

NOV. 27

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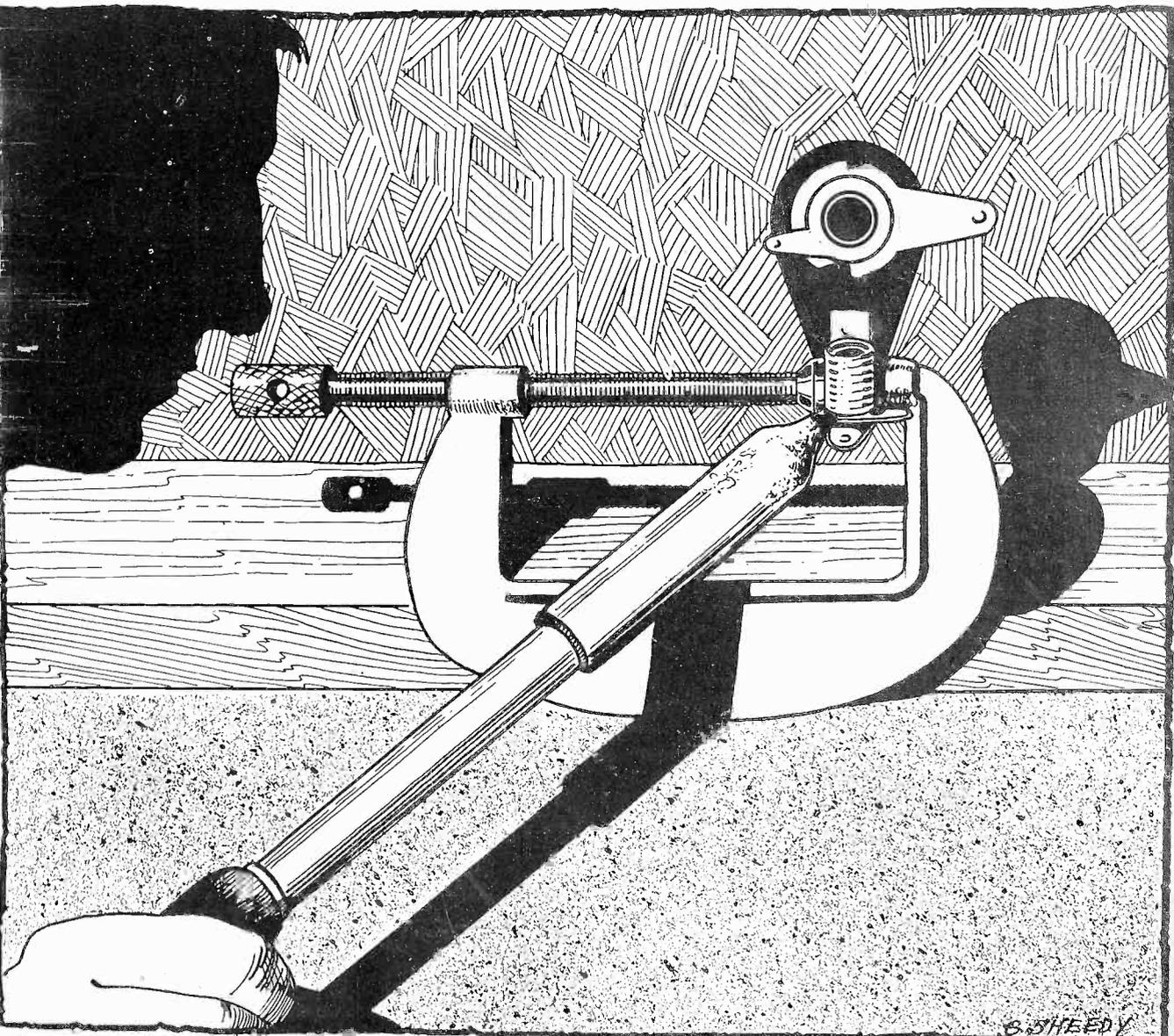
1927

RADIO WORLD

Reg. U. S. Pat Off.

America's First and Only National Radio Weekly
Vol. 10 No. 10 *L.H.* Illustrated

IN THIS ISSUE—Sir Oliver Lodge's Non-Radiating N Circuit—World-Wide Check-Up on Short Wave Phenomena—Trouble-Shooting in B Battery Eliminators—Complete List of Broadcasting Stations



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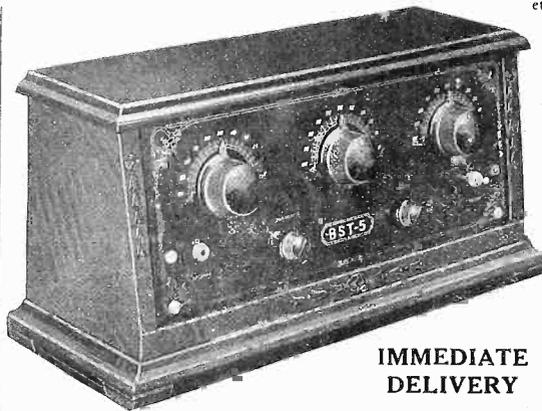
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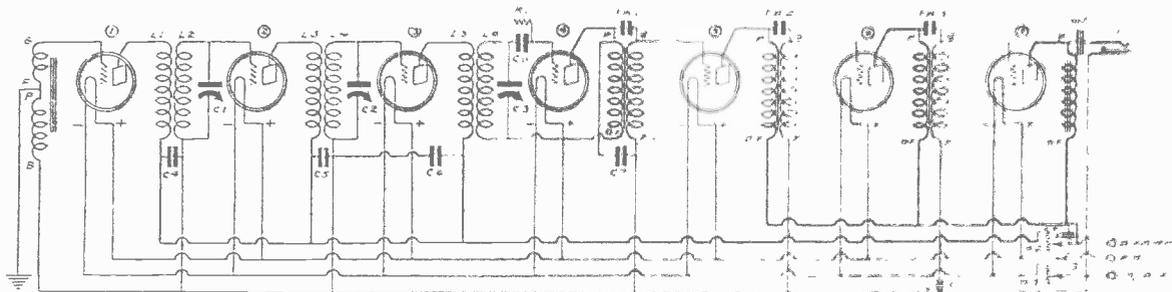


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In the Antennaless Receiver, the circuit diagram of which is shown schematically, an iron core radio frequency transformer of the untuned type is used in the first stage, followed by three tuned stages, one of which is the detector input. The coils and variable condensers are Benjamin. The audio channel is composed of three stages of Truphonic coupling, TR1, TR2 and TR3. The commercial audio units are complete and include encased coupling condensers.

Ground Connection Is Made to the Input and, With Suitable Audio Amplification, Affords All Sufficient Volume, Excellent Selectivity And Distance—Ground Wave Is Noted For Its Penetrating Quality

By Dr. Louis B. Blan

AS a great number of persons desire to do away with an outdoor or indoor aerial, a seven-tube receiver was designed that will meet these conditions. All one needs is a good ground connection, and this is brought to a joined pair of posts of a fixed or untuned, radio frequency transformer that has an iron core. In many instances even the ground may be supplanted successfully with a lamp socket antenna.

The untuned stage is followed by three tuned stages. The set is balanced against self-oscillation by reduction of the plate voltage, hence plate current, to the highest value consistent with avoidance of squeals. The negative bias on the radio frequency tube grids is automatic and is equal to the voltage drop in the rheostat R3, being about one volt.

Volume High, Tone Fine

In the audio channel three stages of Truphonic coupling are used, as these bring up the volume to the desired high level and afford excellent quality reproduction.

The filtered output method is used, to protect the speaker windings from the possibly injurious effect of passing direct current through them. Only the audible frequencies pass through the fixed condenser connected to jack, while the direct current flows through the choke coil.

The noise level is quite low in the Antennaless Receiver, and the selectivity is

high indeed, thus reducing very considerably the number and intensity of whistles, usually experienced on account of the wave of one station beating against that of another.

Nor is the distance-getting, faculty diminished because of the absence of an outdoor or indoor aerial. It is true, indeed, that a good outdoor aerial will intercept the waves much more strongly than any other system, but the additional stage of RF is included to make up for this as much as is necessary for full satisfaction, and to afford the aerialless advantage, which is one of convenience.

Uses the Ground Wave

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It is well known that the ground wave is far more penetrating than the sky wave of the electro-static system of pick up, hence we are safe in assuming there is no loss of distance-getting power.

The design, however, must be utilized in toto, since merely a pair of audio stages scarcely would afford insufficient volume, and one fewer stage of RF would give only fair volume. It must be realized that radio frequency amplification is a volume increaser, besides a radio amplifier. Full, rich tone, of sufficient volume to satisfy almost anyone, is obtainable, and the method to follow is the one shown schematically in Fig. 1.

Suitable For Eliminator

The circuit as shown is adaptable to B battery eliminator. The detector tube will not self-oscillate, because the plate is connected through the primary of the first Truphonic coupler, TR1, to A plus. Hence no B voltage whatsoever is used on the detector tube, the plate potential be-

Circuit Design is Adaptable to B Battery Eliminator and May be Operated From a Maximum of 135 Plate Volts, Although Even 90 Will Work Well—Filtered Audio Output Is Used

ing about 5 volts positive, due to connection to A plus. The applied plate voltage is equal to the difference between the negative filament and the positive A. As the rheostat drops one volt, in other words, the filament voltage is 5, the plate voltage is 5 volts positive. This is enough for good detector action.

The maximum B plus connection is the only B lead that is brought to the set. It may be 135 to 90. The voltage is cut down from that maximum to radio frequency plate values by the 200-ohm variable resistor, R2. This should be suitably bypassed. C9, which is 001 mfd., serves that purpose. For R2 a potentiometer may be used, only it is connected in rheostat fashion. One post of the potentiometer is not used, but only the centerpost and one of the side posts.

The Ground Lead

For best results a ground to the cold water pipe or to a copper plate buried 10 feet in moist earth is advisable. A long lead from actual ground or pipe to the set is in no way objectionable. A connection to a radiator or hot air vent will not do, as this type of ground never is anything better than a poor or fair makeshift.

Good coils are necessary in the receiver. Those used in the laboratory were Benjamin.

The layout of the parts is special and will be discussed and illustrated next week. The placement of the coils and the location of the sockets are important in their effect on self-oscillation and its
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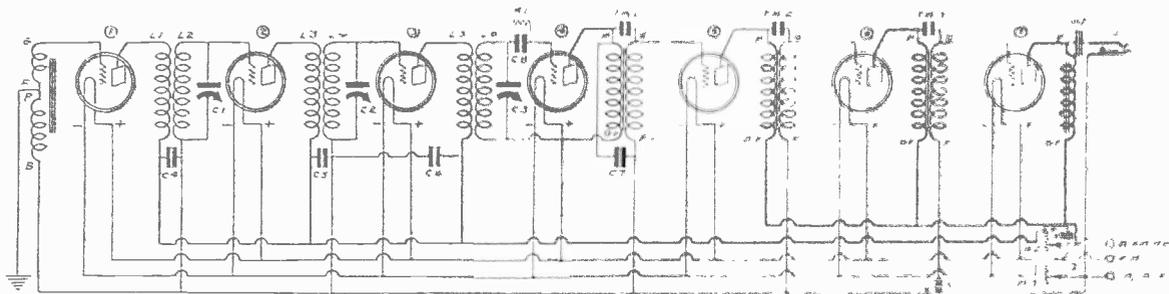


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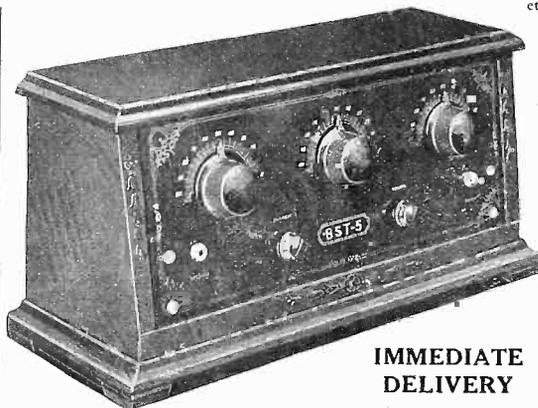
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[Entered as second-class matter, March, 1922, at the post office at New York, N. Y., under Act of March 3, 1879]

The Antennaless Receiver

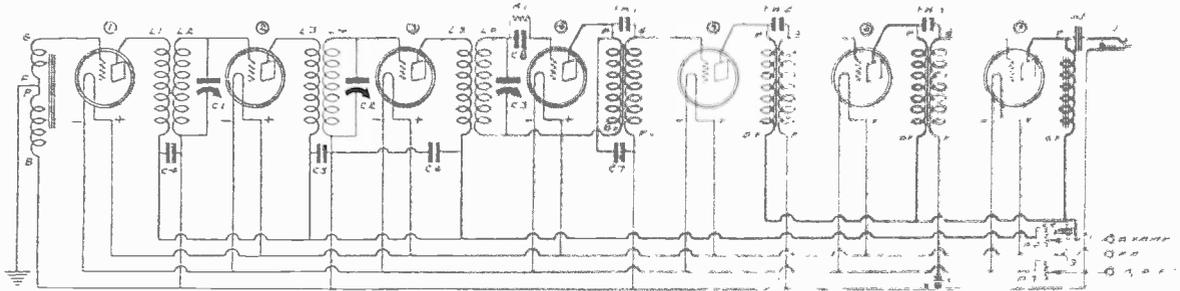


FIG. 1

In the Antennaless Receiver, the circuit diagram of which is shown schematically, an iron core radio frequency transformer of the untuned type is used in the first stage, followed by three tuned stages, one of which is the detector input. The coils and variable condensers are Benjamin. The audio channel is composed of three stages of Truphonic coupling, TR1, TR2 and TR3. The commercial audio units are complete and include enclosed coupling condensers.

Ground Connection Is Made to the Input and, With Suitable Audio Amplification, Affords All Sufficient Volume, Excellent Selectivity And Distance—Ground Wave Is Noted For Its Penetrating Quality

By Dr. Louis B. Blan

AS a great number of persons desire to do away with an outdoor or indoor aerial, a seven-tube receiver was designed that will meet these conditions. All one needs is a good ground connection, and this is brought to a joined pair of posts of a fixed or untuned, radio frequency transformer that has an iron core. In many instances even the ground may be supplanted successfully with a lamp socket antenna.

The untuned stage is followed by three tuned stages. The set is balanced against self-oscillation by reduction of the plate voltage, hence plate current, to the highest value consistent with avoidance of squeals. The negative bias on the radio frequency tube grids is automatic and is equal to the voltage drop in the rheostat R3, being about one volt.

Volume High, Tone Fine

In the audio channel three stages of Truphonic coupling are used, as these bring up the volume to the desired high level and afford excellent quality reproduction.

The filtered output method is used, to protect the speaker windings from the possibly injurious effect of passing direct current through them. Only the audible frequencies pass through the fixed condenser connected to jack, while the direct current flows through the choke coil.

The noise level is quite low in the Antennaless Receiver, and the selectivity is

high indeed, thus reducing very considerably the number and intensity of whistles usually experienced on account of the wave of one station beating against that of another.

Nor is the distance-getting, faculty diminished because of the absence of an outdoor or indoor aerial. It is true, indeed, that a good outdoor aerial will intercept the waves much more strongly than any other system, but the additional stage of RF is included to make up for this as much as is necessary for full satisfaction, and to afford the aerialless advantage, which is one of convenience.

Uses the Ground Wave

Some say the tone quality is better on the type of receiver represented by the Antennaless. Certain it is that with the input softened, the noise level lowered and extraneous noises thus kept at minimum, the volume is achieved largely through the abundance of power in the audio channel. The situation is something like that present where a loop is used, since the advantages are of the same caliber. In the present instance, however, instead of using the magnetic component of the broadcast wave we use the capacity or electro-static component, yet only as to the ground wave.

It is well known that the ground wave is far more penetrating than the sky wave of the electro-static system of pick-up, hence we are safe in assuming there is no loss of distance-getting power.

The design, however, must be utilized in toto, since merely a pair of audio stages scarcely would afford insufficient volume, and one fewer stage of RF would give only fair volume. It must be realized that radio frequency amplification is a volume increaser, besides a radio amplifier. Full, rich tone, of sufficient volume to satisfy almost anyone, is obtainable, and the method to follow is the one shown schematically in Fig. 1.

Suitable For Eliminator

The circuit as shown is adaptable to B battery eliminator. The detector tube will not self-oscillate, because the plate is connected through the primary of the first Truphonic coupler, TR1, to A plus. Hence no B voltage whatsoever is used on the detector tube, the plate potential be-

Circuit Design is Adaptable to B Battery Eliminator and May be Operated From a Maximum of 135 Plate Volts, Although Even 90 Will Work Well—Filtered Audio Output Is Used

ing about 5 volts positive, due to connection to A plus. The applied plate voltage is equal to the difference between the negative filament and the positive A. As the rheostat drops one volt, in other words, the filament voltage is 5, the plate voltage is 5 volts positive. This is enough for good detector action.

The maximum B plus connection is the only B lead that is brought to the set. It may be 135 to 90. The voltage is cut down from that maximum to radio frequency plate values by the 200-ohm variable resistor, R2. This should be suitably bypassed. C9, which is .001 mfd., serves that purpose. For R2 a potentiometer may be used, only it is connected in rheostat fashion. One post of the potentiometer is not used, but only the centerpost and one of the side posts.

The Ground Lead

For best results a ground to the cold water pipe or to a copper plate buried 10 feet in moist earth is advisable. A long lead from actual ground or pipe to the set is in no way objectionable. A connection to a radiator or hot air vent will not do, as this type of ground never is anything better than a poor or fair makeshift.

Good coils are necessary in the receiver. Those used in the laboratory were Benjamin.

The layout of the parts is special and will be discussed and illustrated next week. The placement of the coils and the location of the sockets are important in their effect on self-oscillation and its

(Concluded on page 31)

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A \$75 Set Direct from Factory at \$40

I received my B. S. T. radio set two weeks ago and I am very well pleased with it.

I had the set working in fifteen minutes and at the end of two hours and a half I had twenty-nine stations logged. The set brings in new stations almost every night.

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With built-in Utah Unit Loud Speaker and commodious compartment in which there is ample room for batteries, charger, eliminators, etc.

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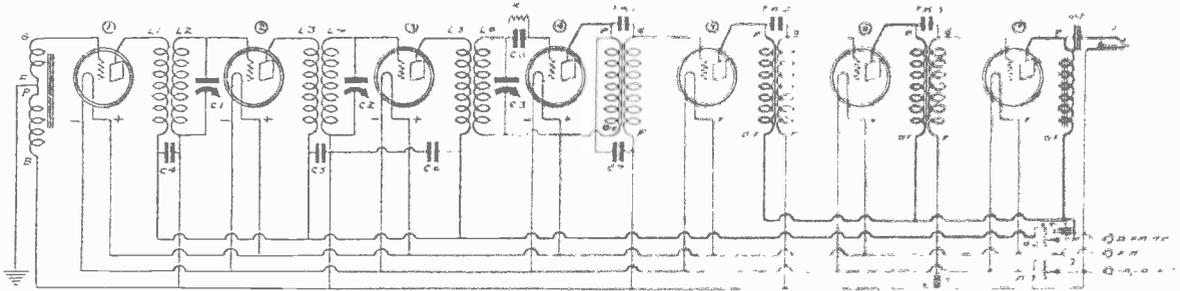


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(Concluded on page 31)

SIR OLIVER LODGE GIVES N CIRCUIT

**Much - Rated Non - Radiating Receiver, Comprising
Single Stage, Not Selective Enough for American
Needs—Universal Adoption Asked**

The N circuit of Sir Oliver Lodge, the non-radiating design that obtained much publicity without disclosure of the hookup, was made public in London recently. Fig. 1 shows the hookup. The kind words Sir Oliver said about it would not apply wholly in the United States, as the circuit is not sufficiently selective.

Sir Oliver said:

"In designing the receiver which has now become known as the N circuit my object was first to provide a wireless set that would not oscillate or cause interference with neighboring sets (and this is very necessary if we are all to enjoy the broadcasting, just as traffic control on the roads is necessary if we are to

have safety); secondly, to provide a set which would be perfectly simple to operate and yet would receive programs from the local stations as well as the distant stations.

"If the N circuit were universally adopted there would be an end to the oscillation nuisance."

The fundamental principle of the circuit is the single connection between the antenna and detector tube. It is a closed oscillating circuit.

Sir Oliver maintains that for good quality of reproduction there should not be more than one tuned circuit, as, if two tuned circuits be employed, there is a great likelihood distortion owing to heterodyning between the circuits.

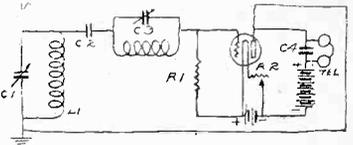


FIG. 1.

The N circuit, C1 would have to be at least .001 mfd. for American conditions, L1 being about 35 turns on 3 inch diameter, C3 may be .0005 and L2 be 50 turns or more on 3 inches. The grid leak is 3 meg. C2 is .00025 mfd. and C4 is .002 mfd.

News Broadcast, U. S. to Arctic

News, somewhat delayed but still news, was broadcast by KYW, Chicago; KFKX, Hastings, Nebr.; WBZ, Springfield, Mass., and KDKA, Pittsburgh, to the Arctic. The result of the Dempsey-Tunney fight, though a month had elapsed, was absolutely fresh to the Arctic denizens.

No mail or news has entered the Arctic region since the freeze-up early in the Fall, so KYW informed residents of trading posts and detachments of the Royal Canadian Mounted Police that destructive hurricanes have visited Florida and the West Indies, and broadcast various other happenings.

Care and Patience Aid In Trouble-Shooting

With the aid of a systematic check up system, servicing a home made or manufactured receiver is a very simple process. Patience is a very important essentiality, though.

It is taken for granted that the receivers had previously worked satisfactorily and suddenly ceased to give satisfaction either as to poor volume, quality, or distance. Of course, if the receiver is of the home made type, and didn't work upon completion, the wiring should be checked back, first. This is the only step that differs from the completed sets although if a wiring diagram of the factory made set is at hand, a check up, in case of a broken lead, will ease matters.

Materials Required

A pair of phones, a 1½ volt dry cell battery, flexible wires about 7 inches long with attached lugs, a hydrometer for storage A battery, a high reading voltmeter, high resistance for B eliminator and low resistance for battery type B and an exact duplicate number of tubes used in the set are the only material that are necessary for testing. Pliers, screwdrivers, soldering iron, etc., should also be at hand. The following check up should be followed:

The antenna and ground or loop, should be removed from the respective posts. Connect up a pair of phones, so that they may be connected to the output of the set. Listen in. If you hear noises, then you may be sure that the trouble is in the set. If noise is absent, then the trouble lies in the collector. Check up on the continuity of the leadin wire in the house, loosened bolts on the ground clamp, loop, lightning arrester, etc. Probably the leadin wire has become partially severed at the window sash, or on the roof, where the leadin drop is made, and making poor contact. This can be tested with the phones and battery, which

are connected in series, so that you have a lead from the battery and a lead from the phone. A small piece of the insulation should be scraped off on each side of the supposed places where the break might occur and the phone and battery lead attached. A click will indicate a complete circuit. The same method is used in finding the broken connections in the ground. In the loop, just shunt the terminals with the phone and battery leads. Be sure that no violet ray, power line, etc., has been recently installed near or in the house. Loose contacts on the transformers resistor mounting, choke coils, jacks, terminals of the socket, legs of the tube elements; poor contact on the rotor plates in the revolving holder, touching of plates at several places; broken tinsel in the flexible leads of coils, condensers or phone cords; poor contact on rheostats between leak metal points and holder, are frequent causes of internal noises. The trouble may be also in the A, B or C supply. The batteries may be checked up for noise by placing the phones across the plus and minus posts and listening. If eliminators are used, by substituting dry batteries, or by placing the eliminators far away from the set, this can be cured. The trouble might lay in the battery leads. That is, stranded wire is used in most lead wire or cables and it is possible that one of the wires has broken. This trouble resembles that found in all stranded wire, such as used in the flexible wire on coils, condensers, phones, etc. If the trouble is in the tubes, then try different tubes, or change them around. Whether testing for noise or any other trouble, the same proceedings should be followed. Test the transformer windings, resistors or choke winding for continuity. Test all coils, condensers, and resistances for complete circuits.

When you test the condensers, disconnect a lead from one terminal, so that

you will not hear a click due to a complete circuit and be misled to think that the condenser is shorted. Also don't test the condenser immediately after signals have been received, since a charge will have accumulated and again you will hear a click, without an actual short existing. Poor contacts on the plate prongs, usually give a great deal of trouble.

In a great many receivers, ballast resistors are used. The wrong carrying capacity type are many times installed, with the result that in a very short while, a certain tube will not light or the filament of the tube will not be given its proper voltage. In either case, a sudden drop in signal strength will be noticed. The resistance wire in the rheostats should be tested, also.

The springs in jacks, after some use, are pushed up and do not make good contact. In plugs, the sleeve becomes worn and poor contact again results. Even a filament switch can cause trouble: That is, a poor cutoff will drain the battery. You will then suddenly notice that the A battery (storage) is being rapidly run down.

Clean all dust out of variable condenser plates, tight wiring places, etc.

Honolulu Hears Washington and Indo-China Code

Radio signals from Saigon, Indo-China, and Washington, D. C., are being received regularly at Honolulu—a distance of 6,000 miles and 5,000 miles, respectively—according to a radio message announced by E. Lester Jones, director of the Coast and Geodetic Survey, from E. J. Brown, observer in charge of the Coast Survey's station at Honolulu.

This reception was made in connection with the longitude measurements which now are being made by means of time signals flashed by radio between stations at Annapolis, Washington, Honolulu, Saigon, Bordeaux, Issy, and the Eiffel Tower, in Paris.

HOW TO RECTIFY B ELIMINATORS

You've Heard Much About the Eliminator Rectifying The AC, But Here Are Some Trouble-Shooting Data For the Unit

With the growing use of B eliminators, the radio enthusiast must now add to his stock of knowledge at least a practical understanding of rectifiers, filter circuits and controls.

A B eliminator must be properly designed and constructed if it is to give satisfactory service, especially over a considerable period of time. A really good eliminator is costly, for it incorporates a powerful transformer, equally husky choke coils, liberal condensers, and satisfactory resistances. As with everything else, one gets precisely what one pays for in buying a B eliminator; and trouble starts, of course, with the purchase or the construction of an inferior grade of eliminator. Again, B eliminators are now made in the standard and the heavy-duty models. The standard proves quite satisfactory for the usual run of receivers. The heavy-duty model is intended for receivers employing the largest power tubes. It is unfair, of course, to expect heavy-duty service from a small eliminator.

Use Only Best Parts

For the most part, B eliminators are no longer an experiment. Most offerings are licensed under the Raytheon, the Rectron or the chemical cell rectifier patents, and the buyer is assured of a satisfactory job.

In building a home-made B eliminator, none but the best components should be employed. It is good practice to buy a kit of parts, rather than scattered units, in order to have the benefit of skilled engineering and research. Here again it is well to remember that good products cost more money but insure lasting satisfaction.

Any make of good B eliminator should operate the usual receiving set without introducing extraneous noises. However, if a hum is detected in the reception, it may be due to mechanical vibration from the B eliminator or to electromagnetic induction. In either event, the B eliminator should be placed at some distance from the receiver.

On a Hunt For the Trouble

Should the radio set suddenly cease to function when using a B eliminator, and the filaments of the receiver tubes remain lighted, the trouble is most likely in the B eliminator. If a filament tube rectifier is employed, such as the Rectron, the filament should be examined. If it is still glowing, showing that it is intact, the trouble may be elsewhere.

The next likely source of trouble may be one of the filtering condensers breaking down. Each filtering condenser should be tested out with an earphone and dry cell, connected in series, with the open leads placed on the condenser. One click should be heard when the circuit is completed through the condenser, and the successive clicks of the same condenser should be barely audible, if heard at all. Contrarywise, if each click is persistently loud, the condenser may be considered defective, and should be replaced by a perfect condenser.

Watch For Broken Leak

If the radio rendition gradually fades even over a period of days and weeks, the trouble may be due to a defective rectifying element, whether it be a tube or chemical cell.

There is always the possibility of a broken connection, hence the wiring of the B eliminator should be carefully examined. The terminals and the external wiring should also be examined for loose or broken connections.

Sometimes a B eliminator gives rise to noisy reception which, at first, may be blamed on static. However, if the noise persists even when the receiver is detuned, it is proof that the trouble is with the receiver or its power plant, and not with the atmosphere. Sometimes the cause may be traced to loose or corroded connections on the storage battery, which, while not sufficient to show up in the brightly lighted filaments, will nevertheless cause persistent noise. Again, it may be a loose wire in the connecting leads.

When Signals Grow Weak

But as likely as not the noises are due to faulty resistances, especially those of the variable kind. Variable resistances of insufficient current-carrying capacity soon become noisy and even totally inoperative after some length of everyday service, yet the radio enthusiast, in his search for the trouble, will take the satisfactory performance of the variable resistance controls for granted.

It is no uncommon experience to have a radio receiver suddenly or gradually stop working for no apparent cause. Or again, the signals become weaker and weaker, even though the filament current and the B eliminator output appear satisfactory. Yet all the while the trouble may be due to the breakdown of one of the intermediate voltage control resistances, which has escaped detection.

Variable and Fixed Resistors

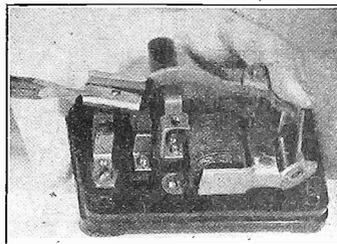
So, all in all, the variable resistances present a source of trouble in B eliminators. The resistor should be capable of handling currents as high as 200 milliamperes at the usual operating voltages, e. g., the Clarostat, without danger of baking or frying or arcing.

Some B eliminators have eliminated all variable resistances, using, instead, fixed resistances to obtain the necessary fixed voltages. Such practice, while insuring silent and positive operation, has the disadvantage of failing to provide the critical voltages required by the different circuits for maximum sensitivity, volume and tone quality. It is a fact that the plate voltage on the radio-frequency tubes is of great importance as regards the sensitivity of the receiver and the tone quality, especially in regulating reception for powerful, local signals, and weak, distant signals. The detector voltage makes all the difference between extreme sensitivity with sharp tonal rendition, or less sensitivity with a mellow reproduction. The plate voltage on the audio-frequency tubes enables the proper balance to be struck with the C battery, for distortionless reproduction.

WIOD GOOD IN NEW YORK

In the New York metropolitan district, since several of its stations have switched to higher wavelengths, reception of distant stations on 210 to 260 meters is now reported to be excellent after nine o'clock at night. WIOD in Florida is coming through with particularly good volume.

CIRCUIT BREAKER



(Hayden)

A SMALL circuit breaker for use with B eliminators. When the button is depressed the metal strip closes the circuit by resting against the two metal contacts. A little catch secures it. When a line surge in excess of three amperes floats in, the magnet winding becomes energized, and the catch is snapped open, thus opening and protecting the circuit. Conditions are restored by again depressing the black button.

How South Africa Got Fight Result

How a Johannesburg, South Africa, newspaper caught its final edition with the result of the Dempsey-Tunney fight, through the medium of 2XAF, the 32.79 meter transmitter of the General Electric Company, is recounted in the Sept. 25 issue of the Rand "Daily Mail." To meet the necessary train the "Daily Mail's" press time limit is 4:30 a. m. At 4:22 the announcer at Philadelphia announced Tunney the winner and while the cheers were still echoing in the stadium the presses in Johannesburg began to grind out the result. Reuter's cable decision arrived at 4:48, just twenty-six minutes after 2XAF had carried the message.

In its story headed "New Speed Record," the Rand "Daily Mail" stated.

"A new speed record in news collection and presentation was created in South Africa in the early hours of yesterday morning, when within twelve minutes of the referee's announcing of the ringside in Philadelphia, U. S. A., that Gene Tunney was the new world's heavyweight boxing champion, the great presses of the Rand "Daily Mail" in Johannesburg were printing papers containing the news."

The news story then explains that the American time is seven hours behind the South African time, that 9:30 p. m. in Philadelphia means 4:30 a. m. in Johannesburg, and the news has 10,000 miles to travel. A "Daily Mail" representative was detailed to attend a local amateur and get the fight direct from 2XAF of Schenectady, N. Y., and a second man was sent to listen on a crystal set to JB, the South African station which was broadcasting 2XAF.

80 Fans Per 1,000 Is Sweden's Tally

WASHINGTON

There are around 80 fans to every 1,000 population in Sweden, according to reports to the Department of Commerce. At the end of July this year, there were 203,833 licensed radio receivers in the entire country. The city of Djursholm had the largest number with 99.5 licenses per 1,000 population. Malmo had 98 per 1,000.

SPEAKERS IN SERIES GIVE BETTER TONE

Series Connection Should Be Utilized, to Bring Impedance Nearer to That of the Tube—How to Match Speakers Thus Joined

It has long been recognized that no single loud speaker of commercial type gives perfect reproduction over the entire musical scale, but tends to amplify some tones more than others. The wise radio fan in search of greatest fidelity of reproduction, therefore, will use two speakers and depend upon their different characteristics to even up amplification throughout the entire tone range. Several of the highest priced radio receivers now use a combination such as this with excellent results.

Set owners who have tried the combination of a good cone and a good horn type speaker, or two horn type speakers with different characteristics, report a marked improvement in tone, so much so in fact, that a single speaker may sound thin and lack timber by comparison.

Matching Speakers

The home experimenter frequently has difficulty in matching the two speakers used. Lacking the facilities of the manufacturer who chooses equipment for this particular purpose, he finds one speaker so much softer than the other one that it cannot be heard at all when both are series connected. This difficulty can be easily corrected with the new cord type Centraab Modu-Plug, either by connecting one plug to each speaker so as to control the tone volume of one entirely independent of the other, or by connecting a single plug to the louder speaker.

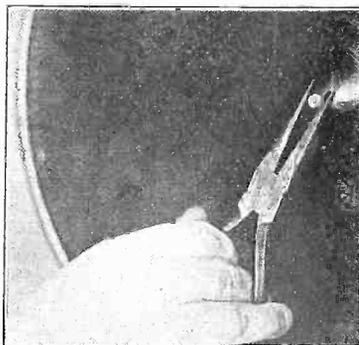
This Modu-Plug is a small device that has many handy applications where tone volume is required. It is a variable high resistance of special type in a phone plug case and shunts the speaker in a way to provide gradual control of tone volume from a whisper to maximum. In the cord type, a phone cord replaces the customary plug connection, and for that reason this type can be used anywhere in the speaker line without the need of making up a jack connection.

Connect in Series

When using two or more speakers, always connect in series so that the current goes through one speaker and then through the other. This increases the impedance of the speaker circuit and makes for better quality than a parallel connection, where the impedance will be reduced far below that of the output tube.

To balance two speakers in series with a single Modu-Plug, first determine the louder of the two speakers. Now insert the cord of this speaker into the spring terminals in the Modu-Plug base. Attach one of the Modu-Plug cord tips to a speaker terminal of the set and the other cord tip to one of the tips of the second speaker. The other cord tip of

CURES RATTLE



(Hayden)

RATTLING in a cone sometimes is caused by the apex working loose. Place a finger on apex, and tighten the loose apex with pliers.

this speaker is then attached to the set. A small sleeve connector can be purchased at radio or electrical stores to connect the two cord tips, or in experimenting, they can be held together with a bit of copper wire.

Both speakers are now in series, with the Modu-Plug controlling the louder one. Adjusting the small knob on the plug will gradually diminish the tone volume of this speaker and slightly increase the volume of the other, therefore any desired balance is quickly obtained.

Radio Lauded by Earl of Clarendon

LONDON

"We must get it out of our heads that it is only a plaything," declares the Earl of Clarendon, new Government Chairman of the British Broadcasting Corporation, when asked about his opinion of radio.

"Radio is more than that," he contends. "It is a new factor in life. We must use it for something higher than just playing dance music, although you cannot ignore that side of it altogether."

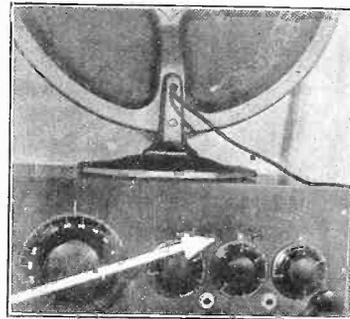
Educational features are gaining popularity in the radio programs, reports K. L. Allerdyce Arnott, managing director of Freed-Eisemann Radio, Great Britain, Ltd., and the excellent programs are not only listened to nightly throughout the British Isles, but throughout the Continent.

"But, of course, the British wireless fan, trying to get America, is after a musical program," he admits. "It is hard to follow a speech at such range, on the normal wavelengths, but quite a number of reports of American reception are coming in."

DIM LIGHTS IN HOME HELP THIS PROGRAM

The feature of the Gondoliers, the new attraction at KGO, the General Electric station in Oakland, Cal., to be presented Monday evening, Dec. 6, will be a visit to the island home of a Russian hermit musician and philosopher. Native folk tunes, with brief word sketches as to their meaning, will be given by one of the members of the Gondoliers' entertainers, personifying the hermit. With the aid of dim lights in the room where the program is being heard, a weird effect can be had. This will indeed tend to give the program a more fascinating aspect. It probably would be still better, if stereoscopic views were also used.

INDUCED HUM



(Hayden)

PLACING the speaker on top of set, as shown, causes a hum, as the speaker unit is right above the transformers, producing interaction.

Sun Spots Worse But DX Is Better

WASHINGTON

Government radio engineers and scientists are trying to reconcile their sun-spots theory with existing conditions. They are positive that sun spots were responsible for poor reception last Winter. It would logically follow that reception would be even worse this Winter because sun spots are worse.

They are baffled by the fact that, barring interference due to congestion of stations, reception is better than it has been for a long time. Fans all over the country are picking up small and large stations at incredibly long distances.

Washington fans are receiving Pacific Coast stations with surprising regularity, and HHK, Port Au Prince, Haiti, has been heard by many. Canadian and far Western stations are also coming in well. In striking contrast to last Winter, the Southern stations seem to be harder to get.

China Gets After Squealing Sets

WASHINGTON

Bloopers can be controlled in China if a new bill which is under consideration is adopted. One of the principal features of the bill is that radio receiving sets come within the definition of a wireless telegraph station for which a license would be required. The fee for a receiving set would be approximately \$2.50 per year.

If arrangements are made to put on such programs as to make the possession of a receiving set more valuable, the license fee could be increased.

A large proportion of the fee would go to the broadcasting companies to pay for operation of stations.

NEW STATION IN FINLAND WASHINGTON

A powerful broadcasting station is to be constructed in Finland, according to reports received by the Department of Commerce. The station would be of 25 kilowatts power and would operate on 1,500 meters.

Fans in America who heard of it built hopes of receiving the station,

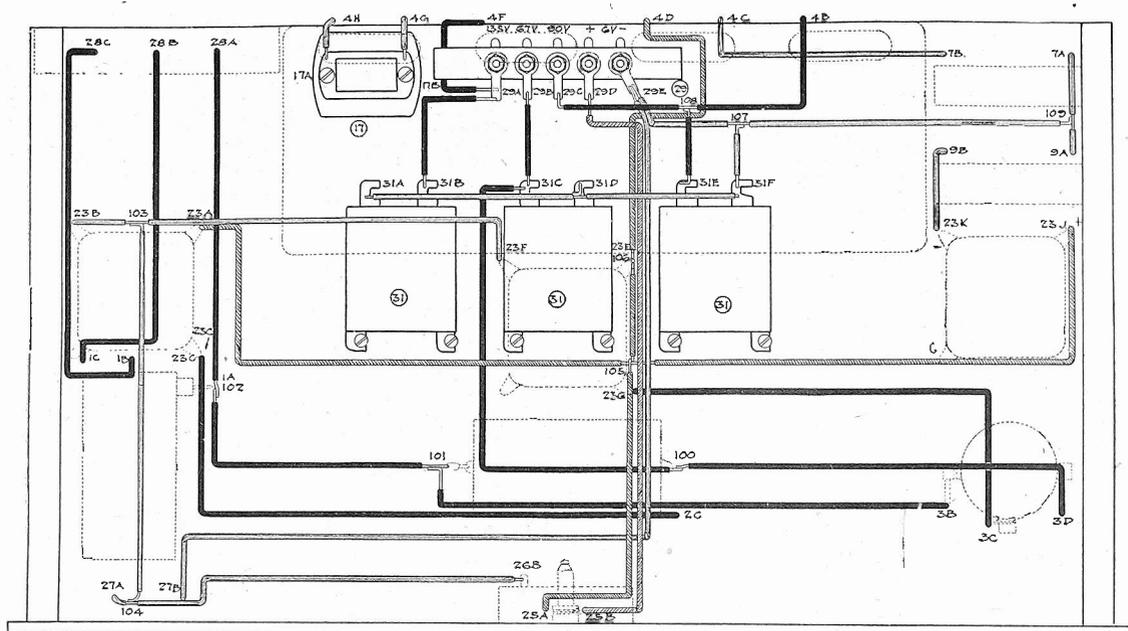


FIG. 7

EFFICIENCY DATA ON DAVEN CIRCUIT

Connections to the Two-Section Condenser Should Be Made Carefully—How to Use Various Antennas on This Hookup

So that you may be absolutely sure of getting the best out of the Daven Bass Note Circuit (described November 13 and 20) it is suggested that the following points be checked up.

The connection terminals, 19C and 19E of the 2-section condenser 19 and also 20C of condenser 20 indicate grounded frame or rotor connections. The terminals 19D, 19A and 19B of the 2-section condenser 19, and 20A and 20B of condenser 20 are the stator terminals. These connections are stressed since they differ with the terminal arrangements of variable condensers of different manufacture. Also be sure that terminal 19E is a grounded frame connection and not a stator connection as shown.

The C battery, No. 24, which is really made of two batteries connected in series so as to give from 9½ to 10 volts, should have its positive terminal No. 24A connected to 4K of the amplifier unit. No. 24B is likewise run to 4J. These terminals should not be reversed. Neither should the set be operated without the C battery. This will cause distortion and short tube life.

The antenna should not be more than 100 feet in overall length. If the receiver is operated within large metropolitan areas, or in proximity to a local broadcast station, the antenna should not exceed 50 feet in length. Using the 100-foot antenna, the connection should be made to ANT-L, while with the short antenna, the connection should be made to ANT-S. Both methods should be tried for best results. The ground wire, preferably leading to a cold water pipe is connected to the GND. post.

LIST OF PARTS

- One Daven Radio Frequency Coil No. 1.
- One Daven Radio Frequency Coil No. 2.
- One Daven Radio Frequency Coil No. 3.
- One Daven Super-Amp ifier, 3 stages.
- Three Daven Mu-20 tubes,
- One Daven Mu-6 power tube.
- One Daven 1½ Ampere ballast tube.
- One Daven 1 ampere ballast tube for other tubes.
- One Daven ¾ ampere ballast tube.
- One Daven 2 megohm Glastor grid resistor.
- One Daven No. 50 Glastor mounting.
- One Daven special type "A" condenser.
- One radio frequency choke coil.
- One Daven Compensator.
- One Daven Balancer.
- One .0005 mfd. fixed condenser.
- One .006 mfd. fixed condenser.
- One .00025 mfd. grid condenser.
- One 2 section .00035 mfd. variable condenser.
- One single section .00035 mfd. variable condenser.
- Two vernier tuning dials.
- Two —01A type tubes.
- Three UX shock proof sockets.
- One 9 to 10½ volt C battery.
- One push pull filament switch.
- One 400 ohm potentiometer.
- One 10 ohm rheostat.
- One antenna-ground terminal strip.
- One 5 terminal cable connection strip.
- One 5 conductor standard battery cable.
- Three 1 mfd. by-pass condensers.
- One 18x7x3/16" Bakelite panel.
- One 17¼x9¾x5/8" wood sub-base.
- Twenty feet multi-colored buss wire.
- Miscellaneous lot of screws, solder clips.

[Parts, top down, Nos. 1 to 35]

Minstrelsy Tribute Is Paid by Paskman

The Old Time Minstrels, are popular at WGBS, New York, and WIP, Philadelphia, in the hook-up between the two Gimbel stations. Under the direction of Dailey Paskman, director of the station, the players present the type of minstrel first part made famous by Lew Dockstader, George Primrose and "Honey Boy" Evans.

The minstrel shows have been a feature of WGBS for the past sixteen months, during which time more than fifty performances have been given.

Commenting on this regular program feature, Mr. Paskman, who inaugurated and developed it, said:

"The Old Time Minstrels represents a form of American music and humor which is in danger of becoming obsolete. I feel that, inasmuch as minstrelsy is purely an American product, it is a privilege to revive this sort of entertainment so as to perpetuate the old songs, jokes, and names of the old black-face minstrel men of former days."

Dill's Aid Honored By National Club

SPOKANE, Wash.

Spokane is established as headquarters of the northwest district of the National Radio Club of Washington, D. C., through the appointment of Russell Conklin as a member of the organization's board of governors. The appointment comes as a result of Mr. Conklin's activity in radio affairs while a member of Senator C. C. Dill's office staff at the capital.

The new corporation, recently incorporated under the laws of the District of Columbia, has for its primary object the interests of broadcasting stations which will form its active voting membership, according to Mr. Conklin. Individuals and concerns who have made application for station licenses, as well as others interested in radio, are being invited to join in other classes of membership.

DAVIS DESCRIBES GROWTH OF KDKA

Started at 100 Watts, Climbed Up to 50,000—Duplicate Equipment on Hand for Emergency—Cost High, Goodwill Chief Asset

By H. P. Davis

"Father of Broadcasting;" Vice-President of Westinghouse Electric & Mfg. Co.

Radio broadcasting has survived, and it has become a great institution because it was conceived and dedicated to public service. Primarily since its course of usefulness has not been directed by motives of private gain broadcasting, in the six years that have elapsed since its inception, has become an integral part of human life, in a manner without parallel in the world's history.

It is fitting that we pause in this, the crowded hour of broadcasting, to pay tribute to KDKA, the pioneer broadcasting station whose history has been said to be a record of the outstanding achievements of broadcasting.

Progress Cited

The growth of broadcasting has not been a slow progression of accomplishment but rather a rushing force crowded with pulsing achievements.

How that progress has been made is well shown in a comparison of the organization and equipment, that was KDKA in 1920, with the present broadcasting station.

The first program of KDKA was transmitted from a small 100 watt station whose operating force and program personnel consisted of four people. The outside pick-up then was unknown nor was there such a thing as a studio.

In the years that have followed, KDKA's power has been increased by stages from its original low power, to 500 watts, to 1000 watts, to 10 kilowatts, thence to 50 kilowatts and today, as the most powerful station in the world, is capable of even higher power to be used when necessary or desirable.

Often Rebuilt

By constant improvement, this many times requiring the rebuilding of the entire station, it has been maintained at the height of efficiency thus serving as a pioneer in the perfecting of radio transmitting engineering.

The imperfections of early broadcasting, when the range of tone frequencies was limited to a few octaves by the transmitting apparatus, has long since been eradicated. The modern KDKA transmits frequencies far above and below the limits of the human ear, thus assuring that every musical instrument, no matter what its scale, and every voice, is broadcast with their quality unmarred.

KDKA's outside pick-ups, the first of which was located in Calvary Episcopal Church, have been increased to 50, and there are now four separate studios, each in different sections of the Pittsburgh district.

The organization of the broadcasting station now consists of more than 60 people.

Duplicate Equipment

The broadcasting station's equipment, which includes not only the broadcast transmitter but also short wave apparatus, is in duplicate so that service may be maintained in any emergency. A record

of which KDKA may well be proud is that since its beginning it has never missed a scheduled period nor had a serious interruption.

KDKA's programs now range to every part of the world, its voice has carried messages to every continent. From the barren wastes far above the Arctic circle to the deserted bush of Australia, KDKA exerts a force for public benefit, whether it be in a message of encouragement concerning the arrival of supplies to northern post or a dance program which entertains those living on the island continent.

It Is Incomparable

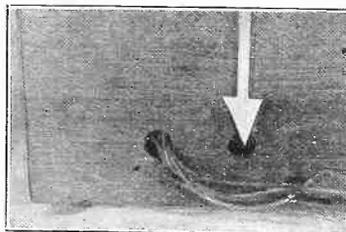
No modern agency can be compared with broadcasting in making effective contact between the business organizations and the public, provided the offering is made in the spirit of service which permeates the broadcasting world. This is clearly shown in the success of such endeavors as the Atwater Kent programs, Eveready Hours, Teaberry and Rund offerings and others.

The maintenance of such a broadcasting station as KDKA requires the expenditure of a large sum of money. In return for this there are few tangible results or manifestations of gain other than the satisfaction of giving public service.

Intense Part of Life

However, if we know that in the broadcasting of church services we are giving comfort to the shut-ins or to those unable to avail themselves otherwise of religious comfort; if we know that in broadcasting market reports, we aid the farmer in the conduct of his business; if we know that by broadcasting messages to the Far North we may assist those isolated far from civilization; if we know that in broadcasting educational courses or addresses we are aiding in the dissemination of useful information; if we know that in broadcasting to other countries, we are spreading an influence for international goodwill; if we know that our programs of entertainment are lightening the burden of humdrum life, then the mission of KDKA has been accomplished.

It is a source of gratification that the originally envisioned ideal of public service has so closely been adhered to by the broadcasting world. Founded on any other basis, the service of broadcasting which is so intensely a part of modern life, could not have endured.



(Hayden)

WHEN the leads enter the set from the rear it is well to have one hole in the cabinet for the battery leads, and another for the aerial and ground leads.

Chummy, Cheery Set Is the Demand

What most fans want in a radio receiver is not one thing but several things. In fact, they want their radio receiver to have numerous excellent qualities.

First the fan wants health, strength and lasting qualities. Not an hysterical receiver that may be quite brilliant at times, but will take a notion to whine, or squeal, or play dead when one wants to show off that receiver to visiting friends.

Of course no one wants a dull receiver. The favorite receiver must be sensitive enough and cosmopolitan enough to pick up some ideas beyond those that are common to the particular burgh in which Mr. and Mrs. DX reside. On cold winter nights one may want that receiver to enable him to fly about in the ether and call on cities all over North America.

The companionable receiver must be discriminating in character and able to stick to one subject at a time. Who in the world wants a receiver that will try to talk about two or three subjects, or try to sing two or three songs, and imitate a band; all at the same time? Selectivity must be one of the imperative characteristics.

Then one wants a receiver that can be controlled. Somebody has to be "boss" and the radio fan should be it. For the receiver to be "boss" would be running things according to somebody else's ideas, not according to the ideas of the broadcast listener.

The broadcast listener does not want a receiver that is too limited in its calling ability. He wants one that is right at home with the younger set of wavelengths, from 200 meters or younger, up to the bigger waves around 550 meters or larger.

Another useful thing in a worthy receiver is a good voice. A voice that can accommodate itself to the kinds of music it is reproducing. A voice that will do more and even remedy the defects in the music.

No one wants a receiver that will be loud-mouthed when one desires it to speak or sing softly and sweetly. In other words a receiver that includes a volume control as one of its features is something to consider.

Does anyone want a receiver in whose nature prejudice is a predominant characteristic? Isn't it better to have one that will separate short wave stations as quickly and as easily as it will separate long wave stations?

Of course, in addition to all these virtues one wants some beauty of face, of figure, or dress, or all of these. Beauty may be paint deep, or solid. What one wants in beauty is a matter of taste. One can get a receiver in a small, simple dress or one can get a receiver in a most elaborate one. However, the old saw about fine feathers does not hold in radio.

Some have selected radio receivers by accident, without any forethought or any other kind of thought. However, it is generally conceded that a receiver is of sufficient importance to think about in advance. If one intends to associate with it after the annexation, it is almost certain that some thinking should be done.

BIRD MIMIC AT WEAF

Edward Avis, the bird mimic will give a brief lecture-recital on "Songs and Calls of American and European Birds" at WEAF at 6:50 p. m. on Saturday, November 27. For his faithful reproduction of bird songs and calls as they are heard in the woods and fields, Mr. Avis is probably considered without a peer. His whistling is a natural gift possessed in a like degree by few other students of the art.

LEADIN WIRE CUT, STATION MUSIC HALTS

WRNY's Broadcast of Religious Services Interrupted as Some One Intentionally Severs Line At Remote Transmitter

Although preliminary tests on the land line, running to the Temple Emanu-El from where Jewish religious services are broadcast each week by WRNY, New York City, were successful, when the switch was pulled for regular broadcasting, the operators in charge found themselves listening to nothing. An investigation showed that the cable leading to the antenna was cut. Harold Hadden, technical man in charge, who discovered the cut, saw no one around at that time, but from the general appearance of the wire, it could be seen that it was an intentional break, since it was badly bent and twisted around the point of the cut. This was the opinion of Sergeant Joseph Rosentengel of the Fort Lee police, also.

This station recently moved its transmitter to the Palisades, opposite 181st Street, and above the Palisades Park about a mile and a half above Fort Lee. The studio is still in N. Y. City. It is still incomplete and the lead-in wire, which is to be buried in a conduit, at present lies along the line. This was the wire that was severed.

Dr. Charles D. Isaacson, director of the station, thought it quite possible that the wire was cut by some one with an animus against the station.

Records Synchronize With Radioed Jazz

A new fad is raging among the radio fans, according to several letters received by George Olsen, the leader of the Hotel Pennsylvania Orchestra, one of WJZ's dance favorites. It seems that at 10:45 p. m. Tuesdays, and 7 p. m. Thursdays, some of the radio fans put a George Olsen record on their phonograph and wait for George's music to play that particular selection over the radio. As soon as the number is announced, the phonograph is started and the same piece is heard from two sources. Unless the two instruments are perfectly synchronized the effect is not the best, but the radio fans seem to be having a good time playing with the thing, and that's about all that matters. A few complaints have been received that George does not play at the same speed when recording and when broadcasting. The cause of these complaints, it has been found, is due to the fact that the speed regulators on the phonographs required adjusting. When the adjustment was made, the tempo was found to be identical in both record and broadcast.

MU-6 PRICE REDUCED

The Daven Radio Corporation of Newark, New Jersey, announces the new price of \$4.50 on its MU-6 Power Tube. This represents a drop in price of \$1.00. This was due to the increased demand, which increased production and reduced price.

NOTED FOLKS SURROUND MIKE



ARTHUR WILLIAMS, vice-president of the New York Edison Company; Jack Cromwell; Princess Murat, huntress, explorer and writer; Dr. Charles D. Isaacson, program director of WRNY; Fanny Brice, and Wallace Eddinger (left to right), before the microphone of WRNY, after the broadcasting of a play.

COST STAGGERING TO NEW STATIONS

Air Congestion Relief Deemed in Sight As Revenues Lag Behind Huge Expenses—Chains Make Money

WASHINGTON

Relief is in sight from the interference due to congestion of stations regardless of Congressional action this Winter. Government experts who have analyzed the situation are confident that the present large number of stations will not continue in operation even if the Government does not step in and demand a new deal.

This opinion is based on the law of supply and demand and the theory that most of the stations will not be able to support themselves.

Want Share of Gold

The influx of new stations is accredited by experts to the desire of their owners to share in the supposedly large amounts of money being spent for advertising via radio. Although there has never been definite proof that any station in the United States has made money from selling time, well established belief is that it is a most profitable business.

According to an analysis, most of the radio advertisers are national in their scope and seek primarily to obtain national audiences. With the exception of one or two chain groups, most of the stations are in a position to serve only a local community.

This eliminates them from the plans of the national advertiser unless they are linked up in a chain. While there is a certain amount of local advertising that may be placed on the air, it is not considered sufficient to support a powerful station.

Field Is Restricted

The belief is that after experimenting several months with broadcasting and discovering that it is not a profitable undertaking, many of the newly licensed stations will give it up as a bad bargain.

This theory, of course, cannot be made to apply to stations owned by large companies which seek only to advertise themselves and do not depend on selling time for support. There is also a number of schools, colleges and churches which broadcast without hope of remuneration.

NEW STATION FOR SPOKANE

SPOKANE, Wash.

Vincent Kraft, president of the Northwest Radio Company of Seattle, now erecting the super-broadcasting station here, was a visitor recently. He arrived to inspect the plant, and possible location for a downtown broadcasting studio.

The new plant, with its downtown studio, will represent an investment of nearly \$100,000.

NEW STATION LIST MOUNTS; IT IS NOW 110

Where Newcomers Will Find Room on the Wavelength Spectrum Without Disturbing Other Broadcasters Is a Problem — List Itemized by Districts

WASHINGTON

Plans are in progress for the construction of 110 new broadcasting stations, according to reports received by the Radio Section of the Department of Commerce. Where these stations will find wavelengths without seriously disturbing stations already in operation, or whether Congress will enact a law before they are ready for operation is not known.

The announcement of the new stations was contained in a second report from Supervisors of Radio throughout the country. The report is a supplement to the one of October 15. Under the new plan, the supervisors are required to report every fifteen days on changes or contemplated changes in their districts.

Conditions Called Worse

After analyzing the reports, Chief Radio Supervisor W. D. Terrell says, conditions are not as bad as originally indicated, but "much worse."

The second report shows the following:

New stations in actual operation since July 1 are 75, an increase of 12 since October 15.

76 stations have increased their power since July 1, an increase of 13 since October 15.

74 stations have jumped wavelengths since July 1, an increase of 12 since October 15.

70 new stations are under construction, an increase of thirty since October 15.

50 stations are preparing to increase their power, an increase of four since October 15.

Plans are in progress for the construction of 110 new stations, an increase of 28 since October 15.

Increased Power

Of the new stations licensed since the first of July, 17 are equipped to use power of 500 watts or more, while 13 of the old stations have increased their power to 500 watts or more.

The summary by districts follows:

First District, Boston: 7 new stations, 4 increased power, 10 changed wavelengths, 6 under construction and 6 stations planned.

Second District, New York: 14 new stations, 7 increased power, 8 changed wavelengths, 2 under construction, 11 preparing to increase their power and plans in progress for 20 new stations.

Third District, Baltimore: 2 stations with increased power, 2 changed wavelengths, and 5 preparing to increase their power.

South and West

Fourth District, Atlanta: 7 stations with increased power, 5 stations under

DRILLING GLASS



DRILLING GLASS is an easy task if this method is used. Place a small three-cornered file in the chuck of a hand drill. Make a little mountain of putty around the spot to be drilled, scoop out a little depression and fill with a few drops of turpentine. Then drill in the same manner as when using regular drills.

construction, and 3 preparing to increase their power.

Fifth District, New Orleans: 10 new stations, 6 with increased power, 4 have changed wavelengths, 10 stations are under construction, 11 are preparing to increase their power, and plans are for twelve new stations.

Sixth District, San Francisco: 2 new stations, 4 with increased power, 14 have changed wavelengths, 6 are under construction and 7 are planned.

Seventh District, Seattle: 8 new stations, 26 with increased power, 24 have changed wavelengths, 6 are under construction, 3 are preparing to increase power, and 11 stations are planned.

Eighth District, Detroit: 8 new stations, 11 with increased power, 4 with changed wavelengths, 3 under construction, one preparing to increase power and 36 new stations planned.

Ninth District, Chicago: 26 new stations, 26 with increased power, 24 have changed wavelengths, 32 are under construction, 16 are preparing to increase power and 18 new stations are planned.

Seven New Stations

WASHINGTON

Seven new stations have been licensed, three stations have changed their wavelengths and one station has discontinued operation. The new stations follow:

WICC—Bridgeport Broadcasting Stations, Bridgeport, Conn., 285 m., 1052 kc.

WLBC—D. A. Burton, Muncie, Ind., 223.7 m., 1340 kc.

WLBE—J. H. Fruitman, Brooklyn, N. Y., 230.6 m., 1300 kc.

WFBE—Garfield Place Hotel, Cincinnati, O., 232.4 m., 1290 kc.

WOMT—Meadow Theatre, Manitowish, Wis., 254.1 m., 1180 kc.

KGDI—Northwest Radio Service Co., Seattle, Washington, 416.5 m., 720 kc.

KGDJ—R. Rathert, Cresco, Iowa, 202.6 m., 1480 kc.

CHANGES

KSO—Clarinda, Iowa, from 241.8 to 405.2 meters, 740 kc.

WCAM—Camden, N. J., from 236.1 m. to 336.9 meters, 890 kc.

KFPY—Spokane, Washington, from 273 m. to 272.6 m., 1100 kc.

WFBE—Seymour, Ind., discontinued.

Eveready Hour Gets Elsie Janis

Elsie Janis has been engaged for an Eveready Hour program to be broadcast in December.

The program in which Miss Janis will appear is being prepared by the program directors of the Eveready Hour who are working on an interesting adaptation of Miss Janis' famous stage mimicry to radio broadcasting.

Elsie Janis is one of the best known of American stage stars. She is a native-born American and has played in musical comedy and vaudeville successes. During the world war she spent several months with the American Expeditionary Forces in France, entertaining American soldiers and their French and British compatriots.

Miss Janis' first stage appearance was as "Cain" in "The Charity Ball." A year later she went into vaudeville. After five years of vaudeville work she had attracted such favorable attention that she was starred in "The Belle of New York," in 1904. Her next appearances were in "The Fortune Teller" and "The Vanderbilt Cup." At the close of her engagement with the latter, in 1908, Miss Janis went under the management of Charles B. Dillingham, first in "The Hoyden" and later in "Fair Co-eds" and "Slim Princess." Her first notable appearance after the war was in her own production called "Elsie Janis and her Gang."

Cone Toward Wall Increases Volume

Tests conducted in the engineering laboratories of the Crosley Radio Corporation show that a majority of the single-cone type of loud-speakers on the market give greater sound volume to listeners directly in front of the speaker when they are placed with the point of the cone in the direction opposite to that of the listeners than when they are placed with the point of the cone toward the listeners.

Thus fans who have placed their loud-speakers with the cone pointing away from the wall will usually find that they can slightly increase the sound volume by turning the speaker around so that the inside of the cone points toward the listeners. This hint will be found valuable in tuning to weak signals.

Engineers explain this slight difference by the fact that the cup-shaped transmitting motion to the surrounding air than the slanting outside surface of the cone. Stronger waves are therefore set up by the inside of the cone than by the outside.

U. S. Is First In Compass Stations

Development of radio communication and under water sound apparatus was described by Commander Stanford C. Hooper, U. S. N., at the thirty-fourth annual convention of the Society of Naval Architects and Marine Engineers at the Engineering Societies Building, New York City.

The United States now leads the world in the number of naval radio compass stations, operating fifty-three of them, Commander Hooper said. These stations and twenty-seven radio beacons furnish in calculable service to all ships equipped with radio, he declared. Aircraft uses the radio in the same way that ships do, he said.

RADIO BILL FACES NEW OBSTACLE

Members of Congress Discover Provision in Dill Resolution Deemed to Put Federal Government in Competitive Commercial Telegraphy

By Thomas Stevenson

WASHINGTON

Government officials and members of Congress are just beginning to awaken to the far-reaching effect of a provision in the Dill radio bill which passed the Senate and is in conference between the Upper and Lower House.

If enacted into law, it would mean the establishment of a giant new government owned communications system by throwing open hundreds of Army and Navy radio stations to general public use.

Most members of Congress did not take the provision seriously when it came up for consideration. Impressed by the activities of commercial companies which would be vitally affected, three members recently made a study and analysis of the provision. It follows:

"Section 13. Any Government station engaged in transmitting or receiving radio communications relating to Government business, compass reports, the safety of ships, or press messages, including Government stations in the Philippine Islands, is hereby authorized to be used for general commercial business when such use does not interfere with the use for Government purposes as aforesaid, but Government business shall have precedence over commercial business: Provided, that rates fixed for such commercial business, except press rates, shall be substantially the same as the rates charged by privately owned and operated radio stations for like communications and services, and no Government station shall be permitted to make unjust charges or show discrimination and that said rates, including press, shall be subject to control by the commission: And provided further, that receipts from such commercial business shall be covered into the Treasury as miscellaneous receipts. Whenever in the judgment of the Commission the enforcement of this section within the Territory of Alaska, or the Virgin Islands, Porto Rico, American Samoa, Guam, or the Territory of Hawaii would not be in the public interest, and the commission shall so certify to the head of the Government department operating any radio station in such Territory and Insular possession, the application of the section within such Territories and Insular possessions shall be suspended for such time as said certificate remains in force."

Competition Discussed

A limited number of government stations has always engaged in commercial business. These stations are in places, however, where no other communication facilities are available, such as Alaska and American Insular possessions.

It was believed that the intention was to continue this custom, in contrast to which the Dill bill says that the Commission may suspend the enforcement of the provision within Alaska, Virgin Islands, Porto Rico, American Samoa, Guam and Hawaii.

The army has radio stations in practically every large city of the United States and if the bill were strictly interpreted, would be compelled to engage in

competition with existing telegraph companies.

The Navy has stations reaching outlying sections of the globe, and they would be compelled to engage in competition with existing cable and wireless companies.

Several Senators have indicated that they will attack the provision and a demand will be made that the bill be recalled from conference for reconsideration.

Men who are in close touch with the situation fear that the row that may result from debate of the provision may hold up final enactment of a radio law for a long time.

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KEEP LAMP AWAY

Many take pains to place their A or B eliminators far away from their receivers, but place a lamp which is operated from the main very close to the set. They then blame the eliminators for causing a hum. All apparatus operated from the mains AC or DC, should be kept from the receiver.

WHITE ASKS TEST OF INTERFERENCE

WASHINGTON

Representative Wallace White, of Maine, author of the White Radio bill, has under consideration a proposal to confer upon the radio inspection service the authority to investigate all cases of interference to radio reception.

For the last few months the radio inspection service has refrained from all activities except the inspection of stations. Previously, whenever possible, the inspectors attempted to relieve extreme cases of interference due to leaky electric lines, etc. Following the Department of Justice ruling that the department had no authority these activities were curtailed.

Authority Doubted

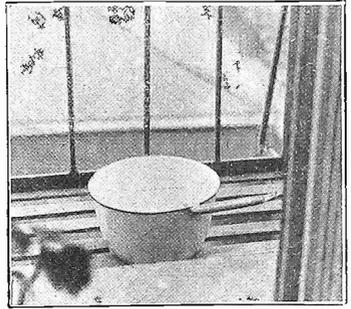
Officials of the Department of Commerce do not believe the White bill, as at present framed, confers the authority for inspectors to investigate cases of non-radio interference. At the same time it is felt that the inspectors should be required to co-operate in this work to a certain extent.

Representative White may propose that a clause something like this be included into the law:

Companies Helpful

"When it does not seriously conflict with their other duties, radio inspectors shall investigate complaints of interference of a non-radio character. When the source of the interference has been discovered, the company which is responsible shall be notified and shall remedy the trouble within ten days under penalty of punishment."

OF NO USE



(Hayden)

RAIN WATER may be used for storage batteries but should be collected in a stone crock, out in "the great open spaces," not on the fire escape as shown, since iron drippings and other foreign matter go into the solution.

ITALY TO U. S. IN HOUR

WASHINGTON, D. C.

When Miss Elizabeth Zandonini of this city received a radiogram from a friend in Italy recently she was somewhat surprised to note that the message had been filed in Italy only an hour before she had received it in this country. A checkup on the routing showed that an Italian amateur had sent it on short waves direct to an American amateur in Philadelphia, who in turn passed it on immediately to an amateur in Washington, the latter completing the fast delivery by telephoning to Miss Zandonini's residence.

It is believed that such a clause would not be objectionable to the electric companies, because most of the interference is due to leaks, which cause a waste of power. Location of these leaks by inspectors, it is said, would be welcomed by the companies which would be only too glad to repair them.

Even without the law, the companies have shown an eagerness to help in this kind of work for their own personal benefit and to win the good will of the public by improving reception.

A decrease of around \$100,000 will be made in the annual appropriation of the radio inspection service for the coming fiscal year, it has been learned. Last year Congress appropriated around \$350,000 for the radio inspection service, which was to have been used to increase the field force and provide better instruments for the location of interference.

Can't Anticipate Law

The Department of Commerce, however, felt that the Department of Justice ruling curtailed its activities in this connection and a large part of the appropriation has not yet been touched. Unless a law is passed before the end of the fiscal year around \$100,000 of last year's appropriation will be turned back to the Treasury.

Estimates for the appropriation for the coming fiscal year were based on the assumption that no law would be passed because Government departments are not allowed to anticipate legislation in this respect.

THOUGHT FOR THE WEEK
If radio never does anything more than bring a ray of sunshine and moments of happiness into the lives of the shut-ins, it still will be one of nature's greatest blessings, and add a note of tenderness to the perfect symphony of science.

RADIO WORLD

REG. U.S. PAT. OFF.

The First and Only National Radio Weekly

Radio World's Slogan: "A radio set for every home."

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Entered as second-class matter March 23, 1922, at the Post Office at New York, N. Y., under the Act of March 3, 1879.

CIVIL SERVICE

The United States Civil Service Commission announces the following open competitive examinations: Associate radio engineer, \$3,000; assistant radio engineer, \$2,400. Applications for associate and assistant radio engineers must be on file at Washington, D. C., not later than December 30. The examination is to fill vacancies in the Signal Service at large of the War Department at McCook Field, Dayton, Ohio, and Fort Monmouth, New Jersey, and vacancies occurring in positions requiring similar qualifications.

Competitors will not be required to report for examination at any place, but will be rated on their education, experience, and fitness; and publications, reports, or thesis to be filed with the application.

Full information and application blanks may be obtained from the United States Civil Service Commission, Washington, D. C., or the secretary of the board of United States Civil Service Examiners at the Post Office or Custom House in any city.

YOUNG EXPECTS OVERSEA MUSIC

In Message to British Broadcasting Company, Sent From Schenectady to Public Abroad, He Prophesies International Programs

Listeners in Great Britain heard the remarks of Owen D. Young, broadcast from the General Electric short-wave station, 2XAF, Schenectady. Mr. Young, chairman of the Board of General Elec. Co., and a collaborator on the Dawes plan, was unable to appear at the microphone, so an operator read his remarks. The waves used simultaneously were 32.79 and 26.8 meters. The occasion of the speech was the fourth anniversary of the British Broadcasting Company. The message:

I send my good wishes to the British Broadcasting Company on its fourth birthday, and my congratulations to the people of England and Scotland on the service which it has performed.

Each generation brings into being new children, who are different from any of their ancestors and who will be unlike any of their descendants. This generation has brought radio into being. It has no nationality or birth. Even Marconi, who has the greatest claim, would be the first not only to admit but to praise contributions of inventors and engineers in every land.

Radio not only recognizes no nationality of birth but it admits of no national limitation of performance. It brazenly passes through all ports of entry; it pays no customs duties; it defies fortresses and frontiers. Only the barriers of language can prevent its universal application.

Make Life Better

True it is that the physical agencies of transmission must be physically located, and therefore, they are subject to national control. Like lighthouses, these broadcasting antennas lift their heads in every land, and their business truly is to enlighten and make more easy the ways of the people whom they serve.

They throw out ideas and information for education. They scatter music and sports for entertainment. Like all in-

struments of great power, they must be widely and conscientiously used. To turn them to wrong purposes would make them engines of destruction.

The problem of the British Broadcasting Company in serving 44,000,000 people in 95,000 square miles differs much from that of our American stations, which serve 110,000,000 people in nearly 3,000,000 square miles.

Method Is Different

Not only do the technical and physical problems differ, but the entire method of control and character of use differs. The differential in time alone between San Francisco and New York is almost as great as that between London and New York. The diversity of our interests leads to diversity of programs, and therefore, diversity of control.

Take agriculture alone. The wheat-growing farmers of the Northwest are interested in quite different problems from the cotton producers of the South. In England you have not only a more concentrated population and a more homogeneous people, but you have more closely unified interests.

Stations Contrasted

It is to be expected, therefore, that your method of dealing with broadcasting would differ from ours. We have roughly 600 stations—you have approximately 21. There are, however, here, with all of our diversity, programs of national interest which we are making provision to broadcast nationally. The time will soon be here when programs of international interest, especially between English-speaking peoples, may likewise be broadcast internationally.

At some other birthday of yours, we will not only send you our best wishes and congratulations, but we will listen in throughout America to your birthday celebration.

LETTERS TO THE EDITOR

Editor Radio World:

I was much interested in an article in Radio World for November 13, 1926, entitled, "WLWL's Beat Annoys Fans in Cleveland."

Of course the folk in Cleveland know what they hear there. Locally there is absolutely no QRM either way between WTAM and WLWL. There is some interference or rather blanketing by WFI and WLIT, two of our locals who are just as much below WTAM as WLWL is above them.

The real interference with WTAM comes from WODA of Paterson, N. J., operating on a "pirated" wave of 390.9 meters. It would seem to me that to the fans to whom WTAM is a 3,500 watt local a 500 watt station, say 300 miles away ought to be inaudible save on a very

sensitive receiver.

As to the variation of wave of WLWL we do not find it. The wave is always sharp, as indicated by the invariable dial setting of a Neutrodyne circuit. Locally WLWL does not interfere with WGY on 379.9 nor does WGY interfere with WLWL.

Of course there is interference with WMBF as there will be anywhere with two stations on the same wave. If you want real heterodyning take a little venture into the 250 to 280 meter wave band! As well expect to select the saxophone from the orchestra in your speaker.

But these things all lend interest to our reading.

PAUL A. HERR.
 6322 Baynton Street,
 Philadelphia, Pa.

GEN. HARBORD GIVES HONOR TO FOOTBALL

First In Field of Sport, He Says, Discussing Listeners' Preferences—Broadcasts of Only Big Events Popular

Of the sports, football has had the most amazing leap in general popularity (with radio listeners). Where football interest formerly was chiefly collegiate, all classes now follow it as the announcer's voice pictures the struggle and suspense of the play. I have often thought that the popularity of football by radio may be due to the fact that the listener, following play by play, imagines himself out there on the white-lined gridiron, squirming, dodging, racing through a broken field and performing deeds of strength and valor such as he has no opportunity of performing in the humdrum daily life.

Event Must be Good

However, it is a dark day for the station director if he picks a poor sports event for broadcast. If you attend a great fight and the fighters are not evenly matched, the excitement of the ringside may in some degree gloss over the fact. But the voice of the accurate announcer relentlessly tells the story of blow after blow and the radio listener "sees" the fight clearly in all its defects. I do not know whether the listener writes to the promoter responsible for a poor fight, but it is certain that he is likely to write to his broadcast station about it.

Services Popular

Although we have heard much discussion of the churches, their attendance and support, the broadcasting of services has been so popular as to indicate a strong religious influence in the country. However, if we put a Methodist on the air tonight we must follow up quickly with a Presbyterian, and so on down the line. Radio must have a balanced religious program.

I often think that we like to pretend to be a little more "common" or "rough-necked" than the facts warrant. The other day I noticed a boy come trudging around a corner whistling an air I did not at first place; then I realized it was Anitra's Dance from "Peer Gynt." A generation or so ago boys whistled "A Hot Time." That tells a story.

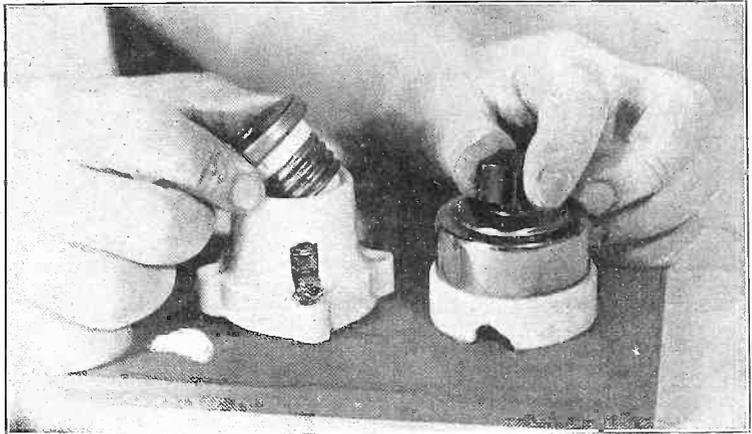
Jazz Circles World

American jazz swept around the world; then along came radio and gave us all kinds of music. No one has been more amazed than have radio leaders to discover how much of the so-called "long haired music" Americans will enjoy—and ask for more.

Our investigations show that less than 10 per cent. of our listeners want "jazz" today. Consequently, in the "home of jazz" this product hitherto considered typically American is being kept off our program until 10 o'clock.

—Gen. James G. Harbord, president of the R. C. A., in the "N. Y. Times Magazine."

FUSE HOUSE CURRENT LEADS



STANDARD porcelain sockets and fuses, in connection with snap switches, form handy protection when the house current is used. Voltage above that normally used causes the fuse to blow out, thus protecting the line and set. The fuses can be secured to blow at standard ampere rate, stamped on the fuse itself.

OVERSEA 'PHONE HELD IMMINENT

Carson In Annual Report Predicts Commercial Service Between United States and Great Britain In Near Future—List of Amateurs Decreases

Radiotelephone commercial service between the United States and Great Britain in the near future is a reasonable probability, according to D. B. Carson, United States Commissioner of Navigation, in his annual report.

Tests which have been conducted show encouraging results, but it is pointed out, the difference in time in connection with office hours of banks, stock exchange and brokerage houses may present some difficulty.

Commercial pictoradiogram services, the report reveals, are now in operation between New York and London and San Francisco and Hawaii. By means of this development, photographs, pictures, advertisements, legal documents, bank checks, cartoons, fingerprints, and similar pictorial or printed matter are quickly transmitted and reproduced. This new field, the Commissioner states, may develop into an important branch of radio communication.

Broadcasting stations in this country on June 30, 1926, decreased slightly during the past fiscal year, totalling 528 licensed stations as compared with 571 last year and 535 in 1924. There has been a material increase in power used. The average power per station in watts is 715.8 as compared with 312.4 last year and 190.5 the year previous. During the past fiscal year, 117 new stations were licensed and 160 discontinued. The previous year 281 new stations were licensed and 245 discontinued.

Fewer Amateur Stations

On June 30, there were 14,902 active amateur radio stations in the United States, according to the report. There was a considerable decrease in the number of these stations licensed during the fiscal year as compared with 1925, the figures being, respectively, 8,037 and 10,074. During the year under review 3,209 amateur stations were discontinued. Amateurs in

this country, the report points out, are taking advantage of all improvements made in the art and are inclined to more readily adopt new ideas than is possible with the larger stations where much experimenting must be done before changes are made which involve large expenditure of time and money. Practically all amateurs are now using continuous-wave transmitters, many of them having crystal control. With the amateurs, the spark set is considered obsolete as is the crystal receiving set.

At the close of the year under review, there were 1954 vessels equipped with radio as compared with 1,901 during the year previous. Considerable progress was made during the year in converting spark transmitters on ships to the more modern type tube transmitters, which increase the range of the station and produce much less interference. It is not unusual for ships equipped with continuous-wave apparatus, tube or arc, to maintain daily communication with land on a trans-Atlantic voyage.

Radio compasses were in use in 230 American merchant vessels at the close of the fiscal year compared with 83 during 1925, the report discloses. The value of this equipment as an aid to navigation and for the purpose of locating vessels in distress is now generally recognized by steamship companies.

The Marine Regulation

Continued growth in the use of radio is predicted by Commissioner Carson, together with improved service to the public. However, he states that in the absence of adequate radio laws, it is difficult to forecast just what the actual conditions may be during the coming Winter.

Referring to the marine regulatory activities of the Bureau of Navigation, the report points out the need for a unification of the different Federal agencies which participate in this work.

TELEPHONE TOUR IS WEAF'S STUNT

Mary Garden at Chicago, and Will Rogers, at Independence, Kan., Heard at Celebration of New Ownership—24 Stations Transmit Event

Radio listeners throughout a greater part of the United States heard Mary Garden, Will Rogers, Weber and Fields and a host of other noted artists and musical organizations in a four-hour radio program marking the formal bow of the National Broadcasting Company, the new owners of WEAF. The program was broadcast simultaneously by twenty-two stations linked with WEAF and WJZ in New York City. The majority of the program was presented before a microphone installed in the grand ballroom of the Hotel Waldorf-Astoria in New York City, where more than 1,000 guests made up a visible audience.

A remarkable demonstration of the use of telephone lines as an adjunct for broadcasting was displayed when, without interruption of the program, the announcer at the Waldorf introduced Mary Garden. She was standing before a microphone in her apartment studio in the Hotel Belmont, Chicago. Miss Garden immediately began her program, several septimo solos, and was heard by the audience in the Waldorf in addition to those listening into receivers.

Rogers Is Heard

Later the same demonstration was witnessed when Mr. Rogers was introduced from New York and replied with a fifteen minute program from his dressing room in Memorial Hall, Independence, Kan., where he was appearing at a show.

The broadcast was opened at 8 p. m. New York time with an address by Merle Hall Aylesworth, the newly elected president of the National Broadcasting Company sponsors of the program. In a five minute talk Mr. Aylesworth told of what the new company was attempting to do in its work as a program maker.

"We are attempting, in this evening's presentation, to give you just a glimpse of the goal we will strive to reach in the make up of programs under our supervision," he said.

In addition to Miss Garden, Mr. Rogers and Weber and Fields, the following artists and musical organizations participated: Titta Ruffo, baritone of the Metropolitan Opera Company; Harold Bauer, pianist, who was engaged while in Europe and found it necessary to advance his sailing date to arrive in time for the broadcast; the New York Symphony Orchestra, Walter Damrosch conducting; the New York Oratorio Society, Albert Stoessel conducting; the Goldman Band, Edwin Franko Goldman conducting; an Operatic Sextette, direction of Cesare Sodero, and consisting of Mesdames Genia Ziefuska and Devora Nadworney and Giuseppe di Benedetto, Milo Picco, Justin Lawrie and Nino Ruisi, all artists well known to a large radio audience; a light opera company, also under the direction of Mr. Sodero, and composed of Mesdames Adele Parkhurst and Frances Paperte and George O'Brien, Justin Lawrie, Theodore Webb and Jack Oakley; Vincent Lopez, George Olsen, Ben

Bernie and B. A. Rolie and their respective orchestras.

Stations In Chain

The following broadcasting stations participated in the simultaneous transmission of the program in addition to WEAF and WJZ in New York City, WEEI, Boston; WJAR, Providence; WBZ, Springfield (Mass.); WTAG, Worcester; WTIC, Hartford; WDRG, New Haven; WGY, Schenectady; WOK, Buffalo; WLLI, Philadelphia; WRC, Washington, (D. C.); WCSH, Portland (Me.); WCAE and KDKA, Pittsburgh; WTAM, Cleveland; WSAI, Cincinnati; WWJ, Detroit; WGN and KYW, Chicago; WHAD, Milwaukee; KSD, St. Louis; WCCO, Minneapolis-St. Paul; and WDAF, Kansas City (Mo.).

One of the surprises of the evening was the display of a photograph taken of Mary Garden while she was singing in her room in the Hotel Belmont, Chicago. It was transmitted to New York City over the telephone lines of the American Telephone and Telegraph Company and flashed on the screen as a stereopticon to the visible audience in the Waldorf before the four hour program had ended.

Advisory Board Named

Mr. Aylesworth announced the names of the members of the Advisory Radio Council, made up of representatives of various professions and phases in public life, which will advise as to the best type of program from the public's point of view. The list:

Walter Damrosch, conductor New York Symphony Orchestra

A. E. Alderman, president University of Virginia

John W. Davis, lawyer

Francis D. Farrell, president Kansas Agricultural College

William Green, president American Federation of Labor

Major General James G. Harbord, president Radio Corporation of America

Rev. Charles F. McFarland, general secretary Federal Council of Churches of Christ in America

Morgan J. O'Brien, lawyer

Dr. Henry S. Pritchett, president Carnegie Foundation

Henry M. Robinson, president First National Bank of Los Angeles

Flihu Root, lawyer

Julus Rosenwald, president Sears-Roebuck Company

Mrs. Mary Sherman, president General Federation of Women's Clubs

General Guy E. Trippe, chairman of the Board Westinghouse Electric and Manufacturing Company

Owen D. Young, chairman of the Board General Electric Company

The navy's chief of operations and chief of staff of the army have also been invited to serve so that the army and navy may be in constant touch with the broadcasting field, and so that the broadcasting facilities may be immediately available in time of national defense.

MARY GARDEN



DAVID SARNOFF, M. H. Aylesworth of Mary Garden sent via wire from Chicago broadcast as part of the inauguration of the new broadcasting Company.

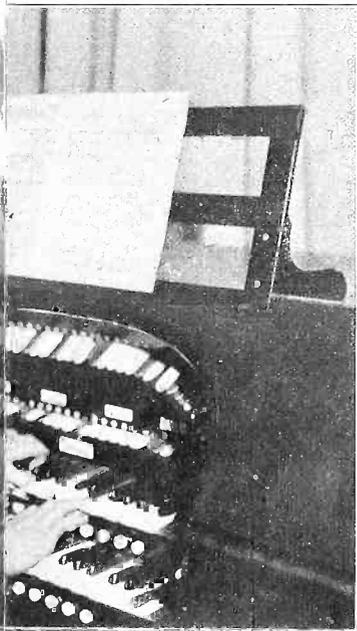


THE ORGAN is one of the most difficult the Crosley station in Cincinnati, Ohio, as perfect as possible, with the aid of a speaker and audio amplifier. Many prominent plimented its wonderful tonal quality. thousands of listeners

PHOTO BY WIRE



Owen D. Young inspecting the photo to New York City simultaneously with program of WEAf under National Broad-management.



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"Not so long ago," explains Mr. Lindsay, "it was thought the more mikes the better broadcast. But experience shows that fewer mikes, properly placed, give better results."

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The creation of the crowd atmosphere is a goal all stations seek.

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Set For All Soon, Says Werrenrath

The musical leadership of the world will pass from Europe to America within the next generation largely because of radio developments, according to Reinald Werrenrath, American baritone, who believes practically every American home will have a radio within the next five years.

"Radio is bringing the finest music to the smallest farm," he added, "and it is a natural result that children will absorb its beauty, and will grow up with a finer appreciation of beauty and culture than their parents."

This popular concert artist was the first of the internationally famous singers to broadcast in the Atwater Kent Sunday night concert.

"By popularizing the classics, the phonograph and radio have contributed immeasurably to America's musical appreciation," he added. "Just how far reaching the effect of radio will be it is impossible to predict. In fact, it is overwhelming when one considers the possibilities of it, and the breadth of its influence. I was told that some time in the future we shall heat our homes and run our automobiles by radio. I do not doubt it, for if any one had told us ten years ago that the radio could do what it is doing today, we should have derided the idea."

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Professor Tilley, who will give hints on the phonetics of speech, studied under Henry Sweet of England, and Prof. W. Vieter, Univ. of Marburg, Germany.

TELEPHONE TOUR IS WEAF'S STUNT

Mary Garden at Chicago, and Will Rogers, at Independence, Kan., Heard at Celebration of New Ownership—24 Stations Transmit Event

Radio listeners throughout a greater portion of the United States heard Mary Garden, Will Rogers, Weber and Fields and a host of other noted artists and musical organizations in a four-hour radio program marking the formal bow of the National Broadcasting Company, the new owners of WEAF. The program was broadcast simultaneously by twenty-two stations linked with WEAF and WJZ in New York City. The majority of the program was presented before a microphone installed in the grand ballroom of the Hotel Waldorf Astoria in New York City where more than 1,500 guests made up a vast audience.

A remarkable demonstration of the use of telephone lines as an adjunct for broadcasting was displayed when, with the exception of the program in the ballroom of the Waldorf, introduced Mary Garden. She was standing before a microphone in her apartment studio in Chicago. Immediately before her program, several minutes before she was heard by the audience in the Waldorf in addition to those listening on receivers.

Rogers Is Heard

Later the same demonstration was witnessed when Mr. Rogers was introduced from New York and repaid with a fifteen minute program from his dressing room in Manning Hall, Independence, Kan., where he was appearing at a show.

The broadcast was opened at 8 p.m. New York time with an address by Mr. H. H. Aylesworth, the newly elected president of the National Broadcasting Company's sponsors of the program. In a five minute talk Mr. Aylesworth told of what the new company was attempting to do in its work as a program maker.

"We are attempting in this evening presentation to give you just a glimpse of the goal we will strive to reach in the making up of programs under our supervision," he said.

In addition to Miss Garden, Mr. Rogers and Weber and Fields, the following artists and musical organizations participated: Titta Ruflo, baritone of the Metropolitan Opera Company; Harold Bauer, pianist who was engaged while in Europe and found it necessary to advance his sailing date to arrive in time for the broadcast; the New York Symphony Orchestra, Walter Damrosch conducting; the New York Oratorio Society, Albert Strossel conducting; the Goldman Band, Edwin Franko Goldman conducting; an Operatic Serenade, direction of Cesare Sodero and consisting of Mesdames Genia Zebuska and Devora Nadsurmer and Giuseppe di Benedetto; Mito Picco, Justin Lauric and Nino Furla, all artists well known to a large radio audience; a light opera company also under the direction of Mr. Sodero and composed of Mesdames Adele Parkhurst and Frances Pasette and George Otlet; James Lawrie, Theodore Webb and Jack Oakley; Vincent Lopez, George Olsen, Ben

Betta and B. A. Kolie and their respective orchestras.

Stations in Chain

The following broadcasting stations participated in the simultaneous transmission of the program in addition to WEAF and WJZ in New York City, WEEI, Boston; WJAR, Providence; WBZ, Springfield (Mass.); WTAG, Worcester; WVIC, Hartford; WDR, New Haven; WGY, Schenectady; WOK, Buffalo; WIII, Philadelphia; WRC, Washington, D.C.; WASH, Portland (Me.); WCAE and KDKA, Pittsburgh; WIAM, Cleveland; WSAI, Cincinnati; WWJ, Detroit; WGN and KYW, Chicago; WEAQ, Milwaukee; KSD, St. Louis; WCCO, Minneapolis; St. Paul; and WDAF, Kansas City (Mo.).

One of the surprises of the evening was the display of a photograph taken of Mary Garden while she was singing in her room in the Hotel Belmont, Chicago. It was transmitted to New York City over the telephone lines of the American Telephone and Telegraph Company and flashed on the screen as a stereoscopic to the vast audience in the Waldorf before the four hour program had ended.

Advisory Board Named

Mr. Aylesworth announced the name of the members of the Advisory Radio Council made up of representatives of various professions and phases of public life which will advise as to the best type of program from the public's point of view. The list:

Walter Damrosch, conductor, New York Symphony Orchestra.

A. F. Alderman, president, University of Virginia.

John W. Davis, lawyer.

Francis D. Farrell, president, Kansas Agricultural College.

William Green, president, American Federation of Labor.

Major General James G. Harbord, president, Radio Corporation of America.

Rev. Charles F. McFarland, general secretary, Federal Council of Churches of Christ in America.

Morgan J. O'Brien, lawyer.

Dr. Henry S. Pritchett, president, Carnegie Foundation.

Henry M. Robinson, president, First National Bank of Los Angeles.

Elihu Root, lawyer.

Julius Rosenwald, president, Sears Roebuck Company.

Mrs. Mary Sherman, president, General Federation of Women's Clubs.

General Guy E. Trinn, chairman of the Board, Westinghouse Electric and Manufacturing Company.

Queen D. Young, chairman of the Board, General Electric Company.

The navy's chief of operating and chief of staff of the army have also been invited to serve so that the army and navy may be in constant touch with the broad casting field, and so that the broad-casting facilities may be immediately available in time of national defense.

MARY GARDEN



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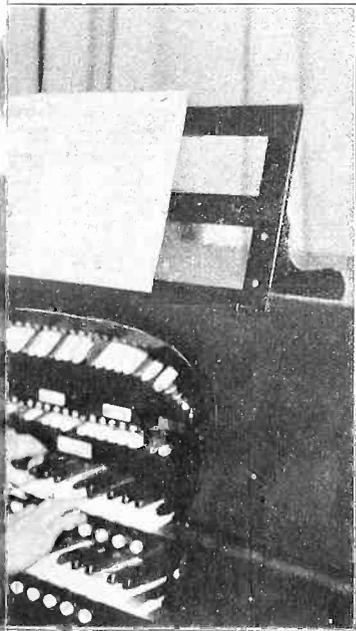


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COMPLETE STATION LIST

Corrected up to November 17

Table with columns: Station, Location, Owner, Meters. Lists radio stations across various states including Louisiana, Oregon, California, Texas, and others.

Station	Location	Owner	Meters
WEAM	North Plainfield, N. J.	Borough of North Plainfield	261
WEAN	Providence, R. I.	The Shepard Co.	367
WEAO	Columbus, O.	Ohio State University	293.9
WEAR	Cleveland, O.	Willard Storage Battery Company	389.4
WEAU	Sioux City, Ia.	Davison Bros. Co.	275
WEBC	Superior, Wis.	W. C. Bridges	242
WEBH	Chicago, Ill.	Edgewater Beach Hotel	370.2
WEBJ	New York, N. Y.	Third Ave. R. R. Co.	273
WEBL	Harrisburg, Pa.	Rate Radio Co.	226
WEBR	Buffalo, N. Y.	H. H. Howell	244
WEBW	Beloit, Wis.	Beloit College	258
WEDC	Savannah, Ga.	Savannah Radio Corp.	263
WEDC	Chicago, Ill.	Emil Denmark Co.	422.3
WEEI	Boston, Mass.	Edison Electric Ill. Co.	364
WEHS	Chicago, Ill.	Edison Electric Ill. Co.	202.6
WEMC	Gerritsen Springs, Mich.	Emanuel Miss. College	315.6
WENR	Chicago, Ill.	All-American Radio Corp.	266
WEW	St. Louis, Mo.	St. Louis University	360
WFAA	Dallas, Tex.	Dallas News & Dallas Journal	475.9
WFAM	Cloud, Neb.	Public Publishing Co.	273
WFAY	Lincoln, Neb.	University of Neb.	275
WFBC	Knoxville, Tenn.	First Baptist Church	250
WFBE	Unic, O.	Garnold Place Hotel	232.4
WFBG	Altoona, Pa.	W. F. Gable Co.	278
WFBJ	Collegeville, Minn.	St. John's University	236
WFBY	Syracuse, N. Y.	Oonodaga Hotel	252
WFBZ	Indianapolis, Ind.	Fort Bank Bldg. L. Co.	268
WFRB	Baltimore, Md.	Fifth National Life Co. Guard	254
WFBZ	Galesburg, Ill.	Knox College	254
WFCl	Pawtucket, R. I.	Frank Crook, Inc.	229
WFDF	Ft. Mich, Mich.	Frank D. allain	234
WFL	Philadelphia, Pa.	Strawbridge & Clothier	394.5
WFKB	Chicago, Ill.	W. C. Fordham	207.3
WFLR	Brown, N. Y.	R. M. Lacey	315.4
WGAL	Lancaster, Pa.	Lancaster Electric Supply and Construction Co.	248
WGBB	Freeport, N. Y.	H. H. Carman	243.8
WGC	Memphis, Tenn.	First Baptist Church	278
WGCS	Evansville, Ind.	Finke Furniture Co.	232
WGCR	Scranton, Pa.	Ed. J. Fordham, Jr.	289.9
WGBS	Astoria, La.	N. Y. Gimbel Bros.	315.6
WGBU	Fulford-by-the-Sea, Fla.	Florida Cities Finance Company	278
WCBX	Oreoro, Me.	University of Me.	234.2
WGCP	Newark, N. J.	May Radio Bdstg. Corp.	252
WGES	Chicago, Ill.	Oak Leaves Broadcasting Corporation	315.6
WGHB	Cleveland, O.	Ed. J. Fordham Hotel	265.3
WGHP	Detroit, Mich.	G. H. Phelps, Inc.	270
WGM	Jeanette, Pa.	Verne & Elton Spencer	372
WGMU	Portable, N. Y.	A. H. Grebe & Co.	236
WGN	Chicago, Ill.	Chicago Tribune	302.8
WGR	Buffalo, N. Y.	Federal Tel. & Tel. Co.	319
WGST	Atlanta, Ga.	School of Tech.	270
WGWV	Milwaukee, Wis.	Radiocast Corp. of Wis.	384.4
WGY	Schenectady, N. Y.	G. E. Co.	379.5
WHA	Madison, Wis.	University of Wis.	535.4
WHAD	Milwaukee, Wis.	Marquette Univ.	275
WHAM	Rochester, N. Y.	Eastman School of Music	273
WHAP	New York, N. Y.	Wm. H. Taylor Finance Corp.	4331
WHAR	Atlantic City, N. J.	F. D. C. Cooks Sons	275
WHAS	Louisville, Ky.	Courier Journal & Louisville Times	399.8
WHAZ	Troy, N. Y.	Rensselaer Polytechnic Inst.	379.5
WHB	Kansas City, Mo.	Sweeney School Co.	365.6
WHBA	Oil City, Pa.	C. S. Shafer	250
WHBC	Canton, O.	R. E. Abraham	254
WHBD	Bellefontaine, O.	Chambers Com.	222.1
WHBF	Rock Island, Ill.	Bardsley Sp. Co.	222
WHBG	Harrisburg, Pa.	John S. Skane	231
WHBL	Portable, N. Y.	Ninth District, C. L. Carrell	215
WHBM	Portable, N. Y.	Ninth District, C. L. Carrell	215.7
WHBN	St. Petersburg, Fla.	First Avenue M. E. Church	238
WHBP	Johnstown, Pa.	Johnston Auto. Co.	256
WHBO	Memphis, Tenn.	St. Johns M. E. Ch.	233
WHBU	Anderson, Ind.	Riviera Theatre & Bings Clothing	218.8
WHBW	Philadelphia, Pa.	D. R. Kienzle	215.7
WHBY	Vest De Pere, Wis.	St. Norberts College	249.9
WHDI	Minneapolis, Minn.	W. H. Dunwoody Institute	278
WHEC	Rochester, N. Y.	Hickson Electric Co., Inc.	258
WHFC	Chicago, Ill.	Hotel Flanders	285.5
WHK	Cleveland, O.	Radio Air Service Corp.	272.6
WHO	New York, N. Y.	Geo. Schubel	361.2
WHOD	Des Moines, Ia.	Bankers Life Co.	526
WHOG	Huntington, Ind.	Huntington Bdsts. Association	241.8
WHT	Deerfield, Ill.	Radiophone Bdstg. Corp.	399.8
WIAD	Philadelphia, Pa.	Howard R. Miller	250
WIAS	Burlington, Ia.	Home Electric	254
WIBA	Madison, Wis.	Capital Times-Strand Theatre	236.1
WIBC	Elkins Park, Pa.	St. Paul's Protestant Episcopal Church	222
WIBH	New Bedford, Mass.	Edit Radio Stores	209.7
WIBI	Flushing, L. I., N. Y.	F. B. Zittel, Jr.	218.8
WIBJ	Portable, Ill.	C. L. Carrell	215.7
WIBM	Portable, Ill.	B. Maine	215.7
WIBO	Chicago, Ill.	Nelson Brothers	226
WIBR	Weirton, W. Va.	Thurman A. Owings	246
WIBS	Elizabeth, N. J.	Thos. F. Hunter	202.6
WIBU	Poyntine, Wis.	The Electric Farm	222
WIBW	Lognansport, Ind.	Dr. L. L. Dill	220
WIBX	Ujica, N. Y.	WIBX, Inc.	205.4
WICC	Bridgport, Conn.	Bridgport Bdstg. Sta.	285
WIEZ	Montgomery, Ala.	A. D. Trum	273
WIET	St. Louis Mo.	Benson Radio Co.	273
WIOD	Miami, Fla.	Carl G. Fisher Co.	247.8
WIPE	Philadelphia, Pa.	Gimbel Bros.	508.2
WIJD	Waco, Tex.	Jackson's Radio Engineering Laboratories	352.7
WIJF	Ferndale, Mich.	J. S. Fernberg Radio Co.	407

Station	Location	Owner	Meters
WJAG	Norfolk, Neb.	Norfolk Daily News	352.7
WJAK	Kokomo, Ind.	Kokomo Tribune	254.1
WJAM	Cedar Rapids, Ia.	D. M. Perlman	268
WJAR	Providence, R. I.	The Out. Co.	305.9
WJAS	Pittsburg, Pa.	Pittsburgh Radio Supply House	275
WJAX	Jacksonville, Fla.	City of Jacksonville	316.9
WJAZ	Mount Prospect, Ill.	Zenith Radio Corp.	322.4
WJBA	Joliet, Ill.	D. H. Leutz, Jr.	206.8
WJBS	St. Petersburg, Fla.	The Out. Co.	254.1
WJBC	By Sale, Ill.	Hummel Furniture Co.	234
WJBI	Red Bank, N. J.	R. S. Johnson	218.8
WJRK	Ypsilanti, Mich.	E. F. Goodwin	253
WJBL	Decatur, Ill.	Wm. Gushard Dry Goods Co.	270
WJBO	New Orleans, La.	V. Jensen	327.7
WJBR	Omaha, Neb.	Omaha Drug Store	257.1
WJBT	Chicago, Ill.	John S. Boyd	468.5
WJBU	Lewisburg, Pa.	Bucknell University	211.1
WJBW	Woodhaven, N. Y.	Union Course Club	288.3
WJBW	New Orleans, La.	C. Carlson, Jr.	270.1
WJBY	Osterville, Mass.	Renderson & Ross	260
WJG	Gadsden, Ala.	Elec. Construction Co.	280
WJH	Omaha, Neb.	Geo. H. Out. Co.	370.2
WJR	Pontiac, Mich.	Jewett Radio & Phonograph Co.	260
WJUG	New York City, N. Y.	B. Ross	516.9
WJY	New York, N. Y.	Nat. Broadcasting Co. of America	406.2
WJZ	Bound Brook, N. J.	Nat. Bdstg. Co. of Amer.	454.3
WKAF	Milwaukee, Wis.	WKAF Broadcasting Corp.	261
WKAQ	San Juan, P. R.	Radio Corporation of Porto Rico	340.7
WKAR	East Lansing, Mich.	Michigan State College	285.8
WKAY	Laconia, N. H.	Lacovia Radio Club	233.7
WKBA	Chicago, Ill.	Arrow Battery Co.	209.7
WKBB	Joliet, Ill.	Sanders Brothers	282.8
WKBC	Birmingham, Ala.	H. L. Ansey	235
WKBD	Jersey City, N. J.	F. V. Bremer	225
WKBE	Webster, Mass.	K. & B. Electric Co.	270.1
WKBF	Indianapolis, Ind.	N. D. Watson	241
WKBG	Portland, Me.	L. G. Gendall	257.2
WKBK	L. Cross, Wis.	L. Callaway of Missouri	29.9
WKBI	Chicago, Ill.	F. L. Schoenwoif	220.4
WKBJ	St. Petersburg, Fla.	Gospel Tabernacle, Inc.	280
WKBL	Monroe, Mich.	Monrona Radio Mfg. Co.	312
WKBM	Youngstown, O.	Radio Elec. Serv. Co.	312.6
WKBN	Jersey City, N. J.	Smith Corp.	309.1
WKBP	Batavia, N. Y.	Ed. J. Fordham, Jr.	265
WKBO	New York City, N. Y.	Starlight Amusement Park	285
WKBR	Auburn, N. Y.	Chas. J. Hesler	256.3
WKRS	Galesburg, Ill.	P. N. Nelson	361.2
WKBT	New Orleans, La.	1st Baptist Church	249
WKBY	Brookville, Ind.	Knox Battery & Electric Co.	236.1
WKBY	Danville, Pa.	Portable E. Quick	220
WKBW	Buffalo, N. Y.	Churchill Egan	362.5
WKBZ	Ludington, Mich.	K. L. Ashbacher	256.3
WKCR	Kenosha, Wis.	E. A. Dato	428.3
WKJC	Lancaster, Pa.	Kirk Johnson & Co.	258.5
WKRC	Cincinnati, O.	The Kodel Radio Corp.	423.3
WKY	Oklahoma City, Okla.	R. C. Hull & N. S. Richards	275
WLAL	Tulsa, Okla.	First Christian Church	230
WLAP	Louisville, Ky.	W. V. Jordan	278
WLB	Minneapolis, Minn.	University of Minnesota	278
WLBC	Minneapolis, Minn.	D. A. Burton	223.7
WLBE	Bklyn, N. Y.	J. H. Fruitman	230.6
WLBL	Stevens Point, Wis.	Wis. Department of Markets	278
WLBI	Elizlet, Ill.	Weekly, Inc.	302.8
WLIT	Philadelphia, Pa.	Lit Brothers	394.5
WLIS	Crete, Ill.	Sears Roebuck Co.	344.5
WLSL	Cranston, R. I.	The Lincoln Studios, Inc.	440.9
WLTS	Chicago, Ill.	Lane Technical High School	258
WLW	Harrison, O.	The Crosley Radio Corp.	422.3
WLWL	N. Y. C.	Patent Fathers	384.4
WMAC	Cazenovia, N. Y.	C. B. Meredith	275
WMAF	Dartmouth, Mass.	Round Hills Radio Corp.	440.9
WMAK	Lockport, N. Y.	Norton Laboratories	266
WMAL	Washington, D. C.	M. A. Leese Optical Co.	212.6
WMAN	Columbus, O.	Haskett Radio Station	278
WMAQ	Chicago, Ill.	Chicago Daily News	447.5
WMAY	St. Louis, Mo.	Kings Highway Presb. Church	243
WMAZ	Macon, Ga.	Mercer University	261
WMBB	Chicago, Ill.	American Bond & Mortgage Co.	250
WMBG	Detroit, Mich.	Michigan Broadcasting Co., Inc.	236
WMBF	Miami Beach, Fla.	Fleetwood Hotel Corp.	384.4
WMBI	Chicago, Ill.	Moody Bible Institute	288.3
WMC	Memphis, Tenn.	Commercial Publishing Co.	499.7
WMCA	Hoboken, N. J.	Greely Square Hotel	400.7
WMRJ	Jamaica, N. Y.	Peter J. Prinz	277.1
WMSC	N. Y. C.	Madison Square Garden Broadcasting Corp.	302.8
WNAB	Boston, Mass.	Shepard Stores	280.2
WNAC	Boston, Mass.	Shepard Stores	430.1
WNAD	Norman, Okla.	University of Okla.	254
WNAL	Omaha, Neb.	Omaha Central High School	258
WNAT	Philadelphia, Pa.	Lennig Brothers Co.	230
WNAX	Yankton, S. D.	Dakota Radio Apparatus Co.	244
WNBH	New Bedford, Mass.	New Bedford Hotel	217.8
WNJ	Newark, N. J.	Radio Shop of Newark	252
WNX	Knoxville, Tenn.	Peoples Tel. & Tel. Co.	267.7
WNOC	Greensboro, N. C.	W. M. Nelson	233.7
WNYC	New York, N. Y.	Department of Plants & Structures	526
WOAI	San Antonio, Tex.	Sou. Equip. Co.	394.5

Station	Location	Owner	Meters
WOAN	Lawrenceburg, Tenn.	J. D. Vaughn	282.8
WOAW	Omaha, Neb.	Woodside of the World	293.7
WOAX	Trenton, N. J.	F. Wood	240
WOBB	Chicago, Ill.	Longere Engrg. Const'n. Co.	555.2
WOC	Davenport, Ia.	Palmer School of Chiropractic	483.6
WOCB	Orlando Bldg. Co.	Orlando, Fla.	293.7
WOCJ	Lansdowne, N. Y.	A. B. Newton	275.1
WOD	Patterson, N. J.	O'Dea Temple of Music	390.9
WOL	Ames, Ia.	Iowa State College	270
WOK	Homerwood, Ill.	Neurofound Radio Mfg. Co.	217.3
WOKP	Peekskill, N. Y.	H. E. Smith	212.4
WOMT	Newark, Wis.	Mikado Theatre	254.1
WOO	Philadelphia, Pa.	J. Wanmaker	508.2
WOOD	Grand Rapids, Mich.	Grand Radio Co.	241.8
WOQ	Kansas City, Mo.	Unity School	278
WOR	Newark, N. J.	L. Hamberger & Co.	405.2
WORD	Batavia, Ill.	Peoples Pulpit Association	275
WOS	Jefferson City, Mo.	State Marketing Bureau	440.9
WOWO	Fort Wayne, Ind.	Main Automobile Supply Co.	227
WPAK	Agricultural College, N. D.	N. D. Agricultural College	275
WPAP	Cliffside, N. J.	(See WQAO)	361.2
WPCC	Chicago, Ill.	North Shore Congregational Church	258
WPCH	N. Y. C.	N. Y. Concourse Radio Corp.	273
WPDQ	Buffalo, N. Y.	Hiram L. Turner	205.4
WPG	Atlantic City, N. J.	Municipality of Atlantic City	299.8
WPRC	Harrisburg, Pa.	Wilson Printing & Radio Co.	215.7
WPSC	State College, Pa.	Pa. State College	261
WQAA	Parkeburg, Pa.	H. A. Beale, Jr.	220
WQAC	Amarillo, Tex.	Gish Radio Service	234
WQAE	Springfield, Va.	Moore Radio News Station	246
WQAM	Miami, Fla.	Electrical Equipment Co.	285.5
WQAO	Cliffside, N. J.	Calvary Baptist Church (WPAJ used when Palisade Amusement Park Program is on)	361.2
WQJ	Chicago, Ill.	Calumet Co.	447.5
WRAF	Laporte, Ind.	Radio Club, Inc.	224
WRAF	Providence, R. I.	L. Stanley N. B. Neal	256
WRAC	Escanaba, Mich.	Ed. J. Fordham, Jr.	256
WRAM	Galesburg, Ill.	Lombard College	244
WRAW	Reading, Pa.	Avenue Radio & Electric Shop	238
WRBC	Valparaiso, Ind.	Immanuel Lutheran Church	278
WRC	Washington, D. C.	Nat. Bdstg. Co. of Amer.	468.5
WRD	Raleigh, N. C.	Wayne Radio Co.	252
WREC	Coldwater, Miss.	Wooten's Radio Shop	254
WREO	Lansing, Mich.	Reo Motor Car Co.	225.5
WRES	Wollaston, Mass.	H. L. Sawyer	300
WRHS	Washington, D. C.	H. C. Washington Radio	256
WRHM	Minneapolis, Minn.	Rosedale Hospital	252
WRK	Hamilton, O.	Doron Brothers Electric Co.	270
WRM	Urbana, Ill.	University of Ill.	272
WRMU	Motor Yacht "MU-1"	A. H. Grebe & Co.	236
WRNY	N. Y. C.	Everimont Publishing Co.	373.8
WRR	Dallas, Tex.	City of Dallas	246
WRST	Bay Shore, N. Y.	Radiotele Manufacturing Co., Inc.	215.7
WRVA	Richmond, Va.	Larus & Bro. Co., Inc.	256
WSAI	Cincinnati, O.	United States Playing Card Co.	325.9
WSAJ	Grove City, Pa.	Grove City College	229
WSAN	Albany, N. Y.	Albenton Call Publishing Co., Inc.	229
WSAR	Fall River, Mass.		

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The navy's chief of operations and chief of staff of the army have also been invited to serve so that the army and navy may be in constant touch with the broadcasting field, and so that the broadcasting facilities may be immediately available in time of national defense.

MARY GARDEN



DAVID SARNOFF, M. H. Aylesworth of Mary Garden sent via wire from Chicago her broadcast as part of the inauguration of the new broadcasting Company.

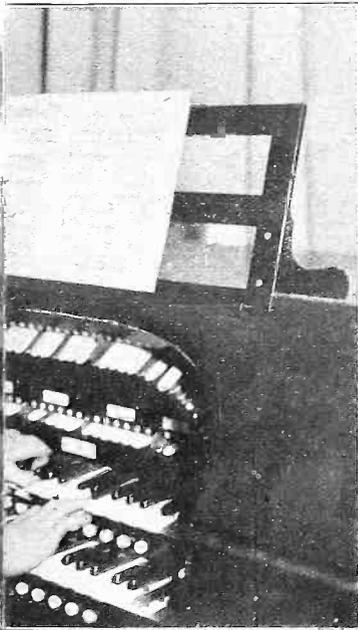


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PHOTO BY WIRE



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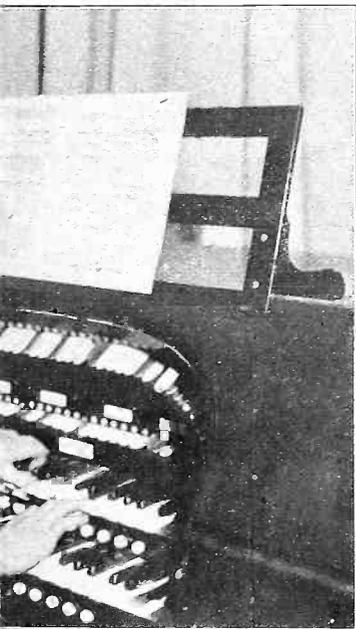


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COMPLETE STATION LIST

Corrected up to November 17

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KDFW	Dallas, Tex.	First Baptist Church	315.6	WABC	Asheville, N. C.	Asheville Battery Co.	254
KFDY	Shreveport, La.	First Baptist Church	236.1	WABI	Bangor, Me.	First Universalist Church	240
KFDZ	Minneapolis, Minn.	H. D. St. John	305.9	WABO	Rochester, N. Y.	Y. Hickson Elec. Co. Inc.	278
KFEC	Portland, Ore.	Meier & Frank	252	WABZ	New Orleans, La.	Colis Place Baptist Church	261
KFEL	Denver, Colo.	E. P. O'Fallon, Inc.	254.1	WABW	Woolster, O.	The College of Wooster	263.8
KFEQ	Oak, Neb.	Scroggin & Co.	268	WABX	Mount Clemens, Mich.	H. B. Joy	246
KFEO	Kellog, Idaho	Bunker Hill & Sullivan	233	WABY	Philadelphia, Pa.	J. Magaldi, Jr.	242
KFEP	Roanoke, Mo.	First Baptist Church	242	WABZ	New Orleans, La.	Colis Place Baptist Church	275.1
KFES	Boone, Ia.	Harvard Co.	267.7	WADG	Akron, O.	Allen T. Simmons	258
KFHA	Cunison, Colo.	Western State College of Colorado	252	WADF	Waco, Tex.	A. P. Barrett	275
KFHL	Oskaloosa, Ia.	Penn College	240	WAGM	Royal Oak, Mich.	R. L. Merritt	275
KFT	Los Angeles, Cal.	Earl C. Anthony, Inc.	467	WAGH	Richmond Hill, N. Y.	A. H. Grebe	315.6
KFTL	Portland, Ore.	Benson Polytechnic Inst.	248	WAGS	Somerville, Mass.	Willow Garages, Inc.	250
KFIO	Spokane, Wash.	North Central High School	272.6	WAIT	Taunton, Mass.	A. H. Waite & Co.	220
KFIQ	Yakima, Wash.	First Methodist Church	256	WAUJ	Columbus, O.	American Ins. Union	293.9
KFIU	Juneau, Alaska	Alaska Elec. Light & Power Co.	226	WAWM	Minneapolis, Minn.	Raddison Radio Corp.	243.8
KFIZ	Fond Du Lac, Wis.	Fond Du Lac Commonwealth Reporter	273	WARC	Medford, Mass.	American Radio & Research	261
KFJB	Marshall, Ia.	Marshall Electric Co.	263	WARS	Brooklyn, N. Y.	Amateur Radio Specialty Co.	295
KFJC	Junction City, Kans.	R. B. Fegan	218.8	WASH	Grand Rapids, Mich.	Baxter Launderers & Cleaners	256.3
KFJD	Fort Worth, Tex.	W. E. Branch	254.1	WATT	Portland, Ore.	Edison Electric, Inc.	243.8
KFKA	Greeley, Colo.	Colorado State Teachers Col.	273	WBBA	W. Lafayette, Ind.	Purdue University	273
KFKB	Miford, Kans.	J. R. Brinkley, M.D.	431.4	WBAL	Harrisburg, Pa.	Pa. State Police	275
KFKU	Lawrence, Kans.	Univ. of Kans.	275	WBAP	Baltimore, Md.	Consolidated Gas & Fuel Co.	245.8
KFKX	Hastings, Neb.	Westinghouse, E. & M. Co.	288.3	WBAT	Decatur, Ill.	James Miliken University	270.1
KFKZ	Kirkville, Mo.	Cham. of Com.	225.4	WBFA	Fort Worth, Tex.	Carver Pub. Inc.	475.9
KFLR	Albuquerque, N. M.	Univ. of N. M.	236	WBAW	Nashville, Tenn.	Braid Elec. Co.	236.1
KFLU	San Benito, Tex.	San Benito Radio Club	236	WBAX	Wilkes Barre, Pa.	J. H. Stenger, Jr.	256
KFLV	Rockford, Ill.	Swedish Evangelist Church	229	WBBC	Brooklyn, N. Y.	P. J. Testan	249.9
KFLX	Galveston, Tex.	Geo. Roy Clough	240	WBBL	Richmond, Va.	Grace Covenant Pres-byterian Church	228.9
KFMR	Sioux City, Ia.	Morningside College	261	WBMB	Chicago, Ill.	Atlas Investment	226
KFMN	Northfield, Minn.	Carlton College	336.9	WBPF	Potoski, Mich.	Potoski High School	226
KFMA	Shenandoah, Ia.	Tunwell Radio Co.	451.3	WBRR	Rossville, N. Y.	Peoples Pulpit Ass'n	416.4
KFOA	Seattle, Wash.	Rhodes Dept. Store	254.3	WBWW	Charlottesville, Va.	Ruffner Junior H. S.	222
KFOB	Burlingame, Cal.	K. F. O. B., Inc.	242	WBXY	Charlestown, S. C.	Washington Light & Power Co.	268
KFON	Long Beach, Cal.	Echophone Radio Shop	233	WBZ	Springfield, Mass.	Westinghouse E. & M. Co.	333.1
KFOO	Salt Lake City, Utah	Latter Day Saints Union	236	WBZA	Boston, Mass.	Westinghouse E. & M. Co.	333.1
KFOD	David City, Neb.	Tire & Electric Co.	236	WCAC	Mansfield, Conn.	Conn. Agri. College	275
KFOT	Wichita, Kans.	Collier Hill Radio Club	231	WCAD	Camden, N. J.	St. Lawrence University	263
KFOX	Omaha, Neb.	Technical H. S.	248	WCAE	Pittsburgh, Pa.	Kaufman & Baer Co.	461.3
KFOY	St. Paul, Minn.	Beacon Radio Service	252	WCAH	Columbus, Ohio	Entrekin Elec. Co.	265.3
KFPL	Dublin, Tex.	C. C. Baxter	252	WCAJ	University Place, Neb.	Neb. Wesleyan University	254
KFPM	Greenville, Tex.	New Furniture Co.	242	WCAL	Northfield, Minn.	St. Olaf College	336.9
KFPR	Los Angeles, Cal.	L. A. County Forestry Department	231	WCAM	Camden, N. J.	City of Camden	336.9
KFPW	Cartersville, Ga.	St. John's Methodist Episcopal Church	258	WCAR	Baltimore, Md.	Brager of Baltimore, 275	
KFFY	Spokane, Wash.	Symons Investment Co.	272.6	WCAR	Corpus Christi, Tex.	Southern Radio Corporation	268
KFOA	St. Louis, Mo.	The Principia	261	WCAT	Rapid City, S. D.	School of Mines	240
KFOB	Fort Worth, Tex.	Searchlight Publishing Co.	508.2	WCAU	Philadelphia, Pa.	Universal Radio Mfg. Co.	278
KFQD	Anchorage, Alaska	Anchorage Radio Club	300	WCAX	Burlington, Vt.	University of Vermont	245.8
KFQP	Iowa City, Ia.	G. S. Carson, Jr.	224	WCAY	Allentown, Pa.	C. W. Heimbach	254
KFOU	Holy City, Cal.	W. E. Riker	257.7	WCBE	New Orleans, La.	Wilber Glenn Voliva	344.6
KFQW	North Bend, Wash.	C. F. Kniernir	215.7	WCBH	Oxford, Miss.	Univ. of Miss.	242
KFQZ	Hollywood, Cal.	Taft Products Co.	226	WCBM	Baltimore, Md.	Hotel Chateaufort	229.7
KFRB	Beverly, Tex.	Hall Brothers	248	WCBR	Portland, R. I.	C. H. Mosser	269.2
KFRS	San Francisco, Cal.	City of Paris	268	WCBO	Anoka, Minn.	Washburn Crosby Co.	416.4
KFRW	Colombia, Mo.	Stephens College	499.7	WCFL	Chicago, Ill.	Chicago Fed. of Labor	491.5
KFRY	Olympia, Wash.	Western Bats Co.	218.8	WCFU	Memphis, Tenn.	Knights of Pythias Home	250.2
KFSD	San Diego, Cal.	Air Mail Radio Corp.	245.8	WCO	Camp Lake, N. J.	C. E. Whitmore	330.6
KFSG	Los Angeles, Cal.	Echo Park Evangelist Association	275	WCLS	Joliet, Ill.	H. M. Couch	214
KFUL	Galveston, Tex.	T. Goggan & Bros.	258	WCMA	Culver, Ind.	Culver Military Academy	258.5
KFUM	Colorado Springs, Colo.	W. D. Corley	239.9	WCOA	Pensacola, Fla.	City of Pensacola	222.1
KFUP	Denver, Colo.	Concordia Seminary	545.1	WCSB	Chicago, Ill.	C. R. White	416.4
KFUR	Denver, Colo.	Fitzsimmons Gen. Hosp.	234	WCSH	Springfield, Mass.	W. H. Rines	499.7
KFUS	Oakland, Cal.	L. L. Sherman	256	WCSP	Springfield, Vt.	Wiltonberg College	248
KFUT	Salt Lake City, Utah	Univ. of Utah	263	WCWK	Fort Wayne, Ind.	W. C. Keen	234.2
KFUU	Oakland, Cal.	H. C. Colburn & E. L. Mathewson	220.4	WCWS	Portland, Mass.	C. W. Sclen	269.2
KFVJ	Venice, Cal.	C. I. McWhinnie	205.4	WCX	Pontiac, Mich.	Detroit Free Press	516.9
KFVE	St. Louis, Mo.	Venson Broadcasting Corporation	239.9	WJR	Pontiac, Mich.	Jewett Radio & Phonograph Co.	516.9
KFVG	Independence, Kans.	First M. E. Church	236.1	WDAD	Nashville, Tenn.	Dads Automobile Accessories, Inc.	226
KFVI	Houston, Tex.	Headquarters Troop, 5th Calvary	240	WDAA	Tampa, Fla.	Tampa Daily Times	273
KFVN	Fairmont, Minn.	C. E. Bagley	227	WDAB	Kansas City, Mo.	Kansas City Star	365.6
KFVR	Denver, Col.	Moonlight Ranch	244	WDAG	Amarillo, Tex.	J. L. Martin	263
KFVS	Cape Girardeau, Mo.	Cape Girardeau Battery Station	224	WDAH	El Paso, Tex.	Trinity Methodist Ch.	267.7
KFVY	Albuquerque, N. M.	Radio Supply Co.	250	WDAR	Fargo, N. D.	Radio Equipment Corp.	260.7
KFWB	Hollywood, Cal.	Warner Bros. Pic.	252	WDBE	Atlanta, Ga.	Gilham Electric Co.	270.6
KFWC	San Bernardino, Cal.	L. E. Wall	291.1	WDBJ	Roanoke, Va.	Richardson, Wayland Elec. Corp.	228.9
KFWF	St. Louis, Mo.	St. Louis Truth Center	214.2	WDBK	Cleveland, O.	M. F. Broz	227
KFWH	Eureka, Cal.	F. Wellington Morse, Jr.	254.1	WDBO	Winter Park, Fla.	Rollins College	240
KFWI	San Francisco, Cal.	Radio Entertainments	249.2	WDBZ	Kingston, N. Y.	Kingston Radio Club	232.4
KFWM	Oakland, Cal.	Educa. Society	315.6	WDEL	Wilmington, Del.	Wilmington Electric Specialty Company	265.3
KFWO	Avalon, Cal.	Lawrence Mott	211.1	WDGY	Minneapolis, Minn.	Dr. G. W. Young	263
KFWU	Pineville, La.	Louisiana College	238	WDOD	Chattanooga, Tenn.	Chattanooga Radio Co., Inc.	256
KFWV	Portland, Ore.	Wilbur Jerman	212.6	WDR	New Haven, Conn.	Doolittle Radio Corporation	268
KFXD	Logan, Utah	Service Radio Company	205.4	WDXL	Detroit, Mich.	DXL Radio Corp.	296.9
KFXE	Logan, Utah	Service Radio Company	205.4	WDWF	Winston, R. I.	D. W. Flint, Inc.	440.9
KFXF	Denver, Colo.	Pikes Peak Broadcasting Company	430.1	WDZ	Tuscon, Ariz.	James L. Bush	278
KFXG	El Paso, Tex.	Bledsoe Radio Co.	242	WEAF	N. Y. City	Wanamaker Bldg. Co. of Am.	491.5
KFXH	Near Edgewater, Col.	R. G. Howell	215.7	WEAI	Ithaca, N. Y.	Cornell University	254
KFXI	Oklahoma City, Okla.	Classen Film Finishing Co.	214.2				
KFXJ	Oxnard, Cal.	Carl's Radio Inst.	205.4				
KFXK	Portland, Tex.	Houston Chronicle Publishing Company	238				
KFXL	Texarkana, Tex.	Buchanan-Vaughan Co.	209.7				
KFXM	Bismark, N. D.	Hoskins-Meyer, Inc.	248				
KFXN	Tucson, Ariz.	Tucson Citizen	243				
KFXO	Ketchikan, Alaska	Alaska Radio and Service Company	228.9				
KFXP	Joplin, Mo.	Martin Brotherson	282.8				
KFXQ	St. Joseph, Mo.	Julius B. Abercrombie	347.8				
KFXR	York, Pa.	Federal Live Stock Keady	202.6				
KFXS	Decatur, Ala.	C. W. Greenle	333.1				
KFXT	Oklahoma, Okla.	Wallace Radio Inst.	331				
KFXU	Newark, Ark.	Moore Motor Co.	239.9				
KFXV	Wayne, Neb.	Wayne Hospital	450				
KFXW	San Antonio, Tex.	Int. Radio Co.	239.9				
KFXX	Seattle, Wash.	Louis Warner	230.6				
KFXY	San Antonio, Tex.	Louis Warner	230.6				
KFXZ	Concordia, Kans.	Alva E. Smith	210				
KFYA	Brookings, S. D.	Cutlers Broadcasting Service	252				
KFYB	Vida, Mont.	First State Bank	240				
KFYC	Dell Rapids, S. D.	Home Auto	250				
KFYD	Cresco, Ia.	First State Bank	405.2				
KFYE	Seattle, Wash.	N. W. Radio Service Co.	361.2				
KFYF	Oakland, Cal.	General Electric Co.	361.2				
KFYG	San Francisco, Cal.	Glad Tidings Temple & Bible Inst.	206.8				
KFYH	Honolulu, T. H.	Marion A. Mulrony	270				
KFYI	Lacey, Wash.	Oregonian Pub. Co.	491.5				
KFYJ	Los Angeles, Cal.	Times Mirror Co.	435.2				
KFYK	Spokane, Wash.	Wm. W. W. W. Co.	394.5				
KFYL	Anita, Ia.	Atlantic Automobile Co.	272.6				
KFYM	San Francisco, Cal.	J. Brunton & Sons Co.	234.2				
KFYN	Seattle, Wash.	Northwest Radio Serv. Co.	384.4				
KFYO	Independence, Mo.	Reorganized Church of Jesus Christ	440.9				
KFYP	Oakland, Cal.	Warner Brothers	250				
KFYQ	Oakland, Cal.	Tribune Publishing Co.	508.2				
KFYR	Denver, Col.	Reynolds Radio Co.	265.3				
KFYS	Shenandoah, Ia.	May Seed & Nursery	461.3				
KFYT	Fresno, Cal.	The Fresno Bee	234.2				
KFYU	Clay Center, Neb.	M. M. Johnson Co.	228.9				
KFYV	Tacoma, Wash.	KMO Inc.	250				
KFYW	St. Louis, Mo.	St. Louis	280.2				
KFYX	Los Angeles, Cal.	Los Angeles Express	336.9				
KFYZ	Denver, Col.	General Electric Co.	322.4				
KGAA	Corvallis, Ore.	Oregon Agriculture Col.	280.2				
KGAB	State College, N. M.	New Mexico College of Agriculture	348.6				
KGAC	Omaha, Neb.	Omaha Central H. S.	258				
KGAD	Chickasha, Okla.	Oklahoma College for Women	252				
KGAE	Council Bluffs, Ia.	Mona Motor Co.	305.9				
KGAF	Portland, Ore.	KOIN Inc.	319				
KGAG	Seattle, Wash.	Birt F. Fisher	305.9				
KGAI	Walla Walla, Wash.	F. A. Moore	285				
KGAJ	San Francisco, Cal.	Hale Bros., Inc.	428.3				
KGAK	Prescott, Ariz.	Wilbur Radio Service	215				
KGAL	Pasadena, Cal.	Pasadena Presbyterian Church	229				
KGAM	Houston, Tex.	Houston Printing Co.	286.9				
KGAN	Pasadena Star-News	Pasadena, Cal.	313.6				
KGAO	San Jose, Cal.	First Baptist Church	333				
KGAP	Pittsburgh, Pa.	Doubleday Hill Electric Company	275				
KGAQ	Shreveport, La.	Caddo Radio Club	220				
KGAS	Dallas, Tex.	Dallas Radio Labs	357.1				
KGAT	Seattle, Wash.	Radio Sales Corp.	499.7				
KGAS	Berkeley, Cal.	Berkeley Daily Gazette	256				
KGAT	Manhattan, Kans.	Kansas State Agricultural College	340.7				
KGAS	Shreveport, La.	W. G. Paterson	312.6				
KGAS	St. Louis, Mo.	Pulitzer Publishing Co.	545.1				
KGAS	Pocatello, Ida.	GSEI Broadcasting Co.	260.7				
KGAS	Salt Lake City, Utah	Radio Service Corp.	299.8				
KGAS	Santa Maria, Cal.	Santa Maria Valley R. R.	282.8				
KGAS	Clarinda, Ia.	A. B. Berry Seed Co.	325.2				
KGAS	Oakland, Cal.	Ass. Broadcasters	302.8				

Station	Location	Owner	Meters	Station	Location	Owner	Meters	Station	Location	Owner	Meters
WEAM	North Plainfield, N. J.	Borough of North Plainfield	261	WJAG	Norfolk, Neb.	Norfolk Daily News	352.7	WOAN	Lawrenceburg, Tenn.	J. D. Vaughn	282.8
WEAN	Providence, R. I.	The Shepard Co.	261	WJAK	Kokomo, Ind.	Kokomo Tribune	354.1	WOAW	Omaha, Neb.	W. F. Wood	246
WEAR	Columbus, O.	Willard Storage Battery Company	283.9	WJAM	Cedar Rapids, Ia.	D. M. Reimann	263	WOAX	Trenton, N. J.	F. J. Wood	520
WEAU	Sioux City, Ia.	Davidson Bros.	389.4	WJAR	Providence, R. I.	The Outlet Co.	305.9	WOBB	Chicago, Ill.	Longacre Engrg. Const'n Co.	555.2
WEBC	Superior, Wisc.	W. C. Bridges	242	WJAS	Pittsburg, Pa.	Pittsburgh Radio Supply House	375.9	WOC	Davenport, Ia.	Palmer School of Chiropractic	483.6
WEBH	Chicago, Ill.	Edgewater Beach Hotel	370.2	WJAX	Jacksonville, Fla.	City of Jacksonville	236.5	WOCB	Orlando, Bdstg. Co.	Orlando, Fla.	293.7
WEBO	New York, N. Y.	Third Ave. R. Co.	226	WJBA	Joliet, Ill.	D. H. Lentz	322.4	WOCL	Lowell, N. Y.	A. B. Newton	275.1
WEBS	Fortale, Ill.	Tate Radio Co.	226	WJBC	St. Louis, Mo.	Financial Journal	254.1	WODA	Patterson, N. J.	O'Pea Temple of Music	390.9
WEBR	Beloit, N. Y.	H. H. Howell	244	WJBI	Red Bank, N. J.	R. S. Johnson	218.8	WOL	Ames, Ia.	Iowa State College	270.0
WEBW	Heloit, Wisc.	Beloit College	238	WJBL	Ypsilanti, Mich.	E. F. Goodwin	253	WOK	Homewood, Ill.	Neutrowood Radio Mfg. Co.	217.3
WEDC	Savannah, Ga.	Savannah Radio Corp.	263	WJBR	Decatur, Ill.	Wm. Gushard Dry Goods Co.	270	WOMI	Peckskill, N. Y.	H. E. Smith	232.4
WEDL	Boston, Mass.	Edison Electric Light Co.	348.6	WJBS	New Orleans, La.	L. V. Johnson	267.7	WOMT	Manitowoc, Wisc.	Mikado Thea	254.1
WEEB	Chicago, Ill.	O. Fordham	202.6	WJBT	Chicago, Ill.	John S. Boyd	468.5	WOO	Philadelphia, Pa.	J. Wanamaker	508.2
WEMC	Berrien Springs, Mich.	Emanuel Miss. College	316.6	WJBU	Lewisburg, Pa.	Bucknell University	211.1	WOOD	Grand Rapids, Mich.	Grand Radio Co.	241.8
WENR	Chicago, Ill.	All-American Radio Corp.	266	WJBV	Woodhaven, N. Y.	Union Course Club	288.3	WOOX	Kansas City, Mo.	Unity School	278
WEW	St. Louis, Mo.	St. Louis University	360	WJBW	New Orleans, La.	C. Carlson Jr.	270.1	WOR	Newark, N. J.	L. Bamberger & Co.	405.2
WFAA	Dallas, Tex.	Dallas News & Dallas Times Herald	475.9	WJBO	Osterville, Mass.	Reader & Ross	260	WOS	Worcester, Mass.	State Marketing Bureau	440.9
WFAM	Cloud, Minn.	Times Publishing Co.	273	WJBR	Omro, Wisc.	Omro Dry Stores	227.1	WOW	Fort Wayne, Ind.	Main Automobile Supply Co.	227
WFAY	Lincoln, Neb.	University of Neb.	275	WJBT	Chicago, Ill.	John S. Boyd	468.5	WPAK	Agricultural College, N. D.	N. D.	275
WFBC	Knoxville, Tenn.	First Baptist Church	250	WJBU	Lewisburg, Pa.	Bucknell University	211.1	WPAP	Chiffside, N. J.	(See WQAO)	361.2
WFBE	Cinc., O.	Garnfield Place Hotel	232.4	WJCV	New York, N. Y.	Nat. Bdstg. Co. of America	406.2	WPCC	Chicago, Ill.	North Shore Congregational Church	258
WFBG	Altoona, Pa.	W. F. Gable Co.	278	WJDD	Moosheart, Ill.	Loyal Order of Moose	370.2	WPCH	N. Y. C. N. Y.	Concourse Radio Corp.	273
WFBI	Collegeville, Minn.	St. John's University	252	WJDR	Pontiac, Mich.	Jewett Radio & Phonograph Co.	516.9	WPQ	Buffalo, N. Y.	Hiram L. Turner	205.4
WFBS	Chicago, Ill.	Vesta Battery Co.	217.3	WJEW	New York, N. Y.	Unat. Broadcasting Co.	406.2	WPG	Atlantic City, N. J.	Municipality of Atlantic City	299.8
WFBB	Baltimore, Md.	Fifth Infantry, National Guard	254	WJFZ	Bound Brook, N. J.	Nat. Bdstg. Co. of Amer.	454.3	WPRC	Harrisburg, Pa.	Wilson Printing & Radio Co.	215.7
WFBZ	Galesburg, Ill.	Knox College	254	WKAF	Milwaukee, Wisc.	WKAF Broadcasting Corp.	261	WPSC	State College, Pa.	Pa. State College	261
WFCL	Pawtucket, R. I.	Frank Crook, Inc.	229	WKAO	San Juan, P. R.	Radio Corporation of Porto Rico	340.7	WQAA	Parkensburg, Pa.	H. A. Beale, Jr.	220
WFDD	Ft. Worth, Mich.	Frank D. Allan	248	WKAP	East Lansing, Mich.	Michigan State College	285.8	WQAC	Amarillo, Tex.	Gish Radio Service	234
WFDE	Philadelphia, Pa.	Omnia Hotel Co.	394.5	WKAV	Laconia, N. H.	Laconia Radio Club	233.7	WQAE	Springfield, Vt.	Moore Radio News Station	246
WFKB	Chicago, Ill.	Vesta Battery Co.	217.3	WKBA	Chicago, Ill.	Arrow Battery Co.	209.7	WQAM	Milford, Fla.	Electric Fertilizer Co.	285.5
WFRF	Brooklyn, N. Y.	R. M. Lacey	205.4	WKBB	Joliet, Ill.	Sanders Brothers	282.8	WQAN	Scranton, Pa.	Scranton Times	250
WGAL	Lancaster, Pa.	Lancaster Electric Supply and Construction Co.	248	WKBC	Birmingham, Ala.	H. L. Anslcy	225	WQAO	Chiffside, N. J.	Calvary Baptist Church (WPAJ used when Palisade Amusement Park Program is on)	361.2
WGBB	Freeport, N. Y.	H. H. Carman	243	WKBD	Jersey City, N. J.	F. V. Bremer	235	WQJ	Chicago, Ill.	Calumet Co.	447.5
WGBE	Memphis, Tenn.	First Baptist Church	236	WKBE	Webster, Mass.	K. & B. Electric Co.	270.1	WRAP	Laperte, Ind.	Radio Club, Inc.	235
WGBF	Evansville, Ind.	Ontario Hotel Co.	236.1	WKBF	Indianapolis, Ind.	Radio Corporation	244	WRB	Providence, R. I.	St. Peter's Church	235
WGBS	Scranton, Pa.	Scranton Bdg. Inc.	239.9	WKBP	Portale, Pa.	C. L. Carrell	215.7	WRK	Escanoba, Mich.	Economy Light Co.	256
WGBL	Astoria, L. I.	N. Y. Gimbel Bros.	316.6	WKBK	La Crosse, Wisc.	Callaway Music	249.9	WRAM	Galesburg, Ill.	Lombard College	244
WGBU	Fulford-by-the-Sea, Fla.	Florida Cities Finance Company	278	WKBI	Chicago, Ill.	F. L. Schoenwolf	220.4	WRBW	Reading, Pa.	Avenue Radio & Electric Shop	238
WCBX	Oreno, Me.	University of Me.	234.2	WKBJ	St. Petersburg, Fla.	Gospel Tabernacle, Inc.	280	WRCC	Washington, D. C.	Nat. Bdstg. Co. of Amer.	468.2
WCCH	Newark, N. J.	May Radio Bdstg. Corp.	252	WKBL	Monroe, Mich.	Monrona Radio Mfg. Co.	252	WRCE	Raleigh, N. C.	Wayne Radio Co.	252
WCGB	Chicago, Ill.	Oak Leaves Broadcasting Corporation	316.6	WKBM	Youngstown, O.	Radio Elec. Serv. Co.	316.6	WRD	Coldwater, Miss.	Wooten's Radio Shop	254
WGHB	Clearwater, Fla.	Ford Harrison Hotel	265.3	WKBN	Jersey City, N. J.	Radio Corp.	309.1	WRE	Lansing, Mich.	Reo Motor Car Co.	225.5
WGHP	Detroit, Mich.	G. H. Phelps, Inc.	270	WKBP	Battle Creek, Mich.	Enquirer & News	265	WRES	Pollaston, Mass.	H. L. Sawyer	300
WGM	Jeanette, Pa.	Verne & Elton Spencer	372	WKBO	New York City	Starlight Amusement Park	285	WRHF	Washington, D. C.	Washington Hospital Fund	256
WGMU	Portland, N. Y.	A. H. Grebe & Co.	236	WKBR	Auburn, N. Y.	Chas. J. Heiser	286	WRHM	Minneapolis, Minn.	Rosedale Hospital	252
WGN	Chicago, Ill.	Chicago Tribune	302.8	WKBS	Galesburg, Ill.	P. N. Nelson	361.2	WRK	Hamilton, O.	Doron Brothers Electric Co.	270
WGND	Buffalo, N. Y.	Federal Tel. & Tel. Co.	318	WKBT	New Orleans, La.	1st Baptist Church	249	WRM	Urbana, Ill.	University of Ill.	272
WGST	Atlanta, Ga.	School of Tech.	270	WKBY	Brookville, Ind.	Knox Battery & Electric Co.	236.1	WRMY	Motor Yacht "MU-1," A. H. Grebe & Co.	236	
WGWB	Milwaukee, Wisc.	Radiocast Corp. of Wisc.	384.4	WKBY	Danville, Pa.	(Portable) F. Quick	230	WRNY	N. Y. C.	Experimenter Publishing Co.	373.8
WGY	Schenectady, N. Y.	G. E. Co.	379.5	WKBB	Buffalo, N. Y.	Churchill Ev. Assn.	262.5	WRP	Dallas, Tex.	City of Dallas	246
WHA	Madison, Wisc.	University of Wisc.	535.4	WKBC	Ludington, Mich.	K. L. Ashbacher	356.3	WRST	Bay Shore, N. Y.	Radiotel Manufacturing Co., Inc.	215.7
WHAD	Milwaukee, Wisc.	Marquette Univ.	275	WKCR	Kenosha, Wisc.	E. A. Dato	428.3	WRVA	Richmond, Va.	Larus & Bro. Co., Inc.	256
WHAM	Rochester, N. Y.	Eastman School of Music	273	WKJC	Lancaster, Pa.	Kirk Johnson & Co.	428.3	WSAJ	Cincinnati, O.	United States Playing Card Co.	325.9
WHAP	New York, N. Y.	Wm. H. Taylor Finance Corp.	4331	WKRC	Cincinnati, O.	The Kodel Radio Corp.	423.3	WSAN	Allentown, Pa.	Allentown Call Publishing Co., Inc.	229
WHAR	Atlantic City, N. J.	F. D. Cooks Sons	275	WKRY	Oklahoma City, Okla.	R. C. Hull & N. S. Richardson	275	WSAR	Fall River, Mass.	Doughty & Welch Electric Co.	254.1
WHAS	Louisville, Ky.	Courier Journal & Louisville Times	399.8	WLAL	Tulsa, Okla.	First Christian Church	230	WSAV	Houston, Tex.	Clifford W. Vick	247.8
WHAZ	Troy, N. Y.	Rensselaer Polytechnic Inst.	379.5	WLAP	Louisville, Ky.	W. V. Jordan	270	WSAZ	Chicago, Ill.	Zentich Radio Corporation	268
WHB	Kansas City, Mo.	Swansea School Co.	365.6	WLBP	Louisville, Ky.	W. V. Jordan	270	WSB	Atlanta, Ga.	Atlanta Journal Co.	428.3
WHBA	Oil City, Pa.	C. S. Shaffer	254	WLBS	Minneapolis, Minn.	University of Minnesota	278	WSBC	Chicago, Ill.	World Battery Co.	288.3
WHBC	Canton, O.	Rev. E. P. Graham	254	WLBT	Chicago, Ill.	Lane Technical High School	258	WSBF	St. Louis, Mo.	Stix Baer & Fuller	273
WHBD	Bellefontaine, O.	Chamber of Com.	222.1	WLBU	Elgin, Ill.	Liberty Weekly Inc.	302.8	WSBT	South Bend, Ind.	South Bend Tribune	315
WHBF	Rock Island, Ill.	Bearsley Spec. Co.	222	WLIT	Philadelphia, Pa.	Lit Brothers	394.5	WSDA	N. Y. C.	Seventh Day Adventist Ch.	263
WHBG	Harrisburg, Pa.	John S. Skane	231	WLS	Crete, Ill.	Sears Roebuck Co.	344.5	WSDC	Bay City, Mich.	World's Star Knitting Co.	261
WHBH	Portland, Ninth District, C. L. Carrell		215.7	WLSL	Cranston, R. I.	The Lincoln Studios, Inc.	440.9	WSM	Nashville, Tenn.	National Life & Accident Insurance Co.	282.8
WHBN	St. Petersburg, Fla.	First Avenue M. E. Church	238	WLTS	Chicago, Ill.	Lane Technical High School	258	WSMZ	New Orleans, La.	Sauger Amusement Co. & Maison Blanche Co.	319
WHBP	Johnstown, Pa.	Johnstown Auto Co.	235	WLWB	Harrison, O.	The Grosby Radio Corp.	263	WSMH	Wosmo, Mich.	Shattuck Music House	240
WHBO	Memphis, Tenn.	St. Johns M. E. Ch.	233	WLWL	N. Y. C.	Paulist Fathers	384.4	WSM	Dayton, O.	W. M. K. Radio Corp.	275
WHBU	Anderson, Ind.	Riviera Theatre & Bings Clothing	218.8	WMAC	Cazenovia, N. Y.	C. B. Meredith	275	WSOE	Milwaukee, Wisc.	School of Engineering of Milwaukee	246
WHBY	Philadelphia, Pa.	D. R. Kienzie	215.7	WMAF	Dartmouth, Mass.	Round Hills Radio Corp.	440.9	WSRO	Hamilton, O.	H. W. Fahlander	252
WHCC	West De Pere, Wisc.	St. Norberts College	249.9	WMAK	Lockport, N. Y.	Norton Laboratories	266	WSSH	Boston, Mass.	Tremont Temple Baptist Church	260.7
WHCI	Minneapolis, Minn.	W. H. Dunwoody Institute	278	WMAL	Washington, D. C.	M. A. Leese Optical Co.	212.6	WSUI	Iowa City, Iowa	State University of Ia.	483.6
WHCE	Rochester, N. Y.	Hickson Electric Co., Inc.	258	WMAN	Columbus, O.	Haskett Radio Station	278	WSWS	Buffalo, N. Y.	Seneca Vocational Sch.	218.8
WHCF	Chicago, Ill.	Hotel Flauders	285.5	WMAQ	Chicago, Ill.	Chicago Daily News	447.5	WTAB	Fall River, Mass.	Fall River Daily	275.1
WHCG	Keokuk, O.	Radio Air Service Corp.	272.6	WMAY	St. Louis, Mo.	Kings Highway Fresh. Church	243	WTAD	Carthage, Ill.	E. Compton	236
WHCH	New York, N. Y.	Geo. Schube	361.2	WMBA	Macon, Ga.	Mercer University	261	WTAC	Worcester, Mass.	Worcester Telegram	545.1
WHCO	Des Moines, Ia.	Bank of Ia.	526	WMBB	Chicago, Ill.	American Bond & Mortgage Co.	250	WTAL	Toledo, O.	Toledo Radio & Electric Co.	252
WHOG	Huntington, Ind.	Huntington Bldg. Association	241.8	WMBC	Detroit, Mich.	Michigan Broadcasting Co., Inc.	236	WTAW	Cleveland, O.	Willard Storage Battery Co.	389.4
WHT	Deerfield, Ill.	Radiophone Bdstg. Corp.	399.8	WMBF	Miami Beach, Fla.	Fleetwood Hotel Corp.	384.4	WTAR	Norfolk, Va.	Reliance Electric	254.1
WHAD	Philadelphia, Pa.	Howard R. Miller	250	WMBI	Chicago, Ill.	Moody Bible Institute	288.3	WTAW	College Station, Tex.	Agricultural & Mechanical College of Texas	270
WHAB	Burlington, Ia.	Home Electric	254	WMCA	Hoboken, N. J.	Greely Square Hotel	340.7	WTAX	Streator, Ill.	Williams Hardware Co.	231
WHAC	Madison, Wisc.	Capital Times-Strand Theatre	236.1	WMRI	Jamaica, N. Y.	Peter B. Prinz	277.1	WTAZ	Lambertville, N. J.	Thomas J. McGuire	261
WHAG	Elkins Park, Pa.	St. Paul's Protestant Episcopal Church	222	WMSC	N. Y. C.	Madison Square Garden Broadcasting Corp.	302.8	WTBC	Hartford, Conn.	Travelers Insurance Co.	475.9
WHAI	New Bedford, Mass.	Elite Radio Stores	209.7	WMNB	Boston, Mass.	Shepard Stores	280.2	WTRC	N. Y. C.	20th Dist. Rep. Club	239.9
WHAL	Flushing, L. I.	N. Y. F. B. Zittel, Jr.	218.8	WMNC	Boston, Mass.	Shepard Stores	430.1	WVAE	Plainfield, Ill.	Electric Park	384.4
WHAM	Portland, Ill.	C. L. Carrell	215.7	WMND	Normal, Okla.	University of Okla.	254	WWJ	Detroit, Mich.	Evening News Association (Detroit News)	352.7
WHAN	Chicago, Ill.	Nelson Brothers	226	WMNE	Omaha, Neb.	Omaha Central High School	258	WWL	New Orleans, La.	Loyola University	275
WHAP	Weymouth, N. Y.	Thos. F. Hunter	202.6	WMNF	Miami Beach, Fla.	Fleetwood Hotel Corp.	384.4	WWRL	Woodside, N. Y.	Woodside Radio Laboratories	258.5
WHAR	Philadelphia, Pa.	Gimbel Bros.	508.2	WMNL	Normal, Okla.	University of Okla.	254				

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General Guy E. Tripp, chairman of the Board, Westinghouse Electric and Manufacturing Company.

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The navy's chief of operations and chief of staff of the army have also been invited to serve so that the army and navy may be in constant touch with the broadcasting field, and so that the broadcasting facilities may be immediately available in time of national defense.

MARY GARDEN'S



(Left to Right)
DAVID SARNOFF, M. H. Aylesworth of Mary Garden sent via wire from Chicago her broadcast as part of the inauguration of the new Broadcasting Company.

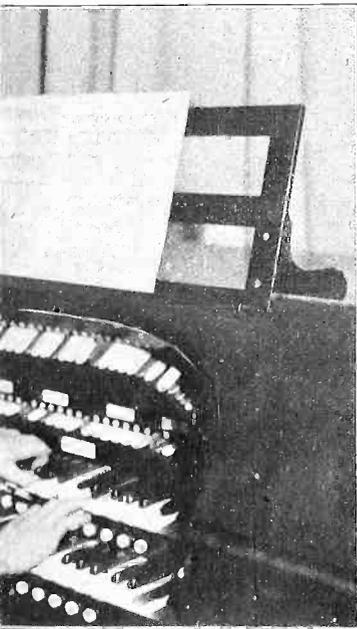


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PHOTO BY WIRE



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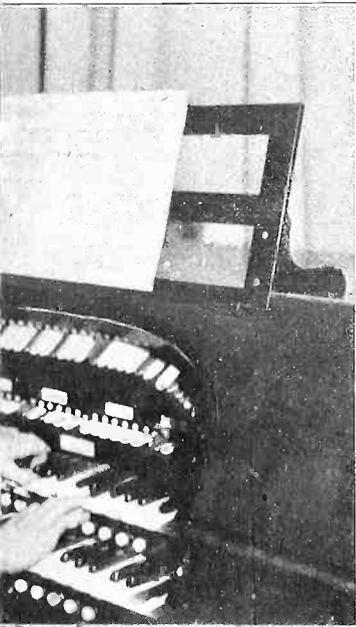


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WEAN	Providence, R. I.	The Shepard Co.	367
WEAO	Columbus, O.	Ohio State University	293.9
WEAR	Cleveland, O.	Willard Storage Battery Company	389.4
WEAU	Sioux City, Ia.	Davidson Bros. Co.	275
WEBC	Superior, Wisc.	W. C. Bridges	242
WEBH	Chicago, Ill.	Edgewater Beach Hotel	370.2
WEBJ	New York, N. Y.	Third Ave. R. R. Co.	273
WEBL	Fortable, R. C. A.	Show	226
WEBO	Harrisburgh, Ill.	Tate Radio Corp.	226
WEBR	Buffalo, N. Y.	H. H. Howell	244
WEBW	Beloit, Wisc.	Beloit College	258
WEBZ	Savannah, Ga.	Savannah Radio Corp.	263
WEDC	Chicago, Ill.	Emil Denmark Co.	422.3
WEDS	Boston, Mass.	Louison Electric Ill. Co.	308
WEGC	Chicago, Ill.	O. Fordham	202.6
WEMC	Berrien Springs, Mich.	Emanuel Miss. College	315.6
WENR	Chicago, Ill.	All-American Radio Corp.	266
WEW	St. Louis, Mo.	St. Louis University	360
WFAA	Dallas, Tex.	Dallas News & Dallas Journal	475.9
WFAM	St. Cloud, Minn.	W. J. Publishing Co.	273
WFAY	Lincoln, Neb.	New University of Neb.	275
WFBC	Knoxville, Tenn.	First Baptist Church	250
WFBE	Cinc., O.	Garneld Place Hotel	232.4
WFBG	Altoona, Pa.	W. F. Gable Co.	278
WFBJ	Collegeville, Minn.	St. John's University	256
WFBL	Syracuse, N. Y.	Onondaga Hotel	232
WFBR	Indianapolis, Ind.	W. J. B. Co.	268
WFRB	Baltimore, Md.	Fifth Infantry, National Guard	254
WFBZ	Galesburg, Ill.	Knox College	254
WFCI	Pawtucket, R. I.	Frank Crook, Inc.	229
WFDL	Ft. Mich., Mich.	Frank D. allain	234
WFL	Philadelphia, Pa.	Strawbridge & Clothier	324.5
WFLC	Chicago, Ill.	W. J. B. Co.	317.3
WFLR	Brooklyn, N. Y.	R. M. Lacey	205.4
WGAL	Lancaster, Pa.	Lancaster Electric Supply and Construction Co.	248
WGBB	Freeport, N. Y.	H. H. Carman	243.8
WGCB	Memphis, Tenn.	First Baptist Church	278
WGCS	Evansville, Ind.	Pinke Furniture Co.	236.1
WGCT	Scranton, Pa.	Scranton Bldg. Inc.	239.9
WGBS	Astoria, La. N. Y.	Gimbel Bros.	315.6
WGBU	Fultord-by-the-Sea, Fla.	Florida Cities Finance Company	278
WCBX	Oreno, Me.	University of Me.	234.2
WCGP	Newark, N. J.	May Radio Bdstg. Corp.	252
WGES	Chicago, Ill.	Oak Leaves Broadcasting Corporation	315.6
WGHB	Clewiston, Fla.	For Harrison Hotel	265.3
WGHP	Detroit, Mich.	G. H. Phelps, Inc.	270
WGM	Jeanette, Pa.	Verne & Elton Spencer	372
WGMU	Portable, N. Y.	A. H. Grebe & Co.	236
WGN	Chicago, Ill.	Chicago Tribune	302.8
WGR	Buffalo, N. Y.	Federal Tel. & Tel. Co.	319
WGS	Atlanta, Ga.	School of Tech.	270
WGWV	Milwaukee, Wisc.	Radioast Corp.	384.4
WGY	Schenectady, N. Y.	G. E. Co.	379.5
WHA	Madison, Wisc.	University of Wisc.	535.4
WHAD	Milwaukee, Wisc.	Marquette Univ.	275
WHAM	Rochester, N. Y.	Eastman School of Music	273
WHAP	New York, N. Y.	Wm. H. Taylor Finance Corp.	431
WHAR	Atlantic City, N. J.	F. D. Cooks Sons	275
WHAS	Louisville, Ky.	Courier Journal & Louisville Times	399.8
WHAZ	Troy, N. Y.	Rensselaer Polytechnic Inst.	379.5
WHB	Kansas City, Mo.	Sweeney School Co.	365.6
WHBA	Oil City, Pa.	Ch. Shaffer	250
WHBC	Canton, O.	Rev. E. P. Grant	254
WHBD	Bellefontaine, O.	Chamber of Com.	222.1
WHBF	Rock Island, Ill.	Bearsley Sp. Co.	222
WHBG	Harrisburg, Pa.	John S. Skane	231
WHBL	Portable, Ninth District	C. L. Carrell	215
WHBM	Portable, Ninth District	C. L. Carrell	215.7
WHBN	St. Petersburg, Fla.	First Avenue M. E. Church	238
WHBP	Johnstown, Pa.	Johnson Auto Co.	238
WHBO	Memphis, Tenn.	St. Johns M. E. Ch.	238
WHBU	Anderson, Ind.	Riviera Theatre & Bings Clothing	218.8
WHBW	Philadelphia, Pa.	D. R. Kienzie	215.7
WHBY	West De Pere, Wisc.	St. Norberts College	249.9
WHDI	Minneapolis, Minn.	W. H. Dunwoody Institute	278
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WIBR	Weirton, W. Va.	Thurman A. Owings	246
WIBS	Elizabeth, N. J.	Thos. E. Hunter	202.6
WIBW	Poyntext, Wisc.	The Electric Farm	222
WIBX	Loganport, Ind.	Dr. L. D. Dill	220
WIBY	Utica, N. Y.	WIBX, Inc.	205.4
WICC	Bridgport, Conn.	Bridgport Bdstg. Sta.	285
WIEZ	Montgomery, Ala.	A. D. Trum	273
WILO	St. Louis, Mo.	Benson Radio Co.	273
WIOM	Madison, Wisc.	Car. Fisher Co.	247.8
WIOP	Philadelphia, Pa.	Gimbel Bros.	508.2
WIJAD	Waco, Tex.	Jackson's Radio Engineering Laboratories	352.7
WIJAF	Ferdale, Mich.	J. S. Fernberg Radio Co.	407

Station	Location	Owner	Meters
WJAG	Norfolk, Neb.	Norfolk Daily News	352.7
WJAK	Kokomo, Ind.	Kokomo Tribune	251.1
WJAM	Cedar Rapids, Ia.	D. M. Pham	268
WJAR	Providence, R. I.	The Outlet Co.	305.9
WJAS	Pittsburg, Pa.	Pittsburgh Radio Supply House	275
WJAX	Jacksonville, Fla.	City of Jacksonville	336.9
WJAZ	Mount Prospect, Ill.	Zenith Radio Corp.	322.4
WJBA	Joliet, Ill.	D. H. Lentz, Jr.	306.8
WJBC	St. Petersburg, Fla.	Journal	254.1
WJBB	St. Alle, Ill.	Hummer Furniture Co.	234
WJBI	Red Bank, N. J.	R. S. Johnson	218.8
WJBK	Ypsilanti, Mich.	E. F. Goodwin	253
WJBL	Decatur, Ill.	Wm. Gushard Dry Goods Co.	270
WJBO	New Orleans, La.	N. Jenson	367.7
WJBQ	Oak Grove, Ind.	Radio Stores	227.1
WJBT	Chicago, Ill.	John S. Boyd	468.5
WJBU	Lewisburg, Pa.	Bucknell University	211.1
WJBW	Woodhaven, N. Y.	Union Course Club	388.3
WJBW	New Orleans, La.	C. Carlson, Jr.	270.1
WJBY	Osterville, Mass.	Renderson & Ross	280
WJCB	Gadsden, Ala.	Elec. Construction Co.	260
WJCC	Dayton, Ohio	Radio	370.2
WJCR	Pontiac, Mich.	Jewett Radio & Phonograph Co.	516.9
WJCY	New York City, N. Y.	B. Ross	516.9
WJUG	New York, N. Y.	Nat. Broadcasting Co. of America	406.2
WJZ	Bound Brook, N. J.	Nat. Bdstg. Co.	454.3
WKAF	Milwaukee, Wisc.	WKAF Broadcasting Corp.	261
WKAQ	San Juan, P. R.	Radio Corporation of Porto Rico	340.7
WKAR	East Lansing, Mich.	Michigan State College	285.8
WKAV	Laconia, N. H.	Laconia Radio Club	213.7
WKBA	Chicago, Ill.	Arrow Battery Co.	209.7
WKBB	Joliet, Ill.	Sanders Brothers	282.8
WKBC	Birmingham, Ala.	H. L. Ansley	225
WKBD	Jersey City, N. J.	F. V. Bremer	235
WKBE	Webster, Mass.	K. & B. Electric Co.	270.1
WKBF	Indianapolis, Ind.	N. D. Watson	241
WKBG	Portland, Ill.	Loyal Order of Moose	353.7
WKBK	La Crosse, Wisc.	Callaway Music	249.9
WKBI	Chicago, Ill.	F. L. Schoenwolf	220.4
WKBJ	St. Petersburg, Fla.	Gospel Tabernacle, Inc.	289
WKBL	Monroe, Mich.	Monrona Radio Mfg. Co.	252
WKBM	Youngstown, O.	Radio Elec. Serv. Co.	312.6
WKBN	Jersey City, N. J.	Camith Corp.	309.1
WKBP	Greenville, S. C.	Radio Stores	265
WKBO	New York City	Starlight Amusement Park	285
WKBR	Auburn, N. Y.	Chas. J. Hieser	256.3
WKBS	Galesburg, Ill.	P. N. Nelson	361.2
WKBT	New Orleans, La.	1st Baptist Church	249
WKBY	Brookville, Ind.	Knox Battery & Electric	236.1
WKBY	Danville, Pa.	(Portable) E. Quek	220
WKBW	Buffalo, N. Y.	Chas. Egan	362.5
WKBU	Ludington, Mich.	K. L. Ashbacher	256.3
WKDR	Kenosha, Wisc.	E. A. Dato	428.3
WKJC	Lancaster, Pa.	Kirk Johnson & Co.	258.5
WKRC	Cincinnati, O.	The Kodak Radio Corp.	423.3
WKY	Oklahoma City, Okla.	R. C. Hull & N. S. Richards	275
WLAL	Tulsa, Okla.	First Christian Church	250
WLAP	Louisville, Ky.	W. V. Jordan	275
WLB	Minneapolis, Minn.	University of Minnesota	278
WLBC	Minneapolis, Minn.	D. A. Burton	223.7
WLBE	Bklyn, N. Y.	J. H. Fruitman	230.6
WLBL	Stevens Point, Wisc.	Wisc. Department of Markets	278
WLBI	Ellettsville, Ind.	Weekly Inc.	308.8
WLIT	Philadelphia, Pa.	Lit Brothers	394.5
WLS	Crete, Ill.	Sears Roebuck Co.	344.5
WLSL	Cranston, R. I.	The Lincoln Studios, Inc.	440.9
WLTS	Chicago, Ill.	Lane Technical High School	258
WLW	Harrison, N. J.	The Crosley Radio Corp.	422.3
WLWL	N. Y. C.	Paunist Fathers	324.4
WMAC	Cazenovia, N. Y.	C. B. Meredith	275
WMAF	Dartmouth, Mass.	Round Hills Radio Corp.	440.9
WMAK	Lockport, N. Y.	Norton Laboratories	266
WMAL	Washington, D. C.	M. A. Leese Optical Co.	212.6
WMAN	Columbus, O.	Haskett Radio Station	278
WMAQ	Chicago, Ill.	Chicago Daily News	447.5
WMAZ	St. Louis, Mo.	Kings Highway Fresh. Church	243
WMAZ	Macon, Ga.	Mercer University	261
WMBB	Chicago, Ill.	American Bond & Mortgage Co.	250
WMBC	Detroit, Mich.	Michigan Broadcasting Co., Inc.	256
WMBF	Miami Beach, Fla.	Fleetwood Hotel Corp.	384.4
WMBI	Chicago, Ill.	Moody Bible Institute	288.3
WMCA	Memphis, Tenn.	Commercial Publishing Co.	499.7
WMCA	Hoboken, N. J.	Greely Square Hotel	340.7
WMR	Jamaica, N. Y.	Peter J. Prinz	277.1
WMSC	N. Y. C.	Madison Square Garden Broadcasting Corp.	302.8
WMNB	Boston, Mass.	Shepard Stores	280.2
WMNC	Boston, Mass.	Shepard Stores	430.1
WMND	Norman, Okla.	University of Okla.	254
WMNL	Omaha, Neb.	Omaha Central High School	258
WMNT	Philadelphia, Pa.	Lennig Brothers Co.	250
WMNX	Yankton, S. D.	Dakota Radio Apparatus Co.	244
WNBH	New Bedford, Mass.	New Bedford Hotel	217.8
WNJ	Newark, N. J.	Radio Shop of Newark	252
WNOX	Knoxville, Tenn.	Peoples Tel. & Tel. Co.	267.7
WNRC	Grensboro, N. C.	W. M. Nelson	233.7
WNYC	New York, N. Y.	W. M. Nelson, Plants & Structures	526
WOL	Austin, Tex.	Sou. Equip. Co.	394.5

Station	Location	Owner	Meters
WOAN	Lawrenceburg, Tenn.	J. D. Vaughn	282.8
WOAW	Omaha, Neb.	Woodmen of the World	240
WOAZ	Watson, N. Y.	A. H. Newton	250
WOBB	Chicago, Ill.	Longueur Engrg. Con'n. Co.	555.2
WOC	Davenport, Ia.	Palmer School of Chiropractic	483.6
WOCB	Orlando Bdstg. Co.	Orlando, Fla.	293.7
WOCL	Jamestown, N. Y.	A. H. Newton	275.1
WODA	Patterson, N. J.	O'Brien Temple of Music	190.9
WOL	Ames, Ia.	Iowa State College	270
WOK	Homewood, Ill.	Neurotound Radio Mfg. Co.	217.3
WOKM	Peekskill, N. Y.	H. E. Smith	212.4
WOMT	Wilmington, Wisc.	Mikado Theatre	254.1
WOO	Philadelphia, Pa.	J. Wanmaker	508.2
WOOD	Grand Rapids, Mich.	Grand Radio Co.	241.8
WOOQ	Kansas City, Mo.	Unity School	278
WOR	Newark, N. J.	L. Hamberger & Co.	405.2
WORA	Batavia, Ill.	Peoples Pulpit Association	275
WOS	Jefferson City, Mo.	State Marketing Bureau	440.9
WOWO	Fort Wayne, Ind.	Main Automobile Supply Co.	227
WPAC	Agricultural College, N. D.	N. D. Agricultural College	275
WPAP	Cliffside, N. J.	(See WJAO)	361.2
WPCB	Chicago, Ill.	North Shore Congregational Church	258
WPCH	N. Y. C., N. Y.	Concourse Radio Corp.	273
WPDQ	Buffalo, N. Y.	Hiram L. Turner	305.4
WPG	Atlantic City, N. J.	Municipality of Atlantic City	299.8
WPRC	Harrisburgh, Pa.	Wilson Printing & Radio Co.	215.7
WPSC	State College, Pa.	Pa. State College	261
WQAA	Parkersburg, Pa.	H. A. Beale, Jr.	220
WQAC	Amarillo, Tex.	Gish Radio Service	234
WQAE	Springfield, Vt.	Moore Radio News Station	246
WQAM	Miami, Fla.	Electrical Equipment Co.	285.5
WQAN	Scranton, Pa.	Scranton Congregational Church	250
WQAO	Cliffside, N. J.	Calvary Baptist Church (WPAP used when Palsade Amusement Park Program is on)	361.2
WQJ	Chicago, Ill.	Calumet Co.	447.5
WRAF	Laporte, Ind.	Radio Club, Inc.	224
WRAF	Providence, R. I.	I. Stanley N. & Real	236
WRK	Escanaba, Mich.	Escanaba Light Co.	255
WRAM	Galesburg, Ill.	Lombard College	244
WRAW	Reading, Pa.	Avenue Radio & Electric Shop	218
WRBC	Philadelphia, Pa.	Beracah Ch. Inc.	267.7
WRCC	Valparaiso, Ind.	Immanuel Lutheran Church	278
WRD	Washington, D. C.	Nat. Bdstg. Co. of Amer.	468.5
WRCO	Raleigh, N. C.	Wayne Radio Co.	252
WREC	Coldwater, Miss.	Wooten's Radio Shop	254
WREO	Lansing, Mich.	Reo Motor Car Co.	225.5
WRES	Wolffston, Mass.	H. L. Sawyer	300
WRHF	Washington, D. C.	Washington Radio	256
WRHM	Minneapolis, Minn.	Rosedale Hospital	252
WRK	Hamilton, O.	Doron Brothers Electric Co.	270
WRM	Urbana, Ill.	University of Ill.	272
WRMU	Motor Yacht "MU-1"	A. H. Grebe & Co.	236
WRNY	N. Y. C.	Experimental Publishing Co.	373.8
WRR	Dallas, Tex.	City of Dallas	246
WRST	Bay Shore, N. Y.	Radiotel Manufacturing Co., Inc.	215.7
WRVA	Richmond, Va.	Larus & Bro. Co., Inc.	256
WSAI	Cincinnati, O.	United States Playing Card Co.	325.9
WSAJ	Greenville City, Pa.	Grove City College	229
WSAN	Allentown, Pa.	Allentown Call Publishing Co., Inc.	229
WSAR	Fall River, Mass.	Doughty & Welch Electric Co.	254.1
WSAY	Houston, Tex.	Clifford W. Vick	247.8
WSAX	Chicago, Ill.	Zenith Radio Corporation	268
WSB	Meromy, O.	Chas. Electric Shop	244
WSB	Atlanta, Ga.	Atlanta Journal	428.3
WSBC	Chicago, Ill.	World Battery Co.	288.3
WSBF	St. Louis, Mo.	Stix Baer & Fuller	273
WSBT	South Bend, Ind.	South Bend Tribune	315
WSDA	N. Y. C.	Seventh Day Adventist Ch.	263
WSKC	Bay City, Mich.	World's Star Knitting Co.	261
WSM	Nashville, Tenn.	National Life & Accident Insurance Co.	282.8
WSMZ	New Orleans, La.	Sauger Amusement Co. & Maison Blanche Co.	319
WSMH	Owosso, Mich.	Shattuck Music House	240
WSMK	Dayton, O.	S. M. K. Radio Corp.	275
WSOE	Wilwaukee, Wisc.	School of Engineering	246
WSRO	Hamilton, O.	H. W. Fahlander	252
WSSH	Boston, Mass.	Tremont Temple Baptist Church	260.7
WSUI	Louis City, Iowa	State University of Ia.	483.6
WSVS	Buffalo, N. Y.	Seneca Vocational Sch.	218.8
WTAB	Batavia, Ill.	R. Harris & Co.	275.1
WTAD	Hartford, Conn.	Hartford Evening Daily	266
WTAE	Carthage, Ill.	Compton	236
WTAG	Worcester, Mass.	Worcester Telegram	545.1
WTAL	Toledo, O.	Toledo Radio & Electric Co.	252
WTAM	Cleveland, O.	Willard Storage Battery Co.	389.4
WTAP	Eau Claire, Wisc.	C. S. Van Gordon	254.1
WTAR	Norfolk, Va.	Reliance Electric Co.	261
WTAW	College Station, Tex.	Agricultural & Mechanical College of Texas	290
WTAX	Streator, Ill.	Williams Hardware Co.	231
WTAZ	Lambertville, N. J.	Thomas J. McGuire	261
WTIC	Hartford, Conn.	Travelers Insurance Co.	475.9
WTRC	N. Y. C.	20th Dist. Rep. Club	230.9
WVAE	Plainfield, Ill.	Electric Park	384.4
WVW	Detroit, Mich.	Evening News Association (Detroit News)	352.7
WWL	New Orleans, La.	Loyola University	275
WWRL	Woodside, N. Y.	Woodside Radio Laboratories	258.5

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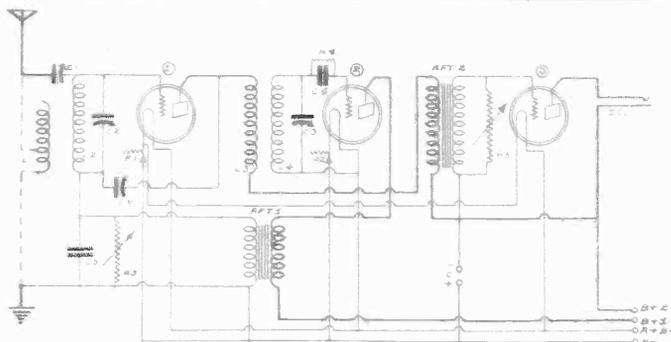


FIG. 468

The circuit diagram of the 3-tube reflex, requested by Leon Menden.

I HAVE two Electrad type B Royalty variable high resistances, a Samson 6 to 1 and a Samson 3 to 1 AFT, and two .00025 mfd variable condensers. Please give the circuit diagram of a 3-tube receiver, employing these parts, stating coil data.—Leon Menden, Morristown, N. J.

Fig. 468 shows the circuit diagram of such a receiver. It is a reflex, using one of the transformers (6 to 1, AFT 1) in the reflex stage and the other (3 to 1, AFT 2) in the standard audio stage. R3 and R5 are the Electrad resistances. They are used to control the volume. L1 and L3, the primaries, consist of 15 turns. L2 and L4, the secondaries, consist of 65 turns. Each primary and secondary is wound on a 3" diameter tubing using No. 22 double cotton covered wire. About a 1/4" space can be left between the two primary windings. C1 is a .00005 mfd variable condenser, which is used if the primary winding, L1, is not used. That is, the connecting of this condenser and primary winding is experimental. C6 is a .00004 mfd variable condenser. C2 and C3 are the .00025 mfd variable condensers. C5 is a .0001 mfd fixed condenser. The filament of the detector tube is controlled by a 20 ohm rheostat, while the filaments of the RF-AF and the straight audio tubes is controlled by a 10 ohm rheostat. C4 is a .00025 mfd grid condenser. R4 is a 2 megohm grid leak. SCJ is a single circuit jack. The -01A tubes should be used for best results. If higher than 90 volts are used on the audio tubes, then the B plus 2 lead should be broken, since higher voltage will cause the first tube to oscillate beyond control. A 4.5 volt C battery should be used for the 90 volt battery. A 9 volt C battery, if 135 volts B are used. Another stage of transformer or any type of audio frequency amplification may be added to the output. Be sure that all the grid returns are properly made, also the rotary section of the condensers. The filament control is not critical, neither is the tuning. If it is found that the volume is a bit low, then it is suggested that the resistance in the reflex transformer AFT1, be cut out. The parts for this set can be mounted on a baseboard 17" long and 6" wide. This will require a 7x18" panel and cabinet. The coils should either be placed at right angles at or about 5" from each other. Keep the grid and plate leads away from each other. If they have to run parallel, then space them about 6". It is a good idea, if they run parallel close to each other, to place a small copper shield around the wire and ground the shield. Care should be taken that the

shield does not touch the lead, though. The shield can be cylindrical or square, about 3/4" around the entire inner surface. A light switch can be installed also, the terminals for the light being connected across the A leads, and the switch in series with an A lead, before the connections to the light.

I HAVE a 1:1 ratio transformer which I wish to use as a means of coupling the loud speaker to the plate output. The terminals are marked IN1P and IN2B and OUT1 and OUT2. How should it be connected?—Norman Stone, West New York, N. J.

The IN1P post is connected to the P post of the last socket. The IN2B post is connected to the B plus amplifier post. The OUT1 post is connected to the minus speaker cord while the OUT2 post is connected to the plus speaker cord. Try changing these leads around for louder signals.

I WOULD like to have the baseboard layout of a 2-stage transformer coupled audio frequency amplifier unit, using rheostats in each of the filament circuits, Fahnestock clips for all battery, input and output connections, unshielded transformers and standard shell type sockets—Meyer Clerks, Boston, Mass.

Such a layout is shown in Fig. 469. The transformers, due to the fact that they are unshielded, are placed at right angles. The sockets are placed in between the AFT, with the rheostats directly in front. The filament posts of the sockets are in front of the rheostats. The P and B posts of the input transformer are near the input posts. The G and F posts of this AFT is placed near the G and F posts of the socket. The P and P posts of the second AFT are placed toward the rear, the G and F posts being near the front. Provision is also made for C battery connection. These clips should be placed a fair distance away from each other so that there is no possibility of shorting them. This can be averted by bolting the clips down tightly. Flexible or solid wire may be used for wiring. The board should be 12x8".

I HAVE built the 4-tube reflex receiver shown on page 12, Radio University columns of the Sept. 11 issue of Radio World and have obtained wonderful results. I would like to know if it is possible to add another stage of transformer coupled audio frequency amplification. If so should a low ratio, about 2 to 1 type be used? Is any precaution necessary to

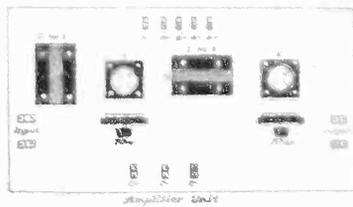


FIG. 469

The experimental layout of the 2-stage transformer coupled audio frequency amplifier unit.

prevent distortion?—Henry Mardens, Pittsburgh, Pa.

Yes, another stage of audio can be used, provided you use the low ratio transformer you state. It is possible that distortion will prevail. This can be prevented by the use of a power tube, with the proper C bias. A variable resistor, or across the secondary winding, such as used in the reflex shown in Fig. 468 may also help. The filament control can be automatic.

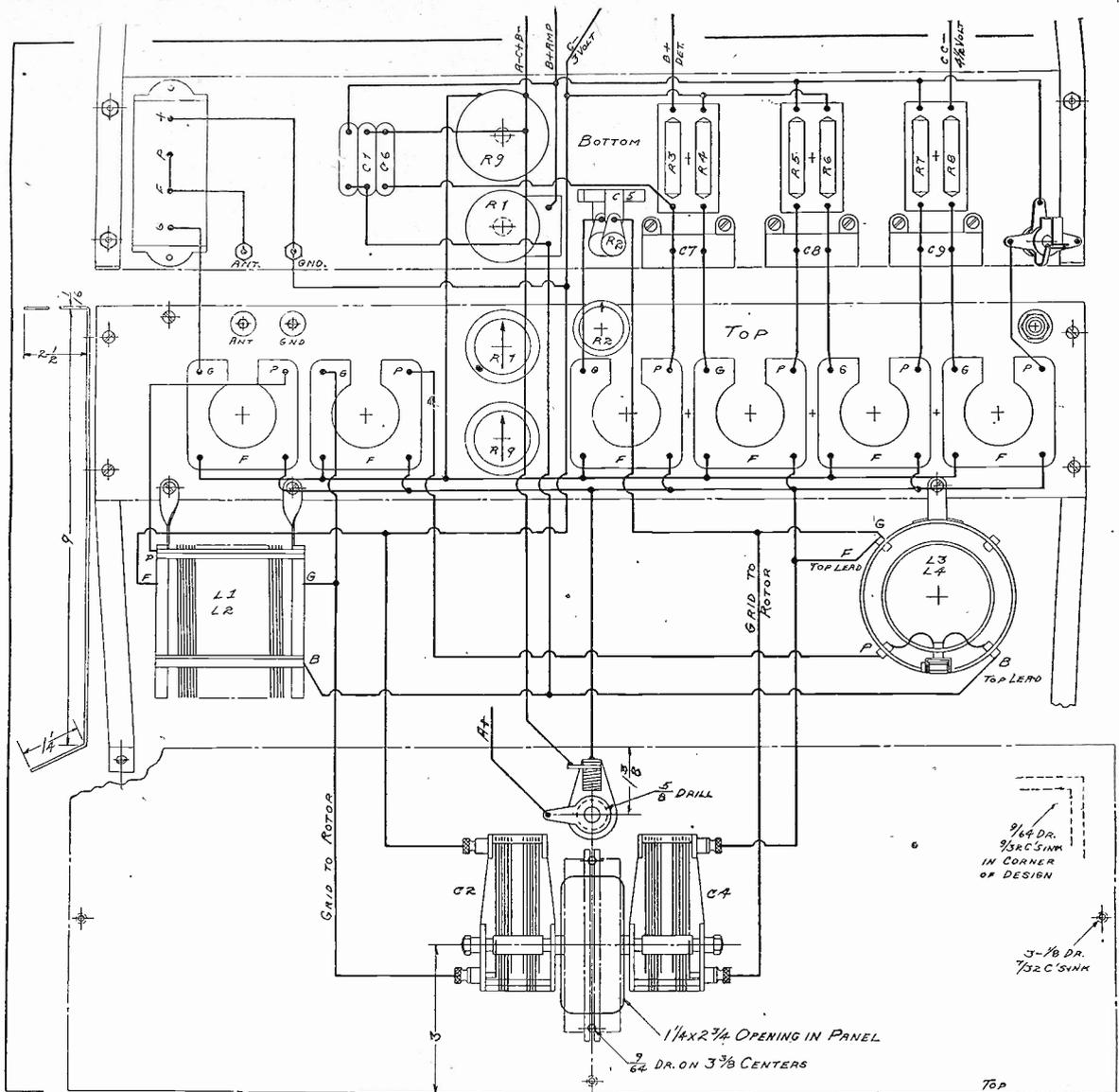
I HAVE two .00035 mfd variable condensers. I would like to build the 2-tube set shown in Fig. 349, Radio University columns of the May 29 issue of Radio World. Please give the coil data, using solenoid forms, 4" in diameter, with No. 20 single cotton covered wire—Reddy Grant, Hunter, N. Y.

The antenna coil consists of 40 turns, tapped at the 10th turn. The primary of the inter-stage coupler consists of 10 turns. The secondary consists of 35 turns. Space 1/4" between windings.

I HAVE a pair of tuned radio frequency transformers, both of which have 15 turn primaries and 55 turn secondaries, wound on 2 3/4" diameter tubings, using No. 24 double cotton covered wire with a 1/8" space between the primary and secondary windings. I would like to use these in the 3-tube regenerative receiver shown on page 11 of the Aug. 7 issue of Radio World. Please give the proper information, so that they may be used. I am going to keep the variometer in the set.—Bob Luster, Plainfield, N. J.

The secondaries of these coils are for .0005 mfd variable condensers. The antenna is connected to the beginning of the primary winding of one of the RFT. The end of this winding is brought to the ground. The beginning of the secondary winding of this same RFT is brought to the A minus and to the rotary plates of a .0005 mfd condenser. The end of this winding is brought to the stationary plate post of the condenser and to the G post of the socket. The beginning of the primary winding of the other RFT is brought to the P post of the first socket. The end of this winding is brought to the B plus 67 1/2 volt post. The beginning of the secondary winding is brought to the rotary plate post of the second .0005 mfd variable condenser and to the A plus post. The end of this winding is brought to the stationary plate post of the condenser and to one terminal of the grid leak and condenser, R1, C2. No other change is necessary in the wiring. Be sure that the end of the primary windings are near to the beginning of the secondary windings. If the end of the primary winding is near to the end of the secondary winding, then bring these secondary leads to the low potential points, instead of to the high potential points.

COULD I build the 5-tube set, shown in Fig. 371, Radio University columns, July 17 issue of Radio World, with a stage of tuned radio frequency amplification, instead of the untuned stage, as diagrammed? How shall I make the coil



(Design Copyright 1926) **FIG. 470**

The picture diagram of the wiring of the Bernard 6-tube set. The subpanel or socket strip is shown in top and bottom views. The panel is shown folded back, so to speak, to align with the upper diagram. The C3 fixed condenser, top left, is unmarked.

and what variable condenser should I use?—Herman Shad, South Bend, Ind.

Yes. Very good results will be obtained with this scheme. The primary consists of 10 turns. The secondary consists of 50 turns. Both should be wound on a 3" diameter tubing, using No. 22 double cotton covered wire. Shunt this secondary with a .0005 mfd. variable condenser. The wiring connections as per diagram, are used. Be sure to bring the grid return to the A minus post.

PLEASE tell me whether self-oscillation on high wavelengths is to be expected on the Bernard receiver (Oct. 16 issue), prior to neutralization.—J. P. Marr, El Paso, Texas.

While most persons expect that, prior to the balancing of a receiver, that there will be self-oscillation on the lower wavelengths, it is quite possible that in the Bernard (Fig. 470) not only will this exist, but also there will be self-oscillation on the higher wavelengths, even at the very top part of the wavelength tuning scale. Since the receiver has a fixed radio frequency transformer in the first stage, nor-

mally and Acme R3, with high wavelength peak, the amplification is built up for the benefit of the longer waves, to

give a rather uniform amplification over the entire tuning scale. (The R4 may be (Continued on page 23))

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Street

City and State

THE RADIO TRADE

Freshman Ahead of 1925 by 38%

The Chas. Freshman Co. Inc. report net sales for October of \$1,482,913, an increase of 15 per cent over net sales of October 1925, which were \$1,290,174. Charles Freshman, president, further reports that the total net sales from June 1 to October 31, 1926, showed an increase of 38 per cent over the corresponding period of 1925.

In spite of this substantial increase it is pointed out by Mr. Freshman that the sales during October were greatly handicapped through the company's inability to get sufficient console cabinets to meet the demand of the trade. In order to eliminate this condition in the future the company is seriously considering the acquisition of one or more furniture factories.

Daven Becomes Set Maker, Too

W. H. Frasse, president of the Daven Radio Corporation, announced the purchase of the controlling interest of the stock of the Port Manufacturing Company, manufacturers of the Daven Bass Note Circuit. The purchase price was not divulged.

Mr. Frasse stated that the Daven Radio Corporation realized soon after granting a license to the Port Manufacturing Company that they had made a mistake. The business of the Port Company far exceeded anyone's expectations, due to the popularity of the Bass Note Set. The only way to get control of the license again was to buy the controlling stock of the Port Company.

The business will be conducted as in the past by the Port Manufacturing Company but will be under supervision of the parent company.

The purchase definitely puts the Daven Radio Corporation set in the field.

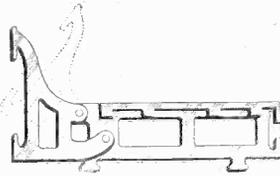
BELMUTH HANDLES SMALL PARTS

J. Belmuth, 198 Broadway, New York City, is exclusive metropolitan distributor for the well-known Fahnestock clips. In addition he handles a large line of standard radio parts. He has just taken over the Belco Cone Speaker, one of the fast-selling low priced speakers on the market. This is a single cone speaker with a strong and durable unit that will handle volume, pass all frequencies and is adapted to any set. It has just been awarded the RADIO WORLD Certificate of Merit. Besides the larger parts, Belmuth is one of the few that still handles and will continue to stock the smaller, hard to get parts and his lines include leadin and aerial wire, insulators, ground clamps, lightning arrestors and the smaller fittings which are in demand by the fan every day.

F. N. T. IN NEW POST

F. N. T. (Mr. Tracy) who has been one of the announcers at Station W. H. N., and who was associated with this popular station when it was an infant in Ridgewood, before moving to the Loew State Theatre Bldg., is now with station W. P. C. H., at present located in the Hotel Majestic. But the station will soon move to The New Park Central Hotel on 7th Ave., between 55th and 56th Sts., N. Y. C.

Bruno Markets Adjustable Brackets



BRUNO adjustable brackets.

The New Bruno adjustable brackets are now ready for immediate delivery. They are models of their kind, sturdy and handsome in appearance and will beautify any set while standing up under a heavy load. They also simplify wiring. Made of die-cast aluminum, they are light in weight and yet the tensile strength is equal to that of the hardest steel. An adjustable style is made for sets that have sloping panels or may be used right angularly. A Bruno booklet embodying the full Bruno line will be sent to all who address the Bruno Radio Corporation, 40 Paynter Avenue, Long Island City, New York.

AT YOUR SERVICE

Rate: 10 cents a word. No advertisement less than ten words.

NEW YORK

Manhattan

DON'T endure poor radio reception. The right tubes, right battery voltages, correct wiring, etc., give you the utmost from your set. Let me improve your receiver if it is not up to snuff.—Max Lager, 221 Fulton St., N. Y. City.

DIAMOND OF THE AIR service. DX reception improved, if due to conditions in receiver. Also specialize on Bernard set.—T. Forshaw, 115 E. 82d Street.

Brooklyn

IF YOUR SET does not work properly we can put it in fine condition. Experts on Atwater-Kent, Ferguson, Freshman and Stromberg-Carlson. Familiar with all Radio World circuits.—Bert Reinitz, 127A Clark Ave., Brooklyn, N. Y.

Queens

ANY set put in fine working order. All work done at factory and set shipped in working condition. Special facilities for stopping squealing in any set.—Rider, 40 Paynter Ave., Long Island City, N. Y.

EXPERT SERVICE on Bernard, LC27, Henry-Lyford, Infradyne, Diamond of the Air, Browning-Drake, Victoreen, Lynch Lamp Socket Amplifier. Special attention to electrification of receivers and getting rid of motor-boating. Write to 122 Stuyvesant Ave., Brooklyn, N. Y., or phone Bushwick 1676.—Sidney Buchalter.

PHILADELPHIA, PA.

SINGLETRON service. Also Bernard and Diamond hookups thoroughly understood. Familiar with circuits popularized by magazines.—A. Witz, Widener Bldg.

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145 West 45th St., N. Y. City.

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Address:

City or town:

State:

Robert T. Mawrus, 34A Rochester Ave., Brooklyn, N. Y.
Henry W. Deubs, 208 E. High St., Gorydon, Ind.
Albert Torres, 75 Elm St., Rochester, N. Y.
Milford Hardesty, Asbury College, Room 417, Morrisson, Wilmore, Ky. (Dealer).
D. S. MacFarlane, 453 W. Spring St., Hazelton, Pa.
Lloyd Hust, RFD 2, Box 32, Tremonton, Utah.
John Bennet, 18 Bond St., Wallington, N. J.
A. J. Welch, 808 West Mercury, Butte, Mont.
W. Roland Grover, 261 Aldrich Road, Portsmouth, New Hampshire.
Julian E. Johnson, 3522 1/2 Lombard, Everett, Wash.
J. E. Saxton, Box 155, Weosho, Mo.
William Friedman, 3303 Glenwood Road, Brooklyn, N. Y.
William Yuster, 807 2nd St., N. W., Washington, D. C.
Everett M. Renick, P. D. Box 151, Clendenin, W. Va.
U. J. Flynn, 411 Mill St., Reno, Nev.
Jack Franz, Fox Washington Theatre, Detroit, Mich.
A. Luther Kurtz, 3226 Bailey Ave., St. Louis, Mo.
Wm. D. Levin, 388 Palisade Ave., Jersey City, N. J.
F. S. Richards, 291 Plymouth, Buffalo, N. Y.
Henry R. Knight, 4439 West Papin, St. Louis, Mo.
C. E. Venard, Box C, Oil Fields, Calif.
Chas. H. Robertson, 219 Lyle Ave., East Point, Ga. (Dealer).
T. E. Patterson, 120 Pierce St. San Francisco, Calif.
Dan O'Connor, 121 Ward St., Urbana, O.
Arthur S. Uebner, 935 South 8th St., Quincy, Ill. (Dealer).
James Avenone, De Vitts Camp, Allewood, Pa.
J. M. Singleton, 3823 Morehead Ave., El Paso, Tex.
M. Lerner, 1498 Remsen Ave., Brooklyn, N. Y.
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AN ESTABLISHED WHOLESALE DISTRIBUTOR, with first-class reputation in the radio market, has recently been granted franchises for the distribution of the best-established lines; resultant expansion of business requires further capital investment of at least \$15,000, will accept experienced man in organization; thorough investigation and exchange of references invited. Box 444, Radio World.

"LIBERTY AFLAME" and other verses, by Roland Burke Hennessy. Handsomely bound in cloth; sent postpaid for \$1.00. Columbia Print, 145 West 45th Street, New York City.

(Continued from page 21)

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* * *

PLEASE set forth textually the wiring of the Bernard 6-tube receiver and show picture diagram of the wiring of this set. How should panel be drilled?—Edward Moyer Phillips, Stroudsburg, Pa.

The layout of the parts in the Bernard receiver is very orderly, and anybody will find it an easy matter to wire up even if a novice. Even an experienced set the physical location of the wiring. Now, let us take up some of the mounting points first. The front panel, if obtained as part of the official kit, will be completely drilled and engraved, and the bracket holes will be suitable for the new Bruno adjustable brackets. However, the picture diagram shows panel holes and other data for use in case you are trying to accommodate the set to brackets of your own manufacture, hence the 9/64-hole at upper right on the front panel is intended only as a guide to including improvised brackets. The design for home-made brackets is shown at center left in the picture diagram. Drill drum slot oblong, 1 1/4 x 2 3/4", without rounded corners. The official panel, however, has all this drilling already done. The frame for C2 and C4 and the panel plate, which is bronzed, are mounted on the front panel by means of machine screws held by nuts in the panel rear. The plate holes are two 9/64 one of which is so marked, although both are shown. Mount switch in a 5/8 hole, which is centered 1 3/8" from the bottom of the panel, in the central line. In following Fig. 470 for drilling directions, necessary only in case you are drilling your own panel, remember that the panel is shown as upside down, as it were, this representing the view of the panel when it is folded back, so that you see the rear, with the real bottom seemingly at top.

The picture diagram shows the mounting of the parts that go on the bottom of the socket strip, this view being at top of Fig. 470, while just below are set forth the parts that go on the top of the socket strip. The top view is marked "top" and the bottom view is marked "bottom." Therefore if you follow the layout as given you cannot go wrong, as the dimensions were taken from the laboratory model of the receiver.

Assuming that the panel parts are mounted, as well as the socket strip parts, first wire the filaments.

Connect all F minus posts of all six sockets with one bus. This lead runs on top of the socket strip. All A plus posts of the sockets are joined together with one bus, and this too is atop the socket shelf, although a little farther from the socket posts.

Make the following connections next: Join the Ant. binding post to the F post of the Acme R3 transformer, GFPB, and join the F and B posts. Connect the B post to ground. G of this transformer is connected to grid of the tube through a hole drilled in the socket strip near the grid post of the socket (1).

Next tackle the coil L1L2. This has its P post connected to plate of tube 1, its B post to one side of C1, its G post to G of

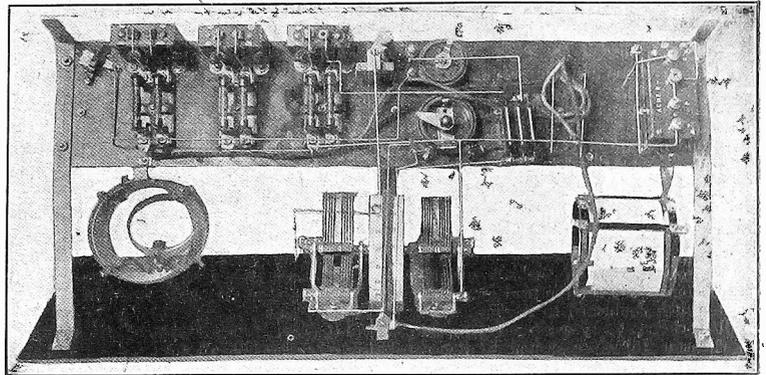


FIG. 471

View of the bottom. The fixed condensers, in the audio circuit, are at left, being, right to left, C7, C8 and C9. The first Aero coil, L1L2, is secured to the sub-panel or socket strip by twisting each of the two mounting brackets that are supplied by the coil manufacturer. Note the A plus battery lead coming direct to the Bruno light switch.

socket 2, while F is unconnected for the moment.

Going to the input into the detector tube, the coil system L3 L4 is wired with P to plate, B one side of R 1 and to one side of the fixed condenser C3. If only three posts are designated on the coils you can tell the missing one by deduction. G goes to one side of the grid condenser C5 and one side of the grid leak. With the condenser already mounted on the leak one connection takes care of both. The F post of L4 goes to F plus. The other side of the grid condenser-leak is leak soldered to the lug on the G post of the detector socket (3). The plate of detector tube is connected to C6, one of the three fixed condensers side by side on the bottom of the subpanel (Aerovox .00025 mfd. each). The other side of C6 is left unconnected for a while.

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The nearest terminal to detector plate is connected thereto, while the opposite points on the two other plate resistor clips are jointed together. Each plate lead of each of the three sockets, detector (3) first audio

(4) and second audio (5), is joined to one side of a fixed condenser of .25 mfd. capacity, all these being the Electrad 200—volt bypass of that valve. The open sides of the .25 mfd. condensers then are joined to nearest Lynch mounting clips for grid resistors and to the grid of the succeeding tube.

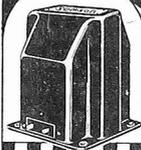
The single closed circuit jack is on the sub panel. The plus post (so marked on instrument) is joined to open side of the plate resistor clip for the second audio tube (5)

(Continued on page 24)

Daven Bass Note Circuit Kit
COMPLETE KIT OF PARTS \$65.00
 WITH FULL INSTRUCTIONS
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 How to Build the Daven Bass Note Circuit
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Samson Dual Impedance

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RADIO WORLD, 145 West 45th St., New York City. (Phones: Bryant 0558-0559.)

THE RADIO TRADE

Freshman Ahead of 1925 by 38%

The Chas. Freshman Co. Inc. report net sales for October of \$1,482,913, an increase of 15 per cent over net sales of October 1925, which were \$1,290,174. Charles Freshman, president, further reports that the total net sales from June 1 to October 31, 1926, showed an increase of 38 per cent over the corresponding period of 1925.

In spite of this substantial increase it is pointed out by Mr. Freshman that the sales during October were greatly handicapped through the company's inability to get sufficient console cabinets to meet the demand of the trade. In order to eliminate this condition in the future the company is seriously considering the acquisition of one or more furniture factories.

Daven Becomes Set Maker, Too

W. H. Frasse, president of the Daven Radio Corporation, announced the purchase of the controlling interest of the stock of the Port Manufacturing Company, manufacturers of the Daven Bass Note Circuit. The purchase price was not divulged.

Mr. Frasse stated that the Daven Radio Corporation realized soon after granting a license to the Port Manufacturing Company that they had made a mistake. The business of the Port Company far exceeded anyone's expectations, due to the popularity of the Bass Note Set. The only way to get control of the license again was to buy the controlling stock of the Port Company.

The business will be conducted as in the past by the Port Manufacturing Company but will be under supervision of the parent company.

The purchase definitely puts the Daven Radio Corporation set in the field.

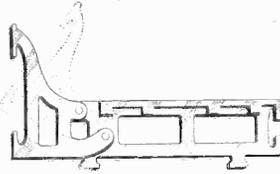
BELMUTH HANDLES SMALL PARTS

J. Belmuth, 198 Broadway, New York City, is exclusive metropolitan distributor for the well-known Fahnestock clips. In addition he handles a large line of standard radio parts. He has just taken over the Belco Cone Speaker, one of the fast-selling low priced speakers on the market. This is a single cone speaker with a strong and durable unit that will handle volume, pass all frequencies and is adapted to any set. It has just been awarded the RADIO WORLD Certificate of Merit. Besides the larger parts, Belmuth is one of the few that still handles and will continue to stock the smaller, hard to get parts and his lines include leadin and aerial wire, insulators, ground clamps, lightning arrestors and the smaller fittings which are in demand by the fan every day.

F. N. T. IN NEW POST

F. N. T. (Mr. Tracy) who has been one of the announcers at Station W. H. N., and who was associated with this popular station when it was an infant in Ridgewood, before moving to the Loew State Theatre Bldg., is now with station W. P. C. H., at present located in the Hotel Majestic. But the station will soon move to The New Park Central Hotel on 7th Ave., between 55th and 56th Sts., N. Y. C.

Bruno Markets Adjustable Brackets



BRUNO adjustable brackets.

The New Bruno adjustable brackets are now ready for immediate delivery. They are models of their kind, sturdy and handsome in appearance and will beautify any set while standing up under a heavy load. They also simplify wiring. Made of die-cast aluminum, they are light in weight and yet the tensile strength is equal to that of the hardest steel. An adjustable style is made for sets that have sloping panels or may be used right angularly. A Bruno booklet embodying the full Bruno line will be sent to all who address the Bruno Radio Corporation, 40 Paynter Avenue, Long Island City, New York.

AT YOUR SERVICE

Rate: 10 cents a word. No advertisement less than ten words.

NEW YORK

Manhattan

DONT endure poor radio reception. The right tubes, right battery voltages, correct wiring, etc., give you the utmost from your set. Let me improve your receiver if it is not up to snuff.—Max Lager, 221 Fulton St., N. Y. City.

DIAMOND OF THE AIR service. DX reception improved, if due to conditions in receiver. Also specialize on Bernard set.—T. Forshaw, 115 E. 82d Street.

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(Continued from page 21)

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The picture diagram shows the mounting of the parts that go on the bottom of the socket strip, this view being at top of Fig. 470, while just below are set forth the parts that go on the top of the socket strip. The top view is marked "top" and the bottom view is marked "bottom." Therefore if you follow the layout as given you cannot go wrong, as the dimensions were taken from the laboratory model of the receiver.

Assuming that the panel parts are mounted, as well as the socket strip parts, first wire the filaments.

Connect all F minus posts of all six sockets with one bus. This lead runs on top of the socket strip. All A plus posts of the sockets are joined together with one bus, and this too is atop the socket shelf, although a little farther from the socket posts.

Make the following connections next: Join the Ant. binding post to the F post of the Acme R3 transformer, GFPB, and join the F and B posts. Connect the B post to ground. G of this transformer is connected to grid of the tube through a hole drilled in the socket strip near the grid post of the socket (1).

Next tackle the coil L1L2. This has its P post connected to plate of tube 1, its B post to one side of C1, its G post to G of

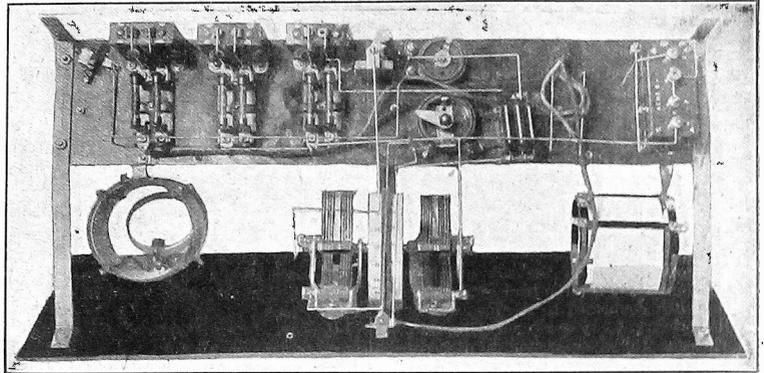


FIG. 471

View of the bottom. The fixed condensers, in the audio circuit, are at left, being, right to left, C7, C8 and C9. The first Aero coil, L1L2, is secured to the sub-panel or socket strip by twisting each of the two mounting brackets that are supplied by the coil manufacturer. Note the A plus battery lead coming direct to the Bruno light switch.

socket 2, while F is unconnected for the moment.

Going to the input into the detector tube, the coil system L3 L4 is wired with P to plate, B one side of R 1 and to one side of the fixed condenser C3. If only three posts are designated on the coils you can tell the missing one by deduction. G goes to one side of the grid condenser C5 and one side of the grid leak. With the condenser already mounted on the leak one connection takes care of both. The F post of L4 goes to F plus. The other side of the grid condenser-leak is leak soldered to the lug on the G post of the detector socket (3). The plate of detector tube is connected to C6, one of the three fixed condensers side by side on the bottom of the subpanel (Aerovox .00025 mfd. each). The other side of C6 is left unconnected for a while.

The Lynch mountings for the audio resistors next are wired.

The nearest terminal to detector plate is connected thereto, while the opposite points on the two other plate resistor clips are jointed together. Each plate lead of each of the three sockets, detector (3) first audio

(4) and second audio (5), is joined to one side of a fixed condenser of .25 mfd. capacity, all these being the Electrad 200-volt bypass of that valve. The open sides of the .25 mfd. condensers then are joined to nearest Lynch mounting clips for grid resistors and to the grid of the succeeding tube.

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(Continued on page 24)

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UNIVERSITY

(Continued from page 23)

and the corresponding clip of the previous tube (4), and this lead is carried to the movable arm of the Electrad Royalty type F and to the open side of C3, one of the three fixed condensers. If you can not easily distinguish the movable arm from the stationary post of the Royalty, R1, connect either way.

Now carry the closed sides of the grid resistor clips intended for service in the grids of tubes 5 and 4 to ground.

The front panel and the sub panel now may be joined and the top lead of the Bruno light switch connected to the plus bus wire of all sockets, at any one point. One side of the rheostat R9 is connected to the upper bottom switch point and the other side of R9 goes to the F minus lead of the six Air Gap sockets. The free switch point goes to F plus.

Connect the variable condensers. The rotor of C2 goes to grid of tube 2 and stator to ground. The rotor of C4 goes to grid condenser C5 and stator goes to F plus (any socket.) For Bruno condensers rotor to grid is correct.



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The open ends of C1 and C6 go to A minus.

Connect the cable leads. Red may be used for A plus and be connected to switch, the corresponding switch contact to the F plus bus of the sockets. The A minus, black, goes to the rheostat at post other than the one connected directly to F minus of tubes. B plus det. is soldered to the open terminal of the detector plate mount, while B plus amp. goes to the Electrad Royalty terminal other than the one connected to coils. CC minus is the lead to the last grid leak, R8, while C minus is the ground lead, connected by cable to any convenient point.

The top should be put on the cable leads at the forked terminals reserved for battery connections.

Connect the coil side of C1 to the corresponding side of C3.

* * *

IS IT POSSIBLE to use a power tube as a radio frequency amplifier? If not, why not?—Joseph Gort, Pittsburgh, Pa.

When you use a power tube as a radio frequency amplifier the volume is increased considerably but the selectivity declines somewhat. The very fact of increased amplification without additional tuning causes the diminished selectivity. As the general idea imparted by the word "selectivity" is the ability of a receiver to discriminate between the resonant frequency and all other frequencies, the discrimination is rendered more difficult when the power or energy supplied to the first tuned circuit is increased.

Power tubes as radio amplifiers are very satisfactory and their use has been retarded somewhat by the fact that so many power tubes are labeled "last audio stage." This warning leads some fans to fear, perhaps, that if the tube is placed in any other socket, the set may blow up!

As there is no such thing as a receiver that is universally suitable for all locations, without possibility of improvement by any adjustment, a radio receiver is rendered doubly attractive because of

the factors of adjustment and option which make it possible to accommodate it to the needs of any location in a simple and quick manner.

Whether your location will justify the use of a power tube in the first socket can be determined very quickly and without expense. It is assumed that a power tube is used in the final audio stage and that it is of the 5-volt 0.5 ampere type. Simply transpose this power tube and the A type tube that is in the first socket. In the run of sets this can be done without rheostat adjustment. In other receivers suitable transposition of ballast resistors may have to be made. Also it may be advisable slightly to alter the grid bias on the last audio tube. Your ear will tell you right away the effect of the power tube as a radio amplifier, in that volume will increase considerably. Then you may test for selectivity by finding out whether you are able to separate stations satisfactorily. In congested areas, like the Metropolitan District, this is not always the happy result, but in almost any locations say 50 miles outside of such cities as New York, Chicago and Philadelphia (toward the south), great gain will be accomplished by using a power tube thus, and still all necessary selectivity will be preserved. This decided, get another power tube for the final AF socket.

If the selectivity necessary for satisfactory receiver operation in your location is represented as S, then you may use a power tube, which of itself gives you less than S, but by decreasing the coupling between circuits you will get back to S again. When the set is made very selective, while the volume is less than under the other condition (of normal selectivity) it is still quite adequate, only you have to tune more carefully, so as not to pass the resonance point. Under one condition a station that will come in at a setting, say, of 50 on the right-hand drum, and still give audibility over from three to five divisions of the scale, will pass out of audibility in one or two divisions or less, under the ultra-selective system.

* * *

CAN a set like the Bernard be worked successfully on a trickle charger combination?—Percy Van Roos, Oakland, Cal.

The use of a 6-volt storage battery, with trickle charger, is very satisfactory in connection with the Bernard receiver. Under these conditions the storage battery need not be one of high rating in ampere hours. With the periodic charging system formerly so popular, a receiver like this, which, if a power tube is used in the first RF stage, and the other tubes as specified, draws 2 amperes, nothing less than a 120-ampere-hour storage A battery would be

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convenient. Otherwise recharging would have to be done too often.

But the trickle charger does away with the necessity of large capacity of the battery, because the trickle charging goes on (at a very, very slow rate) all the while the set is not in use, and does not take place while the receiver is being operated. Hence no wide range of drain is necessary.

If the longest stretch during which you use the set is 5 hours on end, then you would consume 10 amperes. Allowing a 50 per cent. safety margin, the A battery would not have to be more than 15 ampere hours capacity. In practice, however, even the small storage batteries that are sold specially for use in conjunction with trickles have a higher capacity than that. But any storage battery will do, particularly if you have one now. There is no necessity for a small one. The reason for using a small one is simply that there is no necessity for a large one.

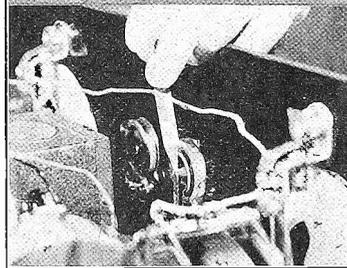
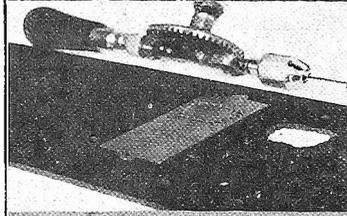
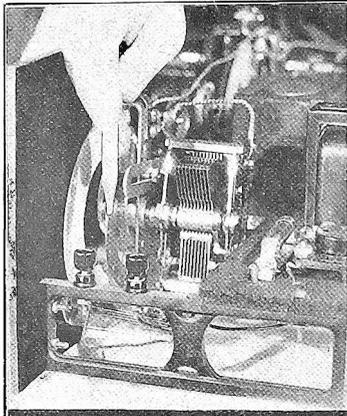
The receiver uses only one rheostat, and that simply reduces the battery voltage of 6 to that voltage required for heating the filaments of the tubes at the combined point of maximum efficiency and stability (5 volts). Hence we desire to drop one volt. The resistance necessary to do this is easily determined by Ohm's law. Assuming that two power tubes (each .5 ampere filament drain) and four other tubes (each .25 ampere drain) are used, the voltage being the same for all, we simply solve for.

$$R = \frac{E}{I}$$

where R is the resistance in ohms, E is the voltage in volts and I is the current in amperes. We know the amperage is .5+ .5+ .25+ .25+ .25+ .25 or 2 and that the voltage is 1 (the amount we desire to drop, or the difference between 6 and 5). Hence the required resistance is .5 ohm. But we allow a safety margin by employing a 2-ohm rheostat and adjusting it until the resistance in the circuit is .5 ohm, or, if we have a voltmeter handy, until the voltage between the low side of the rheostat and the A battery plus reads 5.

The only precaution needed is that the rheostat shall have a resistance substance that will pass 2 amperes at 5 volts. Most wire wound rheostats will pass only 1.5 amperes and anything more will cause them to heat up. If larger wire is used on the wire wound type (as in the case of the Electrad rheostat in the Bernard circuit), then the full 2 amperes will be safely carried without heating, indeed a respectable margin is left besides. Thus the rheostat is of the power type.

Of course the receiver will work with 99



FIGS. 472, 473, 474
How the Mar-co dials are put on the Hi-Power. Pencil points to the switch rheostat.

type tubes, but in that case a 20-ohm rheostat is recommended, if the source is 4½ volts, while if 99 tubes are to be used

from a 6-volt source a 30-ohm rheostat, or larger, should be used.

I READ with interest the description of the 4-Tube Hi-Power by Herbert E. Hayden in the Nov. 13 issue of Radio World, and would like to ask a few questions, before I start construction. (1)—How is the baseboard cut? (2)—Can the bell wire be used for wiring? (3)—Are binding posts used for battery and antenna-ground connections? (4)—How are the sockets placed? (5)—I have two 20 ohm Electrad rheostats. Can they be used? (6)—How thick should the baseboard be?—Harvey Williams, Atlanta, Georgia.

(1, 3 and 4)—Figs. 472, 473, 474, 475, 476 and 477 illustrate these points. Binding posts are used. Note the positions of the coils and transformers. (2)—Yes. (Concluded on page 26)

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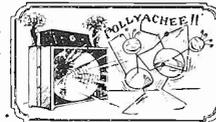
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(Concluded from page 25)

(5)—Yes, for controlling the detector and RF filaments. (6)— $\frac{1}{2}$ ".

CAN I build the 5-tube Neutrodyne, shown on page 11 of the June 26 issue of Radio World, cutting the neutralization out of the circuit, so that the set resembles a standard 5-tube tuned RF set only? I have three coils of the basket weave type, containing 10 turn primaries and 62 turn secondaries. The form is $2\frac{1}{2}$ " in diameter and No. 24 DDC wire is used. Can they be used? I intend to follow the rest of the wiring diagram. I don't wish to use the neutralization, because it will require tampering with the coils.—Henry Morris, Denver, Colo.

Yes, you can wire the set using these coils. However, it must be remembered that the control will be a bit more critical.

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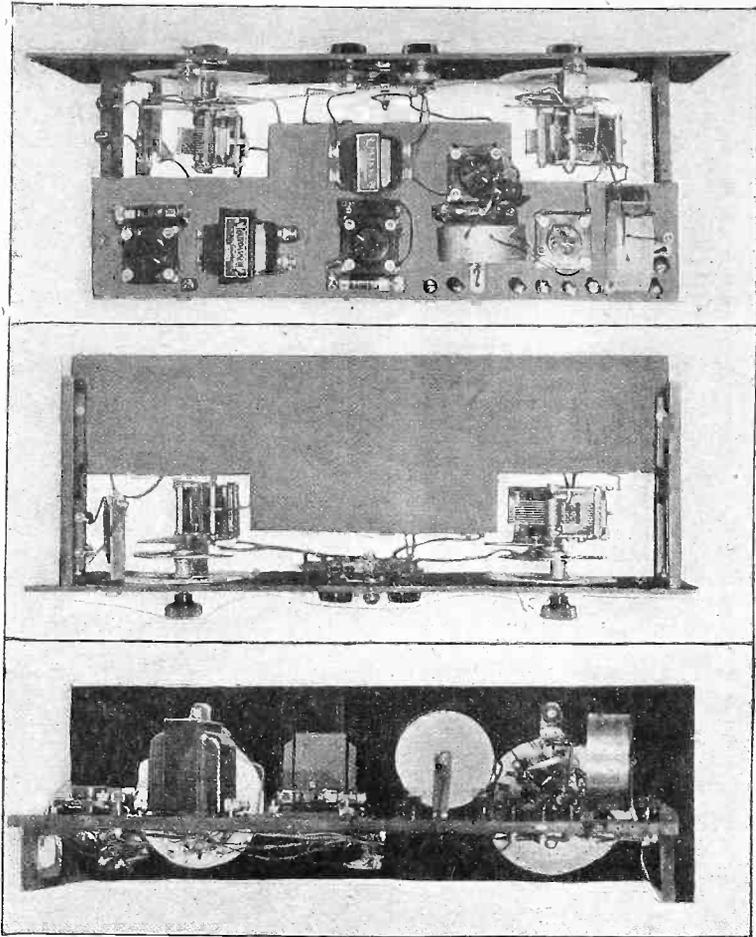
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FIGS. 475, 476, 477 (top to bottom)

The top, bottom and side views of the Hayden Hi-Power receiver. Sickles coils are used.

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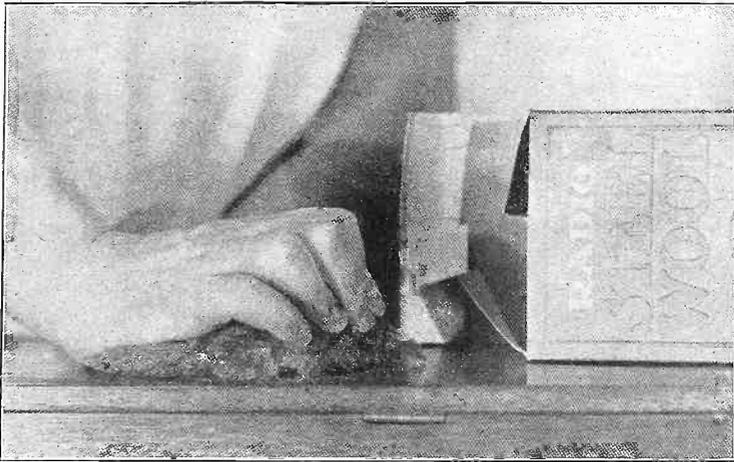
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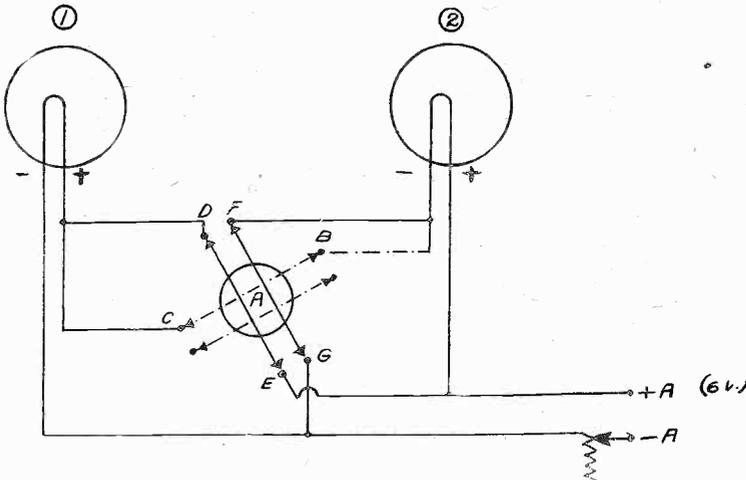


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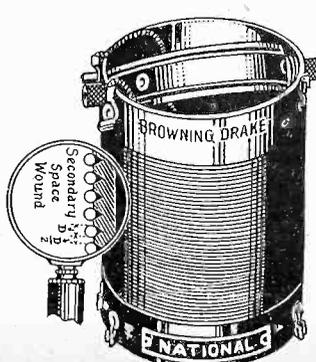
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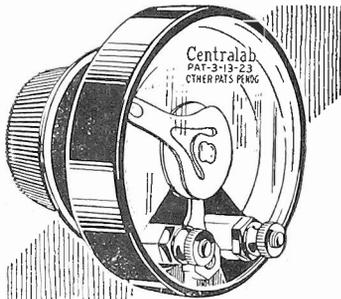
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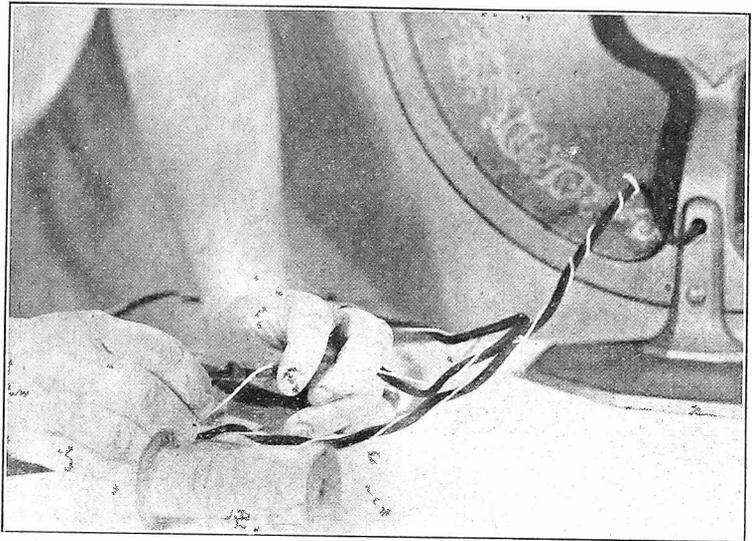
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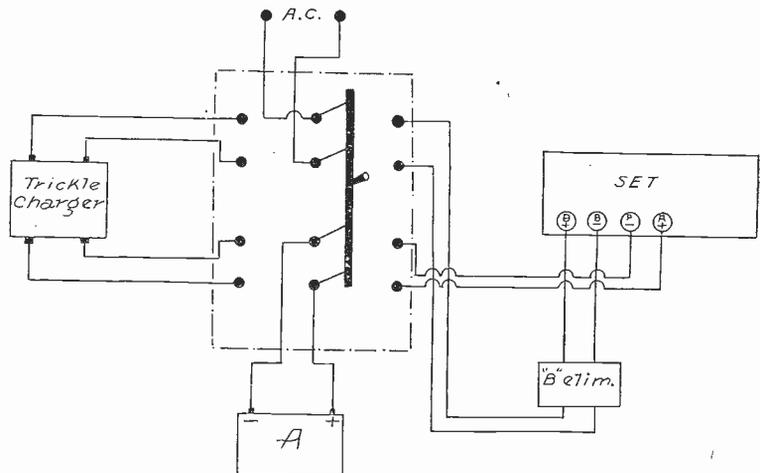


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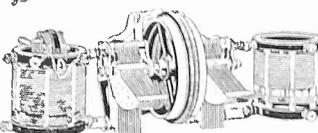
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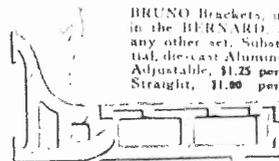
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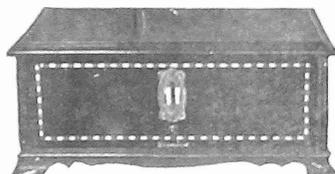
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Illustrating Parts, Antenna and Ground guaranteed by American Radio Hardware Co., and the only parts which will function correctly in the Bernard set. Furnished with kit or sold direct for other circuits. See each. 9 American Cable Tags will simplify your hookup. Furnished with kit or sold direct for any circuit. 15c per set.

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A 6-TUBE CIRCUIT BEAUTIFUL TO EAR AND EYE



How to Build the

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Fully described in the October 16 issue of RADIO WORLD by Herman Bernard. Schematic and picture diagrams of the wiring, textual wiring directions, step by step; striking photographs of the completed receiver, all treated so that the veriest novice in radio can build the Bernard.

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Fixed Condensers and Resistors Specified by Herman Bernard in the "DIAMOND OF THE AIR" and in his newest marvel, the

Bernard

Registered U. S. Patent Office
 The 6-Tube Receiver of Exquisite Tone

Specified by Dr. Louis B. Blau in the new ANTENNALESS

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 489-491-493 Broome St., New York City

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5-Tube Model

Herman Bernard designer of this wonder circuit, has written an illustrated booklet on "How to Build Radio World's Improved Diamond of the Air." Send 50c and get this booklet, including a full-sized wiring blueprint and free namepiece.

Outstanding Features of Set: (1) Fans, charmed by tone quality, sensitivity and selectivity, report speaker reception of far-distant stations with great volume. (2) A 2-tube earphone set, a 5-tube speaker set, and a separate 3-stage audio-amplifier for immediate use with any tuner, are combined in one. (3) No rheostats are used. (4) The set is inexpensive to construct and maintain. (5) The set works from outdoor aerial or loop; hence no aerial problems present themselves, in city or country.

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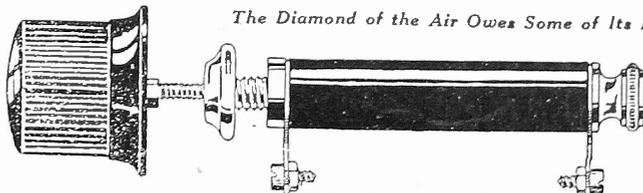
[Newsdealers or radio dealers, order the booklets with blueprints included, in quantity, direct from American News Co. or branches.]

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THE BROWNING-DRAKE CIRCUIT—Text and illustrations covering this famous circuit starting with our issue of Aug. 14. The 3 numbers sent on receipt of 45c. RADIO WORLD, 145 W. 45th St., N. Y. C.

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 Variable Grid Leak
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The Diamond of the Air Owing Some of Its Efficiency to This Leak

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 Improves Any Set!
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TIPS ON MAKING A 3-FOOT CONE

By Thomas Force

Acoustic engineers first discovered that amplification in a cone speaker is caused by resonance in the cone in circles six inches in diameter, the circle around the tip providing the resonating area for the highest set of frequencies, the next circle providing for another set, etc., until the sixth or last, providing the lowest, so that a 36" cone is able to resonate at practically all frequencies, low or high, within the range of audibility. Hence, a properly designed and constructed 36" cone speaker has proven very popular.

Persons with an ear for music readily appreciate the quality of reproduction pro-

vided by this type of speaker. My friend and contemporary, James H. Carroll, having built a 36" cone and boasted about it, I resolved to build one, choosing a double cone for my experiment. This cone proved to be a simple and inexpensive job.

The magnet is 16 oz. size, cyanide hardened. The driving rod is short, operates through a brass sleeve, and does not extend beyond the cone. These features make the cone strong and durable.

Starting the job, first lay out your parts (1) then study directions carefully.

To use as a compass get a slat of wood about two feet long, 3/4" thick and 1" wide. About 2" from the end and in the middle of the slat drill a hole just large enough to take the point of a pencil. Eighteen inches from the center of the hole drive a nail. This serves as a compass for the front cone. Another nail hole should be made 1/2" nearer the hole for the pencil—17 1/2" away. This serves as a compass for the back cone. Lay one of the sheets of paper on the floor, turning the side up that shows a little grain. Determine the exact center, draw a 36" circle and cut out with a sharp knife. Look at the rough side and you will see dark, rippling streaks running in one direction. In line with these and from the exact center of cone cut a slit.

Next measure a point 5 1/2" away in a straight line from where the slit cuts the periphery or outside rim of the cone. Mark this point and draw but do not cut a line to this point from the center. Then measure another point 3/4" nearer the slit and cut. Remove the cut segment and you have a flap 3/4" wide for cementing. Punch a 1/4" hole in the center of the disc. Spread the Amberoid cement on the flap and bring the cut edges so that the flap is on the inside of the cone. Smooth carefully, put weights on the cemented parts and let dry.

This forms the front cone with exactly the correct angle for tone quality. Now take the larger brass disc which comes with the Penn cone speaker unit, cover it with Amberoid and cement it carefully

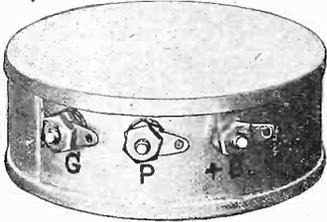
to the inside of the apex of the cone, being sure that it is in the exact center. Then, in a similar manner cover the smaller brass piece with Amberoid and cement on the outside of the apex of the cone.

Draw this circle exactly 35" in diameter. Then from the exact center draw another circle exactly 16" in diameter, (8" in radius). Do not cut this out before the cone has been cemented and is perfectly dry. Then the segments are cut as for the first cone and cemented in the same way.

As I am aware that many skilled at making sets are not so handy at making a speaker, I will be glad to answer questions on this topic. Address me care of RADIO WORLD, 145 West Forty-fifth Street, New York City.

LIST OF PARTS

- One Penn Cone Speaker Unit.
- Two sheets Alhambra Fon-O-Tex, 38" x 38".
- One set Penn Back Rings.
- One set Unit Mounting.
- One 5-oz. can Ambroid cement.



SICKLES

Shielded Tuned Radio Transformer

The ideal coil for the Na-ald Localized Control Tuning Unit, and for Truphonic Catalog Assembly.

Widely adaptable to all leading control units. This transformer is compact, sturdy, sharp-tuning. Prevents both outside and local interference.

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SEND FOR PAMPHLETS OF THE GOODMAN TUNER—In use for years and still good. Tested and approved by many technical laboratories. L. W. Goodman, Drexel Hill, Penna.

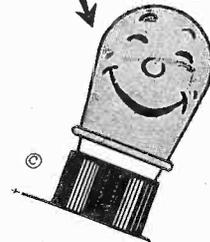
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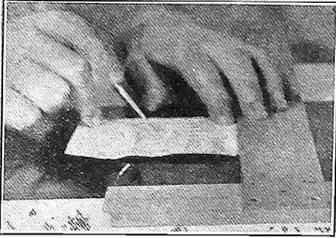
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Remember the name! You can get it for every size tube. It sells for 75c each. Just ask your dealer, or write.

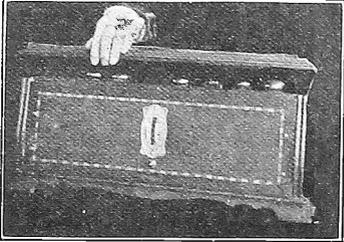
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SPARTAN ELECTRIC CORPORATION Manufactured in the U. S. A., by the
550 West 34th Street, New York City **SCIENTIFIC PRODUCTS CANADA, LTD.**

"It Stops that Howl!"

ON THE SQUARE



WHEN using one of the templates for the new cut-out drum dials be sure to get it square with the panel by using a T square, or ruler.



WHEN laying out parts for set construction be sure your subpanel is low enough to allow tubes to clear the cabinet lid.

THE ANTENNALESS

(Concluded from page 3)

control. While R2 stops self-oscillation under conditions of correct placement of coils, it is not 100 per cent. effective unless magnetic back coupling is kept at a minimum.

[Part II, the conclusion of this article, will be published next week, December 4, in the Holiday Gifts Number. Photographs of the receiver will illustrate the instalment.]

LIST OF PARTS

- GFPB—One Acme R3 transformer.
- L1L2, L3L4, L5L6—Three Benjamin 2½" diameter transformers.
- TR1, TR2, TR3—Three Truphonic couplers (include built-in coupling condensers).
- OU—One Alden output unit (includes condenser).
- C1, C2, C3—Three Benjamin .00035 straight line frequency variable condensers.
- R3—One Electrad 2-ohm rheostat.
- R2—One Electrad 200-ohm potentiometer.
- C4, C5, C6, C7, C9—Five Aerovox .001 mfd. fixed condensers.
- C8—One Aerovox .00025 mfd. fixed condenser with clips.
- C1—One Lynch metallized fixed grid leak, 2 meg.
- 1, 2, 3, 4, 5, 6, 7—Seven Benjamin Cle-Ra-tone spring supported shock-absorbing sockets.
- J—One Electrad single circuit closed jack.
- S—One Benjamin battery switch.
- Three National Velvet Vernier dials.
- One 7x24" Bakelite front panel.
- One 8x23" Bakelite subpanel.
- One pair of Benjamin adjustable brackets.
- Two flexible leads for C battery.
- One 7x24" cabinet.
- One Swan-Haverstick aerial kit.
- One Polymet phone plug.
- One loud speaker.
- Three CeCo type A tubes (sockets 1, 2 and 3); one CeCo type H tube (socket 4); two CeCo type G tubes (sockets 5 and 6); one CeCo type F tube (socket 7).

RADIO WORLD'S

Most important issue of the year

HOLIDAY

GIFTS NUMBER

December 4th

Editorial Features

The DX Getter. A 5-tube circuit. One of the most selective and penetrating hookups for home constructors. By Capt. Peter V. O'Rourke.

The Bernard Lamp Socket Set. How to construct the famous Bernard receiver and a B eliminator, so that it may be operated without need of battery replenishment. By Herman Bernard.

"The Christmas Spirit"—A front cover design in two colors. By J. Gerard Sheedy, art director of Radio World.

A D.C. Eliminator of A, B and C. Batteries. By Lewis Winner, technical editor, Radio World.

Common Fallacies in Radio. By J. E. Anderson, consulting engineer.

A Beat Note Audio Oscillator. By John F. Rider. Full Page of Fascinating Photographs of the latest happenings in radio.

Tell your newsdealer to save you a copy—15c.

Advertising Results

Radio World's Annual Holiday Gifts Number brings the maximum results to its advertisers. This issue will be advertised to some ten million people in other publications, and generally sells from forty to fifty thousand in addition to our 100,000 weekly circulation. It reaches the buyer just at the time when he is planning what he will give for Christmas.

Radio is the Most Appreciated Xmas Gift

This issue will tell what is best to buy and where to buy it.

Radio World's Holiday Gifts Number is dated December 4; is on newsstands December 1. Red form goes to press Monday morning, November 22. Last black form closes Tuesday noon, November 23. Full-page advertisers, on request, get an extra color—red—without additional charge. All advertisers get thousands of extra circulation without additional charge. Advertising rates: \$10 an inch; \$100 a column, and \$300 a page.

RADIO WORLD

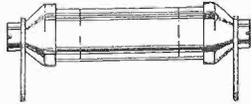
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for Your Detector Grid
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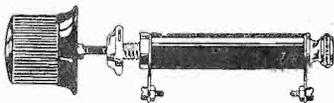
Capacity .00025 mfd. (actual size)

It Hits the Mark Every Time

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Let the Best Be None Too Good for You!



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Connect a BRETWOOD Variable Grid Leak in the detector circuit of your set and turn the knob until the signals clear up beautifully.

Use a BRETWOOD Variable Grid Leak across your last stage audio transformer, or put one in place of the fixed leak in the final grid of impedance or resistance coupled audio. Turn the knob and note the a m a z i n g improvement in quality.

In any circuit where a grid leak has to be used its value in ohms is important. Conditions differ in individual circuits and with different equipment. Experts cannot specify definite values that are applicable to all cases. The variable leak takes the guesswork out of the grid circuit, and the BRETWOOD is the best for the purpose. "It Does the Trick!"

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Awards for novel and original hook-ups, modifications of existing circuits; trade names; slogans; write our nearest office for full details.

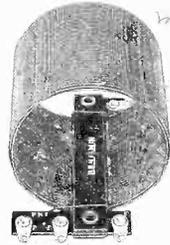
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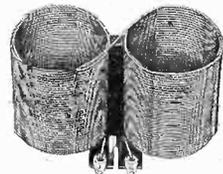
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Capacity coupling reduced to lowest degree. For use with .00035 Mfd. Condensers.

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"Lekeless" Transformers



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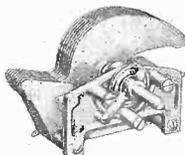
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Spring Supported, Shock-Absorbing, Stop Tube Noises. The greatest aid to non-noisy operation. Contacts always clean.

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Eliminates bunching of stations. Spreads the log evenly over the dial. Makes tuning easy. Adjustable turning tension. Compact. A beautiful instrument that not only improves reception, but adds to the good appearance of the set.

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

Plain—70c pair. Adjustable—\$1.25 pair

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



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