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Under Radio Commission's Reallocation Order

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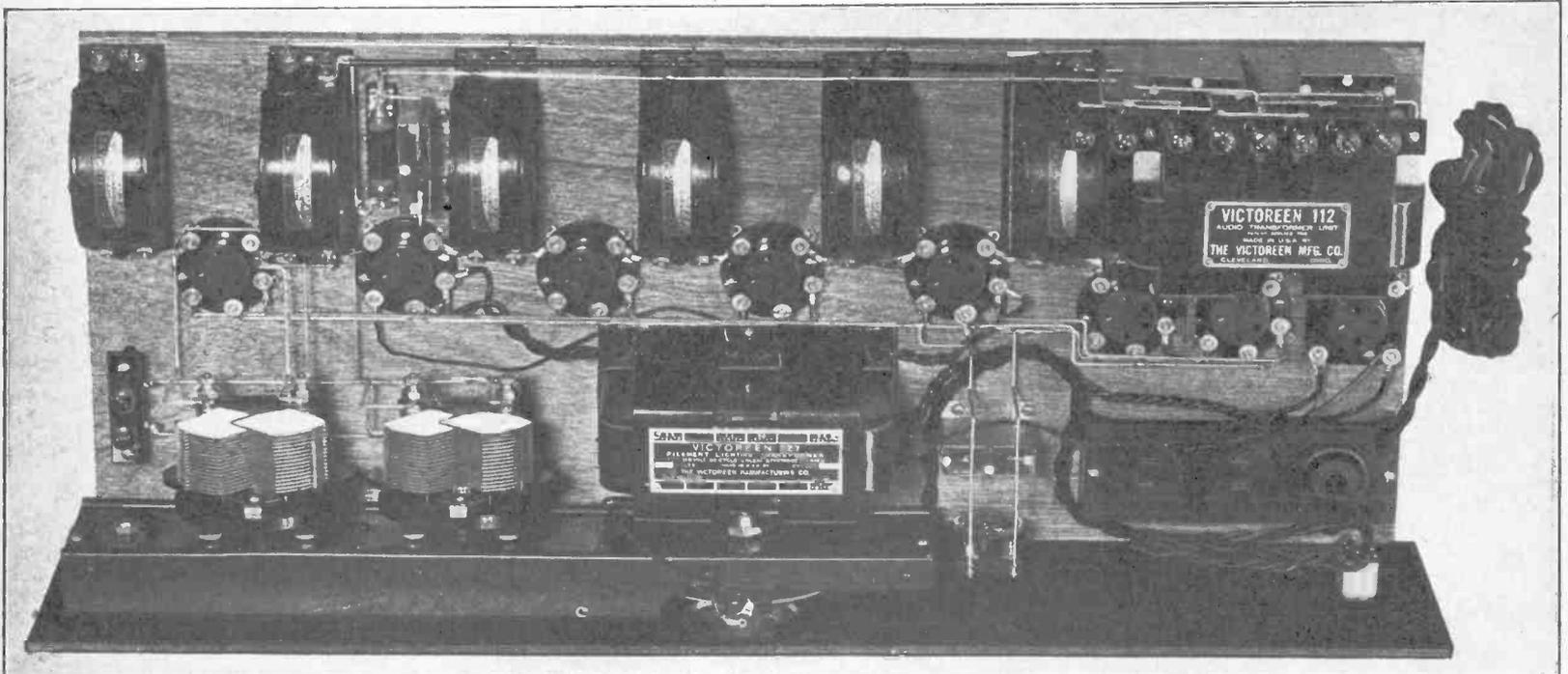
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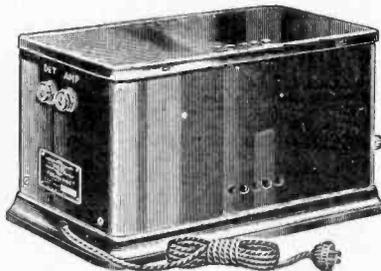
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NO Change in Set Wiring
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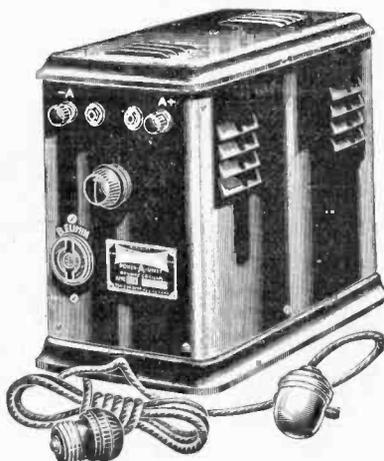
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No. A22—"A" Eliminator. Supplies up to 2 1/2 amperes at 6 volts. Variable resistance permits adjustment to number of tubes in set. Supplies A current and voltage to sets using from 4 to 10 quarter ampere tubes, or equivalent current drawn by any other combinations. Tip jacks for voltmeter readings. Receptacle for "B" eliminator plug. Pendant switch controls everything. Set switch needn't be touched. Device requires no attention. Uses no tube. Size: 10 1/2" high, 6 1/2" wide, 11 1/2" long. Shipping weight, 27 lbs. **\$22**

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- One 180-volt maximum "B" eliminator, with variable detector and variable intermediate voltage (three different voltages in all); equipped with one Raytheon BH tube, 125 milliamperes rating. I will pay \$18, plus a little extra for freight, on receipt of goods, which are to be on approval for ten days (money back, if desired after 10-day trial).
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Confidence in Polymet to produce the best in every electric set essential led to the adoption of Polymet by two-thirds of the R. C. A. licensed radio manufacturers.

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Complete Kit of Parts as Specified by H. B. Herman for 4-Tube

SCREEN GRID \$39.50
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BLUEPRINT FREE WITH EACH KIT!
Kit consists of Hammarlund HR 23 coils, Karas tuning condensers and audio transformers, four Amperites, Clarostat, Yaxley switch and pilot bracket with lamp, aluminum subpanel with sockets on, drilled front panel, Lynch leak, Aerovox fixed condensers, Mar-co dials, Pec-wee clip, Vac-Shield, binding posts.

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New hook-ups. This book shows how to make short wave receivers and short wave adapters. How to use the new screen grid tube in DC and AC circuits. How to build power amplifiers. ABC eliminators. Up-to-the-minute information on all new radio developments. It's free. Send for copy today.

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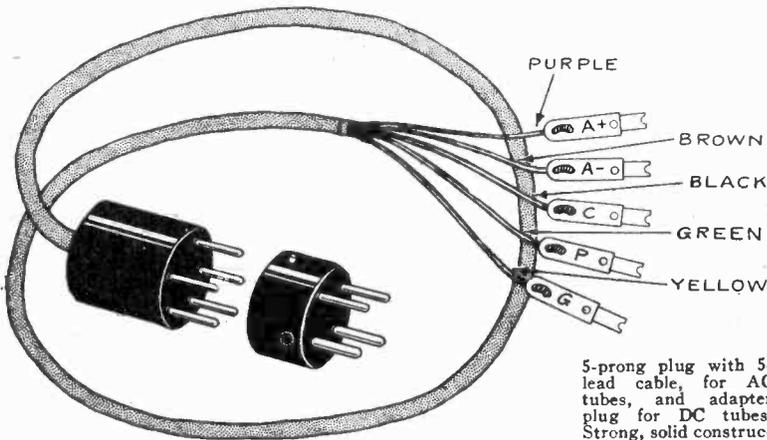
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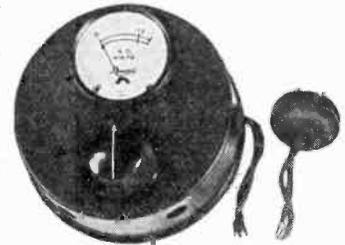
NEXT WEEK'S ISSUE of RADIO WORLD will contain another absorbing instalment on the 1929 Victoreen AC Receiver and associated equipment. Follow these fine articles on a well-engineered circuit. The construction and use of a vacuum tube voltmeter will be detailed in the same issue. Read the article on a 4-tube AC receiver, rising screen grid tubes. The Economy Three, sweeping on to great success, will be discussed from new angles; also the ush-pull resistance coupled amplifier.

Universal AC and DC Short-Wave Adapter Plugs! Voltage Regulator!



5-prong plug with 5-lead cable, for AC tubes, and adapter plug for DC tubes. Strong, solid construction, positive contact.

Handiest thing in the world for any short-wave adapter. Put detector tube of your present set in socket of any short-wave adapter you build, put plug in detector socket of your broadcast receiver. Cable, 34". Leads identified both by color scheme and tags. May be used as 5-lead battery cable plug with UY socket. 5-prong plug with 5-lead cable (Cat. No. 21AC)\$1.50 4-prong extra plug only, for DC short-wave adapter (Cat. No. 21DC)\$0.50 Cat. No. 21AC and 21DC ordered together\$1.75 Cat. No. 21AC and 21DC with 99 adapter\$2.25



Line voltage regulator for AC sets has an AC meter showing line voltage, and a power adjustable resistance so that the line voltage may be reduced until it reads 110 volts. Wall plug and socket for connection to AC cord from the set also built-in (Cat. No. 218)\$5.00

Accurate Meters for Exacting Radio Uses! Speaker Switch!



Cat. No. 390, reading 0-100 milliamperes. Price ..\$1.65



Cat. No. 326, reading 0-6 volts DC, price ..\$1.65

Two of the most popular meters are Cat. No. 390, reading 0-100 milliamperes, and Cat. No. 326, reading 0-6 volts DC. Both are panel mount types (2 5/64" hole). See illustrations above. No. 390 is recommended for sets having six tubes or more, particularly if a -71, -10 or -50 tube is used as the output. May be kept permanently in circuit. For DC measurements 0-100 milliamperes. Cat. No. 390\$1.65 The 0-6 panel voltmeter may be kept permanently in circuit (Cat. No. 326)\$1.65

PANEL AC VOLTMETER

Cat. No. 351 For reading 0-15 volts AC\$2.25

PANEL MILLIAMMETERS

Cat. No. 311 For reading 0-10 milliamperes DC\$1.95
 Cat. No. 325 For reading 0-25 milliamperes DC\$1.85
 Cat. No. 350 For reading 0-50 milliamperes DC\$1.45
 Cat. No. 399 For reading 0-300 milliamperes DC\$1.65

PANEL AMMETER

Cat. No. 338 For reading amperage, 0-10 amperes DC\$1.65

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Cat. No. 23 For showing when 6-volt A battery needs charging and when to stop charging; shows condition of battery at all times\$1.85

VOLTAMMETER

Cat. No. 35 For testing amperage of dry cell A batteries and voltage of B batteries (not B eliminators); double reading, 0-50 volts, 0-40 amperes DC\$2.00

HIGH RESISTANCE VOLTMETERS

A 0-300 DC voltmeter with a very high resistance. Specially made that way so it will test the output voltages, from maximum to any intermediate voltage, of any B eliminator or grid biasing resistor. Cat. No. 346\$4.50

[Note: 0-500 volts, instead of 0-300 volts, is No. 347. Tests ALL power packs—Price \$5.50.]

PANEL VOLTMETERS

Cat. No. 335 For reading DC voltages, 0-8 volts\$1.65
 Cat. No. 310 For reading DC voltages, 0-10 volts\$1.65
 Cat. No. 337 For reading DC voltages, 0-50 volts1.65
 Cat. No. 339 For reading DC voltages, 0-100 volts\$1.75
 Cat. No. 40 For testing A and B batteries, dry or storage, but not for B eliminators; double reading, 0-8 volts and 0-100 volts DC scale.....\$2.25
 Cat. No. 42 For testing B batteries, dry or storage, but not for B eliminators; 0-150 volts DC scale.....\$2.00
 Cat. No. 348 For testing AC current supply line, portable, 0-150 volts.....\$4.50



In home or store you often want to operate two speakers together, or each separately, and this speaker switch, the Speakerelay, does the trick! Connect the cord to the set and the speakers to the jacks in the switch. Turn knob at No. 1 at left to operate one speaker alone, to No. 2 to operate both speakers together, and to No. 1 at right to operate the other speaker alone. Enclosed in moulded Bakelite case. (Cat. No. 121).....\$2.00

Strong, Rugged Loud Unit

Powerful unit, excellent for any cone or similar type of speaker. Stands up to 150 volts unfiltered. Very loud. Adjustable armature. Well packed. Won't get damaged in shipment. Supplied with apex, chuck and nut. Unit easily mounted. **\$3.75**

Build yourself a very fine large cone speaker and get the fullest enjoyment of the quality your receiver offers. Nothing but praise has been heaped on these 36" and 24" speakers. Also, their appearance is so entrancing that they fit nicely into the surroundings of the finest living rooms and parlors. Expert radio and acoustical engineers endorse them. Nobody need be without a really fine speaker of 36" or 24" diameter, now that all have a choice of these two sizes at the same price. Remember, a five-day money-back guaranty attaches to each of these speaker kits!

Take your choice of a 24" or 36" diameter cone speaker kit, with Unit No. 1098 (see description at left). Either size at same price. Tri-foot pedestal FREE with each kit order. Front sheet of designed Phonotex, rear sheet of plain Ephonotex. Radio cement furnished with each kit. Also mounting bracket, apex, chuck and nut, with instruction sheet. Fine tone quality reproduced at large volume. Ornamental and efficient cone easily built by anybody. Novices find not the slightest difficulty. As the unit is adjustable you can adjust the impedance until best results are obtained. These speakers are used as demonstrators in stores in New York City at full volume without rattling. Low notes are reproduced particularly well, because of the large radiating surface. Apex is at center for highest efficiency. (Cat. No. 36 for 36" or Cat. No. 24 for 24").....\$6.00

Kit is complete, including unit, apex, bracket, chuck, nut, paper, pedestal, cement and instruction sheet.



If bothered by interference between stations or living near a station that comes in all over the dials and prevents you from getting other stations, use a wave trap and trap out the offender at will. Turn of the knob covers entire broadcast band. Trap is encased in moulded Bakelite (Cat. No. 22WT).... \$1.50



Guaranty Radio Goods Co.

141 W. 45th Street, N. Y. City

Please mail at once C.O.D. on a five-day money-back absolute guaranty, your catalogue numbers as follows, for which I will pay the advertised prices, plus a few cents extra for postage:

Cat. No. Cat. No. Cat. No.

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Address

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

SEND NO MONEY!

Real MUSICAL Instruments Are Made of Wood!

THE SWEET MELLOWNESS OF WOOD GIVES REAL MUSIC!

THE finest reproduction is made possible by the long tone chamber horn loudspeaker, for then you hear the *true* sounds, without over-emphasis or under-emphasis, in other words, without distortion. Violins, pianos, flutes, 'cellos and the like are not made out of paper or cloth, but out of wood. Nature chose wood as the unsurpassed vehicle of sound. Man utilized the long tone chamber to make the sound supremacy of wood available for radio reproducers.

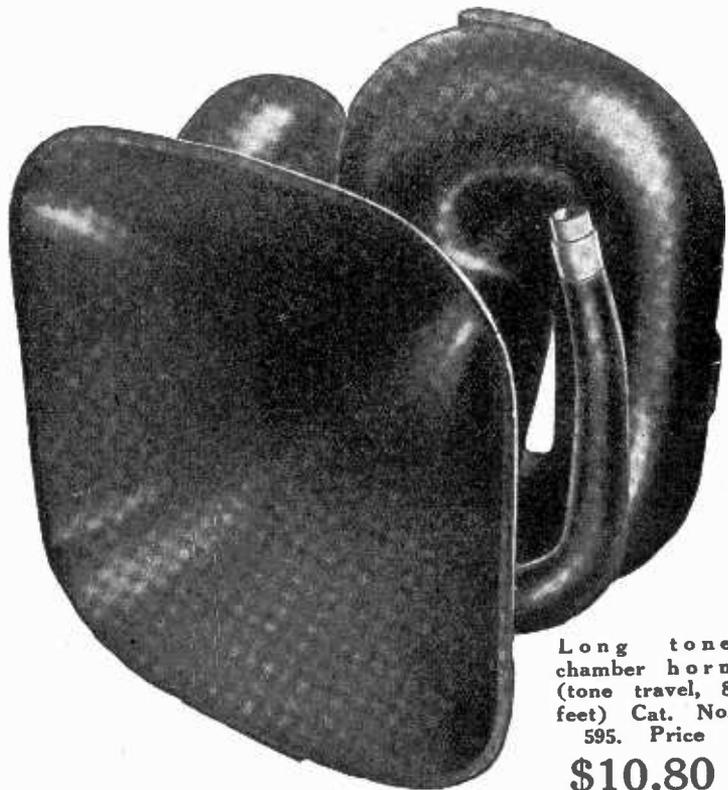
With fine quality moulded wood formed into a long tone chamber you hear the orchestral instruments stand out individually,—sounds from the boom of the bass drum, the zoom of the 'cello, to the sweet, high notes of piccolo and clarinet. And the human voice is natural, real. The hissing sounds of speech—high audio frequencies—come through as realistically as the guttural.

Use a long tone chamber horn, like the No. 595 illustrated at right, with a specially sensitive and faithful motor, (Cat. No. 112), shown at left and enjoy the best. Cat. No. 595, horn loudspeaker, tone travel 8 feet; over-all dimensions, 21 1/4" high, 18" wide, 13" or 15" deep. Nozzle takes standard size unit. Price \$10.80.

Felt-padded Baffle Board FREE with each order for a No. 595. The baffle is used as the inside shipping box. No need to remove the horn from the box. Use the outfit as you receive it, inside a cabinet, or in any other place you desire.



Horn Motor, Cat. No. 112. Price \$4.20.



Long tone chamber horn (tone travel, 8 feet) Cat. No. 595. Price \$10.80

Smaller Model Meets Space Economy Needs

WHERE space requirements limit you to a smaller size horn, use Cat. No. 570, illustrated below. The tone quality of this medium-sized model far surpasses that of the usual cones, but does not quite come up to that of the No. 595 on the extremely low register (40 cycles and less). However, it is a very satisfactory horn, as good as can be made for the smaller space.

Your mounting problems are solved completely with this model, as with the other, due to the inclusion of a FREE baffle board with each order.

No one need hesitate ordering the smaller model if space limitations counsel such choice, for the result will be charming beyond expectation.

Cat. No. 570 horn loudspeaker, tone travel 6 feet; over-all dimensions 15" high, 12" wide, 12" deep. Nozzle takes standard size unit. Price \$7.80.

Felt padded baffle board FREE with each order for a No. 570.



Baffle Board FREE with each horn order!

FREE Baffle Board with Each Order

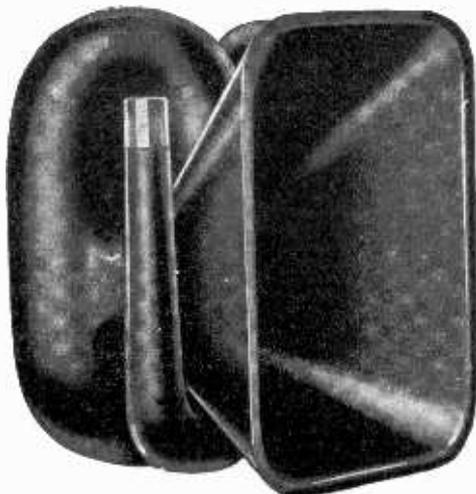
THE long tone chamber moulded wood horns are sold with an offer of a FREE baffle board that is felt-padded so that the horn is felt-suspended and doubly protected against possibility of rattles. This is the final point of protection and perfection.

What DeForest Says:

"I do not consider any of the cones now on the market come anywhere near the perfect loudspeaker. Cones invariably favor some frequencies at the expense of others and most of the cones, while over-emphasizing the bass, put a mask of paper rustle over the higher frequencies. There are certain types of non-metallic horns now on the market which, with proper loudspeaker units, give far better reproduction than any 18-inch cone. I strongly advocate a radio set built into a large console cabinet with sufficient room to take in one of the larger exponential horns."

—Dr. Lee DeForest in "Radio News" for April, 1928.

Why saddle a good set to a poor speaker?
Travel 8 feet and get somewhere! Travel 6 feet and outstrip the others, anyway!



Medium sized tone chamber horn (tone travel, 6 feet) Cat. No. 570. Price \$7.80.

SEND NO MONEY!

ACOUSTICAL ENGINEERING ASSOCIATES, 143 West 45th Street, N. Y. City
Please ship me at once the following (check off):

- One No. 595 at \$10.80 plus a little extra to defray shipping costs; also send FREE baffle board. 13" width will be sent unless 15" is specified by a cross in this square
- One No. 570 at \$7.80 plus a little extra to defray shipping costs; also send FREE baffle board.
- One No. 112 horn motor (universal nozzle) at \$4.20 plus a little extra for shipping.

Name

Address

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5-Day Guarantee of Money Right Back if Not Delighted—
No Stalling—No Questions!



SEPTEMBER 22, 1928
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 (Just East of Broadway)
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New Waves and Power Announced by Board

Washington.
 The Federal Radio Commission announced the new
 wavelengths and power of all broadcasting stations, effec-
 tive November 11th, at 3 A. M. Most of the stations are

*changed as to wavelength. Some consolidations were
 ordered, all stations otherwise were retained, and time allot-
 ments were deferred for future action. The plan carries out
 the Davis Equalization bill.*

SEE PAGES 8, 9 AND 10 FOR LIST OF STATIONS, WITH FREQUENCY AND POWER.

Improved Reception Promised

By Orestes H. Caldwell

Federal Radio Commissioner

WHEN mother serves pie to a large, hungry family, she must plan her operations in two steps. First, she must make the pie as large as possible, with the materials available. Second, when the pie is ready, she must divide it among the pie-eaters as accurately as possible, according to the pie-rights and claims of each diner.

The radio-broadcasting problem, in many respects, is like this matter of equitably distributing a single pie in a lusty, growing family.

Regulations for dividing the national radio pie among the States, were issued by the last Congress. It gave instructions that whatever the size of the pie to be served, it must be divided proportionally to population. For example, under this act, known as the Davis amendment, the State of Indiana is entitled to 2½ per cent of the national total, whatever that shall be. Illinois gets 5½ per cent, Ohio 5 per cent, Kentucky 2 per cent, and so on.

Much Left to Board

But Congress wisely left to the Radio Commission the complex technical problem as to how large the radio pie could safely be made, with the materials (wavelengths) available. Congress also left to the Commission's discretion, the make-up of the pie's filling, in its proportion of plums, prunes, grapes, and currants (if big and little broadcasting stations can be so designated!)

Of course the Radio Commission would like to make the national radio pie so large that every State and city would be well supplied and well satisfied with its share.

But the size of our radio pie is sharply limited by the ether dish which holds it. In fact, it must be very exactly calculated to fit this intangible container, for

if we pour in too little broadcasting, wavelengths will be wasted. And if we pour too much broadcasting, the whole pie will be spoiled by whistles and heterodynes.

What the national total of broadcasting can safely be, while still preserving good radio for all the people of the United States, has been the subject of long and careful study by the members of the Radio Commission, with the aid of many of the country's best engineers.

165 Stations of 500 Watts Up

Hardly had the 1928 Act been passed, before all sorts of broadcasting allocations and solutions were being analyzed, in an effort to find a plan or arrangement which would be most flexible to meet the varying requirements of the different zones, while insuring good reception. Literally dozens of plans and allocations have been built up, studied and revised.

And all of these various and differing plans have shown that if good radio reception is to be preserved, the broadcasting band will not hold more than 150 to 165 stations of 500 watts and upward, operating simultaneously.

After trying out every conceivable expedient, we come invariably back to this figure, that there can be no more than 165 such stations on the air at one time during night hours.

Better This Winter

So our national radio pie is limited to 165 simultaneous stations of 500 watts and above, and this national total we must divide equally among the five radio zones and then within those zones, proportionally to State populations.

The new reallocation which was put under way with the Commission's general order No. 40, and which is to go into effect in October (November, according

to later information) accomplishes this equalization of the country's facilities. It follows the Davis amendment completely and exactly. All present licensed stations will be continued, but on such a basis of sharing time, that their total time is equivalent to 165 full-time stations (not including nearly again as many "locals" of small power).

But the new allocation also provides a greatly improved basis for radio reception, by so arranging the channels that on 70-odd out of our 90 wavelengths, there will be the very best of receiving conditions this Winter, especially for the farmers and distant listeners.

Remote Points Benefited

It is these millions of remote listeners who live 75 miles or more from any broadcasting station, who will be the chief beneficiaries of the new arrangement, particularly in their future ability to hear clearly the smaller stations in their own neighborhood and States.

At least 60,000,000 people are involved in this improved service.

And, these remote populations—on the farms and ranches, in the mountains, along the coasts, and in towns, villages and crossroads—make up the very folk to whom radio means most, as a source of news, inspiration and entertainment.

And later, as increased power is used on the cleared channels assigned to various sections, there will be no home anywhere within the nation which will not enjoy a diversity of broadcast programs of satisfactory intensity.

A second feature of the reallocation is the preferred treatment accorded to the smaller stations. Under the Commission's new plan, the regional stations of 50 to 1,000 watts are given essentially clear channels, so that they may be heard to the full extent of their service ranges.

Authorities Hail "Best Possible" Reallocation Plan

Dellinger

Is Glad All Get Benefit

By Dr. J. H. Dellinger
Chief Engineer, Radio Commission

Washington.

I rejoice that the Commission has taken the action (pronounced in General Order No. 40, issued August 30) necessary to improve radio reception.

After the most intensive study of all sorts of palliatives, the examination of every possible expedient, and the consideration of innumerable suggestions, the Commission has determined that a major operation is necessary to cure the ills of broadcasting.

The whole set-up of broadcasting stations has been readjusted, in the new allocation now ready for announcement, in accordance with a definite, practical plan.

Better Reception

Radio reception will be materially bettered for practically all listeners as soon as the stations are adjusted to the new allocation. This allocation is worked out in accordance with principles recognized as sound by all radio men.

It is noteworthy that, while all classes of listeners benefit under the new allocation, the farmers will be the chief gainers. They will not only be able to receive more stations reliably without interference but practically all points on the radio dial will be free from the curse of heterodyne whistles.

The city listeners will gain through heterodyne-free reception of their various local stations and also reception of distant stations free from interference.

In order to bring about these improvements, and introduce order into the broadcasting chaos, the Commission was faced with alternatives, either (a) the abolition of several hundred stations, or (b) the use of such expedients as time division and restriction of power on some of the channels in order to provide opportunity for the continuation in existence of approximately the present number of stations. The Commission having chosen course (b), I consider that the new allocation is the best that can be worked out.

Objects Stated

In the few days since the allocation plan was announced, there have been some objections expressed which in general boil down to two; (a) the frequencies of most of the stations are changed, (b) there are considerable curtailments of power and time of operation of stations in the fourth zone.

The objections would apply to any allocation which would comply with the radio law and which would introduce any material improvement over the present very bad conditions. It is in fact the particular merit of this allocation that it has gone as far as possible to minimize these objections and still comply with the requirements of law and nature.

The Commission's order establishing the basis of the new allocation shows that an exact equalization of the broadcasting channels among the zones has been attained. This is a gratifying realization.

Washington.

The new radio allocation plan "will give to the broadcast listeners throughout the country a vastly improved service," in the opinion of John V. L. Hogan, radio engineer of New York, as expressed in a statement made public by the Federal Radio Commission.

It was explained that the Commission has sought the advice of prominent radio engineers as to the scientific soundness of the plan and that the opinion of Mr. Hogan is representative of the views of the experts consulted.

Commission's Statement

The Commission's statement follows in full text:

"In order to assure themselves of the engineering and technical soundness of the new broadcasting-allocation structure recently announced by the Federal Radio Commission in General Order No. 40, several of the Commissioners in advance of its adoption, put the plan to the scrutiny of leading radio experts and engineering advisers.

"The views of these men were asked particularly as to the probable improvement in radio reception to be expected as compared with the present allocation upon the return of winter interference and heterodynes.

Representative View

"The following statement by John V. L. Hogan, prominent radio consulting engineer of New York City, is representative of the engineering opinions of radio men who have reported to the Commissioners on the new allocation arrangement:

"I consider the new allocation plan to embrace admirable principles and to permit an orderly arrangement of broadcast stations that will not only meet a strict interpretation of the requirement of equal division of facilities among the five zones, but also will give to the broadcast listeners throughout the country a vastly improved service.

"The public has been impatient at what many thought an undue delay in the announcement of a new allocation by the Commission, and of course you could long ago

Phonograph Renditions Frowned on

Washington.

The license of one station was revoked, another station suffered a reduction of power, and two other stations were given renewals, under decisions by the Federal Radio Commission in cases of stations cited for alleged failure to serve the public interest.

WNBA, of Joliet, Ill., was ordered off the air.

WCRW, at Chicago, was reduced from 500 to 100 watts.

The licenses of WLBC, at Muncie, Ind., and WJBL, at Decatur, Ill., were renewed.

At the same time the Commission made public certain basic principles adopted for its guidance in reaching its decisions. The text of the statement follows:

"Four more decisions were handed down by the Federal Radio Commission in cases of radio broadcasting stations which were called upon to prove that their operation was in the public interest, convenience or necessity.

Encourages Good Quality

"The license of one of the stations, WNBA, operated by Michael T. Rafferty, at Joliet, Illinois, will be revoked; the power of another station, WCRW, operated by Clinton R. White, at Chicago, will be reduced from 500 watts to 100 watts, and the licenses of the other two stations, WLBC, operated by Donald A. Burton, at Muncie, Indiana, and WJBL, operated by Wm. Gushard Dry Goods Company, at Decatur, Illinois, will be renewed.

"The Commission is convinced that with the band of frequencies devoted to broadcasting, public interest, convenience or necessity will be best served by a fair distribution of different types of service.

"Without attempting to determine how

many channels should be devoted to the various types of service, the Commission feels that a certain number should be devoted to stations so equipped and financed as to permit the giving of a high order of service over as large a territory as possible.

"This is the only manner in which the distant listener in the rural and sparsely settled portions of the country will be reached. A certain number of other channels should be given over to stations which desire only to reach a more limited locality.

Needs of Localities

"Finally, there should be a provision for a number of stations which are distinctly local in character and which aim to serve only the smaller towns in the United States without any attempt to reach listeners beyond the immediate vicinity of such town.

"The Commission also believes that public interest, convenience or necessity will be best served by avoiding too much duplication of programs and types of programs. Where one community is overserved and another community is receiving duplication of the same programs, the second community should be restricted in order to benefit the first. Where one type of service is being rendered by several stations in the same region, consideration should be given to a station which renders a type of service which is not such a duplication.

"In view of the paucity of channels, the Commission is of the opinion that the limited facilities for broadcasting should not be shared with stations which give the sort of service which is readily available to the public in another form.

Frowns on Records

"For example, the public in large cities can easily purchase and use phonograph records of the ordinary commercial type. A station which devotes the main portion of its hours of operation to broadcasting such phonograph records is not giving the public anything which it cannot readily have without such a station.

"If, in addition to this, the station is located in a city where there are large resources in program material, the continued operation of the station means that

"Sensible" Untanglement of Air Indorsed by Experts

have put into effect a more or less arbitrary enforcement of the equalization requirements.

Congratulates Board

"But it is very unlikely that a hasty application of the law would have resulted in a superior service to the users of radio, and I feel that you and your fellow Commissioners are to be congratulated upon having withstood criticism until this time when you are prepared to rearrange the broadcasters with the least possible disturbance of established services and the greatest improvement of the status of the listener, consistent with the law.

"The principle of assigning to each zone a number of channels for its own use, upon which all stations may fairly expect to serve fully the areas over which they are competent to distribute a satisfactory signal, is absolutely sound from a practical engineering viewpoint.

"No less important is the provision of definite channel assignments in each zone for the delivery of interference-free local and regional programs by stations of small

and medium power. Both of these features are embodied in your present plan.

"Let me close with two suggestions as to your application of the plan in a detailed allocation of existing broadcast stations.

"I trust that in taking advantage of the additional service that can be given by supplemental stations during daylight hours you will be absolutely firm in insisting upon return to the night-time status immediately upon the appearance of interference caused by the operation of any 'day-time' station. In general, this will require closing, or reduction of power, by such stations at or before sunset.

"Further, I hope that your allocation will cause the fewest possible changes in frequency assignments, and no such changes in the cases of stations rendering important services which listeners have become accustomed to find at definite points on their tuning dials.

"I am looking forward to the early day when your application of the plan will give to all of us a good interference-free service on each of the 70 or more channels that can be so used."

some other station is being kept out of existence which might put to use such original program material.

"The Commission realizes that the situation is not the same in some of the smaller towns and farming communities where such program resources are not available. Without placing the stamp of approval on the use of phonograph records under such circumstances, the Commission will not go so far at present as to state that the practice is, at all times and under all conditions, a violation of the text provided by the statute."

Wave Jumper Punished

Explaining its reasons for reducing the power of WCRW, the Commission said:

"This station was first licensed on or about August 15, 1926, and was one of the many stations which came into being during the chaotic period which preceded the enactment of the Radio Act of 1927.

"This station first appropriated to itself a frequency then being used by a Minneapolis station, and two or three weeks later it 'jumped' to a frequency which, under an informal understanding between the Department of Commerce and Canadian authorities, had been reserved for exclusive use by Canadian stations.

"At the hearing, Mr. White, the applicant, was the only witness. In addition to this testimony, a number of affidavits were submitted and considered by the Commission.

75 Per Cent. of Programs "Canned"

"The evidence discloses that Station WCRW's transmitter is located in the midst of a very thickly inhabited community on the near north side in Chicago.

"Of the total hours of operation, 75 per cent. is devoted to the broadcasting of phonograph records, a type of entertainment which the witness referred to as 'electrical reproduction.' It is clear that a large part of the program is distinctly commercial in character, consisting of advertisers' announcements and of direct advertising, including the quoting of prices.

"An attempt was made to show a very limited amount of educational and community civic service but the amount of time thus employed is negligible and the evidence of its value to the community is not convincing."

Ouster Held No Seizure of Property

Washington.

Radio broadcasting, in the opinion of the Federal Radio Commission, does constitute interstate commerce, particularly where it is made a vehicle for advertising, according to a statement made public by the Commission. The statement answered certain points of law raised during the hearings in July of the cases of about 100 of the 164 stations cited for alleged failure to serve the public interest.

Interference Possibility

Answering the charges of defense counsel made throughout the hearings that the Radio Act was invalid and unconstitutional, the Commission stated that whether broadcasting be interstate commerce or not, "it is clear that even the smallest broadcasting station does or may interfere with interstate commerce and is, therefore, subject to regulation."

Every station, the statement added, prevents anyone in the vicinity of that station from receiving programs or messages on that channel, and its interference range extends far beyond the State of its location.

Ouster Held Legal

The contention that refusal to grant renewal of licenses constitutes a taking of property without due process of law, in contravention of the Constitution, was described by the Commission as "not well founded." Pointing out that all broadcasters are licensed to use the ether, the statement said that if an applicant is deprived of anything by the decision of the Commission, "it is not of his tangible property, his transmitter or his studio, but of the privilege of using and operating this property either in interstate commerce or in such a way as may interfere with interstate commerce."

Wave Order in Effect in November

Washington.

The Federal Radio Commission's reallocation of radio facilities, originally scheduled to go into effect on October 1st, 3 a. m., November 11th, was announced by about November 10th, in the opinion of Louis G. Caldwell, general counsel of the Commission.

30-Day Rule

Discussing the procedure necessary to put the new plan into operation, Mr. Caldwell said that under the provisions of the Radio Act the Commission cannot issue a renewal license until 30 days prior to the expiration of the existing license under which a particular station is operating.

The stations are now operating under licenses which are scheduled to expire on October 1 but, Mr. Caldwell was of the opinion that they probably will be renewed for short periods and then other renewal licenses predicated on the reallocation plan will be issued sometime within 30 days prior to November 11th.

An Opportunity

This, he said, would give stations which might be dissatisfied with their allotments of time and frequencies an opportunity to apply for a hearing and the hearing could be held on the basis of a definite license, even though that license had not yet become effective. From a legal point of view, he said, it would be preferable to handle the situation in this manner.

Lafount Sees Better Business Stability

Washington.

The announced intention of the Federal Radio Commission to apply its new plan of reallocation simultaneously throughout the entire country will have a good effect from a business standpoint, in the opinion of Commissioner H. A. Lafount.

The Commissioner said that some consideration had been given the idea of applying the new scheme gradually, but that this had been rejected by the Commission. The rejection was justified, in the opinion of Commissioner Lafount, because the gradual change would have resulted in business uncertainty for a part of the radio industry during the time required to complete the reallocation.

"Speaking now as a business man," he said, "I am convinced that the complete adjustment of all stations will bring a feeling of permanency and stability not heretofore experienced."

APPLICATION DENIED

Washington.

The application of the Bull Insular Lines, of New York, for two short wave channels for commercial operation between the United States and San Juan, Porto Rico, was rejected by the Federal Radio Commission.

Advance List of Stations

Compiled According to the Reallocation Plan of the Federal Radio Commission, and Effective November 11th, at 3 a. m., E. S. T.

Station	Owner	Location	Power	Kc.	Station	Owner	Location	Power	Kc.	Station	Owner	Location	Power	Kc.
ALABAMA					COLORADO (Continued)					ILLINOIS (Continued)				
WAPI, Auburn, Ala. Poly. Inst.....			5,000	1,140	KFEL, Denver, Colo. Edison, Inc.			250	1,120	WCLS, Joliet, WCLS, Inc.....			100	1,310
WBRC, Birmingham, Birm. Brdcast. Co.			500	930	KFXJ, Edgewater, R. G. Howell....			50	1,500	WKBB, Joliet, Sanders Bros.....			100	1,310
WKBC, Birmingham, H. L. Ansley..			10	1,310	KGEW, Ft. Morgan, City of Ft. Morgan			100	1,200	WJBC, LaSalle, Hummer Furn. Co..			100	1,200
WJBY, Gadsden, Electric Const. Co.			50	1,210	KFKA, Greeley, Colo. St. Tchrs. Col.			500	1,010	WJJD, Moosehart, Sup. Lod. of the World (Loy. Ord. of Moose).....			1,000	620
WIBZ, Montgomery, Alexander D. Trum			15	1,500	KFHA, Gunnison, Western St. Col. of Colo.			50	1,200	WJAZ, Mt. Prospect, Zenith Radio			5,000	1,480
ALASKA					CONNECTICUT					INDIANA				
KFOD, Anchorage, Anchorage Radio Club			100	900	WICC, Easton, Bridgeport Brdcastg. Sta.			500	1,430	WHBU, Anderson, Citizens Bank....			100	1,210
KFIU, Juneau, Alaska Elec. L. & P. Co.			10	1,310	WTIC, Hartford, Travelers Ins. Co....			CP	50,000	WCMA, Culver, Culver Military Acad.			500	1,400
KGBU, Ketchikan, Alaska Rd. Ser. Co., Inc.			500	610	WDRS, New Haven, Doolittle Radio Corp.			500	1,330	WGBF, Evansville, Evansville on Air			500	630
ARIZONA					DELAWARE					IOWA				
KFXY, Flagstaff, Mary M. Costigan..			100	1,420	WDEL, Wilmington, WDEL, Inc.....			250	630	WJAK, Kokomo, J. A. Kautz.....			50	1,310
KFAD, Phoenix, Electric Equipment Co			500	620	WRHF, Washington, American Brdcastg. Co.			150	1,270	WBAA, Lafayette, Purdue Univ.....			500	1,400
KFCB, Phoenix, Nielsen Radio Supply Co.			100	1,310	WMAL, Washington, M. A. Leese Co.			250	630	WRAF, LaPorte, Radio Club, Inc....			100	1,200
KGAR, Tucson, Citizen Publishing Co.			100	1,370	WRC, Washington, Radio Corp. of America			500	950	WLBC, Muncie, Donald A. Burton....			50	1,310
KPJM, Prescott, Frank Wilburn.....			15	1,500	FLORIDA					WSBT, So. Bend, So. Bend Tribune			500	920
ARKANSAS					DISTRICT OF COLUMBIA					KANSAS				
KLCN, Blytheville, Daily Courier News KUOA, Fayetteville, Univ. of Arkansas			500	1,250	WDEL, Wilmington, WDEL, Inc.....			250	630	WJBC, Concordia, Concordia Brdcastg. Co.			50	1,420
KTHS, Hot Springs, Arlington Hotel Co.			1,000	800	WRHF, Washington, American Brdcastg. Co.			150	1,270	WLBK, Kansas City, Everett L. Dilard			50	1,420
KLRA, Little Rock, Arkansas Brdg. Co.			1,000	1,250	WMAL, Washington, M. A. Leese Co.			250	630	WLFU, Lawrence, Univ. of Kansas..			500	1,000
KGHI, Little Rock, Berean Bible Class			15	1,500	WRC, Washington, Radio Corp. of America			500	950	WREN, Lawrence, Jenny Wren Co..			500	1,010
KGJF, Little Rock, 1st Ch. of the Nazarene			100	1,370	GEORGIA					KSAC, Manhattan, Kan. State Agr. Col.			500	1,010
KGHB, McGehee, Chas. W. McCollum			50	1,370	WFLA, Clearwater, Clear. Cham. of Com., St. Petersburg Cham. of Co.			1,000	560	KFKB, Milford, John R. Brinkley, M.D.			5,000	1,130
KFPW, Sulphur Spgs., Rev. L. W. Stewart			50	1,340	WSUN, Clearwater, Clear. Cham. of Com., St. Petersburg Cham. of Co.			5,000	1,470	WIBW, Topeka, C. L. Carrell.....			1,000	1,300
CALIFORNIA					HAWAII					KENTUCKY				
KFWO, Avalon, Lawrence Mott.....			100	1,500	KGU, Honolulu, Marion A. Mulrony..			500	940	WFIW, Hopkinsville, Acme Mills, Inc.			1,000	940
KRE, Berkeley, First Cong. Ch. of Berkeley			100	1,500	KGHB, Honolulu, Radio Sales Co....			250	1,320	WHAS, Louisville, Courier-Journal Co.			5,000	1,020
KEJK, Bev. Hills, R. S. MacMillan			500	1,250	IDAHO					WLAP, Louisville, Amer. Brdg. Corp. of Ky.			1,200	
KELW, Burbank, Earl L. White.....			500	780	KFAU, Boise City, Indpt. Sch. Dist. of B. C.			1,000	1,230	LOUISIANA				
KFVD, Culver City, McWhinnie....			250	700	KFXD, Jerome, Service Radio Co....			15	1,420	KGGH, Cedar Grove, Bates Radio & El. Co.			50	1,370
KGHN, El Centro, Irey & Bowles....			15	1,200	KFEY, Kellogg, Union High School..			10	1,370	KWKI, Kennonwood, W. K. Henderson			5,000	850
KMJ, Fresno, The Fresno Bee.....			50	1,200	KSEI, Pocatello, KSET Brdcastg. Assoc.			250	1,320	WDSU, New Orleans, Jos. H. Uhalt..			1,000	1,270
KGFH, Glendale, Fred Robinson....			250	1,000	ILLINOIS					WABZ, New Orleans, Coliseum Pl. Bap. Church			50	1,200
KZM, Hayward, Leon P. Tenney.....			100	1,370	WMAQ, Chicago, Chicago Daily News			5,000	670	WJBO, New Orleans, Valdemar Jensen			100	1,370
KFQZ, Hollywood, Taft Radio & Bdg. Co.			250	850	WMBI, Addison, Moody Bible Inst..			5,000	1,160	WJBW, New Orleans, Chas. C. Carlson, Jr.			30	1,200
KFWB, Hollywood, Warner Bros. Bg. Corp.			1,000	950	WORD, Batavia, Peoples Pulpit Assn..			5,000	1,480	WKBT, New Orleans, First Baptist Ch.			50	1,420
KNX, Hollywood, Western Bdg. Co.			5,000	1,050	WCAZ, Carthage, Carthage College..			100	1,070	WSMB, New Orleans, Saenger Theatres, Inc., Maison Blanche Co.....			750	1,320
KMTR, Hollywood, KMTR Radio Corp.			1,000	570	WEBH, Chicago, Edgewater Beach Hotel Co.; Westinghouse El. & M. Co.			5,000	1,000	WWL, New Orleans, Loyola Univ....			5,000	850
KFOU, Holy City, W. E. Riker.....			100	1,500	KENTUCKY					KFDX, Shreveport, First Bap. Ch....			50	1,200
KMIC, Inglewold, James R. Fouch..			250	1,120	WGST, Atlanta, Ga. School of Tech.			500	890	KRMD, Shreveport, Robt. M. Dean..			50	1,200
KGER, Long Beach, C. Erwin Dobyns			100	1,370	WSB, Atlanta, Atlanta Journal Co....			1,000	740	KWEA, Shreveport, Wm. E. Antony..			100	1,370
KFON, Long Beach, Nichols & Wariner			1,000	1,250	WTHS, Atlanta, Atlanta Tech. H. S.			20	1,310	KSBA, Shreveport, W. G. Patterson..			1,000	1,450
KFI, Los Angeles, Earle C. Anthony			5,000	640	WMAZ, Macon, Mercer University..			500	890	MAINE				
KFSG, Los Angeles, Echo Park Evan. Assn.			500	1,120	WRBL, Columbus, Roy E. Martin.....			50	1,200	WARI, Bangor, First Univ. Church			100	1,200
KEGF, Los Angeles, Trinity Meth. Church			1,000	1,300	WRBI, Tifton, Kents Furn. & Music			100	1,310	WLBZ, Dover, Foxcroft, T. L. Guernsey			250	570
KGJF, Los Angeles, Ben S. McGlashan			100	1,420	WTFI, Toccoa, Toccoa Falls Institute..			500	1,450					
KHJ, Los Angeles, Don Lee, Inc.....			1,000	900	HAWAII									
KTBI, Los Angeles, Bible Inst. of Los Angeles			1,000	1,300	KGU, Honolulu, Marion A. Mulrony..			500	940					
KPLA, Los Angeles, Pacific Dev. Radio Co.			1,000	570	KGHB, Honolulu, Radio Sales Co....			250	1,320					
KLX, Oakland, Tribune Pub. Co.....			500	1,270	IDAHO									
KGO, Oakland, General Elec. Co....			10,000	790	KFAU, Boise City, Indpt. Sch. Dist. of B. C.			1,000	1,230					
KTAB, Oakland, Asso. Brdcastrs....			500	1,270	KFXD, Jerome, Service Radio Co....			15	1,420					
KFWM, Oakland, Oakland Edu. Soc..			500	930	KFEY, Kellogg, Union High School..			10	1,370					
KLS, Oakland, Warner Bros.....			100	1,420	KSEI, Pocatello, KSET Brdcastg. Assoc.			250	1,320					
KFWC, Ontario, James R. Fouch..			100	1,200	ILLINOIS									
KPPC, Pasadena, Pasadena Prs. Ch..			50	1,200	WMAQ, Chicago, Chicago Daily News			5,000	670					
KPSN, Pasadena, Pasadena Star-News Co.			1,000	950	WMBI, Addison, Moody Bible Inst..			5,000	1,160					
KFSD, San Diego, Airfan Radio Corp..			500	600	WORD, Batavia, Peoples Pulpit Assn..			5,000	1,480					
KGB, San Diego, Southwestern Brdg. Corp.			250	1,340	WCAZ, Carthage, Carthage College..			100	1,070					
KFRS, S. Francisco, Don Lee, Inc.			1,000	610	WEBH, Chicago, Edgewater Beach Hotel Co.; Westinghouse El. & M. Co.			5,000	1,000					
KGTT, S. Francisco, Flad Tid. T. & B. Inst.			50	1,500	KENTUCKY									
KFWI, S. Francisco, Radio Entertainments			560	930	WGST, Atlanta, Ga. School of Tech.			500	890	WFIW, Hopkinsville, Acme Mills, Inc.			1,000	940
KJBS, S. Francisco, J. Brunton & Sons Co.			100	1,370	WSB, Atlanta, Atlanta Journal Co....			1,000	740	WHAS, Louisville, Courier-Journal Co.			5,000	1,020
KPO, S. Francisco, Hale Bros. & Chronicle			5,000	680	WTHS, Atlanta, Atlanta Tech. H. S.			20	1,310	WLAP, Louisville, Amer. Brdg. Corp. of Ky.			1,200	
KYA, S. Francisco, Pacific Brdcastg. Corp.			1,000	1,220	WMAZ, Macon, Mercer University..			500	890	LOUISIANA				
KFBK, Sacramento, Kimball-Upson Co.			100	1,310	WRBL, Columbus, Roy E. Martin.....			50	1,200	KGGH, Cedar Grove, Bates Radio & El. Co.			50	1,370
KQW, San Jose, First Baptist Church			500	1,013	WRBI, Tifton, Kents Furn. & Music			100	1,310	KWKI, Kennonwood, W. K. Henderson			5,000	850
KWTC, Santa Ana, Pacific Bdstg. Fed.			100	1,500	WTFI, Toccoa, Toccoa Falls Institute..			500	1,450	WDSU, New Orleans, Jos. H. Uhalt..			1,000	1,270
KFCR, Santa Barbara, S. Barbara Brdg. Co.			100	1,500	HAWAII					WABZ, New Orleans, Coliseum Pl. Bap. Church			50	1,200
KSMR, Santa Maria, S. Maria Val. R. R. Co.			100	1,200	KGU, Honolulu, Marion A. Mulrony..			500	940	WJBO, New Orleans, Valdemar Jensen			100	1,370
KNRC, Santa Monica, Pickwick Bdg. Corp.			500	780	KGHB, Honolulu, Radio Sales Co....			250	1,320	WJBW, New Orleans, Chas. C. Carlson, Jr.			30	1,200
KWG, Stockton, Portable Wireless Tel. Co.			100	1,420	IDAHO					WKBT, New Orleans, First Baptist Ch.			50	1,420
KGDM, Stockton, E. F. Pepper.....			10	1,150	KFAU, Boise City, Indpt. Sch. Dist. of B. C.			1,000	1,230	WSMB, New Orleans, Saenger Theatres, Inc., Maison Blanche Co.....			750	1,320
COLORADO					ILLINOIS					KENTUCKY				
KFUM, Colo. Spgs., W. D. Corley....			1,000	1,390	WMAQ, Chicago, Chicago Daily News			5,000	670	WFIW, Hopkinsville, Acme Mills, Inc.			1,000	940
KPOF, Denver, Pillar of Fire, Inc..			500	1,010	WMBI, Addison, Moody Bible Inst..			5,000	1,160	WHAS, Louisville, Courier-Journal Co.			5,000	1,020
KOW, Denver, Assoc. Industries, Inc.			500	1,390	WORD, Batavia, Peoples Pulpit Assn..			5,000	1,480	WLAP, Louisville, Amer. Brdg. Corp. of Ky.			1,200	
KFUP, Denver, Fitzsimmons Gen. Hospital			100	1,500	WCAZ, Carthage, Carthage College..			100	1,070	LOUISIANA				
					WEBH, Chicago, Edgewater Beach Hotel Co.; Westinghouse El. & M. Co.			5,000	1,000	KGGH, Cedar Grove, Bates Radio & El. Co.			50	1,370
					ILLINOIS									
					WMAQ, Chicago, Chicago Daily News			5,000	670	KWKI, Kennonwood, W. K. Henderson			5,000	850
					WMBI, Addison, Moody Bible Inst..			5,000	1,160	WDSU, New Orleans, Jos. H. Uhalt..			1,000	1,270
					WORD, Batavia, Peoples Pulpit Assn..			5,000	1,480	WABZ, New Orleans, Coliseum Pl. Bap. Church			50	1,200
					WCAZ, Carthage, Carthage College..			100	1,070	WJBO, New Orleans, Valdemar Jensen			100	1,370
					WEBH, Chicago, Edgewater Beach Hotel Co.; Westinghouse El. & M. Co.			5,000	1,000	WJBW, New Orleans, Chas. C. Carlson, Jr.			30	1,200
					ILLINOIS					WKBT, New Orleans, First Baptist Ch.			50	1,420
					WMAQ, Chicago, Chicago Daily News			5,000	670	WSMB, New Orleans, Saenger Theatres, Inc., Maison Blanche Co.....			750	1,320
					WMBI, Addison, Moody Bible Inst..			5,000	1,160	WWL, New Orleans, Loyola Univ....			5,000	850
					WORD, Batavia, Peoples Pulpit Assn..			5,000	1,480	KFDX, Shreveport, First Bap. Ch....			50	1,200
					WCAZ, Carthage, Carthage College..			100	1,070	KRMD, Shreveport, Robt. M. Dean..			50	1,200
					WEBH, Chicago, Edgewater Beach Hotel Co.; Westinghouse El. & M. Co.			5,000	1,000	KWEA, Shreveport, Wm. E. Antony..			100	1,370
					ILLINOIS					KSBA, Shreveport, W. G. Patterson..			1,000	1,450
					WMAQ, Chicago, Chicago Daily News			5,000	670	MAINE				
					WMBI, Addison, Moody Bible Inst..			5,000	1,160	WARI, Bangor, First Univ. Church			100	1,200
					WORD, Batavia, Peoples Pulpit Assn..			5,000	1,480	WLBZ, Dover, Foxcroft, T. L. Guernsey			250	570
					WCAZ, Carthage, Carthage College..			100	1,070					
					WEBH, Chicago, Edgewater Beach Hotel Co.; Westinghouse El. & M. Co.			5,000	1,000					
					ILLINOIS									

Station	Owner	Location	Power	Kc.	Station	Owner	Location	Power	Kc.	Station	Owner	Location	Power	Kc.
MAINE (Continued)					MISSOURI (Continued)					NEW YORK (Continued)				
WCSH	Cumberland Cong. Sq.	Hotel	500	940	WMAY	St. Louis, Kingshighway Pres. Church		100	1,200	WNBZ	Saranac Lake, Smith & Mace		10	1,290
MARYLAND					MONTANA					NEW YORK (Continued)				
WCAO	Baltimore, Monumental Radio, Inc.		250	600	KGHL	Billings, Northwestern Auto Supply Co.		250	950	WGY	S. Schenectady, Gen. Elec. Co.		50,000	790
WCBM	Baltimore, Hotel Chateau		100	1,370	KFBB	Havre, F. A. Battery Co.		50	1,200	WFBL	Syracuse, Onondaga Co., Inc.		750	900
WFB	Baltimore, Balt. Radio Show		250	1,120	KGEZ	Kalispell, Flathead Brdcastg. Assn.		100	1,310	WSYR	Syracuse, Olive B. Meredith		500	550
WBAL	Glen Morris, Cons. Gas. E. L. & P. Co.		5,000	1,060	KGHD	Missoula, Elmore-Nash Bdg. Corp.		5	1,420	WHAZ	Troy, Rensselaer Poly. Inst.		500	1,300
WBES	Salisbury, Tom F. Little		100	1,310	KUOM	Missoula, State Univ. of Montana		500	920	WIBX	Utica, WIBX, Inc.		100	1,310
MASSACHUSETTS					NEBRASKA					NEW YORK (Continued)				
WBZA	Boston, Westinghouse E. & M. Co.		500	990	KGES	Central City, Central Radio E. Co.	(consolidated with KGBZ)			WVDA	Italian Educ. Brdg. Co.		250	1,350
WBIS	Boston, The Shepard Stores		500	1,230	KMMJ	Clay Center, M. M. Johnson Co.		1,000	740	WHAP	Def. of Truth Soc., Inc.		500	1,300
WEEI	Boston, Edison El. Illum. Co. of Boston		500	590	KGBY	Columbus, Ervin Taddiken	(consolidated with KGBZ)			WPAP-WQAD	Calv. Bap. Church		250	1,010
WMES	Mass. Educ. Soc.		50	1,500	KGEO	Grand Is., Hotel Yancey	(consolidated with KGBZ)			WRNY	Experimenter Pub. Co.		250	1,010
WSSH	Boston, Tremont Temple Bap. Church		100	1,420	KGDW	Humboldt, Frank J. Rist	(consolidated with KGBZ)			WHPP	Bronx Brdg. Co.		10	1,420
WLOE	Chelsea, Wm. S. Pote		100	1,420	GFOB	Lincoln, Howard Shuman		100	1,210	WPCH	Concourse Radio Corp. (day only)		500	810
WHA	Dartmouth, Round Hills Radio Corp.		500	1,320	KFAB	Lincoln, Neb. Buick Auto Co.		5,000	770	WLWL	Missionary Soc. of St. Paul		5,000	1,100
WSAR	Fall Riv., Doughty & Welch El. Co.		250	1,450	WCAJ	Lincoln, Neb. Wesleyan Univ.		500	590	WVW	(WGL) International Brdg. Corp		1,000	1,130
WEPS	Gloucester, Matheson Radio Co.		100	1,200	WJAG	Norfolk, Norfolk Daily News		500	590	WJZ	Radio Corp. of America		30,000	760
WLEX	Lexington, Lexington Air Station		500	1,320	WAAW	Omaha, Omaha Grain Exch.		500	600	NORTH CAROLINA				
WBET	Medford, Boston Transcript Co.		500	1,320	WOW	Omaha, W. O. W. Life Ins. Assn.		1,000	590	WWNC	Asheville, Chamber of Com.		1,000	570
WNBH	New Bedford, N. Bedford Bdtg. Co.		250	1,450	KGCV	Ravenna, Otto Sothman		50	1,420	WBT	Charlotte, C. C. Coddington		5,000	1,000
WBZ	E. Springfield, Westinghouse E. & M. Co.		15,000	990	KGCH	Wayne, Farmers & Merch. Coop.	(consolidated with KGBZ)			WRBU	Gastonia, A. J. Kirby Music Co.		50	1,210
WKBE	Webster, K. & B. Elec. Co.		100	1,200	KGBZ	York, Fed. Livestock Remedy Co.		500	930	WNRC	Greensboro, Wayne M. Nelson		500	1,440
WBSO	Wellesley, H. Babson's Sta. Organization		100	780	NEW HAMPSHIRE					WPTF	Raleigh, Durham Life Ins. Co.		5,000	1,080
WTAG	Worcester, Worcester Tel. Pub. Co.		250	580	WRBH	Manchester, N. H. Brdcastg. Corp.		50	1,310	WRBT	Wilmington, Wilmington Radio As.		50	1,370
MICHIGAN					NEW JERSEY					OHIO				
WKBP	Battle Creek Enquirer-News Co.		50	1,420	WCAP	Asbury Pk., Radio Indus. Bestg. Co.		500	1,280	WADC	Akron, Allen T. Simmons		1,000	1,340
WSKC	Bay City, World's Star Knit. Co.		500	1,410	WPG	Atlantic City, Municipality of A. C.		5,000	1,100	WFJC	Akron, W. F. Jones Brdg., Inc.		500	1,340
WEMC	Berrien Spr. Emmanuel Mis. Col.		1,000	680	WCA	Camden, City of Camden	(see "New York")			WHBD	Bellefontaine, First Pres. Ch.		100	1,370
WVJ	Detroit, Detroit News		1,000	820	WHAP	Carlstadt, Def. Truth Society	(see "New York")			WEBE	Cambridge, Roy W. Waller		10	1,210
WVBC	Detroit, Mich. Brdcastg. Co.		100	1,420	WCDA	Cliff. Pk., Italian Edu. Bldg. Co.	(see "New York")			WHBC	Canton, St. John's, Cath. Ch.		10	1,200
WBMH	Detroit, Braun's Music House		100	1,310	WPAP	Cliff. Pk., Calv. Bap. Ch.		250	1,010	WAA	Cincinnati, Ohio Mech. Inst.		25	1,370
WAFD	Detroit, Albert Parlet Co.		100	1,420	WQAO	Elizabeth, N. J. Brdcastg. Corp.		500	570	WKRC	Cincinnati, Kodel Radio Corp.		500	550
WKAR	E. Lansing, Mich. State Col.		500	1,040	WMC	Hoboken, Greeley Sq. Hotel		500	740	WFBE	Cincinnati, Park View Hotel		100	1,200
WFDF	Flint, Frank D. Fallain		100	1,310	WPC	Hoboken, Conc. Radio Corp.		500	810	WLW	Cincinnati, Crosley Radio Corp.		5,000	700
WGHP	Fraser, Geo. Harrison Phelps		750	1,220	WAA	J. City, Bremer Brdcastg. Corp.		250	1,450	WJAY	Cleveland, Cl. Radio Brdg. Corp.		500	1,390
WOOD	Furnwood, Walter B. Stiles		500	1,270	WKBO	J. City, Camith Corp.		250	1,450	WHK	Cleveland, Radio Air Serv. Corp.		500	1,390
WASH	G. Rapids, Baxter Laundries		250	1,270	WLWL	Kearny, Miss. Soc. of St. Paul		5,000	1,100	WTAM	Cleveland, WTAM & WEAR, Inc.		3,500	1,070
WIBM	Jackson, C. L. Carrel		100	1,370	WOR	Kearny, L. Bamberger & Co.		5,000	710	WEAR	Cleveland, WTAM & WEAR, Inc.		1,000	1,070
WMPC	Lapeer, First Meth. Prot. Ch.		30	1,310	WAAM	Newark, WAAM, Inc.		500	1,250	WAIU	Columbus, American Ins. Union		5,000	640
WKBB	Ludington, K. L. Ashbacher		50	1,500	WGCP	Newark, May Radio Brdcastg. Corp.		250	1,250	WCAH	Columbus, Com. Radio Serv. Co.		250	1,450
WCX	Pontiac, WJR, Inc.		5,000	750	WNI	Newark, Radio Inv. Co.		250	1,450	WEAO	Columbus, Ohio State Univ.		750	640
WAGM	Royal Oak, Robt. L. Miller		50	1,310	WOD	Paterson, Richard O'Dea		1,000	1,250	WMAN	Columbus, W. E. Heskett		50	1,210
WJBK	Ypsilanti, Ernest F. Goodwin		50	1,370	WJBI	Red Bank, Robt. S. Johnson		100	1,210	WSMK	Dayton, Stanley M. Krohn, Jr.		200	570
MINNESOTA					NEW MEXICO					OKLAHOMA				
WCCO	Anoka, Washburn Crosby Co.		10,000	810	KOB	State Col., N. M. Col. of Agri.		5,000	1,180	KGFF	Alva, Earl E. Hampshire		100	1,420
KGDE	Barrett, Jaren Drug Co.		50	1,200	KGFL	Raton, N. L. Cotter		50	1,210	KOCW	Chickasha, Okla. Col. for Women		100	1,420
WFBJ	Collegeville, St. John, Univ.		100	1,370	KGGM	Albuquerque, Jay Peters		100	1,420	KGCB	Okla. City, Wallace Radio Inst.		50	1,210
WRHM	Fridley, Rosedale Hospital Co.		1,000	1,230	NEW YORK					WNAD	Norman, Univ. of Okla.		500	580
KGFK	Hallock, Kittson County Enterprise		50	1,200	WKBW	Buffalo, Churchill Ev. Assn.		5,000	1,470	KEJF	Okla. City, Natl. Radio Mfg. Co.		5,000	1,470
WDGY	Minneapolis, Dr. Geo. W. Young		500	1,410	WGBS	Astoria, Gimbel Bros.		500	1,180	KFXR	Okla. City, Exchange Ave. Bap. Church		50	1,310
WHDI	Minneapolis, W. Dunwoody Ind. Inst.		500	1,410	WMBO	Auburn, Radio Serv. Lab.		100	1,370	KGFG	Okla. City, Fnl Gospel Church		50	1,370
WLB	Minneapolis, Univ. of Minnesota		1,000	1,230	WLN	Bay Shore, Radiotele. Mfg. Co.		100	1,210	WKY	Okla. City, WKY Radiophone Co.		1,000	900
KFMX	Northfield, Carleton College		1,000	1,230	WEAF	Bellmore, N. Bdg. Co.		50,000	660	KGGF	Pichner, D. L. Connel, M.D.		500	580
WCAL	Northfield, St. Olaf Col.		1,000	1,230	WBBC	Brooklyn, Brook. Brdg. Corp.		500	1,400	WBBZ	Ponca City, C. L. Carroll		100	1,200
KSTP	Wescott, Natl. Bat. Brdcastg. Co.		10,000	1,460	WLTH	Brooklyn, Voice of Brook, Inc.		250	1,400	KVOO	Tulsa, Southwestern Sales Corp.		1,000	560
MISSISSIPPI					NEW YORK (Continued)					OREGON				
WCOC	Columbus, Crystal Oil Co.		500	880	WSDA	Buffalo, H. H. Howell		500	1,400	KFJI	Astoria, George Kincaid		50	1,370
WRBQ	Greenville, J. Pat. Scully		100	1,200	WEBR	Buffalo, H. H. Howell		100	1,310	KOAC	Corvallis, Ore. State Agri. Col.		1,000	1,250
WGCM	Gulport, Gulf Coast Music Co.		15	1,370	WGR	Buffalo, Fed. Radio Corp.		750	550	KORE	Eugene, Eugene Brd. Sta.		100	1,420
WRBJ	Hattiesburg, Woodruff Furn. Co.		10	1,500	WWSV	Buffalo, Seneca Voc. Sch.		50	1,370	KMED	Medford, W. J. Virgin		50	1,420
WQBC	Utica, Utica Cham. of Co.		100	1,210	WCAD	Canton, St. Lawrence Univ.		500	1,220	KEX	Portland, Western Brdg. Co.		2,500	1,180
MISSOURI					NEW YORK (Continued)					PENNSYLVANIA				
KFVS	Cape Girardeau, Hirsch B. & R. Co.		50	1,210	WMA	Cazenovia, Clive Meredith		500	440	KFEC	Portland, Meier & Frank Co.		50	1,370
KFUO	Clayton, Concordia Theo. Seminary		500	550	WCGU	Coney Is., U. S. Brd. Corp.		500	1,400	KFIF	Portland, Bensen Poly School		50	1,420
KFRU	Columbus, Stephens College		500	630	WNB	Endicott, Hewitt-Wood Radio Co.		50	1,500	KFJR	Portland, Ashley C. Dixon & Son		500	1,300
KMBC	Independence Midland Brdg. & Reorg. Ch. of J. C. of Latter Day Saints		1,000	950	WLBH	Farmingdale, Jos. J. Lombardi		30	1,420	KTBR	Portland, M. E. Brown		500	1,300
WOS	Jefferson C. Mo. State Market, Bureau		500	630	WGBB	Freeport, Harry H. Carman		100	1,210	KGW	Portland, Oregonian Pub. Co.		1,000	590
WMBH	Joplin, Edwin Aber		100	1,210	WKEN	Buffalo, WKEN, Inc.		750	1,470	KWBS	Portland, Schaeffer Radio Co.		15	1,500
KWKC	Kans. City, Wilson Duncan Brdg. Co.		100	1,370	WCOH	Greenville, Westchester Bdg. Corp.		100	1,210	KWJJ	Portland, Wilbur Jerman		50	1,500
WDAF	Kans. City, Kansas City Star Co.		1,000	610	WLCI	Ithaca, Lutheran Assn., Ithaca		50	1,210	KXL	Portland, KXL Broadcasters		1,000	1,250
WHB	Kans. City, Sweeney Auto Sch. Co.		1,000	950	WMRJ	Jamaica, Peter J. Prinz		10	1,420	KOIN	Sylvan, KOIN, Inc.		1,000	940
WOQ	Kans. City, Unity School of Chris.		1,000	610	WOCL	Jamestown, A. E. Newton		25	1,210	PENNSYLVANIA				
KFKZ	Kirkville, N. E. Mo. St. Tchrs. College		50	1,210	WCLB	Long Beach, Arthur Faske		100	1,500	WCBA	Allentown, Musselman & B. Bryan		100	1,500
KMOX	Kirkwood, Voice of St. Louis		5,000	1,090	WLBX	Lone Is. City, John N. Brahy		100	1,500	WSAN	Allentown, Allen, Call Pub. Co., Inc.		100	1,500
KFEQ	St. Joseph, Scroggin & Co. Bank		500	1,410	WMAK	Lockport, WMAK Brdg. Sys., Inc.		750	900	WFBG	Altoona, Wm. F. Gable Co.		100	1,310
KG BX	St. Joseph, Foster-Hall Tire Co.		100	1,210	WOKO	Peekskill, Harold E. Smith		500	1,440	WNBW	Carbondale, Home Cut G. & C. Co.		5	1,200
KWK	St. Louis, Grtr. St. L. Brdcastg. Corp.		1,000	1,350	WBNY	New York, Baruchrome Corp.		250	1,350	WIBG	Elkins Pk., St. Paul's P. E. Church		50	930
WLBF	Kansas City, (transfd. from Kansas)		100	1,200	WHN	New York, George Schubel		250	1,010	WEDH	Erie, Erie Post Dispatch		30	1,420
KFWF	St. Louis, St. Louis Truth Center		100	1,200	WKBO	New York, Stand. Cahill Co.		250	1,350	WRAC	Erie, C. R. Cummins		50	1,370
KSD	St. Louis, Pulitzer Pub. Co.		500	550	WNYC	New York, Dept. of Plant & Struc.		500	570	WPKD	Frankford, Foulkrod Radio Eng. Co.		50	1,310
WEW	St. Louis, St. Louis Univ.		1,000	760	WMSG	New York, Mad Sq. Garden		250	1,350	WSAJ	Grove City, Grove City Co.		100	1,310
WIL	St. Louis, WIL Brdcastg. Co.		1,000	1,350	WABC	New York, Atlantic Brdg. Corp.		5,000	860	WBAK	Harrisburg, Pa. State Police		500	1,120
<p>The following stations transferred from New Jersey area:</p> <p>WVDA, Italian Educ. Brdg. Co. 250 1,350 WHAP, Def. of Truth Soc., Inc. 500 1,300 WPAP-WQAD, Calv. Bap. Church 250 1,010 WRNY, Experimenter Pub. Co. 250 1,010 WHPP, Bronx Brdg. Co. 10 1,420 WPCH, Concourse Radio Corp. (day only) 500 810 WLWL, Missionary Soc. of St. Paul 5,000 1,100 WVW (WGL) International Brdg. Corp 1,000 1,130 WJZ, Radio Corp. of America 30,000 760</p>														

(Continued on next page)

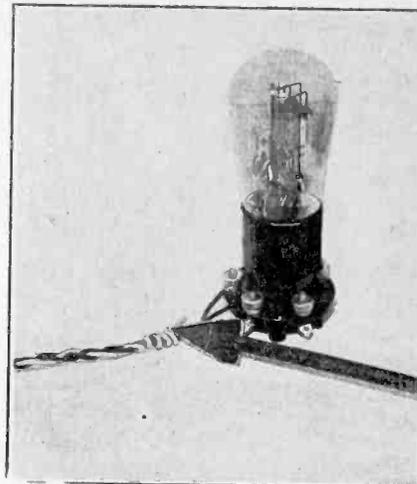
CUSTOM BUILDER CLEANS UP!



(Herbert Photos, Inc.)

"BLEW OUT A FEW TUBES LAST NIGHT," CASUALLY REMARKED ONE EXPERIMENTER AS HE SHOVELLED A GREAT HEAP INTO A REFUSE BAG. "BURNT OUT A FEW RHEOSTATS, TOO." THEN HE TRUTHFULLY ADDED: "I'M A CUSTOM SET BUILDER, DISPOSING OF FIVE YEARS' ACCUMULATION, WITHOUT THOUGHT OF PROFIT. PAYING RENT TO STORE THIS JUNK PROVED TOO EXPENSIVE."

REDUCES HUM



(Hayden)

HUM CAN BE REDUCED IN AN AC RECEIVER BY BRAIDING A WIRE AROUND THE TWO HEATER LEADS AND GROUNDING ONE END OF THE WIRE.

Station	Owner	Location	Power	Kc.
UTAH (Continued)				
KSL	Salt Lake City, Radio Serv. Corp. of U.		5,000	1,130
VERMONT				
WCAX	Burlington, Univ. of Vermont		100	1,200
WNBX	Springfield, First Cong. Church		10	1,200
VIRGINIA				
WTAZ	Chesterfield Hills, W. Reynolds, jr., & Thomas J. McGuire, Richmond		15	1,210
WNEW	Newport News, Brdg. Co., Inc.		100	1,310
WTFE	Mt. Vernon Hills, Ind. Pub. Co.		10,000	1,460
WASHINGTON				
WPOR	Norfolk, Reliance Elec. Co., Inc.		500	780
WBBW	Norfolk, Ruffner Jr. High Sch.		100	1,200
WLBG	Petersburg, Robt. Allen Gamble		100	1,200
WRVA	Richmond, Larus & Bro. Co., Inc.		5,000	1,110
WBBL	Richmond, Grace Covenant P. Church		100	1,210
WRBX	Roanoke, Richmond Dev. Corp.		100	1,370
WDBJ	Roanoke, Richardson-Wayland E. Co.		250	930
WSEA	Portsmouth, Va. Beach Broadcasting Co.		500	780
WASHINGTON (Cont.)				
KXRO	Aberdeen, KXRO, Inc.		50	1,210
KVOS	Bellingham, L. Kessler		250	570
KFBL	Everett, Leese Bros.		50	1,500
KGY	Lacey, St. Martin's College		50	1,420
KUJ	Longview, Fed W. Lovejoy & R. W. Kerfoot		10	1,500
KWSC	Pullman, State Col. of Wash.		500	570
KFOA	Seattle, Rhodes Dept. Store		1,000	1,280
KFOW	Seattle, KFOW, Inc.		100	1,420
KPO	Seattle, A. Taft & L. Wasmer		100	1,210
KVL	Seattle, Arthur C. Dailey		100	1,500
KJR	Seattle, N. W. Radio Service		5,000	970
KKP	Seattle, City of Seattle (Harbor Dept.)		15	1,420
KOMO	Seattle, Fisher's Blend Station		1,000	620
KPCB	Seattle, Pacific Coast Biscuit		100	1,210
KRSC	Seattle, Radio Sales Corp.		50	1,120
KTW	Seattle, First Pres. Church		1,000	1,280
KXA	Seattle, Amer. Radio Tel. Co.		500	570
KFIO	Spokane, N. Cen. High School		100	1,220
KFPY	Spokane, Symons. Inv. Co.		100	1,210
KGA	Spokane, N. W. Radio Serv. Co.		5,000	1,470
KHO	Spokane, Louis Wasner, Inc.		1,000	920
KMO	Tacoma, KMO, Inc.		500	1,340
KVI	Tacoma, P. Sound Radio Brdg. Co.		1,000	1,340
WEST VIRGINIA				
WOBV	Charleston, Charleston R. Brdg. Co.		250	580
WQBJ	Clarksburg, John Raikes		65	1,200
WSAZ	Huntington, McKellar Elec. Co.		250	580
WWVA	Wheeling, W. Va. Brdg. Corp.		5,000	1,020
WQLZ	Weirton, J. H. Thompson		60	1,200
WISCONSIN				
WEBW	Beloit, Beloit College		250	600
WTMJ	Brookfield, Milwaukee Journal		1,000	570
WTAQ	Eau Claire, Clyde, S. Van Gorden		1,000	1,330
KFIZ	Fond Du Lac, Fond Du Lac Commonwealth Reprinter		100	1,420
WCLO	Kenosha, C. Whitmore		100	1,200
WKDH	LaCrosse, Callaway Music Co.		1,000	1,380
WIBA	Madison, Capital Times Strand Theater Station		100	1,210
WHA	Madison, Uni. of Wisconsin		750	570
WOMT	Manitowoc, Mikadow Theater		100	1,210
WHAD	Milwaukee, Marquette Univ.		250	1,120
WISN	Milwaukee, Evening Wisconsin Co.		250	1,120
WIBU	Poynette, The Electric Farm		100	1,310
WRJN	Racine, Racine Brdg. Corp.		100	1,200
WHBL	Sheboygan, Press Pub. Co. & C. L. Carrell		1,000	1,380
WEBC	Superior, Head of Lakes Brdg. Mark.		1,000	1,280
WLBL	Stevens Point, Wis. Dept. of Mark.		1,000	900
WHBY	West Depero, St. Norbert's Col. Wyoming		50	1,200
KFBU	Laramie, Bishop N. S. Thomas		500	600

Station	Owner	Location	Power	Kc.	Station	Owner	Location	Power	Kc.
PENNSYLVANIA (Continued from preceding page)					SOUTH DAKOTA (Continued)				
WPRC	Harrisburg, Wilson Ptg. & Radio Co.		100	1,200	KUSD	Vermillion, University of S. D.		500	890
WHBP	Johnstown, Johnstown Auto. Co.		100	1,310	WCAT	Rapid City, S. D. Ste. Sch. of Mines		100	1,200
WABF	Kingston, Marikle Brdg. Corp.		250	1,440	WNAX	Yankton, Gurney Seed & Nursery Co. & Dakota Radio Apparatus Co.		500	890
WGAL	Lancaster, Lanc. E. S. & C. Co.		15	1,310	TENNESSEE				
WKJC	Lancaster, Kirk-Johnson & Co.		50	1,310	WFBC	Knoxville, First Bap. Church		50	1,200
WMBS	Lemoyne, Mack's Battery Co.		250	1,430	WNBK	Knoxville, Lonsdale Bap. Church		50	1,310
WJBU	Lewisburg, Bucknell Univ.		100	1,210	WNOX	Knoxville, Sterchi Bros.		1,000	560
WLBW	Oil City, Petrol. Tele. Co.		500	1,260	WOAN	Lawrenceburg, Ch. of the Naz. & Vaughan Sch. of Music		500	600
WFAN	Phila. Keystone Brdg. Co.		500	610	WGBC	Memphis, First Bap. Church		500	1,430
WABY	Phila. John Magaldi, Jr.		50	1,310	WHBO	Memphis, Brdg. Sta. WHBO		100	1,370
WFI	Phila. Strawbridge & Clothier		500	560	WMBM	Memphis, 7th Day Adventist Ch.		10	1,500
WCAU	Phila. Univ. Brdg. Co.		5,000	1,170	WMC	Memphis, Memphis Com. Appeal		500	780
WHBW	Phila., Dr. R. Kienzie		100	1,500	WNBK	Memphis, John Ulrich		500	1,430
WIAD	Phila., Howard R. Miller		100	1,310	WBAW	Nashville, Waldrum Drug Co.		5,000	1,490
WIP	Phila., Gimbel Bros., Inc.		500	610	WLAC	Nashville, Life & Cas. Ins., Inc.		5,000	1,490
WLIT	Phila., Lit Bros.		500	560	WSM	Nashville, Nat. Life & Acc. Ins.		5,000	650
WNAT	Phila., Lennig Bros. Co.		100	1,310	WSIX	Springfield, 638 Tire & Vul. Co.		100	1,210
WOO	Phila., John Wanamaker		100	1,500	WOBT	Union City, Tittsworth's R. A. M. Sp.		15	1,310
WPSW	Phila., Phila. School Wire Tel.		50	1,500	WREC	Whitehaven, WREC, Inc.		500	600
WRAX	Phila., Berachah Church, Inc.		250	1,420	WDOO	Chattanooga, Chattanooga R. Co.		1,000	1,280
KQV	Pittsburgh, Doubleday, Hill E. Co.		500	1,380	TEXAS				
WCAE	Pittsburgh, Kaufmann & Baer Co.		500	1,240	KGRS	Amarillo, Gish Radio Serv.		1,000	1,410
WJAS	Pittsburgh, Pitts. Rad. S. House		500	1,290	WDAG	Amarillo, J. Laurence Martin		1,000	1,410
KDKA	Pittsburgh, West. E. & M. Co.		50,000	980	KUT	Austin, Univ. of Texas		500	1,120
WRAW	Reading, Ave. Radio & El. Shop		100	1,310	KFDM	Beaumont, Magnolia Petrol. Co.		1,000	550
WGBI	Scranton, Scranton Brdrs., Inc.		250	880	KFYO	Breckenridge, Kirksey B. B. & E. Co.		100	1,500
WQAN	Scranton, The Scranton Times		250	880	KWVG	Brownsville, Cham. of Com.		500	1,010
WPSC	State Col., Pa. State Col.		500	1,230	WTAW	College Sta., A. & M. Col. of Texas		500	1,120
WNBO	Washington, John Brownlee Spriggs		15	1,200	KRLD	Dallas, KRLD, Inc.		10,000	1,040
WBAX	Wilkes-Barre, John H. Stenger, Jr.		100	1,210	WFAA	Dallas, Dallas Morning News (See Gen. Order No. 48)		5,000	1,040
WALK	Willow Grove, Albert A. Walker		50	1,500	WRR	Dallas, City of Dallas		5,000	1,190
WBRE	Wilkes-Barre, Louis G. Baltimore		100	1,310	KFPL	Dublin, C. C. Baxter		15	1,370
(See Gen. Order No. 42)					WDAH	El Paso, Trinity Metho. Ch.		100	1,310
PORTO RICO					KFJZ	Fort Worth, Henry C. Allison		100	1,370
WKAQ	San Juan, R. C. of Porto Rico		500	580	WBAP	Fort Worth, Carter Pub. Inc.		5,000	800
RHODE ISLAND					KFOB	Fort Worth, W. B. Fishburn		1,000	1,240
WDWF	Canston, D. W. Flint & Linc. Stud.		100	1,370	KFLX	Galveston, George Roy Clough		100	1,210
WMBA	Newport, Leroy J. Beebe		100	1,500	KFUL	Galveston, Will H. Ford		500	1,290
WFCA	Pawtucket, Frank Brook, Inc.		100	1,370	KGKL	Georgetown, M. L. Cates		100	1,370
WEAN	Providence, Shepard Co.		500	1,160	KGKB	Goldthwaite, Eagle Pub. Co.		100	1,500
WJAR	Providence, The Outlet Co.		250	880	KFPN	Greenville, New Furniture Co.		15	1,310
SOUTH CAROLINA					KRGV	Harlingen, Harlingen Music Co.		500	1,010
WBYY	Charleston, Washington Light Inf.		75	1,200	KPRC	Houston, Houston Ptg. Co.		1,000	550
WRBW	Columbia, Paul S. Pearce		15	1,310	KTUE	Houston, Uhalt Electric		5	1,370
SOUTH DAKOTA					KGHX	Richmond, Ft. Bend City Sch. Bd.		50	1,500
KFDY	Brookings, S. D. State College		500	550	KGFI	San Angelo, San Angelo Broadcasting Co.		15	1,310
KGCR	Brookings, Cutler's Radio Brdg. Ser.		100	1,210	KGCI	San Antonio, Liberto Radio Sales		100	1,370
KGDA	Dell Rapids, Home Auto Co.		15	1,210	KGDR	San Antonio, Joe B. McShane		100	1,500
KGDY	Oldham, J. Albert Loesch		15	1,200	KGRC	San Antonio, Eugene J. Roth		100	1,310
KGFX	Piere, Danna McNeil		200	580	KTSA	San Antonio, Alamo Brdst. Co.		1,000	1,290
KSOO	Sioux Falls, Sioux Falls Brdg. Asso.		1,000	990	KTAP	San Antonio, Robert B. Bridge		100	1,210
UTAH					WQAI	San Antonio, Southern Equip. Co.		5,000	1,190
KFUR	Ogden, Peery Bldg. Co.		50	1,310	WJAD	Waco, Frank P. Jackson		1,000	1,240
KDYL	Salt Lake City, Intermt. Bridg. Corp.		1,000	1,230	KGKO	Wichita Falls, Highland Hgts., Christian Church		100	1,370

Board Gives a Definition of New Law

Washington.

The Federal Radio Commission in a recent statement interpreted the section of the Radio Act calling for the administration of the law for purposes of "public interest, convenience and necessity." The Board held that the listening public and not broadcasters or radio advertisers should be served first and foremost.

This section of the Act, which was not given specific definition by Congress, it was explained, is the basis of many of the questions involved in the reallocation of radio licenses now being considered by the Commission in compliance with the Davis amendment to the Act, providing for equal allocation among the five radio zones.

Expects Court Action

In announcing its opinion the Commission explains that the phrase "will have to be defined by the United States Supreme Court, and this will probably be done by a gradual process of decisions on particular combinations of fact."

The Commission, it states, has been urged to give a precise definition of the phrase, and in the course of the many hearings held has been frequently criticized for not having done so. Because of the alleged uncertainty and indefiniteness of the phrase "it also has been urged that the statute itself is unconstitutional," the opinion continues.

The opinion was used as the basis for decisions in the cases of the 164 stations cited for alleged failure to serve "the public interest, convenience and necessity," and is made public for the information of broadcasters and for possible use by appeal courts in rehearing of adversely decided cases.

No Definition in Act

Pointing out that no attempt is made anywhere in the radio Act to define the term, the opinion says that it is only possible to state "a few general principles which have demonstrated themselves in the course of the experience of the Commission and which are applicable to the broadcasting band."

These hold that it is in the public interest, convenience and necessity to create an exclusive broadcast band; so to allocate stations as to bring about the best possible broadcasting reception conditions throughout the United States; avoiding too much duplication of programs; and that "the emphasis must be first and foremost on the interest, the convenience and the necessity of the individual broadcaster or the advertiser."

Board Is Prepared For Any Legal Test

Washington.

The Federal Radio Commission has not sought to avoid a legal test of the Radio Act, the General Counsel for the Commission, Louis G. Caldwell, stated.

The Commission, throughout its existence, Mr. Caldwell explained, has proceeded cautiously for the reason that it hardly would have been wise "to have permitted a test of the law without arguments to sustain the rights of the Government and the listening public."

Subletting of Chain for News Meets Snag

Washington.

The Federal Radio Commission has found objections to the plan proposed for the establishment of a radio short-wave network by newspaper and press associations for the transmission and receipt of dispatches to and from Europe and other transoceanic points, for which the necessary licenses already had been granted.

After the plan had been discussed by the Commission in executive session, Commissioner Sykes declared that the plan was not in accordance with the authorization issued by the Commission. He said to the applicants:

"It does not in any wise mean that you could parcel out licenses. If you are to take advantage of the allocations, this corporation must operate each and every one. It cannot parcel out to any newspaper or group of newspapers."

Advisory Board Plan Laid Before Commission

Washington.

Formal recommendation that all broadcasting stations be required to secure the services of an advisory board of 10 citizens, to be consulted regarding programs of the stations and means of their improvement in the public interest, was made to the Federal Radio Commission by Commissioner Harold A. Lafount. The Commission took the recommendation under advisement.

In his plan Commissioner Lafount stated that the boards, which would serve without compensation should be of benefit to listeners, to stations, and to the Commission. Listeners should have representation as to program selection by the stations, because the public is the undisputed owner of the air.

Erla in Merger With Greene-Brown

Chicago.

The Electrical Research Laboratories, Inc. and the Greene-Brown Manufacturing Company have merged under the name of the Erla Corporation, with general offices at 2500 Cottage Grove Avenue, Chicago, where the plant and offices of the Electrical Research Laboratories have been located for years.

Board Threatens Bickering Stations

Washington.

The Federal Radio Commission threatens to revoke the licenses of stations that air their personal and commercial disputes and has placed on watchful probation for thirty days four stations in Pennsylvania accused of such tactics. The activities are being studied to determine if the stations are public nuisances rather than agencies of public service, convenience and necessity.

The Commission in a statement cites WRAC, owned by C. A. Cummins, Erie, WABF, owned by The Markle Broadcasting Corporation at Kingston, WBRE, owned by Louis G. Baltimore, Wilkes-Barre, and WMBS, owned by Mack's Battery Co., Lamoyne.

WRAC, Erie, is accused of being disputatious with WRAX of the same city.

200,000 Watts Indorsed for Summer Work

Washington.

Large broadcasting stations should be authorized to use 100,000 to 200,000 watts of power in contrast to the present maximum assignments of 50,000 watts, during Summer months, to provide the listening public with dependable, strong radio signals that overcome Summer static, in the opinion of O. H. Caldwell, of the Federal Radio Commission, expressed in a letter to E. J. and C. B. Mosher, of Cortland, N. Y. The letter sets forth:

"Answering your letter protesting against the cutting of the powers of the large broadcasting stations, as has been proposed, I want to say that I am in thorough sympathy with your demand that such powers be not only returned at present maximums but be increased.

Convinced by Tour

"Having just returned from a tour of inspection through your vicinity, I realize from first-hand experience the need for high power to send through a strength of signal which will be heard satisfactorily against the roar of summer static you suffer at this season. Indeed, in my opinion, stations should be authorized to use 100,000 or even 200,000 watts in Summer if their owners are willing to spend the money to please the public with dependable strong radio signals that overcome the crashes of Summer static.

No Limit

"For when Nature broadcasts, she does not limit her station power to any mere 50,000 watts. Instead—disregarding this maximum prescribed by the Federal Radio Commission—old Nature calmly turns on powers of 500,000,000 watts, and even 1,000,000,000 watts, in any average lightning flash.

Nature's Pile

"Using thus the momentary power of 20,000 WEAF's or KDKA's all rolled into one; Nature can pile up a broadcast signal beside which man's present broadcasting powers seem puny and futile, indeed—or will seem so until we increase those powers to amounts comparable to other electrical power applications."

The Commission added:

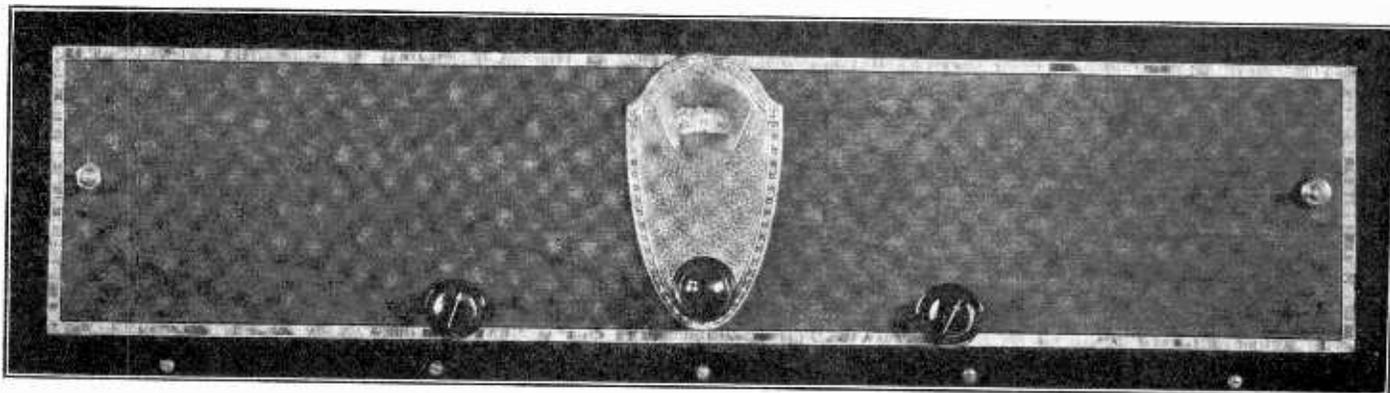
"The owners of the two stations have apparently indulged in a continuous personal controversy, in the course of which they have used their stations for purposes of abuse against each other.

"The controversy has been aired in the newspapers, the owner of one station having control of a newspaper. Charges of perjury, libel and slander have been constantly exchanged. As a result of one of the controversies extensive litigation is in process or threatened.

"Does this same constitutional guaranty apply to the airing of personal disputes and private matters? It seems to the Commission that it does not. The history of the guaranty shows that it was the outgrowth of a long struggle for the right of free expression on matters of public interest.

The 1927 Victor

By E. A.



A VIEW OF THE ATTRACTIVE PANEL LAYOUT OF THE 1929 MODEL AC VICTOREEN, AN 8-TUBE CIRCUIT OF FINE SENSITIVITY AND STABILITY.

RADIO'S place in the home today amounts almost to a utility and for this reason it is extremely desirable to eliminate such nuisances as battery worries and unnecessary tinkering.

The Victoreen 1929 AC receiver has been designed only after exhaustive research into AC requirements for Super-Heterodyne use. It renders a most natural reproduction with clear-cut definition of both the spoken word and the musical note. Compact in assembly and free from frills, this hookup has a most pleasing appearance and a simplified panel layout, and contains no "bugs" so often found in this type of receiver. It incorporates every feature for quality reception and reduces the number of panel controls to a minimum, consistent with practical operation. Its assembly is simplicity itself and the results meet the requirements of the most exacting radio critic.

The following marked improvements are incorporated in the 1929 Victoreen circuit:

- 1—An improved method of detection.
- 2—An unusual and smooth volume control.
- 3—A special oscillator eliminating objectionable repeat points.
- 4—A simplified circuit making assembly still easier.
- 5—A special fixed adjustment in the oscillator to simplify tuning.
- 6—A redesigned and new type RF transformer providing greater selectivity and sensitivity.
- 7—A sharpened loop circuit without using regeneration.
- 8—There is no hum, therefore no hum adjustments.
- 9—Variable adjustments have been reduced in number.

The 172 RF Transformers

In the evolution of multi-tube receivers, Victoreen early earned an enviable position. This was due largely to the type of radio frequency transformers used, combined with care in manufacture and precision in matching.

How good these transformers were is proven by the fact that, in the face of the fastest moving industry in the world, an industry which reflects as nothing else the modern trend of "changing time," these transformers have represented through five years to qualified radio fans, the "standard of comparison."

The Victoreen 172 RF transformers are designed on the same principle as the old No. 170 type, which proved their worth

[Herewith is the first presentation of the 1929 Victoreen AC Receiver, an expertly engineered circuit, affording all the latest conveniences, and built around the famous Victoreen circuit, changed only to create improvements. Those interested in obtaining a full picture diagram of the circuit should address E. A. Benson, c/o RADIO WORLD, 145 West 45th Street, New York City. Discussion of a short-wave tuner, the power supply, and other features will be published in the September 29th issue of RADIO WORLD (next week) and in subsequent numbers.]

over that long period of years. Each unit contains a variable condenser, and is tuned and sealed at the factory to a standard frequency of 90 kilocycles. Thus any four transformers may be used together without the necessity of matching in sets of four.

A second adjustment is made at the factory, by means of which the gain per stage is closely controlled, so that the tendency to oscillate is regulated to a point at which it acts to increase the selectivity by virtue of the negative resistance thus obtained.

It is not necessary to place these transformers at an angle, as the gain per stage is regulated so that maximum efficiency is obtained, when the coils are aligned in a straight position.

The 152 Victoreen Oscillator

Responsible for the elimination of many of the so-called harmonics usually found in Super-Heterodyne circuits, the No. 152 oscillator is radically new in design and contains an adjustment made at the factory, whereby each oscillator is tuned to cover a definite frequency range. This special feature makes the oscillator and antenna circuits tune together throughout the broadcast range although the circuits naturally operate at different frequencies. Thus practically no compensation is required. To overcome the trouble—some harmonics, it is essential that the resistor be incorporated as shown, as the oscillator requires an extremely low plate voltage.

The Single Dial Control

The single dial control unit must neither be confused with, or substituted for, or by, the old Victoreen master control unit, as

the 1929 unit contains no mechanical compensation. Furthermore, the circuit is not intended to function with any other than Remler condensers, which were chosen because of their extremely low minimum. Other condensers shorten the frequency range, making it impossible to receive the lower stations. This single control unit, although of the rack and pinion type, has no backlash, the unit incorporates a 360-degree back panel illuminated dial.

If for any reason the single dial feature is not desired, two single Remler condensers may be used. This, however, is not recommended, as the increased selectivity of the 1929 circuit makes the tuning extremely critical, and as compensation is provided for, by the small .0001 variable condenser, there is not the slightest need for two dials.

Plate rectification is used in the 1929 Victoreen AC receiver and in a measure is responsible for the unusual quality obtained from this circuit.

90-Volt Intermediates

The new Victoreen 172 RF transformers are designed to operate in this circuit with 90 volts plate potential. Several advantages are thereby gained.

First, the use of 90 volts on the first six tubes permits the same grid voltage to be applied to the detectors as is applied to the first audio, which operates from 180 volts, thus simplifying the circuit.

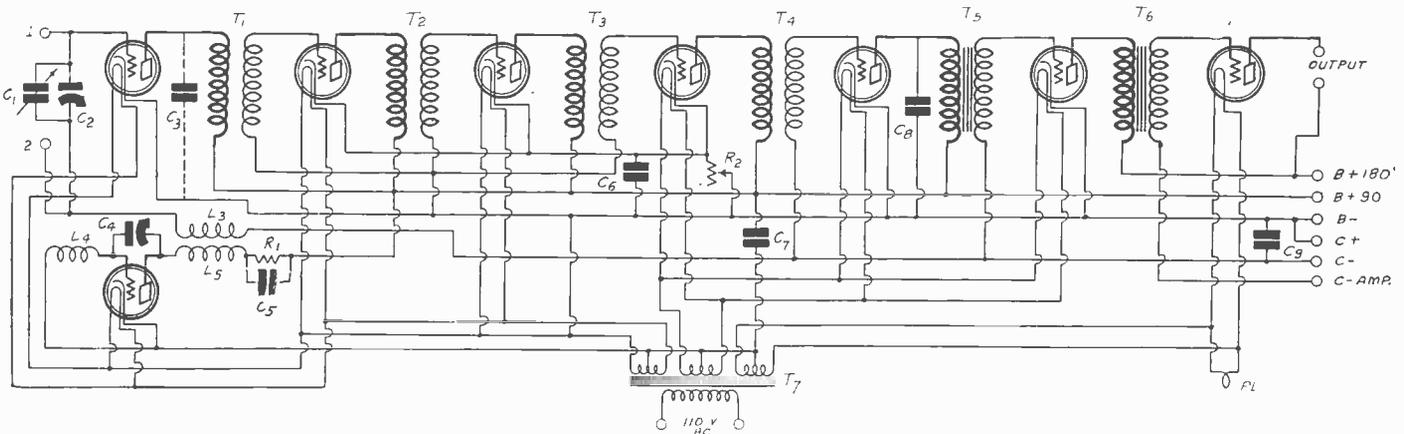
Second, it permits the use of a 90 volt voltage regulator tube, which assures a constant potential and eliminates reaction from the audio circuits.

The rest of the Victoreen parts are well known to radio fans. The 112 audio unit is used in this circuit, as its performance has already made it outstanding for audio amplification. It combines the first and second stage transformers in one case to insure the proper location and combination of these transformers. This unit renders all the naturalness of the original program and is noted for its wide frequency range and freedom from distortion. It is designed to handle plate potentials up to 500 volts.

The Victoreen 327 filament transformer is designed to supply the standard AC tubes slightly below their rated voltage. This transformer is standard for 50 to 60 cycle use only, and is normally furnished for 108 to 112 volts. This unit contains two separate 2½-volt windings and one 5-volt winding, all of which are center tapped. This unit is designed to supply

een AC Circuit

Benson



THE CIRCUIT DIAGRAM OF THE NEW VICTOREEN, PUBLISHED HERE FOR THE FIRST TIME ANYWHERE.

up to five UX227 tubes from each 2½-volt secondary and two UX112A or one UX210 tube from the five-volt secondary.

This efficient unit is especially designed to furnish low voltage on the 2½-volt secondary winding as a precaution for the life of the UY227 tubes. This transformer comes equipped with leads all attached to facilitate ease in placement and wiring. The placement of the transformer in its particular location on the baseboard assures efficiency.

The Victoreen 333 Switch and Plug Unit is of unusual design. It eliminates the necessity of any AC wiring connections by providing three receptacles in which the power leads for the A, B and C connections may be plugged. This unit comes equipped with a 110 volt switch permanently connected and with leads of proper length for correct placement. An extension is also furnished with 6 feet of cord permanently connected to the plug unit. This unit is placed in the set and permits all the AC devices to be operated by the panel switch.

Tube Requirements

The UY227 tubes have been selected because of their greater stability in operation. Their use eliminates variation in volume with line voltage, while at the same time reducing the hum to an imperceptible value. A point of interest in this circuit is the placing of the cathode potential at zero, rather than at 45 volts, as is the usual practice. This tends to give longer life to the tubes.

The unusual method of volume control consists of a resistor in the common plate return of the intermediates. This variable resistor not only acts to decrease the plate potential but also places a high negative bias on the grids of the intermediate tubes, resulting in an extremely smooth volume control.

Whereas most volume controls are likely to change the tuning due to a change in voltage relations in the different circuits, the volume control in the 1929 Victoreen circuit does not change the tuning at all. Therefore it is unnecessary to readjust the dial when the volume is changed.

Voltage Requirements

To reduce the so-called harmonics, it has been necessary to make some of the foregoing changes in the circuits, which

- LIST OF PARTS**
- Co, C1.**—Two Remler .0005 mfd. tuning condensers
 - C2.**—One .0001 mfd. microdenser
 - C3.**—One .00025 mfd. fixed condenser
 - C5, C6, C7, C9.**—Four Acme 1 mfd. fixed condensers
 - C8.**—One .002 mfd. fixed condenser
 - L3, L4, L5.**—One Victoreen Type 152 Oscillator coil
 - T1, T2, T3, T4.**—Four Victoreen Type 172 RF transformers
 - T5, T6.**—One Victoreen Type 112 double audio transformer unit
 - T7.**—One Victoreen Type 327 filament transformer
 - R1.**—One Electrad 25,000-ohm resistor fixed value
 - R2.**—One Electrad 25,000-ohm variable resistor, type H
 - Seven UY type tube sockets**
 - One UX type socket**
 - One Victoreen No. 162 antenna coupler**
 - One Victoreen No. 333 switch and plug unit**
 - One Victoreen 1929 single dial control**
 - Ten binding posts**
 - One Vee Coil antenna**
 - One cabinet, 10 inches deep, for 7x26 inch front panel**
 - One front panel 7x26x3/16 inches**
 - One binding post strip 5/8x6½x3/16 inches**
 - One binding post strip 5/8x2¼x3/16 inches**
 - One wood baseboard 10x25x½ inches**
 - Thirty-six feet of No. 14 square tinned bus bar wire**
 - Fifty solder lugs**
 - A quantity of small roundhead brass wood screws.**

in turn necessitates different B voltage requirements. It is essential that the following specifications be strictly followed.

The first audio must have 180 volts of B voltage and the detector's 90 volts of B voltage, so the same C voltage is applied to both the first audio and the detectors. This is really an advantage, as the C voltage may be found quite critical to within 1½ volts. Therefore, when the C voltage is once adjusted, the audio is sure to have the right value, which is automatically determined by the requirements of the detectors. Thus there is only one C voltage on the set which needs to be questioned, and this voltage is easily

determined. Its value is approximately 10½ volts for a 112A tube.

The 117 Power Supply

The Victoreen 117 Power Supply is practically a necessity with this circuit as it provides the 90 and 180 volt circuits with voltage regulator tubes, thereby eliminating all questionable voltage controls.

This feature, together with the extreme simplicity of wiring and lack of shielding, makes possible a radio receiver unparalleled for ease of operation and one which is unaffected by reasonable changes in line voltage.

Although the current required for the operation of the first six tubes is less than 10 mils, B eliminators or power supplies which do not contain at least two 274 regulator tubes can not be used. Batteries, of course, may be used if desired, providing the proper voltage is maintained.

C Voltage

There are only two C voltages required—90 volts for the UX250 tube, if one is used, and 8 to 12 volts on the receiver proper. While dry cell batteries are, of course, quite satisfactory, the Victoreen 516 C Supply will be found more than advantageous, as it supplies a voltage which may be varied to suit the detector requirements of the receiver. Its upkeep is less and its dimensions smaller than batteries, and provides a more uniform voltage over a longer period of time.

(Other illustration on front cover.)

Tobe Has 'A' Unit for DC Tube Sets

Tobe Deutschmann Co., has just placed on the market a complete A-Supply, capable of supplying a steady filament current up to 2 amperes at either 6 or 4 volts. The unit is compact, measuring only 10x6x5 inches, and is of heavy, solid construction. The unit contains two high inductance chokes, a large oversized transformer, a condenser bank of two 4,000 mfd. dry electrolytic condensers and a dry rectifier element. All units are bolted to a heavy chassis and are not covered up by wax. The outfit is guaranteed for one year.

Those who are interested in this complete filament current supply device should write for full particulars to the Tobe Deutschmann Co., Canton, Mass. Mention RADIO WORLD.

Improved Scanning Ta

By James

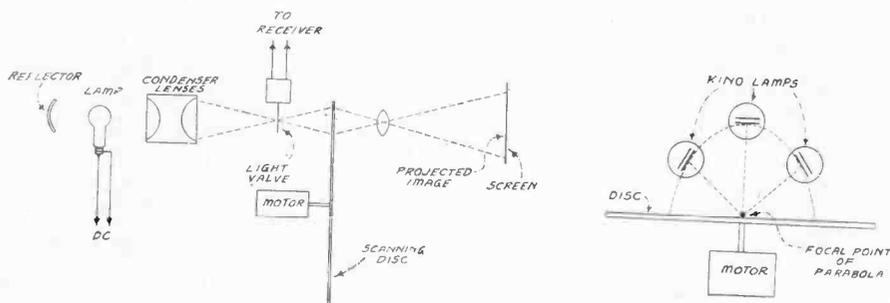


FIG. 1

LEFT—A DIAGRAM SHOWING HOW A TELEVISION IMAGE MAY BE PROJECTED ON A SCREEN. A BRIGHT STEADY LIGHT IS PROVIDED BY A LAMP. THIS LIGHT IS INTENSIFIED BY A REFLECTOR AND A PAIR OF CONDENSER LENSES. A LIGHT VALVE, CONTROLLED BY THE RECEIVED SIGNAL, IS PLACED IN THE FOCUS. A SCANNING DISC IS PLACED IN THE PLANE WHERE THE IMAGE OF THE LIGHT SOURCE IS FORMED. ANOTHER LENS ENLARGES THIS IMAGE AND PROJECTS IT ON THE SCREEN. RIGHT—THE LIGHT OF THREE KINO LAMPS, PLACED ON A PARABOLA, IS CONCENTRATED AT THE FOCUS OF THE PARABOLA. THE INTENSIFIED LIGHT IS SCANNED IN THE USUAL WAY.

WHILE the television receiver described in the September 15th issue of *RADIO WORLD* is one that *works* and, considering the early state of the art, works remarkably well, nevertheless there are some improvements that will suggest themselves to the average experimenter after he has constructed and operated the televisor as described.

During the past few months a great many different types of televisors and television ideas have been tried out by engineers engaged in the development of this new and extremely fascinating art.

One of the many steps to be taken before television can become an accepted household necessity is the elimination of the "machine shop" resemblance.

In this connection it has been found that

the noise, vibration and cumbersomeness can be eliminated by the use of scanning discs of much smaller diameter than the conventional 24-inch variety now so universally employed by all experimenters and requiring large motors for spinning.

There seems to be a misconception that the scanning disc used at the receiver must be of the same diameter as that used at the transmitter.

All that is necessary is that the angular spacing between apertures (and thus the number of apertures) be the same and that the radial pitch of the spiral be equal to the mean cord between the apertures.

As a result of the smaller diameter disc, a very much smaller and less expensive motor may be used.

At first thought it might seem that the

smaller image resulting from the use of the smaller disc might be a serious handicap and a decided step in the wrong direction. The improved detail of the smaller image, however, makes readily possible the enlarging of the image to the same size as with the larger discs. The reduced illumination resulting from the optical magnification of the image may be easily compensated for by the use of a condenser lens between the Kino lamp and the disc to gather in as much as possible of the illumination from the large plate of the Kino lamp and focus it as a spot of the desired area, but of increased brilliancy, on the back of the scanning disc.

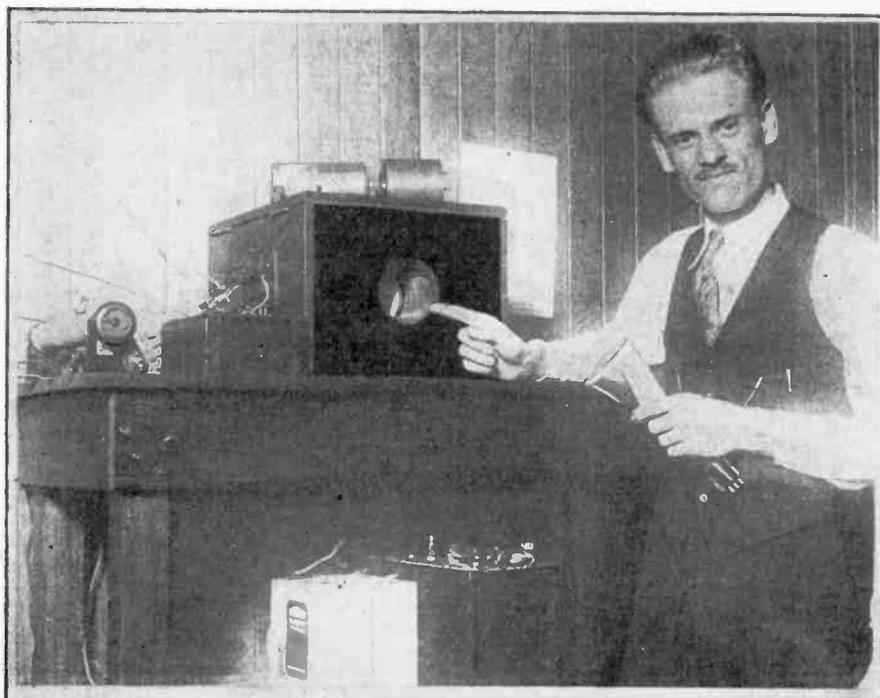
Such an arrangement, suggested to the writer by D. E. Replogle of the Raytheon Company, already has been put to practical use in connection with a 12-inch National disc for receiving Jenkins' silhouette radio movies.

Gernsback's Method

Another method of increasing the illumination of the image in connection with small scanning discs is one suggested some time ago by Hugo Gernsback, head of the company that operates WRNY, which has a regular television transmission schedule. Several Kino lamps are connected together and mounted with their plates tangent to an imaginary parabola located behind the disc in such a position that its focal point strikes the disc directly back of the observation opening, or else so that its focal point lies some distance behind the disc, so that a suitable condenser lens may be used to concentrate an intense light spot of the desired area at the proper point on the back of the disc.

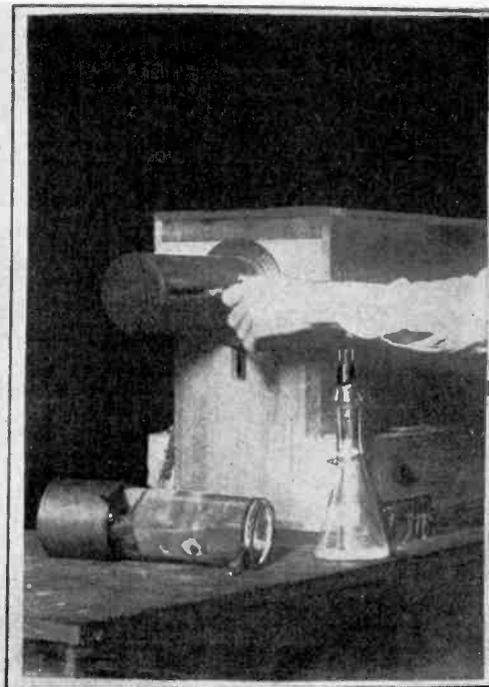
Of course, a quite different and, "on paper," a seemingly better system would be to employ a powerful incandescent lamp operated from a constant DC supply and equipped with a suitable condenser lens system to put a very intense spot of light on the proper place on the disc. Then a light

CLAIMS ELIMINATION OF SCANNING DISC



(Acme)

THE ELIMINATION OF THE SCANNING DISC AND ALL MOVING PARTS FOR TELEVISION IS CLAIMED BY PHILO T. FARNSWORTH, 22, SHOWN AT LEFT WITH HIS TRANSMITTER. AT RIGHT IS THE RECEIVER, WHICH USES A CATHODE RAY OSCILLOGRAPH. HE HAILS FROM UTAH BUT IS EXPERIMENTING IN CALIFORNIA.



Exes Scientists' Ingenuity

Millen

valve or shutter is interposed between the light source and the disc and operated by the television signal in such a manner as to modulate the brilliancy of the illumination reaching the disc.

Such a light would produce an image of sufficient brilliancy to permit projecting by means of suitable lenses directly on a small screen. Unfortunately, suitable "light valves" or other methods of modulating constant intensity light sources at high frequencies are not available.

Dr. Frank Conrad of the Westinghouse Co., recently demonstrated a still different light source for television work that shows promise of being of real importance. It is a modification of the well-known Cooper-Hewitt or mercury vapor arc lamps. As yet, however, such lamps are not available to the experimenter.

But getting back again to the scanning disc and its associated motor, we come up against another problem, namely, that of synchronization.

The Synchronous Motor

In the apparatus described last week (September 15th issue) and recommended to the beginner in television, a variable speed motor was used. Such an outfit has the decided disadvantage of requiring constant attention and, in fact, quite a bit of skill on the part of the operator if the images are to be held for more than a few seconds at a time.

Such an arrangement has the advantage, however, of being less expensive, more easily rigged up and more easily adapted for reception from different stations using different disc speeds.

On the other hand, by the use of a synchronous motor, the image always is kept in view, without the motor requiring attention. If both the transmitter and the receiver are served by the same power supply company, or by power supply companies with interconnecting or "tie-in" lines, then the image will stay pretty well in frame for a long stretch.

If the power systems are not "tied-in," as in the case when receiving 3XK of Washington at Boston, then the image will move in and out of "frame."

By mounting the motor so that its casing may be revolved slowly by hand, it is a very simple matter in such instances to keep the image properly framed at all times. Such a process is very much simpler than attempting to "hold" an image with a variable speed motor.

Small synchronous motors are rapidly be-

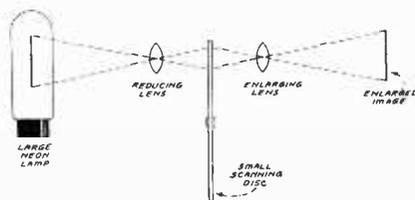


FIG. 2

coming available at reasonable prices from a number of different sources as a result of the demand of the television experimenters and it is recommended that the first step for the new experimenter to make after becoming thoroughly familiar with the operation of the television as originally described is to construct a new scanning device employing a synchronous motor.

WRNY Enlarges Television Schedule

Since WRNY started to broadcast television on a regular schedule on August 21st, thousands of telephone calls and hundreds of letters have been received by the station asking for lengthened schedules. Until recently the station had been broadcasting television impulses for five minutes of every hour that it is on the air.

Television experimenters asked for longer schedules because it is difficult to adjust a television receiver to synchronism and it sometimes takes three or four minutes to get the images into step. For this reason, the station now gives three extra twenty-minute periods over WRNY and 2XAL, on 326 and 30.91 meters, respectively. The additional schedule is as follows:

Monday: 6:40 P. M. to 7:00 P. M.

Tuesday: Midnight to 12:20 A. M.

Saturday: 3:40 P. M. to 4:00 P. M.

Between the broadcasting of different objects, an operator breaks in to state what is being televised. WRNY televises the following one after the other, the same night:

Faces of various individuals in motion.

A large placard on which are printed the letters WRNY. This helps the experimenter to know whether the received image is right or left handed, and is not upside down.

Moving toy monkey.

A moving roly-poly man.

Play Seen and Heard Via Radio

Schenectady, N. Y.

A playlet was broadcast simultaneously by sound and vision radio for the first time in history by the General Electric Co. in a recent demonstration. The voice and action of J. Hartley Manners' one-act play "The Queen's Messenger" came through space in perfect synchronization. It required forty minutes to broadcast the play.

The pictures received were three by three inches, and they were sometimes blurred and indistinct. They were not always in the center of the screen and they flickered a good deal. Consequently they were not always easy on the eyes. Yet the action could be seen and the words of the actors clearly heard and understood. The synchronism, of course, was perfect.

The transmission took place on three wavelengths. The pictures were carried on 379.5 meters and on 21.4 meters and the words were carried on 31.96 meters.

Alexanderson's Work

The demonstration was made possible by the development by Dr. E. F. W. Alexanderson of a simplified portable television camera, used for the first time in public to record Governor Smith's acceptance speech at Albany, and by the previous development by Dr. Alexanderson of a simple television receiver.

Dr. Alexanderson stressed the fact that the development of television and the simultaneous transmission of sound and images are still in the experimental stage. He predicted, however, that some day we would have special television theaters which would have no actors nor musicians but which would receive their performances from a central broadcasting station of sound and images. He also predicted that color television would be added in time.

Equipment at Show

Dr. Alexanderson exhibited his apparatus at the Radio World's Fair in New York York City. The projection was on a screen 12x12 inches and the transmission by wire.

The transmission and reception of 12x12 inch images is practical at this time by wire connection but not by radio because the allowed channels in radio are not wide enough to insure clearness.

ARMY MAKES PLEA

Washington.

Secretary of War Davis in a letter has urged the Radio Commission to allot an additional band of frequencies for amateur use, stating that the importance of the amateur operator in the scheme of national defense justified it. He proposed the assignment of a definite band between 5,000 and 10,000 kilocycles, which has not already been assigned to the army.

R. C. A. Tube Clause Defeated On Appeal

Philadelphia

The Federal Court of Appeals by a two-to-one decision has declared invalid the clause in the agreements made between the Radio Corporation of America and licensed manufacturers, which provided that the manufacturers should use RCA tubes exclusively for initial equipment of receiving sets.

The decision upheld the ruling of Judge Hugh M. Morris of the District Court of Delaware that the clause was a violation of the Clayton Anti-Trust law. Judge Morris held that to permit such a contract to be carried out would be to write a nullifying clause in the Clayton act itself.

Judge J. Warren Davis and Judge Victor B. Woolley of the Court of Appeals agreed with Judge Morris of the District Court, while Judge Joseph Buffington dissented.

The complainants against the Radio Corporation were Arthur D. Lord, receiver of the De Forest Radio Corporation, The Northern Manufacturing Company, the United Radio and Electric Corporation, the Televocal Corporation and Harry Chirelstein, owner of the Sonatron Tube Corporation.

The case, which has attracted a wide attention in radio circles, may be carried to the Supreme Court.

Stopping Condens

IN NEW PUSH-PULL RE

By J. E.

Technical

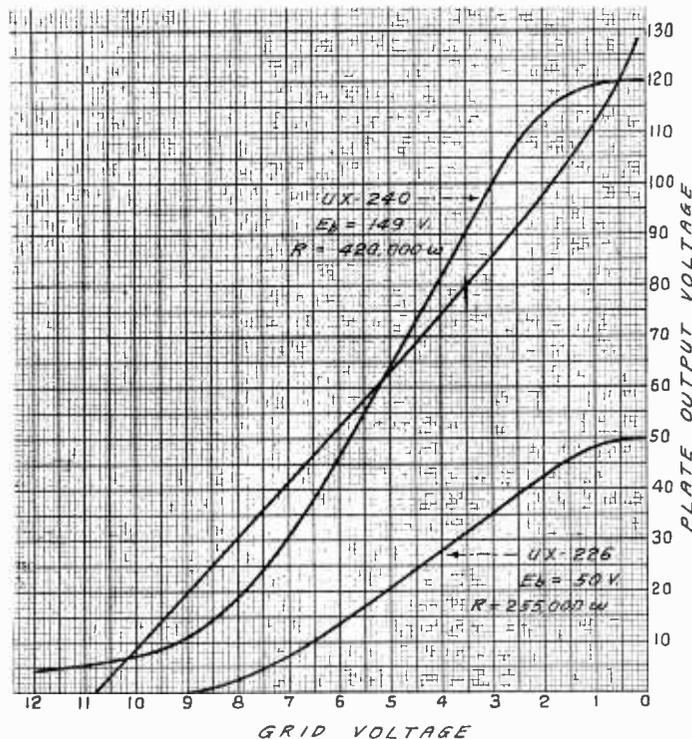


FIG. 5
Grid voltage plate output voltage curves of -26 and -40 type tubes with AC on the filaments, high resistance loads and high resistors in the grid circuits.

IN the September 15th issue of RADIO WORLD the beginning of a description of a new type of resistance coupled push-pull amplifier appeared. The novel feature of this amplifier is that no stopping condensers are used between the plates on one stage and the grids in the succeeding stage.

This circuit is the result of a suggestion by G. H. Paris of Duluth, Minn., and a long series of experiments by the writer and his co-workers.

In the description of the receiver and in the details of design continual reference to performance characteristic curves previously published was made. These curves are now reproduced for the convenience of those who are interested in the new circuit. Fig. 5 reproduced in this issue applies to the case when the -26 and the -40 tubes are heated with transformers, and Fig. 6 applies to the -40 tubes when heated by direct current.

The previous installment of the description of this new amplifier concluded by a discussion of the bias on the second pair of tubes. We continue from that point.

The bias needed for the grids of the second stages, as shown by the upper curve in Fig. 5, is 5 volts. If point C, Fig. 1, were connected to point B the bias would be 30 volts, as shown by the lower curve in Fig. 5. Hence C must be connected 25 volts to the left of B, or in the exact center.

This connection checked out perfectly, for when the grid bias, as measured with a vacuum tube voltmeter between C and either of the grids of the second stage was exactly 5 volts.

Now the voltage between C in its new position and the point B should be 150 volts. Since the point C was now 25 volts to the left of B, the voltage between B and D should be 125 volts.

The point E had to be placed to the left of D for the same reason that C was placed

to the left of B. Just how far was determined by the aid of the upper curve in the graph referred to. When the grid voltage on the high mu tube is 5 volts the drop in half of R3 is 64 volts, as shown on the curve. This would be the bias on the power tubes if E were connected to D. The bias selected for the power tube was 45 volts. Hence E should be 64—45, or 19 volts to the left of D.

Thus the voltage drop between B and the new position of E should be 125 less 19 volts. Between B and E the current is about 50 milliamperes, but between E and D it is only 10 milliamperes. Thus E had to be placed so that between B and E the resistance was 2,120 ohms and between E and D, 1,900 ohms. A suitable resistor with a slider was connected between B and D and the slider adjusted to the proper position.

The voltage between the new position of E and B plus was to be 180 volts, or between D and B plus 180 less 19. Thus the resistance between D and B plus had to be 161/01, or 16,100 ohms. This was made up partly from a fixed 10,000 ohm resistor and partly from a resistor having a slider.

The voltage distribution resulting from this calculation was not so good as it was for the preceding stages. This was largely due to the uncertainty of the current distribution. Less flowed through the power tubes and more through the resistor D to B plus than had been assumed. Consequently the measured values of the plate voltages on the second and third stages as well as the effective grid bias on the 1st stage were considerably in error. But all that was necessary to correct this was to move E farther left, keeping the total plate current constant at 50 milliamperes while making the adjustment.

The final measured result was 150.5 volts on the second stage, a bias of 44.5 volts on the grid of the power stage and 178 volts on the plates of the last stage. The total voltage available was not enough to reach

the 180 mark. But the adjustment was considered good enough to try the circuit on a signal.

The output of a radio frequency circuit and detector was coupled to the amplifier by means of a 1-to-6 transformer. The slider on R1 was adjusted to the center point, and the set was turned on.

That a signal was being impressed on the amplifier could be determined by the peculiar assortment of squeals and grunts that issued from the speaker. Nothing intelligible came forth. The push-pull oscillated at many different frequencies at once. And it was affected by body capacity. It was as "touchy" as a short-wave regenerative circuit without a ground on it.

That was it. The amplifier had no ground on. Hence one was connected to B minus. The "touchiness" disappeared. It no longer growled when the foot or the hand came near the speaker leads, or near the input transformer, or output choke.

But the circuit still oscillated and the signals were not intelligible. The amplifier oscillated. This was no discouragement, because it had been expected. It is not possible to balance a circuit so well that there will be a total absence of feed-back. If there is ever so little unbalance the overlapping of the grid and plate voltage produced by the crossing over of the filament taps and the plate voltage taps increases the unbalance and feed-back.

By-Pass Condensers Necessary

The cure for feed-back through the voltage supply is by-passing. And it was a swift and effective cure in this case. Just one condenser of 6 mfd. connected between almost any two points did partially. Three 1 mfd. condensers connected from B minus, that is, ground to A, C and E proved very effective. With these in place the signals came through clear and strong. Judging from the sound the frequency characteristic was excellent.

That is as far as this circuit has been carried at this time. More and larger condensers will be connected. Condensers will be connected from A to B, from C to D and from E to B plus. And the points where the condensers are most effective will be determined.

The amplifier was connected to the same signal source before the plate and grid voltage adjustments had been made accurately. Not a sound came through. This was largely due to the overbiased grids in the second stage.

Hum Not Serious

It was expected that the set built with high mu tubes and resistance coupling would hum. It did. But not nearly so much as some AC transformer coupled receivers the writer has heard. This hum was not due to any ripple in the plate voltage supply, but from the filaments. With heater type of tubes in the circuit there should be no hum. But these tubes do not amplify so much as the high mu tubes. If the radio frequency amplifier and detector are efficient no great amplification is necessary.

Each of the three coupling resistors, R1, R2 and R3, is composed of three parts, two fixed coupling resistors on each side of a 100,000 ohm voltage divider. Any two resistors in each coupler should be chosen so that the difference between them is less than 100,000 ohms. This makes accurate balancing possible.

There is another method of balancing, and

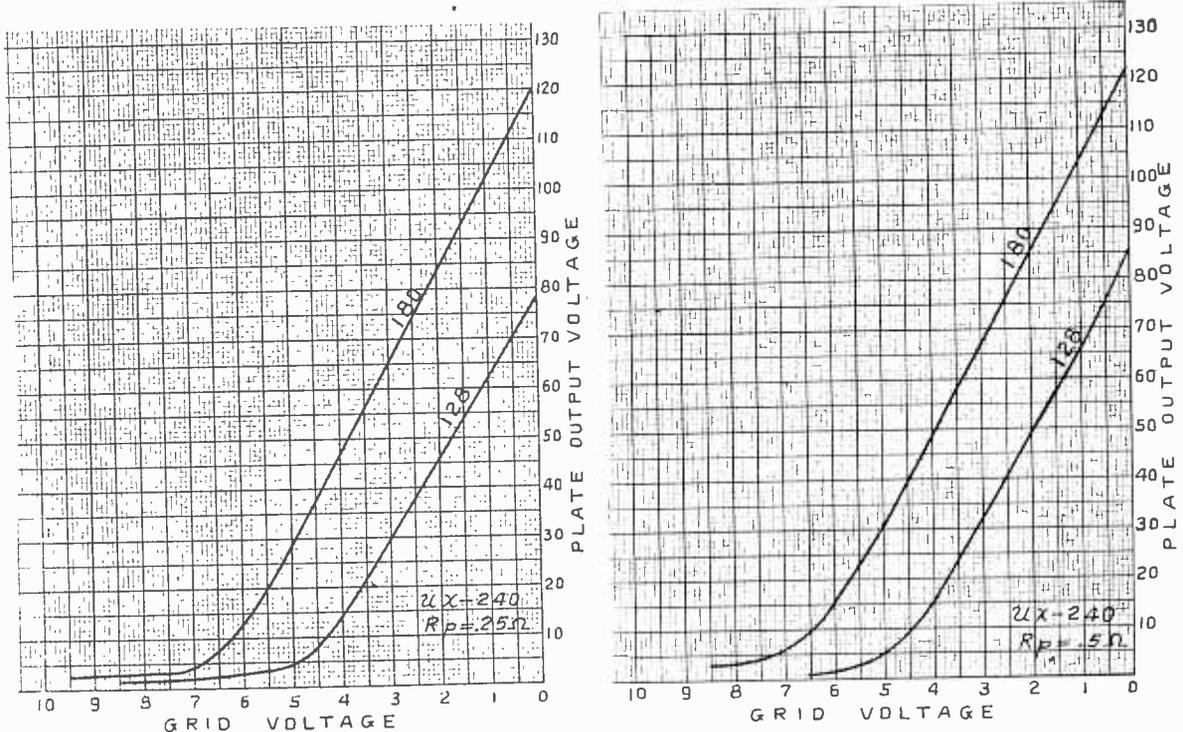
Resistors Are Omitted

RESISTANCE AMPLIFIER

Anderson

Editor

FIG. 6
Grid voltage plate output voltage curves a high mu tube working into high resistance loads at different plate voltages.



that is by using two variable resistors on each side of the middle. This is shown in Fig. 2, which shows essentially the same circuit as in Fig. 1. This circuit also shows the complete connection of the voltage divider and the filament transformers. In this case mid-tapped resistors are used across the filaments in place of taps on the transformers.

If the same tubes are used in the circuit R1 should be 75 ohms. R2 should be 1,000 ohms with a slider which may be set near the middle. R3 should have a total resistance of 4,020 ohms or more, and it should be provided with a slider or two. R4 is the 19,100 ohm resistance. Of course, it is not necessary to have these exact values, provided that the circuit be adjusted for the values used.

Fig. 3 shows a two-stage push-pull resistance coupled amplifier which has been tried with good results. Two screen grid tubes are used in the first stage and two -71A

power tubes in the second. The input and output circuits are arranged in the same way as the three-stage circuits described.

The curves that apply to this case were given by the writer in Fig. 2, page 7 of the August 18th issue. Those curves do not indicate successful operation for a voltage swing of 80 volts cannot be obtained for the output tubes without entering the curved regions of the characteristic. If the screen grid voltage is 22 volts and a bias of 3 volts is used on the grids the drop across the one megohm output resistor will be 63 volts. The upward swing will be all right, but the downward swing will enter the curved portion.

The bias on the power tubes will be 63 volts if the connection shown is used, 23 volts more than should be used. Hence the mid-tap on R9 should be connected 23 volts from the junction of R3 and R4 down on R7.

(Continued next week)

KIND WORDS

EDITOR, RADIO WORLD:

I have intended for some time to compliment your magazine. I take nearly every radio magazine published and I think all are good and I like them very much. But I get more kick out of receiving RADIO WORLD every Tuesday morning than out of any one of the rest.

I get to looking forward to Tuesday to see what is coming in the next issue. If I should miss an issue I think it would spoil my week.

Your articles are well written, understandable and very interesting. You seem to be really interested in the advancement of radio and in keeping a little ahead of the art, rather than in just publishing improvements as they come out.

G. H. Paris,
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Duluth, Minn.

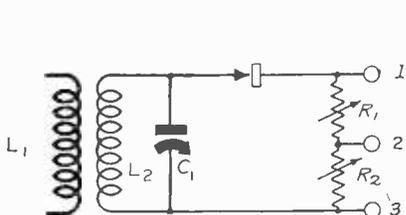


FIG. 7
A CRYSTAL DETECTOR CIRCUIT WHICH MAY BE USED IN CONJUNCTION WITH A PUSH-PULL DIRECT COUPLED AMPLIFIER WITHOUT KILLING ONE SIDE OF THE CIRCUIT, PROVIDED A CORRECTION FOR THE UNBALANCE OF THE GRID BIAS BE MADE AS EXPLAINED

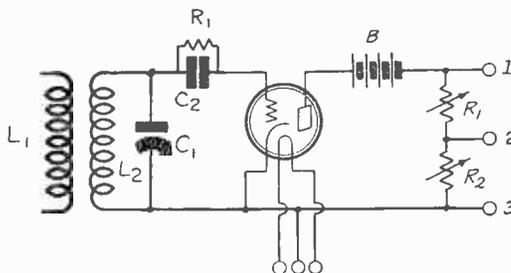


FIG. 8
A CONDUCTIVELY ISOLATED TUBE DETECTOR AS SHOWN IN THIS DRAWING MAY BE USED FOR DIVIDING THE SIGNAL VOLTAGE EQUALLY BETWEEN THE SIDES OF A PUSH-PULL DIRECT COUPLED AMPLIFIER. POINT 2 IS THE ONLY POINT WHICH MAY BE GROUNDED EITHER DIRECTLY OR THROUGH CONDENSERS

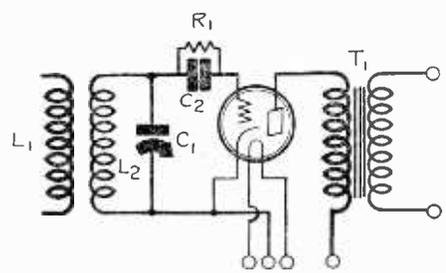


FIG. 9
A PRACTICAL METHOD OF COUPLING THE DETECTOR TO THE DIRECT COUPLED PUSH-PULL AMPLIFIER IS SHOWN IN THIS CIRCUIT, AND THAT IS USED IN THE RECEIVER IN FIG. 4. THIS ARRANGEMENT IS NOT SUBJECT TO THE ISOLATING CONDITION.

A THOUGHT FOR THE WEEK

THERE must be nothing approaching a monopoly in broadcasting. But we may be quite sure that neither a Republican nor a Democratic Administration would consent to any move that will place broadcasting in the hands of a favored few. The present national political campaign furnishes ample proof that, considering the rights of all parties and of the general public, it would be an idiotic thing to give any combination of broadcasters the power to say who shall or shall not be entitled to the biggest benefits that the air affords to those who are entitled to them.

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Exports Totalled \$721,690 in June

Washington.
 Exports of radio apparatus from the United States to foreign countries during June were valued at \$721,690, according to figures made public by the Department of Commerce.
 Shipments to Hawaii and Porto Rico amounted to \$6,918.

The All-Wave Super

[A 6-tube circuit, using an intermediate frequency amplifier, was described last week, issue of September 15th. Plug-in coils are used. The first detector rheostat, when resistance is increased, lowers the bias, but sometimes this increases volume. How to connect the mixer coils is explained on the next page.]

Then why not give it the lower bias to begin with? Because that lower bias is less than 1 1/2 volts difference, and the external battery limits you to 1 1/2-volt steps. Hence if improved operation is somewhat in between, merely set the rheostat to obtain greatest volume, consistent with absence of self-oscillation. Turning the rheostat either way from that point will decrease the volume sometime in some installations.

With no oscillation in the modulator or in the intermediate channel the circuit is excellently free from secondary interference, indeed may be operated without any gurgling or moaning characteristic of such circuits.

The circuit well operated with the dial readings about five degrees apart, the modulator always giving the same reading for the same frequency, but the oscillator bringing in a given station at either of two settings. This repeat tuning of the oscillator is due to the intermediate frequency and is present in all such circuits where that intermediate frequency is low. In a circuit designed for short waves, only a low frequency can be used in the intermediate channel, otherwise the intermediate amplifier would be at or near the frequency of some stations you wanted to receive—and you would have a wild receiver.

If it is desired to make the two dials read approximately in step, an adjustable series condenser may be connected between stator of the oscillator tuning condenser. A station is tuned in before the series condenser is inserted, and the dial settings noted. Then the condenser is connected between stator of the oscillator tuning condenser and

grid of the oscillator socket to which the secondary winding goes. The oscillator dial is arbitrarily put at the same setting as the modulator dial, and the series condenser turned until the station comes in loudest.

Then a test is made to determine whether the repeat tuning of the oscillator is at a higher or lower numerical value on the oscillator dial. If the alternate setting proves to be higher numerically, then readjust the series condenser until the synchronous tuning is achieved at the higher frequency setting of the oscillator (lower numerical value on the dial, and lower wavelength.) You will still have repeat tuning, of course. But you will not have the option of the lower frequency (higher wave length and higher dial setting) in tuning above 500 meters. In some localities this may be a disadvantage, for at the intermediate frequency used, in congested centers the better reception is obtained at the lower frequency setting of the oscillator, contrary to general impression.

The assembly is interesting and attractive, also decidedly simple. The front panel has on it the dual tuning drum, the A battery switch and the two rheostat knobs—nothing else.

On the subpanel are the eight sockets (two of the five-prong type being used as receptacles for the coils); two rheostats, which, once set, are not disturbed thereafter; three coils, binding posts, resistor mounts and resistors, series condenser and tip jacks. The tuning condensers are attached exclusively to the drum frame.

The arrangement is extremely orderly, and the completed receiver has a fascination for the eye, as well as affording a sense of satisfaction in operation. Less difficulty in tuning in short waves, than is usually associated with such reception, prevails in this circuit, while all bands are covered without instability or body capacity. The rotor of the oscillator tuning condenser is grounded, which it can not be by the oscillator hook-ups more frequently used.

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How to Connect Coils for All-Wave Mixer

The following directions apply to the circuit discussed on opposite page.

MODULATOR

No. 1 terminal on coil base—G on 5-spring coil socket and goes to grid of modulator and to C6.

No. 2—The H (heater) or F (filament) on 5-spring coil socket, nearer the C post, and goes to C minus, to ground, and to C1 rotor.

No. 3—H or F on 5-spring coil socket nearer the P post, and goes to C (cathode) or K of other 5-spring socket (oscillators).

No. 4—P on 5-spring coil socket, which is left unconnected.

No. 5—C or K and goes to antenna.

OSCILLATOR

No. 1—G and goes to grid of oscillator and to C7.

No. 2—The H nearer C and goes to H minus and to C4 rotor.

No. 3—The H or F nearer P and goes to Bx45.

No. 4—P and goes to oscillator plate.

No. 5—C or K and goes to H or F of modulator coil socket.

Hagel Power Plug Cables

Manufacturers' Sales Co., New York City, has added to its lines the new Hagel power plug cable, binding post socket and wall outlet socket. This cable is a fine job, its improved construction making short circuits impossible, the contacts being turned from solid rod and firmly embedded in molded bakelite sockets. The cable gripping bushing prevents twisting of conductors and relieves soldered connections of pull strain. There are two power plugs, seven and ten contact; bracket sockets for baseboard and sub-panel mounting; a binding post socket with 18 inch leads for sets already fitted with binding posts which fits the cable plug, and a wall socket consisting of socket attached to standard switch box cover finished in brush brass.

The list price is reasonable for such high grade products. The line is manufactured by Eugene A. Hagel, Chicago, and full information and prices may be had from Manufacturers' Sales Co., 377 Fourth Avenue, New York City. Mention RADIO WORLD.—J. H. C.

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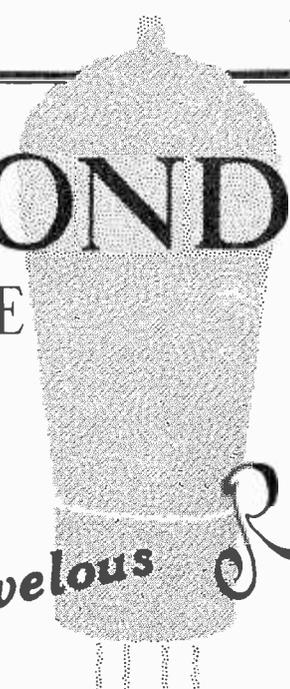
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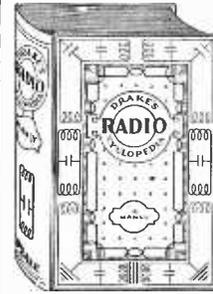
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has been developed to answer the questions of service men, custom set builders and home constructors, of experimenters, students, salesmen and operators of receiving equipment and to allow all these to have instant access to the information they want. The author, Harold P. Manly, has collected and translated into plain English the material formerly obtainable only from dozens of scattered sources.

BOOK IS 2 1/2" THICK, WEIGHS 3 3/4 LBS., 1,025 ILLUSTRATIONS.

Each rule, fact, method, plan, layout and diagram is instantly picked out and separated from everything else by placing all subjects in alphabetical order with cross references for every imaginable name under which the information might be classed. This alphabetical arrangement lets the experienced worker refer directly to the one thing in which he is interested at the moment without hunting through non-essentials. The needs of the beginner are cared for. The important articles deal primarily with receivers and reception. They do not stop with the electrical end, but go also into the mechanics of construction. Every new thing in radio is covered in detail.

1,680 Alphabetical Headings from A-battery to Zero Beat
1025 Illustrations, Diagrams, Layouts and Graphs
920 Pages, Each 6 by 9 inches
240 Combinations for Receiver Layouts
OF THE PRINCIPAL ARTICLES

159 concern service men, 129 help the set builder, 162 help the experimenter, 153 interest the student, 75 assist in sales work, 73 interest set owners.

Radio World: "The most suitable volume for those who want the facts stripped as far as possible of intricacies. Useful addition to any library."

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QST: "The information is so put as to be of most immediate use to the constructor and repair man, and, remarkably enough, includes apparatus of most recent origin."

Radio: "Scidom is any subject so comprehensively and practically explained."

GUARANTY RADIO GOODS CO., 145 W. 45th St., New York, N. Y. (Just E. of B'way)
Gentlemen: Please mail me at once the new (second) edition of "Drake's Radio Cyclopaedia," by Harold P. Manly. Just published, with all the latest technical information in it. I will pay the postman \$6.00 plus a few cents extra for postage. If I am not delighted, I may return the book in five days and you will promptly refund my purchase money.

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Radio World's Speedy Medium for Enterprise and Sales

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FREE BLUEPRINTS! GET YOUR SHARE! National Short Wave Circuit blueprint, exact circuit used by James Millen for tuning in television, voice, code, music, programs. National Screen Grid Five (broadcast receiver circuit) blueprint FREE also. John F. Rider's B Eliminator blueprint free. Send separate request for each of the above free blueprints you desire. Custom Set Builders Supply Co., 57 Dey Street, N. Y. City.

EXCELLENT unit for phonograph attachment, to play records. Connects to speaker terminals, nozzle to phonograph, \$4.20. P. Cohen, 236 Varet St., Bklyn., N. Y.

USED MOTORCYCLES. Low terms. Also Parts. Accessories. Catalog Free. Western Motorcycle Co. 947 East 15th St., Kansas City, Mo. 12-5-28

NEW LINEN DIAPHRAGM speaker, superior tone quality, no details as yet published in radio press, but to alert inquirers the whole absorbing story will be entold. Uses new super-sensitive unit, beautiful splice-jointed frame, 18x24", with decorative moulding; absolutely a wonderful speaker. Put together in ten minutes. Rich-looking job. Write for details. Guaranty Radio Goods Co., 145 West 45th Street, New York City.

QUICK SERVICE. Order radio goods now, shipments made day following receipt. All merchandise pre-tested. Set of Screen Grid Coils for Bernard's Economy Three, consisting of antenna coil Model 2A and High Impedance Tuner, Model 5 HT, \$4.75. One screen grid tube, one high mu tube, one —12A tube, total for three tubes, \$7.00. Blueprint for Bernard's Economy Three, \$1.00. Front panel and subpanel for 4-tube Screen Grid Diamond of the Air, \$5.00. All merchandise guaranteed on five-day money-back basis. Send remittance and I pay carrying and shipping charges. Philip Cohen, 236 Varet Street, Brooklyn, N. Y.

POLO

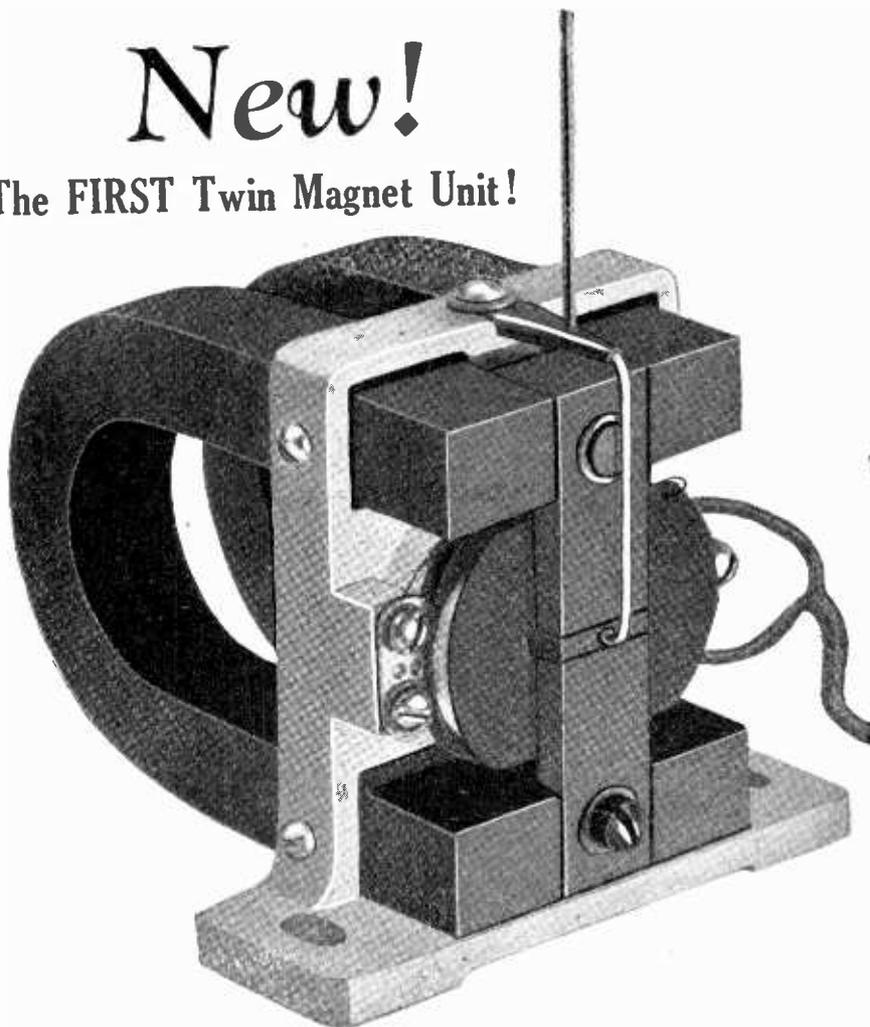
DUO-MAGNETIC

UNIT

TWIN MAGNETS
DOUBLE SENSITIVITY

New!

The **FIRST** Twin Magnet Unit!



Polo Duo-Magnetic Unit, shown actual size. Weight three full pounds. Supplied complete with ten-foot cord, apex, chuck, nut and moulded metal mounting bracket (Senior model) \$10.00

No Filtering at 180 Volts!

THE magnet coil of the unit consists of two separate windings, connected in parallel, so that the current divides between them. This enables you to put **TWICE AS MUCH** current through the coil without danger of harming it! Use 180 volts on a -71A or -10 tube, with proper negative grid bias, and you do not need an output filter, the usual list price of which is around \$10.00. The coil of the unit safely carries 25 milliamperes!

Enormous Volume, No Rattling!

THE volume obtainable from a set depends to a large extent on the efficiency of the unit. The Polo Duo-Magnetic Unit is incredibly loud—enormously loud—yet without rattling! The **SENSITIVITY IS DOUBLED** by the use of two magnets—the first time two have been used in a commercial unit. The magnets are genuine, efficient, costly chrome steel, and there are no holes in them. Holes weaken a magnet and shorten its life.

ASTOUNDING

Performance—And Why!

THE new and startling Polo Duo-Magnetic Unit is of the balanced armature type, needing no adjustment and no servicing. It is exceptionally efficient, long-lived and mechanically rugged. Here is a summary of its superiority:

- (1) Twin magnets double sensitivity.
- (2) Magnets are of chrome steel.
- (3) Magnet coil consists of two windings in parallel, doubling the flux and the current handling capacity.
- (4) Volume is extraordinary, and without rattling, due to twin-magnets, great flux density, short air gaps, balanced silicon steel armature and single-piece coupling rod and pin. The pin **WON'T BREAK OFF!**
- (5) Die cast aluminum frame fits assembly to 1/1000 of an inch, enhancing rigidity.
- (6) Large, solid machined pole pieces.



Moulded bracket **FREE** with each unit order; also cord, apex, chuck and nut.

Every unit undergoes seventeen careful tests and is guaranteed against all mechanical or electrical imperfections. This unit needs no after-servicing, but will last indefinitely. It works superbly any cone, cloth, Balsa or skin speaker and is one of the most remarkable units ever produced. Make Polo your choice and you'll rejoice!

POLO ENGINEERING LABORATORIES,
57 Dey St. (Suite 6), corner Greenwich St.,
New York, N. Y.

Enclosed please find ten dollars for which send me one Polo Duo-Magnetic Unit, with ten-foot cord, moulded metal bracket, apex, chuck and nut. **YOU ARE TO PAY SHIPPING CHARGES.** If after a 10-day trial I return the unit **YOU WILL QUICKLY REFUND THE TEN DOLLARS.**

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Orders Filled in Sequence of Their Receipt

POLO ENGINEERING LABORATORIES

57 Dey Street

(Suite 6), Corner Greenwich Street
Tel. CORtland 5112

New York, N. Y.

Olsen Has Tested 500,000 Speakers

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Subscription Dept., RADIO WORLD, 145 West 45th Street, New York City.

For seven and a half years Martin T. Olsen, chief tester for the Jensen Radio Manufacturing Company, Chicago, Ill., has been testing loudspeakers. During this time he has personally tested on the average of 250 speakers a day or a total of more than 500,000. While the average human ear, according to scientists, can distinguish the difference in tones or notes up to about 5,000 or 6,000 cycles per second, Olsen, in this competitive test, was

able to distinguish and designate notes at frequencies of over 10,000 cycles per second.

Manufacturers of the better class and higher priced loudspeakers and other reproducing devices test all of their instruments before they are shipped, by comparison with a master model or speaker. A tone-tester does this comparative checking and decides whether a speaker ready for shipment is up to the standard and of the same tone or pitch as the master model. It is the final check after the speaker has gone through the customary inspection for freedom from mechanical and electrical defects.

Mr. Olsen started as a tone-tester back in the early days of commercial radio, when the magnetic horn loudspeaker was considered a wonderful and highly perfected instrument. Then he saw the development and tested thousands of the magnetic cone type speakers which were an improvement. Since the organization of the Jensen Radio Manufacturing Company, Olsen has been chief tester for this company and has been closely identified with the development of the ultra modern dynamic principle speaker, as perfected by Peter L. Jensen.

BLUEPRINT
FOR
Bernard's Economy 3
Price \$1.00
PHILIP COHEN
236 VARET STREET
BROOKLYN, N. Y.

BLUEPRINTS of National Screen Grid Five, 4-tube Screen Grid Diamond and Karas 3-tube Short Wave Set—three blueprints—one dollar. Guaranty Radio Goods Co., 145 W. 45th St., N. Y. C.

Bakelite Front and Aluminum Subpanel for the 4-Tube Screen Grid **DIAMOND OF THE AIR** - - **\$5.00**

Five-Day Money-Back Guaranty

View of the Completed Receiver, using Drilled Front Panel and Aluminum Subpanel
Finest eye appeal results from construction of the 4-tube Screen Grid Diamond of the Air when you use the official panels. The front panel is bakelite, already drilled. The subpanel is aluminum, with sockets built-in, and is self-bracketing. Likewise it has holes drilled in it to introduce the wiring, so nearly all of it is concealed underneath set. Make your set look like a factory job.

- Front panel alone, bakelite, drilled.....\$2.35
 - Aluminum subpanel alone, drilled, with sockets built-in..... 3.00
- Screws, nuts and insulating washers supplied with each subpanel.

GUARANTY RADIO GOODS CO.
145 WEST 45TH STREET
NEW YORK, N. Y.
[A few doors east of Broadway]

HAVE YOU MISSED ANY COPIES OF RADIO WORLD WHILE ON YOUR VACATION?

If so we can furnish you with any numbers of Radio World for the entire Spring and Summer of 1928. Any one issue, 15c, any seven issues, \$1.00. Find out what copies you are short of and send your order. Copies will be sent to, postpaid, immediately upon receipt of price.

Radio World, 145 W. 45th St., N. Y. C.

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RADIO WORLD

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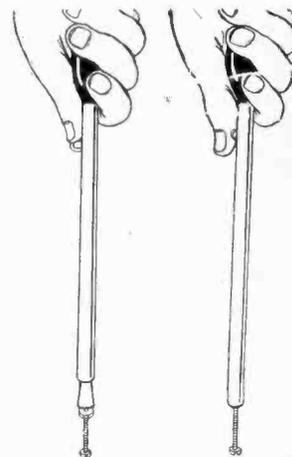
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SUBSCRIPTION RATES:
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Three Months 1.50
Six Months 3.00
One Year, 52 Issues..... 6.00
Add \$1.00 a Year for Foreign
Postage; 50c for Canadian Post-
age.

Socket Wrench

FREE!



Push out the control lever with knob (as at left) and put wrench on nut. Push down on handle only (at right), then turn nut left or right.

One of the handiest tools for a custom set builder, service man or home constructor is a BERNARD socket wrench. It consists of a 5/8" long metal tubing in which is a plunger, controlled by a knob. The plunger has a gripping terminal (called a socket, hence the name "socket wrench") that may be expanded or contracted to fit 6/32, 8/32 and 10/32 nuts, the most popular sized nuts in radio. Use the knob to push out the plunger, press down on the handle to grip the nut, then turn the nut to left for removal or to right for fastening down. Total length, distended, including stained wooden handle, 10". Gets nicely into tight places. Send \$1 for 8 weeks' mail subscription for RADIO WORLD and get this wrench FREE. No other premium with this offer. Present subscribers may extend subs.

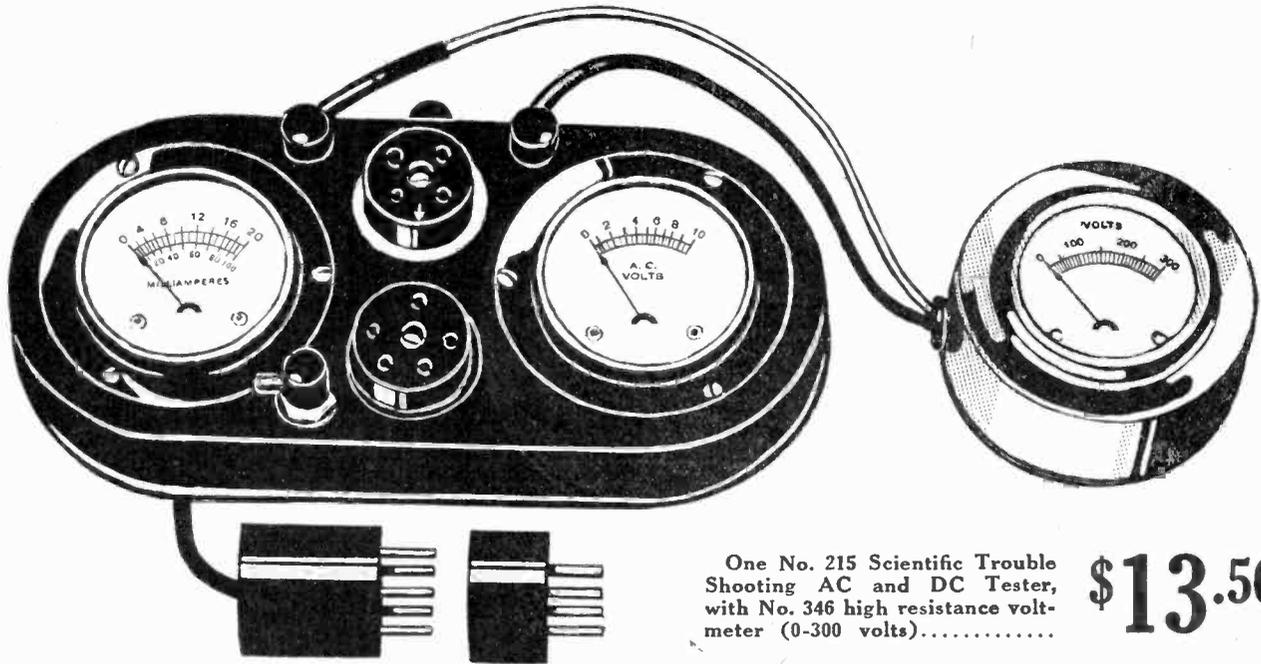
RADIO WORLD

145 WEST 45TH ST., N. Y. CITY
A few doors east of Broadway

All in a Jiffy!

**Tube Any Good?
Set Getting Proper Voltages?
Any Shorts or Open Circuits?
Universal Tester Answers 12 Questions in a Jiffy!**

You are lost without meters when you shoot trouble and seek remedies. The Universal Tester is your reliable diagnostician for both AC and DC.



One No. 215 Scientific Trouble Shooting AC and DC Tester, with No. 346 high resistance voltmeter (0-300 volts)..... **\$13.50**

The Scientific Trouble Shooting AC and DC Tester (at left) and high resistance meter (at right) Make Twelve Vital Tests in 4 1/2 Minutes. The instruments are exactly TWICE the size pictured. They are handy and handsome.

Amplly Accurate, Even for Service Men!

SERVICE men, going out on calls, must have a reliable test set. The Universal Tester and separate Voltmeter are reliable and versatile. The readings are accurate to 5% plus or minus, which is ample. Twice as great accuracy as this costs four to five times as much money, and isn't really necessary, except for engineering work in laboratories.

The Universal Tester and Separate Voltmeter can be used to make ALL the following twelve tests in 4 1/2 minutes:

(1) to measure the filament voltage, up to 10 volts, of AC and DC tubes. (2) to measure the plate current of any one tube, including any power tube, from less than 1 milliamperes up to 100 milliamperes; (3) to measure the total plate current of a receiver or amplifier, up to 100 milliamperes. (Hardly any set draws more.) Open common A and B of set and connect to P of tester socket and to P prong under adapter plug; (4) to measure the B voltage applied to the plate of tube; the voltage across B batteries or B eliminators, up to 300 volts (5) to determine the condition of a tube, by use of the grid bias switch. (6) to measure any tube's electronic emission (tester cuts in at no load, hence plate current equals filament emission). (7) to regulate AC line, with the aid of a power rheostat, using a 27 tube as a guide, turning rheostat until filament voltage is 2.5 or 2.25 volts. (8) to test continuity of resistors, windings of chokes, transformers and circuits generally. (9) to find shorts in bypass and other condensers, as well as in inductances, resistors and circuits generally. (10) to read grid bias voltages including those obtained through drops in resistors (bias read by noting plate current and voltage and consulting chart). (11) to determine the presence of distortion and overloading, by noting if milliammeter needle fluctuates. (12) to determine starting and stopping of oscillation, as milliammeter needle reads higher current for oscillation and lower for no oscillation.

Fits Your Needs, As Well As Your Purse!

GUARANTY RADIO GOODS CO.,
145 West 45th Street, New York City.

- Please send me at once, by parcel post, on a five-day money-back guaranty, one complete Two-in-One (AC and DC) scientific trouble-shooting test set, consisting of one No. 215 and one No. 346, for which I will pay the postman \$13.50, plus a few cents extra for postage.
- If 0-500 v. high resistance voltmeter No. 347 is preferred, put cross in square and pay \$14.50, plus postage, instead of \$13.50, plus postage.
- One No. 215 and one No. 346, with two adapters for UV199 tubes \$14.50
- One No. 215 and one No. 347, with two adapters for UV199 tubes \$15.50
- One No. 215 alone, \$10.00.
- One No. 346 alone, \$4.50.
- One No. 347 alone, \$5.50.

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FIVE-DAY MONEY-BACK ABSOLUTE GUARANTY!

Try out the combination tester and high resistance voltmeter. If you are a service man, custom set builder, home constructor, experimenter, teacher or student. You run no risk. These instruments are guaranteed. Money back if you're not satisfied after a five-day test.

High value and low price combine to give these instruments a field all to themselves, because they meet your needs fully in quality as well as in economy.

HERE'S WHAT YOU GET FOR ONLY \$13.50:

- (1) One two-in-one 0 to 10 voltmeter for AC and DC. Same meter reads both. Scale specially legible at 1 1/2 to 7 1/2 volts. This meter reads the AC and DC filament voltages.
 - (2) One DOUBLE reading DC milliammeter, 0 to 20 and 0 to 100 milliamperes, with changeover switch. This reads plate current, which is always DC in all sets.
 - (3) One 0-300 volts high resistance voltmeter, No. 346, with tipped 30" cord to measure B voltages.
 - (4) One 5-prong plug with 30-inch cord for AC detector tubes, etc., and one 4-prong adapter for other tubes.
 - (5) One grid switch to change bias.
 - (6) One 5-prong socket.
 - (7) One 4-prong socket.
 - (8) Two binding posts.
 - (9) One handsome noise metal case.
 - (10) One instruction sheet.
- [If 0-500 voltmeter No. 347 is desired instead of No. 346, price of combination is \$14.50.]
- No. 215 Universal AC-DC Tester Alone..... **\$10.00**
No. 346 high resistance 0-300 voltmeter alone..... **\$4.50**
No. 347 high resistance 0-500 voltmeter alone..... **\$5.50**

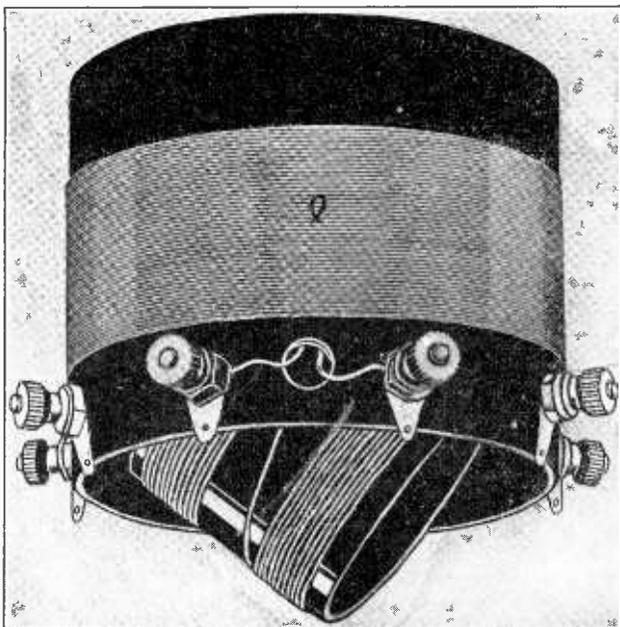
GUARANTY RADIO GOODS CO.

145 West 45th Street

New York City

Just East of Broadway

New Coils Produce Revolutionary Results!



High Impedance Screen Grid Tuner, three windings. Primary center-tapped for short waves. Single hole panel mount. (Model 5HT)..... **\$3.00**

**ENORMOUS VOLTAGE GAIN!
MORE VOLUME! MORE DX!
THE SHORT AND LONG WAVES
WITHOUT CHANGING COILS!**

WORKING out of a screen grid tube, the High Impedance Tuner develops incredible voltage.

The primary, the outside winding, is tuned by a variable condenser the user puts across it. At resonance this gives *infinite impedance!* What the screen grid tube needs is a high impedance plate load, otherwise the tube's full, amazing quantity of amplification is missed. Could there be any impedance higher than *infinite?*

The secondary has a step-up ratio of about 2-to-1, the first time a voltage increase by radio frequency coupling ever has been made available with a tuned primary. The secondary is wound on a separate form and riveted inside the primary form.

The third winding is rotatable inside the secondary form, from a front panel knob, and has a variety of uses. Bakelite forms are used exclusively.

It is inconceivable the revolutionary effect this coil has—volume so great you would never imagine it possible—greatly increased sensitivity, often 100 times greater than an ordinary TRF coil—more distant reception, *much* more, in fact—and—short waves may be tuned in by shorting out half of the primary, without change of coil or condenser.

Mount coil upside down for short leads. All terminals are then on bottom.

High Impedance Screen Grid Tuner Primary Center—tapped for short waves. Single hole panel mount (for .0005 mfd.). Model 5HT **\$3.00**
For .00035 mfd. Model 3HT..... **\$3.25**

Wonders of Screen Grid Tubes Fully Capitalized for First Time

ANTENNA COIL

Like the High Impedance Tuner, the Screen Grid Antenna Coil is specially designed for input to a screen grid tube. Its inductance is so arranged that the dial readings of the antenna circuit will be like those of the tuned circuit in which the High Impedance Tuner is used.

The antenna coupling is conductive, giving the maximum signal strength consistent with selectivity—a degree of volume that is so enormous as to astound you! Using these two coils, the volume is so great that only one stage of audio works a loud speaker superbly—thrillingly!

For short wave reception all except 14 turns of this single, continuously-wound coil are shorted out, and short-wave tuning confined to the succeeding stage or stages.

The Screen Grid Antenna Coil is matched to the High Impedance Tuner, by having dissimilar turns that equalize the tuning. Dial readings track nicely because the Screen Grid Antenna Coil's individual inductance is made to atone for the effect mutual inductance has on the High Impedance Tuner's primary.

Screen Grid Antenna Coil. One tap for short waves. For .0005 mfd. (Model 2A) **\$1.75**
For .00035 mfd. use (Model 3A)..... **\$2.00**

REPLACEMENT COIL

A great many persons now possess good radio receivers and do not desire to part with them, but would like to gain the benefit of the wonderful new screen grid tubes that, with proper coils, increase volume and sensitivity enormously, and without reducing selectivity.

Moreover, they do not want to tear down existing receivers and virtually rebuild them. No need to do so. The Screen Grid Replacement Coil, for either .0005 mfd. or .00035 mfd. tuning, occupies a space only 2 1/4 x 2 1/2 inches, so can be put in almost any receiver from which the old coil has been removed.

The replacement coil has an untuned primary of high impedance—generous number of turns—while the secondary is tuned. Thus it conforms to requirements of the usual tuned radio frequency receivers. Custom Set Builders, Service Men and Home Experimenters will welcome this opportunity to redeem "the old set," make it pep up and step out—cure that loss of the old kick—capitalize the great advantages of radio's outstanding tube! In replacement work one of these coils should be used as the antenna coil.

Screen Grid Replacement Coil for .0005 mfd. Secondary center-tapped for short waves. (Model 2R5) **\$1.50**

Screen Grid Replacement Coil for .00035 mfd. Secondary center-tapped for short waves. (Model 2R3) **\$1.75**

OTHER SCREEN GRID COILS

For circuits using screen grid tubes, with single tuning control, four models of coils are manufactured with rotors that serve as trimmers, so that no midget trimming condenser is needed.

These single control coils are:

Model 2SC5. Conductively coupled antenna coil, for input to a screen grid tube, with two turns taken from the stator and wound on the rotor. Thus the variations in tuning, due to the antenna's capacity effect on the tuned circuit, are compensated for by turning the panel knob. For .0005 mfd. tuning. Usual tap for short waves. (Model 2SC5) **\$2.75**

Model 2SC3, same as above, except that inductance is for .00035 mfd. tuning. Usual tap for short waves. (Model 2SC3)..... **\$3.00**

Model 2RSC5 is a replacement coil for single control sets, corresponding to 2R5, but having the trimmer coil on a rotatable form, so that any interstage coupling out of a screen grid tube may be accomplished efficiently. Usual tap for short waves. (Model 2RSC5) **\$2.75**

Model 2RSC3, same as above, except this is for .00035 mfd. tuning. Usual tap for short waves. (Model 2RSC3)..... **\$3.00**

Coils for Other Than Screen Grid Tubes

For all circuits other than screen grid circuits the STANDARD group of coils is manufactured, as distinguished from SCREEN GRID Coils. The STANDARD coils are for 201A, 240, 199, 226AC, 227AC and all other non-screen grid tubes.

All the coils, both STANDARD and SCREEN GRID, have 2 1/2 inch diameter, the smallest diameter consistent with high efficiency!

All are sturdily made and are carefully designed and constructed with the idea of having them last TEN YEARS. That includes coils with rotatable forms, for they are no less rugged than the others—another exceptional virtue.

All coils have a short-wave tap, but this need not be used, if not desired.

STANDARD COILS

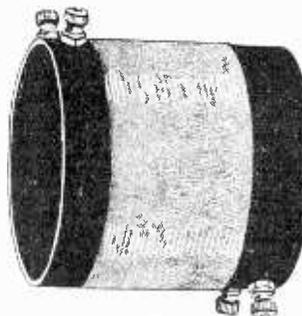
3-circuit tuner, for .0005 mfd. Secondary center-tapped for short waves. (Model T5) **\$2.25**

3-circuit tuner for .00035 mfd. Secondary center-tapped for short waves. (Model T3) **\$2.50**

TRF coil, interstage coupler and also used as antenna coil. For .0005 mfd. Secondary center-tapped for short waves. (Model RF5) **\$1.00**

TRF coil. Same as above, except it is for .00035. Secondary center-tapped for short waves. (Model RF3) **\$1.25**

[Note: This advertisement contains our complete line of coils. Inquiries invited from the trade, custom set builders, etc.]



Screen Grid Antenna Coil, for Input to any Screen Grid RF Amplifier. Tapped once for short waves. (Model 2A) **\$1.75**

SCREEN GRID COIL COMPANY

143 WEST 45th STREET
NEW YORK CITY

Just East of Broadway

Please mail me at once, your following coils, for which I will pay post-
man the advertised prices, plus a few cents extra for postage.

Screen Grid Coil Co., 143 W 45th St., N. Y. City.
[Specify Quantity in the Squares]

Model..... Model..... Model..... Model.....
 Model..... Model..... Model..... Model.....

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

SEND NO..... (RW)