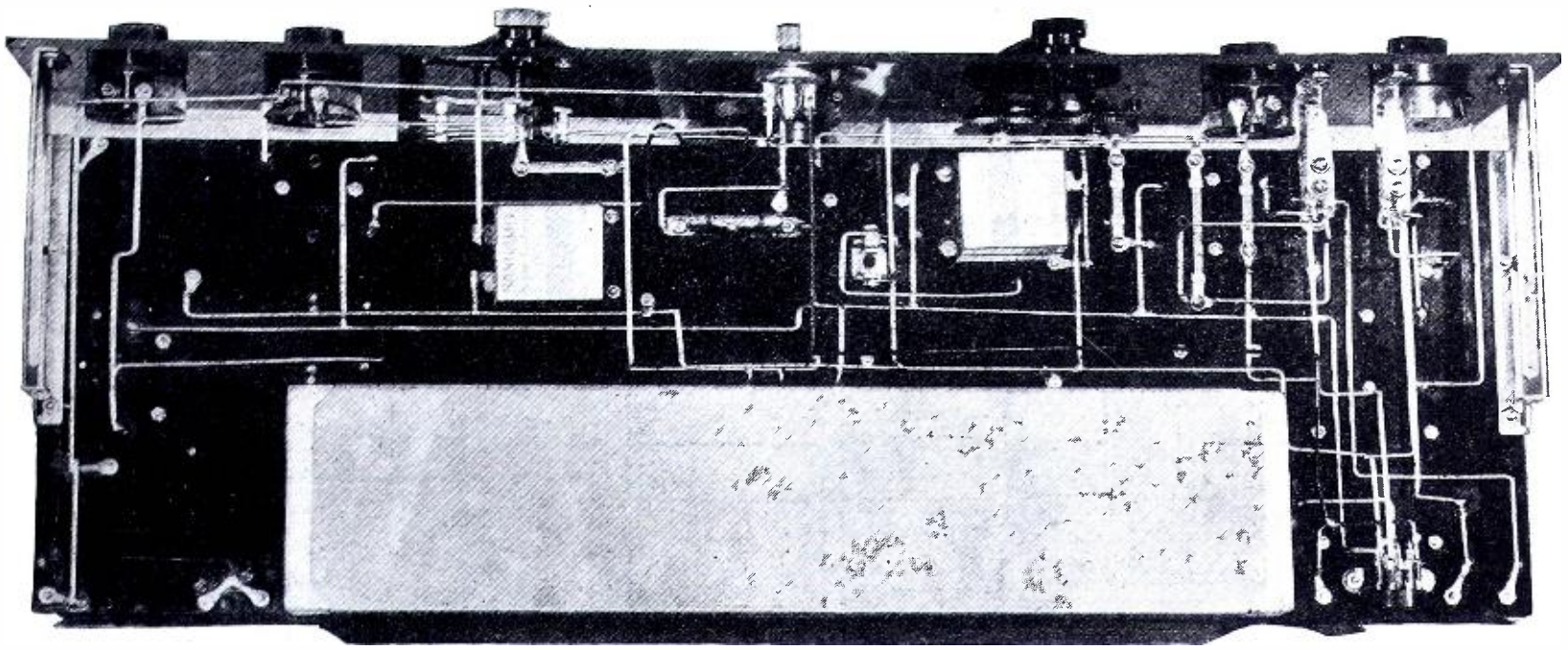


Photo D—Bottom view of receiver

Complete the assembling under the sub-panel by mounting the four Carter fixed resistances, the two 1 mfd. by-pass condensers, the Jones plug, the grid leak mounting and the test jack.

Turning the sub-panel right side up, fasten all remaining apparatus upon it, referring to Figure 2 for proper locations and so forth.

Next mount the rheostats, filament switch, the two jacks, the variable condensers, the variable resistance and the voltmeter on the front panel.

It is best not to mount the front panel on the brackets until all possible wiring is completed on the sub-panel. A careful study of the various photographs accompanying this article will show the best manner in which to arrange the wires. Either insulated or bare wires may be employed to wire up the set.

Three rheostats are used in this receiver. A ten ohm rheostat controls the two radio frequency tubes, a thirty ohm rheostat controls the first detector, and a four ohm fixed resistance in series with a thirty ohm rheostat regulates the intermediate frequency and oscillator tubes. The four ohm fixed resistance is inserted in the circuit as a safety device to protect the 199 tubes. It effectually prevents more than the normal operating voltage to be applied to the tubes, regardless of the amount of resistance "cut out" in the rheostat. *Under no circumstances remove any of the 199 tubes from a socket without first turning off the filament switch.* The fixed resistance will be insufficient to properly reduce the "A" battery current to such an extent that it will be harmless to the 199 tubes when less than four tubes are in the circuit.

Both the second detector and first audio tubes are each controlled by a Carter four ohm fixed resistance, while the last audio tube is controlled by a two ohm fixed resistance. Since the adjustment of these three tubes is not critical, this method is quite efficient.

A Frost 50,000 ohm variable resistance is shunted across the secondary of the first audio transformer. It functions admirably as a volume control and helps considerably in obtaining good volume.

A separate jack is used for the first stage of audio. The second stage uses a filament control jack which automatically completes the filament circuit of the last tube when the speaker plug is inserted.

A Weston Model 506 Type 217 double scale voltmeter is used in this receiver. When properly connected into the circuit as shown in the diagrams, the lower scale will show the filament voltage applied to the 199 tubes. The upper scale reading is obtained by pushing the button on the meter frame and shows the "B" battery voltage on the Infradyne Amplifier.

All connections on the Jones plug are as shown on the color chart supplied with the cable. The terminal normally used for the antenna connection has the 135 volt "B" lead connected to it while the ground terminal is not used. The proper "C" battery bias, 4½ volts for the first stage and 7½ volts for the second stage, is connected to separate binding posts located at the rear edge of the sub-panel.

All plate and grid leads are made on the upper side of the sub-panel except the plate lead of the second radio frequency

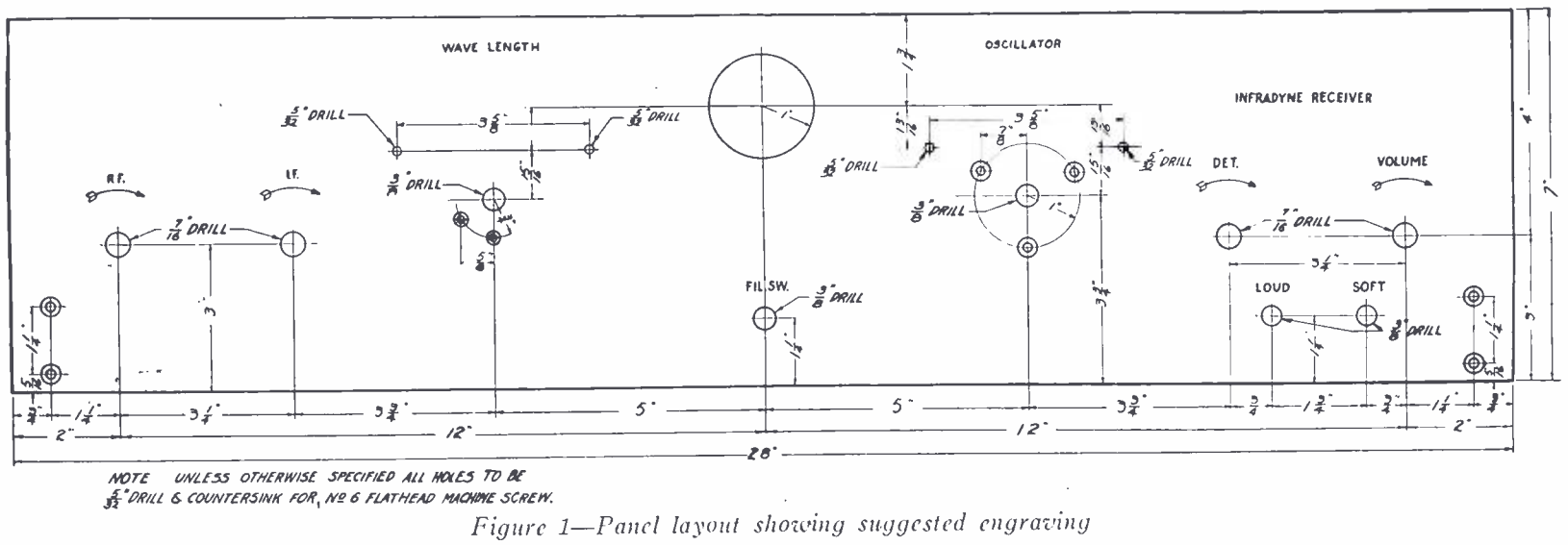


Figure 1—Panel layout showing suggested engraving

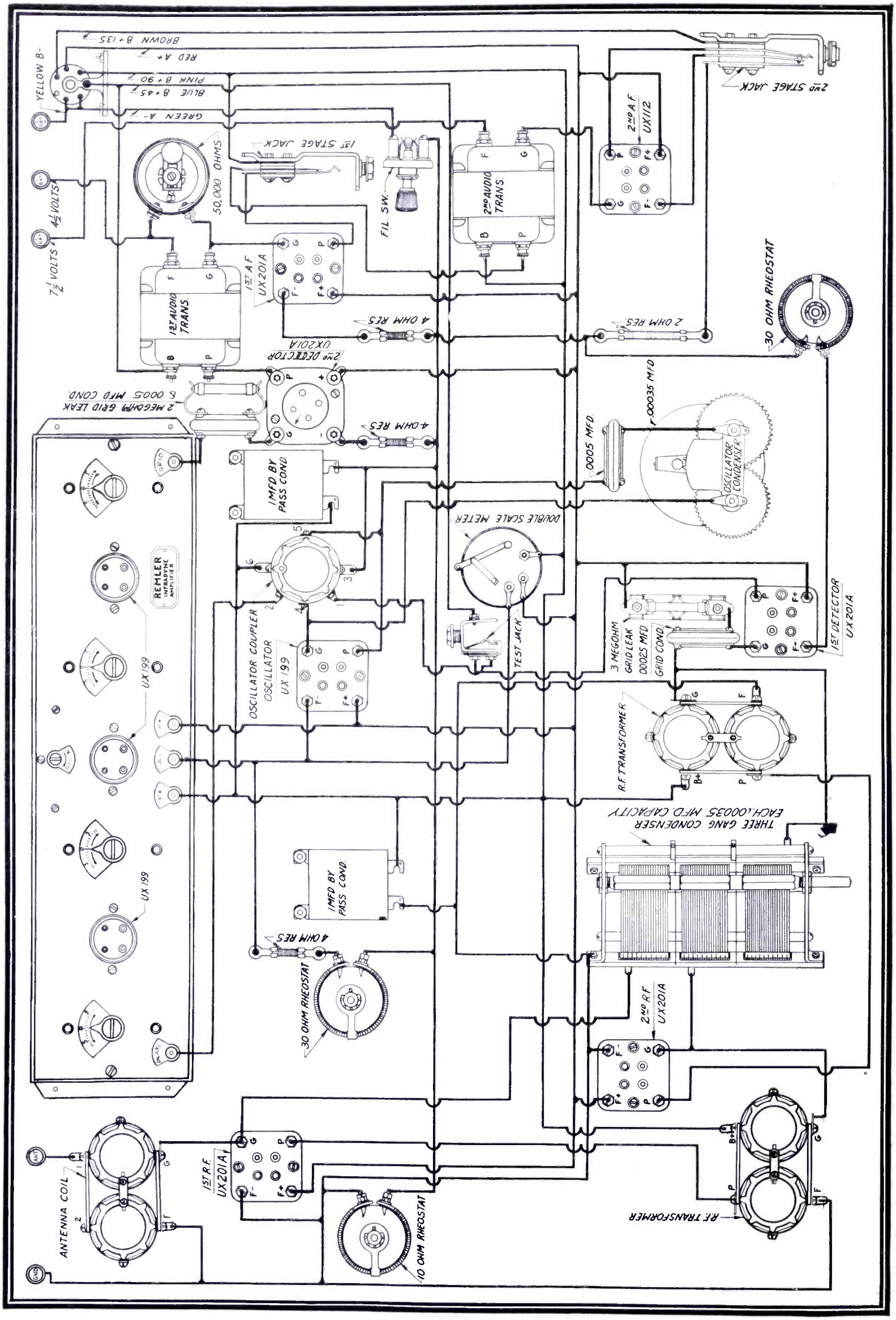


Figure 5—Graphic illustration showing all connections

be. This lead runs under the panel to the plate terminal of the cond radio frequency transformer.

After the receiver has been completely wired, carefully check l connections against the large graphic illustration shown in gure 5. Then connect the "A" battery leads only to the set. Insert ree UX 199 tubes in the Infradyne unit and one in the oscilla-

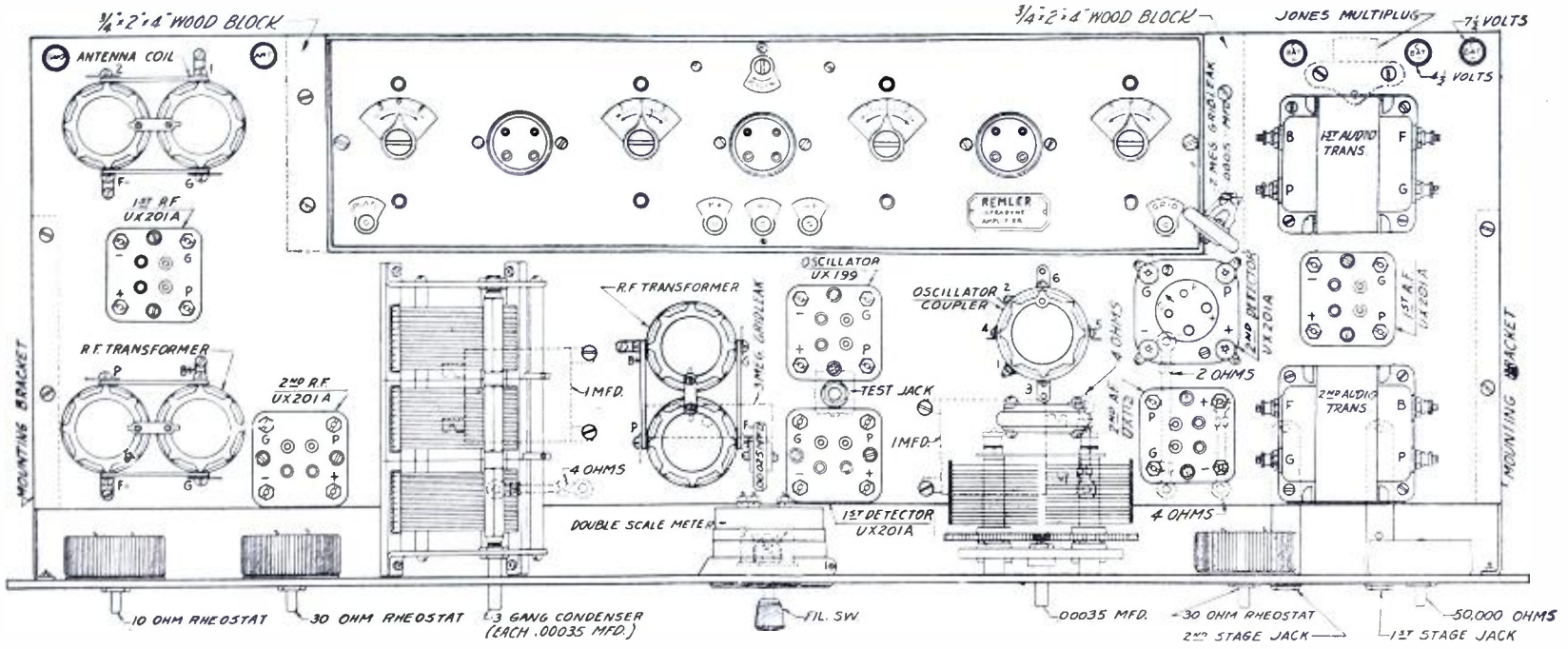


Figure 2—Baseboard layout

e socket. The last stage of audio uses a UX 112 power tube and h remaining sockets UX 201A tubes. Turn on the filament itch and turn up each rheostat, observing whether all tubes ght up and are controlled by the proper resistance. When all dications show that the tubes are properly connected, dis-nect the "A" positive lead and touch it in turn to the other ttery terminals on the receiver, noting each time whether any es light. If there is no indication of tubes lighting except en the "A" battery is properly connected, it is safe to con-ct up the rest of the batteries, attach aerial and ground and g in the speaker.

After removing all tubes except the first three, plug in with ad phones at the test jack and begin tuning with the three g condenser until some station of fairly good volume, located

it will go to the right. Then set the pointer on each of the four Vernier condenser knobs at zero. Slowly change the settings of the four knobs, using the wooden wedge furnished with the unit, until the combination is found which gives the greatest volume. As the settings of the knobs approach more nearly the values for the most satisfactory operation, the amplifier will be found to go into oscillation. This oscillation can be prevented by carefully loosening the adjusting screw marked "Increase." The vernier condenser settings should again be slightly changed until the point of best operation is obtained. Should the latter adjustment again throw the amplifier into oscillation it will be necessary to further slightly loosen the adjusting screw. If difficulty is experienced in obtaining maximum amplification in the unit, and all other instructions for placing the receiver in proper working order have been followed, the trouble may probably be remedied by inserting a coil of about 8 to 10 turns of No. 20 D. S. C. wire, wound around a finger, in the plus "B" lead just before it enters the Infradyne Amplifier. Once the above adjustments have been made and the settings for the most satisfactory operation found, the amplifier will function without fur-

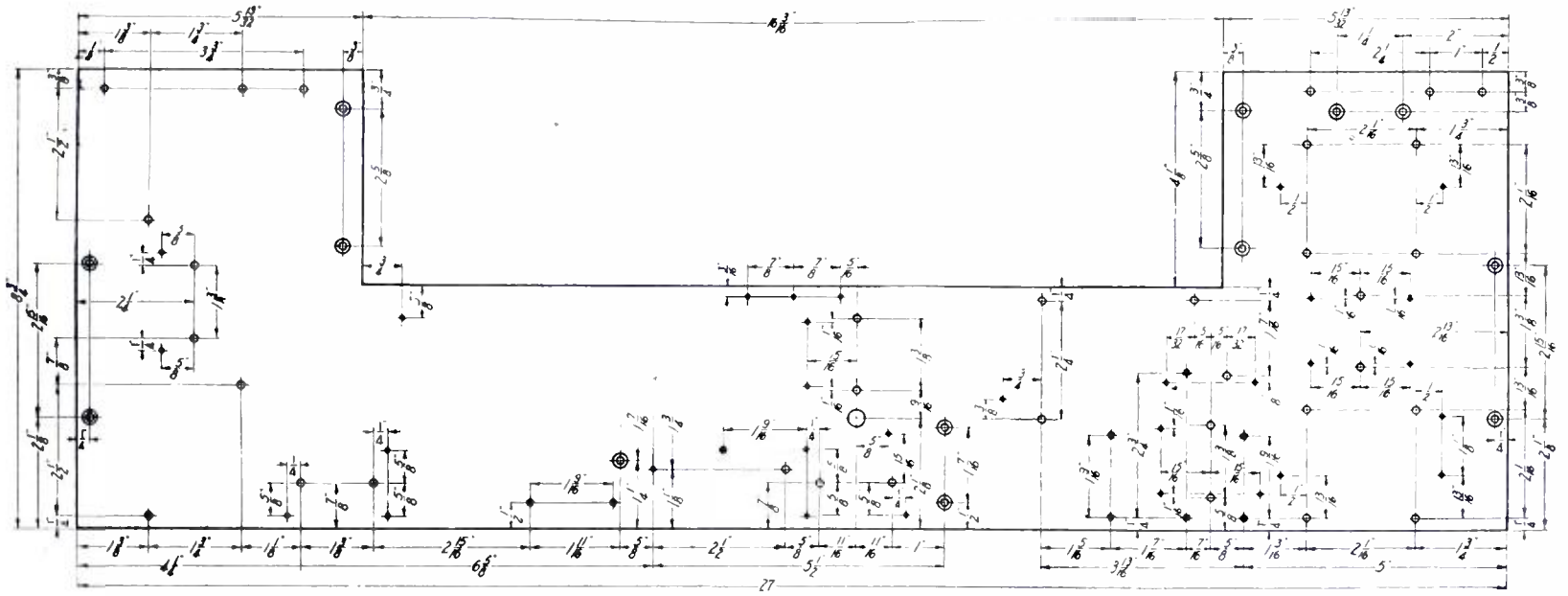


Figure 3—Sub-panel layout

a moderate distance, is found. Then carefully adjust the com-nsating plates on the condenser until the station heard comes in ry sharply only at one place on the dial.

Next insert all tubes and with the speaker plugged in its proper ck, tune in a station with a moderately weak signal. The sta-on should be at least 150 miles distant. The next procedure the balancing of the Infradyne unit, which is accomplished as llows: Turn the adjusting screw marked "Increase" as far as

ther attention other than the adjustment of the filament temperature.

An antenna no longer than 50 feet, including lead in, will serve very nicely. A good ground is absolutely necessary.

If no great volume is obtained from the audio amplifier, remove all the leads connected to the terminals of the voltmeter and connect separate flexible leads to them. Then test the filament voltage of the different tubes controlled by the fixed resistances.

This is a helpful hint for any type of receiver using various types of fixed resistances, as often various tubes do not consume the same amount of current.

If 4.8 to 5.2 volts are not indicated for the 201 A tubes and 2.75 to 3 volts for the 199 tubes, change either the resistor or the tube until the correct voltage is obtained. Amperites or any other resistor of the correct value may be used. 135 volts "B" battery is used on the plate of the last tube as specified in the illustration. The only necessary change to be made if other types of power tubes are used in the last stage is to change the 2 ohm fixed resistance to the proper size for the tube used and increase the "C" battery and "B" battery voltage as specified on the circular supplied with the tube.

This receiver has been very neatly arranged both for construction and wiring, and we advise that you do not change the location of any parts and use only those specified, although any of the minor controls may be substituted, providing they are of the same value as given. While Thordarson R-200 Audio Transformers and the Continental 3 gang condenser have been selected for this receiver, Silver-Marshall Audio Transformers and the Hammarlund 3 gang condenser, designed especially for this circuit, may be successfully substituted.

1—Frost No. 880 50,000 ohm Variable Resistance
6—Frost No. 530 UX Sockets
1 Set Camfield Type 22K Duoformers
1—Special Oscillator Coupler
2—Thordarson Type R200 Audio Transformers
2—Kurz-Kasch Aristocrat Vernier Dials
1—Jones Type BM Multiplug
1—Carter 2 ohm Fixed Resistance
3—Carter 4 ohm Fixed Resistances
2—Sangamo 1 mfd. By-Pass Condensers
1—Sangamo .0005 mfd. Fixed Condenser
1 Pair Sangamo Grid Leak Clips
1—Lynch Grid Leak Mounting
1—Lynch 2 megohm Grid Leak
1—Lynch 3 megohm Grid Leak
5—Eby Engraved Binding Posts
2 Dozen No. 6x1-inch R. H. Br. Mach. Screws
2 Dozen No. 6x½-inch R. H. Br. Mach. Screws
1 Dozen No. 6x½-inch Flat Head Br. Mach. Screws
½ Dozen No. 5x1-inch Flat Head Br. Mach. Screws
1 Dozen No. 6x¼-inch R. H. Br. Mach. Screws
100 Kellogg Tinned Soldering Lugs

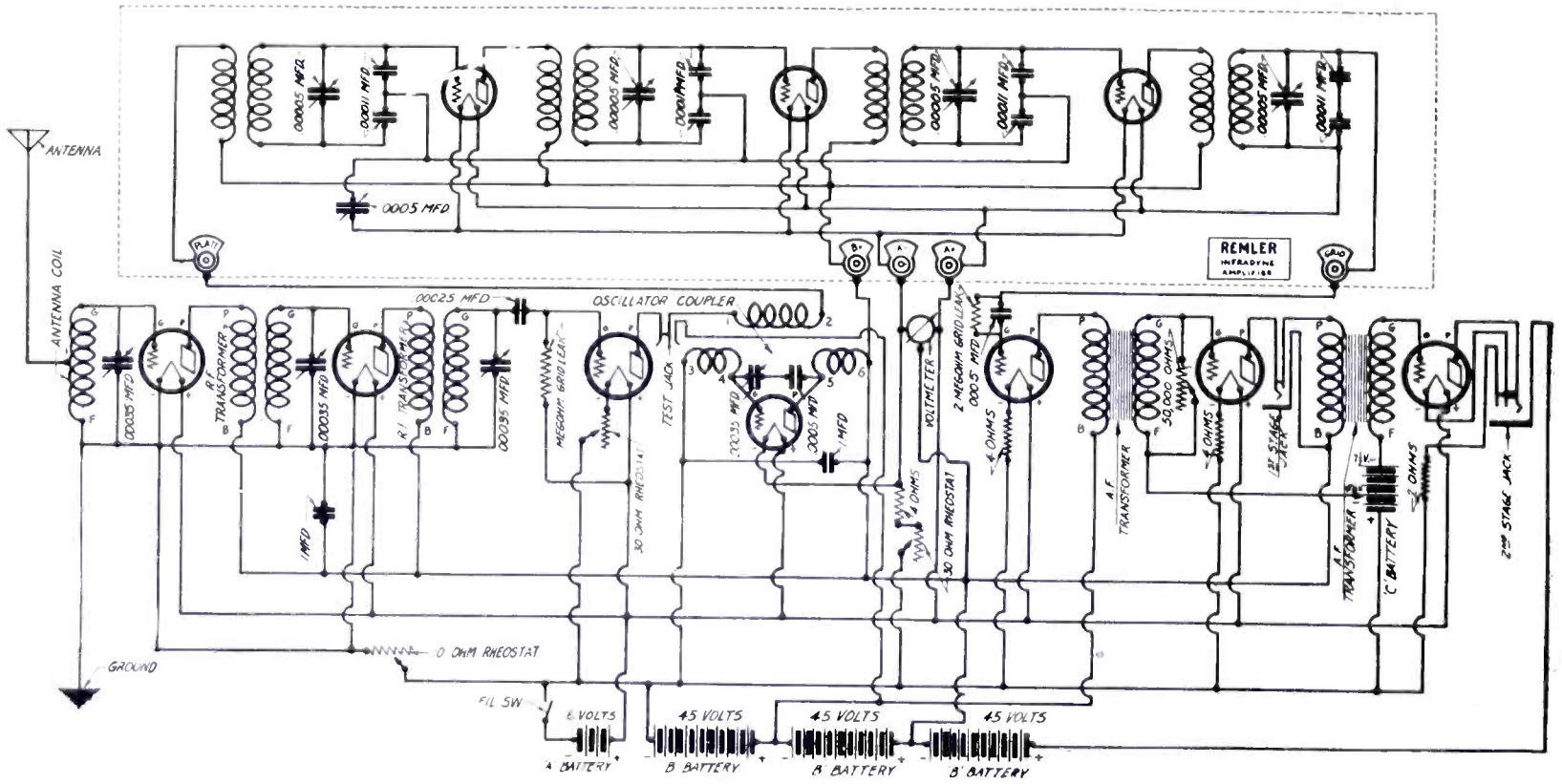


Figure 4—Schematic wiring diagram

It is unfair to expect the receiver to give phenomenal results the first time it is placed on the air. Being an extremely sensitive and selective instrument, it has certain peculiarities of tuning which must be experienced and thoroughly understood. When the little intricacies of tuning are mastered, a properly balanced receiver will perform in such a manner so as to give the utmost satisfaction in reception.

List of Parts

These parts or their equivalent will give satisfactory results:
1—7x28x3/16-inch Formica Panel
1—8¾x27x3/16-inch Formica Sub-Panel
1—Remler Type 700 Infradyne Amplifier
1—Remler Type 630 .00035 mfd. Variable Condenser
1—Continental .00035 mfd. 3-gang Vernier Condenser
1—Weston Model 506, Type 217 0-7-140 Voltmeter
1 Pair Benjamin Type 8629 Shelf Brackets
1—Benjamin Type 9040 UX Cushion Socket
1—Frost No. 710 10 ohm Rheostat
2—Frost No. 730 30 ohm Rheostats
1—Frost No. 608 Filament Switch
1—Frost No. 954 Gem-Jac
1—Frost No. 234 Pan-Tab Jack
1—Frost No. 235 Pan-Tab Jack
50 Feet Belden Tinned Copper Hookup Wire (12 gauge)
1 Package Kester Solder

The accessories shown in the Infradyne article consist of the following:

The "A" battery supply is furnished by an Exide "A Plant," which is connected into any convenient house lighting plug furnishing 110-volt A.C. This unit furnishes a 6 volt supply kept at full charge by a trickle charger, and is made by the Electric Storage Battery Co., Philadelphia, Pa.

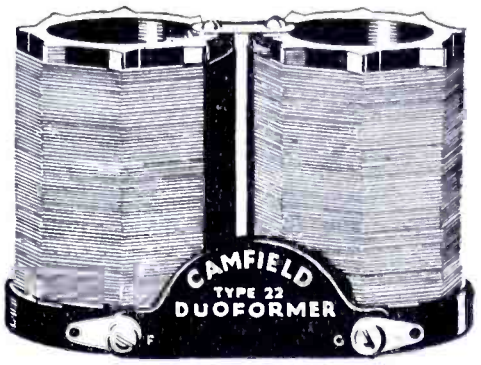
The "B" supply is furnished by the New Raytheon "B" Eliminator made by the Kokomo Electric Co., Kokomo, Ind. It will supply all necessary voltages to operate both detector and amplifier circuits.

The new Trimm Cone Type Speaker is shown, made by Trimm Radio Products Co., Chicago.

The Console is a piece of furniture of rare beauty. It has a sliding door arrangement so that when the doors are opened they may be pushed back out of the way. It is also beautifully decorated with genuine inlay work, and would be an ornament of the highest quality in any home. It is made by Detroit Woodcraft Co., Detroit, Mich.

(If any further information is desired about these accessories—kindly write manufacturer direct.)

Announcing



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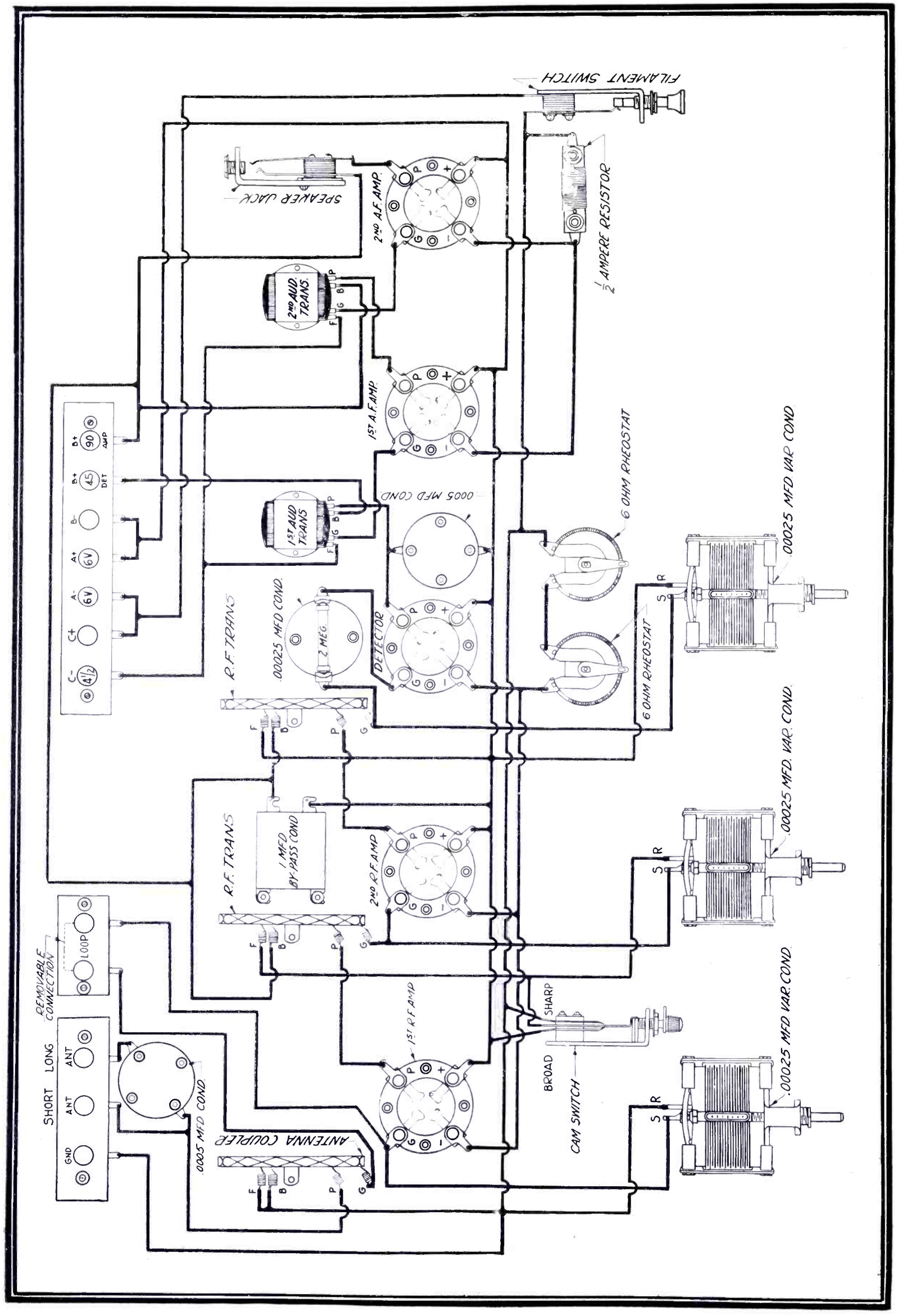

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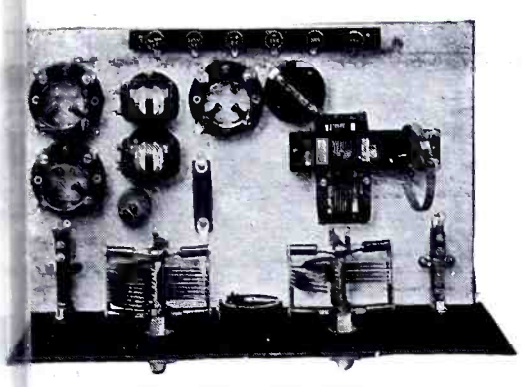

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Sub-base, 9"x14"x ½"	2 Premier "Hegehog" Transformers
Premier "Crofoot" Condenser, .00015 M.F.	1 Premier Phone Jack
	1 Premier Battery Switch
Premier "Crofoot" Condenser, .00025 M.F.	1 Premier Filament Resistor
	1 Premier Choke Coil
Premier "Micro-Dials"	1 Premier Grid Condenser
	1 Premier Grid Leak
Premier "Arctic" Rheostat, with knob	1 Premier Binding Post 6-Point Block

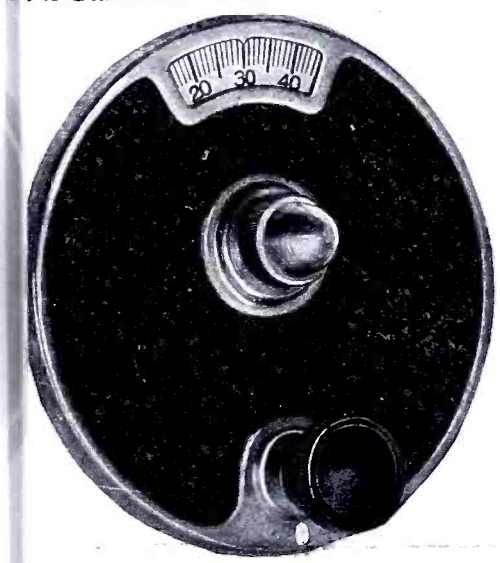
ice, complete as above listed **$22.00**

Your Low Wave Lengths Coils which you prob- y think are wonders, can be used with the above mier Combination to complete your set, but if are not so sure about their efficiency, we rec- mend the "Aero" which are a plug-in type, and ich are quite widely known and used, and are ced as follows:

"Aero" Coils, with mounting, 15 to 130 meters	$12.50
"Aero" Coil, 125 to 250 meters	4.00
"Aero" Coil, 235 to 550 meters	4.00

Premier dealers usually carry "Aero" Coils, and l be glad to supply you along with our parts . but if there is none convenient in your town, mit direct to us and they will be sent postpaid.

Premier MICRO-DIAL



Improves Reception

Replace your antiquated dials and "pep" up the ks of your set and get all the stations with this curate high ratio vernier dial.

An all-brass dial—4 inches in diameter—beauti- lly finished in gold and black—friction drive mooth as silk"—no back-lash or lost motion.

ice **$1.00**

your dealer hasn't them, remit direct to us, less % and give us your dealer's name. They'll be t postpaid.

TRADE IN your "Bloopers"

Take this ad to your radio dealer and show it to him so that he will know that Premier will make you a substantial cash allowance on any 3, 4 or 5 tube table type set, regardless of age or condition, as part payment for one of our Premier "Everybody's" Model Console Radio Receivers. Have him send in coupon attached.

If your dealer isn't interested or if there is no dealer in your locality, clip the attached coupon and mail it to the Premier Electric Company, Chicago, and we will make you our proposition direct.

Quality Radio at a Sane Price

Premier "Everybody's" Console Radio Receiver is the greatest value ever offered in a receiving set. The cabinet is well constructed and has a very attractive Duco, two tone walnut finish which will harmonize with the furnishings of most any room. The loud speaker is the same that we use in all our higher priced sets and is built in the cabinet and gives great volume with a naturalness of tone unsurpassed.

Has drop shelf and arm rest to assist in accurate tuning, and a well ventilated battery compartment, ample size for all batteries and charger. Dimensions over all, 45" x 25" x 15" deep.

FEATURES

FRONT PANEL is 7"x21"x3/16" genuine Bakelite, finished in an exact reproduction of beautiful, black walnut.

DIALS are Premier "Micro-Dials" of the vernier type, all brass, gold and black finish which presents a pleasing appearance to the eye in contrast to the walnut panel.

VOLTMETER permits instant test of the "B" battery voltage, allowing an easy check-up on this most important accessory to the performance of your set.

OSCILLATION CONTROL is accomplished instantly, permitting broad or extremely sharp and selective tuning.

VOLUME is uniform and unusually good on the loud speaker over the entire wave band range.

DISTANCE RANGE is guaranteed the equal of any 5-tube T. R. F. set, and under favorable weather conditions extends from coast to coast.

TONE RANGE is from low bass to the highest treble with the naturalness of reproduction provided only in sets costing three or four times as much.

SELECTIVITY—sharp enough to separate all stations even in congested areas like New York and Chicago.

LOOP OPERATION is provided for and when used in large cities gives extreme selectivity and good distance.

Premier Electric Company of Canada, Ltd.
London - Ontario
Exclusive Dist. for N. E. Can.

"Everybody's" Console Receiver

Is of the Tuned Radio Frequency type, and is manufactured under license granted us by the U. S. Navy Department which permits its manufacture under patents controlled by our government.

Construction

Every component part is made from only best of raw materials in our own plant and assembled into the completed whole by expert radiotricians.

Guarantee

Every Premier Radio Receiving Set is guaranteed to be everything that we claim, and to perform and function properly when installed according to directions. Our responsibility is back of this guarantee and that, we believe, is sufficient to make it mean something.

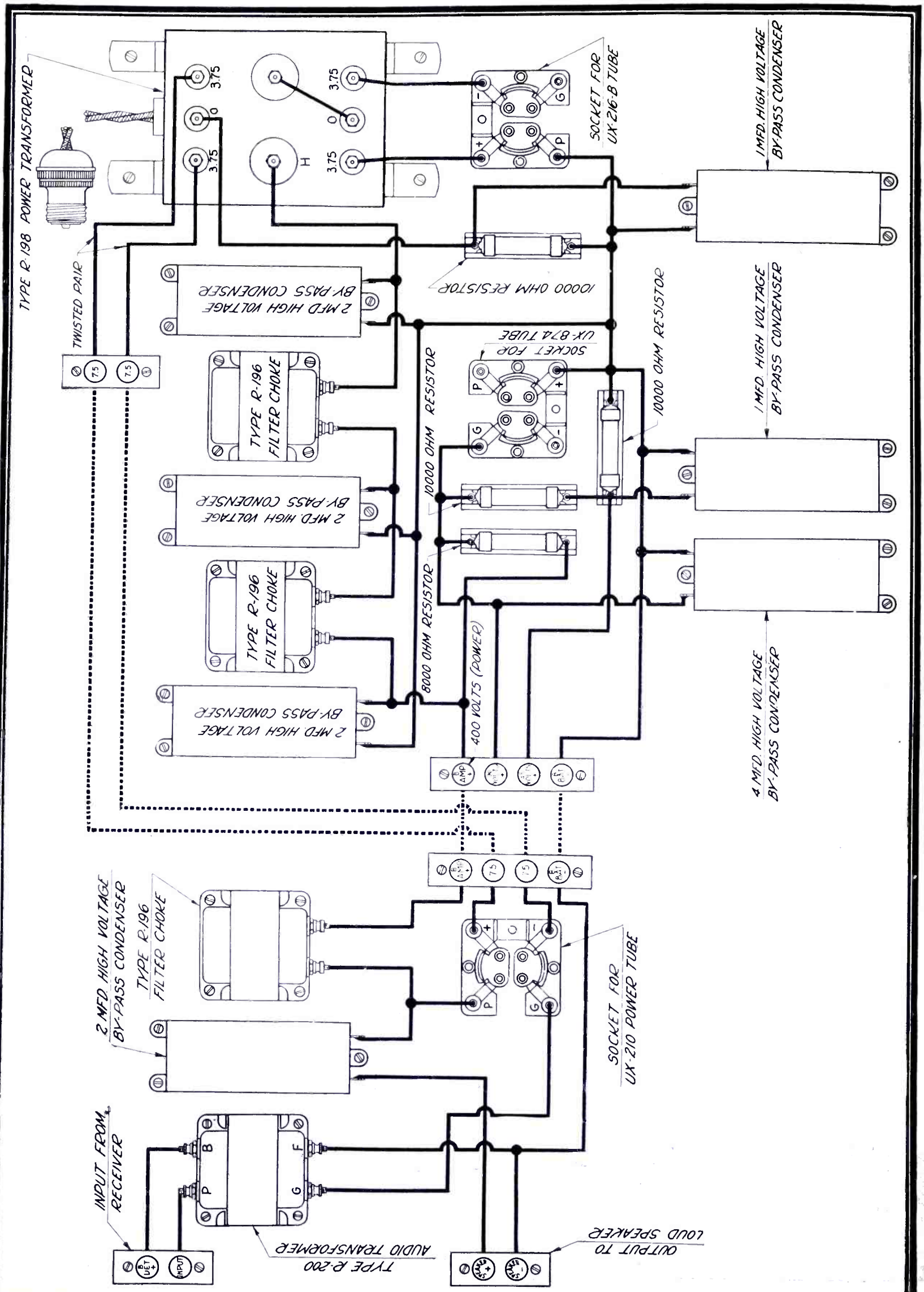
List Price

$117.00

Prices slightly higher in Canada

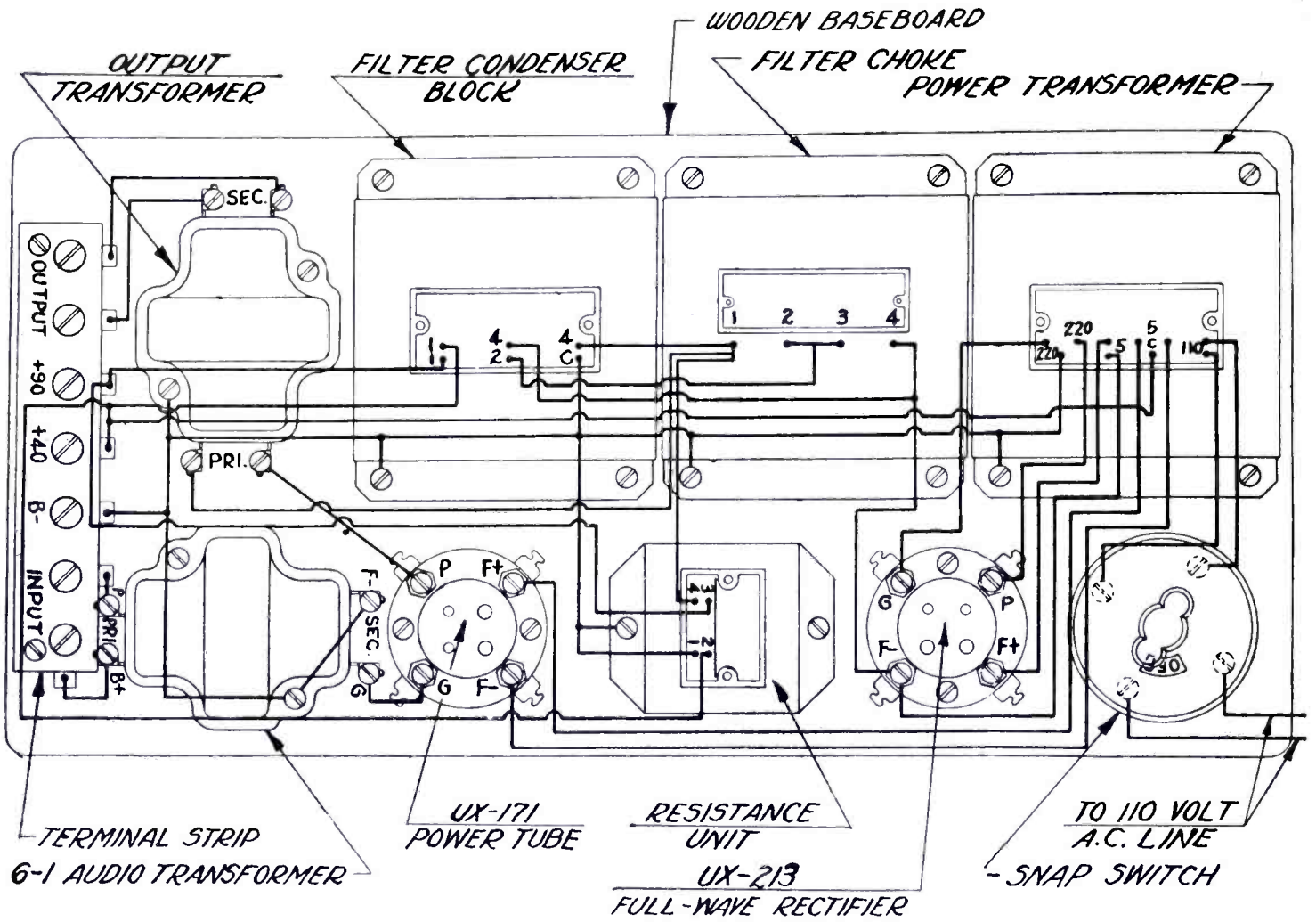
Premier Electric Company Estab. 1905
3803 Ravenswood Avenue, Chicago, Illinois.
Please send me complete details for selling your "Everybody's" Console Receiver.
Name .....
Address .....
City ..... State .....

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

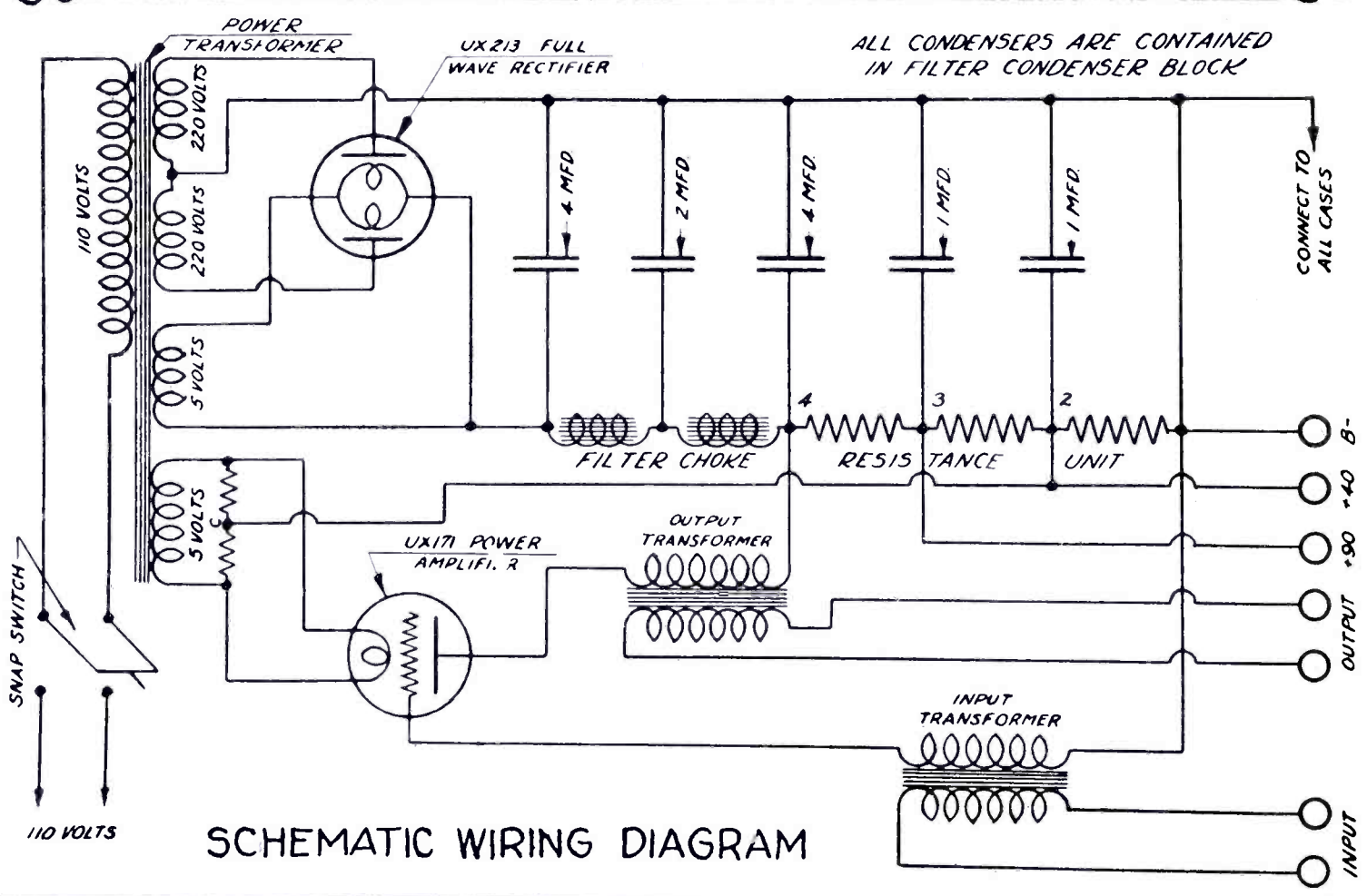


The Thordarson Power Amplifier and "B" Eliminator

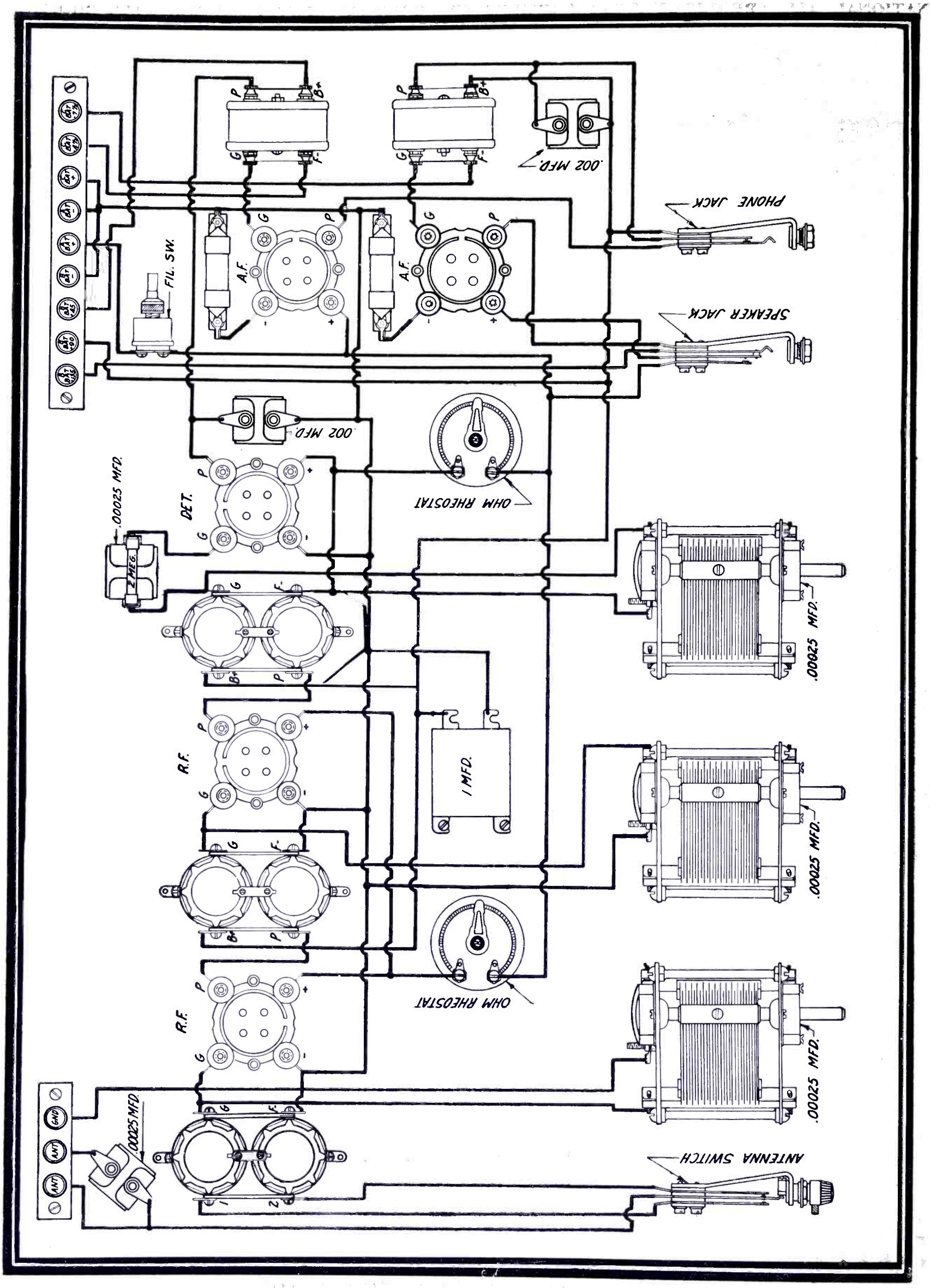
GENERAL RADIO RECTRON "B" ELIMINATOR & POWER AMPLIFIER



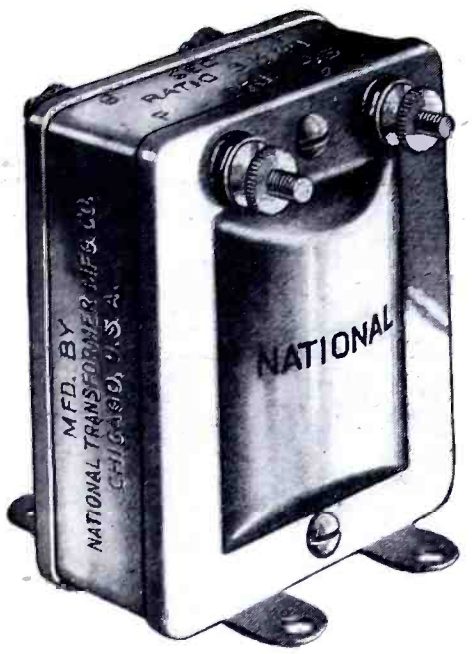
PICTORIAL WIRING DIAGRAM



SCHEMATIC WIRING DIAGRAM



NATIONAL ALL-FREQUENCY TRANSFORMERS SPECIFIED BY CITIZENS RADIO CALL BOOK



AMAZING Money Saving OFFER!

The wonderful National All-Frequency Audio Transformers specified by Radio Call Book in the article beginning on the next page—offered special at less than half regular price. But—you must act NOW—supply is limited!

Bass Note Amplification Only $1.97

Seldom comes an opportunity like this. Certainly—you should take instant advantage of it—because never again will such a startling offer be made. Just think! National Transformers, the new type all-frequency units that amplify the lowest bass and the highest soprano with equal volume and clarity. And instead of paying their regular price of $4.50, you can buy them for only $1.97 each. Truly, the very money-saving opportunity you have been watching for.

INSTANTLY—You'll Notice a Tremendous Improvement in Volume and Tone

Rip out your old audio transformers—no matter what they are, or how good you think them. Put these oversize, nickel-plated giants of amplification in place and prepare yourself for a distinct revelation. An orchestra will sound like an orchestra. You'll hear every instrument, round, full, clear, natural. No more jumbled mess, no more flat, tin-pan noise when the musical program happens to be at the lower end of the musical scale. National All-Frequency Transformers cover *the whole scale*, perfectly. And instead of paying $7, $8, or $9 for this kind of amplification, you can NOW, for a limited time, get it for only $1.97.

Why "NATIONAL'S" are BETTER

The secret of National's Supremacy is in its extra large, especially shaped, high grade silicon steel core, and its oversize special-wound core. No other transformer, regardless of price, can boast of the same combination of ideal features. Hence, no other transformer, regardless of price, can out-perform the National—in amplification, in fidelity of reproduction. Then think, too, of the improvement these wonder transformers will make in the appearance of your set. They are heavily nickel plated, all over, and polished so they are just like mirrors. To make a neat looking job of any set they can't be beaten.

SAVE MONEY!

Hundreds of thousands of National Transformers have modernized radio sets everywhere in the land. Thousands upon thousands of fans have found them to be the final answer to perfect tone reproduction of voice and music. And, everyone else who has ever bought National's has paid the full, regular price of $4.50 each. They are a bargain at that price. They are a super-bargain at our price of $1.97 each. Think! You save $2.53 on each transformer, or more than $5.00 on a pair. Money talks! Order now.

USE COUPON! This OFFER LIMITED!

Only a few thousand National All-Frequency Audio Transformers are in our present stocks. The special, low price of $1.97 will hold only so long as this stock lasts. The thousands of set building fans who have used Nationals will order as many transformers from this stock as they can—because *they* know there is no better transformer at *any* price. This will take most of our present supply. If you want to make sure of obtaining a pair of Nationals for your own set, order at once. Use the coupon below, being careful to write your name and address plainly. Save money. Order TODAY!

Keystone Radio Laboratories, Inc.
154 Whiting St., Chicago, Ill.

Keystone Radio Laboratories, Inc. (Dept. C. B.)
154 Whiting St., Chicago, Ill.

Send me.....National All-Frequency Audio Transformers ☐ Ratio 6 to 1, ☐ Ratio 3½ to 1 (indicate ratio wanted). I agree to pay postman $1.97 for each transformer ordered, plus few pennies postage. We pay postage if you send cash with order.

Name.....

Street.....

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

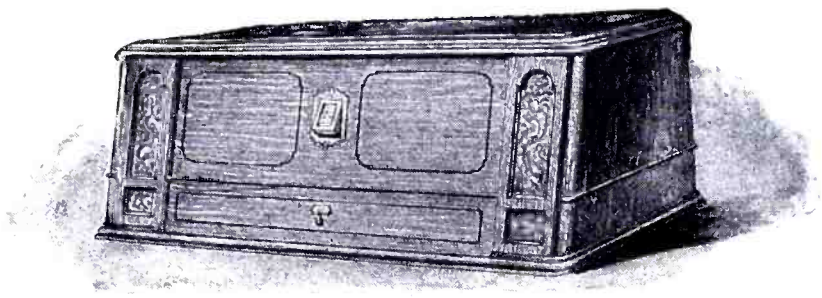
For Real Music

NATIONAL

All Frequency Audio Transformer

Counterphase-Eight
Bremer-Tully's Crowning Achievement

That B-T products have been more than ordinarily successful is known the world over. The "NAMELESS" created a sensation eclipsed only by the subsequent "COUNTERPHASE SIX."



Now—the Counterphase-Eight—B-T's greatest effort

Exclusive features you cannot afford to miss—even if it's only to learn what's new in Radio.

A new cabinet design, straight line selectivity, no "oscillation control" yet set cannot squeal or howl —and it's "hot" across the entire scale, Visual Indicator, accurate calibration of each receiver, Rejector stage, one station selector and—selectivity never before equalled, even in B-T Receivers!

B-Power Unit

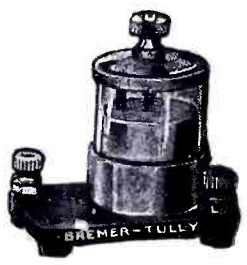
A Unit designed to be used with our receivers, the best endorsement we can give it. No guess-work, no knobs to turn—no fussing around with adjustments and uncertain results—You *know* what the B-T Power Unit delivers.

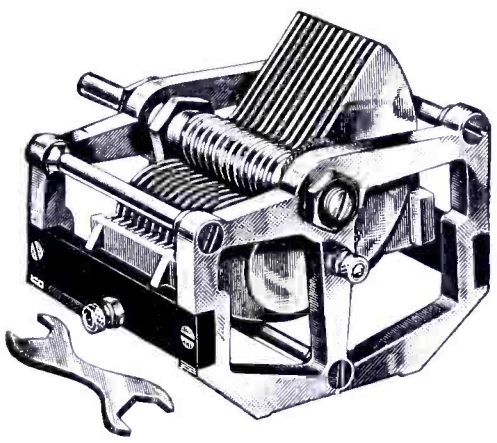
Price $49.50

Mikro Mike Condenser

Accuracy and precision are at once evident. A short circuit is impossible. Glass dielectric is unaffected by moisture. Capacity 1½ to 25 mmf.

Price $1.00





Lifetime Condensers

Still the choice of experts. A design and workmanship that has set the pace for years and it's still ahead. Made in all popular sizes and priced from $4.25 to $5.00.

"Better Tuning"

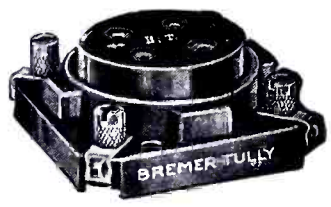
If you want to know more about the new COUNTERPHASE set models, you will find a complete discussion in the 10th edition, "Better Tuning."

Before spending the price of a B Eliminator you should investigate the results of several years' research made by B-T.

The 10th Edition tells the whole story. You cannot afford to miss it. Sent postpaid on receipt of 10c in stamps or coin.

Bremer Tully

Manufacturing Co.
520-532 So. Canal St.
Chicago
"Pioneers of Better Tuning"

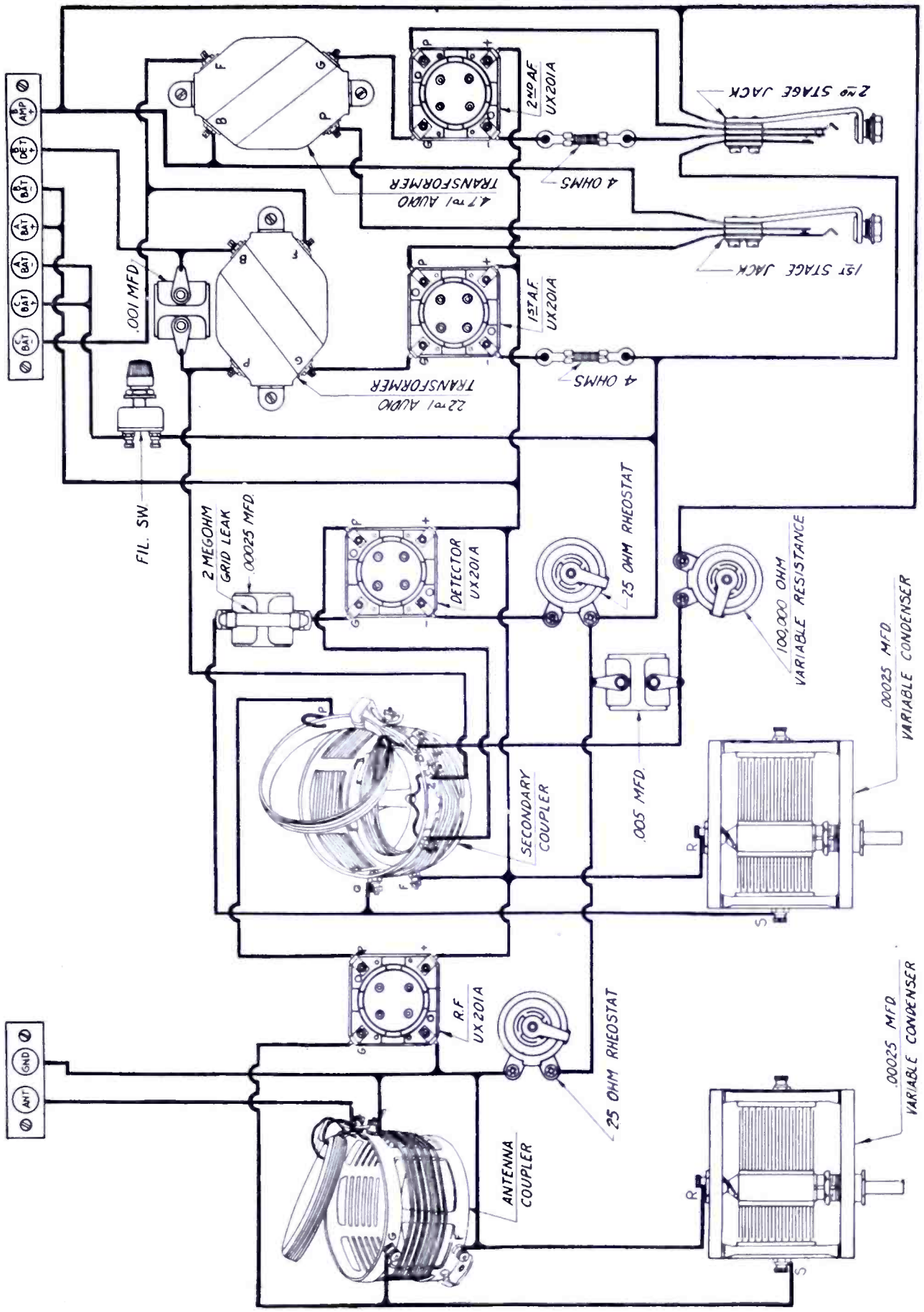


UX Absorber Socket

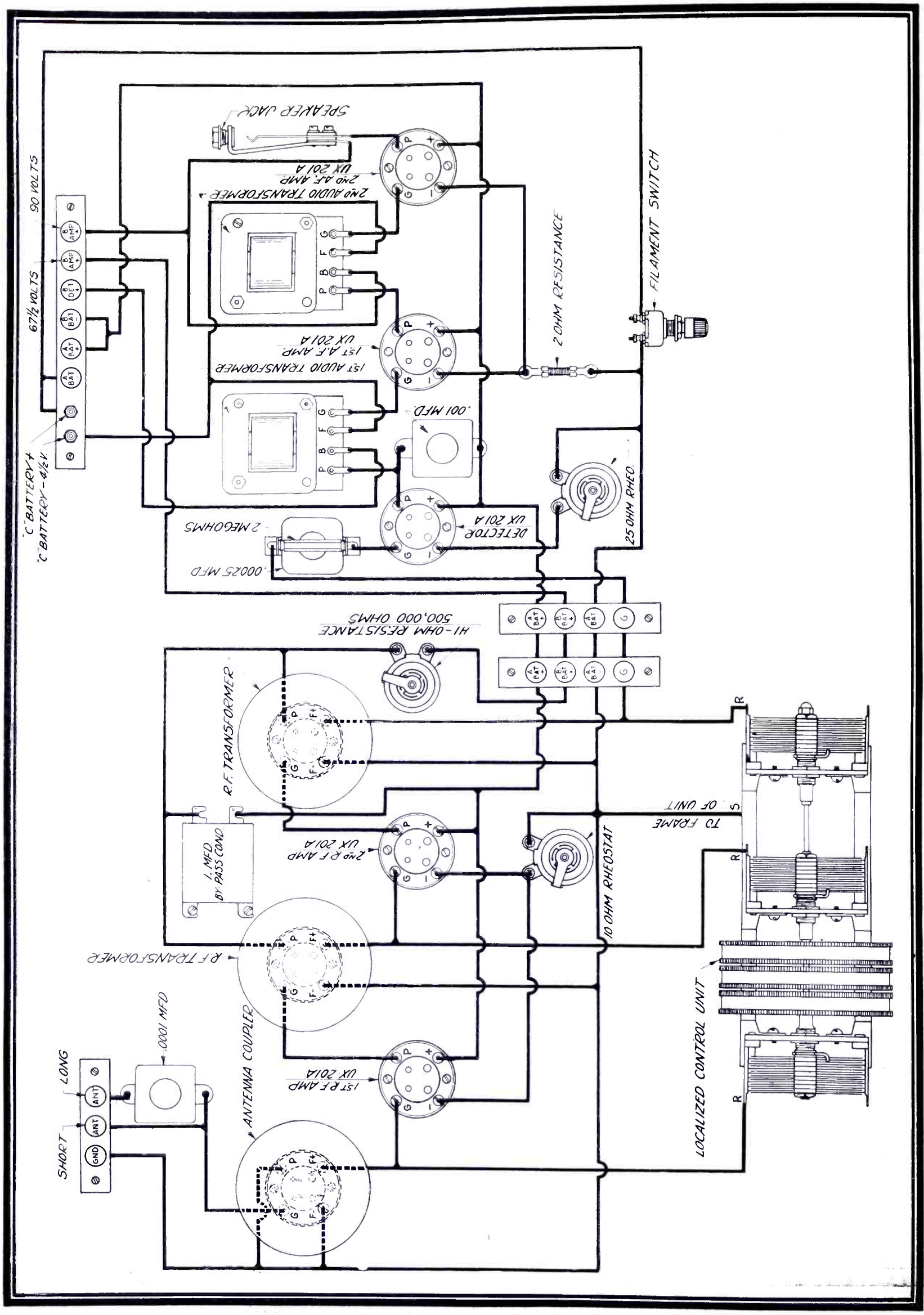
Springs may prevent shocks but the vibrations which follow must also be prevented. The UX Absorber Socket does it by exclusively B-T methods, resulting in longer tube life and quieter reception.

Price 75c

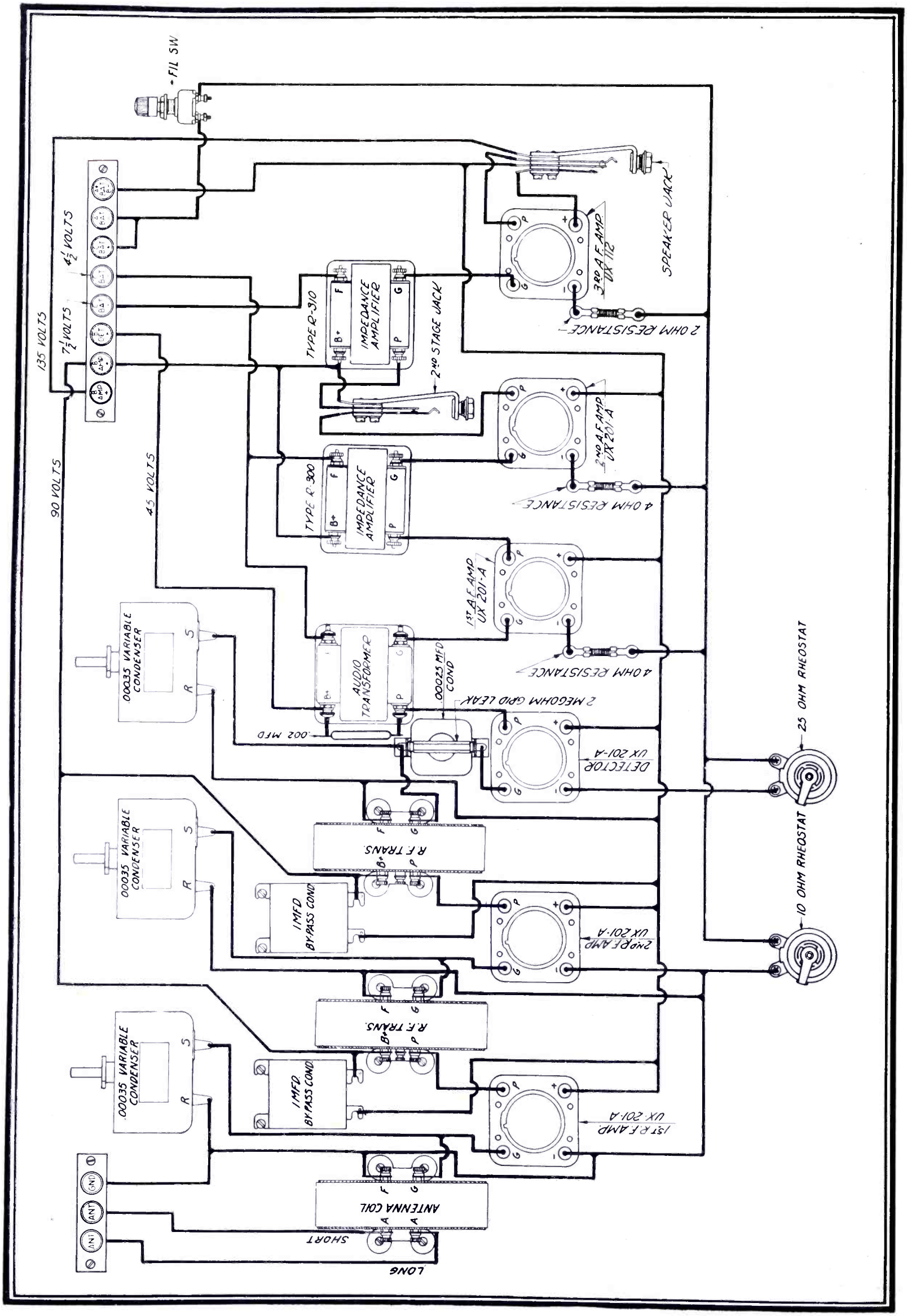
UX Detector Socket—$1.00.



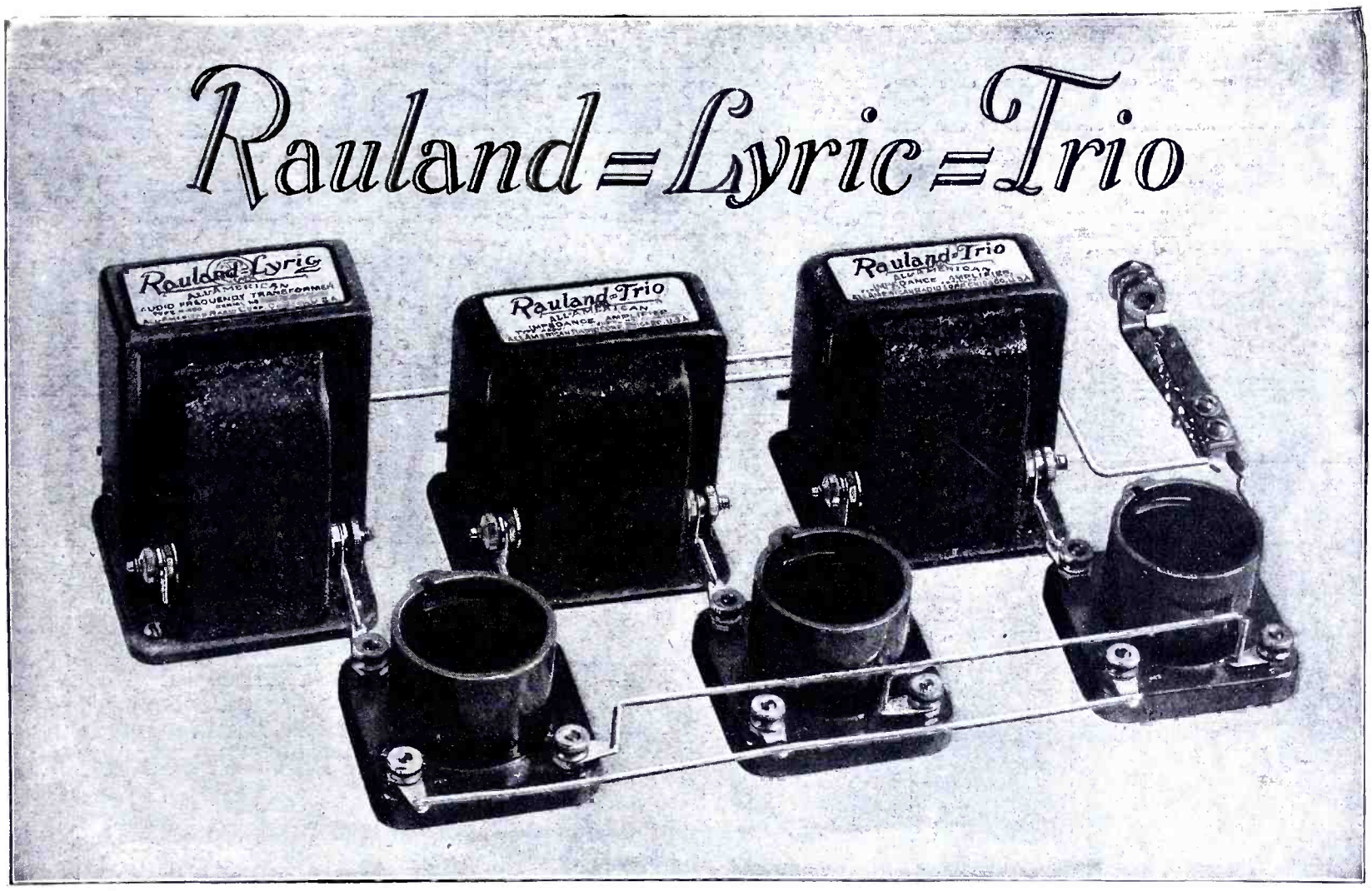
A Four-Tube Non-Reradiating Receiver



Five tube tuned radio frequency receiver using the new Alden gang condenser



The All-American Tuned Radio Frequency Receiver Using Toroid Coils and the Rauland Lyric Trio Audio Amplification



A remarkable improvement in audio amplification

New unit perfected by All-American Engineers gives you the full, pure, natural tone you have always sought

YOU have always wanted the ideal result in audio amplification—pure, natural tone with good volume. The laboratories of All-American Radio Corporation have developed a new method of audio amplification and now bring to you this long sought ideal result in the—

Rauland-Lyric-Trio

You know the Rauland-Lyric transformer. Its exceptional tone perfection has made it the largest selling quality transformer in the world. The Rauland-Lyric is now used in combination with the new Rauland-Trio (impedance units) to produce the Rauland-Lyric-Trio amplifier—the highest known perfection in three stage audio amplification.

It is well known that any system of amplification using instruments of similar characteristics has inherent disadvantages. Rauland-Lyric-Trio successfully combines the two leading systems—transformer and impedance coupling—coordinated to retain the advantages of both and to eliminate their weaknesses.

This new method consists of a Rauland-Lyric transformer for the first stage, a Rauland-Trio Type R-300 impedance for the second stage, and a Rauland-Trio Type R-310 impedance for the third stage.

Rauland-Trio

This is a triple feature instrument containing an inductance, a capacity and a resistance in one compact impedance unit. Through laboratory tests of utmost precision, absolutely correct balance is maintained between these important factors. You secure full advantage of impedance amplification and overcome the common variance of commercial types of condensers and resistances. Rauland-Lyric-Trio is the last word in audio amplification.

ALL-AMERICAN TRADE-MARK

A free book, "Modern Audio Amplification," tells more about this interesting new development. Write for handbook B-90.

ALL-AMERICAN RADIO CORPORATION
4221 BELMONT AVE., CHICAGO, U. S. A.

***Station* WENR—266 *Meters—is owned and operated by the All-American* Radio Corporation**

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

Eliminate Your Batteries

"Simply Plug Into Light Socket"

USE RATIONAL A-C TUBES

Pats. Applied For

NO BATTERIES
NO ACIDS
NO CHARGER
NO MICROPHONIC NOISE
NO TUBE REJUVENATION
NO AERIAL OR LOOP

MORE POWER
MORE VOLUME
MORE DISTANCE
MORE STATIONS
MORE LIFE
MORE ELECTRON EMISSION

With the RATIONAL A-C TUBES and KIT, you can easily change your present set into a BATTERY LESS SET, requiring no storage battery, acids or trickle charger. NO HUM. Get DISTANCE without AERIAL or LOOP. Get STATIONS you could never get before. Less noise—less static. No more weak signals due to run-down batteries. No special socket required. Consumes very little current.

—FREE—

For a limited time only, we will send ABSOLUTELY FREE with order for set of 4 or more RATIONAL A-C TUBES, at $5.00 each, the RATIONAL KIT, which consists of a Special Transformer, Power Rheostat, Blueprints and Directions.

The RATIONAL A-C TUBES are the result of years of research and development.

Mail Coupon with Order

RATIONAL TUBE LABORATORIES, Not Inc.
2459 W. Harrison St., Chicago, Ill.

Send ..... RATIONAL A-C TUBES at $5.00 each.
I am to receive FREE the RATIONAL KIT.
Name of set ..... Model .....
Circuit ..... No. of tubes .....
House Current ..... Volts ..... Cycles
Enclosed P. O. or Express Money Order $ .....
Send order C. O. D. .....
Name .....
Address .....
City ..... State .....

— FULLY GUARANTEED —

RATIONAL TUBE Laboratories

Not Inc.

2459 W. Harrison St.
Chicago, Ill.

A 5-Tube Tuned Radio Frequency Receiver Operating from the Light Socket Using Rational A-C Tubes

FEW recent inventions in radio have created more intense interest than the development of an efficient radio tube operating from the A-C current supply.

Receivers were designed which operated from power lines, but the necessary equipment for filtering out the hum has been so imposing and the results so unsatisfactory that the only logical direction of research open to the engineer has been the development of an A-C tube. It was important that this tube operate directly from an A-C source without the necessity of inserting any filtering devices to eliminate the hum. In addition, it was necessary that the new tubes have the same characteristics as the other tubes using D-C for heating their filaments, so that either tube could be substituted for the other with only a very few changes in the circuit.

A new type of radio tube, the Rational A-C Tube, is used in the receiver described herewith. It differs from the other A-C tubes in that a greater electron emission is realized, thereby giving greater volume and more power. The life of the tube is far in excess of the minimum 1,500 hours set by factory specifications. The tube is absolutely non-microphonic, thereby eliminating the necessity of cushion sockets. An extremely rugged and sturdy construction is used in the design of the tube. No A-C hum is heard when using a loud speaker.

Each tube draws about one ampere at 3 volts in the heater circuit and five milliamperes in "B" current when operating at its maximum with zero grid bias. The proper bias of course will reduce the "B" circuit considerably. In all other respects the tube has very nearly the same electrical characteristics as a standard 201-A tube or its equivalent. It can therefore be substituted in any circuit where a 201-A tube is used by making a few changes.

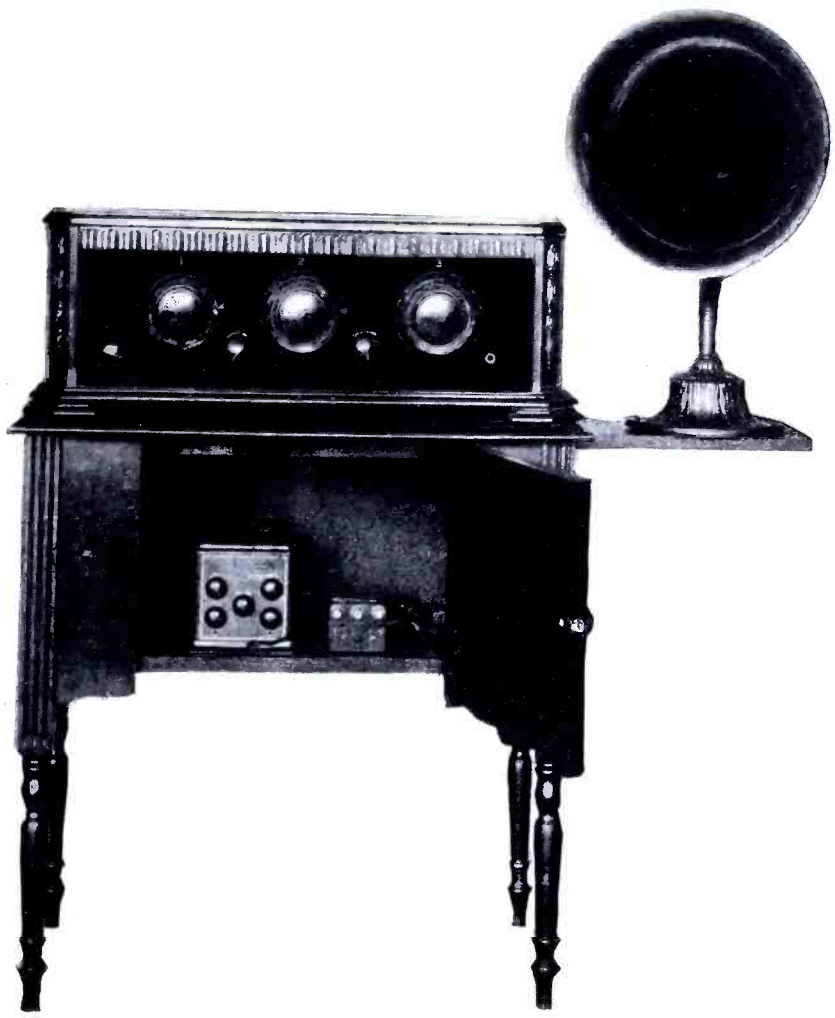


Photo A. Front view of receiver showing suggested accessories

We have designed in our laboratory a simple tuned radio receiver using the Rational A-C Tube. A small step-down transformer for reducing the 110 volts to approximately 3 volts is used to heat the cathode. The transformer in this receiver serves the same purpose as the storage battery in the average set. This receiver is identical to any other tuned radio frequency receiver except that the usual filament circuit is discarded and all of the filament binding posts on the sockets are connected together by one common bus wire. This now becomes the cathode lead and is connected to the positive of the "C" battery and the grid return of the detector tube. The ground and negative of the "B" battery are also connected to this lead.

The grid returns of the radio frequency tubes are connected together and go to the negative 3 volt "C" battery, which establishes the grid bias in the radio frequency circuits. The connections to grids and plates of all tubes are made in the usual manner. Plate voltages up to 150 volts may be used on the amplifying tubes and 22½ to 40 volts on the detector.

A 200,000 ohm variable resistance is in series with the 90 volt lead running to the plate return of each radio frequency tube. This acts as a very efficient volume control and prevents undesirable oscillations and distortion.

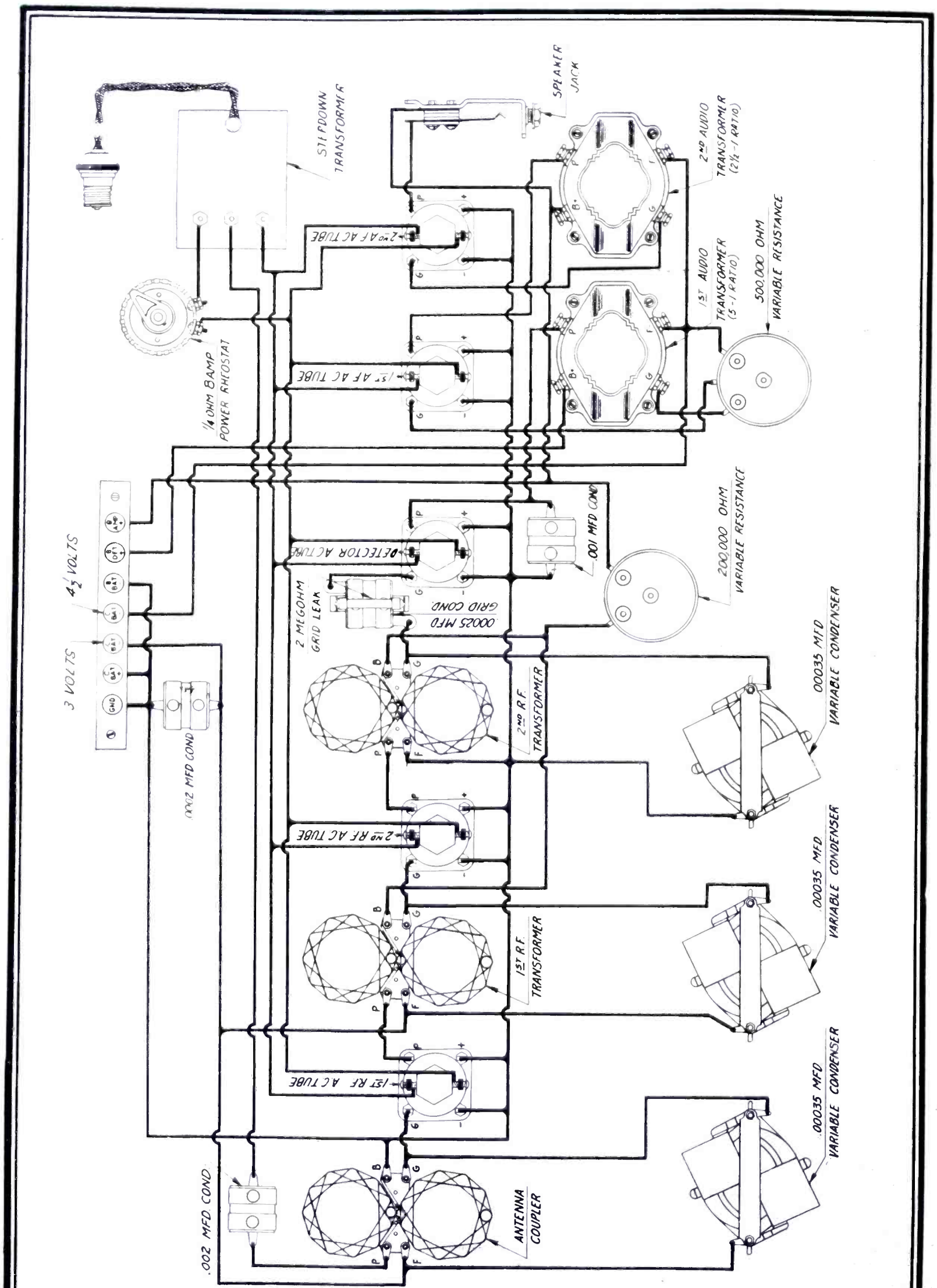
The Audio Amplifier is connected in the usual manner. The primary of the first Audio Transformer has a .001 mfd. by-pass condenser shunted across it which effectually bypasses any stray radio frequency currents. A 4½ volt "C" battery bias is used on both audio transformers. If a higher "B" voltage than 90 volts volts is used for the amplifier, it will be necessary to increase the bias in the proportion of 3 volts for every 45.

The unique feature of this circuit lies in the fact that absolutely no antenna or loop is required for operation. The terminal of the antenna coupler, usually connected to the aerial binding-post, is fastened to the center post of the step-down transformer. This post is the center tap of the secondary winding and since there is static coupling between the primary and secondary windings of the transformer, the 110 volt power line is utilized as an antenna. A good ground connection is very necessary for the proper operation of the receiver.

The cathode heaters are connected together in parallel with not less than a No. 14 flexible insulated wire. The heater voltage should never exceed 3 volts. It is advisable to connect a voltmeter across the heater line to indicate the voltage applied. A ¼ Ohm, 8 Ampere power rheostat is inserted in one side of the heater circuit and controls the voltage at all times.

A laboratory test of this receiver showed remarkable efficiency in reception. Complete absence of A-C hum, exceptional volume with excellent tone quality and clearness was secured on all stations received. The tuning is quite sharp with no interference encountered from nearby stations.

With the addition of a "B" battery and "C" battery eliminator, the set is made entirely battery-less, consuming electric current equivalent to only a 60 Watt lamp.



A Five-Tube Tuned Radio Frequency Receiver Using Rational AC Tubes

List of Parts

1—7x26x3/16-inch Radion Panel
1—8½x25x½-inch Wood Baseboard
1—Frost Open Circuit Pan-Tab Jack
5—Frost UX Sockets, Type No. 530
1—CRL 200,000 Ohm Variable Resistance
1—CRL 500,000 Ohm Variable Resistance
1—¼ Ohm 8 Amp. Power Rheostat
1—A.C. Step-Down Transformer
5—Rational A.C. Tubes
2—Precise Audio Transformers (1 high and 1 low ratio)
3—Gen-Ral Radio Frequency Transformers
1—Electrad .00025 Grid Condenser
1—Electrad 2 Megohm Grid Leak
1—Electrad .0002 mfd. Fixed Condenser
1—Electrad .001 mfd. Fixed Condenser
3—Signal .00035 mfd. Fixed Condensers
7—XL Binding Posts
3—Radion 4-inch Dials
1—Package Kester Solder
50 Ft. Belden No. 12 Wire
1—Blackburn Ground Clamp
Misc.: Wire, Lugs, Screws, Etc.

A complete kit containing all necessary equipment for constructing an aerial may be purchased at most all first class radio stores. They are manufactured by Brach Manufacturing Company, Newark, N. J.

The accessories shown are: The new Webco Little Giant Power unit provides the proper current variations to "B," "C" and detector circuits. The detector allows a variation of from 5 to 100 volts and the amplifier variation from 20 to 120 volts. The power tube supply may be adjusted to the exact value needed in any receiver with any power tube up to 125-180 volts. Manufactured by Webster Electric Co., 3510 West Lake Street, Chicago.

The speaker is a new Qualitone model, manufactured by the Duro Metal Products Co., Chicago.

The radio table is by the Watsontown Table & Furniture Co., Watsontown, Pa.

(If any further information is desired regarding any accessories shown they will be supplied by the manufacturer if you will address them direct.)

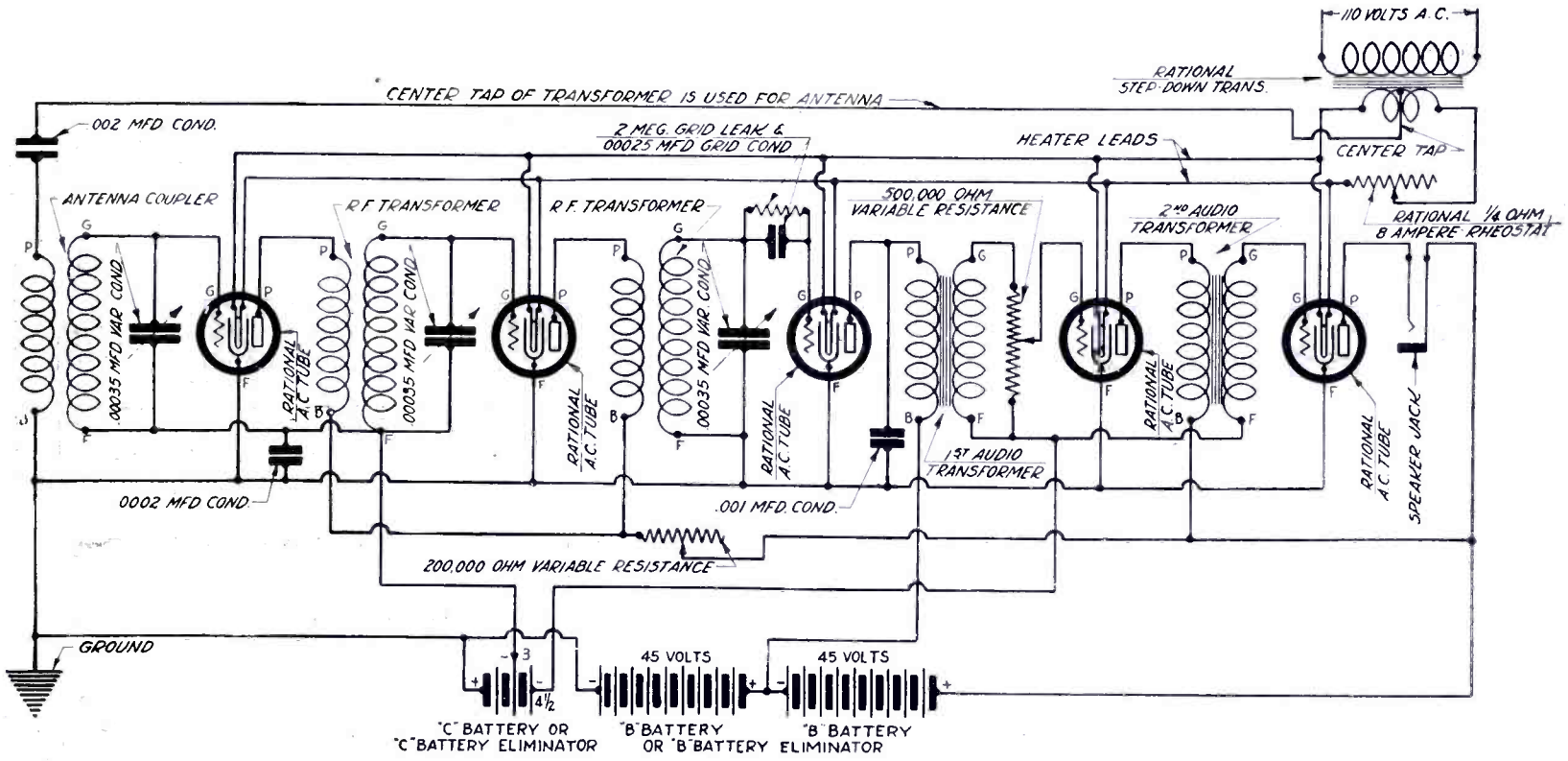
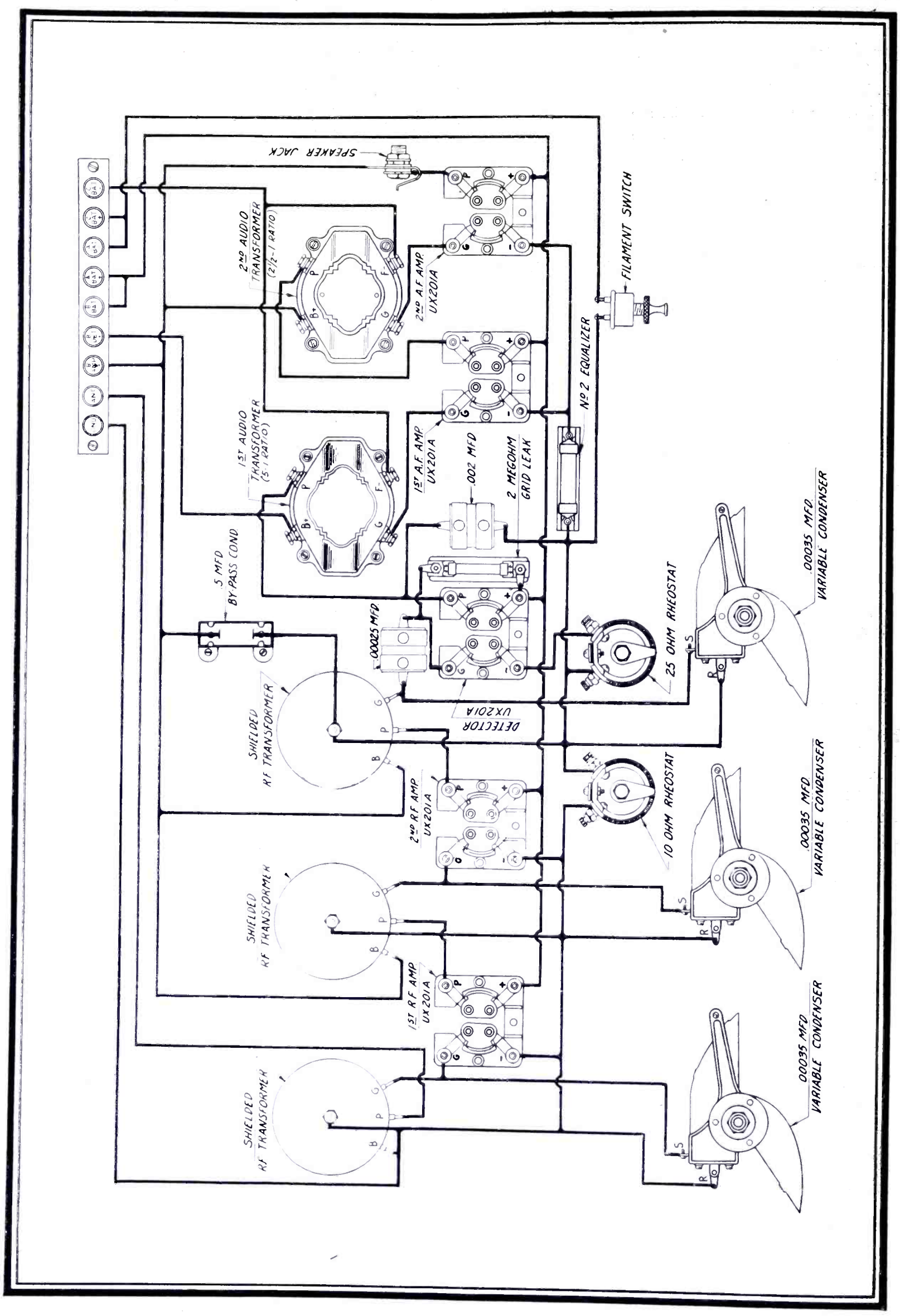
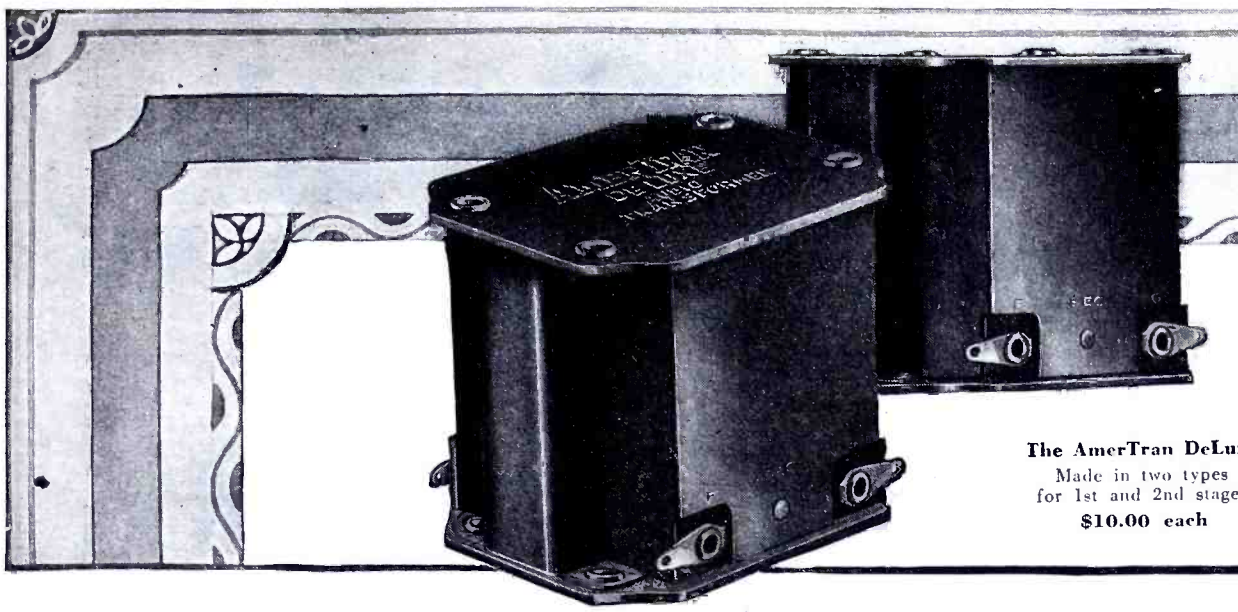


Figure 2. Schematic diagram of receiver using Rational A-C tubes



Tuned Radio Frequency Receiver using the New Sickles Shielded Coils



The AmerTran DeLuxe
Made in two types
for 1st and 2nd stages
$10.00 each

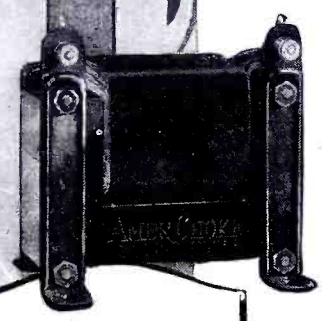
AMERTRAN RADIO PRODUCTS

STANDING out prominently among recent developments toward better reproduction, the AmerTran DeLuxe sets an entirely new standard of audio amplification.

Here is an audio transformer which reproduces the deep boom of the bass drum, the roll of the pipe organ and the lowest tones of the bass viol with startling realism, at no sacrifice of the highest sounds within the audible range. Used in connection with the new cone speakers and new tubes these transformers amplify uniformly over the entire audible range. The approach to absolute perfection is so close that the human ear is unable to note further improvement.

The AmerTran DeLuxe is made in two types—first and second stages and should be used by the pair!

The AmerTran Power Transformer and the AmerChoke are the result of over twenty-five years' experience in transformer building. They are among the finest units available for the construction of a power supply of the better type. The Power Transformer has filament supply windings for the rectifying tubes and furnishes sufficient plate current, after rectification, for the operation of the set.



The AmerChoke Type 854
This is a scientifically designed impedance or choke coil of general utility, designed primarily for use in filter circuits. As an output impedance for by-passing direct current from the loudspeaker it is both efficient and economical.
$6.00 each

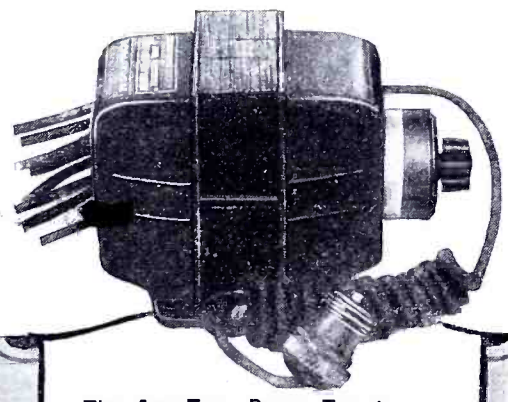
AMERICAN TRANSFORMER COMPANY
178 Emmet Street, Newark, N. J.

"Transformer builders for over twenty-five years"

AmerTran products are sold only at Authorized AmerTran Dealers.

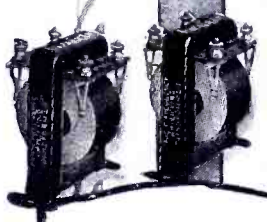
Other AmerTran products:

AmerTran Resistor Type 400.....$7.50
AmerTran Heater Transformer Type H-28 (for A. C. tubes) $10.00



The AmerTran Power Transformer Type PF-52, 65 VA—60 Cycles
Type PF-52 is intended for use in the best power supply developments. It will convert the standard 110-volt, 60-cycle alternating house lighting current to a higher voltage for the plate and low voltages for filament supply.
$18.00 each

Write today for interesting free booklet, "Improving Audio Amplifier," and other data on the subject of better radio.



AmerTran Types AF-7 and AF-6
AmerTran Audio Transformers types AF-7 and AF-6 have been considered among the leaders in audio amplification. These popular and efficient models may now be purchased at a considerable saving in cost.
Types AF-7 (ratio 3½:1)—AF-6 (ratio 5:1) $5.00 ea.

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Professional

SET BUILDERS

who earn their livelihood by building and installing radio receivers

Write to Morison's for Full Particulars on The New

VARION

Battery B&C *Eliminator*

Morison's is exclusive wholesale distributor for parts for The New Varion B and C Eliminator and the marvelous Varion A. C. Operated Set. They are among the most talked-of radio developments this fall.

Endorsed by 11 Leading Radio Manufacturers

Eleven of the country's best-known manufacturers endorse The Varion Eliminator. Their combined engineering and research facilities have gone into its development. You have their assurance and guarantee that the Varion is as fine an eliminator as engineering skill and money can produce. Nothing has been sacrificed, no expense has been spared to make The Varion the standard by which others will be judged.

An Opportunity for the Dealer and Set Builder

The Varion Eliminator and A. C. Operated Set give the dealer and set builder a splendid opportunity to "cash in" this season. Strong advertising and publicity plans already under way—and more coming right along. It's a coast to coast campaign. You'll see The Varion Units featured in prominent magazines and newspapers everywhere.

Send today for complete information? Just clip the coupon below

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MORISON
Electrical Supply Co. Inc.
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MORISON ELECTRICAL SUPPLY CO., INC
15 East 40th St., New York City

Please send me complete details and prices on the new Varion B and C Eliminator and the A. C. Operated Set. I understand that this obligates me in no way whatever.

I am a

.....Dealer.....Set Builder

Name .....

Address .....

CRCB-S

Centralab

CENTRAL RADIO LABORATORIES

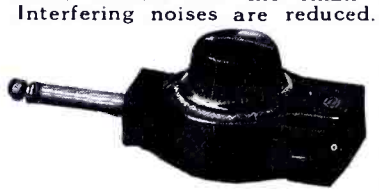
PRODUCTS 1926·27

IN the past season more than 2000 newspapers recommended Centralab Products. Most radio magazines mentioned them frequently in circuit articles. Every product has distinctive features and obvious **high quality.**

Centralab Modu-plug

The New Tone and Volume Control

Tone improvement is this year's only real radio advance. Just one change will modernize your present set. Replace your loud speaker plug with the Centralab Modu-Plug and your set will equal the tone performance of the latest high-priced receivers. Gives any degree of tone volume. No other control but the small knob on the plug. Interfering noises are reduced.



No. 1. Standard Type Modu-Plug for sets with one or more jacks, $2.50.

No. 2. Cord Type Modu-Plug for sets not equipped with jacks; has 24 in. phone cord, $2.50.

NEW Heavy-Duty RADIOHM

For Simple Control of "B" Battery Eliminator

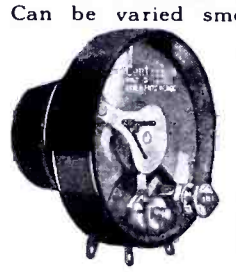
Get full efficiency from your "B" Battery Eliminator by installing a Centralab Heavy-Duty Radiohm. By using this device a single turn of the knob gives full resistance variation to control the output voltages. **Tested and approved by Raytheon Laboratories.**

Resistance remains permanent as adjusted (no carbon particles or discs) and remains same for any knob setting regardless of how often adjusted. Bushing and shaft insulated to withstand 1500 volts.

Resistances 2,000, 10,000 or 50,000 ohms.....$2.00

Centralab Standard Radiohms

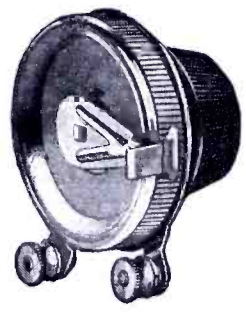
Can be varied smoothly throughout their entire range from zero to maximum resistance. Gives full resistance variation with single turn of the knob. Non-inductive, permanently noiseless in adjustment; no sliding contacts carrying current; maintain exact resistance values as adjusted.



Resistances 2,000, 25,000, 50,000, 100,000, 200,000 or 500,000 ohms.....$2.00

Centralab Rheostats

Centralab Rheostats always operate smoothly and noiselessly, for the resistance element is firmly clamped between insulated metal discs so that it cannot move or warp. This maintains uniform spacing between windings, giving even regulation and eliminating dead spots. The large area of metal aids in cooling, and they carry unusually heavy current for their size. Centralab Ribbon Type Rheostat is wound with flat ribbon instead of wire. Will handle five to ten tubes with smooth, noiseless control.



Wire wound: 6, 10, 20 or 30 ohms $1.00

Ribbon wound: 2 or 3 ohms, price $1.25

Purchase any Centralab product at your dealer's, or we will mail direct on receipt of price.

Central Radio Laboratories

26 Keefe Ave. Milwaukee, Wis.

Makers of a full line of variable resistances for 69 manufacturers of leading standard sets

Centralab

How to Build the Varion "B" and "C" Eliminator

An Efficient Battery Eliminator of Extreme Flexibility Adaptable to Both "B" and "C" Voltage Requirements

FROM the very day that multi-tube sets became popular with the radio public, battery elimination gained in popularity by leaps and bounds. Economy was, of course, the main factor in determining this trend of public opinion. A t using five or six tubes and in operation three or four hours day will just about use the equivalent cost of a good battery iminator in dry cell B Batteries in the course of a year.

The recently introduced power tubes requiring high plate voltges have further emnasized the desirability efficient battery elimiation. Incidentally, he modern receiving t, using from five to n tubes, requires an iminator of extreme exibility, when one onsiders the number of pecial purpse tubes ow on the arket, each ith its own articular equirements in the atter of ate and rid bias oltages. It is safe to say that the majority of radio owners toy are using these special combinations of tubes rather than one rticular tube for all purposes.

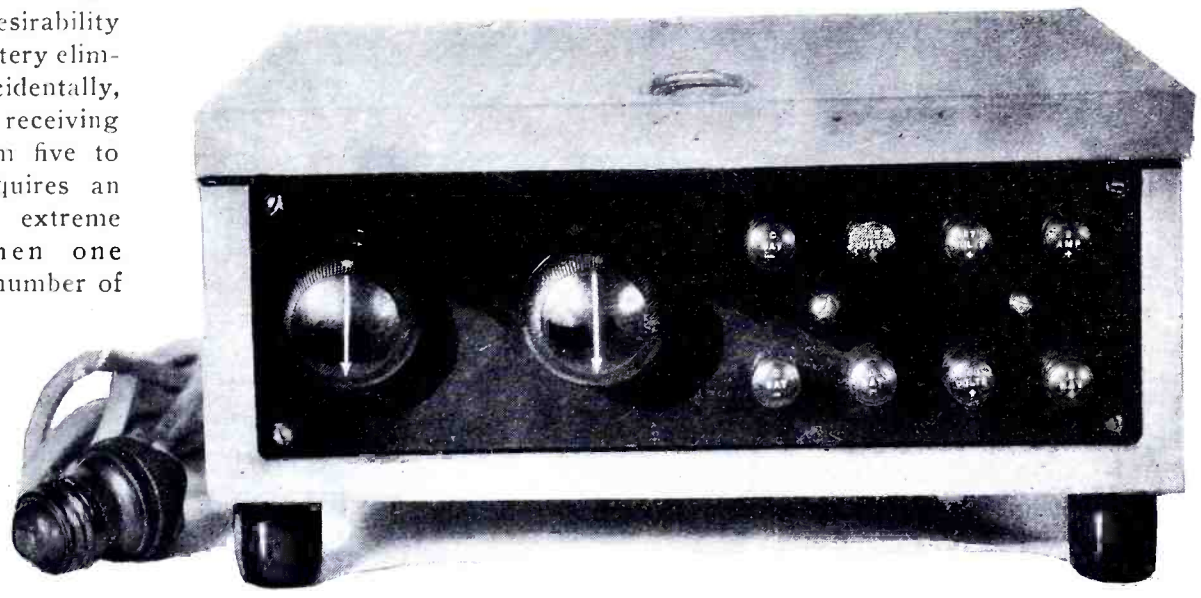


Photo A. Front view of completed Varion

Not only must the modern eliminator be adaptable in the atter of B voltages, but in C voltages as well. Consider that te 201A tubes, used as first stage audio amplifiers, require as ltle as 4½ volts C bias, while the 171 power output tube calls for high as 40 volts C bias.

In designing the two models of the Varion Eliminators, deribed here, the requirements of the multi-tube set as well as of the latest type power tubes, have been kept constantly in mind. The result is a design which supplies constant B voltages from 22 to 250, covering the range required by the softest type detector tube to the high voltage 171 or 210 power output tubes. In both models there are two C voltages available, with variations from 0 to 45 volts.

B and C Current Fluctuations Compensated

As C bias voltages are dependent entirely upon the applied plate voltages, the designers of the Varion chose a logical method of securing C voltages by drawing it from the same source from which the plate potential is taken. Minor variations in the plate supply are then taken care of automatically. This feature which is incorporated in both models of the Varion shown here will be well appreciated by those to whom changes in tone and volume are objectionable.

Upon the efficiency of the rectifying device used depends the efficiency of the completed eliminator to a large extent. Without going into the technical side of the subject, we believe that the newly developed Raytheon tube is the most logical to use. Its highly satisfactory performance as a rectifier, its rugged construction, long life, and practically foolproof operating characteristics make it almost ideal for work of this kind.

Summary of Specifications of the Varion Eliminators

The circuit diagrams for two types of Varions are shown.

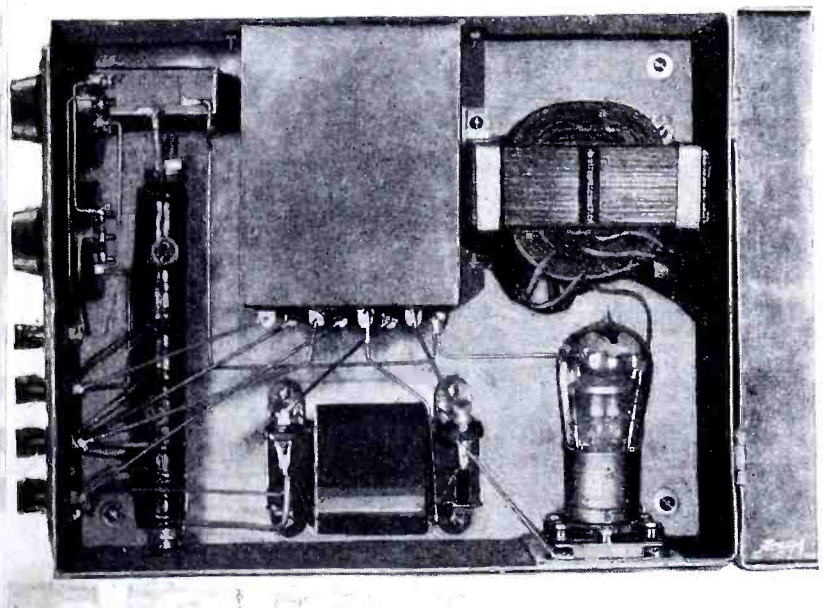


Photo B. Top view of Varion with lid open

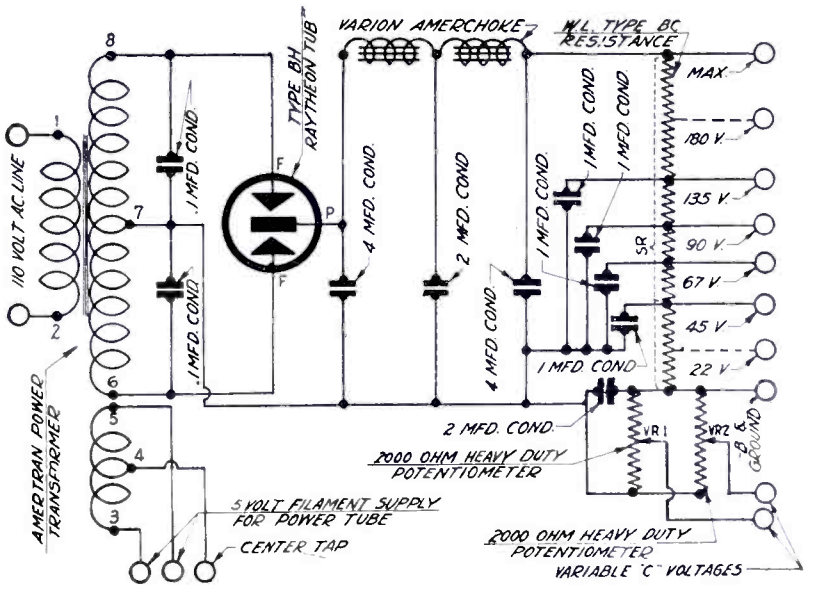


Figure 1. Schematic wiring diagram of Type A Varion

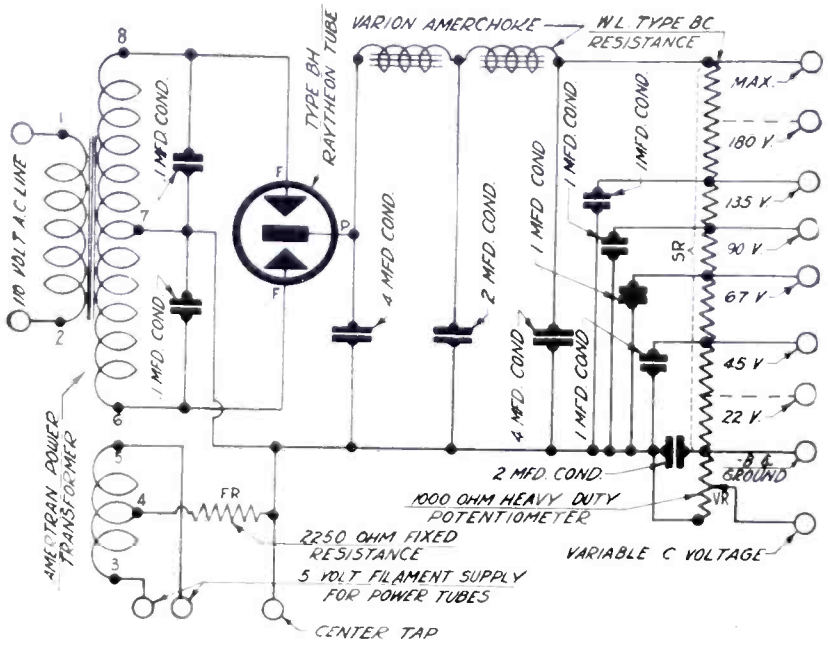


Figure 2. Schematic wiring diagram of Type B Varion

Figure I gives the circuit diagram of the Type A Varion. In this model there are no changes in the receiver to be made and the B and C voltages are drawn from the eliminator exactly as though batteries were being used. The 5 volt, center tapped, filament winding is not used.

The circuit diagram of the Type B Varion shown in Figure II shows slight variations from the other model. While the B voltages are the same, only one variable C voltage is available and the 5 volt center tapped filament winding is used to provide filament current for a power tube of the 112 or 171 type. The resistance FR is in series with the negative B return and the voltage drop across this resistance is utilized as the grid bias voltage. The value of this resistance is 2250 ohms and due to a fortunate coincidence, no change in this value is necessary to produce the correct C bias for either a 112 or 171 type tube.

Operating Power Tubes

It is suggested that where the set with which the Varion is to be operated is already equipped for power tube operation, that the Type A Eliminator Circuit be followed. If the set is not wired for power tube operation or if dry cell tubes are used, the Type B Varion should be constructed. Figure III shows the few changes necessary to change your set so that the filament of the power tube is operated from alternating current.

Parts Used in the Varions

1—Amertran Varion Transformer.
1—Amerchoke, Varion Type.
1—Raytheon Tube, BH Type.
1—Eby UX Socket.
1—Sangamo Varion Condenser Unit Containing 2-1 Mfd. Type B Condensers.
1—Sangamo Varion Condenser Unit containing:
  1—4 Mfd. Type B Condenser.
  1—2 Mfd. Type A Condenser.
  1—4 Mfd. Type A Condenser.
  4—1 Mfd. Type A Condensers.
1—Sangamo 2 Mfd. Type A condenser.
8—Eby Ensign Posts.
1—Ward Leonard Varion BC Resistance.
1—Varion Steel Case.
Solder, wire, etc.

Used With Above in Type A Varion Only:
2—Centralab 2000 Ohm Type HD Potentiometers.

Used With Above in Type B Varion Only:
1—Centralab 1000 Ohm Type HD Potentiometer.
1—Ward Leonard Varion FR Resistance.

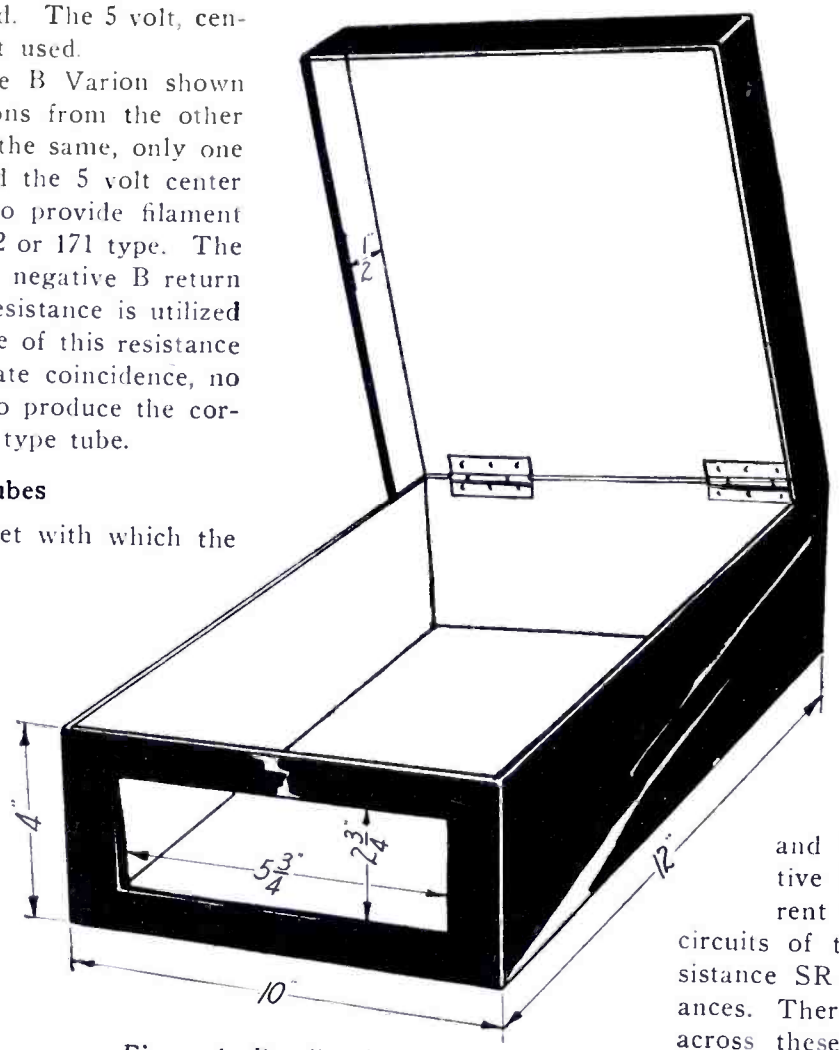


Figure 4. Details of iron box

Characteristics of the Varions

The operating characteristics of both Varions is identical with the exceptions noted above.

Type of Circuit: Raytheon Full Wave Rectification.

Load Capacity: 60 Milliamperes Drain at 180 Volts.

Plate Voltage Output: Maximum of 250 Volts with 4 available combinations of the following Voltages: 22-45-67-90-135-180.

C Bias Voltage Output: Model A: 2 Variable C Bias Outputs, each Variable from 0 to 45 Volts. Model B: 1 Fixed C Bias for 112 or 171 power tube and 1 variable C Bias from 0 to 45 volts.

The parts used in the Varion Eliminators have been chosen solely upon their merit as parts of these eliminators. Certain of them, such as the Amertran, Ward Leonard, and Sangamo parts are of special manufacture for use here.

As the filter circuit, with the exception of the rectifying device, is the most important part of an eliminator, it deserves some special mention. The tapped Varion Amerchoke has an effective inductance of 100 Henrys which is far in excess of the average inductance employed or available. This choke, in combination with the Sangamo condensers form a very effective filter circuit which guarantee an absolutely humless output under all conditions.

The special Ward Leonard Varion Resistances used across the output are wire wound and vitreous enamelled. These resistances are rated at 25 watts dissipation and possess a zero temperature coefficient. These characteristics assure quiet, even output under all loads.

The Centralab Heavy Duty Potentiometers are used to obtain the C bias voltage for the amplifier tubes as has been explained previously. Their placement in the circuit and the manner in which the bias voltages are obtained may be of interest. Glancing at Figure 1, it will be seen that the resistances VR1 and VR2 are in series with the negative B lead. Obviously, then, all current flowing through either the plate circuits of the various tubes or through resistance SR must pass through these resistances. There will be, therefore, a voltage drop across these resistances and by placing the center arm of the potentiometers at various points, voltages from zero to the maximum

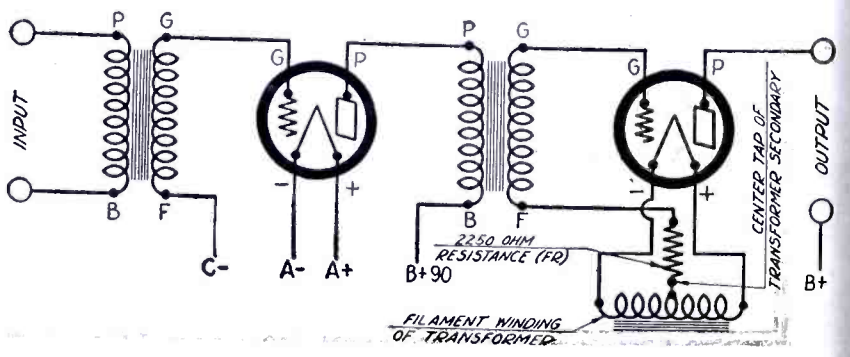


Figure 3. Method of using filament transformer for power tubes

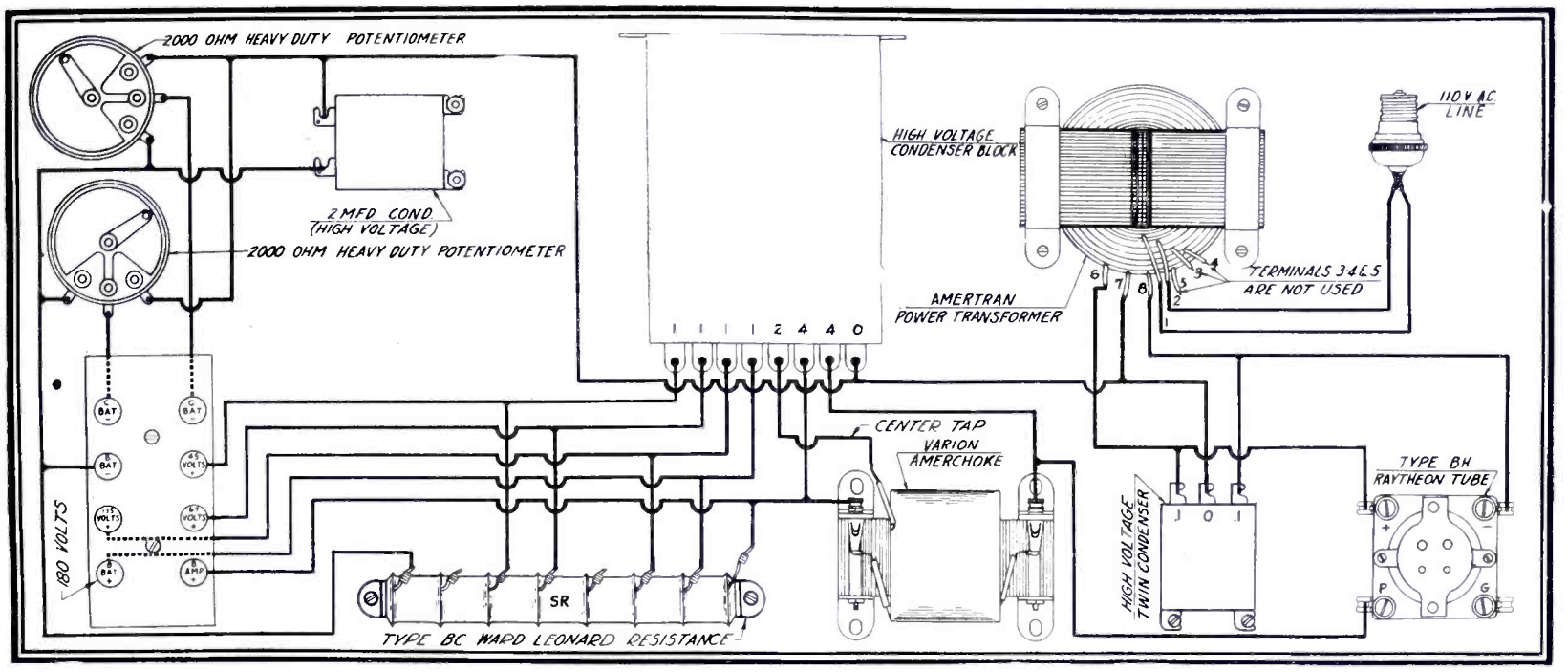


Figure 5. Pictorial wiring diagram of Type A Varion

drop across each resistance may be obtained. In the case of the Varion, the circuit characteristics are such that a maximum drop of 45 volts is obtained. The changes in grid current for various bias voltages may be discounted as negligible in the case of any amplifier tube now on the market and they will not affect the output of the amplifier or the voltages at any of the taps.

Assembly and Wiring

The first step in completing either of the Varions is to mount the apparatus in the steel case. This may be made by your local metal worker or purchased already made. If you buy it assembled, the case will be supplied fully drilled and the mounting of parts is quite simple. If the can is made locally, the data given in Figure V will be sufficient to have it turned out properly.

When the instruments are mounted, turn to either the schematic or pictorial diagram of the model you have selected, and carefully wire the job with Belden No. 18 Rubber Covered Flexible Wire. Do not attempt to run the leads in a particularly orderly fashion. A straight line is always the shortest and best path in radio wiring. The high voltage A. C. Circuits should, of course, be kept away from the D. C. output.

Testing and Operating the Varion

Connect the Varion to your receiver and insert the Raytheon Tube in its place. Then turn on the Alternating Current. A sudden blue glow or haze will probably surround the Tube elements. This, however, should cause no worry as it will disappear as soon as the tube warms up. In the case of the Model B Varion, the power tube in your set will also light up. It is not necessary to attempt to regulate the filament voltage on this tube as the applied voltage will never exceed five.

The voltages from the Varion may be tested with fair accuracy with any high resistance voltmeter such as those manufactured by Weston or Jewell. A cheap voltmeter, it must be remembered, draws an excessive amount of current and the reading from such a voltmeter will be far below the actual voltage.

When a station has been tuned in, the C Bias Voltages can be adjusted. It is only necessary to set the controls to a point where the volume and tonal quality are satisfactory.

In conclusion, a word or two of caution in the construction and operation of the Varion Eliminator. Never make any adjustments or repairs in the eliminator itself while the house current is on. Never leave the cover of the eliminator off while it is operating, for someone is apt to come along and investigate—with results painful but not usually severe.

As the case of the Varion is of metal and grounded, the eliminator may be placed fairly close to the set without the difficulties of interference usually encountered when this is done.

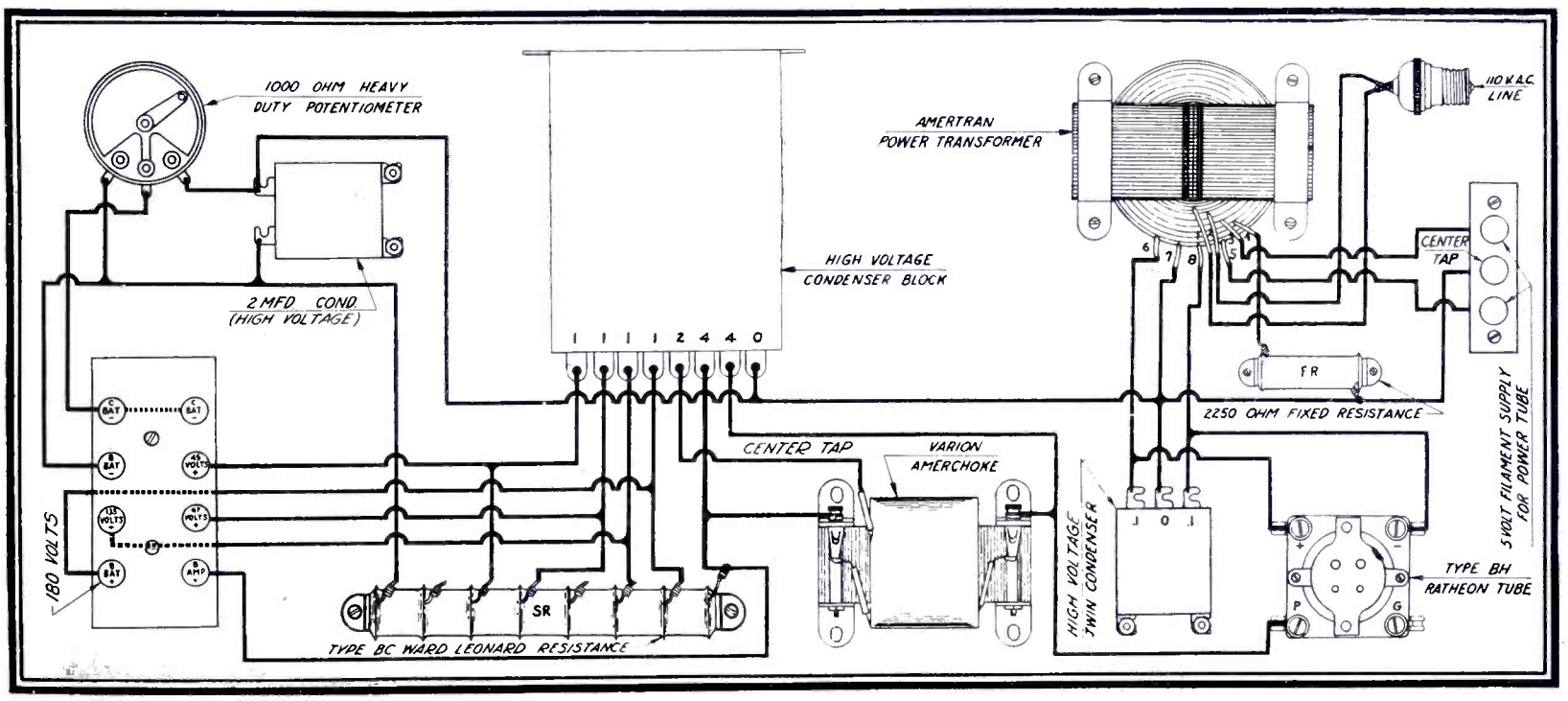
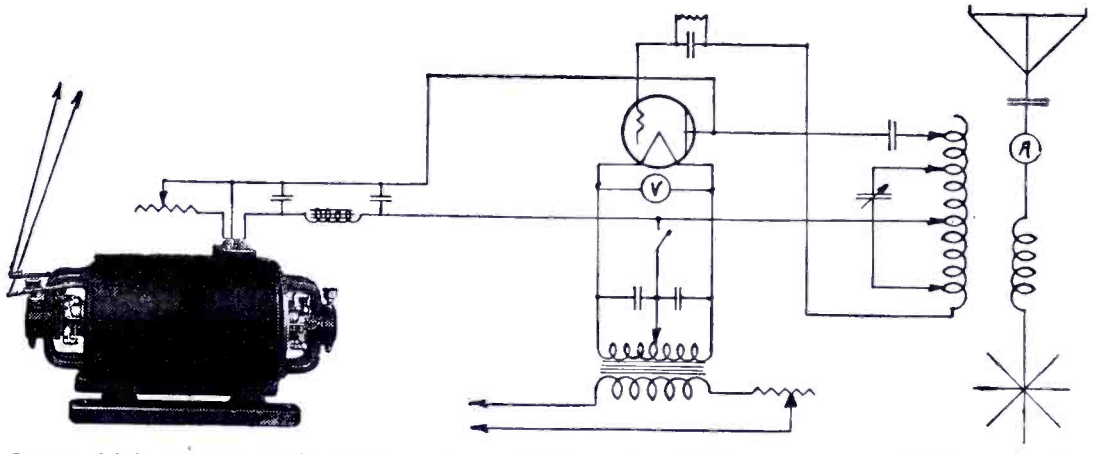
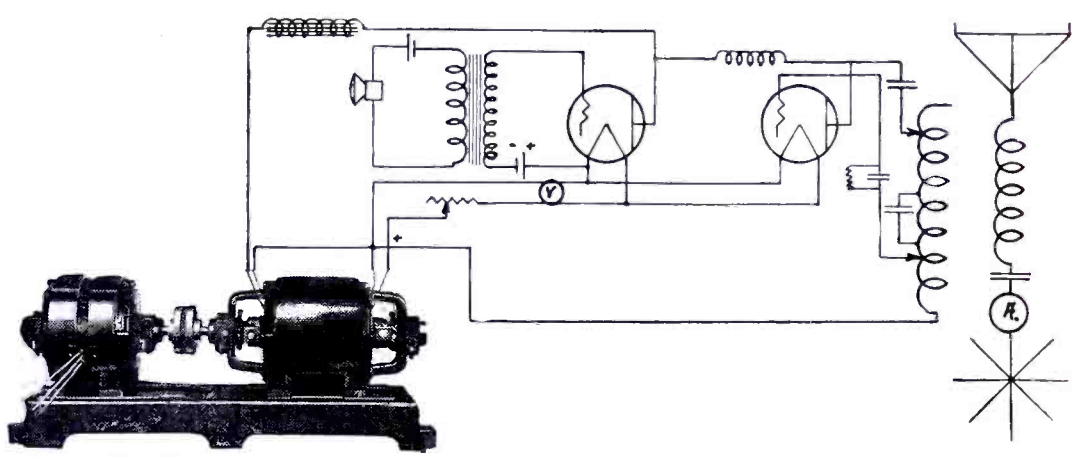


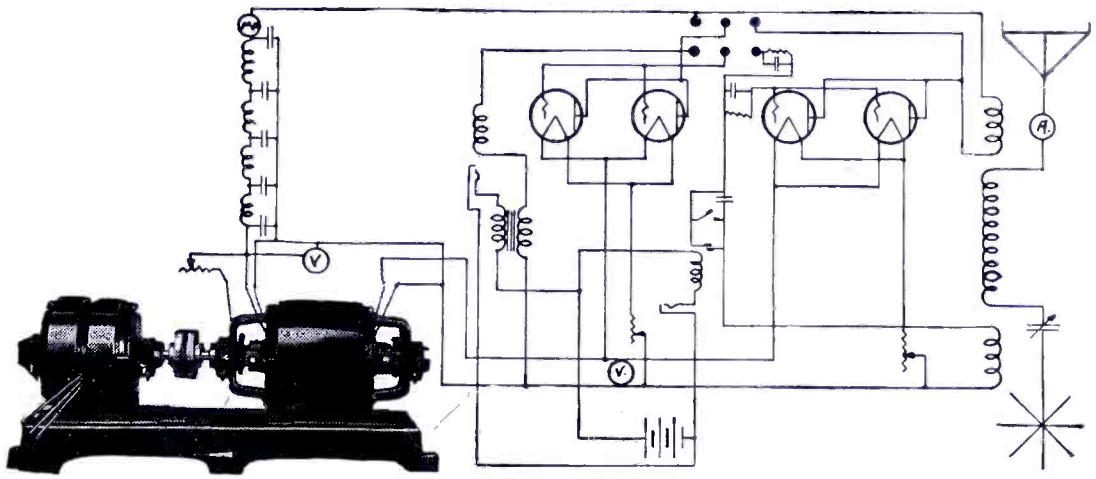
Figure 6. Pictorial wiring diagram of Type B Varion



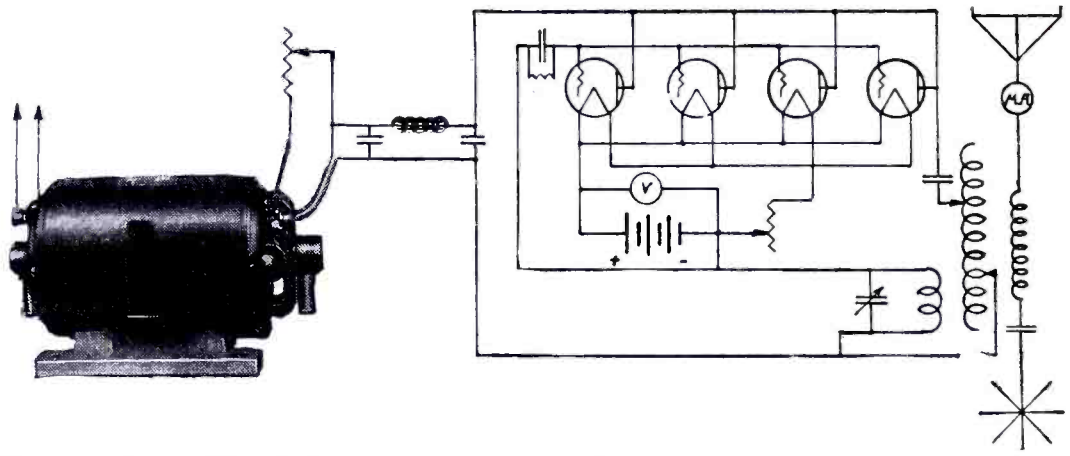
Item 11A, Type MG-343S output 1000 volts, 300 watts, an efficient and compact Power Supply for one or two 50 watters. This machine is built ruggedly yet designed to take a minimum of space. It is a machine that not only will stand the kicks of hard usage, but will also give your Station a kick that will turn the Q.R.Z.'s into Q.S.A.'s.



Item 35. Two unit four bearing set. Furnished with ring oiled or ball bearings. Motor to suit local supply. This "ESCO" set delivers 1000 volts, 300 watts for plate supply and 12 volts, 150 watts for filament supply. This set driving two 50 watters will make a good consistent station.



Item 37, 2 unit four bearing set, delivering 1000 volts, 600 watts for plate and 12 volts, 300 watts for filament. The "ESCO" Set is shown here furnishing Power Supply for 4—50 watters in a phone or telegraph set. This is the Item used by CBZ8 in pioneer achievement of the first two way amateur wireless communication between North and South America.



This is Item No. 8 furnishing Power Supply for 4/5 watters in the reversed feed back hook up.
Item 8 can be furnished with either AC or DC motors, or as a separate generator. The machine is two bearing, wick oil, and its output is conservatively rated at 500 volts, 150 watts. It's a real little maximum miles per watt DX getter.

MOTORS—DYNAMOTORS—GENERATORS—MOTOR-GENERATORS

ELECTRIC SPECIALTY COMPANY

TRADE **"ESCO"** MARK **267 South Street, Stamford, Conn., U. S. A.** TRADE **"ESCO"** MARK

Pioneers in Developing and Perfecting High Voltage Wireless Apparatus

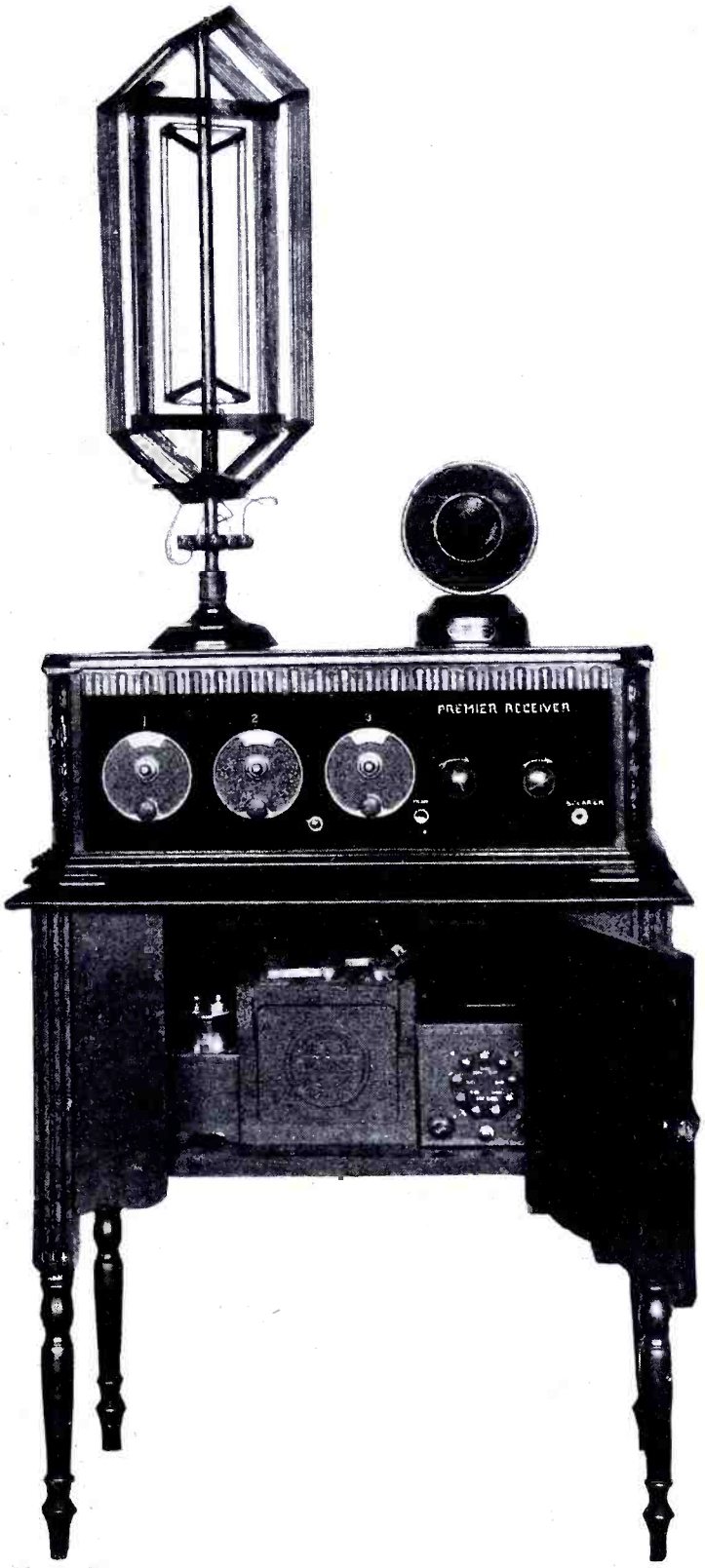
Review of Circuits

Announcing Our New Question and Answer Department

We receive thousands of questions yearly from our readers on every phase of Radio maintenance, construction and design. In order to handle this on an economical basis we are going to make a slight charge for this service. Our engineers will answer your questions under the following conditions:

1. Make your questions brief and to the point.
2. No more than four questions allowed to one person.
3. Write on one side of the paper in ink or on the typewriter.
4. Schematic wiring diagrams must be submitted on separate sheets.
5. We cannot answer questions free of charge. Send 25c in stamps or coin.
6. If your question requires considerable laboratory work or an unusual amount of time for research an extra charge will be made, but you will be informed of that charge.
7. Do not send us checks.

Avail yourself of this service. It is conducted to help You.



View of receiver mounted on table, with accessories

The Premier Five Tube Tuned Radio Frequency Receiver

(See Page 144 for diagram)

THERE is no doubt as to the efficiency of a tuned radio frequency receiver. The continued popularity of this type of circuit among the radio public serves well to show this fact. It is the aim of every prospective set builder to construct a receiver having good volume with excellent reproduction and is selective with a minimum number of controls.

The Premier Tuned Radio Frequency Receiver described herewith is a five tube set embodying all these good features and is extremely easy to assemble and hook-up. The majority of apparatus, as may be seen from the list of parts, is manufactured by the Premier Electric Company. The manufacture of parts is controlled from the raw material stage to the finished piece of apparatus, thereby assuring a product which is uniform in quality at all times. A very compact radio frequency transformer of the diamond weave type is used. It is only 3⅝-inches in diameter, has a very small field and a very low distributed capacity.

The sockets consist of a moulded bakelite frame of extremely small cross section and a highly nickeled metal collar for supporting the tube and holding the pin. The contact springs and lugs are of phosphor bronze, also nickeled and so arranged that capacity between them is negligible.

Excellent volume with reproduction of both upper and bass notes is due to the audio transformers. They are extremely compact pieces of apparatus and while only a fraction of the size of the best audio transformers, they equal them in efficiency.

Three major tuning controls are used in this receiver. They are each a .00025 mfd. variable condenser of straight frequency tuning characteristic. The rotor plates are concentric in shape and therefore balanced.

The circuit used is a standard tuned radio frequency hook-up with two stages of transformer coupled audio amplification and a novel method for controlling oscillations. This is accomplished by the insertion of a cam switch in the plate circuit of the first radio frequency transformer and varies the grid return of the second tube. This allows an instant control of oscillation as well as permitting broad or sharp tuning.

A long or short antenna or a loop may be used with this receiver. If a loop is used, the connection between the two loop binding posts on the receiver is removed. However, the connection must be in place when an antenna is used.

The first three tubes are regulated by two 6-ohm rheostats connected in series. This allows a very critical adjustment on both sides the radio frequency tubes and the detector, for the proper selectivity and volume. A ½ ampere resistor controls the two audio amplifiers. The proper "C" battery grid bias on the amplifier tubes is in proportion to the "B" voltage. 4½ volts "C" battery is sufficient for ninety volts and 7½ for 135. Using

a "C" battery is good practice, since it effects a considerable saving in "B" battery current as well as improving reproduction.

This receiver should give excellent reception at all times which under favorable conditions will be from coast to coast. Its selectivity is sharp enough to prove of value in those metropolitan districts like New York and Chicago, where the air congestion is quite severe.

List of Parts or their equivalent will give satisfactory results

1—7x24x3/16-inch Formica Panel
1—8x23x½-inch Wood Baseboard
3—Premier T.R.F. Transformers
3—Premier Crofoot .00035 mfd. Variable Condensers
3—Premier Vernier Dials
5—Premier No. 1 Sockets
1—Premier Fil. Sw. S-5
1—Premier No. 133 Jack
1—Premier No. 7 Cam Switch
2—Premier No. 104 Hegehog Audio Transformers
2—Premier No. 206 6-ohm Rheostats
1—Premier ½ Amp. Resistor
1—Premier .00025 Grid Condenser
1—Lynch 2 Megohm Grid Leaks
2—Premier No. 4 .0005 mfd. Fixed Condensers
12—XL Push Binding Posts
1—Sangamo 1 mfd. By-Pass Condenser
1 Package Kester Solder
3 Dozen Kellogg Tinned Soldering Lugs
1—Blackburn Ground Clamp
1—Acme Five Wire Cable Cord

A complete kit containing all necessary equipment for constructing an aerial may be purchased at most all first class radio stores. They are manufactured by Brach Manufacturing Company, Newark, N. J.

The accessories shown are:

Kodel Microphone Loud Speaker, manufactured by Kodel Radio Corp., Cincinnati, Ohio.

The Trickle Charger shown is by the same company.

One standard 6-volt Radio Battery is shown which is made by Willard Storage Battery Co., Cleveland, Ohio.

The Radio Table is one of the many models made by the Watsontown Table and Furniture Co., Watsontown, Pa.

Cabinet by D. H. Fritts Co., Hearst Square, Chicago.

This Receiver was designed for either loop aerial or outdoor antenna. The aero loop illustrated can be used in two ways, either as a straight loop using only the outside windings, or the antenna and ground can be connected to the small winding inside the loop and the outside terminals to the loop terminals of the receiver.

If volume is such that no outdoor aerial is needed, it is not necessary to use the antenna section of the loop, and if greater sensitivity is required, both antenna and loop can be used at the same time. Made by Utt-Williams Electrical Products Co., Santa Ana, Cal.

The "B" Battery Eliminator shown will supply all necessary voltage to detector and amplifier circuits. Manufactured by De Witt La France Co., Cambridge, Mass.

(If further information is desired regarding any accessories listed it will be supplied by the manufacturers if you will address them direct.)

The Thordarson Power Amplifier and "B" Elminator

(See Page 146 for diagram)

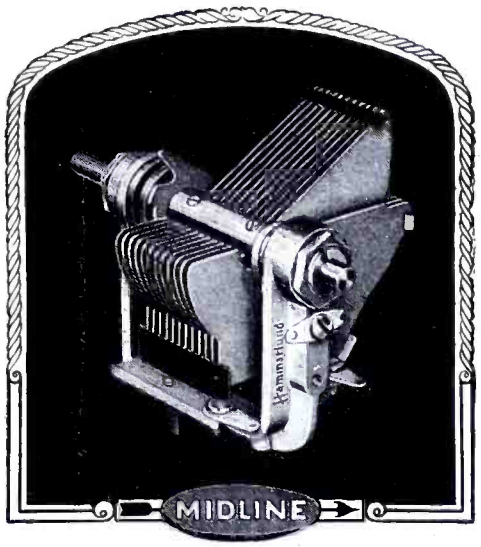
POWER amplification is the increase of the strength of radio reception, without distortion, through the use of larger capacity tubes, capable of handling many times the volume of the tubes ordinarily employed.

"But," you may say, "my set has plenty of volume as it is,—more, in fact, than I can listen to in comfort; and the quality is excellent." Power amplification has a much more important function than

HAMMARLUND QUALITY PRODUCTS
Simplify Your Radio Problems

"Quality" is the most potent word in radio parlance. Quality parts will often improve a poor circuit, but poor parts will inevitably prevent a good circuit from doing its best.

Sixteen years' experience is back of Hammarlund Quality Products. Radio experts concede them to be unsurpassed in design, workmanship and efficiency. Their world-wide reputation is your safeguard.



Avoids Crowding at Any Part of the Scale

Hammarlund "Midline" Condensers are made in six standard capacities for the broadcast and short-wave bands. .0001 to .0005 mfd. Price, $4.25 to $5.00. Also dual and triple models in tandem. $7 to $12.

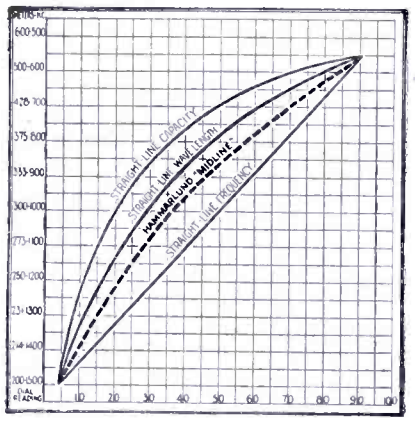
"Hammarlund, Jr." *(Midget)*

A high ratio, shielded midget condenser with all the distinctive earmarks of Hammarlund design and workmanship. Many uses are shown in circulars packed with each condenser. Made in four sizes: 16, 32, 50 and 75 mmfd. Price, $1.80 to $2.00.

Space-wound Coils

Hammarlund Coils give extreme sensitivity and sharp tuning, owing to their space-winding on a mere film of dielectric material. Distributed capacity and resistance are at a minimum. Short-circuits are impossible. Made in styles and sizes for all standard circuits, *including short wave*. Prices on application.

Hammarlund's New Creation
The "MIDLINE" Condenser



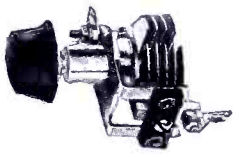
"Straight-line-Capacity" crowded the low waves; "Straight-line-Frequency" crowded the high waves; "Straight-line-Wave-Length" merely compromised between the two. But the Hammarlund "Midline" retains the important advantages of these earlier types, without any of their disadvantages.

The new Hammarlund "MIDLINE" Condenser makes its bow with the claim of superiority over any other type ever produced.

Experience (yours and ours) is responsible for its many excellent features.

All of the tried and true Hammarlund principles are included: soldered, non-corrosive, brass plates with tie-bars; rib-reinforced aluminum alloy frame; minimum dielectric; one-hole mounting with anchoring screw; bronze clockspring pigtail; friction brake. *In addition, there have been added ball and cone bearings, and a full-floating rotor shaft. This shaft supports no weight; it may be entirely removed and a longer shaft inserted for coupling to other condensers in tandem, or for mounting a variable primary coil.*

The "Midline" is much more compact and even stronger than previous Hammarlund Models. It is built for a long life and a happy one.



The New "Verni-tune" Dial

An unusually attractive and efficient dial. Four inches in diameter: 10 to 1 ratio. Turns full 180 degrees in either direction. Molded bakelite with black satin finish. Adjustable, brass friction mechanism. No gears. No backlash. An exclusive and important feature is the bakelite sleeve over the main rotor shaft, which completely shields the shaft from detuning effects by contact with the hand. Price $2.50.

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merely to increase volume. It gives the set power to reproduce the heavier tones and overtones which cannot find release, even at moderate volume, through the customary method of amplification. Power amplification gives radio reproduction the fullness of a third dimension, reproducing every sound from the highest treble to the deepest bass of the broadcast program with almost unbelievable realism.

If driving a car were narrowed down to moving smoothly along a level paved road at a speed of not more than thirty miles an hour we could get along with much less power than the average car possesses. But there are times when we need a good pick-up, there are occasional steep hills and mud holes or sand pits that require many times the power used in the normal run. We do not make a practice of traveling through traffic at 60 miles an hour, but there are times when we need that power.

If radio reception were put to no greater task than reproducing the music of the violin, power amplification would be unnecessary. There are times, however, when broadcast reproduction demands many times the power consumed in duplicating the music of the original violin.

It is not difficult to appreciate the fact that the beat of a drum or the deep vibrations of the pedal diapason of the organ require a much greater expenditure of *mechanical* energy than does the bowing of a violin or the playing of a flute. Likewise it is easy to understand that the consumption of *electrical* energy must be proportionate to the mechanical energy expanded. A radio tube with the capacity just sufficient to amplify comfortably the music of a violin cannot be expected to do justice to the tones of the heavier bass instruments.

The development of the UX-210 power amplifying tube has meant much in the advancement of quality reproduction. The standard amplifying tubes in common use today—the UX-201-A and CX-301-A—have a maximum undistorted power output of .015 watts when operated at the normal of 90 volts on the plate. The undistorted power output of the power tubes mentioned above is much greater,—measuring 1.54 watts, or more than 100 times the output of the ordinary amplifying tube. This is sufficient to amplify the music of any broadcast program without tube distortion or sacrifice of bass notes.

A tube producing so much power necessitates the use of more power to operate it. These power tubes require the special voltages of 7½ on the filament and 425 on the plate for maximum results. Batteries, to supply the current of proper values, would be so costly, inconvenient, and bulky as to make their use prohibitive. The Thordarson power supply transformer R-198 furnishes the proper values of current for both plate and filament of this power tube.

The current for the plate is rectified from A.C. to D.C. through the radiotron UX-216-B tube designed for this purpose, after which it is "ironed out" through the usual filter circuit of condensers and chokes.

One very convenient feature of the Thordarson power amplifier is the use of the voltage regulator tube, UX-874 which eliminates all controls, making manual voltage regulation unnecessary. This makes it possible to put the amplifier in the battery compartment, out of the way.

In addition to serving as the supply for the power tube, the complete assembly shown in sketch (G) also provides the proper values of B-voltage to take care of the needs of the entire receiver, furnishing 45 volts for the plate of the detector tube and 90 volts for the stages of ordinary amplification. This B-elimination feature operates, as does the amplifier itself, with no internal hum or other noises. It would be well for the man contemplating the construction or purchase of a B-eliminator alone to bear in mind the great advantage of the combination of power amplification with B-elimination which this circuit affords him at but a slight increase in cost.

1—Thordarson Power Supply Transformer (R-198)
2—Thordarson Chokes, 30 henries (R-196)
3—2 mfd. high voltage condensers. (Not less than 400 volts normal load and 1500 volts D.C. flash test)
2—1 mfd. condensers (standard by-pass type)
1—4 mfd. condenser (standard by-pass type). (Use either Potter Tobe, or Dubilier)
1—8000-ohm resistor (capacity to carry 40 milliamperes. Ward Leonard)
2—Tobe 10,000-ohm resistors (grid leak type)
1—1,000 ohm resistor (capacity to carry 25 M. A. current).

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1—U. X. 216-B or C. X. 316-B rectifying tube.
1—U. X. 874 or C. X. 374 voltage regulator tube.
2—Standard tube sockets.
1—Thordarson R-200 Amplifying Transformer.
1—Thordarson Choke, 30 henries (R-196)
1—2 Mfd. high voltage condenser (same specifications as above).
1—U. X. 210 or C. X. 310 power amplifying tube.
1—Standard tube socket.

Caution.—Before laying out your apparatus or beginning your wiring remember that you are dealing with alternating current voltages up to 500,—strong enough to give a very uncomfortable shock to the unwary. Use rubber covered wire or bus bar wire covered with rubber tubing when connecting up the amplifier.

Where space permits we recommend following the layout of the accompanying sketch. If space for this arrangement is not available, much room may be saved by mounting the condensers under the chokes. The three high voltage condensers of the power supply may be placed side by side with their cases touching. If all four high voltage condensers are grouped together, or if the apparatus is mounted on a metal base plate, insulate the case of the condenser of the power amplifier from the cases of the other high voltage condensers. The purpose of this is to prevent the 60-cycle hum of the light circuit from being inducted into the power amplifier itself.

To further prevent any inductive pick-up in the power amplification stage, it is advisable to twist the 7½ volt filament leads of the U. X. 210 and the U. X. 216-B tubes. These are the leads extending from either end of the transformer (R-198).

The 8,000-ohm resistor between the (power) B tap and the 90 v. B tap should always have a capacity of not less than 15 watts continuous duty rating. The Ward Leonard Company make such a resistor which mounts conveniently into a standard electric lamp socket.

The 10,00-ohm resistor, designated as No. 1, is of the proper value for supplying one tube (detector) with 45 volts on the plate. If value for supplying one tube (detector) with 45 volts on the plate. If 45 volts B-supply is desired for more than one tube, it is necessary to decrease the resistance with the increase in the number of tubes used. Some sets, particularly superheterodynes, use 45 volts as the B-supply for five and six tubes. In this case, a 2,000 resistor should be used as No. 1.

The assembly of the Thordarson Power Amplifier and B-supply is simple. The only tools necessary are a soldering iron, a pair of pliers, a screw-driver and a small drill. Following the above instructions, and using quality apparatus, you will be able to build this amplifier in an evening's time—and at last you will realize full reproduction.

The Camfield Duodyne Circuit

(See Page 150 for diagram)

IN ORDER to understand the method used in the Duodyne Circuit to prevent oscillation, we must first make a brief survey of the causes of oscillation in a tuned radio frequency amplifier.

Oscillation in a tuned radio frequency amplifier is caused by coupling between the plate or output circuit of the tube and the grid or input circuit. One or more of the following forms of coupling are always inherent to some degree in tuned radio frequency amplifier circuits:

First—Inductive coupling between the windings of interstage radio frequency transformers.

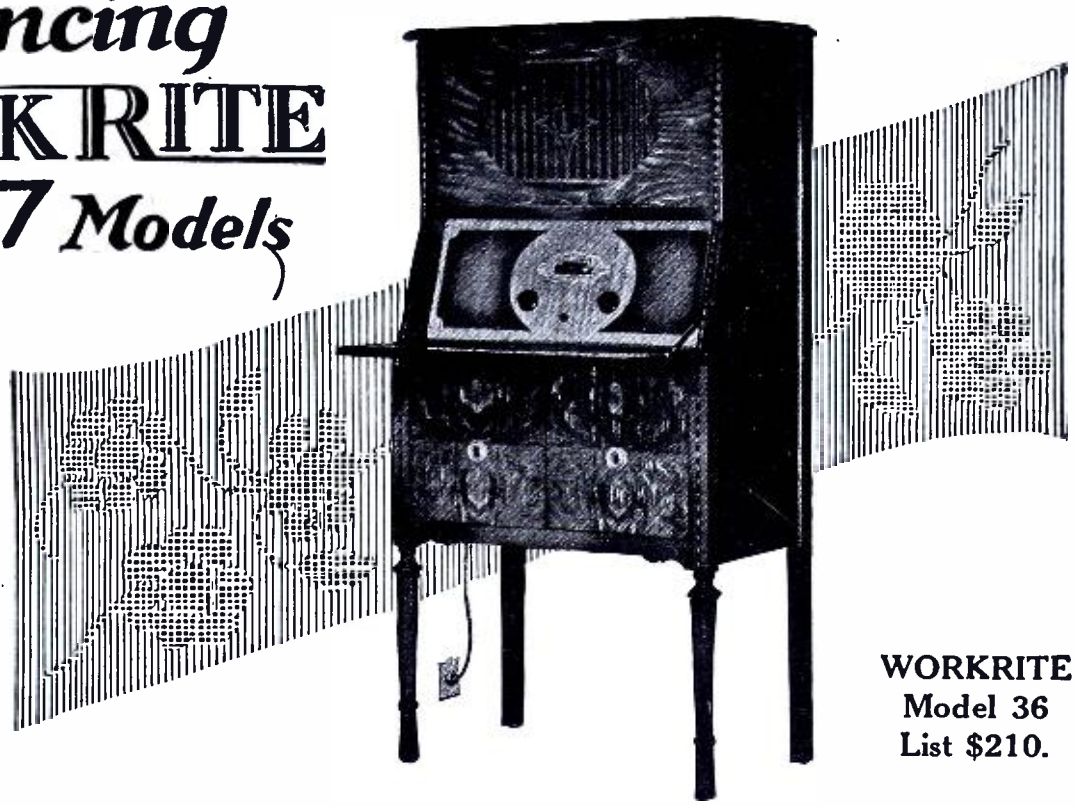
Second—Capacity and conductive coupling in the wiring of the set.

Third—Capacity coupling between the two circuits due to the capacity between the grid and plate of the vacuum tube.

The first and second causes of oscillation are comparatively easy to eliminate. The Camfield Duoformer has been designed to minimize its effective external magnetic field. Thus, when three of these transformers are used in a set, magnetic coupling between them is negligible.

The second cause of oscillation may be eliminated by the proper arrangement of parts and wires in the set and the proper use of by-pass condensers. This has been done in the set lay-out recom-

Announcing WORKRITE 1927 Models



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List $210.

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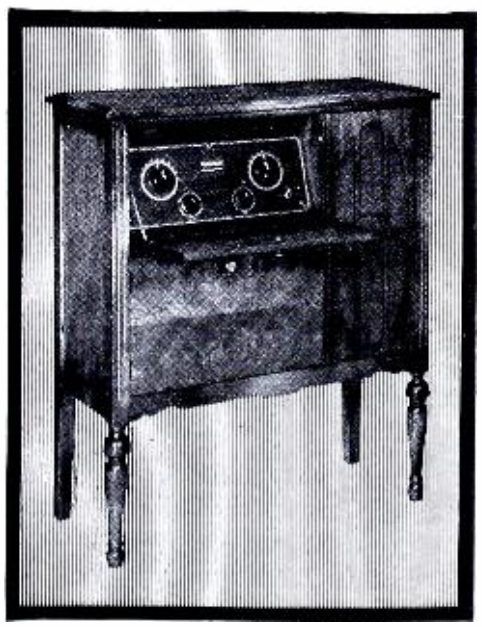
WORKRITE MODEL 16
6 tubes — 2 controls, no verniers necessary. Walnut Cabinet with panel and dials to match, gold trimmed. List Price, $80.00.



WORKRITE MODEL 26
Same chassis as above mounted on a small floor console with high grade loud speaker enclosed. List Price, $145.00.

Licensed by Independent Radio Manufacturers, Inc. Reg. U.S. Pat. Off. NEUTRODYNE Reg. U.S. Pat. Off. Pat. March 27 1923 and April 1, 1924. Signalling Pats. Nos. 1,450,080 and 1,480,228 Other Patents Pending.

All models use six tubes—two stages radio, detector, one stage transformer coupled and two stages resistance coupled audio. Three way switch giving "Off, Soft, Loud," straight line broadcast condensers, battery cable and cabled wiring, beautiful cabinets and panels, gold trimmings, wired for new power tubes using batteries or power unit supply from electric light socket. One or two dial control of new design.

WorkRite Super Neutrodyne radio sets are made and sold by a conservative, well financed company. You won't have an orphan set if you buy a WorkRite.

Because of long radio manufacturing experience, WorkRite radios are manufactured on a standardized economical basis. That's why they can be sold at these remarkably low prices.

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1827 E. 30th St. **Cleveland, Ohio**

WORKRITE
SUPER NEUTRODYNE RADIO SETS

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

mended for the Camfield Duoformer, and for this reason it is advocated that the builder of a set using these coils follow our detailed instructions as closely as possible.

The third cause of oscillation, that is, the grid plate capacity of the vacuum tube, cannot be eliminated without entirely changing the design of the tube itself, and it is doubtful whether or not a tube designed with a sufficiently low grid to plate capacity would be efficient in other respects.

In the past few years, several methods of compensating for the energy fed back from the plate circuit to the grid circuit through the tube capacity have been developed. The most noteworthy of these is the use of some means to feed back additional energy from the plate circuit to the grid circuit in such a manner that it is out of phase with the energy fed back through the tube, thus preventing oscillation. Several different ways of doing this are in use today, and some of them unquestionably have a great deal

View showing receiver mounted in cabinet, with accessories

of merit. However, this system has several disadvantages, principal among them being that the means of feeding back compensating energy is often very critical in its adjustment, and that circuits using it are not equally efficient over the full range of wave lengths.

Another means of preventing oscillation in general use today is to place a resistance or in some other manner to introduce a loss in the grid circuit of the tube. It is very easy to prevent oscillations in this manner, but at the expense of decreasing the sensitivity of the circuit and broadening its tuning.

Some set and part manufacturers prevent oscillation by using tuned radio frequency transformers of very low efficiency, so that the over-all gain in each stage of the radio frequency amplifier is so low that oscillation are not produced. This is generally accomplished by making the primary inductance so small that the proper degree of coupling between the primary and secondary is not obtained. Practically all transformers that do not necessitate the use of some form of compensating feed-back or resistance in the grid circuit are made in this manner. They usually have the characteristic of being fairly efficient on the low wave lengths and inefficient on the upper range of the broadcasting scale.

In support of this comparatively inefficient type of transformer, some manufacturers and technical writers have made the radical statement that the minute capacity between the grid and plate of a tube does not cause a sufficient transfer of energy to produce oscillation. They claim that oscillations are caused entirely by

Whatever set you build, remember this—

There are many makes of every part specified. Your set will receive, after a fashion, with whatever parts you use—within reason. Experienced amateurs know that there is usually **one outstanding** make in each group of parts that gives the best results. Often the best make costs no more—sometimes **less** than the other kinds. This holds true particularly of insulation parts—panels, dials, sockets, coil forms, etc. The man who uses RADION gets what he goes after—true insulation—that gives adequate protection to the circuit.

RADION

RADION is a material **entirely different** from the ordinary insulation, notwithstanding that all insulating materials look more or less alike.

Electrical tests immediately establish its superiority. RADION has

1—The lowest angle phase difference
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3—The highest resistivity
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It is more beautifully finished and is easiest to work with home tools

RADION PANELS made in a full range of standard sizes to fit any regular type set. In black or mahoganite, beautifully finished.

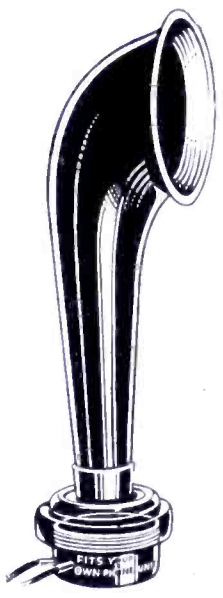
3/16x7x10 in.	3/16x7x14 in.	3/16x7x21 in.	3/16x7x26 in.
3/16x7x12 in.	3/16x7x18 in.	3/16x7x24 in.	3/16x7x30 in.

RADION DIALS

Regular sizes 2, 2½, 3 and 4 inch diameter, black and mahoganite to match Radion Panels fitted with set screw and bushing.

RADION SOCKETS

made to take new UX tubes or with collar (as shown) to fit old type of UV tubes as well.



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coupling between transformers and couplings in the wiring, and that it can be overcome by the use of closed-field transformers. This, however, is not the case. Feed-back due to tube capacity does exist in all well-designed radio frequency amplifiers and must be compensated for if the circuit is to be prevented from oscillating. To substantiate this, we quote the following statement from "Principles of Radio Communications," by J. H. Morecroit, chapter six, page 432:

"It would seem as though the capacity (electrostatic) of a vacuum tube is so small as to be negligible, but such is far from the truth. The internal capacity of a tube may have very great effect on its operations, especially at high frequency."

In designing the Duodyne Circuit, the engineers of the Camfield Radio Manufacturing Company fully recognize the existence of feed-back through the tube capacity and the necessity of compensating for it in order to prevent oscillations when all stages of radio frequency amplifiers are tuned to resonance. Not satisfied with the means previously employed, which either resulted in inefficient operation or in the necessity of making critical internal adjustments, our engineers worked along an entirely new line.

Under the usual conditions existing in tuned radio frequency amplifiers, the currents fed back from the plate circuit to the grid circuit through the tube capacity are of such phase as to add to the voltage already existing between the grid and filament of the tube, and therefore cause oscillation. It obviously follows that if the right phase relation is obtained between the current fed back through the tube and the current existing in the grid circuit, oscillation would not be caused.

It is well known that the phase relation between current and voltage in any circuit or group of circuits depends upon the relative constants of such circuits, namely, the inductance, the resistance and the capacity. In the case of transformers, the mutual inductance and the distributed capacity between the primary and the secondary must also be taken into consideration.

In designing the Duoformer, our engineers arranged the relative proportion of all of the constants, mentioned above, in such a manner that the current fed back from the plate to the grid circuit of the tube used in connection with these transformers would be in the proper phase relation with the current in the grid circuit to prevent oscillations.

This feature, combined with the physical design of the Duoformer Coils, which practically eliminates all electro-magnetic coupling between successive stages, and a circuit design embodying the proper use of by-pass condensers, makes it possible to build a five-tubed tuned radio frequency set that is extremely simple to construct, and that has a high and uniform efficiency over the entire range of broadcast wave lengths.

LIST OF PARTS

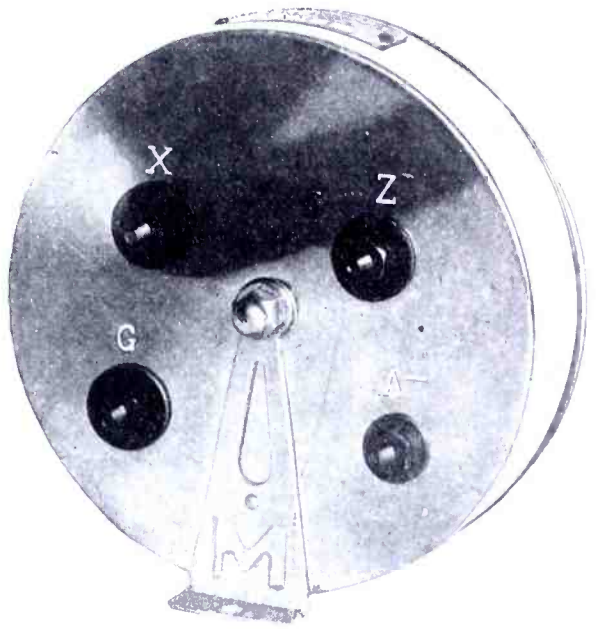
These parts or their equivalent will give satisfactory results.

1—7x24x3/16-inch Radion Panel
1—8x23x½-inch Wood Baseboard
3—Radion Dials
3—Camfield Duoformers
1—Kurz Kasch 10-ohm Rheostat
1—Kurz Kasch 25-ohm Rheostat
1—Brach 4-ohm Fixed Resistance
1—Brach 2-ohm Fixed Resistance
3—Wirt .00035 mfd. Variable Condensers
1—Micamold .00025 Grid Condenser
1—Micamold 2-meg. Grid Leak
1—Micamold .00025 Fixed Condenser
2—Micamold .002 Fixed Condensers
1—Allen Bradley Filament Switch
1—Carter No. 3 Jack Switch
1—Carter No. 103 Jack
1—Carter No. 102A Jack
2—National Audio Transformers
9—Eby Binding Posts
1 Package Kester Solder
50 Feet Belden Wire
1—Blackburn Ground Clamp

CHI-RAD

Parts for the Madison-Moore Receiver Described in This Issue of Call Book

			List Price
Variable Condensers	2	No. 192-E Cardwell	$ 10.00
Panel	1	7x24x3/16 Formica	3.36
Sub-panel	1	7x23x3/16 Formica	3.36
Transformers	5	MM—Madison Moore	62.50
Transformers	2	Thordarson No. R-200	16.00
Sockets	8	No. 9040 Benjamin	6.00
Brackets	2	No. 8629 Benjamin	.70
Binding Posts	7	Engraved Eby	1.05
Rheostats	1	No. 120-K Yaxley	1.35
Rheostats	1	No. 140-K Yaxley	1.35
Rheostats	1	No. 199-K Yaxley	1.35
Resistance	1	Fixed 40 ohm Yaxley	.50
Resistance	1	Fixed 10 ohm Yaxley	.50
Resistance	1	Fixed 15 ohm Yaxley	.50
Voltmeter	1	No. 506 0-5 volt Weston	7.00
Dials	2	Type B National	5.00
Knob	1	1½" Kurz-Kasch	.20
Jack	1	Open circuit Yaxely	.50
Multi-plug	1	Connector plug Yaxley	3.50
Condenser	1	Fixed .00025 with clips Sangamo	.50
Condenser	1	Fixed .005 Sangamo	.70
Condenser	1	Fixed 1 mfd. Sangamo	1.25
Grid Leak	1	Loewe Tipon, Deutschman 2 meg	.50
Solder	1	Can Kester	.25
Wire	50 ft.	Hookup Belden Tinned No. 14	.50
			$128.42



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We Make a Specialty of Short Wave Transmitting and Receiving Equipment

Parts for the Thordarson 400 Volt B Eliminator and Power Amplifier

(See "Radio Age" for September)

1. Daven Mountings	4	No. 50 Daven	$0.35	$ 1.40
2. Transformer	1	No. R-193		12.00
3. Chokes	2	No. R-196	5.00	10.00
4. Sockets	2	Frost	.40	.80
5. Condensers	3	Tobe Power Pack No. 602	4.00	12.00
6. Condensers	2	Tobe By-Pass No. 201 1 mfd.	.90	1.80
7. Condensers	1	Tobe By-Pass No. 204 4 mfd.	3.50	3.50
8. Resistance	1	1,000 ohm Aerovox		1.00
9. Resistance	1	8,000 ohm Ward-Leonard		4.00
10. Resistance	2	10,000 ohm Aerovox		2.00
				$48.50
		For Power Amplifier		
11. Choke Coil	1	No. R-196 Thordarson		$5.00
12. Transformer	1	No. R-200 Thordarson		8.00
13. Condenser	1	No. 302 Tobe 2 mfd.		1.75
14. Tube Socket	1	Frost		.40 15.15
				$63.65

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A complete kit containing all necessary equipment for constructing an aerial may be purchased at almost all first-class radio stores.

They are manufactured by Brach Manufacturing Company, Newark, N. J.

The accessories shown are: one 6-volt Standard Radio Battery made by Willard Storage Battery Co., Cleveland, Ohio.

A Westinghouse Tungar Charger is shown which will keep the "A" battery charged. This is made by Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa.

The new Pacent "B" Battery Eliminator and Power Amplifier will supply all necessary voltages to both detector and amplifier circuits and permits a wonderful range in the power circuit from a whisper to a roar. It is compact, 8x8x10, and weighs only 32 pounds. Made by Pacent Radio Corporation, 156 W. 16th Street, New York City.

The cabinet is by D. H. Fritts Co., Hearst Square, Chicago.

The speaker is the neat appearing Rola Re-Creator Cone Type, made by Rola Radio Co., Oakland, Calif.

The table is by United Cabinet Mfg. Co., Chicago. There is ample room in bottom of table to place all necessary accessories, and a panel covers them completely when in place.

(If any further information is desired regarding accessories please write manufacturers direct.)

A Single Control Tuned Radio Frequency Receiver Using New Design of Gang Condenser

(See Page 154 for diagram)

NUMEROUS tuned radio frequency receivers have appeared from time to time endeavoring to reduce the number of tuning controls to a minimum. Various methods have been devised by which this end has been attained, the underlying principle being the mechanical coupling of the tuning condensers so that they operated as one unit. Invariably the amount of backlash and lost motion present, as well as the difficulty of properly adjusting each condenser for maximum selec-

tivity, was of such serious consequence that the fullest degree of efficiency and versatility of control could not be realized.

In view of this fact a new type of gang condenser has been designed which is extremely well constructed electrically and very clever in mechanical design.

It consists of three modified straight frequency variable condensers mounted on a metal chassis. Located between the first and second condensers are three dials, with corrugated peripheries, provision being made for the insertion of graduated strips so that loggings may be marked. The construction is such that any one condenser may be rotated independently of another by turning the proper dial, yet used as a single dial at will.

Contrary to regular practice, the unit is mounted with its axis of rotation parallel to the baseboard and panel. The dials appear through a window in the panel and the operator places three fingers of one hand on the three discs which are grooved to fit the fingers. By a downward or upward movement, either one, two or all three of the dials may be rotated.

The circuit used in this receiver consists of two stages of tuned radio frequency detector and two stages of transformer coupled audio frequency amplification.

The radio frequency unit consists of a shielded antenna coil and two shielded radio frequency transformers. The coils are of a solenoid construction and are provided with an arrangement similar to a tube by which they may be plugged into a socket. Compact arrangement of parts is possible and advised, since the burnished copper shield covers the coils and prevents interstage coupling as well as keeps out strays.

The detector amplifier unit is also very compact. Two very efficient audio transformers, capable of excellent volume with the reproduction of both the upper and lower audible frequencies, are used.

The two radio frequency tubes are controlled by a 10 ohm rheostat, the detector by a 25 ohm rheostat, and the two audio tubes by a 2 ohm fixed resistance. A 500,000 ohm variable resistance is in series with the 67½ volt lead running to the two radio frequency transformers. This acts as a very efficient volume control and also prevents undesirable oscillations in the radio frequency circuits.

UX sockets of an extremely well make cushion type are used throughout the receiver. Both the shielded coils and the tubes are mounted on them.

The two units are connected together electrically by the two sets of four binding posts on each unit. The two Lastite connectors are for a 4½ volt "C" battery.

Either a long or short antenna may be used with this receiver. A .0001 mfd. condenser in the antenna circuit automatically increases the selectivity of the receiver if the antenna is too long.

The low distributed capacity and negligible resistance of the parts used in this receiver make it very sharp in tuning. It cannot pick up undesirable signals, since the shielding of the coils nullifies and stray currents which may arise.

The accessories shown are:

Kodel "A" power plant which operates direct from A.C. house light socket. Manufactured by Kodel Radio Corp., Cincinnati, Ohio.

The new Valley "B" Eliminator operates from any convenient house light socket and will deliver all necessary voltages for detector and amplifier circuits. Made by Valley Electric Co., St. Louis, Mo.

A Standard Utah Loud Speaker is shown which is manufactured by Utah Radio Products Corp., Chicago.

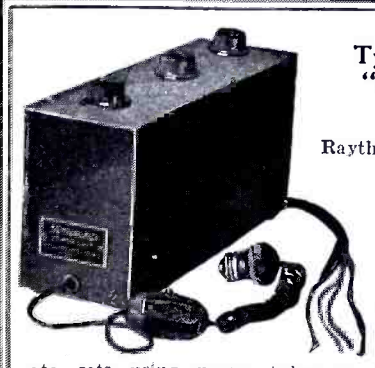
The Radio Table is made by the United Cabinet & Mfg. Co., Chicago, and has ample room to store all accessories.

(If further information is desired regarding any accessories shown it will be supplied by manufacturers if you will address them direct.)

List of Parts or their equivalent will give satisfactory results

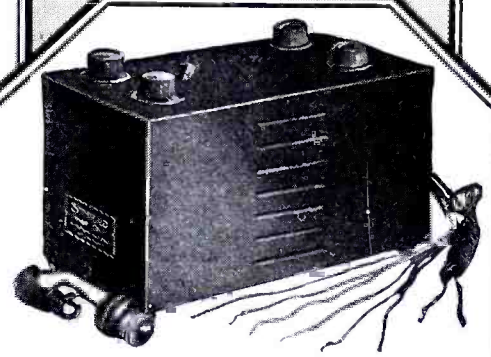
1—7x18x3/16-inch Panel
1—7x12x3/16-inch Panel
1—Alden Localized Control

STORAD
Radio Power Supply



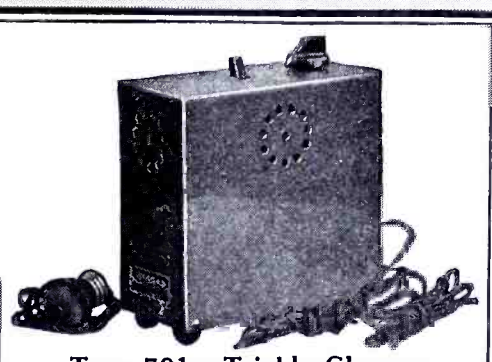
Type 101—"B" Power Supply

Raytheon Tube Type Unit. Surplus capacity. Storad special transformers and filter. Tobe Deutchman heavy duty condensers. Will operate sets using power tubes on last audio stage. 3 variable controls from 180 volts down. Operates on house lighting circuit.



Type 201—"B" Power Supply and Trickle Charger

Raytheon Tube Type "B" Power Unit—high capacity, with a bulb type Trickle Charger for A Storage Battery. Storad Special transformers and filter. Tobe Deutchman heavy duty condenser. Operated from 1 switch which turns off switch and B supply and turns on Trickle Charger. Charging current ½ of 1 amp. 4 variable controls.



Type 701—Trickle Charger

Sufficient capacity for A batteries used with larger sets. Switch turns on charger when set is turned off. Charging current ½ of 1 amp. Variable control regulates charging current.

Eliminators-Chargers and Storage "A" and "B" Batteries

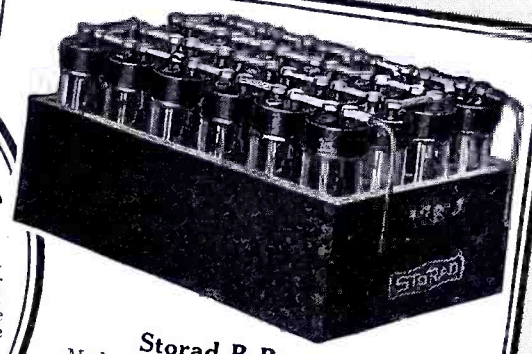
TYPE 501—Storad Combination Power Amplifier and B Power Supply

gives undistorted quality and large volume. The B Power Supply is from a Raytheon Tube Type Unit of large capacity. Built with Storad Special Transformer and Filter, and Tobe Deutchman Heavy Duty Condensers. Variable controls from 180 volts down.

Storad A Battery

Rubber case. Non-corroding rubber terminal nuts. Made in three sizes.

R3— 60 amp. hr.
R4— 80 amp. hr.
R5—100 amp. hr.



Storad B Battery

Made in two sizes, No. 4548, 4500 milleamp hr. 48 volt, No. 4524, 4500 milleamp hr. 24 volt.

Ask your dealer about these Storad Units. Complete descriptive literature sent on request

THE STORAD MANUFACTURING CO.

2411 Detroit Avenue **Cleveland, Ohio**

5—Alden UX Cushion Sockets
3—Welty Shielded Radio Frequency Coils
2—Welty Audio Transformers
1—Carter No. 101 Jack
1—Carter 10 ohm Rheostat
1—Carter 25 ohm Rheostat
1—Carter Hy ohm Resistance
1—Carter 2 ohm Fixed Resistance
1—Carter Fil. Sw.
1—Micamold 2 megohm Grid Leak
1—Micamold .00025 mfd. Grid Condenser
1—Micamold .001 mfd. Fixed Condenser
1—Micamold .0001 mfd. By-Pass Condenser
1—Sangamo 1 mfd. By-Pass Condenser.
17—XL Push Type Binding Posts
2—Lastite "C" Battery Terminals
1 Package Kester Solder
1—Blackburn Ground Clamp
Miscellaneous Wire, Lugs, Screws, etc.

A complete kit containing all necessary equipment for constructing an antenna may be purchased at all first class radio stores. They are manufactured by Brach Manufacturing Co., Newark, N. J.

The All-American Tuned Radio Frequency Receiver Using Toroid Coils

(See page 156 for diagram)

MANY home builders of radio receivers have expressed a desire to construct a set identical to one built in a factory. The receiver described herewith is the counterpart of the All-American Model R Receiver, with one or two changes made in order to make it practicable for the home builder.

A set made up following the diagram, accurately and properly wired with the parts named, should perform in every way as well as the actual manufactured receiver. The circuit is a standard tuned radio frequency tuner with a new design of audio amplification using a transformer and two impedance units.

The unusual clean-cut appearance of the set is largely due to the use of toroid coils and tube sockets of a type well suited to it. That is, the sockets are of a type such that the binding posts may be inverted so as to bring the lead under the sub-panel, and in this way all of the filament wiring is brought out of sight. The binding posts on the coils are set very low, so that they are easily reached by short leads through the holes in the sub-panel.

The new method of audio amplification is the result of considerable experimentation in the laboratories of the All-American Radio Corporation. Being a successful combination of both transformer and impedance coupled radio amplification, it retains the advantages of both and eliminates their weaknesses. The system consists of a Rauland Lyric transformer for the first stage, a Rauland-Trio Type R-300 impedance for the second stage, and a Rauland-Trio Type R310 impedance for the third stage. The impedance units are triple feature instruments containing an inductance, a capacity and a resistance in one compact piece of apparatus.

This system of amplification gives a very faithful reproduction of both voice and music with excellent volume when a good quality of disc speaker is used.

A 10 ohm rheostat controls both radio frequency tubes, a 25 ohm rheostat the detector and each of the first two audio tubes by a 4 ohm fixed resistance. The last audio tube has a 2 ohm fixed resistance in the filament lead to regulate it. 201A tubes are used throughout the receiver with the exception of the last stage of audio. Here a UX112 power tube is used. Either the old navy base type or the new UX base tubes may be used, since the socket will take either.

NEW CONSOLE MODEL

BANK FIAT WOUND LOOP

"Remarkable Efficiency Combined with Unusual Beauty"

Sells on sight. Makes good in use. Quick turnover. Good profits. Satisfied fans. Everybody happy.

New Fiat an ornament to any set. In harmony with finest surroundings anywhere.

Made of solid American Walnut, with natural lacquer finish hand rubbed.

Easily erected by simply inserting center support in pedestal and turning until wires are taut. Reverse process as quickly takes it down.

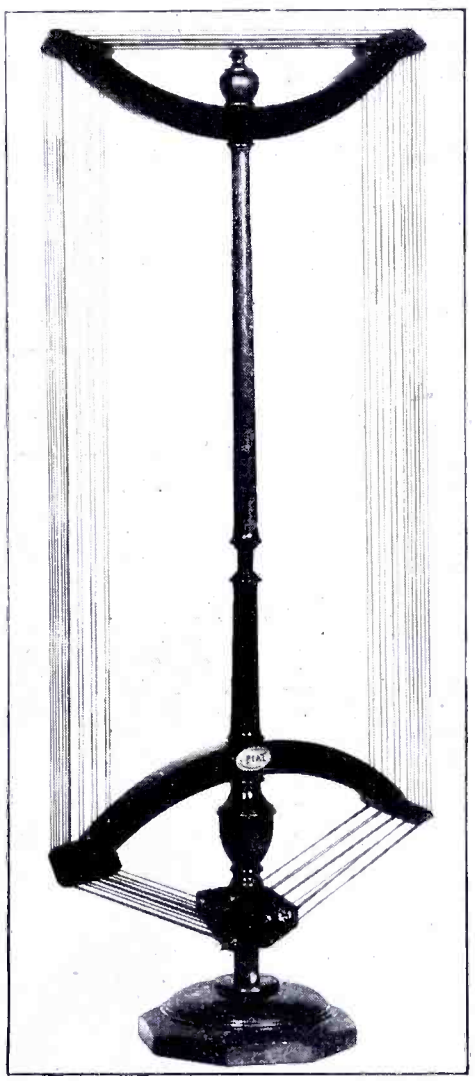
Size erected—13½" wide by 30" high. Turns on 7" radius.

Individual package—12"x14"x4½".

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

The Fiat is specified with St. James, Madison-Moore and other Super-Heterodyne sets. (See articles in September, 1926, issue Citizen's Radio Call Book, pages 68 and 103.)

Browning-Drake and Neutrodyne or any tuned radio frequency receiver can be converted for FIAT Loop operation by slight circuit modifications. (Circuits upon request.)



Patented Oct. 27, 1925—Other Patents Pending

SPECIFICATIONS—TYPE C CONSOLE

Woodwork—Solid walnut.
Metal—Rose Gold Plated Fittings.
Wire—Special H. F. cable, 65 strands No. 38 copper, brown silk covered.
Base—Equipped with felt bottom.
Finish—Natural laquer, hand rubbed.
Dielectric—Bakelite throughout.
Size—Erected 13½" wide by 30" high. Packed 12"x14"x4½". Twelve to standard case.
Spacing Combs—Patented construction, wires locked.
Binding Posts—Special type between bottom combs. Also has center tap.
Pivot—Extra large with bushing in base.
Weight—3 lbs. boxed.
Type A Folding Diamond Shape Portable Loop also available.
Height 29⅝" overall. Width 26¼" overall. Sides 18" each. Folded 21" overall.

Laboratory Test

Self inductance, 0.00019 Henries; distributed capacity, 17.38 M.M.F.; natural wave length, 108 Meters; Resistance at 1,000,000 cycle, 8 Ohms; Wave band covered with .0005 M.F.; Condenser, 180 to 600 Meters.

JOBBERS

For selling beauty and making-good merit, the Fiat is the Loop to stock. To profit by its phenomenal success this season, write us at once for our liberal discounts and terms. Good territory still open to recognized jobbers and distributors.

Price, $12.50 each; West of Rockies, $13.50. Canadian $15.50; Foreign $17.00

In case your jobber or dealer does not carry Fiat Loops, order from us direct. Sent postpaid on receipt of list price.

THE FIAT GUARANTEE—

Every FIAT Loop is guaranteed against any mechanical or electrical defects. Any FIAT Loop that does not prove entirely satisfactory will be replaced or repaired free of charge providing the loop does not show signs of misuse.

RADIO APPLIANCE CORPORATION

4884-90 North Clark Street, Chicago

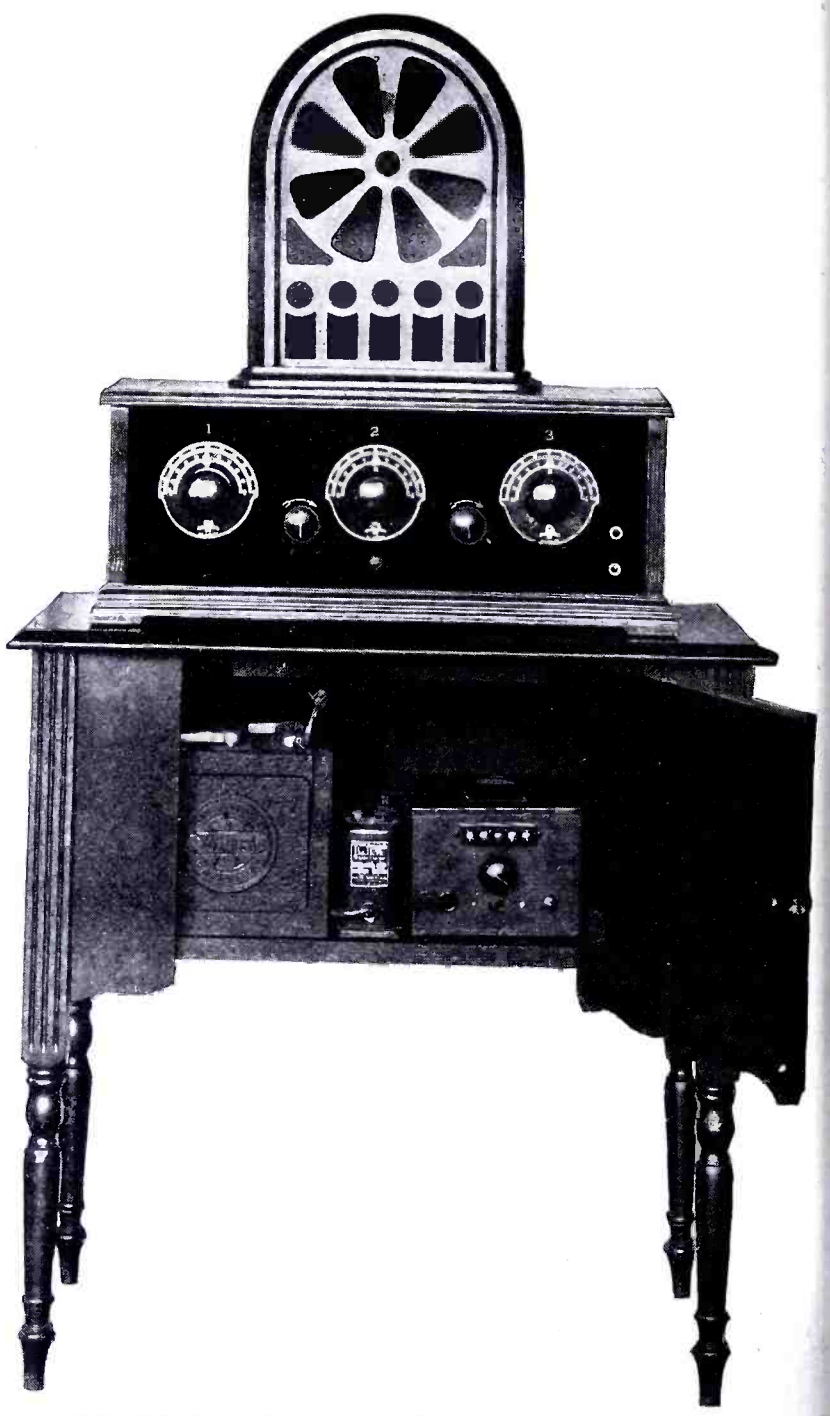
Cable Address FIATCO

With condensers having a strictly straight-line frequency tuning characteristic and fully 360 degrees rotation, there is no need of vernier mechanism, thus still further simplifying the set without sacrificing any ability to tune in all stations of whatever wave length.

The accessories shown are:

All-American New Cone Type Loud Speaker made by All-American Radio Corp., Chicago.

The "B" Eliminator is the Raytheon type made by the same company and will deliver all necessary voltages to operate the detector and amplifying tubes.



Completed receiver mounted on table with accessories

A Balkite Trickle Charger is shown in connection with a standard 6 volt Willard Radio Battery which when plugged into any A.C. house light socket will supply all "A" battery current necessary to operate your tubes with very little further attention. The trickle charger is made by Fansteel Products Co., Inc., North Chicago, Ill. The 6-volt battery, Willard Storage Battery Co., Cleveland, Ohio.

(If any further information is desired regarding these accessories, please write manufacturers direct.)

List of Parts. These parts or their equivalent will give satisfactory results

1—7x26x3/16-inch Formica Panel
1—8½x25x½-inch Wood Baseboard
1—T-1 Toroid Coil
2—T-2 Toroid Coils

WORLD BATTERIES

Sure— They Save You 50%

Silent "B" Power with World Radio Storage "B" Battery 12 Cells—24 Volts

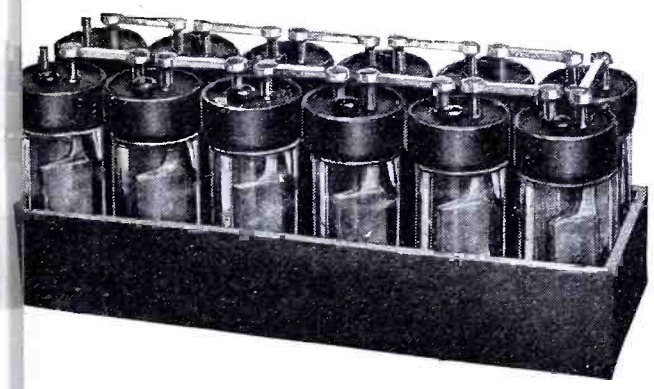
Lasts Indefinitely—Pays for Itself

Dependable. Quiet "B" power, clear without "hum." Economy you have never before thought possible. Convenience. Outstanding performance. Recharged for almost nothing.

SOLID RUBBER CASE

Insures against leakage or acid. Extra heavy glass jars. Heavy rugged plates. *Approved and listed as standard by Pop. Radio Laboratories, Pop. Science Inst. Standards, Radio News Lab., Lefax, Inc., and other important authorities.*

Extra Offer: In series of 4 Batteries (96 volts), $10.50



$2.75, C. O. D.

World Storage "A" Batteries—*at cost!*

For a limited time only, genuine World Storage "A" Batteries can be purchased at actual cost. Every cent of profit has been cut out in order to keep our full factory organization busy during the slack season. Prices below are lowest in history. World Batteries are nationally known for dependable, long wearing performance.

2 Year Guarantee Bond in Writing on All World Storage "A" Batteries

Approved and Listed as Standard

By leading radio authorities, such as Radio News Laboratories, Popular Science Institute of Standards, Popular Radio Laboratories, Radio Broadcast Laboratories, Radio In The Home, Lefax, Inc.

Solid Rubber Case Prevents Acid and Leakage

6-Volt—100 Amperes	$10.50
6-Volt—120 Amperes	12.50
6-Volt—140 Amperes	13.25

SEND NO MONEY

Just state number and kind of batteries wanted and we will ship same day order is received, by Express C. O. D., subject to examination on arrival. 5% discount for cash in full with order. Get your batteries NOW at a great saving. Remember, World Batteries are backed by years of success and thousands of convinced users. Send your order *NOW*.

WORLD BATTERY COMPANY

1219 So. Wabash Ave., Dept 26, Chicago, Ill.

Set your radio dials for the new 1000-watt World Storage Battery Station WSBC— Variety—New Talent—Always Interesting

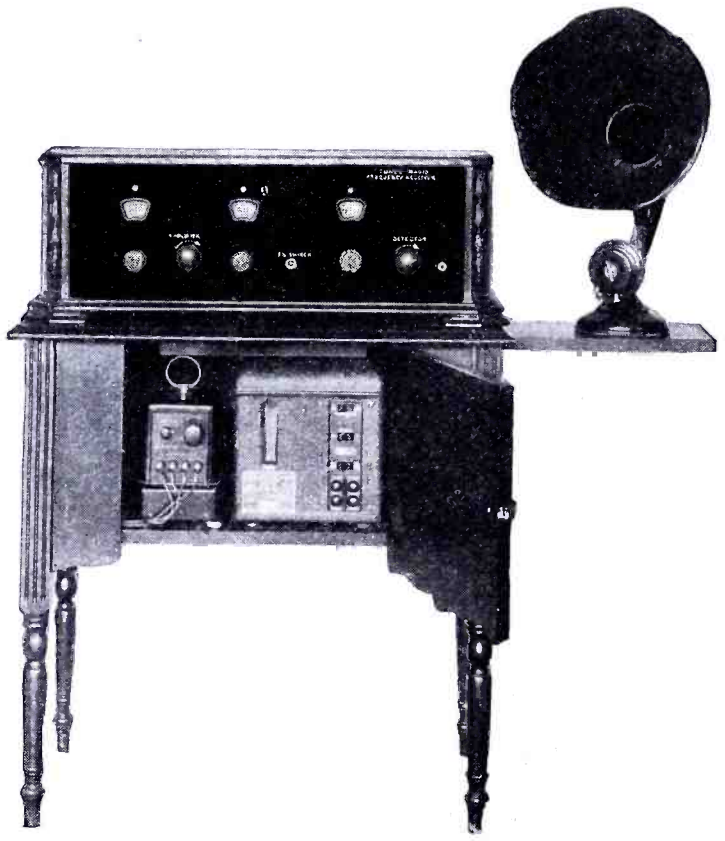
Tell 'Em You Saw It in the Citizens Radio Call Book

3—T-35 .00035 Variable Condensers
3—C-40 Vernier Dials
1—Rauland Lyric Transformer
2—Rauland Lyric Trio Impedance Units
1—Carter Filament Switch
1—Carter No. 103 Jack
1—Carter No. 102A Jack
1—Carter 10 ohm Rheostat
1—Carter 25 ohm rheostat
1—Carter 2 ohm Fixed Resistance
2—Carter 2 ohm Fixed Resistances
1—Micamold .00025 mfd. Grid Condenser
1—Micamold 2 megohm Grid Leak
1—Micamold .002 mfd. Condenser
2—Tobe 1 mf. By-Pass Condenser
11—Eby Engraved Binding Posts
6—All-American Sockets
Miscellaneous Wire, Lugs, Screws, etc.
1—Blackburn Ground Clamp

A complete kit containing all necessary equipment for constructing an aerial may be purchased at most all first class radio stores. They are manufactured by Brach Manufacturing Co., Newark, N. J.

A Tuned Radio Frequency Receiver Using a New Shielded Transformer Coil

(See page 162 for diagram)



Front view showing new Marco illuminated dials

HERE is a receiver using an entirely new design in a shielded tuned radio frequency transformer. The size of the shield is only three inches in diameter and one and one-eighth inches high, and is composed of pure copper, nickel-plated. It contains a transformer coil consisting of primary and secondary and designed to tune from 200 to 550 meters when the secondary is shunted by a .00035 mfd. variable condenser. The grid, plate and plug B terminals project through insulating bushings, while the grid return is grounded to the shield.

These coils tune extremely sharp and possess a nearly straight line oscillation curve over their total tuning range. When placed in a tuned radio frequency circuit oscillation may be controlled by the radio amplifier tube rheostat without the use of any other means of neutralizing. When 90 volts is applied to the plates of

Glowing spots of light . . . *in place of dials*

MICROMETER TUNING ACTION to bring out the best your set can do . . . .

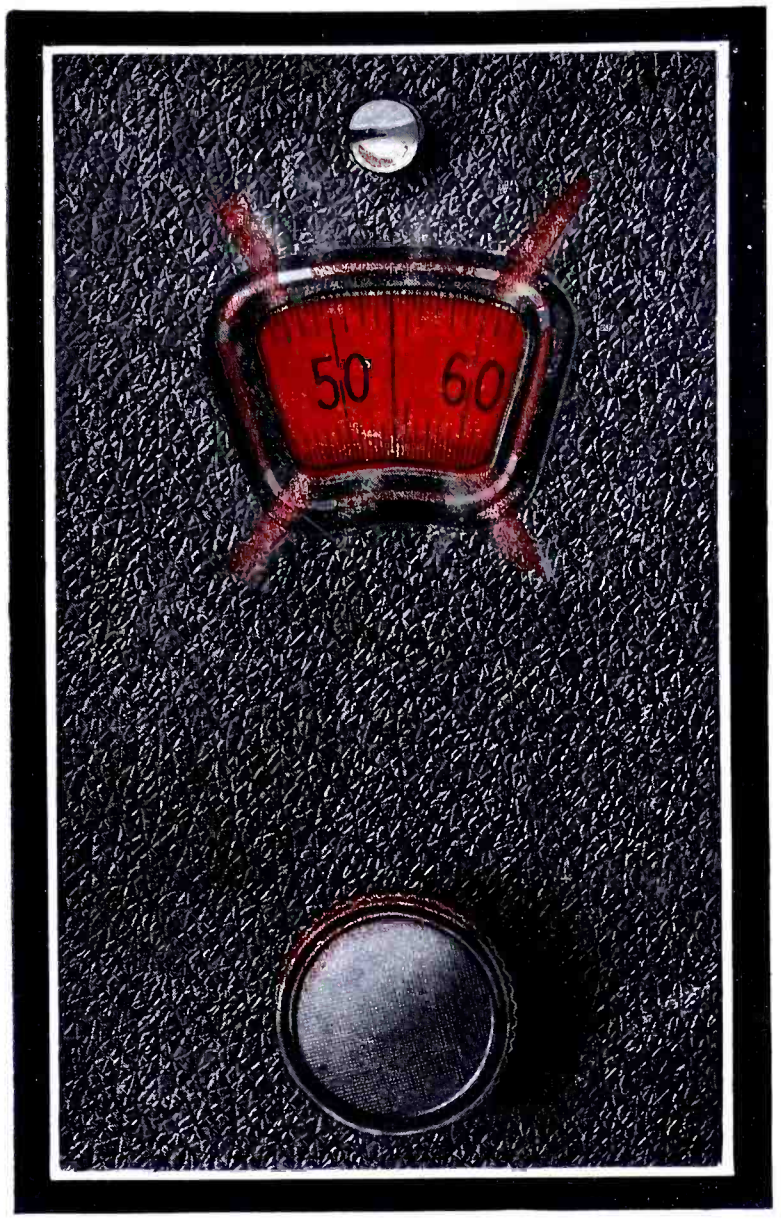
Smooth, gearless "friction-drive" to banish backlash forever . . . .

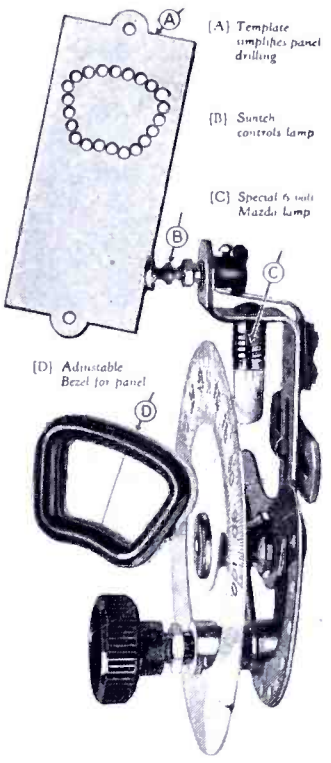
Soft illumination to add swifter readability to scale and flashing beauty to the panel . . . .

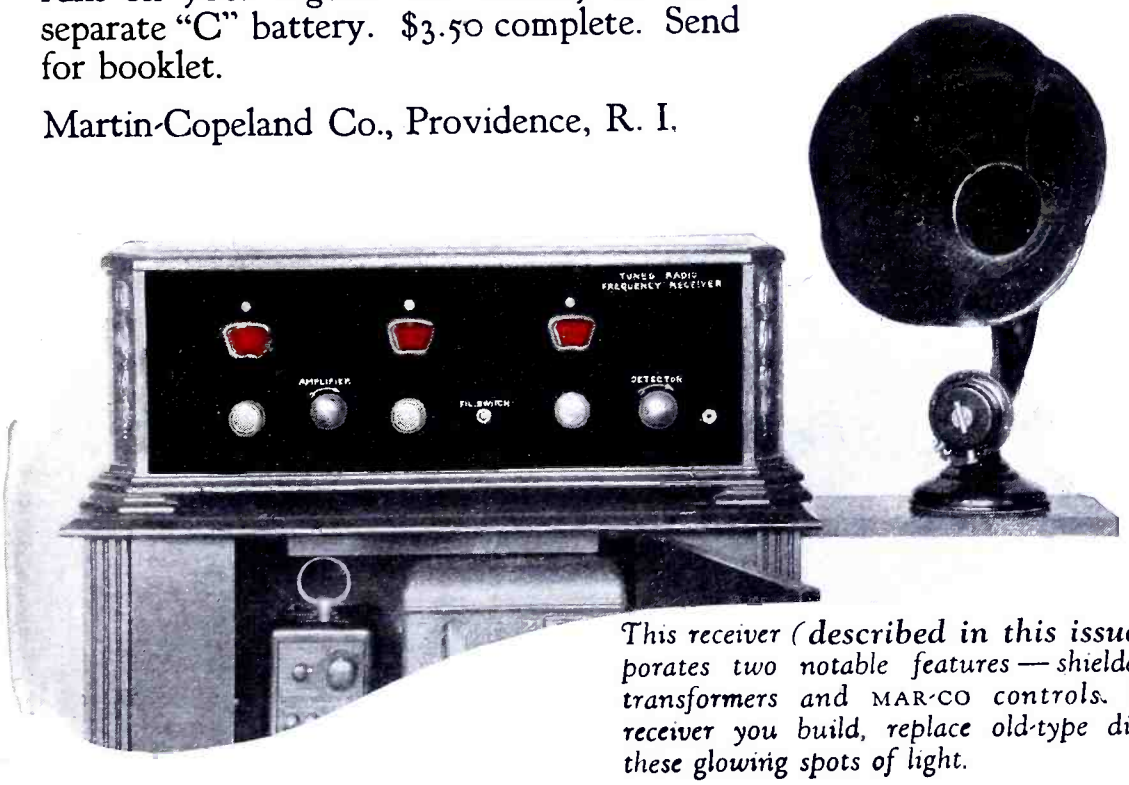
. . . . these are the advanced features that distinguish the set you equip with MAR-CO illuminated controls.

Any receiver—the new one you build, or the old one you remodel—can have MAR-CO controls. They fit all standard condensers. Scales read 0 to 100, or 100 to 0, as preferred. The template makes mounting a simple 10-minutes' undertaking. Special Mazda lamp supplied runs on your regular "A" battery or on a separate "C" battery. $3.50 complete. Send for booklet.

Martin-Copeland Co., Providence, R. I.







This receiver (described in this issue) incorporates two notable features — shielded TRF transformers and MAR-CO *controls. In any receiver you build, replace old-type dials with these glowing spots of light.*

MAR·CO *Illuminated* CONTROLS

the radio amplifier tubes the full plate current for which the tube is rated may be used before oscillation takes place.

All of the shields are connected to minus A and grounded. It will be noticed that a positive grid return is used on the detector tube. This allows a 201A tube to be used as a detector. The shields may be placed very close together for compactness without detrimental effects. This compactness of shield and assembly is made possible by the use of new principles in coil design.

A standard five tube tuned radio frequency circuit is used in this receiver. The two radio frequency tubes are controlled by a 10 ohm rheostat, the detector by a 25 ohm, and the two audio tubes by a ballast resistor. A .5 mid. by-pass condenser is shunted across the "B" 90 volt lead and the grid return of the detector tube. This helps considerably in stabilizing the radio frequency circuit. Only one jack is used in the output, since the radio frequency rheostat serves admirably as a volume control. Three major tuning controls, each consisting of a variable condenser of straight frequency tuning characteristic, tune the receiver. A new departure in an indicating device is the incorporation of the Marco Illuminated Control in this receiver. This unit offers the solution of many problems and is the first device of its kind to appear on the market. There has been a general feeling that dial housings with their attendant mechanisms should be behind the panel with other apparatus. The Marco Illuminated Control consists of a translucent dial, of extra large size, with attendant lamp socket for a low current consumption bulb designed to operate from the filament battery. A switch is provided for this lamp. The graduations and figures are large enough to read under circumstances which would render the ordinary dial scale illegible. All mechanism and the dial itself are mounted behind the panel. The unit is heavily constructed so that instruments may be mounted directly on the dial frame.

The audio transformers are capable of amplifying all audible frequencies now broadcast. Excellent reproduction should result if a good speaker is used.

With this receiver it is possible to tune a powerful local station within a few degrees on the dial, or in localities where there are several local stations any one of them may be tuned in without interference, and distant stations received while locals are operating.

The accessories shown are:

One 7x26 Super Cabinet made by D. H. Fritts Company, Hearst Square, Chicago, Ill. The Burns "B" Eliminator delivers all necessary voltages to operate both detector and amplifier circuits, made by American Electric Company, Chicago. The speaker is also by the above mentioned company. A Willard "A" Power Plant is shown and when connected in any convenient A.C. house light socket requires very little further attention. Manufactured by Willard Storage Battery Company, Cleveland, Ohio.

(If further information is desired regarding any accessories listed it will be supplied by the manufacturers if you will address them direct.)

List of Parts or their equivalent will give satisfactory results

1—7x26x3/16-inch Radion Panel
1—8½x25x½-inch Wood Baseboard
3—Sickles T.R.F. Shield Coils
3—.00035 Pacent Variable Condensers
3—Alden Vernier Dials
2—Precise Audio Transformers, one High, one Low
1—Electrad Filament Switch
5—Airgap N1. X Sockets
1—Electrad 25 ohm Rheostat
1—Electrad 10 ohm Rheostat
1—Elkay 2 ohm Resistance
1—Electrad .00025 Grid Condenser
1—Electrad Mtg.
1—Electrad Open Jack
2—Electrad Fixed and By-Pass Condensers
1—Electrad 2 megohm Grid Leak
1 Package Kester Solder
50 Feet Belden Wire
1—Acme 5-Wire Cable Cord

1—Blackburn Ground Clamp
Miscellaneous Lugs, Screws, etc.
Eby Binding Posts

A complete kit containing all necessary equipment for constructing an aerial may be purchased at most all first class radio stores. They are manufactured by Brach Manufacturing Co., Newark, N. J.

Instructions for Assembling the General Radio Type 390 Rectron "B" Eliminator and Power Amplifier Kit

(See Page 148 for diagram)

ONE of the necessary requirements of any radio receiver using vacuum tubes as detectors or amplifiers is the "B" battery, the chief function of which is to supply a relatively high positive charge to the anodes or plate terminals of the tubes. This positive potential is necessary in order that the negatively charged electrons emitted from the hot filament of the tube may be drawn across the intervening space to the plate and a current of electricity established.

The most universal method of supplying this positive potential is by the use of small dry cells, which are usually supplied assembled in block units of multiples of 22½ volts. Such batteries are limited in their useful life, and upon aging are apt to give an unsteady voltage which introduces troublesome noises into the radio receiver. Furthermore, they deteriorate even while not in use, affording, thereby, an uncertain service, and requiring inconvenient and rather expensive renewals.

Batteries constructed of groups of small capacity storage cells are frequently used for supplying the desired "B" voltage. Such units, while quite saisfactory for the purpose, require proper charging and considerable attention to keep them in prime condition. They are cumbersome and difficult to keep properly clean, and so are rather undesirable to the average man who desires a maximum amount of service for a minimum amount of attention from his radio.

The electric lighting service with which the great majority of homes are equipped affords a very inexpensive source of electrical power for "B" battery purposes. Except within limited metropolitan areas this service is almost universally supplied by 60 cycles alternating current. Before this alternating current can be utilized for the purpose, it must first be rectified or made to flow in a single direction and then filtered to convert the intermittent ripple of current into a continual, steady flow. The rectifying device and the filtering system constitute the chief components of the "B" battery eliminator.

The great majority of radio sets using low-power vacuum tubes, that is, tubes having filaments which draw such small currents that they may be lighted by means of dry cell "A" batteries, are rarely able to supply a sufficient power output to operate a loud speaker successfully without danger of overloading the last tube of the audio amplifier. Such overloading invariably causes a distortion of the reproduced music or speech and seriously cripples what would otherwise be an excellent radio set. The use of a higher power tube in the last audio stage is then quite desirable, but such tubes require more filament current than may be economically drawn from dry cells, while on the other hand a storage battery is so troublesome that many persons continue to use the smaller power tubes.

To overcome this difficulty the General Radio Company have incorporated a power amplifier unit into their "B" eliminator kit. This power amplifier, which should comprise the last stage of audio amplification, employs alternating current of the proper voltage for lighting the filament of a vacuum tube designed to handle a sufficient intensity of signal to give true and undistorted music and speech on a loud speaker with all the volume desired under any ordinary circumstances.

The Rectron tube, Type UX-213, is used as the rectifying device in this kit. This tube, which is a double-wave rectifier, is efficient in operation, is free from tube noises, and, supplied with a

moderate filament current, has a very long life. A suitable transformer, Type 391, was designed to be used with this tube. The primary coil is connected through a switch to the ordinary 110-volt, 60-cycle house-lighting current. The transformer has three secondary coils, one having an open circuit of 440 and provided with a center tap. There are also two independent five-volt secondaries, one intended to light the filament of the Rectron tube and the other to light the filament of the power amplifier tube, Type UX-171, for which this kit is designed. A resistance of 60 ohms, having a center tap, is connected inside the transformer case across the terminals of the amplifier filament coil.

The filter circuit comprises two choke coils mounted in a single unit, Type 366, and a block of waxed-paper condensers mounted as a separate unit, Type 392. Extensive experiments have shown the filter combination of four, two and four microfarads to be quite satisfactory for the purpose. The Type 392 unit also contains two one-microfarad condensers used as by-pass capacities across certain portions of the resistance unit. Such a filter passes a steady flow of current with an entirely negligible amount of hum. Any noticeable hum observed on a radio used with this kit must necessarily arise from some other source, as induction from power mains, etc.

In order that various "B" battery voltages may be obtained for use in the radio set, the Type 393-A resistance unit is connected across the output of the filter. Various "B" eliminators on the market make use of adjustable resistances for this purpose whereby variations of voltage may be obtained according to the output of current furnished to the set. In the great majority of cases such adjustments are troublesome and are of little real value. Furthermore, the variable resistance units employed are of such a nature that they are quite apt to be irregular in action, giving rise to troublesome noises in the circuits. The Type 393-A resistance unit is constructed of a series of wire-wound fixed resistances so proportioned, after careful study, as to give the desirable voltage required by the great majority of sets, and to maintain these voltages with a sufficient approximation with the "B" battery currents, which are required by all but the exceptionally heavy-duty sets.

Two voltage taps are provided for use with the radio receiver, one giving about 40 volts and the other about 90 volts. For use on the detector tubes and small power amplifier tubes the 40-volt tap is recommended, while the 90-volt tap provides a source of higher potential for use with amplifier tubes when desired. The still higher voltage required by the UX-171 power amplifier tube is supplied directly from the set, likewise the 30 to 40 volt "C" bias required by this tube.

By substituting a different resistance unit for the Type 393, a variation in the available voltage may be obtained, but it was decided that the unit as designed would fit the great majority of sets, would require no bothersome and uncertain adjustments, and would be thoroughly reliable in operation.

For use with the power amplifier the Type 285 input transformer having a ratio of 1:6 is employed. This operates very well in conjunction with the UX-171 tube. This tube has only a moderate amplification factor, but is designed to handle an unusually large signal without distortion, which is the more important consideration in a power amplifier. No rheostat is used with this tube, the proper voltage being supplied directly from the transformed. Thus there are no adjustments whatever to cause trouble—a desirable feature.

The Type 367 output transformer is used in the plate circuit of the power amplifier tube. This removes the direct current from the loud speaker, helps still further in reducing distortion and is in other ways desirable.

LIST OF PARTS

The kit contains the following parts:

1. One panel board properly drilled for mounting the various pieces of apparatus.
2. One power transformer, Type 391.
3. One filter choke, Type 366.

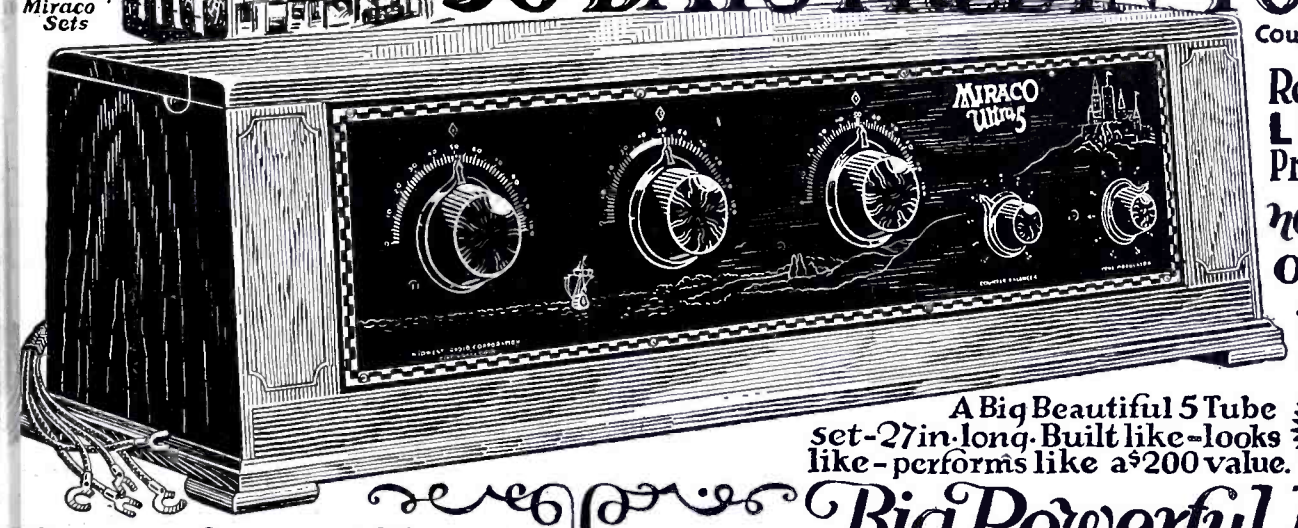
7th Successful Year!

Every inch of this big 4-story factory is devoted to building Miraco Sets

America's foremost direct-selling radio set factory invites you to enjoy the Ultra-selectivity, Tremendous distance range, clear tone and great volume of a Big Powerful latest model Miraco!

30 DAYS FREE IN YOUR HOME

Coupon Brings Amazing Special Offer



Retail LIST Price now only $49.75

GET SPECIAL OFFER

One year GUARANTEE

Tested and approved by all of Radio's Highest Authorities

A Big Beautiful 5 Tube set-27in.long-Built like-looks like-performs like a $200 value.

APPROVED RADIO NEWS LABORATORIES 1926 · POPULAR RADIO · RADIO BROADCAST

Coast to Coast and Foreign Reception Certified by Miraco users!

MIRACO RADIO GETS 'EM COAST to COAST

Send for Proof!

NOTICE! Enormous sales of the celebrated Miraco 6-tube Receivers (resulting from delighted users so highly endorsing them to friends) again enable us to add hosts of costly new features, latest refinements and up-to-the-minute improvements such as you might expect to find only on much higher priced sets. Miraco's this year are still better—more beautiful—more selective—more powerful—for less money than ever before!

Reports from users everywhere leave little for us to add. These are only a few of the many in our files and which we receive daily. Send coupon for plenty of additional proof and testimony of nearby users.

WISC. USERS HEARD FRANCE Kenosha, Wis. I was one of Kenosha's International Test Listeners during the test week Jan. 24 to 30.

Am sending a clipping of the Kenosha Eve. News to prove I had PTT Toulouse, France. On Thursday night I picked up LOX at Argentina. Both verified by Kenosha Eve. News is having some of the program. We have sold a number of Ultra-5's, and two of the sets reported having PTT also. Horace R. Boylan.

OREGON HEARS FLORIDA—MEXICO. Antelope, Ore. Comparison with higher priced radio sets has proved the Miraco everything you claimed for it. I have had about 100 stations from Florida to New York and from Mexico City to Canada, all on the loudspeaker. Vernon Hill.

THRU LOCAL COAST TO COAST Cleveland, O. Located about 1 1-2 miles from WTAM, I can tune them out on 3 degrees of the dials. I have gotten: 9 New York stations; 14 Chicago stations; Mexico City; Los Angeles; Denver; Cuba and Miami, Fla. all with good loudspeaker volume. Geo K. Montgomery.

ALL. HEARS LONDON--LOS ANGELES. Danville, Ill. List enclosed of stations logged this week on Miraco Ultra-5. Received several foreign stations on loudspeaker. 2LO London was heard plainly. I had Cuba and Mexico City several times. Also logged KFI, Los Angeles. Earl Everett.

THRU CHICAGO LOCALS--COAST TO COAST. Chicago, Ill. Some of the stations I get on Ultra-5 with all Chic. stations broadcasting; KFAE Pullman, Wash.; WEAF New York; KFAL Denver, Colo.; KFI Los Angeles, Cal.; KFKX Hastings, Neb.; KOA Denver, Colo.; 6WK Tuinucu, Cuba, WBPA Ft. Forth, Tex.; WBT Charlotte, N.C.; WCAP Wash. D.C.; WGY Schnectady, N.Y.; WJZ N. Y. WJAX Jacksonville, Fla. A. Huff.

EQUALS HIGH PRICED SETS. Pittsburgh, Pa. I am getting the very best results in Radio Reception that can be found in any high priced super set or any costing 6 times the price of my Miraco Ultra-5; Sunday evening 11.15 P. M., Madrid, Spain, entertainment was clear. I tune them in on the loudspeaker, coast to coast and then some more. If there is anything on the air the Miraco will bring it home. J. H. Adamson.

N.Y. HEARS LOS ANGELES. Glenfield, N. Y. Have logged 93 stations in 8 weeks on our Miraco Set all on the loudspeaker including stations in Canada, Florida, Cuba, and Los Angeles. Mrs. LeRoy Burdick.

COLORADO "TOURS CONTINENT." Jareso, Colo. It is really wonderful what your Miraco Ultra-5 can do. I have gotten Seattle, San Francisco, Los Angeles, Phoenix, Ariz., San Antonio, New Orleans, Miami, Florida, and Atlantic City and New York City and CKY in Canada. Now I'll say that is touring the continent. Stewart L. Medill.

NEBR. HEARS N. Y. TO CALIF. Geneva, Nebr. Having fine success with your 5 tube set. Have picked up stations as far away as WSB Atlanta, Ga.; WEAF New York; WSMB New Orleans; WFAA Dallas, Tex.; WGO Oakland, Cal. R. D. Hampton.

BEATS OTHERS IN TESTS. West Salem, O. Have demonstrated Miraco beside a good many different sets and not one of them was as good. During International Radio Week Jan. 27th, at 11:28 P.M. EAJ Madrid, Spain was heard plain At 11:40 an announcement was made from Hamburg, Germany. Also heard CGZ Mexico City and WKAQ Porto Rico. Have 75 other distant stations on my log including KFI Los Angeles, Cal. KGO Oakland, Cal. 6KW Tunicuco, Cuba Howard Snoddy.

COAST TO COAST ON SPEAKER Claude, Tex. Very much pleased with my Miraco. I have gotten stations all over the United States with it. Received New York and within a few minutes I had brought in Los Angeles on loudspeaker. That is truly "coast to coast" reception. L. Wiegman.

PERFORMS LIKE $175, $200 SETS. Ringgold, Va. To say that my Miraco is a "wonder" is a small expression. Friends say that it is as clear and plain as sets that cost $175 and $200. Have heard WDAF Kansas City, Mo.; WABI Bangor, Me.; WPG Atlantic City, N. J.; KFJF Okla. City; KFI Los Angeles, Cal.; WEAF New York, N. Y. Berry Beasley.

ALA. CUTS THROUGH LOCALS Camp Hill, Ala. My Ultra-5 is doing fine. Can get most any station I want from Mexico to Mass. from Cuba to Canada with all of our local stations going full blast. R. C. Whetstone.

VIRGINIA HEARS CALIFORNIA Mt. Sterling, Va. Miraco Ultra-5 sure gets them. It's as easy to operate as a Ford. I have over 92 stations to my record. Programs come in on the speaker from Ottawa, Canada, Ont. and Montreal, Que. to Havana and Tuinucu, Cuba, also Mexico City and from New York to Los Angeles, Calif. E. H. Baker.

CAL. FINDS MIRACO EXCELS Suisun, Cal. Am ordering another Ultra-5, the set sure does all you claim. I have tried it out with many other sets costing twice or three times as much only to find the Ultra-5 as good or better in most cases. Earl Branscombe.

SELECTIVITY! CUTS THRU LOCALS. Detroit, Mich. I am satisfied with Miraco. Can cut thru WWJ WCX WJR WGHP very very strong local stations. Charles Paul.

Big Powerful New MIRACO Ultra 5

TRADE MARK REGISTERED

Guaranteed by a Big Old Company 7th Successful Year

Sloping Front Cabinet-Panel-Dials Finished in Walnut

[ULTRA-SELECTIVE LONG DISTANCE SET EASY ON BATTERIES]

Unless convinced—after a good long trial in your home—that the beautiful new high-powered Miraco is the most astonishing bargain offered in big, fine, high-grade radios, don't buy it. Could any offer be fairer? And, remember, this offer is made by a large responsible manufacturing corporation—one of the oldest and most successful set-builders in the industry—a concern which has grown to immense size through the recommendations of satisfied customers who bought after trial.

Testimony of delighted users from coast to coast offers positive proof that the big Miraco actually is unmatched (even at much higher prices) for "razor-edge" selectivity combined with extreme long distance reception, clear natural tone, powerful loud speaker volume and economy in use of battery current.

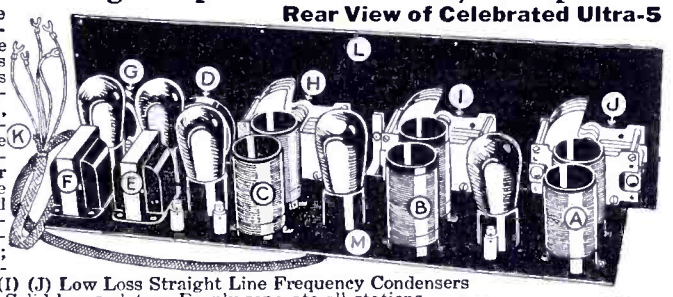
It comes completely built, thoroughly tested and factory guaranteed for one year. A big, beautiful expensive looking radio,—one you'll be proud to have friends see and hear. Has stylish sloping front cabinet, handsomely gold illustrated genuine Bakelite front panel and large Bakelite knobs with "arrow point" indicators for fine tuning—in beautiful walnut finish throughout.

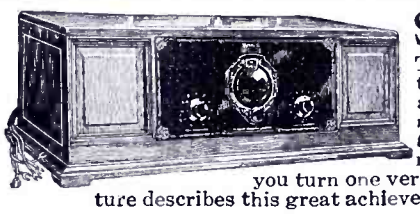
Clip coupon now for literature and Special Offer that will surprise and interest you.

Compare its construction with highest priced sets—study this picture

Note the neat sturdy high-class construction; wide spacings between parts eliminate losses and interference. All wiring concealed under genuine Bakelite base panel (M). Flexible wiring prevents broken or noisy connections. Flush-type sockets for the new tubes. (A) (B) (C)—"Duoformers"—famous exclusive Miraco Ultra low loss, self shielded and matched coils—one of the Miraco secrets of selectivity with powerful volume on long distance stations. (D) "Counter Balancer"—patented feature, NOT a rheostat or potentiometer. Controls oscillations on all wave lengths, reduces "B" battery consumption and further increases selectivity, distance range, clarity, power and volume. (E) (F) Shielded transformers of famous make evenly amplify all notes; beautiful tone quality. (G) Tone Modulator—regulates volume, switches current off or on. (H) (I) (J) Low Loss Straight Line Frequency Condensers—highest grade—equipped with ball bearings. Solid brass plates. Evenly separate all stations. (K) Connect E-Z Cable for attaching batteries. (L) Genuine Bakelite front panel. And many other latest features of costliest sets. Literature describes them fully, send for it!

Rear View of Celebrated Ultra-5





Single Dial Control!

The celebrated Miraco Ultra-5—U.S. Navy type circuit, above described, has also been adapted to Single Dial Tuning—*without sacrifice of selectivity, volume, clearness, power, tone or distance getting qualities!* In the magnificent big Miraco Unitune-5, here shown, you turn one vernier knob for stations everywhere. Literature describes this great achievement. *Also offered on 30 days free trial!*

AGENTS! DEALERS! Write for our latest Miraco proposition. Nation-wide popularity, superior performance of Miraco 5-tube sets, at amazingly lower prices, make them easy to sell. Send coupon today for proof

All the Proof you want is waiting for You!

Coupon or postal brings reports from hosts of users in your vicinity and elsewhere proving that Miraco sets **at rock-bottom money-saving factory prices,** outperform sets costing up to four times as much. **You can also buy speakers, tubes, batteries, etc. at big savings from us!** Get our proposition before spending money elsewhere.

Send coupon for Amazing Special Offer!

MIDWEST RADIO CORPORATION
Pioneer Builders of Sets
Cincinnati, O.

531-D Miraco Building

Without obligation, send free literature, testimony of users, AMAZING SPECIAL OFFER and full particulars of your **big money-saving factory-price proposition** on Guaranteed Miraco sets and all radio supplies. ( ) Agent ( ) User ( ) Dealer

NAME

ADDRESS

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

4. One filter condenser block, Type 392.
5. One input transformer, ratio 1:6, Type 285.
6. One output transformer, Type 367.
7. One resistance unit, Type 393-A.
8. Two vacuum tube sockets, Type 349.
9. One terminal strip.
10. One double snap switch.
11. One attachment plug and cord.

A Four Tube Non-Reradiating Receive

(See Page 153 for diagram)

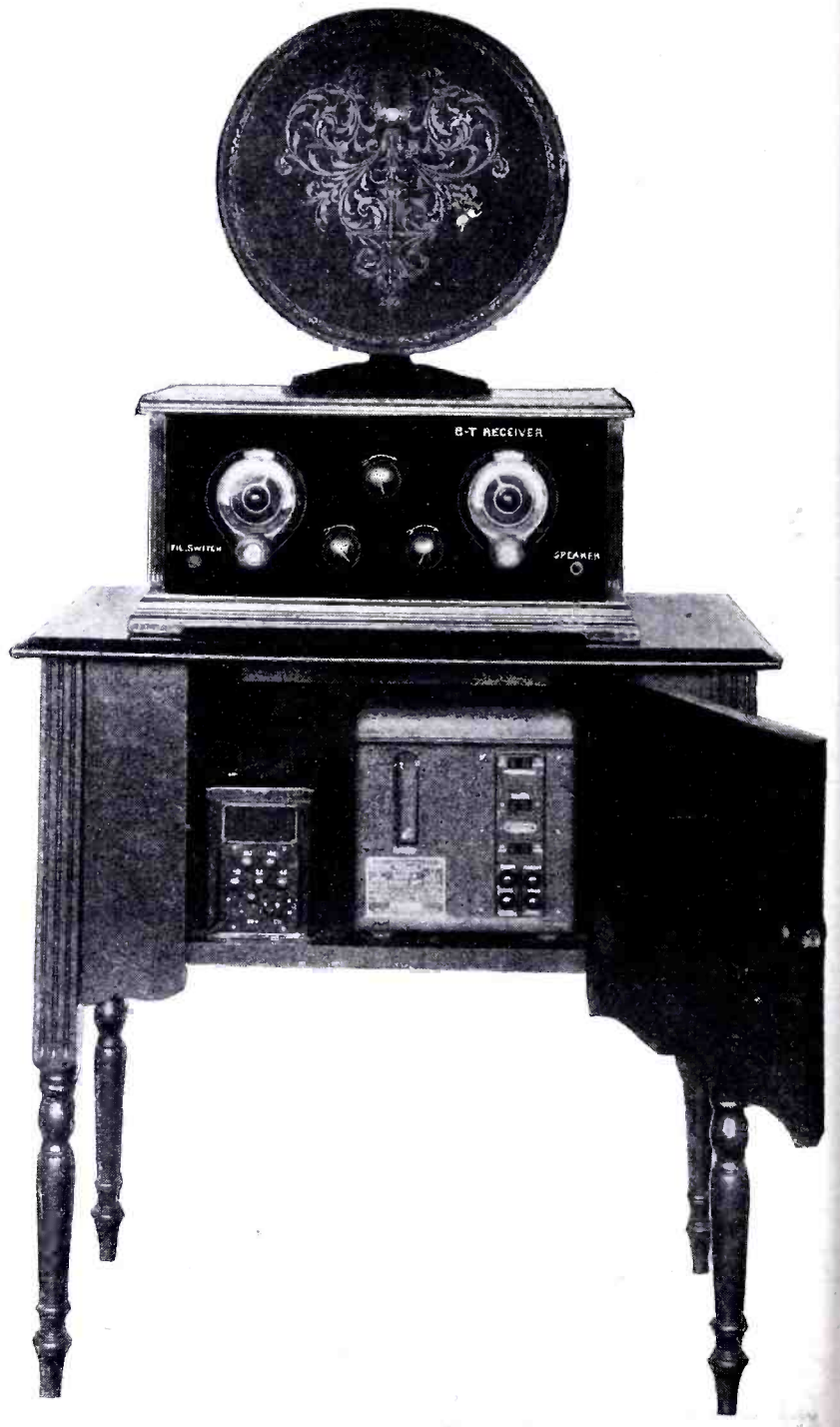
THIS receiver consists of a tuning arrangement of a antenna coupler with an adjustable primary, a three cir cuit tuner consisting of a radio frequency coil used in th plate circuit of the radio frequency tube, a secondar winding and a variable tickler coil used for regeneration in th plate circuit of the detector tube.

The secondaries of each coil are tuned with a .00025 variabl condenser. A variable resistance of 200,000 ohms is used in th plate circuit of the radio frequency tube to control oscillation

Various setting of this unit will increase the amount of volum and sensitivity when tuning in distant stations.

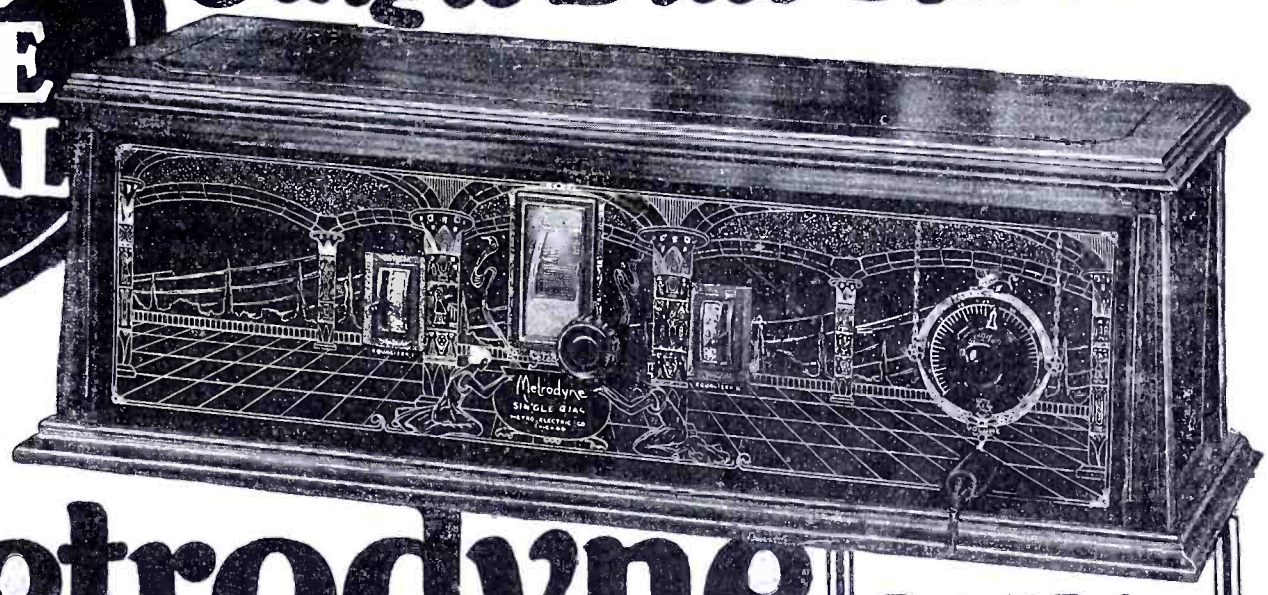
The radio frequency coil is variable and once adjusted for maxi mum selectivity and sensitivity, it needs no further adjustment.

The amplifier consists of two stages of audio transformer wired in the usual manner as illustrated in the graphic drawing.



7 Tube Set
Single Dial Radio

30 DAYS FREE TRIAL



The Metrodyne

ONLY ONE DIAL TO TUNE

Retail Price
$75
Completely Assembled
Big Discounts to Agents and Dealers

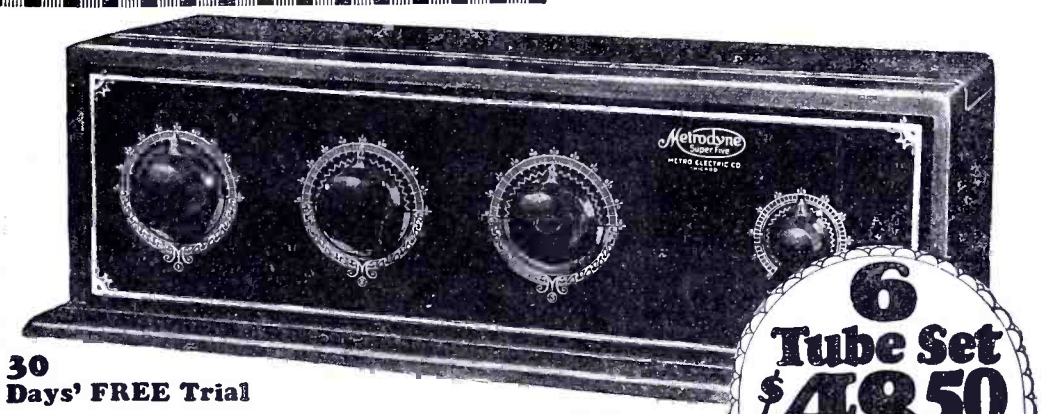
Wonderful offer direct from the factory! The world's greatest radio.
A perfect working, single dial control, 7 tube receiver. And just to prove our claims, we will ship it to your home for **30 days' free trial.** Test it under all conditions. Test it for distance, volume and tonal quality — and if you are not convinced that it is the best single dial set you ever heard, return it to the factory. We don't want your money unless you are completely satisfied.

BIG PROFITS TO AGENTS AND DEALERS
Our Agents and Dealers make big money selling Metrodyne Sets. You can work all or part time. Demonstrate the superiority of Metrodynes right in your home. Metrodyne Radios have no competition. Lowest wholesale prices. Demonstrating set on 30 days' free trial. Greatest money-making opportunity. Send coupon below—or a letter—for our agent's proposition.

Metrodyne Super-Seven Radio

A single dial control, 7 tube, tuned radio frequency set. Approved by America's leading radio engineers. Designed and built by radio experts. Only the highest quality low loss parts are used. Magnificent, two-tone walnut cabinet. Artistically gilded genuine Bakelite panel, nickeled piano hinge and cover support. All exposed metal parts are beautifully finished in 24-k gold.

Easiest set to operate. Only one small knob tunes in all stations. The dial is electrically lighted so that you can log stations in the dark. The volume control regulates the reception from a faint whisper to thunderous volume, 1,000 to 3,000 miles on loud speaker! The Metrodyne Super-Seven is a beautiful and efficient receiver, and we are so sure that you will be delighted with it, that we make this liberal **30 days' free trial offer.** You to be the judge.



30 Days' FREE Trial

6 Tube Set
$48.50
RETAIL PRICE
Completely Assembled

Metrodyne Super-Six

Another triumph in radio. Here's the new 1927 model Metrodyne 6 tube long distance tuned radio frequency receiving set. Approved by leading radio engineers of America. Highest grade low loss parts, completely assembled in a beautiful walnut cabinet. Easy to operate. Dials easily logged. Tune in your favorite station instantly on same dial readings every time. No guessing.

Mr. Howard, of Chicago, said: "While five Chicago broadcasting stations were on the air I tuned in seventeen out-of-town stations, including New York and San Francisco, on my loud speaker horn, very loud and clear, as though they were all in Chicago."

We are one of the pioneers of radio. The success of Metrodyne sets is due to our liberal 30 days' free trial offer, which gives you the opportunity of trying before buying.

MAIL THIS COUPON
or send a postal or letter. Get our proposition before buying a radio. Deal direct with manufacturer—
Save Money.

Mail COUPON Below!

Let us send you proof of Metrodyne quality

F. L. Warnock, Greentown, Ind., writes: "I received the Metrodyne in good shape and am more than pleased with it. Got stations 2,000 miles away."

C. J. Walker, Mariposa, Calif., writes: "Received my Metrodyne Single Dial set O. K. I believe that these one-dial sets are going to be excellent sellers. I had no trouble in tuning in stations enough to satisfy anyone, so you will please send me another set."

Roy Bloch, San Francisco, Calif., writes: "Very often we travel from New York to the Hawaiian Islands quickly — from station to station — by means of the little tuning-knob which operates the electrically-lighted dial. The Metrodyne Single Dial Set is much easier to operate than any radio set I've ever seen."

We will send you hundreds of similar letters from owners who acclaim the Metrodyne as the greatest radio set in the world. A postal, letter or the coupon brings complete information, testimonials, wholesale prices, and our liberal **30 days' free trial offer.**

METRO ELECTRIC COMPANY
2161-71 N. California Ave., Dept. 597
Chicago, Illinois

Gentlemen:

Send me full particulars about Metrodyne 6 tube and 7 tube sets and your **30 days' free trial offer**

Name _____

Address _____

_____

If you are interested in AGENT'S proposition, place an "X" in the square ➡ ☐

METRO ELECTRIC COMPANY
2161-71 N. California Ave. • Dept. 597 • Chicago, Illinois

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

The accessories shown are:

The new Saal Cone Type Loud Speaker made by Saal Mfg. Co., Chicago.

The "B" battery eliminator shown will deliver all necessary voltages to operate detector and amplifier circuits. Connects into any A. C. 110-volt light socket. Made by Bremer-Tulley Co., Chicago.

A Willard "A" plant supplies "A" current to set and when connected into any 110-volt A. C. light socket keeps the "A" supply fully charged with very little further attention. Made by Willard Storage Battery Co., Cleveland, Ohio.

The cabinet shown is by the Southern Toy Co., Hickory, N. C.

The table has room to store all accessories, solid mahogany, and made by Watsontown Table & Furniture Co., Watsontown, Pa.

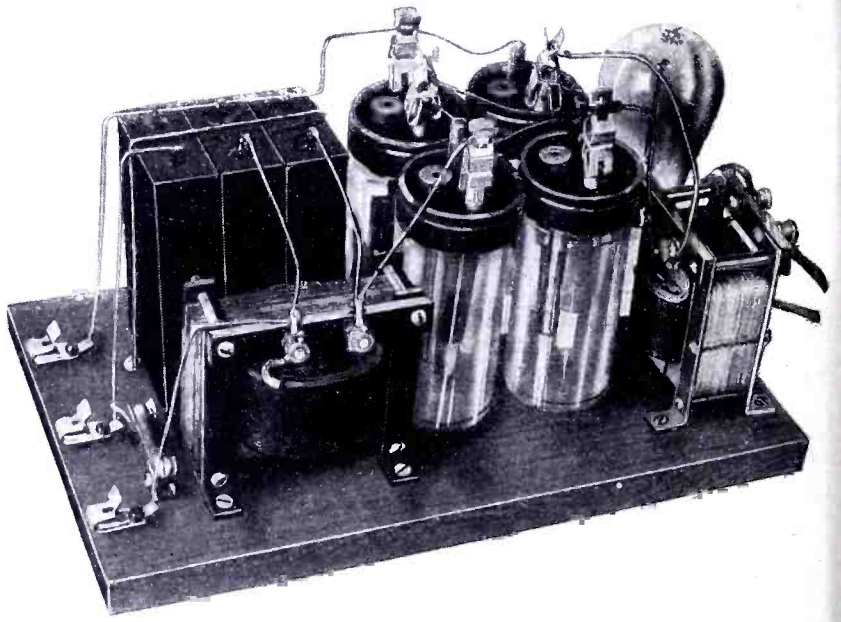
(If any further information is desired regarding these accessories please address manufacturers direct.)

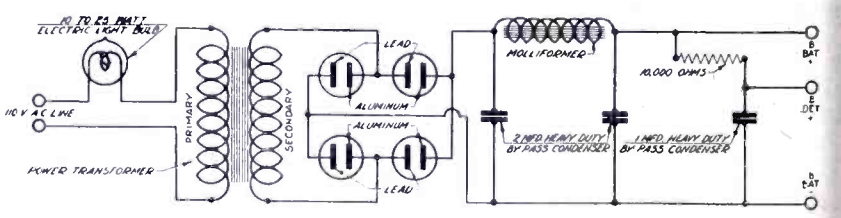
List of Parts. These Parts or Their Equivalent Will Give Satisfactory Results

These parts or their equivalent will give satisfactory results:

1—7x18x3/16-inch Radion Panel
1—7x17x½-inch Wood Baseboard
2—B-T Lifetime .00025 mfd. Variable Condensers
1—B-T Type A.C. 3 Low Loss Antenna Coupler
1—B-T Type B Low Radio Frequency Coil
4—B-T UX Sockets
1—B-T 2.2-1 Ratio Audio Transformer
1—B-T 4.7-1 Ratio Audio Transformer
2—Radion 4-inch Dials
2—Carter 25 Ohm Rheostats
2—Carter 4 Ohm Fixed Resistances
1—Carter 201A Radio Jack
1—Carter 103 Radio Jack
1—Carter Type M1 Ohm Resistance
1—Carter Filament Switch
1—Dubilier 2 Megohm Grid Leak
1—Dubilier .00025 mfd. Grid Condenser
1—Dubilier .001 mfd. Fixed Condenser
1—Dubilier .005 mfd. Fixed Condenser
7—Eby Engraved Binding Posts
1—Package Kester Solder
1—Blackburn Ground Clamp
Misc.: Screws, Lugs, Wire, Etc.

How To Build the Molliformer "B" Unit





(Continued to page 230)

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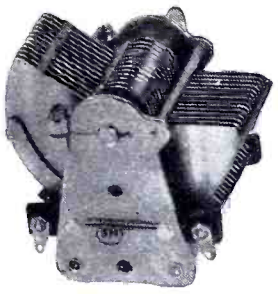


The 316 A, 316 B, and 317 Variable Condensers.

Uniform, interchangeable inductances for all circuits and wavelengths, to fit standard sockets.

A Step Ahead —and Then Some

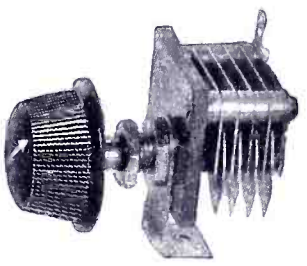
THE name Silver-Marshall has always been associated with progress —S-M parts have always represented something more than devices merely made to fill an existing demand. The part that these products have played in the development of radio reception is fully appreciated by those who know.

A combination of exceptional foresight, a thorough understanding of the field, manufacturing and laboratory equipment that is unequalled, has always resulted in products that have shown a marked advance in efficiency and design—built as well as modern factory methods and laboratory supervision at every step can make them.

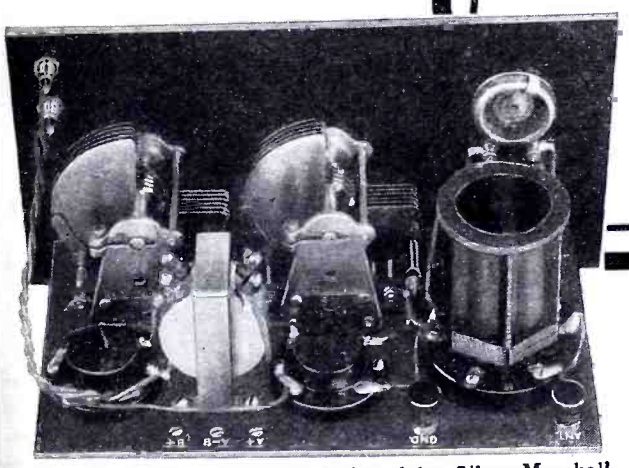
Those illustrated on this page are but a few of the many that are in constant demand where only the best is wanted. Each is a step ahead of the industry—each represents progress—items that experimenters have been waiting for—and are satisfied with.

Behind each S-M part is a guarantee—a guarantee of perfect materials and workmanship. That's why engineers, editors, explorers—seasoned experimenters—use and recommend them.

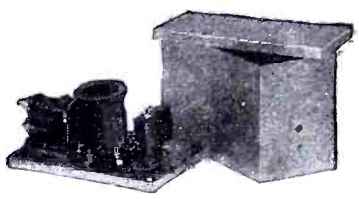
220 Audio and 221 Output Transformer. For power supply sets, 329 and 330 power transformer, 331 Unichoke, and 332 Condenser Bank.



340 Midget Balancing Condenser



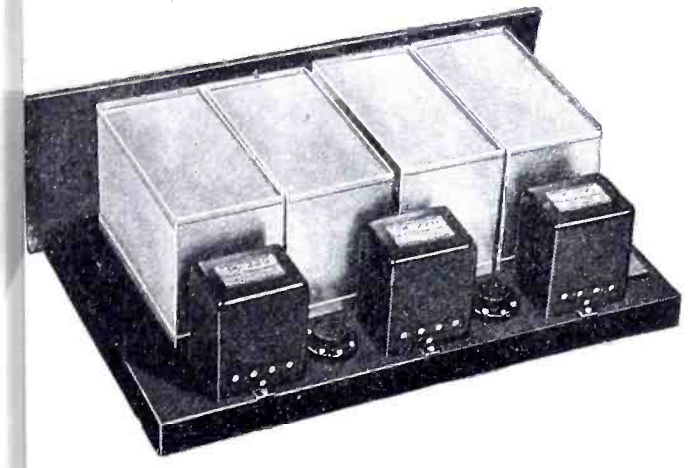
The Short Wave Receiver designed by Silver-Marshall Engineers and carried by Commander Dyott on his South American explorations to keep him in touch with the world—Silver-Marshall parts depended upon and dependable.



Individual 631 Stage Shield

210 and 211 Long Wave Transformers

SM 630 Silver Shielded Six



The assembly is all metal — aluminum shields house each radio frequency circuit and in turn fit on a steel sub-base fastened to a brass panel which is finished in attractive walnut. Not only is the assembly pleasing to the eye—dignified in its quiet richness, but the entire construction is sturdy. The Shielded Six is designed for years to come.

S-M 630 and 633 kits are manufactured by Tresco and licensed under Armstrong U. S. Patent No. 1,113,149, October 6, 1914. Silver-Marshall, Inc., Exclusive Distributing Agents.

The Shielded Six is one of the highest types of broadcast receivers. It embodies complete shielding of all radio frequency and detector circuits. The quality of reproduction is ***real***—true to the ear.

Behind the Shielded Six is competent engineering. It is sensitive. Day in and day out it will give distance—on the speaker. It is selective. Local stations in the most crowded area separate completely—yet there are but two dials to tune.

These features—its all-metal chassis and panel, its ease of assembly, and many others, put it in that small class of ultra-fine factory-built sets, priced at several times the Six's cost.

The S-M 630 Shielded Six Kit—including all specified matched and measured parts to build this remarkable receiver—price $95.00.

The 633 Shielded Six Essential Kit contains four condensers, four radio frequency transformers, four coil sockets, four stage shields and the link motion—all factory matched—price $45.00.

Clear and complete instructions, prepared by S-M engineers, go with each kit—or will be mailed separately for 50c.

220 and 221 AUDIO TRANSFORMERS

S-M 220—the big, husky audio transformer you hear in the finest sets—the only transformer with the ***rising*** low note characteristic that means real quality—not only on paper—but when you hear it. It is a power job—yet this finest of audio amplifying devices is sold, with a guarantee, for but $6.00.

The S-M 221 is an output transformer that will bring out the low notes on your present set. It should be used between the last audio tube and the loud speaker — it eliminates blasting and will increase speaker capacity for handling strong signals without distortion, $6.00.

THE POWER UNITS

These units are particularly designed for all "B" eliminator and power amplifier assemblies.

S-M 330 Power Transformer has 300 volt secondaries, a 110 volt, 60 cycle primary and a 7.5 volt filament lighting winding —$.600.

S-M 331 Unichoke—a two winding high inductance filter choke licensed under Clough Patent Application—$.600.

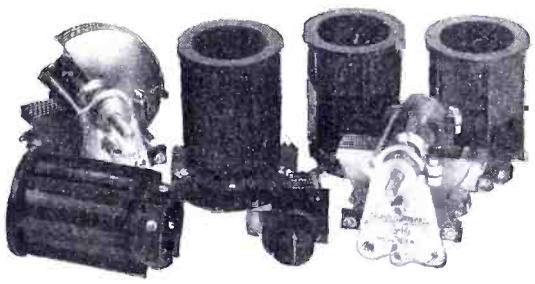
S-M 332 Condenser Bank—contains 10⅘ mf. of tapped filter condensers—all tested at 700 volts D. C.—$10.00.

S-M 329 Power Transformer is similar to 330, except that it is a low voltage type for Raytheon tubes. Primary, 110 volts A. C., two 220 volt secondaries, and a split 5 volt filament winding.—$6.00.

635 SHORT WAVE KIT

The type 635 Short Wave Receiver Kit contains the carefully designed and matched essentials for a real short wave set. Its range is 18 to 150 meters. The kit contains a set of four plug-in coils, one coil socket, one coupling condenser and two 140 mmf. condensers. These parts are all carefully designed for operation together.

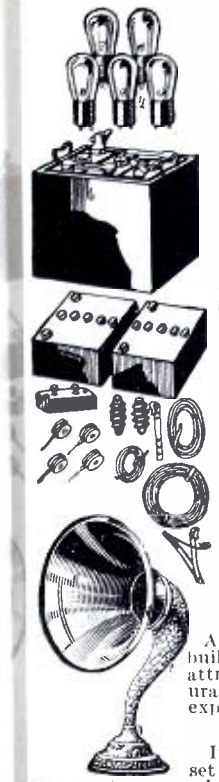
With the four coils supplied, the amateur bands fall well to the center of the tuning scale. "Dead spots" at which the receiver will not oscillate are totally eliminated. The antenna condenser allows coupling adjustment to suit individual conditions. Price $23.00.

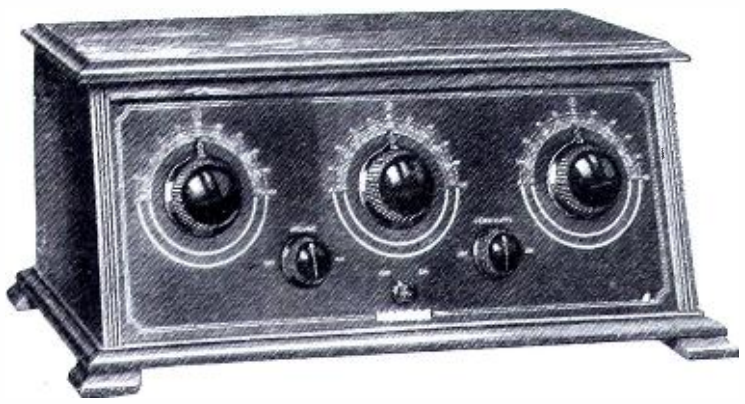


SILVER-MARSHALL, Inc., 836 W. Jackson Blvd., Chicago, U. S. A.

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

A Page of Bargains From the Barawik Catalog





New BARAWIK Radio Set 5 Tubes New Design Only $24.95

Embodies the newest forward steps in radio, such as U. S. Standard low loss coils, straight line frequency condensers, large handy Kurz-Kasch dials and new model cabinet with etched metal sloping panel with gold markings and engravings. Gives you the best radio reception at low cost. A set you can buy complete cheaper than you can build. Direct from our own factory. The Barawik Company is the oldest radio specialty institution in America, numbering 200,000 customers. Every item sold is of high standard. Buy from radio experts and save money. Order direct from this page.

A remarkable 5-tube radio frequency set—finer, better built and producing superior results. It is both rich and attractive looking, and for easy tuning, clear, sweet, natural tones, and distant reception, it is everything you will expect. Takes all tubes including the new power tubes.

PERFECT REPRODUCTION

It stands alone in tone quality, as comparison with any set at any price will reveal. Is the choice of expert musicians who recognize finest distinctions of harmony and tone. Its beautiful, natural, well-rounded tones reproduce the human voice, whether in song or speech, as clear as a bell. Musical programs are reproduced in sweet, perfect tones, delightfully and harmoniously.

ARTISTIC CABINET

Exceptionally fine hand-rubbed walnut finish cabinet. An ornament to any room. A truly distinctive, dignified cabinet in keeping with other Barawik qualities.

THE GREATEST VALUE TODAY —LOOK AT THESE PRICES!

Quality considered, our prices are lowest. Nowhere is there value to equal these prices.

101T5000—Set only, no accessories **$24.95**

Complete With All Accessories as Illustrated

For Storage Battery Operation Including: 5 201A type tubes, 2 45-Volt "B" Batteries, 1 Fine Loud Speaker, 1 6-Volt Storage Battery, 1 Complete Antenna Equipment, 1 "C" Battery, 1 Fine Head Set, Complete.

301T5001—Shipping weight, 120 lbs..... **$56.95**

301T5002—For Dry Cell Operation Including: 5 199 type Tubes, 2 45-Volt "B" Batteries, 1 Fine Loud Speaker, 3 Dry Cell "A" Batteries, 1 "C" Battery, 1 Fine Head Set, Complete. Shipping Wt. 45 lbs..... **$51.50**

Anyone can set up this outfit in an hour or so.

Transportation charges extra.

BIG VALUE STORAGE BATTERY

$9.45

The best battery regardless of price. Its cost to you is less, its life is guaranteed for 3 years for radio service, 18 months for auto service. Its dependability means satisfaction. Strong, rugged, in finest quality hard rubber compound cases. Full rated capacity. Every part is new and of best materials. Shipped fully charged, ready to use. Ship. wts., 40 to 65 lbs.

102T5300—6 volt, 60 amp. Each.....$ 7.85
102T5301—6 volt, 100 amp. Each 9.45
102T5302—6 volt, 120 amp. Each..... 10.75

Auto Batteries

108T5303—6 volt, 100 amp., 11 plate. Each 9.85
108T5304—6 volt, 120 amp., 13 plate. Each 11.85
108T5305—12 volt, 7 plate. Each..... 15.65

Transportation charges extra.

LEADER B BATTERIES

Absolutely uniform, noiseless in operation. Have unusual recuperative powers and extra large capacity. Fresh stock. A good, big, sturdy battery. Guaranteed.

2T225—Large size, 22½ volt. 3 in. high, 4 in. wide, 8 in. long. Has 5 taps. List, $2. Net **$1.28**

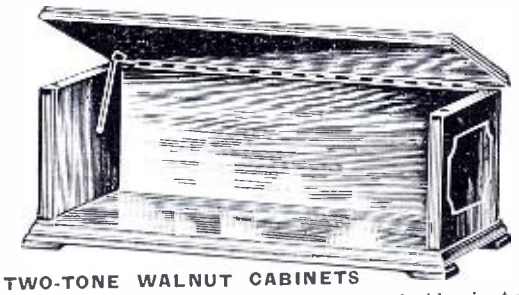
2T204—Large size 45 volt upright style. Height 7 inches, width 8¼ inches, depth 3⅛ in. List, $3.75. Net **$2.55**

Transportation charges extra.

GET OUR NEW CATALOG

Our new 1927 edition catalog shows thousands of bargains and all of the new circuits. It brings radio to you completely and at bargain prices you will be glad to pay. Everything in radio you could want. Also shows complete lines of electrical goods, lighting fixtures, auto supplies, phonographs, etc., all at prices that will save money for you.

PUT YOUR SET IN A GOOD CABINET

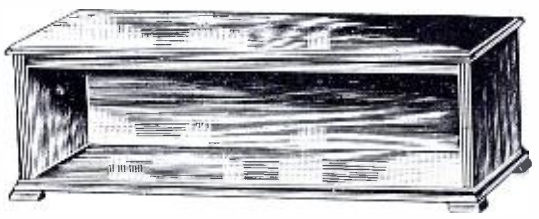


TWO-TONE WALNUT CABINETS

Elegantly finished solid walnut top and sides in two-tone effect. Body is beautiful brown walnut with darker brown panels relieved with inlaid gold lines. Fine hand-rubbed finish gives appearance equal to most expensive furniture. Nickel plated piano hinge and lid stop. Ends grooved for slide-in panel. **Full ten inches deep back of panel.** Guaranteed perfect construction. Shipping wt., 25 to 35 lbs.

Number	Panel	Each	Number	Panel	Each
103T5200	7x18	$6.89	103T5203	7x26	$8.55
103T5201	7x21	7.35	103T5204	7x28	9.50
103T5202	7x24	8.25	103T5205	7x30	9.95

Transportation charges extra.

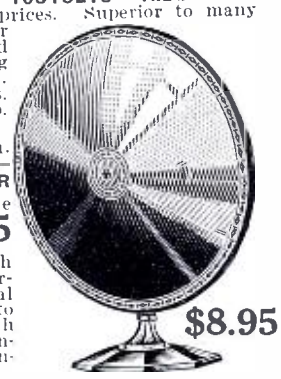


DE LUXE CABINETS

Number	Panel	Each	Number	Panel	Each
103T5210	7x18	$4.95	103T5212	7x24	$5.50
103T5211	7x21	5.30	103T5213	7x26	5.95

Fine looking. Attractive prices. Superior to many cabinets offered at higher prices. Elegant hand rubbed mahogany finish. Overhung top. Neat footed bottom. Grooved for 3/16 in. panels. Inside depth, 10 in.; ship. wts., 19 to 28 lbs.

Transportation charges extra.



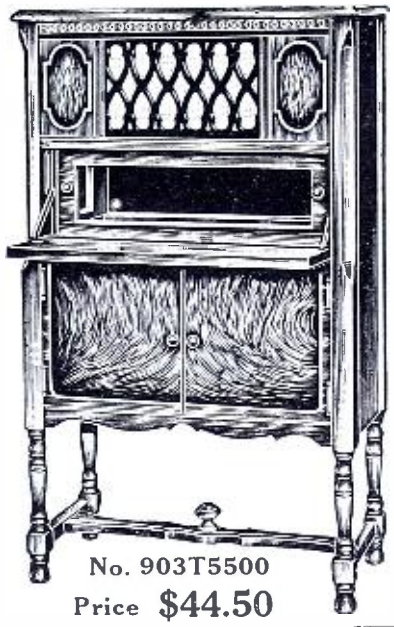
$8.95

BARGAIN CONE SPEAKER

2T5100—Regular value $12.50. Net, each..... **$8.95**

A beautiful speaker with remarkable clarity and clearness of tone. Entire musical range from high soprano to deep bass is reproduced with rare uniformity. A fine instrument at a price unequaled.

PERIOD CONSOLES FOR YOUR PRIZE RADIO SET



No. 903T5500
Price $44.50

TUDOR HIGH-BOY

Very attractive Period design. Top and front of Walnut Satin Rubbed Finish.

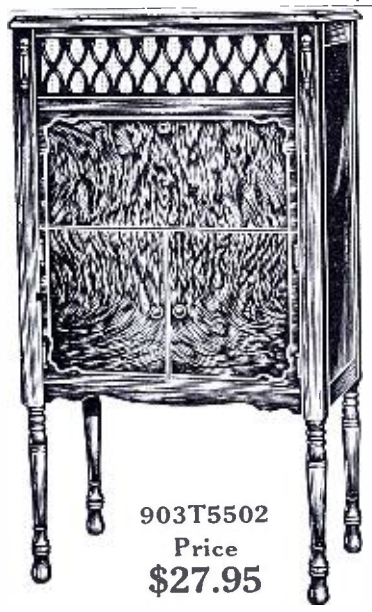
Equipped with full floating horn of best quality and tone, fitted with sliding instrument tray that will accommodate 7 in. by 21 in. or smaller radio panel. Slides into grooves without the use of screws. Slide-in tray also permits instrument to be drawn out nearer to operator when in use, giving a better vision of the dial figures. Holds all A and B batteries. Size over all, 45¾ in. high, 27½ in. wide, 14 in. deep.

LYRIC SPECIAL

A beautiful Console Cabinet made of Genuine Plywoods and Solid Red Gum, with our Walnut Satin Finish. A very attractive cabinet, and an outstanding leader in our line. Equipped with full floating horn of highest quality and tone, fastened to lid, and supported by an automatic lid balance. Will accommodate a 7 in. by 21 in. or smaller instrument panel, which slides into grooves without use of screws. Ample space below instrument compartment for A and B Batteries. Size over all, 45 in. high, 24¾ in. wide, 15 in. deep.

Transportation charges extra.

No. 903T5501
Price $34.80



903T5502
Price
$27.95

HIAWATHA

Here is a Console Cabinet, having the appearance of costing much more than we ask. Is made of Genuine Plywoods and Solid Red Gum, in a beautiful Walnut Satin Finish. Equipped with full floating horn of highest quality and tone. Will accommodate instrument panel 7 in. by 21 in. or smaller, which slides into grooves without the use of screws. Has ample space, entered from rear, to accommodate a full set of A and B batteries. Size over all, 45 in. high, 24¾ in. wide, 15 in. deep.

Transportation charges extra.

GUARANTEED RADIO TUBES

2T900—UX201A Type Tube **$1.20**
2T901—UX199 Type Tube

Postage on tubes, 10c each

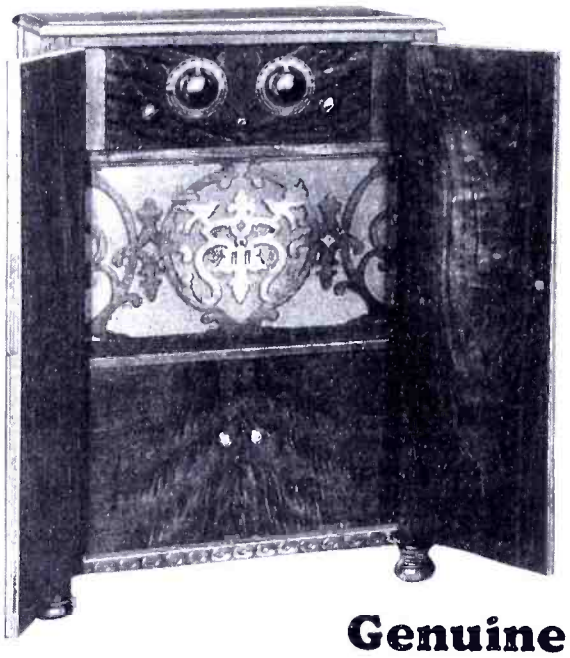
Shepherd Guaranteed Standard $2.00 value tubes. The biggest bargain in high-grade radio tubes on the market. The finest, cleanest looking tube you ever saw. Can be rejuvenated. Contains the genuine, licensed thoriated tungsten filament. Guaranteed — replacements free—you be the judge.

Send order direct to

THE BARAWIK CO. 540-6 Monroe St. Chicago, Ill.

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

Randolph Radio Offers
The New Ampliphonic Six
The Latest Two Dial Receiver with the Amplion Unit



Greatest Radio Bargain

$79.50

(Without Accessories)

Height of console, 39 inches. Top measures 27x16 in. Fits conveniently in the corner of any room. A 6 tube radio frequency, two dial control receiver, with 3 stages of r. f. and transformer amplification. Has provision for power tube, and an additional tap for increased "B" battery voltage. Very latest construction, including solenoid coils, bakelite sockets taking all the latest X-type tubes, modified straight line condensers. The volume control permits any desired degree of volume. Nothing like it on the market for more than two times our price.

Genuine Walnut Console De Luxe

Genuine dark tone and shaded walnut cabinet, built to a full size. Beautifully etched panels of burl walnut. Built in loud speaker with Amplion unit. Large doors open to two smaller doors enclosing a larger compartment for all batteries, chargers, eliminators, etc. Everything is out of the way. The entire set and accessories are concealed in this exquisitely designed, beautiful piece of furniture. You would not think it a radio set until you open the doors of the console, tune in and hear the sweet mellow tones of this new, wonder Ampliphonic six tube receiver. It is beautiful enough in appearance to grace the most fastidious home. It is efficient enough in its performance to satisfy the most exacting critic, and the most astonishing part of it all is the low price. Only $79.50 (without accessories). You may order direct from this ad.

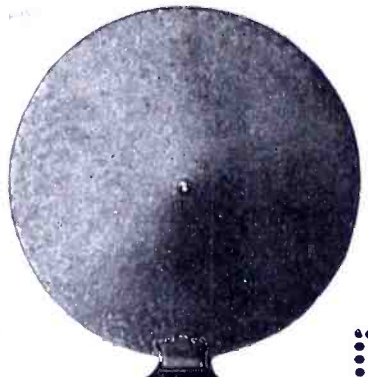
Columbia Senior 6

$36.50

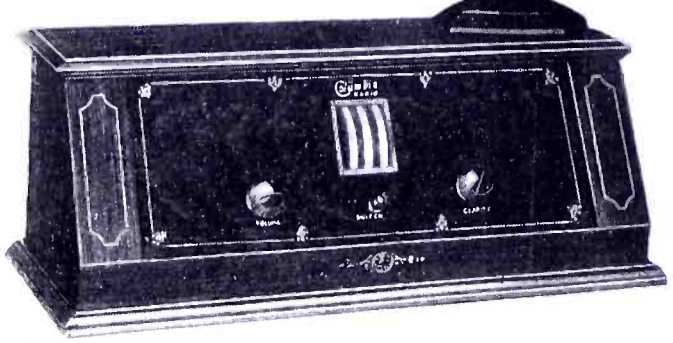
(Without Accessories)

Set complete with two 45 volt "B" batteries, one 100 amp. hr. Storage "A" Battery, one 4½ volt "C" battery, six type X201A tubes, complete aerial kit, attached battery cable, one quality cone speaker or victor horn type loud speaker, whichever you desire..... **$65.45**

No. R3014



No. R 3015



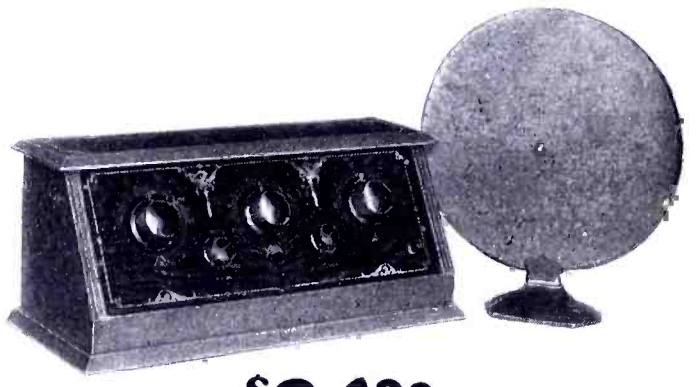
These values are typical of everything in our catalog. If the set you want is on this page, order direct from this ad.

Genuine Mahogany and Walnut Consoles for any size panel $17 to $75. See Our Catalog

One of the finest appearing table sets you can buy. It is the new localized control. One hand to tune with, three rotating drums easily controlled and easily logged. The beautiful dark finish etched panel matches the handsome mahogany finished hand-rubbed cabinet. Full size of cabinet, 7x22.

The set is of the 6-tube design, giving tremendous volume, wonderful tone quality, latest developments in straight line condensers, solenoid coils, sub-base mounting and new amplification. A beautiful receiver in a beautiful cabinet. It is sets like this that are designed to sell for over $100.00.

Symphonic Five



$24.90 No. R3012

(Without Accessories)

The Symphonic Five is built in a cabinet of brown Spanish leatheroid finish, substantial, clean, sloping panel style and well constructed. The panel is gold engraved walnut to match the cabinet. Contrasted beautifully with the black fine tuning knobs. The two small knobs are for control of volume and clarity. The volume control is of the finest smooth slow variation type. Roller bearing. The condensers are of the modified straight line frequency type, substantially constructed and of the latest design. All is sub-panel mounted, using the new X-type socket. The latest development — solenoid coils are used, permitting no losses and fine tuning. Two stages of low ratio audio amplification with a high grade transformer offers the true amplification required for both low and high notes. Real modulated tone quality. Etched panel, size 7x18.

No. R3013

The Symphonic Five complete with five type X201A tubes, two 45 volt "B" batteries, one 100 amp. hr. storage battery, one "C" battery, complete aerial equipment, one battery cable attached, including cone speaker of the same type as pictured..... **$54.75**

Big Catalog Free

Containing over 2,000 items—sets, kits, parts and supplies of every description. It's today's guide to radio prices and radio quality. We are the largest exclusive radio mail order house in the world. We handle nothing but radio. Our tremendous volume of business enables us to command rock bottom prices from manufacturers. We will positively save you money on anything you may want in radio.

Randolph Radio Corp.,
180 N. Union Ave., Dept. 84, Chicago, Ill.

WRITE TODAY

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

PROVED!

Los Angeles, Calif.

Ferbend Electric Co.,
Dear Sirs: No doubt you will be interested to know that we have installed your "B" Eliminator on eight different eight tube Super-Heterodynes, and that every one is giving complete satisfaction.
(Signed) NATIONAL ELECTRIC COMPANY.

Hawkesbury, Ont., Canada.

Ferbend Electric Co.,
Gentlemen: I am pleased to inform you that I received the FERBEND "B" Eliminator and after giving it a fair trial am glad to say it has exceeded all my expectations. I must say it was money well spent.
(Signed) WILL DOOLEY.

Naugatuck, Conn.

Ferbend Electric Co.,
Gentlemen: My FERBEND "B" Eliminator has been doing fine work since last December. After seven months' use will say that I am very well pleased with it.
(Signed) FRANK S. LOBDELL.

Lincoln, Nebr.

Ferbend Electric Co.,
Dear Sirs: I have found your "B" Eliminator to be very satisfactory and the results obtained were even better than the more expensive ——— which I had been using, as it was free from all hum. I also found that it made the reproduction through the loud speaker fully 50% clearer. I am more than satisfied with the machine.
(Signed) H. W. BRADLEY.

COMPLETE
Nothing else to buy
Replaces "B" Batteries. Operates Direct from Electric Light Socket.

$12.50

FERBEND "B" ELIMINATOR

Many careful buyers choose to adopt a policy of "watchful waiting." With the original announcement of the good Ferbend "B" Eliminator and its amazing low price of $12.50, many there were who chose to wait. They wanted to be convinced. True, thousands bought at the start and **they are the ones who now tell you what to expect.** Lack of space alone prevents us from publishing the hundreds of fine testimonials from satisfied users. They are all in our files open to public inspection at any time. A few reproduced here. The Ferbend "B" Eliminator successfully passed the rigid Laboratory tests of Radio News, Popular Radio and Radio Broadcast. It is a **proved** Radio necessity, and a great one.

FERBEND Wave Trap
This company also manufactures the famous Ferbend WAVE TRAP—the instrument which has been widely imitated but never equalled. It is the only **orignal** and **genuine.** $8.50

Ask Your Dealer—or Send Direct

If you prefer, we will make shipment direct to you upon receipt of price, or C. O. D., if desired. Use for 10 days to convince yourself—if unsatisfactory, write us within that time and purchase price will be refunded. Use the coupon now.

Ferbend Electric Co., 426 W. Superior St., Chicago, Ill.

MAIL THIS COUPON TO-DAY!

FERBEND ELECTRIC CO., 426 W. Superior St., Chicago, Ill.

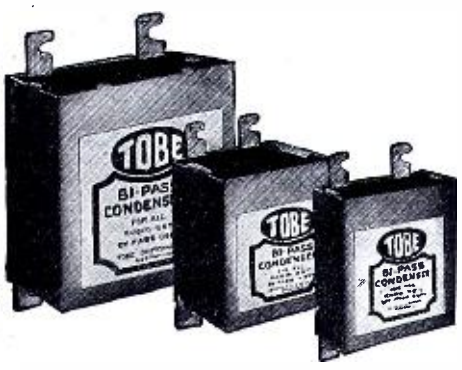
☐ Send at once. Payment enclosed ☐ Send C. O. D. ☐ Send Literature

Name.....

Address.....

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

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



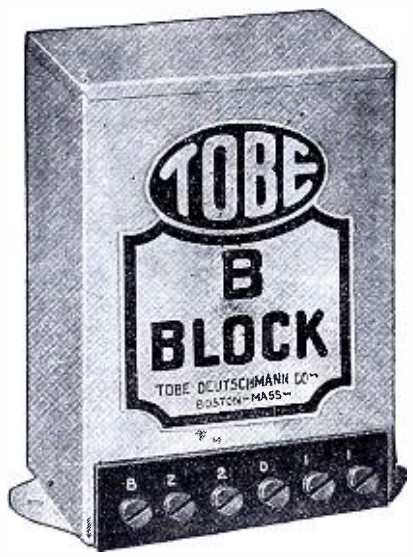
Bi-Pass and Filter Condensers

Hi-Voltage Power Pack Type Condensers for AmerTran Sets

A complete line of Fixed Condensers for set by-passing, for use in filters of Raytheon and Rectron B-Eliminators. and the new TOBE High-Voltage Power Pack Type Condensers, especially designed for use in the AmerTran Power Amplifier.

One quality only,—the best we can make.

In the characteristic silvered, metal cases.



Type 760

The TOBE B-BLOCK contains in one compact metal cased unit, the filter condenser capacities required for the Raytheon B-Eliminator. TOBE Condensers are recommended by the Raytheon Manufacturing Company itself as unsurpassed by any for use with the Raytheon Tube. The TOBE B-BLOCK saves time, saves wiring, saves money. Price $11.00.

(Also made for use with UX-213 Rectron Tube and in other combinations and capacities.)

Vacuum TIPON Loewe-Leak

VERITAS Hi-Current Resistor

The TOBE VACUUM TIPON LOEWE-LEAKS, and the TOBE VERITAS High-Current Resistors, cover the entire Radio requirements for fixed resistances. The vacuum leaks are sealed in a high vacuum and are changeless and noiseless. Adaptable for resistance and impedance-coupled amplifiers and for all grid-leak use in receiving sets. Carry up to 1/10 watt current.

The "VERITAS" Resistors are for use in B-Eliminators and for transmitting grid-leaks and can carry 5 watts continuously. Both types can be soldered into the wiring without damage.

In All Values

We will gladly send you descriptive literature on any or all of these TOBE products, also on TOBE Transmitting Condensers

Tobe Deutschmann Company

Engineers, Manufacturers and Importers of Technical Apparatus

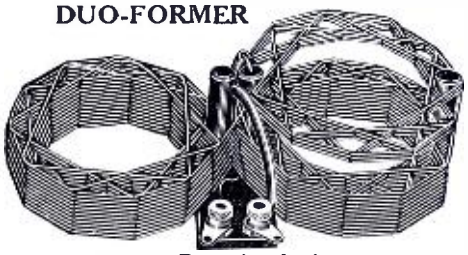
CAMBRIDGE **MASSACHUSETTS**

Gen-Ral Favorites

REGISTERED

Gen-Ral Coils have become a favorite in Chicago, where conditions are most severe, due to their ability to go through local interference and bring in the distant broadcasts.

DUO-FORMER



Pat. Applied

Price $2.50

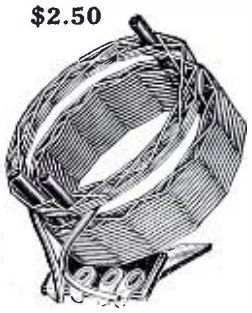
DUO-FORMER

Gen-Ral Duo-Former Coils are built to eclipse past radio performance; to fill the need for higher quality radio reception with an even and undistorted amplification of radio frequency currents; to eliminate the evils of interference between coils and the picking up of outside disturbances; to make possible radio frequency amplification from one to four stages without distortion, producing radio sets combining with distance and selectivity an unparalleled quality of tone.

(Specified in hook-up on page — Other hook-ups sent free on request)

Radio Frequency Transformer

$2.50



The basket-solinoid type of coil of proven ability. The primary winding is adjustable for all conditions. Adaptable for use in sets from 1 to 6 tubes.

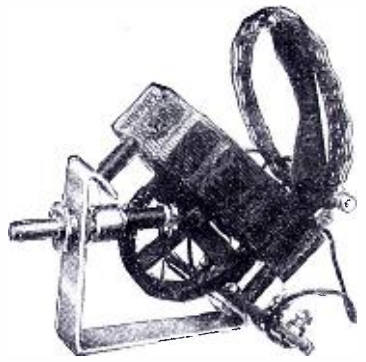
Gen-Ral Team

Used in the standard four tube set which is without a doubt, one of the most successful as an eliminator of local interference and as a distance getter. Write for hook-up.

Free Service

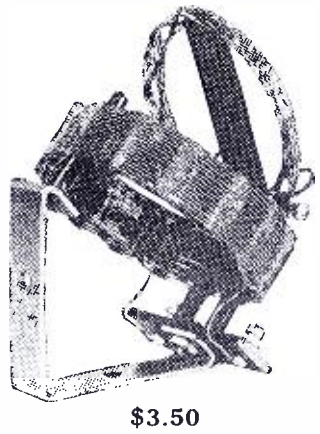
Hook-ups and reprints from one to six tube, will be sent on request.

TUNER



$5.00

ANTENNA COUPLER



$3.50

Ask your dealer or send his name with your order to:

GENERAL MFG. CO.

6637 S. Cottage Grove **Chicago, Illinois**

Manufacturers of Radio Coils and Parts

VICTOREEN
SUPER-HETERODYNE
SUPREME

This wonderful set has proved its great worth during the past season. Thousands of owners are Victoreen Boosters

Unlimited range, tone perfect, greatest possible selectivity, terrific power, can be used either for loop reception or on antenna and ground, change can be made instantly by simply inserting plug in double circuit jack.

DEALERS WANTED EVERYWHERE!
LIBERAL DISCOUNTS!
IMMEDIATE DELIVERIES!

Write for Catalogue and Discount Sheet

List of parts to complete this unequalled set, for the most satisfactory results, as follows:

1—No. 150 Victoreen Oscillator
1—No. 160 Victoreen Antenna Coupler
1—No. 170 Victoreen Input Transformer
3—No. 170 Victoreen Intermediate Transformers
2—Victoreen Rheostats, 30 ohm
2—Victoreen Rheostats, 6 ohm
1—Victoreen Potentiometer, 400 ohm
1—No. 10 Yaxley "A" Battery Switch
1—7x24 in. Hood Rubber Panel
2—.00025 Muter Fixed Condensers with clips
2—2 meg. Muter Grid Leaks
1—.001 Muter Fixed Condenser
1—1 mfd. Muter By Pass Condenser
2—No. 4 Yaxley Double Circuit Jacks
1—No. 3 Yaxley Single Circuit Jacks
75—Tinned Soldering Lugs
8—Benjamin No. 9040 Universal Sockets
2—No. 591 Kurz Kasch Vernier Port Dials
2—.0005 Hammarlund Variable S. L. F. Condensers
1—4½ volt "C" Battery
2—2 to 1 Thordarson Audio Transformers
1—No. 660 Yaxley 7 lead Cable Connector Plug
12—Lengths Celatsite Bus Wire, any color
1—7 in. Binding Post Strip
1—3 in. Binding Post Strip
1—8¼x23 in. Baseboard
1—Working Blue Print, full size

Any one who can solder a joint and read a blue print can make this perfect Superheterodyne, without the services of an expert, as all the laboratory work has been done at the factory and the best skill and the greatest care is taken to place perfect instruments in your hands.

Write us for prices on parts for the famous "Qualitone" Receiver

WE ARE WHOLESALE DISTRIBUTORS FOR THE FOLLOWING LINES:

Kurz Kasch Co.
Acme Wire Co.
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Hammarlund Mfg. Co.
Leslie F. Muter Co.
Micamold Radio Corp.
Thordarson Electric Mfg. Co.
Naxon Laboratories
X-L Radio Laboratories
Hood Rubber Co.
Benjamin Electric Mfg. Co.
Sonatron Tubes
Cunningham Tubes
Cunningham Grid Leaks
Saal Loud Speakers
Bremer Tully Mfg. Co.
Kodel Radio Corp.
Dynamik Chargers
Sterling Mfg. Co.
Heissler Storage Batteries
Diamond "B" Batteries
Meloformer Sales Co.

NELSON ELECTRIC CO.
Telephone Wabash 8719
508 South Dearborn Street
Chicago, Ill.

Oh boy
KESTER
Rosin Core
Radio SOLDER

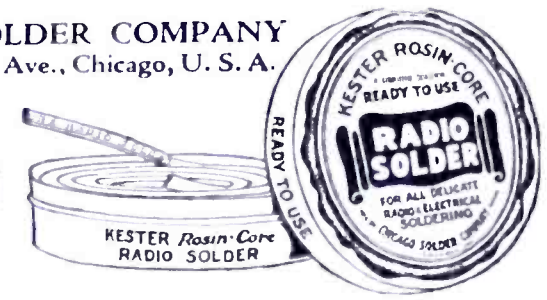
APPROVED by Radio engineers—used by manufacturers of radio and delicate electrical instruments, and yet simple enough for anybody to use. That describes Kester Radio Solder.

Kester is a virgin tin and lead solder of the flat or ribbon type, containing inside itself a pure rosin flux. Just before the solder melts this pure rosin flows to the job in the proper proportion for the amount of solder used.

Kester Radio Solder requires only heat, thereby saving the user the troublesome operation of separate fluxing.

CHICAGO SOLDER COMPANY
4226 Wrightwood Ave., Chicago, U. S. A.

Sure Is Safe and Simple



REQUIRES ONLY HEAT

If your dealer cannot supply you

Chicago Solder Company
4226 Wrightwood Ave., Chicago, Ill.

Gentlemen: Please send me trial can of Kester Radio Solder for which I am enclosing 25c in stamps.

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

Radio Dealers

Reliable service on

Aero Coils
Allen Bradley Co.
Amplion Corp. of America
Amsco Products, Inc.
Balkite
Belden Mfg. Co.
Benjamin Elec. Mfg. Co.
Brandes Products Co.
Bremer-Tully Mfg. Co.
Burgess Battery Co.
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Central Radio Lab.
Daven Radio Corp.
Formica Insulation Co.
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Karas Electric Co.
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Sangamo Elec. Co.
Silver-Marshall, Inc.
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Thordarson Elec. Mfg. Co.
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Weston Elec. Instr. Co.
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and many others

Write for Our New Fall Catalogue
(All the New Parts)

TRADE **Van-Ashe Radio Co.** MARK
MFRS. HIGH GRADE INSTRUMENTS — WHOLESALE DISTRIBUTORS

208 No. 10th Street **St. Louis, Mo.**

2000 RADIO BARGAINS *Here*

A real Radio market. Contains every radio item required by set builders.

KITS—SETS—PARTS
All the Latest Circuits

A postal or letter brings this valuable Radio Book FREE.

RANDOLPH RADIO CORP.
180 N. Union Ave., Dept. 85, Chicago, Ill.

DEALERS *Free!*

Write us on your business letterhead and receive this great catalog of high grade

SETS—KITS AND PARTS

Up-to-the-minute radio merchandise at lowest prices. Every Dealer needs this book.

COLUMBIA RADIO CORP.
711 W. Lake St. Dept. 312 Chicago, Ill.

D-X Tube "Rejuvenator"

Makes old tubes new!

Pays for Itself Immediately

Keep your radio tubes like new instead of throwing them away. Do it yourself with the wonderful D-X Tube Rejuvenator and insure for your set satisfactory reception throughout the year. Especially made for home use, to keep radio tubes at top efficiency and to greatly increase their length of useful service.

Weak tubes mar reception just like weak batteries, besides being a drain on the batteries and causing them to run down quickly. Increases the pleasure of radio reception, adds to volume, increases range and selectivity. Brings back the life in old tubes in a few minutes. Just attach to any convenient electric light socket, either A. C. or D. C. 110-120 volts. Used once a month it will add months, even years, to the life of your tubes. It's simple and easy. Anyone can use it.

Costs but little more than a new tube, yet saves all your tubes for months and even years. Pays for itself the first time you use it. You can even use it to rejuvenate tubes for others and make money so doing. Useful for set owners, set builders, dealers and all radio fans.

Complete with simple directions for operation. Each D-X Rejuvenator carries with it an absolute guarantee of satisfaction. Guaranteed to do the work or money cheerfully refunded.

Made in two models for type 201A tubes or 199 tubes. State which you desire. Order direct from this advertisement and save money during this special offer. Why pay $7.50? Order today —NOW—and know the real satisfaction of keeping your tubes lively at all times.

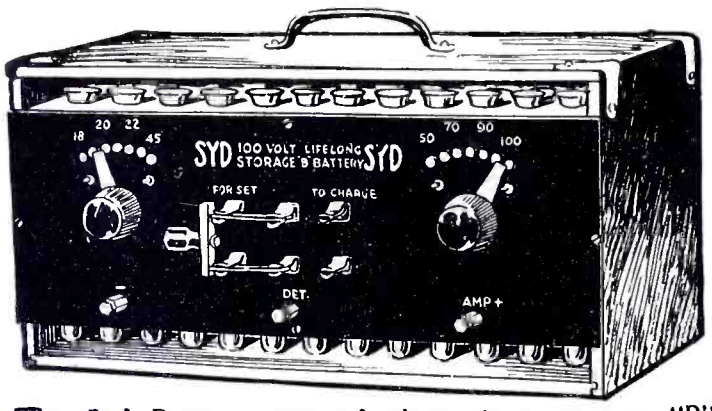
MAIL THIS COUPON TODAY

D-X RADIO ENGINEERS,
Dept. CF, 1010 Hearst Sq., Chicago.

Dear Sirs: Please send me your guaranteed D-X Tube Rejuvenator, postpaid, as per your special offer. Enclosed is $3.65 in full payment. Or, if you wish, send no money. Pay postman on arrival plus postage.

Your Name.....
Street or R.F.D.....
Town..... State.....
Please check type desired—201 A type.....199 type.....

D-X RADIO ENGINEERS
Dept. CF 1010 Hearst Square Chicago, Ill.



SYD 100 VOLT LIFE LONG STORAGE "B" BATTERY SYD

The Syd Battery pictured above is a storage "B" Battery made of Edison Elements, which have nickel and iron in their construction.

The solution used is a preserver of nickel and iron, thereby giving the battery practically unlimited life.

Radio Fans' unqualified approval of the SYD "B" Battery, product of the SYD Battery Co., is founded solely on merit. Experience is a wise teacher and has taught the need of exact voltage at all times to insure greater volume, clearer reception and better selectivity from any radio set. The unvarying adequate power derived from the SYD "B" Battery explains its great and ever-growing popularity.

Operating on an average of 4 or 5 hours daily the SYD Batteries will last six weeks or more on a single charge. The cost of recharging is less than 5 cents. SYD Batteries do not discharge through idleness. The SYD Battery is assembled in a beautiful polished, chemically treated quarter oak cabinet. The Bakelite front panel has a voltage selector switch and various binding posts, which make it easy to obtain voltage from 16 to 100 volts. The battery unit is 14 inches long, 7½ inches high and 6½ inches wide and weighs less than eighteen pounds.

There Are Many Satisfied Users—
Ask Your Friend Who Owns One

MANUFACTURED AND SOLD EXCLUSIVELY BY

SYD Storage "B" Battery Co.

1452½ South Wabash Avenue Chicago

Mail Orders Filled Promptly

The Battery of Many Advantages

Tested and approved by The Chicago Daily News Radio Laboratory.

It is only through our policy of selling direct to the consumer that we are enabled to sell this battery at the remarkable prices of—

100 Volts
Complete with Charger
$15.50

145 Volts
Complete with Charger
$21.50

Laboratory News Notes.

Syd "B" Battery.

The Syd storage "B" battery submitted to The Daily News radio laboratory for a test was found satisfactory. This battery is different from the usual lead sulphuric acid cell type of battery The cells used are commonly known as the Edison cell; the electrodes, or "plates" are of nickel and iron instead of lead, and the electrolite is an alkaline instead of sulphuric acid.

In the hands of the novice the Edison type of cell has the distinct advantage of durability, and ability to withstand neglect and abuse without injury. The battery can be left in a discharged state for any length of time without injuring the plates. Over-charging or heavy loads, even short circuits, have no effect on the life of the battery.

The Syd battery consists of ninety-one Edison cells mounted in a cabinet. Each cell delivers 1.5 volts at full charge. The bakelite front panel has a voltage selector switch and various binding posts which make it easy to obtain voltages from 18 to 100 volts The battery unit is 14 inches long, 7½ inches high and 6½ inches wide. It weighs eighteen pounds

Lowest Prices on RADIO SETS, KITS PARTS and on EVERYTHING IN RADIO!

Randolph Radio Corp.
180 NORTH UNION AVE.
Dept. 87 Chicago, Illinois

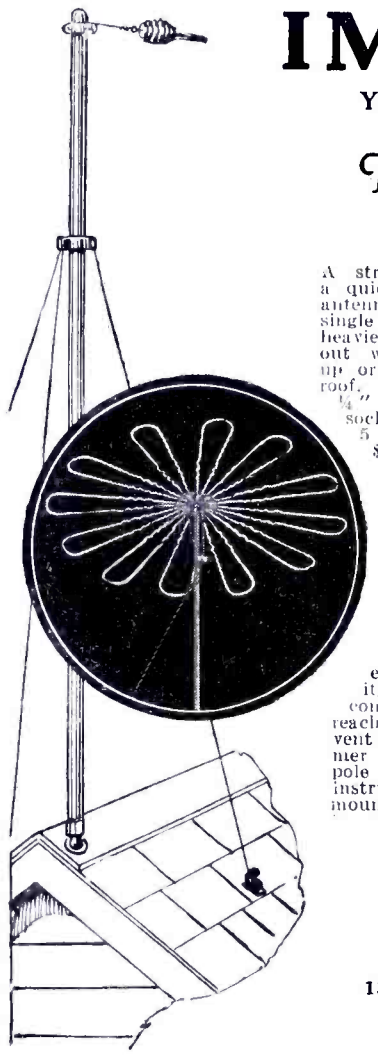
DEALERS Free 1927 Wholesale Radio Catalog

JUST OUT!

A most complete catalog of everything in Radio. All the latest hook-ups. Sets, Parts and kits of every description. Live Dealers need this book. Write on your business stationery.

WRITE TODAY

COLUMBIA RADIO CORP.
711 W. Lake St., Dept. 315., Chicago, Ill.



IMPROVE!

YOUR RADIO RECEPTION BY USING

The REDI-MAST FOR AERIALS

FITS ANY ROOF INSTANTLY

A strong hand-turned rock maple pole which gives a quick, convenient method of erecting a dependable antenna. 5 or 8 foot lengths, will fit any roof—single or multiple wire antennas. Will carry the heaviest sleet covered antenna in strong wind without weakening. Neat in appearance. Can be set up or dismantled without danger of causing leaks in roof. Complete set includes three steel guy rods ¼" in diameter, adjustable pulley, neb irons, roof sockets, anchor pins and full instructions; price, 5 foot mast, each $3.50; 8 foot mast, each $4.25. Ask your dealer.

WAVE-X

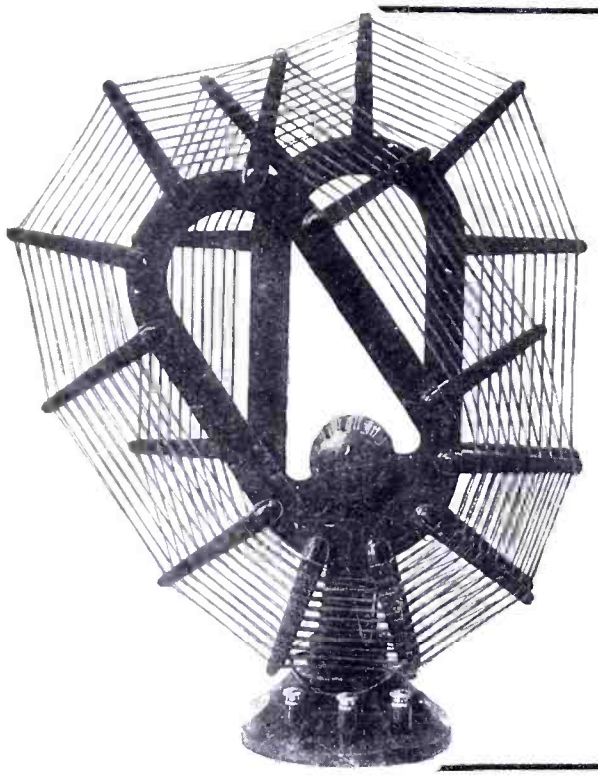
The WAVE-X Condensing Antenna is an aerial that can be quickly erected on wall, chimney or roof, anywhere 5 foot square is available. Several on one roof without interference. Provides sharper tuning, increases selectivity and is non-directional. Twelve durable highly conductive, non-corrosive cast-aluminum feelers reach out in all directions. Perfectly insulated to prevent losses. Only one upright to erect, only a hammer and a screwdriver needed. No. 2, with 8 foot pole ready to install with all accessories and full instructions, $12.50. No. 3, for side wall or chimney mounting, $12.50.

DEALERS

There's a big demand everywhere for REDI-MAST and WAVE-X—write for our dealer sales plan now!

Sales Department
THE ZINKE COMPANY
1323 S. Michigan Avenue
Chicago, Ill.

Manufactured by
PRESSED METAL MFG. COMPANY
Waukesha, Wis.



— TUN-A-LOOP —

The new antenna that will bring any set to the peak of perfection. Will match all tuning dial settings, regardless of the size of the condenser.

TUN-A-LOOP is made of genuine Bakelite, insuring against dielectric losses and eliminating any possible leakage.

Is spider web wound with silk over phosphor bronze wire.

TUN-A-LOOP can be used on any set which has radio frequency, whether tuned, untuned, reflex or straight radio frequency. Gives amazing results on a regenerative set, and also works on neutrodyne sets which no other loop will operate.

TUN-A-LOOP increases volume by covering entire band of wave lengths, assuring higher selectivity in bringing in distant stations. It can be used with portable or non-portable sets and guaranteed to give complete satisfaction.

If your dealer cannot supply you, write for our nearest distributor

ENGLISH-WHITMAN PRODUCTS

120 Broadway **New York City**

The Finest Wholesale-Dealer Proposition in America

DEALER *agents* Radio!

MAKE BIG MONEY

SELLING OUR COMPLETE LINE IN YOUR OWN LOCALITY

WRITE FOR FREE WHOLESALE RADIO CATALOG

The Harry Berg Co.

MINNEAPOLIS

FREE to DEALERS

RADIO SETS KITS PARTS

This wholesale catalog of radio's newest merchandise at money-saving prices.

A handy book for every radio dealer. Your request on your letter head brings it. Write today.

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711 W. Lake St. Dept. 314 Chicago, Ill.

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KITS—SETS—PARTS

All the Latest Circuits

A postal or letter brings this valuable Radio Book FREE.

RANDOLPH RADIO CORP.

180 N. Union Ave., Dept. 85, Chicago, Ill.

1926-1927 **FREE RADIO GUIDE**

NEWEST EDITION

Shows the latest circuits, the newest developments in radio at startlingly low prices. Get the parts you want here and save money. The best in parts, kits, complete manufactured sets and supplies. Orders filled same day received. Write for free copy NOW; also please send names of one or more radio fans.

BARAWIK CO., 401 Monroe St., Chicago, U. S. A.

A. L. Woody, Pantographer **Steven Welsh, Instrument Maker**

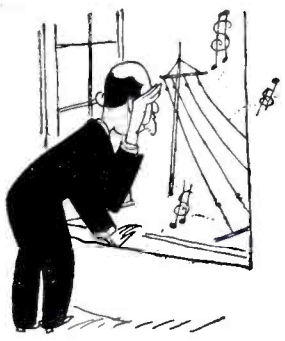
Fine Pantograph Engraving

RADIO PANELS

Our engraving enjoys an honorable reputation among the better class of trade, maintained by dependable service and superior workmanship.

(Also initial work on shell, amber and ivory)

19 So. Wells Street, Chicago, Room 704—FRAnklin 5691



There's a golden tinkle in the air–

Does it reach your ears? All you need is a Rectigon to make music sound like money. And to keep your batteries charged up to their ears with pep. Thus you attain best possible reception at lowest possible cost.

Your Rectigon is good for your pocketbook, as well as batteries. It pays dividends quickly in money saved from the service station. And you always have the power to bring in the best your set can get.

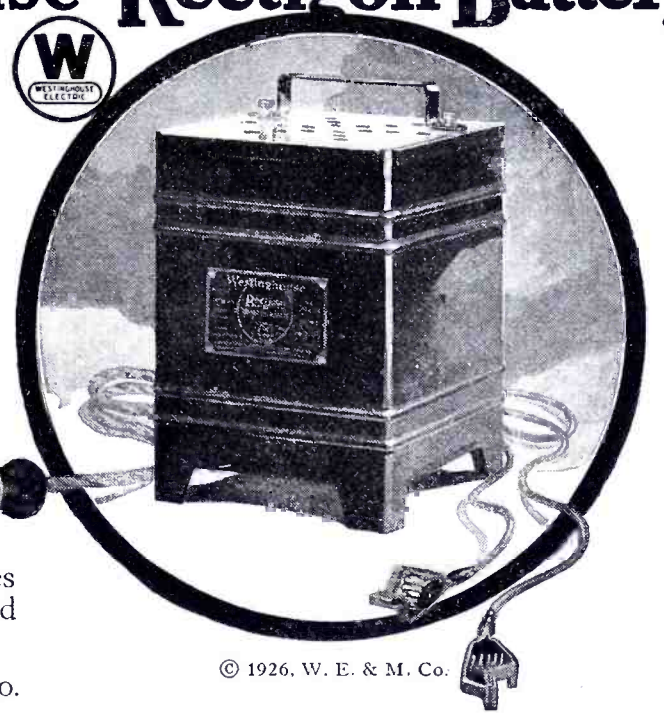
and it comes from charging at home with

The Westinghouse Rectigon Battery Charger

No noise as it charges—not a bit of fuss. You can be sure it will do its work quietly. Not even a murmur from a Rectigon that would disturb the mildest slumber.

No acids, chemicals, no moving parts — nothing to spill or burn. No muss, nor worry, to mar your enjoyment. You'll have no spoiled rugs, ruined clothing.

Snaps on in an instant—just plug into the light socket, snap on the terminals. Saves service station bother. Spares interruptions caused by absent batteries.



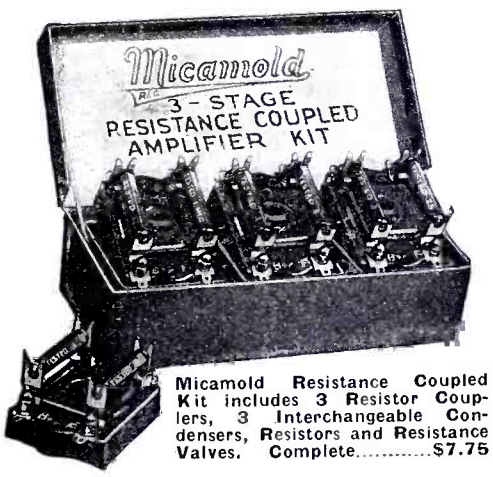
Charges both "A" and "B" batteries — keeps both packed with power. Bulb is used for "B" battery charging and it is enclosed, like all other parts, in metal, safe from accident. (Rectigon charges automobile batteries, too.)

Safety for batteries and set—you'll not wake to find your battery discharged—that can't happen with a Rectigon attached. Should you tune in without detaching the Rectigon from the battery, your set is entirely safe from harm.

THE RECTIGON is a superb Westinghouse product. Things you *can't* see, like extra heavy insulation, things you *can* see, like the durably enameled case — all are of highest quality. Westinghouse manufactures also a complete line of radio instruments, and Micarta panels and tubes.

WESTINGHOUSE ELECTRIC & MANUFACTURING CO.
Tune in on KDKA - KYW - WBZ - KFKX

No Storage Battery Radio is Complete Without a Rectigon



Micamold Resistance Coupled Kit includes 3 Resistor Couplers, 3 Interchangeable Condensers, Resistors and Resistance Valves. Complete.....$7.75

Micamold Condensers constructed of Mica and sold in every desired capacity. Moulded in genuine Bakelite. Priced in accordance with capacity. From ..... .35c

Micamold Heavy Duty "B" Eliminator Resistors—adopted as standard by Raytheon. Price.....$1.00

Micamold Condenser-Resistor Combination Unit. .00025 Mica Condenser with any rating of resistor desired....85c

Micamold Resistors are overlastingly permanent and indestructible.

Micamold

Precision Made Radio Products

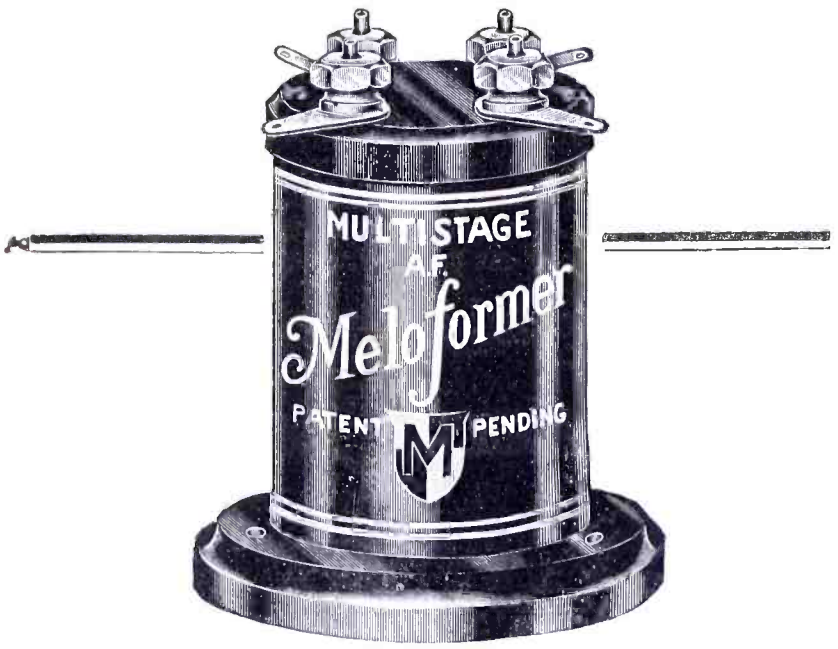
"Moulded in Genuine Bakelite"

Manufacturers, Experimenters and Amateur Set Builders find Micamold Radio Products indispensable because of their being everlastingly constant. Each Unit is moulded in genuine Bakelite, thus indestructible and unchangeable in their values or capacities. They can be soldered right into the set without endangering their usefulness. Since they are uneffected by climatic changes, Micamold Products are guaranteed to give absolute satisfaction.

If your Dealer cannot supply you write direct and they will be forwarded immediately upon receipt of price

MICAMOLD RADIO CORPORATION

Flushing and Porter Avenues **Brooklyn, N. Y.**



CERTIFIED

AUDIO AMPLIFICATION

That's Better!

MELOFORMER has come to mean amplification without distortion, interstage coupling and rasping noises. It is the only transformer that has successfully operated *four* stages of audio. For sale at all dealers, who handle quality instruments, for $4.00.

Watch for Melocoupler—the new big idea in R. F.

ROBERTSON-DAVIS CO., Inc.

412-420 Orleans St., Chicago

MELOFORMER

New Low Price $18.50

The KODEL MICROPHONE *Loud Speaker*

An exact replica of the microphones the broadcasting stations use—The Kodel Microphone Loud Speaker is the successor to the horn and the cone. Its unique, snail-shell horn construction produces tremendous volume—faithful reproduction of the entire scale. Every note, every sound as rich and true as when it entered the broadcasting microphone in the studio.

Any radio dealer can show you the Kodel Microphone Loud Speaker.

Write for descriptive literature

THE KODEL RADIO CORPORATION
510 E. Pearl St. Cincinnati, O.

Owners and Operators of Broadcasting Station WKRC

VOICES OF THE AIR PURE *and* RESONANT

Cone Speakers have made all other types obsolete. For only Cone Speakers can reproduce, without distortion, all tones within range of the human ear. And when the cone itself is Alhambra FONOTEX you have the added advantage of a speaker that gives to all tones depth and roundness unobtainable with any other material; for Alhambra FONOTEX has no resonance point of its own. Used on finest Cone Speakers. The SEYMOUR CO., 329 W. 16th St., N.Y.

ALHAMBRA

FONOTEX

PRODUCT AND PROCESS PATENTED

FOR CONE TYPE LOUD SPEAKERS

FREE

Simply write us a postal or letter and we will send you, absolutely FREE

THIS 84 PAGE BARGAIN RADIO CATALOG

contains everything in radio, including the latest KITS, SETS, PARTS, SUPPLIES. Lowest prices. Be sure to get our book.

WRITE FOR A COPY NOW

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180 N. Union Ave., Dept. 86
Chicago, Ill.

1926-1927

FREE RADIO GUIDE

BARAWIK'S NEWEST EDITION

Shows the latest circuits, the newest developments in radio at startlingly low prices. Get the parts you want here and save money. The best in parts, kits, sets and supplies. Orders filled same day received. Send coupon for free copy NOW; also please send names of one or more radio fans.

BARAWIK CO., 401 Monroe St., Chicago, U. S. A.

BARAWIK CO., 401 Monroe St., Chicago.
Send me free copy of the new Barawik Radio Catalog and Builder's Guide.

Name.....

Address.....

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Address.....

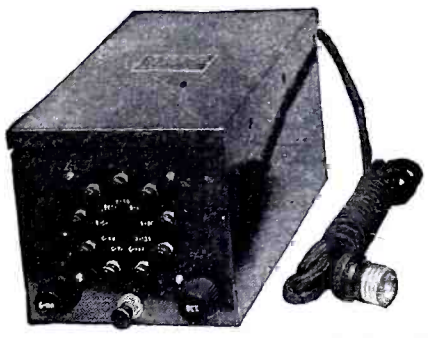
FREE to DEALERS

This wholesale catalog of radio's newest merchandise at money-saving prices.

A handy book for every radio dealer. Your request on your letter head brings it. Write today.

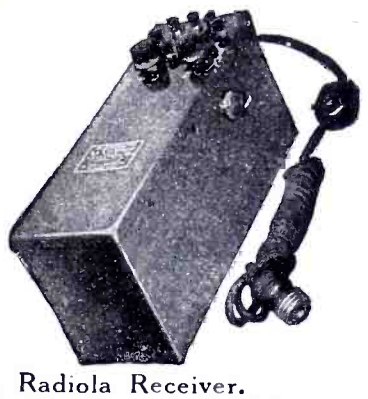
COLUMBIA RADIO CORP.
711 W. Lake St. Dept. 314 Chicago, Ill.

NEW DEWITT-LAFRANCE SUPERADIO ELIMINATORS



Powerful—Silent
"A" "B" "C" Supplies

Watch for our $28 model



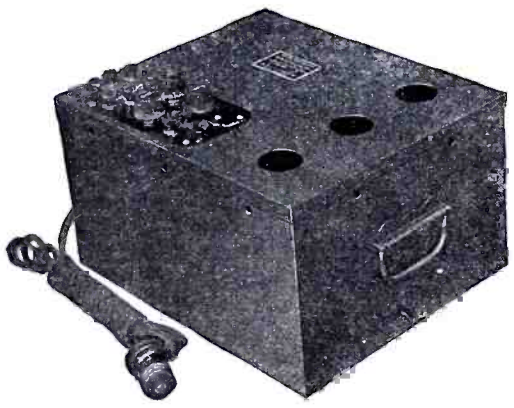
Model "A" Specifications

Size—Case only 11" long x 6" wide x 5½" high
Size—Overall 12¼" long x 6" wide x 5½" high
"B" Supply Taps, Detector 0-80 volts variable, 45 v., 67 v., 90 v., 135 v., "C" Supply Taps 4-, 9-, variable 0-40-.
Maximum Output 180 v. at 70 milliamperes.

Price, $42

Model "C" Specifications

Designed for use with Radiola Receiver.
Size—Case only 12½" long x 4⅛" wide x 5½" high
Size—Overall 12¾" long x 5" wide x 6⅝" high
"B" Supply Taps Detector 0-80 volts variable, 45 v., 67 v., 90 v., 135 v.
"C" Supply Taps 4-, 9-, Variable 0-40-
Maximum Output 180 v. at 60 milliamperes. **Price, $47**



Model "F"

SUPERADIO Power Unit Model "F" consists of a Model "C" Eliminator, complete wiring and compartments for a G. E. Trickle Charger and a storage "A" Battery up to 10⅛" x 7" x 4⅝" in size. Such as Philco No. UD 86. Auxiliary switch with 10 feet of cable and a G.E. master switch for controlling all units.
Price, less battery and trickle charger.... **$60**

Dynometer

The SUPERADIO DYNOMETER is direct reading and will tell you how good your tubes are, how you can use them and where. You can get an engineer's result without experience, tubes being tested at the rate of 3 per minute. True Dynamic readings are obtained with Laboratory accuracy. List price with phones and plug..... **$120**

DEWITT-LAFRANCE CO.
Cambridge, Mass.

Western Radio MFG. CO.

BIG CATALOG OF BIG VALUES

134-138 W. Lake St, Chicago Ill.

Send for our new catalog
Only standard first quality merchandise is offered in our big NEW 1927 Catalog for dealers. Write at once.

CONSTANT POWER

FOR THE "A" CIRCUIT ON YOUR RADIO

Using **SILITE**
The Wonder Rectifier

PRACTICAL
EFFICIENT
NOISELESS AND
ECONOMICAL
Beyond Belief

Costs only 1/15 cent per hour to operate. No tubes or parts whatever to replace. Fully guaranteed.

Sets requiring 6 volts operating on 110 volt 50-60 cycle house lighting current ..... **$27.00** Other sizes to meet all requirements.

It's remarkable the difference a CONSTANT POWER makes in a radio receiver. It operates your tubes always at their maximum efficiency. Stations roll in with greater power and more volume—a sweetness of tone that was formerly possible only when your battery was at full charge. Positively no hum or distortion and is not affected by variations of line voltage, as the current is actually supplied by a quality storage battery, which in turn is automatically kept at full charge by the marvelous SILITE system of rectifying the house current.

Radio-Rubr Storage Battery Corporation
2012-14 Locust Blvd. St. Louis, Mo.

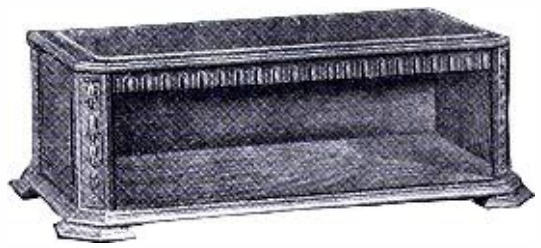
Your Dealer Has It
If not, have him write us, or write direct

FRITTS RADIO CABINETS

The Choice of Leading Engineers

when showing their new hookups. Regarded by the trade as the finest Radio Cabinets made.

STANDARD SUPER



The original Italian Chest Type in Motif—SOLID WALNUT, Four Post construction. Top and sides have raised panel effect. Carvings slightly Polychromed.

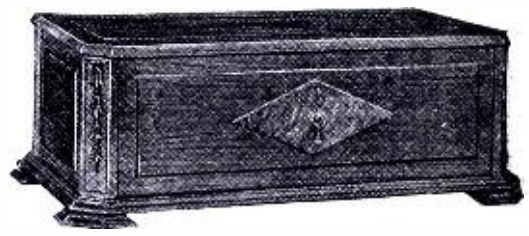
SOLID WALNUT

Made in all standard panel sizes, from 18 in. to 30 in. Inside depth 12 in. Inside height 8 in.

SUPER VESTA

Identical in outer design and finish to the Standard Super. Has Instrument Panel Door with Diamond Insert of genuine Burled Walnut—Handle, Antique Brass. Top Panel strip (back of door) has inverted Panel Lighting, an exclusive feature on Fritts Cabinets only.

Made in all standard panel sizes, from 21 in. to 30 in. Inside depth from panel to back 11 in. Inside height 8 in.



SOLID WALNUT

Finish: The best known to the trade, viz.: Dark walnut varnished. Hand, water and oil rubbed.

Our line includes also, Consolettes and Radio Tables. Descriptive leaflets and prices upon request.

D. H. FRITTS & CO.

604 Hearst Square Chicago, Ill.

"B" BATTERY ELIMINATOR

Only $7.95

Money-Back Guarantee

Stop being a slave to the "B" Battery nuisance! Throw the old-fashioned cells in the ash can! Hook up a new Roll-O "B" Battery Eliminator in 30 seconds and forget battery troubles forever. This wonderful device means better reception, sharper tuning. Ends that annoying hum. Gives you more real pleasure from your set.

COMPLETELY EQUIPPED—NO "EXTRAS" TO BUY

Operates perfectly on direct or alternating current. Simple directions inclosed—anyone can plug it in to any kind of set. Constant voltage gives your set more power without danger of burning out tubes. Costs no more than a set of good "B" Batteries. Solidly built. Enclosed in beautifully finished metal case.

SEND YOUR ORDER NOW

Make your radio a real pleasure—don't blame the set because run down "B" Batteries won't let it work right. Order your Eliminator NOW. Write your name and address on a piece of paper, pin a dollar bill to it, and mail it TODAY. Pay postman balance ($6.95 plus a few cents postage) when he delivers your eliminator. Use it five days. If not more than satisfied, return it and get your money back.

SPECIAL—Write for facts about combination Roll-O "A" Battery Trickle Charger and "B" Battery Charger—Only $2.95. Also two-ampere Battery Charger, $5.00.

THE ROLL-O RADIO COMPANY, Dept. 2
Third and Sycamore Sts., Cincinnati, Ohio

Hoyt

Universal "Tip-In" Meter
And 2-Range Mounting Block

The HOYT UNIVERSAL "TIP-IN" Voltmeter is a Type 17 moving-coil meter, for use with Radiolas Nos. 20, 25, 26 and 28 and other Radio sets, equipped with tip-jacks in the filament circuit. Marked in red at 3 volts.

With it can be furnished a mahogany table-mounting block, with built-in multiplier, converting the meter into a 2-range general-purpose voltmeter—0-6, 0-180 volts.

Meter only—$7.50
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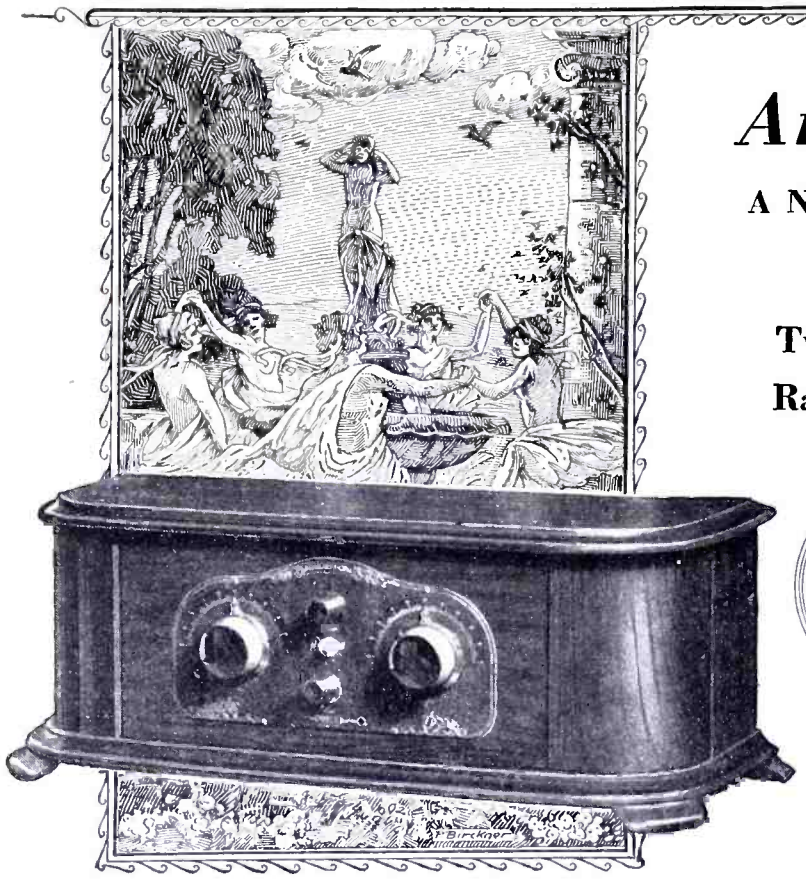

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Amazing value features the new ARBORPHONE 5-Tube Receiver. In appearance and in performance the ARBORPHONE matches, yes excels, point by point, sets listing for more than twice its price.

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The new model boasts many refinements of the same proved ARBORPHONE circuit now being used by thousands of satisfied owners.

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OUR laboratory tests each piece of apparatus before sending to you, insuring its fullest efficiency — no charge for this service.

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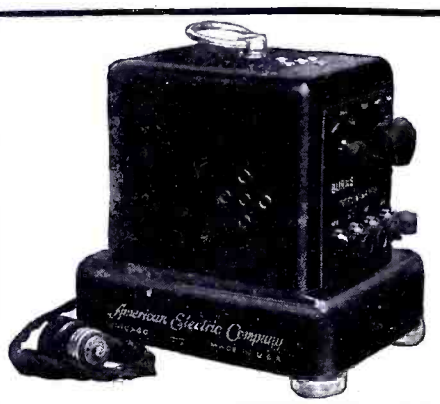

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The Eliminator you have been waiting for. Delivers always the same correct plate voltage. Operates from house lighting current. No acids, no hum. Small neat case.

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Kit sets also furnished for those who wish to build their own eliminator.

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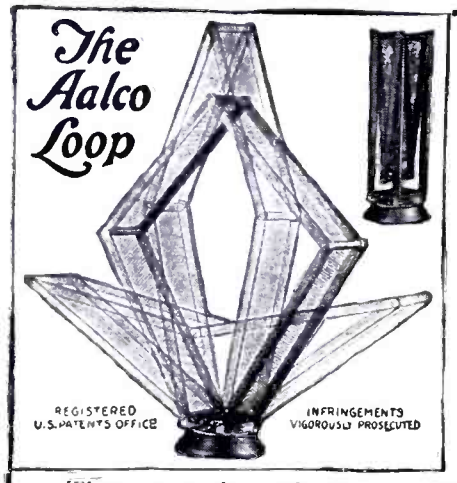

The same excellent workmanship and quality at a new price of **$12.50.**

We also announce our new type 35 loop, which tunes with .00035 variable condenser which makes it possible to **use with all tuned radio frequency, Neutrodyne, Browning Drake, and others.** This information on request. Also at **$12.50.**

These are the only loops which actually collapse without the wire becoming loose and tangled.

Extremely low resistance and fine appearance. Woodwork of genuine walnut with felt bottom to protect furniture. A beautiful addition to any home.

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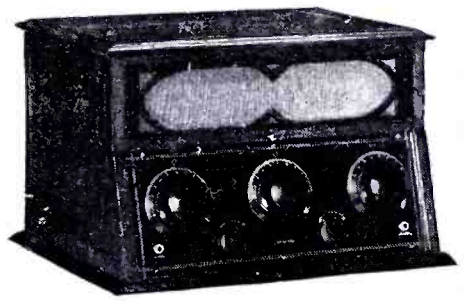

The Gould Serenader

People who know radio, appreciate the value of Gould Radio Receivers. Here is shown the 6-tube Serenader Consolette with speaker, at $85. We have other models from $49.50 to $185. Write for literature.

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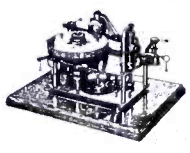

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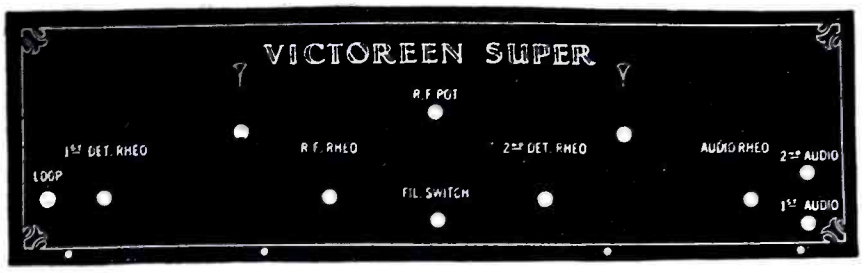

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for the

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An I. C. A. Panel of Insuline or Bakelite, drilled and decorated according to standard specifications, gives your set that "factory-built" appearance which is always so desirable in the home-built set. Either of these well known panel materials also insures you the utmost in dielectric strength, durability and beauty.

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I. C. A. Insuline Panel for 8-Tube Victoreen Super-Heterodyne, 7x24x3/16 in., Black or Mahogany, $4.75. Same for 5-Tube Qualitone, $4.50. In "Frieze" finish for Victoreen, $5.50. "Frieze" finish for Qualitone, $5.25.

I. C. A. Bakelite Panel for 8-Tube Victoreen Super-Heterodyne, 7x24x3/16 in., any finish, $7.00. Same for 5-Tube Qualitone, any finish, $7.00.

I. C. A. Panels can be had for any popular circuit, including the following:

Citizens Call Book 45 Kilocycle Super.—9 Tubes
Citizens Tuned Radio Frequency—5 Tubes
Radio Broadcast Universal—4 Tubes
B. T. Counterphase—6 Tubes
Hammarlund-Roberts—5 Tubes
Browning-Drake—5 Tubes
B. T. Nameless—5 Tubes
Freshman Type T. R. F.—5 Tubes
Madison Moore Super-Heterodyne—8 Tubes
Fenway Super-Heterodyne—9 Tubes
Best Super-Heterodyne—7 Tubes
Silver Six—6 Tubes
Cockaday L. C. 26—5 Tubes
Rasla Reflex—2 and 3 Tubes
Raytheon "B" Eliminator Panel

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FANS! Before building any circuit write for our FREE BOOKLET giving complete list of Insulating Parts, Mounting Brackets, Foundation Units, etc. Also for full particulars of the New I. C. A. Non-Microphonic Socket.

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METAL long has been recognized as the best of electrical conductors. The *Lynch* Metallized Resistor gives *conductive, non-arcing* resistance that means absolutely silent operation, permanent accuracy, dependability.

Leading engineers, test laboratories and experimenters have found that this fixed resistor wins in the acid tests of time and service. It marks as great an advance in its field as did the tungsten lamp over the old carbon bulb. If your dealer cannot supply you, we will ship postpaid—same day order is received.

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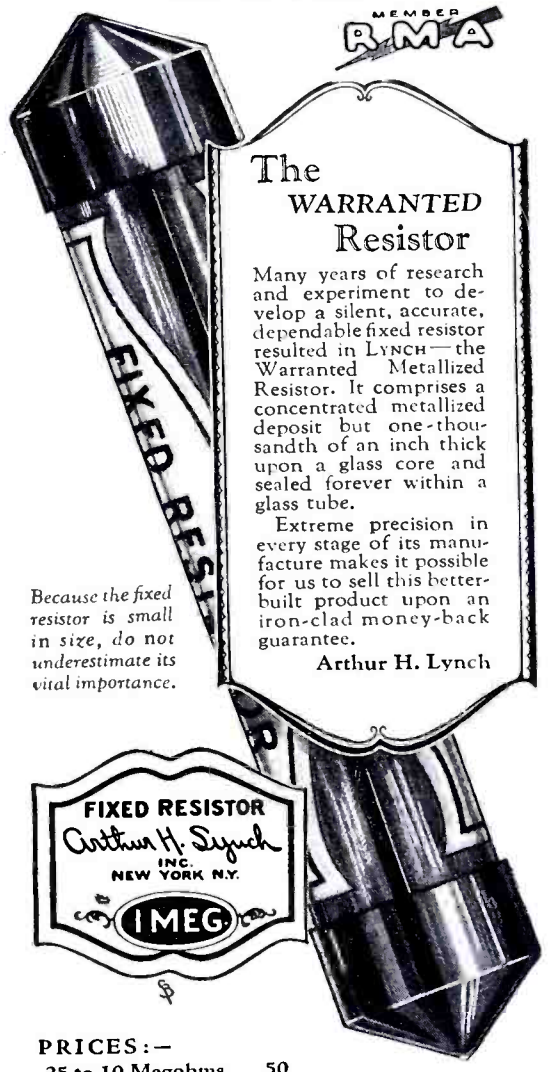

Because the fixed resistor is small in size, do not underestimate its vital importance.

The *WARRANTED* Resistor

Many years of research and experiment to develop a silent, accurate, dependable fixed resistor resulted in LYNCH—the Warranted Metallized Resistor. It comprises a concentrated metallized deposit but one-thousandth of an inch thick upon a glass core and sealed forever within a glass tube.

Extreme precision in every stage of its manufacture makes it possible for us to sell this better-built product upon an iron-clad money-back guarantee.

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PRICES:—

.25 to 10 Megohms	.50	Single Mounting	.35
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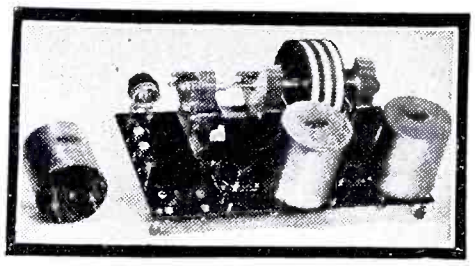
LYNCH METALLIZED FIXED RESISTORS

Welty Radio Products

A new Welty unit. Two step tuned R. F. all wired and ready to install in any set. The condenser of NaAld make with localized tuning dials extending through the panel. All condensers may be operated simultaneously or separately. Equipped with either copper, shielded or unshielded R. F. coils of the plug in type. Absolutely dependable. Exceptional selectivity. Excellent tonal quality.

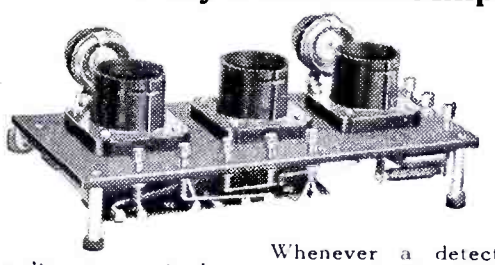


Welty's R. F. Amplifier Unit

Price, with Shielded Coil..... **$32.50** With Unshielded Coils..... **$28.50**

Separate Coils, Shielded..... **$12.50** Unshielded..... **$8.50**

Welty's Detector-Amplifier Unit



Can be used in any receiver. Extremely compact. Size 4¼x9½. All strictly high class parts. Universal sockets. Distortionless transformers. Handles volume of any set. Only 4 connections necessary to hook up to any tuning apparatus. Switch and jack. Whenever a detector and two stages of audio are required you can use it. Saves time in building. Price for three circuit..... **$19.50**

For five tube..... **$22.50**

Also type B amplifier, with 3 steps combined resistance, impedance and transformer amplification. None better. Price..... **$26.50**

Welty's Super Kit

Kit includes Antenna Coupler, Oscillator Coupler, Special Variable Condenser, Tuned Input Transformer, 3 Matched Intermediate Transformers and hardware. Complete with booklet, diagrams, assure perfect success. Order now. At our store or by mail. Price..... **$17.50**

Complete Kit (all parts)..... **$73.50**

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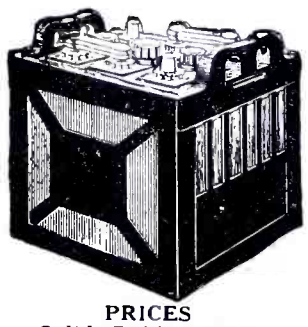

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Famous for unexcelled quality, guaranteed long-lived service and unvarying dependability. Chicago Batteries offer the Radio Fan an "A" Power that is backed by years of experience and master workmanship with the finest materials available. Endorsed and approved by leading Radio Authorities. Chicago Batteries in their new non-leak, solid rubber cases represent an amazing value at lowest cost.

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Easy to Solder This New Way

Indispensable for all soldering work. Simple—Speedy—Economical.

$3.75 Complete

Includes five feet insulated wire, two-piece detachable plug, and comes loaded with stick of solder.

Press-to-Feed Electric Soldering Iron

One hand does the work of two. Speeds up radio set construction. Simplifies all kinds of soldering work. Far better than a blow torch. Solder will not melt until it reaches Soldering Point. Porcelain insulation prevents heat from entering handle. Takes standard size No. 10 rosin core solder wire.

Radio set building requires a lot of soldering work. Press-to-Feed is indispensable to radio assemblers in shops or at home.

DEALERS—JOBBERS AGENTS

This newly invented electric soldering iron offers big money-making opportunity. Order a sample today—$3.75. Discounts in quantities on request. Write to

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A Universal Range Variable Resistor

Maximum Capacity 20 Watts

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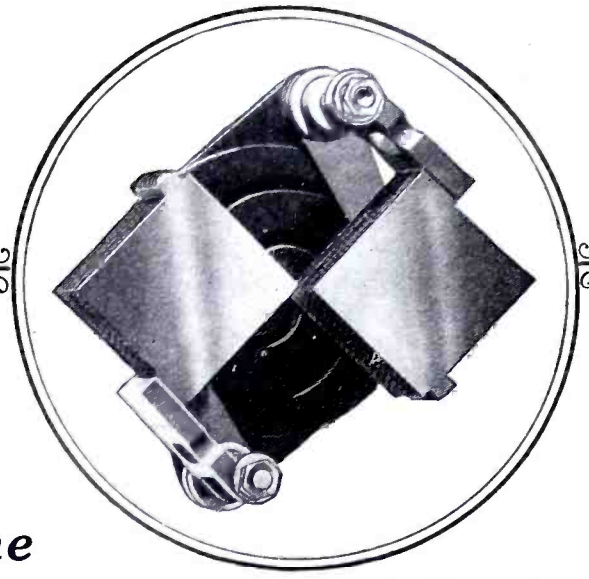
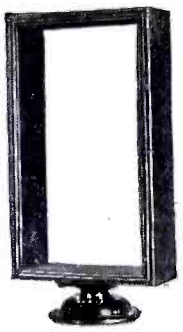


The SIGNAL Spiral Cam Condenser *is still new!*

The Signal Spiral Cam Condenser is still new a year after its introduction to Radio. Nothing has since been developed that offers the selectivity and precision found in the Signal Cam Condenser. The efficiency is all in the patented cam. By means of this cam, wave lengths are distributed evenly over 360 degrees of the dial. The unit is just as compact as the average semi-circular condenser but far more efficient. Resistance losses are very low and the dielectric is entirely out of the condenser field.

It is built in the three standard capacities, .00035, .00025, and .0005, with provision for single or three hole mounting and the attachment of air core transformers directly in the condenser.

SIGNAL Table Type Loop Aerial



Here is a loop aerial that is just about the last word. You will note from the illustration that it presents a beautiful appearance and may well be used with the finest of radio equipment. Made of walnut veneer with a really good-looking antique finish. Height over all 23¾ inches. Has three taps for sets requiring them. There are no wires to get twisted. Positive plug contacts in base. Improves both reception and appearance of your set. Complete at your dealer, $8.50.

The SIGNAL Bracket Type Loop Aerial (not illustrated) is just as fine an aerial as the new table type. It attaches right to cabinet of your set itself and can be turned a complete 360° in a space no greater than the width of the average loop aerial receiver. Built of solid walnut. All metal parts heavily nickel plated. At your dealers, $8.50.

SIGNAL Radio Cabinets

SIGNAL radio cabinets are built of thoroughly seasoned wood, insuring permanent joints and freedom from warping and checking. Workmanship is of the highest grade. Cabinets are hand rubbed to a high piano finish.

Type F

Type "F"

Built of southern willow — mahogany finished. Has hinged top with brace and shaped feet.

Number	Panel	Depth
F1810	7x18"	10"
F2110	7x21"	10"
F2410	7x24"	10"
F2610	7x26"	10"
F2810	7x28"	10"

Type S

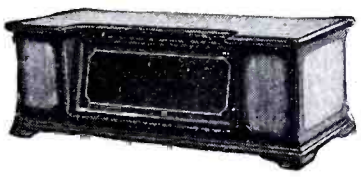
Type "S"

Built of solid walnut with American walnut finish. Has full piano hinge with brace and full shaped base.

Number	Panel	Depth
S1810	7x18"	10"
S2110	7x21"	10"
S2410	7x24"	10"
S2610	7x26"	10"
S2810	7x28"	10"

Type "C"

Made of solid walnut with two tones antique walnut finish. End compartments for batteries or B-Eliminators. Has gracefully curved lines. A delux cabinet beautifully finished. Furnished with Veneer Wood Panel to match.



Type "C"

Number	Panel	Depth	Compartments
C18	7x18"	12"	5 ½ x9x12
C21	7x21"	12"	5 ½ x9x12
C24	7x24"	12"	5 ½ x9x12

Your dealer can get any of these three sizes for you—ask him for prices.

Jobbers and Dealers

SIGNAL Radio Parts are built by a company with over thirty years of experience in the manufacturing of electrical equipment. Quality and performance are the requisites of every piece that leaves our factory. If you are not acquainted with our line, write us at once for complete information.

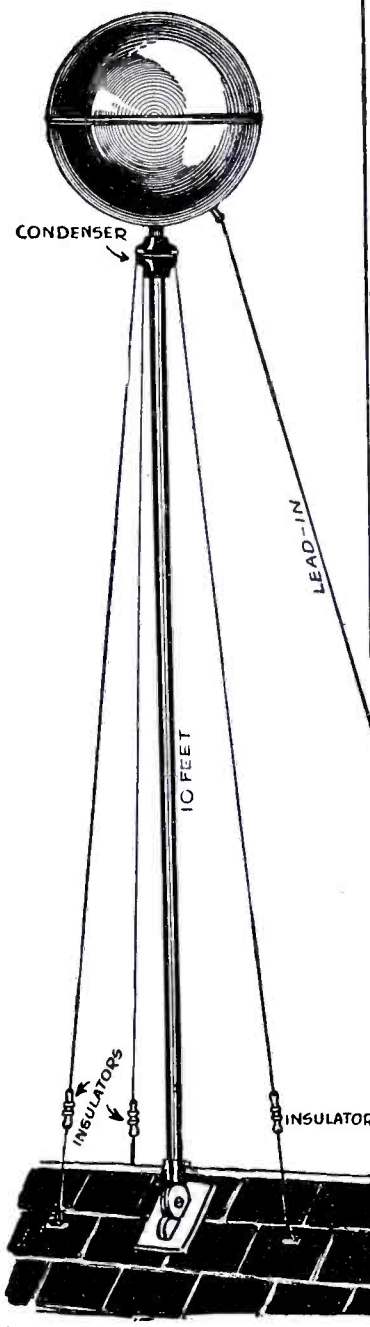
Signal Electric Manufacturing Co.

1919 Broadway **Menominee, Mich.**

Branches in All Principal Cities

The *Super-Ball* Antenna

Increases Selectivity
Minimizes Static
Thousands of Satisfied Users



Unique Features of the Super-Ball Antenna

Increases selectivity
* * *
Clarifies tone
* * *
Minimizes static
* * *
Non-directional
* * *
Easy to install
* * *
Less costly to erect
* * *
Sheds snow and ice
* * *
Not affected by heat
* * *
Will not corrode
* * *
Lasts a lifetime

Write today for full information

YAHR-LANGE, Inc.

National and International Distributor

207-215 East Water St. **Milwaukee, Wis.**

(Continued from page 198)

A complete kit may be purchased containing all parts necessary to build this eliminator. The Molliformer choke has an inductance of 125 henries at 60 cycles and is sufficient to eliminate all AC hum even as low as 25 cycles.

Full wave rectification is accomplished by means of the bridge circuit shown in schematic diagram.

The chemical furnished with kit is self forming and the cells, once they are formed, are ready for service in 10 to 20 seconds.

The amplifier voltage is adjustable by varying the size of the lamp in the primary circuit. The unit delivers from 90 to 125 volts. Its capacity is 90 volts at 35 mills.

Manufactured by C. E. Jacobs, 2802 North Kedzie Avenue, Chicago.

(If any further information is desired regarding this product, write the manufacturer direct.)

The New Crosley Musicone Radio Table

A popular table upon which to place receiver measures 28 inches across and has one of the new Crosley cone type speakers built in. Very neat in appearance and finely finished, has space to accommodate accessories, such as "B" eliminators, 6-volt "A" battery, charger or any other accessories.

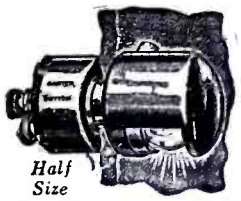
Manufactured by Crosley Radio Corp., Cincinnati, Ohio.

(Any additional information will gladly be supplied by the manufacturer direct.)

CARTER

RADIO PRODUCTS

MEMBER RMA



Half Size

Dial Light.....$1.75

Half Size

"IMP" Battery Switch..65c

Time moves on and with each succeeding year Carter factories expand and increase production.
The confidence of the Radio buyer in Carter products alone makes this possible. It is our constant endeavor, by ever seeking for improvements and new ideas, to continue to hold your regard.

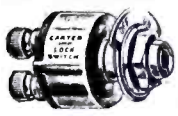
Half Size

Short Jack, Open Circuit ....25c ea.
Closed circuit .....30c ea.

(Half size)
Tip Jack, 10c ea.

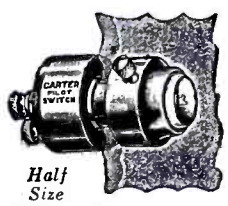
Half Size

"IMP" Jack, 30c ea.



Half Size

Lock Switch.....75c

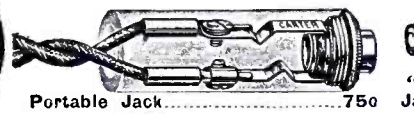


Half Size

"IMP" Pilot Switch $1.50

"MIDGET" Rheostat 50c
(All resistances)

Half Size



Portable Jack.....75c

"HOLD-TIGHT" Jacks, 70c to $1.30

Half Size

Inductance Switches $1.00 to.....$1.25

Jack Switches, 4 Combinations of Springs, $1.00 to.....$1.60

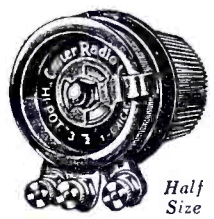
Half Size

"TU-WAY" Plug.....60c

"HI - OHM" with Filament Switch combined ..$2.50
(½ meg. and other resistances)

Half Size

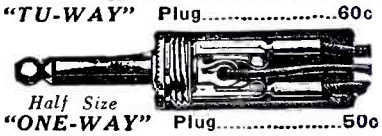
"HI-OHM" $2
Volume Control



Half Size

"HI-POT" $2.25
Volume Control

Fixed Condensers



Half Size

"ONE-WAY" Plug.....50c

Half Size

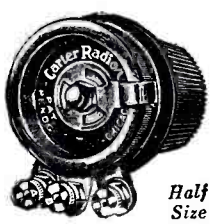
"IMP" Plug.....15c

Half Size

New Fixed Resistance Unit, 3, 4, 6, 10, 15, 20, 25 Ohms, 15c each

Half Size

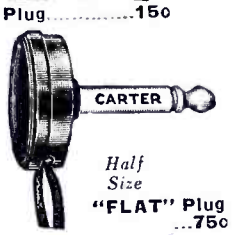
"IMP" Rheostat....$1.00
2, 3, 6, 10, 15, 20, 30, 40, 50 and 75 ohms



Half Size

"IMP" Potentiometer $1.25
200 or 400 ohms

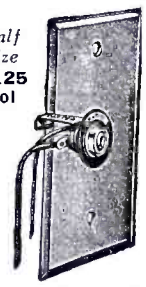
Carter Radio Co.
300 S. RACINE AVENUE
CHICAGO, ILL., U.S.A.



Half Size

"FLAT" Plug ...75c

New "IMP" Loop, $7.50



¼ *Actual Size*

Receptacle Jack 80c

Offices in Principal Cities of the World

In Canada: Carter Radio Co., Ltd.
Toronto and Winnipeg

Ask Your Dealer

FREE

This Wonderful Book

Radio's great market place. Contains everything the set builder needs, at the lowest prices. All of the very newest hook-ups and standard

Sets—Kits—Parts

Over 2000 items, including the new Ampliphonic Console Sets, Spanish Period Consoles, five, six, seven and eight tube sets, with three dial, two dial and the popular Single Simplified Control. Kits of every standard and popular circuit. Parts and supplies of every conceivable description.

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We handle RADIO EXCLUSIVELY. Our tremendous volume of business enables us to contract for large quantities of Radio Goods at most advantageous prices. That's why we can save you money on everything in RADIO.

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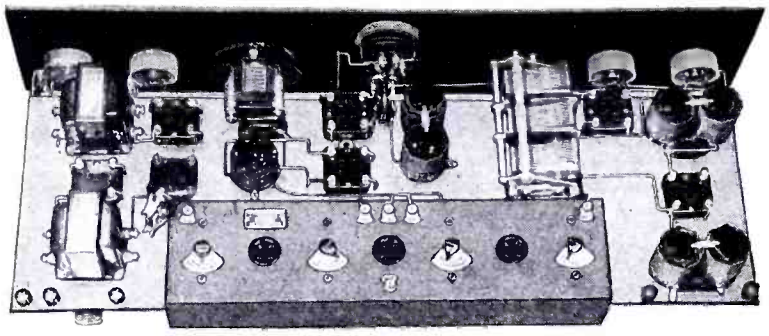
Save Money

New 1927 Catalog

RANDOLPH RADIO CORP.
180 N. UNION AVE. Dept. 89 CHICAGO, ILL.



Rear View of Infradyne Circuit

INFRADYNE

Parts as Specified in Citizens Radio Call Book

1—7x28x3/16 in. Formica Panel (Engraved)	$ 6.85
1—Remler Type 700 Infradyne Amplifier	25.00
1—Remler Type 630 .00035 Mfd. Variable Condenser	5.00
1—Continental .00035 Mfd. 3 Gang Vernier Condensers	9.50
1—Weston Model 506, Type 217 0-7-140 Voltmeter	9.00
1—Pr. Benjamin Type 8629 Shelf Brackets	.70
1—Benjamin Type 9040 UX Cushion Socket	.75
1—Frost No. 710 10 Ohm Rheostat	.50
2—Frost No. 730 30 Ohm Rheostats	1.00
1—Frost No. 608 Filament Switch	.30
1—Frost No. 954 Gem-Jack	.45
1—Frost No. 234 Pan-Tab Jack	.75
1—Frost No. 235 Pan-Tab Jack	.85
1—Frost No. 880 50,000 Ohm Variable Resistance	1.50
6—Frost No. 530 UX Sockets	2.40
1—Set Camfield Type 22K Duoformers	10.00
1—Camfield No. 23 Oscillator Coupler	1.50
2—Thordarson Type R200 Audio Transformers	16.00
2—Kurz-Kasch Aristocrat Vernier Dials	4.00
1—Jones Type BM Multiplug	4.50
1—Carter 2 Ohm Fixed Resistance	.15
3—Carter 4 Ohm Fixed Resistances	.45
2—Sangamo Mfd. By-Pass Condensers	2.50
2—Sangamo .00025 Mfd. Fixed Condensers	.80
1—Sangamo .0005 Mfd. Fixed Condenser	.40
1—Pr. Sangamo Grid Leak Clips	.10
1—Lynch Grid Leak Mounting	.35
1—Lynch 2 Megohm Grid Leak	.50
5—Eby Engraved Binding Posts	.75
100—Kellogg Tinned Soldering Lugs	.75
50 ft. Belden Tinned Copper Hookup Wire (12 gauge)	.50
1—Package Kester Solder	.25
1—Blackburn Ground Clamp	.25
	$108.30

Parts as listed above sent prepaid upon receipt of remittance, for $108.30, or will be sent C. O. D. upon receipt of $25.00 deposit, balance to be paid upon arrival.

We also carry a complete line of parts to following circuits:

ST. JAMES
QUALITONE
SHORT WAVE
NINE IN LINE
BROWNING DRAKE
MADISON MOORE
SAMSON T. C.
VICTOREEN
UNIVERSAL
AERODYNE

Write for information and prices on these circuits

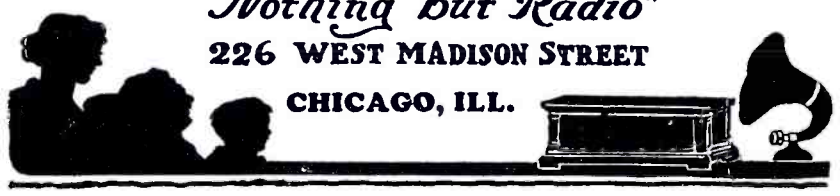
WHOLESALE — RETAIL

NEWARK ELECTRIC CO.

"Nothing but Radio"

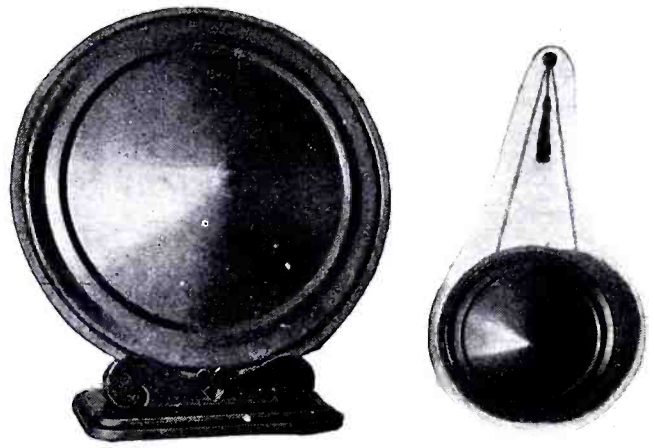
226 WEST MADISON STREET

CHICAGO, ILL.



Stevens Speakers

CONOIDAL



MODEL "A" 17½-INCH—Ideal for the home, combining superior tone, and volume with decorative elegance. Mahogany sounding board gives rich resonance and power to the tone. Can be used on console, or hung on wall. Complete with easel base and silk hanging cord. **$25.**

Stevens Speakers make all the difference in the world—bring you a new realization of radio reception at its best.

You haven't heard radio until you have listened to a Stevens Speaker. All the rich, sonorous tones of the orchestra—all the subtle inflections of the human voice—all that is natural and pleasing to the ear—yours with a Stevens Speaker.

Here Is the Real Test

You can listen to a Stevens Speaker for hour after hour without tiring—there is no feeling of strain, your auditory nerves are not strained by trying to get the full tones, there is no sense of fatigue. This cannot be said of other speakers, as you know.

Try It—Today!

Stevens Speakers are both decorative and superior in performance. The famous Stevens diaphragm—exclusive in form and material—is the ***only seamless diaphragm made*** and is unaffected by atmospheric conditions.

Stevens T. T. Armature Unit operates on an entirely new principle. It is "non-freezable" and its performance resembles the marvelous mechanism of the human voice.

TWO MODELS — EACH THE BEST OF ITS TYPE

MODEL "B" 14½-INCH—Similar to Model "A" but smaller. Ornamental and highly efficient. An exclusive device gives all directional effect if desired—

Adjustable by tilting top as illustrated. Complete, **$16.50**

PATENTS PROTECTED BY AMERICAN PATENT PROTECTION CORPORATION

STEVENS & COMPANY, Inc.

46-48 EAST HOUSTON STREET NEW YORK CITY

Made by the Pioneers in Cone Speakers

Your choice of

SAAL SPEAKERS

ECCENTRIC CONE—No. 1

Entirely new type, no adjustments necessary. Eccentric construction of diaphragm affords more natural reproduction of all tones, as high notes require less space for expression than deep low notes. Satisfactory results with any set using 90 volts "B" battery—135 volts "B" battery recommended.

Height, 22 inches; Diameter of cone, 20 inches; Weight, 15 pounds $25

West of the Rockies $26.50.

JUNIOR MODEL — as above — Height, 16 inches; Cone, 14 inches; Weight, 10 pounds $15

West of the Rockies $16.

PEDESTAL

Can be readily moved from one room to another. The quality of horn reproduction, the beauty of fine walnut furniture. Sound emerges from both front and back—hence non-directional. Stands on its own legs, the top level with your ear when you are seated tuning in. Factory tested with 400 volts "B" battery.

Height, 44 inches: Top Grill Opening, 8x10 inches; Weight, 44 pounds . . $38

West of the Rockies $40.

HORN—No. 5

Latest model of the famous Saal "Soft Speaker." Bell of genuine Bakelite, rich maroon in color. Neck of cast aluminum, porous non-vibrant metal finished in "crackle gold." No tinny ring. Nothing to warp, crack, or deteriorate. No adjustments. Guaranteed not to blast or chatter.

Height, 21½ inches; Bell, 13 inches; Weight, 13 pounds $22.50

West of the Rockies $24.

PHONOGRAPH ATTACHMENT

Easily attached to any standard phonograph, this simple device transforms it into an excellent radio speaker. Price $7

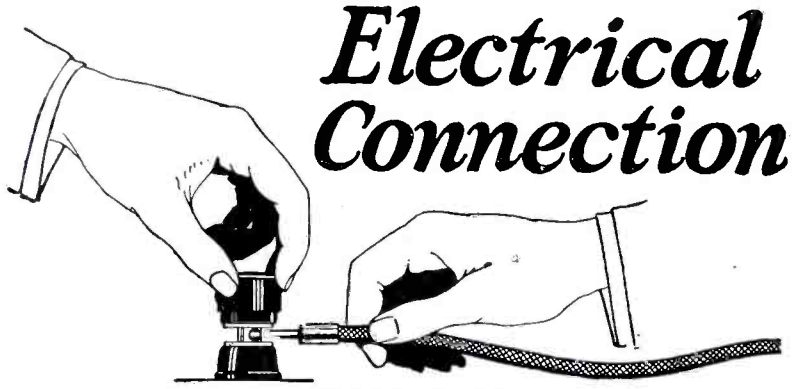
West of the Rockies $8.

H. G. SAAL COMPANY

1800 Montrose Avenue

Chicago, Illinois

A Good Electrical Connection



CONTACT!

No leaks—no mistakes—if your connections are made with

EBY BINDING POSTS

Eby Marked on every base

The drilled shank and the broad flat contact surfaces of Eby patented binding posts provide a good electrical connection for practically every type of terminal.

The tops don't come off, and the 28 different markings obviate dangerous mistakes.

All good dealers carry them—plain or engraved, 15c.

The H. H. Eby Manufacturing Co.

4710 Stenton Ave., Philadelphia

MEMBER RMA

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If you want to know the newest and best in radio

Sets—Kits and Parts

You need this big, 1927 Columbia Catalog. LOWEST WHOLESALE PRICES TO DEALERS.

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COLUMBIA RADIO CORP.

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SAVE MONEY

Get Our Prices Before Buying Radio Parts, Sets or Speakers

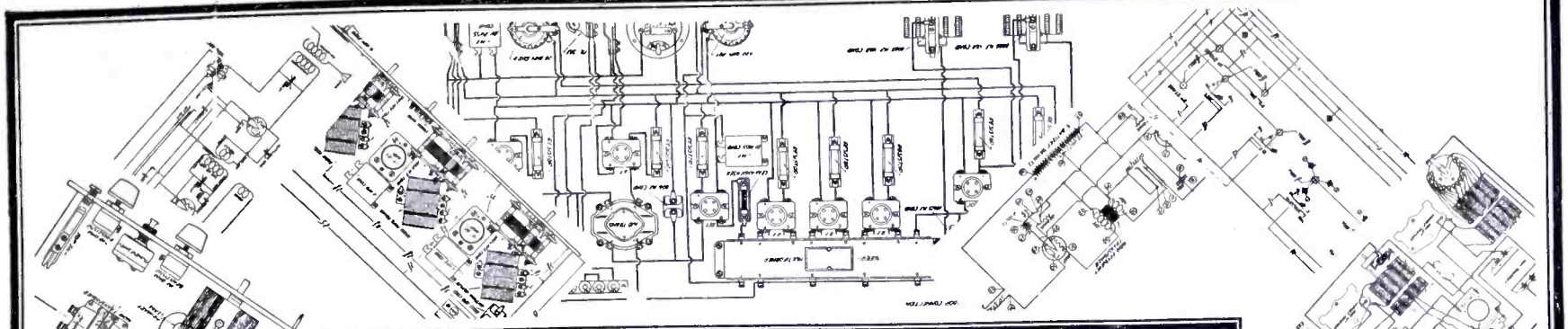
Build Your Sets and Eliminators Out of Standard Parts

Mail orders promptly filled

ALL STORES OPEN EVENINGS

BROOKLYN RADIO SERVICE CORP.

577 Myrtle Avenue **Brooklyn, N. Y.**



IF YOU BUILD RECEIVERS YOU SELL RECEIVERS YOU SERVICE RECEIVERS

You cannot afford to be without the latest Citralab Blueprints. All are full size detailed drawings of panel, baseboard and sub-panel layouts, and graphic and schematic wiring diagrams.

No. 1.	Infradyne 10 Tube Receiver	$1.25
No. 2.	8 Tube Madison Moore Receiver Using Small Tubes	1.25
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No. 9.	St. James 8 Tube Superheterodyne Receiver	1.25
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No. 11.	9 Tube 45 K. C. Superheterodyne Using Large Tubes	1.10
No. 12.	Madison Moore 8 Tube Receiver Using Large Tubes	1.25
No. 13.	Browning Drake 5 Tube Receiver Using Acme Impedance Amplifier	1.25
No. 14.	Browning Drake 4 Tube Receiver Using Audio Amplifier	1.10
No. 15.	Raytheon B Battery Eliminator	1.10
No. 16.	Precise 8 Tube Superheterodyne	1.10
No. 17.	Bremer-Tully Counterphase Six	1.25
No. 18.	An Efficient 5 Tube Receiver Using Space Wound Coils	1.10

FULL SIZE GRAPHIC ILLUSTRATIONS

60 Cents Each

No. 19. Silver Marshall Improved 5 Tube Dual Control Shielded Receiver
No. 20. Silver Marshall Improved 7 Tube Superheterodyne
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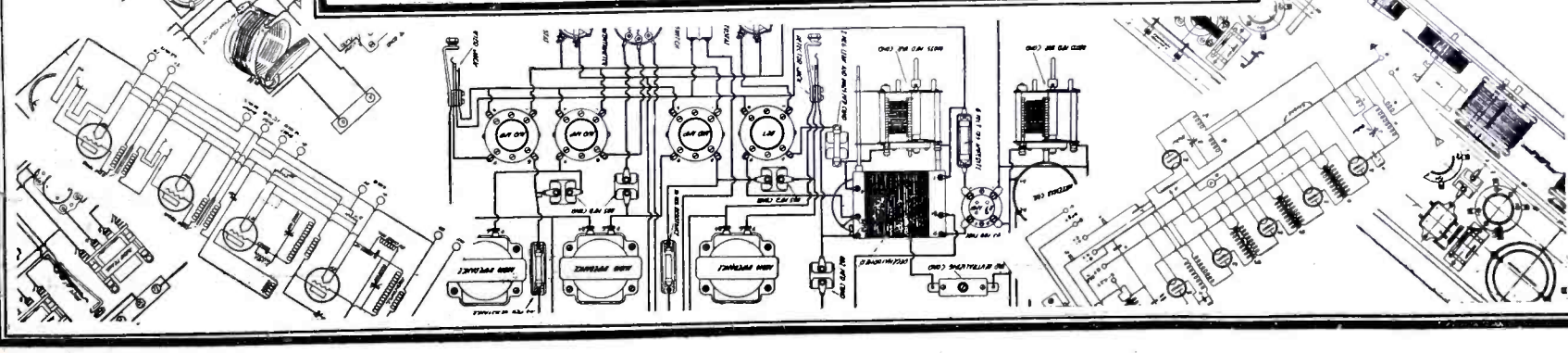
No. 22. Premier 5 Tube T. R. F. Receiver
No. 23. Camfield 5 Tube Receiver Using Duoformer Coils
No. 24. Alden 5 Tube T. R. F. Receiver Using Shielded Coils and Single Control Condenser
No. 25. 5 Tube T. R. F. Receiver Using Sickles Shielded Coils
No. 26. 4 Tube Non-Reradiating Receiver Using Audio Amplifier
No. 27. 5 Tube Non-Reradiating Receiver Using Resistance Coupled Amplifier
No. 28. 5 Tube T.R.F. Receiver Using A.C. Tubes, Eliminating All Batteries
No. 29. 6 Tube All American Toroid Receiver with Impedance Amplification

PRICES ON LABORATORY TEST KITS

All necessary parts for any of the above circuits will be quoted upon request, if you are unable to purchase them in your locality. If we supply the kit to you, every piece of apparatus will be tested in our laboratory without charge, insuring the best operation of your set.

CITIZENS RADIO LABORATORIES

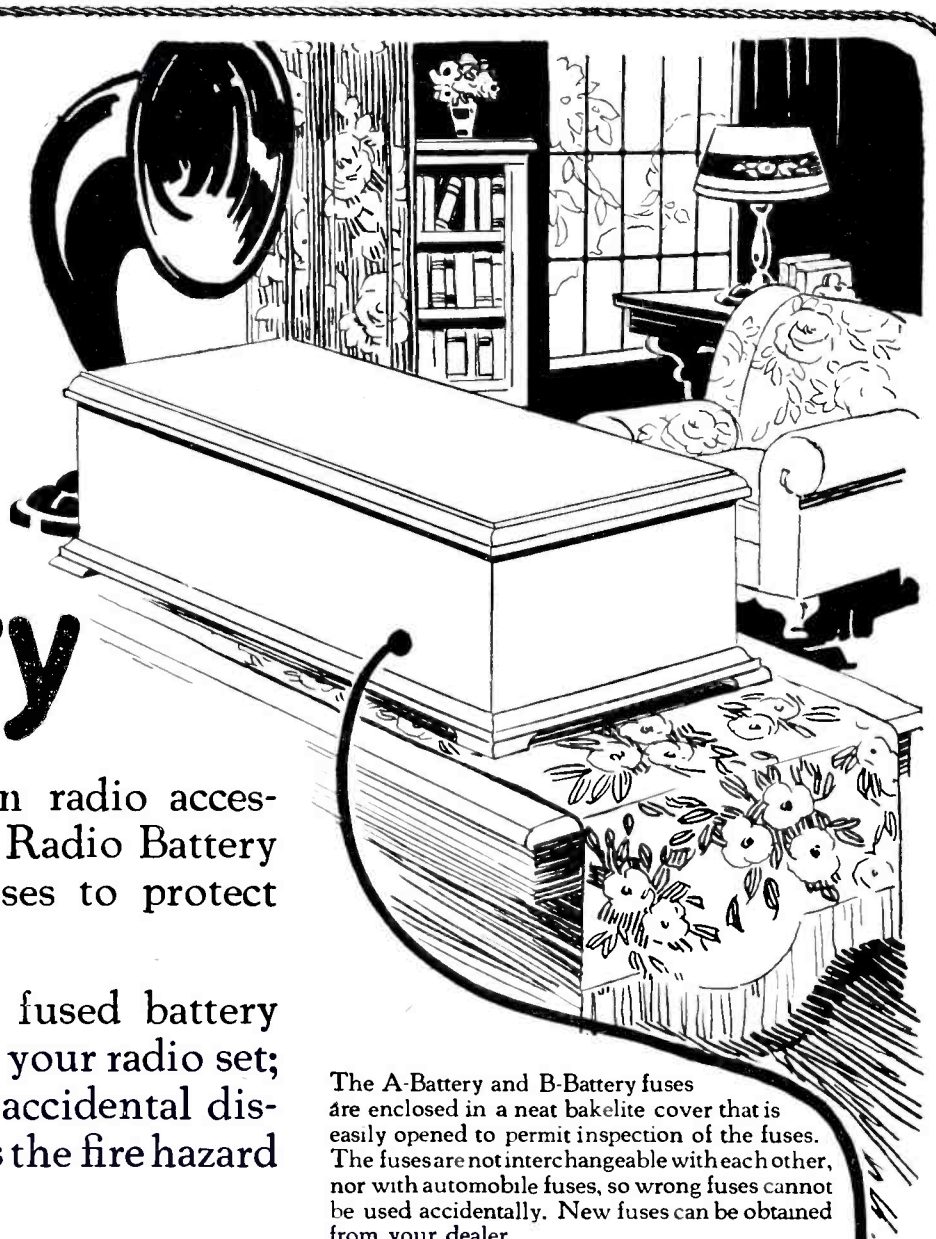
508 South Dearborn Street
Chicago, Ill.



Index to Advertisers

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

A New and Essential Radio Accessory



THE latest development in radio accessories is the Belden Fused Radio Battery Cord, with two enclosed fuses to protect the A and B-Battery circuits.

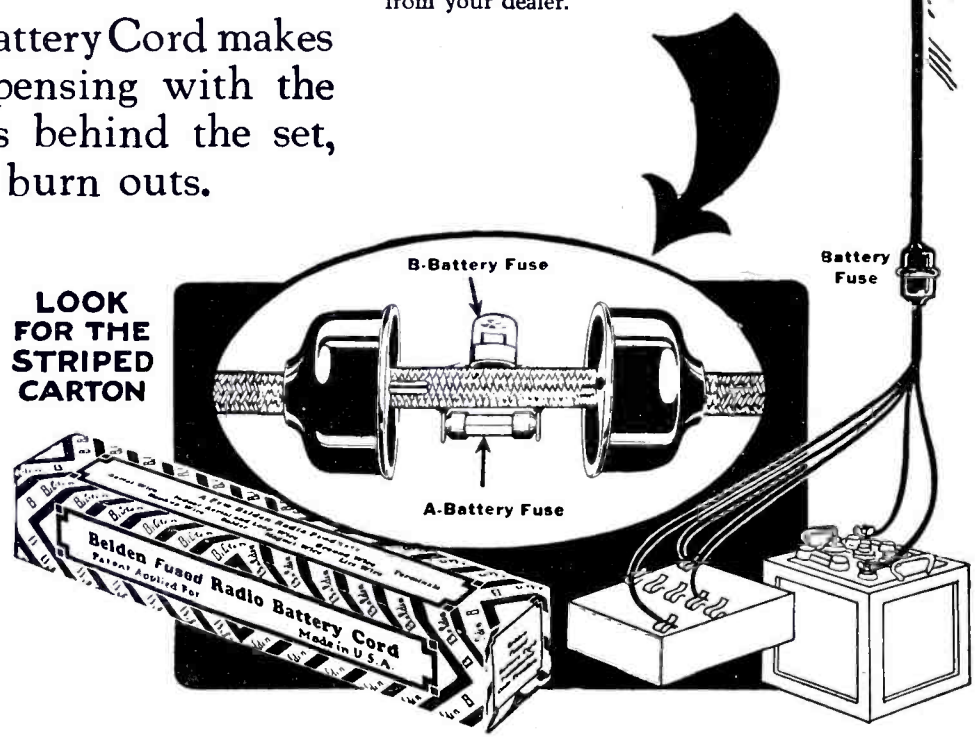
This remarkable and efficient fused battery cord acts as a safety valve for your radio set; it protects the batteries from accidental discharge, and likewise eliminates the fire hazard from crossed wires.

The Belden Fused Radio Battery Cord makes a neat installation by dispensing with the usual array of loose wires behind the set, and it protects tubes from burn outs.

The A-Battery and B-Battery fuses are enclosed in a neat bakelite cover that is easily opened to permit inspection of the fuses. The fuses are not interchangeable with each other, nor with automobile fuses, so wrong fuses cannot be used accidentally. New fuses can be obtained from your dealer.

Ask your nearest radio dealer today for a Belden Fused Radio Battery Cord, sold only in the Belden striped orange and black carton. Your set is not complete without the protection of this essential battery cord. It is inexpensive insurance against fire hazard and costly short circuits.

LOOK FOR THE STRIPED CARTON



Belden Manufacturing Co.
2322A So. Western Ave., Chicago, Illinois

Belden Fused Radio Battery Cord

Bradleyohm-E

PERFECT VARIABLE RESISTOR

for B-ELIMINATORS

Bradleyohm-E is a new and enlarged Bradleyohm designed especially for B-Eliminator Voltage Control. The extra long columns of scientifically-treated graphite discs insure perfect voltage control over a wide range. It is made in several ranges for various B-Eliminator circuits.

Bradleyunit-A

PERFECT FIXED RESISTOR

Bradleyunit-A is a solid molded resistor for radio circuits. It is molded and heat-treated under high pressure, making it impervious to moisture. The silver-capped ends can be soldered without affecting the calibration of the Bradleyunit.

Are You Building a B-Eliminator?

IF so, follow the example of leading radio engineers and use the Bradleyohm-E and Bradleyunit-A for your voltage control.

Most of the well-known factory built B-Eliminators are equipped with Bradleyohms as standard equipment. Surely, no better recommendation of the reliability and stability of the Bradleyohm can be asked.

Build permanent performance and high efficiency into your B-Eliminator by asking your dealer for Bradleyohm-E and Bradleyunit-A for your circuit.

Allen-Bradley Co.

488 Clinton Street, MILWAUKEE, WIS.

Use Allen-Bradley Perfect Radio Devices

Know these RADIOTRONS– *and keep your set up to date*

RADIOTRON AND RECTRON CHARACTERISTICS

			GENERAL					DETECTION					AMPLIFICATION						
								DETECTORS AND AMPLIFIERS											
MODEL	USE	BASE	MAXIMUM OVERALL DIAMETER	MAXIMUM OVERALL HEIGHT	"A" BATTERY VOLTAGE (SUPPLY)	FILAMENT TERMINAL VOLTAGE	FILAMENT CURRENT (AMPERES)	DETECTOR GRID RETURN LEAD TO	GRID LEAK (MEGOHMS)	GRID CONDENSER (MFD)	DETECTOR "B" BATTERY VOLTAGE	DETECTOR PLATE CURRENT (MILLIAMPERES)	AMPLIFIER "B" BATTERY VOLTAGE	AMPLIFIER "C" BATTERY VOLTAGE	AMPLIFIER * PLATE CURRENT (MILLIAMPERES)	OUTPUT RESISTANCE * (OHMS)	MUTUAL CONDUCTANCE * (MICROMHOS)	VOLTAGE AMPLIFICATION FACTOR	MAXIMUM UNDISTORTED OUTPUT (MILLIWATTS)
RADIOTRON UX – 201 – A	Detector Amplifier	R C A Large Standard UX Base	$1\frac{13}{16}$"	$4\frac{11}{16}$"	6 Storage	5.0	25	+F	2 to 9	.00025	45	1.5	135 90	9 $4\frac{1}{2}$	2.5 2	11,000 12,000	725 675	8 8	55 15
RADIOTRON UV – 199	Detector Amplifier	UV 199 Base	$1\frac{1}{16}$"	$3\frac{1}{2}$"	Dry Cell $4\frac{1}{2}$ Storage 4	3.0	.06	+F	2 to 9	.00025	45	1	90	$4\frac{1}{2}$	2.5	16,500	380	6.25	7
RADIOTRON UX – 199	Detector Amplifier	R C A Small Standard UX Base	$1\frac{3}{16}$"	$4\frac{1}{8}$"	Dry Cell $4\frac{1}{2}$ Storage 4	3.0	.06	+F	2 to 9	.00025	45	1	90	$4\frac{1}{2}$	2.5	16,500	380	6.25	7
RADIOTRON WD – 11	Detector Amplifier	WD 11 Base	$1\frac{3}{16}$"	$4\frac{1}{8}$"	Dry Cell $1\frac{1}{2}$ Storage 2	1.1	.25	+F	3 to 5	.00025	$22\frac{1}{2}$ to 45	1.5	90	$4\frac{1}{2}$	2.5	15,000	400	6	7
RADIOTRON WX – 12	Detector Amplifier	R C A Large Standard UX Base	$1\frac{7}{16}$"	$4\frac{11}{16}$"	Dry Cell $1\frac{1}{2}$ Storage 2	1.1	.25	+F	3 to 5	.00025	$22\frac{1}{2}$ to 45	1.5	90	$4\frac{1}{2}$	2.5	15,000	400	6	7
								DETECTORS											
RADIOTRON UX – 200	Detector Only	R C A Large Standard UX Base	$1\frac{13}{16}$"	$4\frac{11}{16}$"	6 Storage	5.0	1.0	–F	$\frac{1}{2}$ to 2	.00025	$16\frac{1}{2}$ to $22\frac{1}{2}$	1	—	—	—	—	—	—	—
RADIOTRON UX – 200 – A	Detector Only	R C A Large Standard UX Base	$1\frac{13}{16}$"	$4\frac{11}{16}$"	6 Storage	5.0	.25	–F	2 to 3	.00025	45	1.5	—	—	—	—	—	—	—
								POWER AMPLIFIERS											
RADIOTRON UX – 120	Power Amplifier Last Audio Stage Only	R C A Small Standard UX Base	$1\frac{3}{16}$"	$4\frac{1}{8}$"	Dry Cell $4\frac{1}{2}$ Storage 4	3.0	1.05	—	—	—	—	—	135	$22\frac{1}{2}$	6.5	6,600	500	3.3	110
RADIOTRON UX – 112	Power Amplifier	R C A Large Standard UX Base	$1\frac{13}{16}$"	$4\frac{13}{16}$"	6 Storage	5.0	.5	—	—	—	—	—	$157\frac{1}{2}$ 135 90	$10\frac{1}{2}$ 9 6	8 6 2.5	4800 5500 8800	1670 1435 890	8.0 7.9 7.9	195 120 40
RADIOTRON UX – 171	Power Amplifier Last Audio Stage Only	R C A Large Standard UX Base	$1\frac{13}{16}$"	$4\frac{11}{16}$"	6 Storage	5.0	.5	—	—	—	—	—	180† 135† 90	$40\frac{1}{2}$ 27 $16\frac{1}{2}$	20 16 10	2000 2200 2500	1500 1360 1200	3.0 3.0 3.0	700 330 130
RADIOTRON UX – 210	Power Amplifier Oscillator	R C A Large Standard UX Base	$2\frac{3}{16}$"	$5\frac{5}{8}$"	Transformer or Storage 8 8 8 / 6 6 6	7.5 7.5 7.5 / 6.0 6.0 6.0	1.25 1.25 1.25 / 1.1 1.1 1.1	—	—	—	—	—	425† 350† 250† 135 90	35 27 18 $10\frac{1}{2}$ $4\frac{1}{2}$	22 18 12 6 3	5000 5100 5600 7400 8000 9700	1550 1500 1320 1020 940 775	7.7 7.6 7.5 7.5 7.5	1540 925 340 65 18
								RECTIFIERS											
MODEL	USE	BASE	MAXIMUM OVERALL DIAMETER	MAXIMUM OVERALL HEIGHT	PURPOSE														
RECTRON UX – 213	Full Wave Rectifier	R C A Large Standard UX Base	$2\frac{3}{16}$"	$5\frac{5}{8}$"	For use in rectifying systems particularly designed for this Rectron.	Filament Terminal Voltage: 5.0 Volts Filament Current: 2.0 Amperes Max. AC Input Voltage per plate 220 Volts (RMS) △ Max. Rectified Current (both plates) 65 Milliamperes													
RECTRON UX – 216 – B	Half Wave Rectifier	R C A Large Standard UX Base	$2\frac{3}{16}$"	$5\frac{5}{8}$"	For use in rectifying systems particularly designed for this Rectron	Filament Terminal Voltage 7.5 Volts Filament Current 1.25 Amperes Max. AC Input Voltage 550 Volts (RMS) △ Max. Rectified Current 65 Milliamperes													
						SPECIAL PURPOSE RADIOTRONS													
RADIOTRON UX – 874	Voltage Regulator Tube	R C A Large Standard UX Base	$2\frac{3}{16}$"	$5\frac{5}{8}$"	Constant Voltage Device	Especially designed for use in the following devices operated from alternating current lighting mains:		R C A Duo-Rectron ("B" Battery Eliminator) R C A Loudspeaker Model 104					Voltage Drop: 90 Volts DC Starting Voltage: 125 Volts DC Maximum Current: 50 Milliamperes DC					Positive (+) to Rod Negative (–) to Cylinder	
RADIOTRON UV – 876	Ballast Tube	Standard Mogul Type Screw Base	$2\frac{1}{16}$"	8"	Constant Current Device	Especially designed for use in the following devices operated from: 105-125 Volts 50-75 Cycles		Radiola 30 R C A Loudspeaker Model 104 Brunswick Models: PR-16C, 26C, 36C, 46C, PR-28C, 38C, 48C, P-3. Victor Models: VV 15-1, VV 9-2, VV 12-2.					Current Rating: 1.7 Amperes Voltage Drop: 40-60 Volts						
RADIOTRON UV – 886	Ballast Tube	Standard Mogul Type Screw Base	$2\frac{1}{16}$"	8"	Constant Current Device	Especially designed for use in the following devices operated from: 105-125 Volts 40-45 Cycles		Radiola 30 R C A Loudspeaker Model 104 Brunswick Models: PR-16C, 26C, 36C, 46C, PR-28C, 38C, 48C, P-3. Victor Models: VV 15-1, VV 9-2, VV 12-2.					Current Rating: 2.05 Amperes Voltage Drop: 40-60 Volts						
RADIOTRON UV – 887	Protective Tube	Double Contact Bayonet Automobile Type △△	$1\frac{7}{16}$"	$2\frac{1}{2}$"	Current Limiting Device	Used in "B" Battery circuits to prevent excessive current resulting from short-circuit which might damage tubes or wiring		Voltage Drop Across: Half Filament 2.5 45 / Entire Filament 5 90					At 20 Milliamperes DC At 90 Milliamperes DC						

† Loudspeaker coupling recommended at this plate potential due to large plate current.

* At indicated "B" and "C" battery voltages

△ R.M.S. indicates "Root Mean Square" as indicated on an AC voltmeter.

△△ Connection to shell of base for third terminal which is the lead to mid-point of filament.

RADIO CORPORATION OF AMERICA

New York Chicago San Francisco

RCA Radiotron

MADE BY THE MAKERS OF THE RADIOLA