



# **RADIO**

STATION,  
**DIRECTORY**

AND

## **TROUBLE FINDER**

Companion of the Radio Set  
A Friend in Need in Case of Trouble  
Written in Plain English

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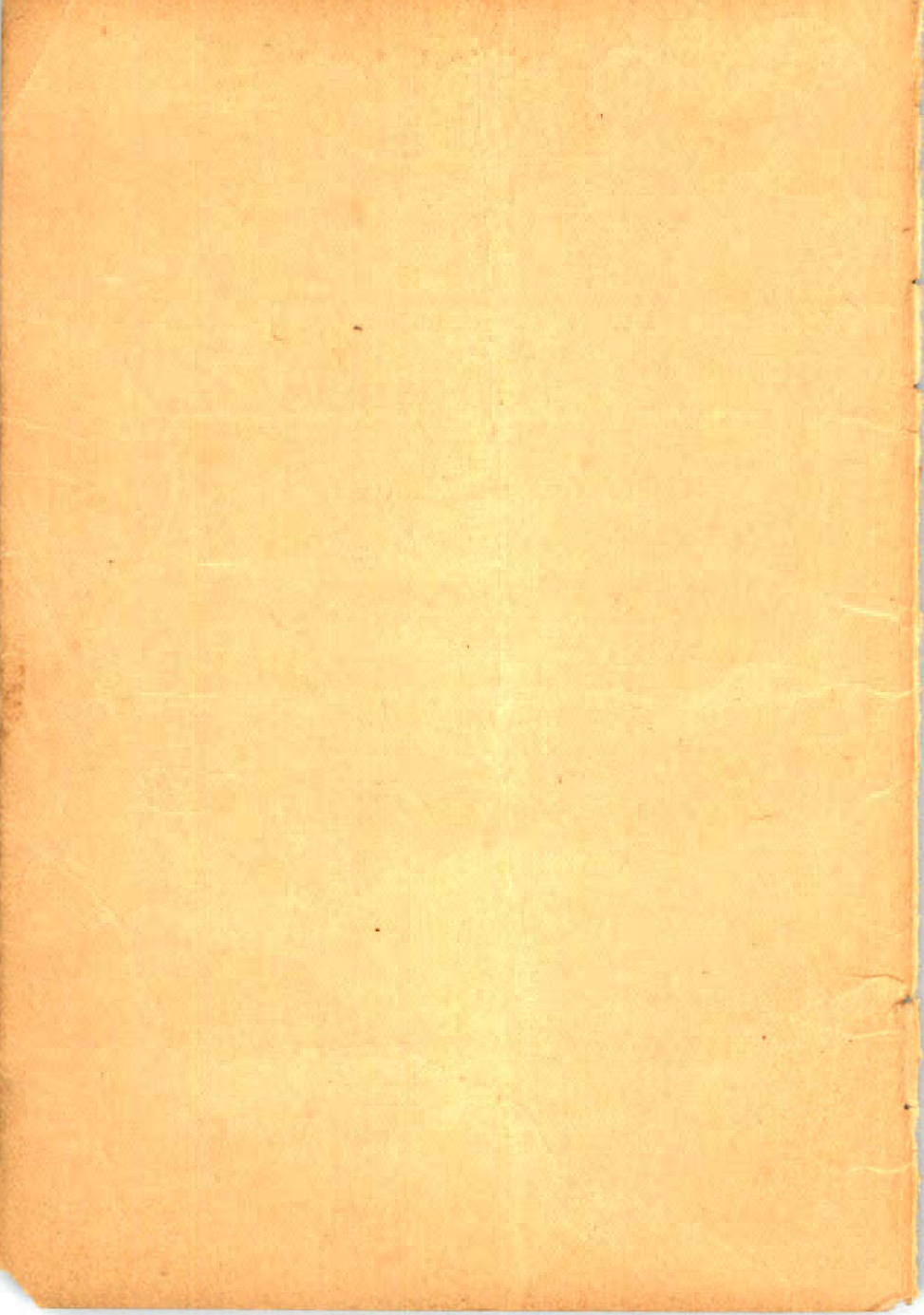
RADIO

**GEORGE H. COCKS, JR.**  
ELECTRICAL CONTRACTOR

OFFICE AND SHOWROOM  
172 MAIN STREET

PORT WASHINGTON, N. Y.





**R A D I O**  
**BROADCASTING STATION**  
**DIRECTORY**  
*and*  
**TROUBLE FINDER**

*by*

**BERTRAM W. DOWNS,**  
*B. Sc., Assoc. A. I. E. E.*

A complete list of Broad-  
casting Stations in North  
America and a Guide for  
the location and elimina-  
tion of trouble in Radio  
Receiving Sets.

**BERTRAM W. DOWNS CO.**

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## INTRODUCTORY NOTE

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**R**ADIO, as a means for entertainment, education and the dissemination of general information, has reached a high degree of development.



Standard radio instruments themselves have reached a degree of excellence comparable to the precision work in fine motor cars.

The "Trouble Finder" portion of the title of this booklet should not be taken as an insinuation that radio sets are continually out of operation; for such is not the case. The normal condition of a radio set is a healthy one. This booklet is offered as an instructor in the proper operation of a radio set, comparable to the instruction book which every wise owner of a motor car will buy.

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## Information for the Beginner

**W**HEN the "around the world" aviators reached the end of their trip at Boston, one of them made a speech over the radio. The newspapers wrote this event up under the headlines "Air Hero Makes Radio Speech From Boston While Mother Listens In From Pacific Coast." When a political speaker recently talked over the radio, the papers told of the millions who listened to him.

Such articles as these, often written by reporters who have never even operated a home radio set, give the impression that all the radio owner has to do is to push a button, call the number he wants, and listen in, just as over a telephone, regardless of time of day or night, winter or summer, in fair or stormy weather.

To avoid disappointment, you should realize at the start, that a radio is not like a phonograph. It is not always ready to bring in any station you want, for weather conditions, local buildings, hills, and other obstructions exercise a marked effect on the operation of **all** radio sets.

Broadcasting stations that are entirely out of range in the daytime may come in loud and clear at night. The night range is approximately ten times that of the daylight range. In winter, when trees have lost their conductive sap, when the air is dry, and atmospheric electricity (static) is at a minimum, greater distances can be covered, and more freedom from static interference is enjoyed.

If the above is new to you, don't let it discourage your interest in radio, for it is this very uncertainty that makes radio attractive. How many fishermen would there be if it were only necessary to drop in the hook in order to pull out a five pound bass? One of the most fascinating features about radio is the fact that you can sit down at your set and listen to nearly any form of entertainment that you please, from coast to coast; and the next night you may hear an entirely different set of stations. Of course the powerful stations that are near, will be readily tuned in night after night, at will, but for real distant stations this is not the case. Some radio enthusiasts find their pleasure in listening an hour at a time to the excellent programs; most of them would rather listen to one number, just long enough to find out the location of the station, and then they are ready to turn to another, content with tuning in as many stations as possible.



## General Information

**T**HERE are as many types and classes of radio sets as motor cars. There are broad principles of design that must be followed in all sets. In addition to the necessary parts there are many refinements and improvements which are found in the better class sets.

Fifteen years ago automobiles were sold without top, wind-shield, or side curtains. These "unnecessaries" were available, but at a higher price. Today a good automobile is really not complete unless it has a closed body, balloon tires, speedometer, bumpers, and countless other refinements that we now look upon as things which should go with any good car.

Likewise, in the early days of radio, an amplifier and loud-speaker was looked upon as admirable equipment for the scientific laboratory, but beyond the hopes of the amateur enthusiast. Today nearly any radio fan contemplates a ten-tube super-heterodyne with considerably less emotion than we used to display toward the first "quick-detachable" tire. So when you buy a radio set remember that you have the opportunity to purchase anything from the "flivver" to the Rolls-Royce of radio; your choice depending on your needs—and also on your purse.

**Radio Essentials.** Every radio set must have in some form or another, these two units; (1) the tuning unit, (2) the detector unit.

The tuning unit, or tuner, is for the purpose of **selecting** the broadcasting station you wish to hear, and **rejecting** all others. It is composed of one or more coils (of wire) and condensers, the electrical values of which can be varied by means of the knobs on the panel of the radio cabinet. Just as the violinist tunes his instrument to the piano which is to accompany him, so the radio set must be tuned to the broadcasting station it is desired to hear.

The detector changes the electrical impulses received from the broadcasting station into such a form that they will actuate the phones, and thus reproduce the sounds which originate in the broadcasting station studio.

**Radio Refinements.** The above units represent the radio set in its simplest form. Improvements on this two-unit radio set almost invariably take the form of (1) low-frequency amplifiers (commonly called audio-frequency or tone-frequency amplifiers), and (2) high-frequency amplifiers (radio frequency), and the tuning units which the latter include.

The low-frequency, or audio-frequency amplifier, serves one purpose; to build up the currents given out by the detector to a point where they are stronger, usually for the purpose of operating a loud-speaking horn. Regardless of the strength of the incoming signals, a detector alone is not sufficient for this.

The high-frequency, or radio-frequency amplifier serves one or more of three purposes; (1) it builds up signals which are received in the aerial but too weak to actuate the detector, to a point where satisfactory reception is possible,



or (2) it makes the use of an aerial unnecessary, due to its great sensitivity, or (3) by means of the tuning coils embodied in the amplifier, it gives great **selectivity**, that is, assists the primary tuner to reject unwanted signals. The radio-frequency amplifier comes ahead of the detector, and is used **only** for the three purposes mentioned, and never for the operation of a loud speaker.

A study of the above will make it easy to understand the part which follows, on "Types of Radio Sets."

## Types of Radio Sets

1. **The Crystal Set.** Simplest of all radio sets, this consists of a tuner and a crystal detector containing Galena, Silicon, or some patented composition which functions as a detector without the use of batteries or vacuum tubes. Its average range with a good aerial does not exceed 25 miles. Its outstanding features are low cost, simplicity, and clearness of signals received. Worthless for long distance reception except where used with a radio-frequency amplifier.
2. **Single-Tube Non-Regenerative.** Simplest of all vacuum tube sets, consisting of tuner and vacuum-tube detector unit. A little more sensitive than the crystal set, and much more reliable. Requires batteries.
3. **Single-Tube Regenerative.** The most popular cheap long-distance set. Consists of same as No. 2, with the addition of a tuning coil, or like device, in the vacuum tube detector circuits, which causes the vacuum tube to serve as both radio-frequency amplifier and detector. Will give good results with phones over distances of 500 to 1,000 miles, and more in good weather.  
**These three comprise the simple sets, as found in general use. The following are variations and improvements, which include amplifiers of several designs:**
4. **Three-Tube Regenerative.** Same as No. 3, with the addition of a two stage amplifier. Has approximately the same range, but will operate a loud-speaker over similar distances. The receiving radius with phones will be slightly greater.
5. **Five to Six-Tube Radio-Frequency.** Such sets usually have two to three stages of radio-frequency amplification, a non-regenerative detector, and two stages of audio-frequency amplification. If well built they have a somewhat greater range than the three tube regenerative set, and, depending on their design and the skill of the operator, they may be more or less selective than the regenerative set.
6. **Neutrodyne Radio Frequency.** Usually built in four, five, or six-tube models, these sets have two or three stages of radio frequency amplification so balanced (by the patented neutrodyne principle) that high selectivity is obtained, as well as great amplification. Two stages of audio amplification permit the use of a loud speaker on nearly all occasions.

7. **Super-Heterodyne.** The super-heterodyne is built in all sizes, from six to twelve vacuum tubes being most common, with the average about eight. In principle it is decidedly different from other sets. Instead of tuning each stage of radio-frequency amplification to the incoming signal, the super-heterodyne requires no variation of the amplifier circuits, but instead changes the frequency of the signal to meet the fixed values of the amplifier circuits. Although the most complex in construction, it is one of the easiest sets to operate. It is primarily meant for use with a loop aerial, which may fit inside the cabinet, thus making the set entirely portable. As with any "loop" set, however, best results will be obtained when an outside aerial is used. When an aerial is used with such sets, however, it must be connected to a coil several feet from the set, instead of direct-connected, as the high sensitivity of these sets makes a closer connection unnecessary. Your dealer can give exact information with regard to any particular set, and the best connections.

NOTE. It is impossible to give all the variations of sets that are found on dealers' shelves and in home workshops, for there are probably two hundred variations. Those above, however, represent the leading classes of sets which are manufactured for the market.

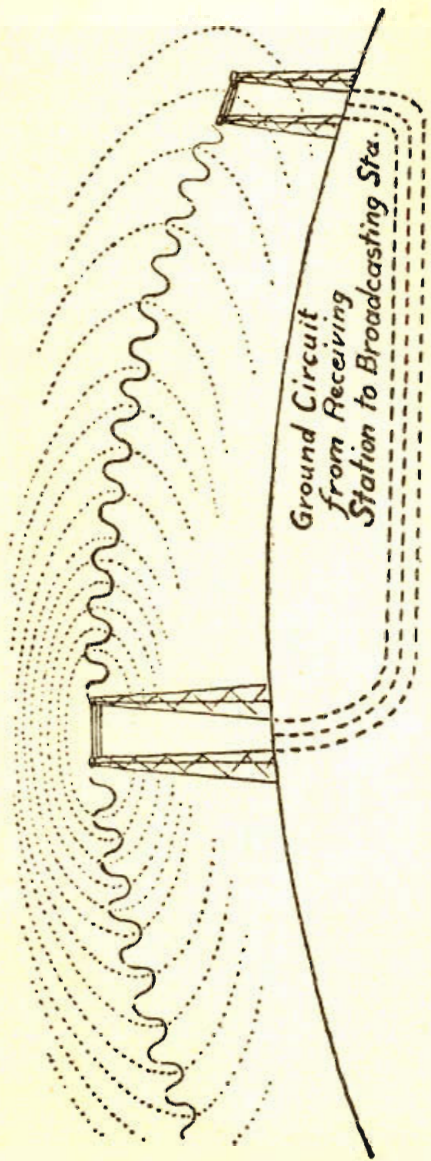
## Aerials, Loops and Counterpoises

**I**N THE past all radio sets depended on an aerial, or elevated wire or wires to "catch" the radio impulses and bring them to the set. With the widespread popularity of the home radio, the erection of an aerial has been something of a problem, particularly in districts where there were many apartment buildings. This condition has led to the adoption of "trick" aerials of many kinds, and also to the popularity of many-tube sets, which will operate over long distances without the use of an outdoor aerial.

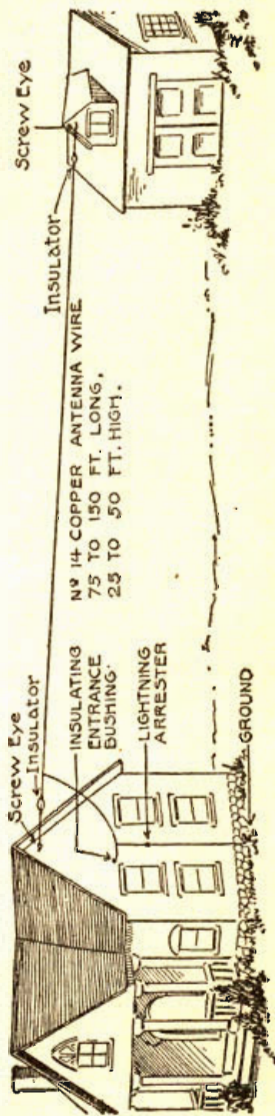
Substitute aerials include bedsprings, fire escapes, indoor clothes lines (metal), wires concealed behind picture moldings, and the like. All of these fulfill their purpose in some degree. Still more effective substitutes are small aerials, built in the top story of the buildings, and patterned after the outdoor aerial. These work, in many cases, nearly as well as the outdoor installation. "Aerial Plugs," to be connected to the lamp socket, are often as satisfactory as aerials; although they sometimes fail completely, the results being dependent mainly on the conditions in the wiring of the house. For this reason, most dealers will sell these plugs on a trial basis. Whenever practical, however, it is urged that a standard installation be used.

In order to make up for the inefficiency of the above make-shifts, it was found desirable to increase the sensitivity of the radio set itself, to overcome the losses introduced at the start. This has been accomplished mainly by the use of more and more vacuum tubes as amplifiers. Eighteen months ago a five tube set was a curiosity; today eight and ten tube sets are common. It was found that by increasing the





Radio waves traveling out in all directions from transmitting to receiving stations.



A typical antenna system for a radio receiving station.



sensitivity of the set, the same results could be obtained with smaller and smaller aerials, until finally it was found that a simple coil of wire about eighteen inches in diameter, and with about ten to twenty turns of wire, would serve as a collector, without the use of a ground connection or aerial of any other kind. This "loop" aerial is all that is needed with many sets of three to twelve tubes, for receiving from distances up to several thousand miles. The loop also possesses the property of receiving best from the direction in which it is pointed, which is an aid in eliminating unwanted signals. To operate a loop it is necessary to use several stages of radio frequency amplification. The most popular loop sets are those with plain radio-frequency amplification or those with the super-heterodyne feature. By using the reflex principle, the same tubes can be made to serve as radio frequency and audio frequency amplifiers, and satisfactory loop sets may be made with as few as three tubes.

The natural thing might seem to be the combination of these ultra-sensitive sets with an outdoor aerial; but the advantage of both can be secured only to a limited degree; for this reason. There seems to be a certain distance, beyond which no set can receive. Of course the actual distance will be governed on any particular date, by atmospheric conditions. But, although the super-sensitive sets may bring in signals that are inaudible to the ordinary good sets, the static and other interferences will also be amplified by the super set, so that the very distant signals are unintelligible, though audible. There is always some static in the atmosphere; although you may not hear it. Connect up a more sensitive set than the one you have been using, and, while you may bring in more distant stations, you will usually also bring in static enough to blanket them.

But there is this much to be said for the use of an aerial with a loop set: If the set does not bring in distant stations as well as others which use an aerial, a small aerial can be erected, and merely passed through the room in which the set is located, the lead-in being one or two feet from the loop. This will usually increase the range of the set. Or instead of leading directly to the ground the lead-in may pass through a small tuning coil, or fixed coil and condenser. Your dealer can give you data on the size of coil that will be best for your set. As a rule, a tapped coil, with fifty turns and about ten taps, will be right for all purposes. The loop will pick up energy from the lead-in without any physical connection. Of course this will remove the directive property of the loop to some degree.

In the case of sets using an outdoor aerial, it has been found that under some conditions better results could be obtained by using a "counterpoise" in place of a connection to the ground. The customary means to a "ground" is by connection to water pipes, radiators, or rods driven into moist ground. The counterpoise is really little more than a second aerial, ordinarily nearer the earth than the aerial, but not necessarily so. The counterpoise is insulated from other objects in the same way as the aerial itself. It may be twenty to fifty feet or more from the aerial, or it may be a fraction of an inch from it. Some manufacturers are now making "counterpoise aerial wire," which has a core of copper wire, which is the aerial, a composition insulating jacket,

and a braided wire covering over that, the latter being the counterpoise. The unit is erected just as an aerial, with two lead-ins, one from the inner wire, which attaches to the "aerial" post on the set, and the other from the outer braided covering, which goes to the "ground" terminal. In dry climates a counterpoise is usually preferable to a ground, and the same is often true in other places where the ground connection is not perfect.

As to the aerial itself, the best length for broadcasting purposes is about fifty to sixty feet. The day of the long aerial is past. The lead-in should be as direct as possible, and should touch as few insulators (and nothing else) as possible. There is a theoretical advantage in using stranded wire, which advantage is seldom evident in a practical sense. Theoretically the best aerial wire is that which is made up of a number of strands of enameled wire braided together. There is absolutely no advantage in using more than one wire in the aerial, although some people persist in erecting three and four wire aerials. A four wire aerial is only of advantage when a transmitting outfit is used.

**Lightning Protection.** With a loop or an indoor aerial there is of course no need for lightning protectors. In the case of the outdoor aerial, the condition is somewhat different. During a lightning storm the aerial picks up a considerable amount of static electricity, which should have a fairly easy path to the ground, in order to protect the receiving instruments. The danger is **not** that the lightning will strike the aerial and then set fire to the house; if lightning strikes an aerial it burns up the wire before it gets to the ground—but the static charges coming from flashes of lightning some distance away are liable to do some harm if not provided for by a grounding switch or protector of some kind.

Any good lightning protector, approved by the Underwriters will serve, and an aerial so protected actually makes the house more safe than when there is no aerial. If a counterpoise is used, it should be protected in the same way as the aerial.

## Radio Batteries

**B**ATTERIES are used in radio to operate the vacuum tubes. These batteries serve three different purposes, and are named, for convenience, "A," "B," and "C" batteries.

**The "A" Battery** is used to heat the filaments of the tubes. The exact type of battery needed depends on the tubes used. Storage battery tubes UV-200, C-300, UV-201-A, C-301-A, and a few others require a six volt storage battery for best results. The storage battery must be re-charged from time to time, as it runs down, and distilled water should be added every few weeks, just as in the case of the automobile storage battery.

The most popular vacuum tubes, however, use dry cells, and no storage battery is necessary. These tubes include the WD-11, WD-12, C-11, C-12, UV-199, C-299, and others. The WD-11, WD-12, C-11, and C-12, will operate on one dry cell per tube. In a two tube set, two dry cells, connected in



parallel, would be used. The 199 and 299 tubes require three dry cells in series, and four or five tubes can be operated for a considerable time from three such cells.

Of course dry cells wear out in course of time, and have to be replaced. When the filaments of the tubes will no longer light up to normal brilliance, it is a pretty good sign that the "A" battery needs replacing. An accurate test can be made with a good voltmeter. With all tubes turned on, test the voltage across the terminals of the battery. In the case of the cells in parallel, this voltage should be nearly  $1\frac{1}{2}$ ; in the case of three cells in series, the voltage should be between 4 and  $4\frac{1}{2}$ . The voltmeter test is, however, scarcely necessary, as the color of the filament will tell the practiced operator whether or not his batteries are in good shape.

**The "B" Battery** has no connection with the lighting of the filament. It serves only as a local battery, to add strength to the incoming currents. The incoming wave, by acting on the grid of the tube, serves as a "trigger," to release some of the energy in the B battery, resulting in a magnified current in the output circuit. The detector requires one block of B battery, or  $22\frac{1}{2}$  volts, approximately, while the amplifier tubes take anything from 45 volts to 110 or more, depending on conditions. It is frequently advisable to test the B battery with a voltmeter (never with an ammeter). Each  $22\frac{1}{2}$  volt block should test 17 volts or more. A new " $22\frac{1}{2}$  volt" battery should test  $21\frac{1}{2}$  or more, and when the voltage is down to 17, the battery is about ready for discard.

**The "C" Battery** is found only in sets having amplifier tubes. Its purpose is to give louder signals, and permit the use of high B voltages. The "C" battery is usually about  $1\frac{1}{2}$  volts when  $67\frac{1}{2}$  volts B is used, and from 3 to 6 volts when 90 to 110 volts B is used. The "C" battery can be tested by a voltmeter, and should be discarded when its voltage has dropped about 20% or 25%.

## Vacuum Tubes

**T**HE vacuum tube is the very heart of a modern radio set. It is used in transmitting stations as well as in receiving sets. In the home radio set vacuum tubes are used for two purposes; as detectors, and as amplifiers. The detector serves to change the character of the waves into electrical impulses which will operate the "phones." When used as an amplifier, the vacuum tube either strengthens this phone current so that it will operate a loud speaker, (audio frequency amplifier) or it builds up weak incoming waves to a point where they will operate the detector (radio frequency amplifier). As mentioned before, all sets use a detector, many use both detector and audio frequency amplifiers, and some use radio frequency amplifiers as well.

The vacuum tube consists of three essential parts, enclosed in a glass envelope, from which the air has been exhausted. In the center is the **filament**, which is heated to a point near incandescence by the "A" battery. Next to the filament is the **grid**, a metal ladder or screen, and on the other side of the grid is the **plate**, a square or tubular piece of metal.



The heated filament gives off electrically charged particles of matter, which fly past the grid, to the plate. The incoming current, which is impressed on the grid, causes that element to regulate the flow of current from the filament to the plate, so that the tube may serve as a relay or amplifier. A weak current entering at the grid, is increased by the local current emanating from the hot filament, so that the current leaving the plate is a **magnified duplicate** of the current that entered by way of the grid. This is the function of amplification. The detecting of the wave, or making it change to such a form as will operate the phones, is also done by means of the grid electrode, which modifies the current passing through the tube.

The four prongs at the base of the tube are the terminals of the enclosed elements; two for the filament, and one each for grid and plate. The prongs should be kept clean, to assure good contact with the socket.

## Tuning Units

**T**HE radio set is adjusted, or "tuned" to any particular station by means of **condensers** and **coils** (of insulated wire). In order to make the range of tuning continuously variable, so as to include the greatest number of stations, either or both the coils and condensers are variable in capacity. That is, the tuning unit may be made up of fixed coils and variable condensers, or fixed condensers and variable coils, or variable condensers and variable coils. Any or all of these combinations may be found in a set.

Variability in a tuning coil is commonly secured in one of two ways: taps are taken off from the coil at regular intervals, and so connected that by means of a switch any desired number of turns can be secured. Or the tuning coil may consist of two identical coils, one of which rotates within, or in close proximity to the other. This combination is called a variometer. When the movable coil is parallel to the other, in one position the tuning value is maximum, while a half turn reduces the tuning value to approximately zero.

A condenser is made up of sheets of conducting material, separated from each other by some insulator. In the case of fixed condensers, it is common to have copper foil conductors, and sheet mica insulators. A variable condenser, due to mechanical requirements, is somewhat different. The plates are semicircular in shape, and are made of aluminum or brass. The insulator is air, and the movable plates are so mounted as to permit them to "sandwich" between the stationary plates without touching. One connection is made to each set of plates. A tuning coil should show a continuous electrical circuit from one terminal to the other; a condenser should show no circuit, or "open circuit." To preserve the good operation of a variable condenser, frequently remove the dust from the plates, so that there will be no danger of the metal particles or moisture in the dust accidentally making a conductive path between the rotating and stationary plates. A pipe cleaner can be used advantageously in cleaning.

## Locating and Eliminating Trouble

**W**HEN your set doesn't work, or does not work right, remember that the trouble is pretty sure to be due to some mistake of your own. Every manufactured set is tested at the factory, and most dealers test sets a second time; so before you call on the dealer for help, first make sure that you have not done something wrong. Look over the instructions that came with the set, make sure that you are right, and then refer to the instructions which follow here. In nine cases out of ten you will be able to correct the trouble without help.

A radio set, like any other piece of fine electrical or mechanical apparatus, is a delicate and sensitive instrument, and must be treated as such. Certain troubles are bound to occur if proper attention is not given to it, or if instructions are not followed. The following pages give a fairly complete list of the evidences that your set is not working properly, with instructions for locating and remedying the trouble. If something "goes wrong" with your set, always remember that it may be your own fault, and make sure that you are right before you complain to the dealer from whom you bought your set. You wouldn't expect your car to run without gasoline; don't expect your radio to work if the battery is dead or if your aerial has fallen to the ground. Note that the instructions which follow apply to both home made and factory-built sets. Where mention is made that the trouble may be due to faulty design, this will probably refer only to home made sets. However, such things as loose wires, faulty connections in socket, too much "B" battery, etc., may refer equally to home made and manufactured sets.

### Troubles Outside of the Set

Troubles that are not in the set or batteries, are usually in the aerial or of the local disturbance type. The quickest way to make sure that a disturbing noise is not in the set is to remove the aerial wire from the set; then if the noise stops you can be sure that it was caused by the aerial rubbing against some obstruction, or by static or some local electrical disturbance. Static can not be eliminated, for it is essentially identical to the very impulses your set was meant to receive. Buzzing, humming sounds, which disappear when the aerial connection is removed, may be due to battery chargers in the neighborhood, defective electric lighting transformers, arc lights, telephone exchanges, power houses, X-Ray machines, and the like. The best remedy for these is to ask the people controlling the interfering elements to "desist or repair."

### Troubles in Set or Installation

**Tubes do not light.** This may be caused by: dead "A" battery, defective rheostat, dirty or poor contact on socket or tube prongs, burnt out tubes, broken wire from "A" battery to set, broken or disconnected wire inside of set, "A" battery connected wrong, so that cells oppose each other, or in parallel when connection should be series.



**Tubes light, but no sound in phones or loud speaker.** Dead "B" battery, "B" battery reversed (negative terminal where positive should be connected), "B" batteries connected together wrong, poor contact in tube socket at plate or grid terminal, broken phone or loud speaker cord, tubes paralyzed from too much "B" battery, short circuit in phone condenser, broken wire in phone circuit, amplifying transformer, phones or loud speaker.

**Signals good in detector circuit, weak in amplifier.** "A" battery in poor condition, transformer reversed or burned out, poor contact in amplifier sockets, section of "B" battery dead, "A" battery polarity reversed, "C" battery reversed or disconnected, moisture in transformers, condenser across transformer short-circuited, defective amplifier tube, defective jacks or plug.

**Signals in detector weak, amplifier O. K.** Batteries run down, phone condenser short circuited, "A" battery reversed, defective tuner, too much or too little grid leak, poor grid connection on socket, aerial or ground disconnected, aerial grounded outside, too much or not enough "B" battery on detector, moisture in coils, dirty variable condenser, short circuited aerial protector.

**Signals clear in detector, distorted in amplifier.** Too little "B" battery on amplifier, too much "B" battery without "C" battery to prevent distortion, broken wire in amplifying transformer, poor contact in socket, disconnected or broken wire leading to transformer, transformers too close together, too many stages of amplification, transformers have too high step-up ratio, signals too loud for tubes, transformers need grid leak or condenser across secondaries, connections to transformers reversed.

**Knocking, scraping, scratching, popping sounds, effected by tuning.** Dust between plates of variable condenser, fingers of operator touching set-screw on dial, or other metal, too much "B" battery on detector, too much wire in tickler coil or radio frequency transformer, too much "A" battery current, poor contact in rheostat, not enough grid leak.

**Same as above, but not effected by tuning.** Poor connection to aerial or ground, aerial rubbing against grounded object, loose contact in set, dirty variable condenser, defective detector circuit jack, tubes burning too bright, transformer burned out, not enough grid leak, transformers need grid leak or condenser across secondaries.

**Howls, hisses, squeals, whistles, effected by tuning.** Too much "B" battery on detector, too much wire in tickler or radio frequency transformer, too much filament current, tickler advanced too far, improper resistance in grid leak, near-by regenerative sets improperly operated, aerial or ground disconnected, poor ground, broken wire in tuning coil, lack of shielding (in case of R. F. or regenerative set).

**Same as above, not effected by tuning.** Too much filament current, too much "B" battery, short circuited grid condenser, improper resistance of grid leak, poor contact in socket, local regenerative sets interfering, transformers too close together, transformers with too high step-up ratio, wiring in set bunched together too much, too many stages of ampli-



fication, primary of transformer connections reversed, transformers need condenser or leak across secondaries.

**Unsteady, wavering signals.** Leakage in aerial, due to swinging against other objects, sooty insulators, batteries run down, loose bearings in coils or condensers, tickler advanced too far, no grid leak, local regenerative receiver interfering.

## Simple Repairs

**W**HEN you have located a source of trouble, by referring to the trouble-finding guide just given, the following instructions will tell you how to make most repairs yourself. You should have an electric soldering iron, small screw driver, tweezers, and wire cutters. With these tools, you can make most radio repairs.

**PHONES OR LOUD SPEAKER.** To find out if the phones or loud speaker are in working order, hold one cord terminal on one binding post of a single dry cell, while you touch the other cord terminal on the remaining binding post. A loud click shows that all is well. If no sound is made, the trouble may be either in the cord or in the instrument itself. Unscrew the cap of the phone or speaker, and apply the battery current to the binding posts inside the instrument. A click shows the instrument to be all right, which definitely locates the trouble in the cord. It is best to get a new one, as a worn out cord is like a rotten inner tube; ready to give trouble again at any time. If the phone still fails to respond, look for broken wires, solder them together, and drop a trace of shellac on the joint. If nothing wrong can be seen, take the instrument to a repair shop.

**TUBES.** A tube which has become paralyzed from too much "B" battery can usually be restored to working order by disconnecting the "B" battery entirely, and lighting the filament for about 20 minutes. If the filament is burned out, there is nothing to do but get a new tube.

**LOOSE OR BROKEN WIRES.** Broken wires in tuning coils, connections, etc., should be soldered, and the connection wrapped with a layer or two of insulating tape. Wires which are loose under the set-screws, should be clamped down tightly by means of a screw driver.

**FIXED CONDENSERS.** A fixed condenser is practically impossible to repair. The cost of replacement is slight, and a new one of the proper capacity should be provided. The capacity will be found stamped on most condensers.

**VARIABLE CONDENSERS.** These sometimes short-circuit due to dust on the plates. Clean the spaces between plates with a pipe cleaner, being careful not to bend the plates. If the rotating plates get out of alignment, so that the whole gang rubs against the stationary plates, use the adjusting screw on the end of the instrument to set them in alignment again. If only one or two plates touch, due to accidental bending, the judicious use of tweezers and screw driver may restore them to position. Poor connections within the condenser may be due to grease or weak spring contacts, or unsoldered or broken flexible contacts.

**SOCKETS.** The most common trouble with a tube socket is in weak or dirty springs. Polish the springs with sandpaper or a knife edge, and tighten the retaining screws. If any springs have become bent out of shape, bend them back with the tweezers.

**RHEOSTATS.** Sometimes the rheostat becomes loose, and causes the filament of the tubes to flicker. By means of the set-screw on the rotating arm, re-adjust the arm so that it bears down on the resistance coil with more pressure. In some rheostats there is a metal strip under the rotating collar, which should make contact with the collar. If the spring in this strip is weak, remove the collar and bend up the connecting strip; then replace the collar. This will put most any wire rheostat into working order.

**LOOSE DIALS.** Dials are held on by a set screw or clutch. Tighten the set screw, and if the threads are stripped, take out the screw, insert a tiny cylinder made by rolling a piece of paper, and again insert the screw, using only as much pressure as is needed to hold the dial.

**BURNED-OUT TRANSFORMERS** usually can not be repaired. It is so hopeless a task that you run little risk of further damage in opening the instrument yourself and searching for broken wires to solder. In most cases a burned out transformer is ready for discard.

**LOOSE TUBE PRONGS AND BASES** do no harm if not irritated by constant handling and twisting. The glass envelope is sealed independent of the base, and a loose base in no way affects the vacuum. The best course is to put the tube into the socket, and leave it there for the rest of its period of service.

**JACKS.** The usual trouble that comes to radio jacks is the weakening of the springs, which are, of course, the heart of the instrument. The only practical repair is to disconnect the wires from the back, by means of a soldering iron, completely take down the jack, bend the springs into shape, file lightly the contacts, and re-assemble. Don't push in the plug farther than necessary, and you will have no jack trouble.

**DUST AND MOISTURE.** These are the worst enemies of the radio set. Keep the cover of your set closed as much as possible, and keep it away from moist air currents. Dust contains much mineral matter, which causes leakage of the currents that should go to your phones. Frequently dust off the coils and other parts, and keep the set in a dry place.



## Common Questions and Answers

- Q. If a three-tube set will receive 1,500 miles, why won't a six or eight tube set receive 3,000 or 4,000 miles?
- A. Because the sensitivity of a receiving set is not the only factor that determines receiving range. If a broadcasting station can only send radio impulses to a distance of 1,000 miles, under normal conditions, it stands to reason that no receiving set will pick up the messages from that station at a distance of 1,500 miles, because (in a practical sense) the signals will not be there to pick up at that distance. **By increasing the sensitivity of a set to weak signals, you are at the same time increasing its sensitivity to static impulses.** There is a certain "threshold point" where static will drown signals completely, and any signals which are weaker than those which can barely be heard, will be lost in the static noise. Conceive of a gasoline tractor which would climb a 50% grade. Could you, by increasing the power of the machine, induce it to climb a vertical surface? The answer is obvious; on such a grade there would be no traction, nothing for the wheels to grip, and the increase in power would count for nothing. Too many persons look upon receiving range as merely a matter of getting an infinitely sensitive set, without considering that to get unlimited range they must first develop a transmitter with unlimited range, and reduce static and interference to zero; an impossibility.
- Q. If I get good results with a 60 foot aerial, why won't I get better results by adding more wires, and making them longer?
- A. Because there is a certain aerial that is best for your set. A shorter or a longer aerial will result in diminished sensitivity. Too long an aerial will absolutely prevent your receiving radio signals at all. Remember the story of the lady who had a mania for patent medicines? She acted on the supposition that "if a little's good, more's better," and took four times the prescribed dose. The analogy is evident.
- Q. If my set works well with 22½ volts "B" battery on the detector, as the instructions said, why not use a stronger battery, and get better results?
- A. See answer above. The same reasoning applies to batteries.
- Q. If I buy a set today, isn't it liable to be obsolete within a year?
- A. Although refinements in radio are constantly being made, no set built in the past ten years has become really obsolete. The underlying principles of radio do not change, and a set that does satisfactory service today, will perform just as well a year from today. Changes that are being made from day to day are concerned more with the cabinet work, and attractive workmanship of a set rather than with radical developments in design and principle. Take, for instance, the Superheterodyne, which is frequently referred to as the latest development. This set has been in use by advanced amateurs for six or seven years. It has only sprung



into popularity recently because people have become convinced of the permanency of radio, and are willing to pay for higher priced sets. When radio was considered as a fad, buyers hesitated to spend as much money on a radio set as they would on a phonograph. Now that radio is established as an institution, and there is a market for high priced sets, the principles which have been known for years are finding expression in the production for the market.

- Q. My set has a range of 200 to 600 meters wave length. How far does that mean it will receive?
- A. The term "wave-length" or "wave-frequency" has no direct relation to the sending power or range of a sending set, nor does it refer to the distance from which you can receive with a given receiving set. To say that a station is sending at 417 meters wave length is comparable to the statement that a violin string is tuned to "G" of the pianoforte. A low power radio transmitter with a maximum range of ten miles might be tuned to 417 meters, while another transmitter with a range of 1,000 miles could use the same wave length. Likewise, the violin string at "G" might be heard from a distance of 200 feet; a steam whistle also pitched at "G" might be audible from two miles away.

The question "How far will that set receive?" is seldom answered in an intelligent manner. Probably this is because the question itself is somewhat ambiguous. It amounts to saying: "How far can you hear the tone of middle C?" The answer to the latter is of course that it depends on the volume of that tone at its source; whether the tone is emitted by a steam whistle or a child's mouth organ; whether the sound originated in a valley or from a hill top; whether the listener was on a country prairie or in the midst of city traffic noises; whether the air was rare or dense, humid or dry. A rather mediocre receiving set may bring in signals from a 1,000 watt broadcasting station 800 miles away; but a receiving set that will record the signals from a "10 watter" 100 miles away will have accomplished a much greater feat.

# Radiophone Broadcasting Stations With Operator and Wave Length

## UNITED STATES STATIONS

Call	Operator	City	Wave Length Meters
AA3	Fitzsimmons General Hospital, U. S. A.		
		Denver, Colo.	440
AQ6	135th Field Artillery, O. N. G.....	Canton, Ohio	425
AT9	U. S. Field Artillery.....	Fort Bragg, N. C.	345
AV7	6th Inf. Minn. Nt'l Guard.....	St. Paul, Minn.	400
AW5	McCook Field, U. S. A.....	Dayton, Ohio	
KDBG	Thos. H. Ince Studios.....	Culver City, Calif.	146
KDKA	Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.		326
KDPM	Westinghouse Elec. & Mfg. Co.....	Cleveland, O.	270
KDPT	Southern Electric Co.....	San Diego, Calif.	244
KDYL	Newhouse Hotel.....	Salt Lake City, Utah	360
KDYM	Savoy Theater.....	San Diego, Calif.	280
KDYQ	Oregon Institute of Technology, Portland, Ore.		360
KDZB	Frank E. Siefert.....	Bakersfield, Calif.	240
KDZE	Rhodes Department Store.....	Seattle, Wash.	270
KDZI	Electric Supply Co.....	Wenatchee, Wash.	360
KDZR	Bellingham Publishing Co....	Bellingham, Wash.	261
KFAD	McArthur Bros. Mercantile Co....	Phoenix, Ariz.	360
KFAE	State College of Washington....	Pullman, Wash.	330
KFAF	Western Radio Corp.....	Denver, Colo.	360
KFAJ	University of Colorado.....	Boulder, Colo.	360
KFAR	Studio Lighting Service Co....	Hollywood, Calif.	280
KFAU	Boise H. S.....	Boise, Idaho	270
KFAW	The Radio Den.....	Santa Ana, Calif.	280
KFAY	Virgin's Radio Service.....	Medford, Ore.	283
KFBB	F. A. Buttrey & Co.....	Havre, Mont.	360
KFBC	W. K. Azvill.....	San Diego, Calif.	278
KFBE	Reuben H. Horn.....	San Luis Obispo, Calif.	242
KFBG	First Presbyterian Church....	Tacoma, Wash.	360
KFBK	Kimball-Upson Co.....	Sacramento, Calif.	283
KFBL	Leese Bros.....	Everett, Wash.	224
KFBS	Trinidad Gas & Electric Supply Co. and the Chronicle News, Trinidad, Colo.		360
KFBU	The Cathedral.....	Laramie, Wyo.	283
KFCB	Nielsen Radio Supply Co.....	Phoenix, Ariz.	278
KFCF	Frank A. Moore.....	Walla Walla, Wash.	360
KFCP	Ralph W. Flygars.....	Ogden, Utah	360
KFCV	Fred Mahaffey, Jr.....	Houston, Tex.	360
KFCZ	Omaha Central High School.....	Omaha, Nebr.	258
KFDD	St. Michael's Cathedral.....	Boise, Idaho	252
KFDH	University of Arizona.....	Tuscon, Ariz.	268
KFDJ	Oregon Agricultural College....	Corvallis, Ore.	360
KFDL	Knight Campbell Music Co.....	Denver, Colo.	226
KFDM	Magnolia Petroleum Co.....	Beaumont, Texas	
KFDX	First Baptist Church.....	Shreveport, La.	360
KFDY	South Dakota State College, Brookings, S. Dak.		360
KFDZ	Harry Q. Iverson.....	Minneapolis, Minn.	231
KFEC	Meier & Frank Co.....	Portland, Ore.	248

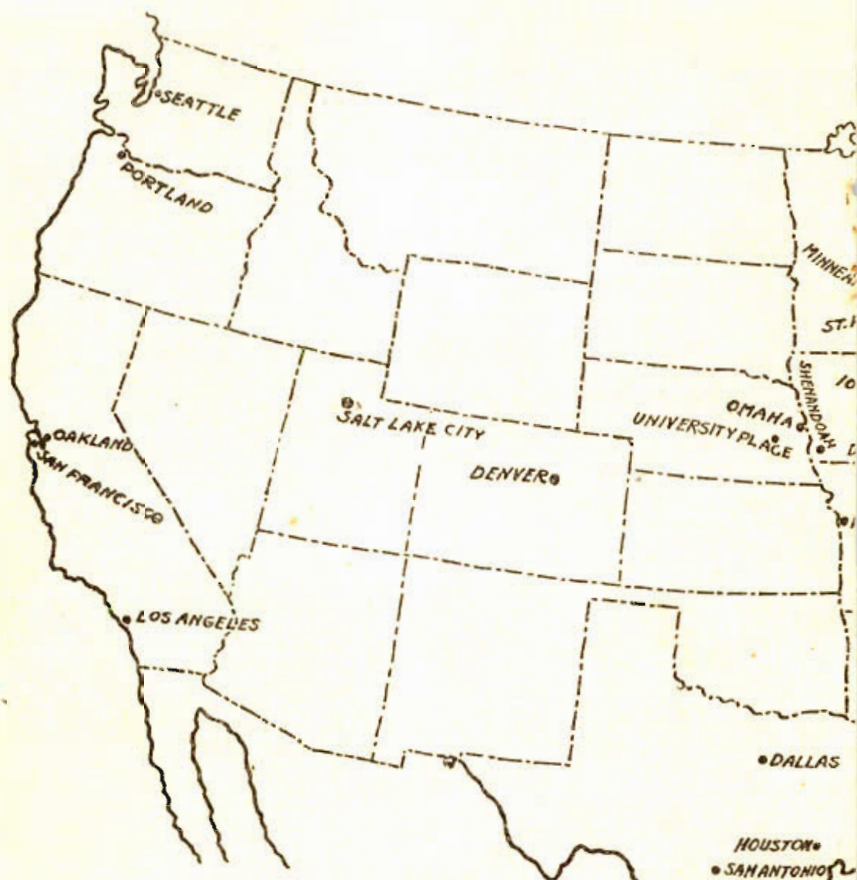


Call	Operator	City	Wave Length Meters
KFEL	Winner Radio Corporation.....	Denver, Colo.	254
KFEQ	J. L. Scroggin.....	Oak, Nebr.	268
KFER	Auto Electric Service Co.....	Fort Dodge, Iowa	231
KFEV	Felix Thompson Radio Shop.....	Casper, Wyo.	263
KFEX	Augsburg Seminary.....	Minneapolis, Minn.	261
KFEY	Bunker Hill & Sullivan Mining & Concentrating Co., Kellogg, Idaho.		360
KFEZ	Associated Engineering Societies of St. Louis, St. Louis, Mo.		248
KFFB	Jenkins Furniture Co.....	Boise, Idaho	273
KFFE	Eastern Oregon Radio Co.....	Pendleton, Ore.	360
KFFP	First Baptist Church.....	Moberly, Mo.	266
KFFR	Nevada State Journal.....	Sparks, Nev.	226
KFFV	Graceland College.....	Lamoni, Iowa	280
KFFX	McGraw Co.....	Omaha, Nebr.	278
KFFY	Pincus & Murphy, Inc.....	Alexandria, La.	275
KFGB	Heidbreder Radio Supply Co.....	Utica, Nebr.	224
KFGC	Louisiana State University...	Baton Rouge, La.	254
KFGD	Chickasha Radio & Elec. Co., Chickasha, Okla.		248
KFGH	Leland Stanford Junior University, Stanford Univ., Calif.		273
KFGL	Snell & Irby.....	Arlington, Ore.	234
KFGQ	Crary Hardware Co.....	Boone, Iowa	226
KFGX	First Presbyterian Church.....	Orange, Tex.	250
KFGZ	Emmanuel Missionary College, Berrien Springs, Mich.		286
KFHA	Western State College of Colo., Gunnison, Colo.		252
KFHJ	Fallon & Co.....	Santa Barbara, Calif.	360
KFHR	Star Electric & Radio Co.....	Seattle, Wash.	263
KFI	Earle C. Anthony (Inc.)....	Los Angeles, Calif.	469
KFIF	Benson Polytechnic Institute....	Portland, Ore.	360
KFIL	Windisch Elec. Farm Equip. Co., Louisburg, Kans.		234
KFIO	North Central High School....	Spokane, Wash.	252
KFIQ	Yakima Valley Radio Broadcasting Association, Yakima, Wash.		242
KFIU	Alaska Elec. Light & Power Co., Juneau, Alaska		226
KFIX	Reorganized Church of Jesus Christ of Latter Day Saints, Independence, Mo.		240
KFIZ	Daily Commonwealth and Oscar A. Huelsman, Fond-du-Lac, Wis.		273
KFJB	Marshall Electric Co.....	Marshalltown, Iowa	248
KFJF	National Radio Mfg. Co....	Oklahoma City, Okla.	252
KFJI	Liberty Theater.....	Astoria, Ore.	252
KFJK	Delano Radio & Electric Co....	Bristow, Okla.	233
KFJL	Hardsag Manufacturing Co....	Ottumwa, Iowa	242
KEJM	University of North Dakota, Grand Forks, N. D.		280
KFJQ	Electric Construction Co., Grand Forks, N. D.		280
KFJR	Ashley C. Dixon & Son.....	Stevensville, Mont.	258
KFJX	Iowa State Teachers College, Cedar Falls, Iowa		280
KFJY	Tunwall Radio Co.....	Fort Dodge, Iowa	246
KFJZ	Texas Nat'l Guard, 112 Cav., Fort Worth, Tex.		240
KFKA	Colorado State Teachers' Coll....	Greeley, Colo.	273
KFKB	Brinkley-Jones Hospital Assn., Milford, Kans.		286
KFKQ	Conway Radio Laboratories.....	Conway, Ark.	250
KFKV	F. F. Gray.....	Butte, Mont.	283
KFKX	Westinghouse Elec. & Mfg. Co., Hastings, Nebr.		341
KFKZ	Nassour Bros., Radio Co., Colorado Spgs, Colo.		234
KFLA	Abner R. Wilson.....	Butte, Mont.	283

Call	Operator	City	Wave Length Meters
KFLB	Signal Electric Mfg. Co.....	Menominee, Mich.	248
KFLD	Paul E. Greenlaw.....	Franklinton, La.	234
KFLE	National Education Service.....	Denver, Colo.	268
KFLQ	Bizzell Radio Shop.....	Little Rock, Ark.	261
KFLR	Univ. of New Mexico.....	Albuquerque, N. M.	254
KFLU	Rio Grande Radio Supply House, San Benito, Tex.		236
KFLV	A. T. Frykman.....	Rockford, Ill.	229
KFLW	Missoula Elec. Supply Co....	Missoula, Mont.	234
KFLX	George R. Clough.....	Galveston, Tex.	240
KFLY	Fargo Radio Supply Co.....	Fargo, N. Dak.	231
KFLZ	Atlantic Automobile Co.....	Atlantic, Iowa	273
KFMB	Christian Churches of Little Rock, Little Rock, Ark.		254
KFMQ	University of Arkansas.....	Fayetteville, Ark.	263
KFMR	Morningside College.....	Sioux City, Iowa	261
KFMT	George W. Young.....	Minneapolis, Minn.	231
KFMW	M. G. Satern.....	Houghton, Mich.	266
KFMX	Carleton College.....	Northfield, Minn.	283
KFNF	Henry Field Seed Co.....	Shenandoah, Iowa	266
KFNG	Wooten's Radio Shop.....	Coldwater, Miss.	254
KFNJ	Warrensburg Electric Shop..	Warrensburg, Mo.	234
KFNL	Radio Broadcast Assn.....	Paso Robles, Calif.	240
KFNV	L. A. Drake.....	Santa Rosa, Calif.	234
KFNX	Peabody Radio Service.....	Peabody, Kans.	240
KFNY	Montana Phonograph Co.....	Helena, Mont.	261
KFNZ	Royal Radio Co.....	Burlingame, Calif.	231
KFOA	Rhodes Co.....	Seattle, Wash.	455
KFOC	First Christian Church.....	Whittier, Calif.	236
KFOD	The Radio Shop.....	Wallace, Idaho	224
KFOF	Rohrer Elec. Co.....	Marshfield, Oregon	240
KFOJ	Moberly High School Radio Club,	Moberly, Mo.	246
KFON	Echophone Radio Shop.....	Long Beach, Calif.	234
KFOO	Latter Day Saints Univ..	Salt Lake City, Utah	261
KFOQ	Ora William Chancellor.....	Galveston, Texas	240
KFOR	David City Tire & Elect. Co..	David City, Nebr.	226
KFOT	College Hill Methodist Church..	Wichita, Kans.	231
KFOU	Hommel Mfg. Co.....	Richmond, Calif.	254
KFOX	Board of Ed., Tech. High.....	Omaha, Nebr.	248
KFOY	Beacon Radio Service.....	St. Paul, Minn.	226
KFOZ	Leon Hudson Real Estate Co..	Fort Smith, Ark.	233
KFPB	Edwin J. Brown.....	Seattle, Wash.	224
KFPG	Garretson & Dennis.....	Los Angeles, Calif.	238
KFPH	Harold Chas. Mailander..	Salt Lake City, Utah	242
KFPL	C. C. Baxter.....	Dublin, Texas	242
KFPM	New Furniture Co.....	Greenville, Texas	242
KFPN	National Guard.....	Jefferson City, Mo.	242
KFPO	Colorado National Guard.....	Denver, Colo.	231
KFPP	G. & G. Radio & Elec. Shop....	Olympia, Wash.	236
KFPQ	Clifford W. Esler.....	Denison, Texas	231
KFPR	Los Angeles Co. Forestry Dept., Los Angeles, Calif.		231
KEPT	Cape & Johnson.....	Salt Lake City, Utah	268
KFPV	Heintz & Kohlmoos, Inc..	San Francisco, Calif.	236
KFPW	St. John M. E. Church.....	Cartersville, Mo.	268
KFPX	First Presbyterian Church....	Pine Bluff, Ark.	242
KFPY	Symons Investment Co.....	Spokane, Wash.	283
KFQA	The Principia.....	St. Louis, Mo.	261
KFQB	Searchlight Publishing Co..	Fort Worth, Texas	254
KFQC	Kidd Bros. Radio Shop.....	Taft, Calif.	227

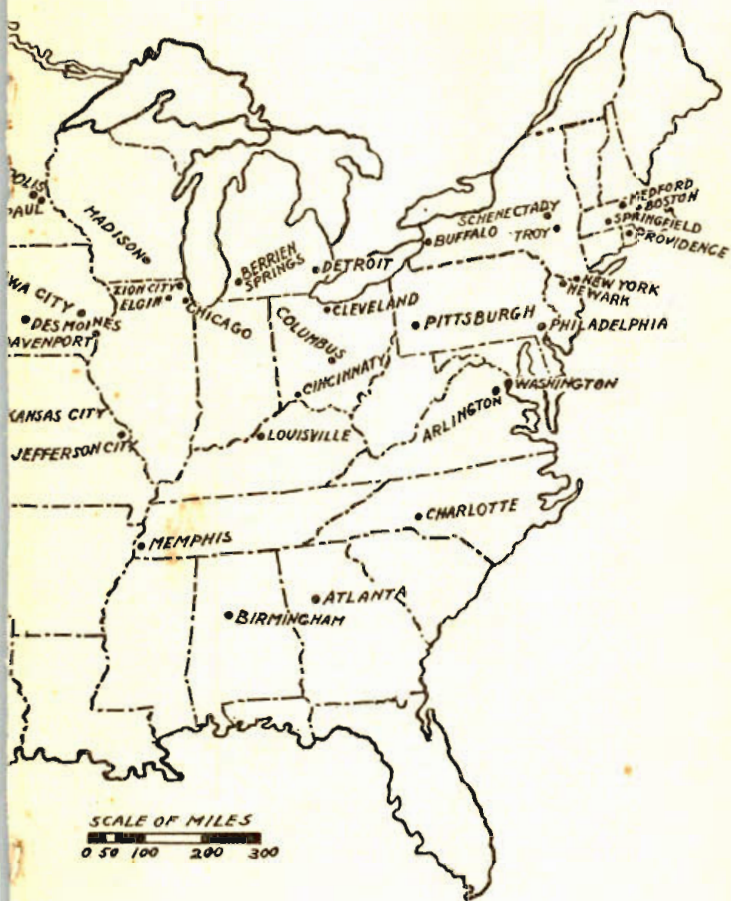


Call	Operator	City	Wave Length Meters
KFQD	Chovin Supply Co.....	Anchorage, Alaska	280
KFQE	Dickenson-Henry Radio Laboratories, Colorado Springs, Colo.		224
KFQF	Donald A. Boulton.....	Minneapolis, Minn.	224
KFQG	Southern Cal. Radio Assn.....	Los Angeles, Calif.	226
KFQH	Albert Sherman.....	Hillsborough, Calif.	231
KFQI	Thomas H. Ince, Corp.....	Culver City, Calif.	234
KFQJ	Harbour Longmire Co.....	Oklahoma City, Okla.	236
KFQK	Democrat Leader.....	Fayette, Mo.	236
KFQL	Okla. Free State Fair Assn.....	Muskogee, Okla.	252
KFQM	Texas Highway Bulletin.....	Austin, Texas	268
KFQN	Third Baptist Church.....	Portland, Ore.	283
KFQO	Meier Radio Shop.....	Russell, Kans.	261
KFQP	George F. Carson, Jr.....	Iowa City, Iowa	224
KFQR	Walter LaFayette Ellis, Oklahoma City, Okla.		250
KFQS	Dickinson-Henry Radio Labs...	Manitou, Colo.	246
KFQT	Texas National Guard.....	Dennison, Texas	252
KFQU	W. Riker.....	Holy City, Calif.	234
KFQV	Omaha Grain Exchange.....	Omaha, Nebr.	231
KFQW	The Photo, Radio & Elec. Shop, North Bend, Wash.		248
KFQX	Alfred M. Hubbard.....	Seattle, Wash.	233
KFQY	Farmers' State Bank.....	Belden, Nebr.	273
KFQZ	Taft Radio Co.....	Hollywood, Calif.	240
KFRC	Radiocast Studio.....	San Francisco, Calif.	280
KFRF	W. R. Brown.....	Alexandria, La.	242
KFRG	Cleveland High School.....	St. Louis, Mo.	236
KFRA	Marvin S. Olson.....	Carver, Minn.	240
KFRB	Hall Brothers.....	Beeville, Texas	248
KFRI	Reynolds Radio Co., Inc.....	Denver, Colo.	224
KFRJ	Guy Simmons, Jr.....	Conway, Ark.	250
KFSG	Echo Pk. Evangelistic Assn., Los Angeles, Calif.		278
KFSY	The Van Blaricom Co.....	Helena, Mont.	261
KGB	Tacoma Daily Ledger.....	Tacoma, Wash.	252
KGG	Hallock Watson Radio Service...	Portland, Ore.	360
KGO	General Electric Co.....	Oakland, Calif.	312
KGU	Marion A. Mulrony.....	Honolulu, Hawaii	360
KGW	Portland Morning Oregonian....	Portland, Ore.	492
KGY	St. Martins College.....	Lacey, Wash.	258
KHJ	Times-Mirror Co.....	Los Angeles, Calif.	395
KHQ	Louis Wasmer.....	Seattle, Wash.	300
KJQ	C. O. Gould.....	Stockton, Calif.	273
KJR	Northwest Radio Service Co.....	Seattle, Wash.	283
KJS	Bible Inst. of Los Angeles, Los Angeles, Calif.		360
KLS	Warner Bros. Radio Supplies Co., Oakland, Calif.		360
KLX	Tribune Publishing Co.....	Oakland, Calif.	500
KLZ	Reynolds Radio Co.....	Denver, Colo.	283
KMJ	San Joaquin Light & Power Corp., Fresno, Calif.		248
KMO	Love Electric Co.....	Tacoma, Wash.	360
KNT	Walter Hemrich.....	Kukak Bay, Alaska	263
KNX	Electric Lighting Supply Co., Los Angeles, Calif.		360
KOB	New Mexico College of Agriculture & Mechanic Arts, State College, N. Mex.		360
KOP	Detroit Police Department.....	Detroit, Mich.	286
KPO	Hale Bros.....	San Francisco, Calif.	423
KQP	Apple City Radio Club.....	Hood River, Ore.	360
KQV	Doubleday-Hill Electric Co.....	Pittsburgh, Pa.	270
KQW	Charles D. Herrold.....	San Jose, Calif.	360
KRE	Berkeley Daily Gazette.....	Berkeley, Calif.	275
KSD	Post-Dispatch.....	St. Louis, Mo.	546



**UNITED STATES**  
 LOCATIONS OF BROADCASTING STATIONS  
 WITH RANGE OF 1000 MILES OR MORE  
 UNDER GOOD WEATHER CONDITIONS





Call	Operator	City	Wave Length Meters
KTW	First Presbyterian Church.....	Seattle, Wash.	360
KUO	Examiner Printing Co.....	San Francisco, Calif.	360
KUY	Coast Radio Co.....	El Monte, Calif.	256
KWG	Portable Wireless Telephone Co.,	Stockton, Calif.	360
KWH	Los Angeles Examiner.....	Los Angeles, Calif.	360
KYQ	The Electric Shop.....	Honolulu, Hawaii	270
KYW	Westinghouse Electric & Mfg. Co.,	Chicago, Ill.	536
KZM	Preston D. Allen.....	Oakland, Calif.	360
NAA	United States Navy Dept.....	Radio, Va.	435
WAAB	Valdemar Jensen.....	New Orleans, La.	268
WAAC	Tulane University.....	New Orleans, La.	360
WAAD	Ohio Mechanics Institute.....	Cincinnati, Ohio	360
WAAF	Chicago Daily Drivers Journal.....	Chicago, Ill.	286
WAAM	I. R. Nelson Co.....	Newark, N. J.	263
WAAN	University of Missouri.....	Columbia, Mo.	254
WAAW	Omaha Grain Exchange.....	Omaha, Nebr.	286
WABA	Lake Forest University.....	Lake Forest, Ill.	266
WABB	Harrisburg Sporting Goods Co.,	Harrisburg, Pa.	266
WABD	Parker High School.....	Dayton, Ohio	283
WABE	Y. M. C. A.....	Washington, D. C.	283
WABG	Arnold Edwards Piano Co....	Jacksonville, Fla.	275
WABH	Lake Shore Tire Co.....	Sandusky, Ohio	240
WABI	Bangor Railway & Electric Co....	Bangor, Me.	240
WABL	Connecticut Agricultural College,	Storrs, Conn.	283
WABM	F. A. Doherty Automotive & Radio Equipment Co.,	Saginaw, Mich.	254
WABN	Ott Radio, Inc.....	La Crosse, Wis.	244
WABO	Lake Avenue Baptist Church,	Rochester, N. Y.	283
WABQ	Haverford College Radio Club,	Haverford, Pa.	261
WABR	Scott High School.....	Toledo, Ohio	270
WABT	Holliday-Hall Radio Engineers, Washington, Pa.		252
WABU	Victor Talking Machine Co.....	Camden, N. J.	226
WABW	College of Wooster.....	Wooster, Ohio	234
WABX	Henry B. Joy.....	Mount Clemens, Mich.	270
WABY	John Magaldi, Jr.....	Philadelphia, Pa.	242
WABZ	Coliseum Place Bapt. Church,	New Orleans, La.	263
WBAA	Purdue University.....	West Lafayette, Ind.	283
WAHG	A. H. Grebe & Co.....	Richmond Hill, N. Y.	316
WAR	Kopp Radio Co.....	Sisht, Wisc.	406
WBAK	Pennsylvania State Police....	Harrisburg, Pa.	400
WBAN	Wireless Phone Corporation....	Paterson, N. J.	244
WBAO	James Millikin University.....	Decatur, Ill.	360
WBAP	Wortham-Carter Pub. Co. (Star Telegram), Fort Worth, Tex.		476
WBAV	Erner & Hopkins Co.....	Columbus, Ohio	423
WBAX	John H. Stenger, Jr.....	Wilkes-Barre, Pa.	360
WBAY	Am. Tel. & Tel. Co.....	New York, N. Y.	492
WBBA	Newark Radio Laboratories....	Newark, Ohio	240
WBBD	Barbey Battery Service.....	Reading, Pa.	234
WBBF	Georgia School of Technology....	Atlanta, Ga.	270
WBBG	Irving Vermilya.....	Mattapoisett, Mass.	248
WBBH	J. Irving Bell.....	Port Huron, Mich.	246
WBBJ	Neel Electric Co....	West Palm Beach, Florida	258
WBBL	Grace Covenant Church.....	Richmond, Va.	283
WBBP	Petoskey High School.....	Petoskey, Mich.	246
WBBR	Peoples Pulpit Association....	Rossville, N. Y.	273
WBBT	Lloyd Bros.....	Philadelphia, Pa.	234
WBBU	Jenks Motor Sales Co.....	Monmouth, Ill.	224
WBBV	Johnstown Radio Co.....	Johnstown, Pa.	248



Call	Operator	City	Wave Length Meters
WBBW	Ruffner Junior High School.....	Norfolk, Va.	222
WBBY	Washington Light Infantry.....	Charleston, S. C.	268
WBBZ	Noble S. Watson.....	Indianapolis, Ind.	227
WBL	T. & H. Radio Co.....	Anthony, Kans.	254
WBR	Pennsylvania State Police.....	Butler, Pa.	159
WBS	D. W. May (Inc.).....	Newark, N. J.	360
WBT	Southern Radio Corporation....	Charlotte, N. C.	360
WBZ	Westinghouse Elec. & Mfg. Co., Springfield, Mass.		337
WCAD	St. Lawrence University.....	Canton, N. Y.	280
WCAE	Kaufmann & Bauer Co.....	Pittsburgh, Pa.	462
WCAG	Clyde R. Randall.....	New Orleans, La.	268
WCAH	Entrekin Electric Co.....	Columbus, Ohio	286
WCAJ	Nebraska Wesleyan University, University Place, Nebr.		283
WCAK	Alfred P. Daniel.....	Houston, Tex.	263
WCAL	St. Olaf College.....	Northfield, Minn.	360
WCAO	Sanders & Stayman Co.....	Baltimore, Md.	360
WCAP	Chesapeake & Potomac Tel. Co., Washington, D. C.		469
WCAR	Southern Radio Corp. of Texas, San Antonio, Tex.		360
WCAS	William Hood Dunwoody Industrial Institute, Minneapolis, Minn.		280
WCAT	South Dakota State School of Mines, Rapid City, S. Dak.		240
WCAU	Durham & Co.....	Philadelphia, Pa.	286
WCAV	J. C. Dice Electric Co.....	Little Rock, Ark.	360
WCAY	Milwaukee Civic Broadcasting Station, Milwaukee, Wis.		266
WCBA	Charles W. Helmbach.....	Allentown, Pa.	280
WCBC	University of Michigan.....	Ann Arbor, Mich.	280
WCBD	Wilbur G. Voliva.....	Zion, Ill.	345
WCBE	Uhalt Radio Co.....	New Orleans, La.	263
WCBF	Paul J. Miller.....	Pittsburgh, Pa.	236
WCBG	Howard S. Williams.....	Pascagoula, Miss.	268
WCBH	University of Mississippi.....	Oxford, Miss.	242
WCBJ	J. C. Mans.....	Jennings, La.	244
WCBK	E. Richard Hull.....	St. Petersburg, Fla.	255
WCL	Northern Radio Mfg. Co.....	Houlton, Me.	280
WCBM	Charles Schwarz.....	Baltimore, Md.	360
WCBO	The Radio Shop, Inc.....	Memphis, Tenn.	250
WCBQ	First Baptist Church.....	Nashville, Tenn.	236
WCBR	Chas. H. Messter.....	Providence, R. I.	246
WCBT	Clark University.....	Worcester, Mass.	238
WCBU	Arnold Wireless Supply Co.....	Arnold, Pa.	254
WCBV	Tullahoma Radio Club.....	Tullahoma, Tenn.	252
WCBW	Maitland Soloman & G. P. Rankin, Jr., Macon, Ga.		226
WCBX	Radio Shop of Newark.....	Newark, N. J.	233
WCBY	Forks Elec. Shop.....	Buck Hill Falls, Pa.	268
WCBZ	Coppotelli Brothers' Music House, Chicago Heights, Ill.		248
WCCO	Washburn Crosby Co.....	Mpls-St. Paul, Minn.	417
WCDA	Stix-Baer & Fuller Dry Goods Co.,	St. Louis, Mo.	360
WCX	Detroit Free Press.....	Detroit, Mich.	517
WDAE	Tampa Daily Times.....	Tampa, Fla.	360
WDAF	Kansas City Star.....	Kansas City, Mo.	411
WDAG	J. Laurance Martin.....	Amarillo, Tex.	263
WDAH	Trinity Meth. Church (South),	El Paso, Tex.	268

Call	Operator	City	Wave Length Meters
WDAP	Drake Hotel.....	Chicago, Ill.	360
WDAR	Lit Brothers.....	Philadelphia, Pa.	395
WDAS	Samuel A. Waite.....	Worcester, Mass.	360
WDAU	Slocum & Kilburn.....	New Bedford, Mass.	360
WDAY	Radio Equipment Corporation..	Fargo, N. Dak.	244
WDBB	H. Waite & Co.....	Taunton, Mass.	220
WDBC	Kirk, Johnson & Co.....	Lancaster, Pa.	258
WDBD	H. E. Burns.....	Martinsburg, W. Va.	268
WDBE	Gilham-Schoen Elec. Co.....	Atlanta, Ga.	252
WDBF	Robert G. Phillips.....	Youngstown, Ohio	246
WDBH	C. T. Sherer Co.....	Worcester, Mass.	268
WDBI	Radio Specialty Co.....	St. Petersburg, Fla.	226-300
WDBJ	Richardson-Wayland Elec. Corp.,	Roanoke, Va.	229
WDBN	Maine Elec. Light & Power Co...	Bangor, Me.	254
WDBO	Rollins College.....	Winter Park, Fla.	240
WDBP	Superior State Normal School,	Superior, Wis.	
WDBQ	Morton Radio Supply Co.....	Salem, N. J.	234
WDBR	Tremont Temple Baptist Church,	Boston, Mass.	256
WDBS	S. M. K. Radio Corp.....	Dayton, Ohio	283
WDBT	Taylor's Book Store.....	Hattiesburg, Miss.	236
WDBW	The Radio Den.....	Columbia, Tenn.	268
WDBX	Otto Baur.....	New York, N. Y.	233
WDBY	North Shore Cong. Church.....	Chicago, Ill.	258
WDBZ	Boy Scouts of America.....	Kingston, N. Y.	233
WDM	Church of the Covenant.....	Washington, D. C.	234
WDZ	James L. Bush.....	Tuscola, Ill.	278
WEAA	Frank D. Fallain.....	Flint, Mich.	250
WEAE	Polytechnic Institute.....	Blacksburg, Va.	360
WEAF	American Tel. & Tel. Co.....	New York, N. Y.	492
WEAH	Wichita Board of Trade.....	Wichita, Kans.	280
WEAI	Cornell University.....	Ithaca, N. Y.	286
WEAJ	University of South Dakota,	Vermilion, S. Dak.	283
WEAM	Borough of North Plainfield,	North Plainfield, N. J.	286
WEAN	Shepard Co.....	Providence, R. I.	273
WEAO	Ohio State University.....	Columbus, Ohio	360
WEAP	Mobile Radio Co.....	Mobile, Ala.	360
WEAR	Evening News Publishing Co.,	Baltimore, Md.	261
WEAU	Davidson Bros. Co.....	Sioux City, Iowa	360
WEAY	Iris Theater.....	Houston, Tex.	360
WEB	Benwood Co.....	St. Louis, Mo.	273
WEBA	The Electric Shop.....	New Brunswick, N. J.	233
WEBC	Walter Cecil Bridges.....	Superior, Wis.	242
WEBD	Elec. Equipment & Serv. Co.,	Anderson, Ind.	246
WEBE	Roy W. Waller.....	Cambridge, Ohio	248
WEBH	Edgewater Beach Hotel Co.....	Chicago, Ill.	360
WEBI	Walter H. Gibbons.....	Salisbury, Md.	242
WEBJ	Third Ave. Railway Co.....	New York, N. Y.	273
WEBK	Grand Rapids Radio Co.,	Grand Rapids, Mich	261
WEBL	Radio Corp. of America. (Portable Station)		226
WEBO	Radio Co.....	Hamilton, Ohio	250
WEBP	E. Budd Peddicord.....	New Orleans, La.	242
WEBQ	Tate Radio Co.....	Harrisburg, Illinois	226
WEER	H. H. Howell.....	Buffalo, N. Y.	240
WEET	Dayton Coop. Industrial School..	Dayton, Ohio	270
WERU	Deland Piano & Music Co.....	Deland, Fla.	258
WEBW	Beloit College.....	Beloit, Wisc.	283
WEI	Edison Station.....	Boston, Mass.	
WEV	Hurlburt-Still Electrical Co....	Houston, Texas	263
WEW	St. Louis University.....	St. Louis, Mo.	280



Call	Operator	City	Wave Length Meters
WFAA	Dallas News and Dallas Journal..	Dallas, Tex.	476
WFAB	Carl F. Woese.....	Syracuse, N. Y.	234
WFAM	Times Publishing Co.....	St. Cloud, Minn.	273
WFAN	Hutchinson Elec. Serv. Co.,	Hutchinson, Minn.	360
WFAV	University of Nebraska.....	Lincoln, Nebr.	275
WFBG	Eureka College.....	Eureka, Ill.	240
WFBG	Wm. F. Gable Co.....	Altoona, Pa.	261
WFBH	Concourse Radio Corp.....	New York, N. Y.	273
WFBJ	Galvin Radio Supply Co.....	Camden, N. J.	236
WFBJ	St. John's University.....	Collegeville, Minn.	236
WFI	Strawbridge & Clothier.....	Philadelphia, Pa.	395
WGAL	Lancaster Elec. Sup. & Const. Co.,	Lancaster, Pa.	248
WGAN	Cecil E. Lloyd.....	Pensacola, Fla.	360
WGAQ	W. G. Patterson.....	Shreveport, La.	252
WGAW	Ernest C. Albright.....	Altoona, Pa.	261
WGAZ	South Bend Tribune.....	South Bend, Ind.	360
WGBS	Gimbel Bros. ....	New York, N. Y.	316
WGI	American Radio and Research Corporation,	Medford Hillside, Mass.	360
WGL	Thomas F. J. Howlett.....	Philadelphia, Pa.	360
WGN	Chicago Radio Laboratory.....	Chicago, Ill.	448
WGR	Federal Tel. & Tel. Co.....	Buffalo, N. Y.	319
WGY	General Electric Co.....	Schenectady, N. Y.	380
WHA	University of Wisconsin.....	Madison, Wis.	360
WHAA	State University of Iowa.....	Iowa City, Iowa	484
WHAD	Marquette University.....	Milwaukee, Wis.	280
WHAG	University of Cincinnati.....	Cincinnati, Ohio	222
WHAH	Hafer Supply Co.....	Joplin, Mo.	283
WHAK	Roberts Hardware Co....	Clarksburg, W. Va.	258
WHAM	University of Rochester (Eastman School of Music),	Rochester, N. Y.	283
WHAR	Seaside House.....	Atlantic City, N. J.	275
WHAS	Courier-Journal and Louisville Times,	Louisville, Ky.	400
WHAV	Wilmington Elec. Spec. Co..	Wilmington, Del.	360
WHAZ	Rensselaer Polytechnic Institute...	Troy, N. Y.	380
WHB	Sweeney School Co.....	Kansas City, Mo.	411
WHK	Radiovox Co.....	Cleveland, Ohio	283
WHN	George Schubel.....	New York, N. Y.	360
WHO	Bankers Life Co.....	Des Moines, Iowa	526
WIAB	Art A. Johnson's Garage.....	Rockford, Ill.	252
WIAC	Galveston Tribune.....	Galveston, Tex.	360
WIAD	Howard R. Miller.....	Philadelphia, Pa.	254
WIAK	Journal-Stockman Co.....	Omaha, Nebr.	278
WIAO	School of Engineering of Milwaukee,	Milwaukee, Wis.	246
WIAS	Home Electric Co.....	Burlington, Iowa	283
WIAY	Woodward & Lathrop.....	Washington, D. C.	273
WIK	K. & L. Electric Co.....	McKeesport, Pa.	234
WIL	Continental Elec. Supply Co.,	Washington, D. C.	360
WIP	Gimbel Bros. ....	Philadelphia, Pa.	509
WJAB	American Elec. Co.....	Lincoln, Nebr.	229
WJAD	Jackson's Radio Eng'g Laboratories,	Waco, Tex.	360
WJAG	Norfolk Dairy News.....	Norfolk, Nebr.	283
WJAM	D. M. Perham.....	Cedar Rapids, Iowa	268
WJAN	Peoria Star.....	Peoria, Ill.	280
WJAQ	Capper Publications.....	Topeka, Kans.	360
WJAR	The Outlet Co.....	Providence, R. I.	360
WJAS	Pittsburgh Radio Sup. House,	Pittsburgh, Pa.	286

Call	Operator	City	Wave Length Meters
WJAX	Union Trust Co.....	Cleveland, Ohio	390
WJAZ	Chicago Radio Laboratory.....	Chicago, Ill.	268
WJD	Denison University.....	Granville, Ohio	229
WJJD	Mooseheart Radio Station....	Mooseheart, Ill.	278
WJY	Radio Corporation of America, New York, N. Y.		405
WJZ	Radio Corporation of America, New York, N. Y.		455
WKAA	H. F. Paar.....	Cedar Rapids, Iowa	278
WKAD	Charles Looff (Crescent Park), E. Providence, R. I.		240
WKAF	W. S. Radio Supply Co....	Wichita Falls, Tex.	360
WKAN	United Battery Service Co....	Montgomery, Ala.	226
WKAQ	Radio Corp. of Porto Rico, San Juan, P. R.		360
WKAR	Michigan Agri. College, East Lansing, Mich.		280
WKAV	Laconia Radio Club.....	Laconia, N. H.	254
WKBF	Dutee W. Flint, Inc.....	Providence, R. I.	286
WKY	WKY Radio Shop.....	Oklahoma, Okla.	360
WLAH	Samuel Woodworth.....	Syracuse, N. Y.	234
WLAL	Naylor Electrical Co.....	Tulsa, Okla.	360
WLAP	W. V. Jordan.....	Louisville, Ky.	286
WLAQ	Arthur E. Schilling.....	Kalamazoo, Mich.	283
WLAV	Electric Shop.....	Pensacola, Fla.	254
WLAW	Police Dept., City of N. Y....	New York, N. Y.	360
WLAX	Putnam Electric Co.....	Greencastle, Ind.	231
WLB	University of Minnesota.....	Minneapolis, Minn.	360
WLBL	Wisconsin Dept. of Markets, Stevens Pt., Wis.		278
WLS	Sears, Roebuck & Co.....	Chicago, Ill.	345
WLW	Crosley Manufacturing Co....	Cincinnati, Ohio	423
WMAC	Clive B. Meredith.....	Cazenovia, N. Y.	261
WMAF	Round Hills Radio Corp....	Dartmouth, Mass.	360
WMAH	General Supply Co.....	Lincoln, Nebr.	254
WMAK	Norton Laboratories.....	Lockport, N. Y.	273
WMAN	First Baptist Church.....	Columbus, Ohio	260
WMAQ	Chicago Daily News.....	Chicago, Ill.	448
WMAV	Alabama Polytechnic Institute... Auburn, Ala.		250
WMAZ	Kingshighway Presby. Church... St. Louis, Mo.		280
WMAZ	Mercer University.....	Macon, Ga.	261
WMC	Commercial Appeal.....	Memphis, Tenn.	500
WMH	Ainsworth-Gates Radio Co....	Cincinnati, Ohio	309
WMU	Doubleday-Hill Electric Co. Washington, D. C.		261
WNAC	Shepard Stores.....	Boston, Mass.	278
WNAD	University of Oklahoma.....	Norman, Okla.	360
WNAL	R. J. Rockwell.....	Omaha, Nebr.	266
WNAP	Wittenberg College.....	Springfield, Ohio	275
WNAR	C. C. Rhodes.....	Butler, Mo.	231
WNAT	Lenning Brothers Co.....	Philadelphia, Pa.	360
WNAW	Henry Kunzman... Box 167, Fort Monroe, Va.		360
WNAX	Dakota Radio Apparatus Co....	Yankton, S. Dak.	244
WNYC	Municipality of New York.....	New York City	526
WOAC	Page Organ Co. (H. P. Maus)....	Lima, Ohio	266
WOAE	Midland College.....	Fremont, Nebr.	280
WOAF	Tyler Commercial College.....	Tyler, Tex.	366
WOAH	Palmetto Radio Corporation, Charleston, S. C.		360
WOAI	Southern Equipment Co.....	San Antonio, Tex.	385
WOAN	James D. Vaughn.....	Lawrenceburg, Tenn.	360
WOAO	Lyradion Mfg. Co.....	Mishawaka, Ind.	360
WOAR	Henry P. Lundskow.....	Kenosha, Wisc.	229
WOAT	Boyd M. Hamp.....	Wilmington, Del.	360
WOAV	Pennsylvania Nat. Guard, 112th Inf..	Erie, Pa.	242
WOAW	Woodmen of the World.....	Omaha, Nebr.	526



Call	Operator	City	Wave Length Meters
WOAX	Franklyn J. Wolff.....	Trenton, N. J.	240
WOC	Palmer School of Chiropractic..	Davenport, Iowa	484
WOI	Iowa State College.....	Ames, Iowa	360
WOO	John Wanamaker.....	Philadelphia, Pa.	509
WOQ	Western Radio Co.....	Kansas City, Mo.	360
WOR	L. Bamberger & Co.....	Newark, N. J.	405
WOS	Missouri State Market'g Bur.,	Jefferson City, Mo.	441
WPAB	Pennsylvania State College..	State College, Pa.	283
WPAC	Donaldson Co.....	Okmulgee, Okla.	330
WPAJ	Doolittle Radio Corp.....	New Haven, Conn.	268
WPAK	North Dakota Agricultural College, Agricultural College, N. D.		283
WPAL	Avery & Loeb Electric Co....	Columbus, Ohio	286
WPAM	Auerbach & Guettel.....	Topeka, Kans.	360
WPAR	Ward Battery & Radio Co.....	Beloit, Kans.	230
WPAU	Concordia College.....	Moorhead, Minn.	286
WPAZ	John R. Koch.....	Charleston, W. Va.	273
WQAA	Horace A. Beale, Jr.....	Parkesburg, Pa.	360
WQAC	E. B. Gish.....	Amarillo, Texas	234
WQAE	Moore Radio News Station....	Springfield, Vt.	275
WQAF	Sandusky Register.....	Sandusky, Ohio	240
WQAM	Electrical Equipment Co.....	Miami, Fla.	283
WQAN	Scranton Times.....	Scranton, Pa.	280
WQAO	Calvary Baptist Church.....	New York, N. Y.	360
WQAQ	W. Texas Radio Co. (Abilene Dairy Reporter), Abilene, Texas		360
WQAS	Prince-Walter Co.....	Lowell, Mass.	266
WQAX	Radio Equipment Co.....	Peoria, Ill.	248
WQJ	Calumet Rainbow Broadcasting Co..	Chicago, Ill.	
WRAF	The Radio Club.....	Laporte, Ind.	224
WRAL	Northern States Power Co.,	St. Croix Falls, Wis.	248
WRAM	Lombard College.....	Galesburg, Ill.	244
WRAN	Black Hawk Electrical Co.....	Waterloo, Iowa	236
WRAO	St. Louis Radio Service Co.....	St. Louis, Mo.	360
WRAV	Antioch College.....	Yellow Springs, Ohio	242
WRAW	Avenue Radio Shop.....	Reading, Pa.	238
WRAX	Flexon's Garage.....	Gloucester City, N. J.	268
WRBC	Immanuel Lutheran Church....	Valpariso, Ind.	278
WRC	Radio Corp. of America.....	Washington, D. C.	469
WRK	Doron Bros. Electrical Co.....	Hamilton, Ohio	360
WRL	Union College.....	Schenectady, N. Y.	360
WRM	University of Illinois.....	Urbana, Ill.	360
WRR	City of Dallas, Police and Fire Signal Dept., Dallas, Texas		360
WRW	Tarrytown Radio Res'ch Lab.,	Tarrytown, N. Y.	273
WSAB	Southeast Missouri State Teachers College, Cape Girardeau, Mo.		360
WSAC	Clemson Agricultural Col.,	Clemson College, S.C.	360
WSAD	J. A. Foster Co.....	Providence, R. I.	261
WSAI	United States Playing Card Co.,	Cincinnati, O.	309
WSAJ	Grove City College.....	Grove City, Pa.	360
WSAN	Allentown Radio Club.....	Allentown, Pa.	229
WSAP	Seventh Day Adventist Temple....	N. Y. City	263
WSAR	Doughty & Welch Elec. Co.,	Fall River, Mass.	254
WSAU	Camp Marienfeld.....	Chesham, N. H.	229
WSAZ	Chase Electric Shop.....	Pomeroy, Ohio	258
WSB	Atlanta Journal.....	Atlanta, Ga.	429
WSL	J. & M. Electrical Co.....	Utica, N. Y.	273
WSOE	School of Engineering of Milwaukee, Milwaukee, Wisc.		246

Call	Operator	City	Wave Length Meters
WSY	Alabama Power Co.	Birmingham, Ala.	360
WTAB	Fall River Daily Herald	Fall River, Mass.	266
WTAC	Penn Traffic Co.	Johnstown, Pa.	275
WTAJ	Louis J. Gallo	New Orleans, La.	268
WTAG	Kern Music Co.	Providence, R. I.	258
WTAJ	The Radio Shop	Portland, Me.	236
WTAL	Toledo Radio & Electric Co.	Toledo, Ohio	252
WTAM	Willard Storage Battery Co.	Cleveland, Ohio	390
WTAP	Cambridge Radio & Elec. Co.	Cambridge, Ill.	242
WTAQ	S. H. Van Gorden & Son	Osseo, Wis.	254
WTAR	Reliance Electric Co.	Norfolk, Va.	280
WTAS	Charles E. Erbstein	Elgin, Ill.	286
WTAT	Edison Electric Illuminating Co.	Boston, Mass.	244
WTAU	Ruegg Battery & Elec. Co.	Tecumseh, Nebr.	242
WTAW	Agricultural and Mechanical College of Texas, College Station, Tex.		280
WTAX	Williams Hardware Co.	Streator, Ill.	231
WTAY	Oak Leaves Broadcasting Station, Oak Park, Ill.		283
WTAZ	Thomas J. McGuire	Lambertville, N. J.	283
WTG	Kansas State Agricultural College, Manhattan, Kans.		273
WTL	H. G. Saal Co.	Chicago, Ill.	268
WWAD	Wright & Wright (Inc.)	Philadelphia, Pa.	360
WWAE	Lawrence J. Crowley	Joliet, Ill.	227
WWAO	Michigan College of Mines	Houghton, Mich.	244
WWI	Ford Motor Co.	Dearborn, Mich.	273
WWJ	Detroit News	Detroit, Mich.	517
WWL	Loyola University	New Orleans, La.	280

### CANADIAN STATIONS

CFAC	Calgary Herald	Calgary, Alta.	430
CFCA	Toronto Star	Toronto, Ont.	400
CFCF	Marconi Wireless Tel. Co.	Montreal, P. Q.	400
CFCH	Abitibi Power & Paper Co.	Iroquois Falls, Ont.	400
CFCJ	Le Cie de L'Evenement	Quebec, P. Q.	410
CFCK	Radio Supply Co., Ltd.	Edmonton, Alta.	410
CFCN	W. W. Grant	Calgary, Alta.	440
CFCO	Semmelhaack-Dickson, Ltd.	Bellevue, P. Q.	450
CFCQ	Radio Specialties, Ltd.	Vancouver, B. C.	450
CFCR	Laurentide Air Service	Sudbury, Ont.	450
CFCT	Victoria City Temple	Victoria, B. C.	410
CFCW	London Radio Co.	London, Ont.	420
CFCX	Westminster Trust Co., New Westminster	B. C.	440
CFDC	Sparks Co.	Nanaimo, B. C.	430
CFDQ	The Elec. Shop, Ltd.	Saskatoon, Sask.	400
CFRC	Queen's University	Kingston, Ont.	450
CFUC	Univ. of Montreal	Montreal, P. Q.	400
CFXC	Westminster Trust Co., New Westminster	B. C.	440
CFYC	Victor W. Odium	Vancouver, B. C.	400
CHAC	Radio Engineers	Hallifax, N. S.	400
CHBC	The Calgary Albertan	Calgary, Alta.	410
CHCB	Marconi Wireless Tel. Co.	Toronto, Ont.	440
CHCD	Canadian Wireless & Elec. Co.	Quebec, P. Q.	410
CHCE	Western Canadian Radio Supply, Ltd., Victoria, B. C.		310-400
CHCL	Vancouver Merchants Exch., Ltd., Vancouver, B. C.		440
CHCM	W. W. Grant	Calgary, Alta.	440



Call	Operator	City	Wave Length Meters
CHCS	Hamilton Spectator Bldg.....	Hamilton, Ont.	410
CHNC	Toronto Radio Research Soc.....	Toronto, Ont.	350
CHYC	Northern Elec. Co.....	Montreal, P. Q.	341
CJCA	Edmonton Journal, Ltd.....	Edmonton, Alta.	450
CJCD	T. Eaton Co.....	Toronto, Ont.	410
CJCE	Sprott-Shaw Radio Co.....	Vancouver, B. C.	420
CJCI	Maritime Radio Corp, Ltd.....	St. John, N. B.	400
CJCM	Dr. J. L. P. Landry.....	Mont Joli, P. Q.	312
CJCN	Simons Agnew & Co.....	Toronto, Ont.	410
CJCX	Percival W. Shackleton.....	Olds, Alta.	400
CJGC	London Free Press.....	London, Ont.	430
CJSC	The Evening Telegram.....	Toronto, Ont.	430
CKAC	La Presse.....	Montreal, P. Q.	425
CKCD	Vancouver Daily Province....	Vancouver, B. C.	410
CKCE	Can. Ind. Telephone Co.....	Toronto, Ont.	450
CKCI	Daily "Le Soleil".....	Quebec City	285
CKCK	Leader Pub. Co.....	Regina, Sask.	420
CKCO	Dr. G. M. Geldert.....	Ottawa, Ont.	400
CKCX	P. Burns & Co., Ltd.....	Calgary, Alta.	440
CKOC	Wentworth Radio Supply Co....	Hamilton, Ont.	410
CKY	Manitoba Tel. System.....	Winnipeg, Man.	450
CNRA	Canadian National Railways..	Moncton, N. B.	313
CNRC	Canadian National Railways..	Calgary, Alberta	440
CNRE	Canadian National Railways..	Edmonton, Alta.	450
CNRM	Canadian National Railways..	Montreal, P. Q.	341
CNRO	Canadian National Railways....	Ottawa, Ont.	435
CNRR	Canadian National Railways....	Regina, Sask.	420
CNRS	Canadian National Railways....	Saskatoon, Sask.	400
CNRT	Canadian National Railways....	Toronto, Ont.	400
CNRW	Canadian National Railways..	Winnipeg, Man.	450

#### BRITISH STATIONS

2LO	London .....	365
5IT	Birmingham .....	475
5WA	Cardiff .....	350
6BM	Bournemouth .....	385
2ZY	Manchester .....	375
5NO	Newcastle .....	400
5SC	Glasgow .....	420
2BD	Aberdeen .....	495
6SL	Sheffield (relay station) .....	303

#### FRENCH STATIONS

YN	Lyon .....	740
FL	Paris (Eiffel Tower).....	2,600
ESP	Paris .....	450
SAJ	Paris .....	1,780

#### CUBAN STATIONS

PWX	Cuban Telephone Co.....	Havana	400
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# Radiophone Broadcasting Stations in North America, Classified Alphabetically by States and Cities

State, City, Call	State, City, Call
<b>Alabama:</b>	<b>Colorado:</b>
Auburn, WMAV	Boulder, KFAJ
Birmingham, WSY	Colorado Springs, KFKZ,
Mobile, WEAP	KFQE
Montgomery, WKAN	Denver, A A 3, KFAF,
<b>Arizona:</b>	KFEL, KFLE, KFPO,
Phoenix, KFAD, KFCB	KLZ, KFDD
Tucson, KFDH	Greeley, KFKA
<b>Arkansas:</b>	Gunnison, KFHA
Conway, KFKQ	Manitou, KFQS
Fayetteville, KFMQ	Trinidad, KFBS
Fort Smith, KFOZ	<b>Connecticut:</b>
Little Rock, KFLQ, KFMB,	Hartford, WDAK
WCAV	New Haven, WPAJ
Pine Bluff, KFPX	Storrs, WABL
<b>California:</b>	<b>Delaware:</b>
Bakersfield, KDZB	Wilmington, W H A V,
Berkeley, KRE	WOAT
Burlingame, KFNZ	<b>District of Columbia:</b>
Culver, KDBG, KFQI	Washington, W A B E,
El Monte, KUY	WCAP, WDM, WIL,
Fresno, KMJ	WMU, WRC
Hillsborough, KFQH	<b>Florida:</b>
Hollywood, KFAR, KFOZ	Miami, WQAM
Holy City, KFQU	Pensacola, WGAN
Long Beach, KFON	St. Petersburg, WCBK,
Los Angeles, KFCL, KFI,	WDBI
KFPG, KFPR, KFQG,	Tampa, WDAE
KFSG, KHJ, KJS, KNX	West Palm Beach, WBBJ
Oakland, KGO, KLS, KLX,	Winter Park, WDBO
KZM	<b>Georgia:</b>
Paso Robles, KFNL	Atlanta, WBBF, WDBE,
Richmond, KFOU	WSB
Sacramento, KFBB	Columbus, WDEA
San Diego, KDPT, KDYM,	Macon, WCBW, WMAZ
KFBC	<b>Idaho:</b>
San Francisco, KFPV,	Boise, KFAU, KFDD,
KPO, KUO, KFRC	KFFB
San Jose, KQW	Kellogg, KFEY
San Luis Obispo, KFBE	Wallace, KFOD
Santa Ana, KFAW	
Santa Barbara, KFHH	
Santa Rosa, KFNV	
Stanford Univ., KFGH	
Stockton, KJQ, KWG	
Taft, KFQC	
Whittier, KFOC	



**State, City, Call****State, City, Call****Illinois:**

Belvidere, WOAG  
 Cambridge, WTAP  
 Carthage, WCAZ  
 Chicago, KYW, WAAF,  
 WBBM, WDBY, WEBH,  
 WGN, WJAZ, WLS,  
 WMAQ, WQJ, WTL  
 Chicago Heights, WCBZ  
 Decatur, WBAO  
 Elgin, WTAS  
 Eureka, WFBB  
 Galesburg, WRAM  
 Joliet, WWAJ  
 Monmouth, WBBU  
 Mooseheart, WJJD  
 Oak Park, WTAY  
 Peoria, WJAN, WQAX  
 Rockford, KFLV, WIAB  
 Streator, WTAX  
 Tuscola, WDZ  
 Urbana, WRM  
 Zion, WCBZ

**Indiana:**

Anderson, WEBD  
 Fort Benjamin Harrison,  
 WCBN  
 Fort Wayne, WDBY  
 Greencastle, WLAX  
 Greentown, WJAK  
 Indianapolis, WBBZ  
 Laporte, WRAF  
 Marion, WIAQ  
 Mishawaka, WAOO  
 South Bend, WGAZ  
 Valpariso, WRBC  
 West Lafayette, WBAA

**Iowa:**

Ames, WOI  
 Atlantic, KFLZ  
 Boone, KFGQ  
 Burlington, WIAS  
 Cedar Falls, KFJX  
 Cedar Rapids, WJAM,  
 WKAA  
 Davenport, WOC  
 Des Moines, WHO  
 Fort Dodge, KFER, KFJY  
 Iowa City, KFQP, WHAA  
 Lamoni, KFFV  
 Marengo, KFOL  
 Marshalltown, KFJB  
 Ottumwa, KFJL  
 Shenandoah, KFNF  
 Sioux City, KFMR, WEAU  
 Waterloo, WRAN

**Kansas:**

Anthony, WBL  
 Beloit, WPAR  
 Louisburg, KFIL  
 Manhattan, WTG  
 Milford, KFKB  
 Russell, KFQO  
 Topeka, WPAM, WJAQ  
 Wichita, KFOT, WEAH

**Kentucky:**

Louisville, WHAS, WLAP

**Louisiana:**

Alexandria, KFFY  
 Baton Rouge, KFGC  
 Franklinton, KFLD  
 Jennings, WCBJ  
 New Orleans, WAAB,  
 WAAC, WABZ, WCAG,  
 WCBE, WEBP, WTAJ,  
 WWL  
 Shreveport, KFDF, WGAQ

**Maine:**

Bangor, WABI, WDBN  
 Houlton, WCBL  
 Portland, WTAJ  
 Skowhegan, WDBU

**Maryland:**

Baltimore, WCAO, WCBM,  
 WEAR  
 Salisbury, WEBI

**Massachusetts:**

Boston, WDBR, WNAC,  
 WTAT, WEEI  
 Dartmouth, WMAF  
 Fall River, WSAR, WTAB  
 Lowell, WQAS  
 Mattapoisett, WBBG  
 Medford Hillside, WGI  
 New Bedford, WDAU  
 Springfield, WBZ  
 Taunton, WDBB  
 Worcester, WCBT, WDAS,  
 WDBH

**Michigan:**

Ann Arbor, WCBC  
 Berrien Springs, KFGZ  
 Dearborn, WWI  
 Detroit, KOP, WCX, WWJ

**State, City, Call****Michigan:**

East Lansing, WKAR  
 Flint, WEEA  
 Grand Rapids, WEBK  
 Houghton, KFMW, WWAQ  
 Kalamazoo, WLAQ  
 Mt. Clemens, WABX  
 Petoskey, WBBP  
 Port Huron, WBBH  
 Saginaw, WABM

**Minnesota:**

Carver, KFRA  
 Collegeville, WFBJ  
 Hutchinson, WFAN  
 Minneapolis, K F D Z,  
 KFEX, KFMT, KFQF,  
 WCCO, WLB  
 Moorhead, WPAU  
 Northfield, KFMX, WCAL  
 St. Cloud, WFAM  
 St. Paul, AV7, KFOY

**Mississippi:**

Coldwater, KFNG  
 Hattiesburg, WDBT  
 Oxford, WCBH  
 Ruleville, WCBG

**Missouri:**

Butler, WNAR  
 Cape Girardeau, WSAB  
 Cartersville, KFPW  
 Columbia, WAAN  
 Fayette, KFQK  
 Independence, KFIX  
 Jefferson City, KFPN,  
 WOS  
 Joplin, WHAH  
 Kansas City, WDAF,  
 WHB, WOQ  
 Moberly, KFFP, KFOJ  
 St. Joseph, KFHD  
 St. Louis, KFQA, KSD,  
 WCK, WEB, WEW,  
 WMAY, WRAO  
 Warrensburg, KFNJ

**Montana:**

Butte, KFKV, KFLA  
 Havre, KFBB  
 Helena, KFNY  
 Missoula, KFLW

**Nebraska:**

Belden, KFQY  
 David City, KFOR  
 Fremont, WOAE  
 Hastings, KFKX  
 Lincoln, WFAV, WJAB,  
 WMAH

**State, City, Call**

Norfolk, WJAG  
 Oak, KFEQ  
 Omaha, KFCZ, KFFX,  
 KFOX, KFQV, WAAW,  
 WIAK, WNAL, WOAW  
 Tecumseh, WTAU  
 University Place, WCAJ

**Nevada:**

Sparks, KFFR

**New Hampshire:**

Chesham, WSAU  
 Laconia, WKAV

**New Jersey:**

Atlantic City, WHAR  
 Camden, WABU, WFBI  
 Gloucester City, WRAX  
 Lambertville, WTAZ  
 Newark, WAAM, WBS,  
 WCBX, WOR  
 New Brunswick, WEBA  
 North Plainfield, WEAM  
 Paterson, WBAN  
 Salem, WDBQ  
 Trenton, WMAL, WOAX,  
 WWAB

**New Mexico:**

Albuquerque, KFLR  
 State College, KOB

**New York:**

Buffalo, WGR  
 Canton, WCAD  
 Cazenovia, WMAC  
 Ithaca, WEAI  
 Kingston, WDBZ  
 Lockport, WMAK  
 New York, WBAV, WBBR,  
 WDBX, WEAF, WEBJ,  
 WFBH, WHN, WJY,  
 WJZ, WLAW, WNYC,  
 WQAO, WSAP  
 Richmond Hill, WAHG  
 Rochester, WABO, WHAM  
 Schenectady, WGY, WRL  
 Syracuse, WFAW, WLAH  
 Tarrytown, WRW  
 Troy, WHAZ  
 Utica, WSL

**North Carolina:**

Charlotte, WBT  
 Fort Bragg, AT9  
 Wilmington, WBBN



**State, City, Call****North Dakota:**

Fargo, WDAY, WPAK  
 Grand Forks, KFJM,  
 KFJQ

**Ohio:**

Canton, AQ6  
 Cambridge, WEBE  
 Cincinnati, WAAD, WHAG,  
 WLW, WMH, WSAI  
 Cleveland, KDPM, WDBK,  
 WHK, WJAX, WTAM  
 Columbus, WBAV, WCAH,  
 WEAO, WMAN, WPAL  
 Dayton, AW5, WABD,  
 WDBS  
 Dover, WABP  
 Granville, WJD  
 Hamilton, WRK, WEBO  
 Lima, WOAC  
 Newark, WBBA  
 Pomeroy, WSAZ  
 Sandusky, WABH, WQAF  
 Springfield, WNAF  
 Toledo, WABR, WTAL  
 Wooster, WABW  
 Yellow Springs, WRAV  
 Youngstown, WDBF

**Oklahoma:**

Bristow, KFJK  
 Chickasha, KFGD  
 Muskogee, KFQL  
 Norman, WNAD  
 Oklahoma City, KFJF,  
 KFQJ, KFQR, WKY  
 Okmulgee, WPAC  
 Tulsa, WGAF, WLAL

**Oregon:**

Arlington, KFGL  
 Astoria, KFJI  
 Corvallis, KFDJ  
 Hood River, KQP  
 Marshfield, KFOF  
 Medford, KFAY  
 Pendleton, KFEE  
 Portland, KDYQ, KFEC,  
 KFIF, KFQN, KGG,  
 KGW

**Pennsylvania:**

Allentown, WCBA, WSAN  
 Altoona, WFBG  
 Arnold, WCBU  
 Buck Hill Falls, WCBY  
 Butler, WBR  
 East Pittsburgh, KDKA  
 Erie, WOAV  
 Grove City, WSAJ

**State, City, Call**

Harrisburg, WABB, WBAK  
 Haverford, WABQ  
 Johnston, WBBV, WTAC  
 Lancaster, WDBC, WGAL  
 McKeesport, WIK  
 Parkersburg, WQAA  
 Philadelphia, W A B Y,  
 WBTT, WCAU, WDAR,  
 WFI, WGL, WIAD, WIP,  
 WNAT, WOO, WWAD  
 Pittsburgh, KQV, WCAE,  
 WCBF, WJAS  
 Reading, WBBB, WRAW  
 Scranton, WQAN  
 State College, WPAB  
 Washington, WABT  
 Wilkes-Barre, WBAX

**Rhode Island:**

Cranston, WKBF  
 East Providence, WKAD  
 Providence, W C B R,  
 WEAN, WJAR, WKBF,  
 WSAD, WTAG

**South Carolina:**

Charleston, WBBY, WOAH  
 Clemson College, WSAC

**South Dakota:**

Brookings, KFDY  
 Rapid City, WCAT  
 Vermillion, WEAJ  
 Yankton, WNAX

**Tennessee:**

Columbia, WDBW  
 Lawrenceburg, WOAN  
 Memphis, WCBO, WMC  
 Nashville, WCBQ  
 Tulsa, WCBV

**Texas:**

Abilene, WQAQ  
 Amarillo, WDAG, WQAC  
 Austin, KFQM  
 Beeville, KFRB  
 College Station, WTAW  
 Dallas, WFAA, WRR  
 Denison, KFQT, KFPQ  
 Dublin, KFPL  
 El Paso, WDAH  
 Fort Worth, KFJZ, KFQB,  
 WBAP  
 Galveston, KFLX, KFOQ,  
 WIAC  
 Greenville, KFPM  
 Houston, KFCV, WCAK,  
 WEAY, WEV, WSAV

**State, City, Call****Texas:**

Orange, KFGX  
 Port Arthur, WFAH  
 San Antonio, W C A R,  
 WOAI  
 San Benito, KFLU  
 Tyler, WOAF  
 Waco, WJAD  
 Wichita Falls, WKAF

**Utah:**

Ogden, KFCP  
 Salt Lake City, KDYL,  
 KFPT, KFOO, KFPH

**Vermont:**

Springfield, WQAE

**Virginia:**

Blacksburg, WEAE  
 Fortress Monroe, WNAW  
 Norfolk, WBBW, WTAR  
 Radio, NAA  
 Richmond, WBBL  
 Roanoke, WDBJ

**Washington:**

Bellingham, KDZR  
 Everett, KFBL  
 Lacey, KGY  
 Neah Bay, KFHH  
 North Bend, KFQW  
 Olympia, KFPP  
 Pullman, KFAE  
 Seattle, KDZE, KFHR,  
 KFJC, KFOA, KFPP,  
 KFQX, KHQ, KJR, KTW  
 Spokane, KFIO, KFPY  
 Tacoma, KFBG, KGB, KMO  
 Walla Walla, KFCF  
 Yakima, KFIQ

**West Virginia:**

Charleston, WPAZ  
 Clarksburg, WHAK  
 Martinsburg, WDBD

**Wisconsin:**

Fond du Lac, KFIZ  
 Kenosha, WOAR  
 La Crosse, WABN  
 Madison, WHA  
 Milwaukee, W C A Y,  
 WHAD, WIAO, WSOE

**State, City, Call**

Osseo, WTAQ  
 Sisiht, WAR  
 St. Croix Falls, WRAL  
 Stevens Point, WLBL  
 Superior, WDBP, WEBC

**Wyoming:**

Casper, KFEV, KFPS  
 Laramie, KFBU

**Alaska:**

Anchorage, KFQD  
 Juneau, KFIU  
 Kukak Bay, KNT

**Hawaii:**

Honolulu, KGU, KYQ

**Porto Rico:**

San Juan, WKAQ

**Canada:**

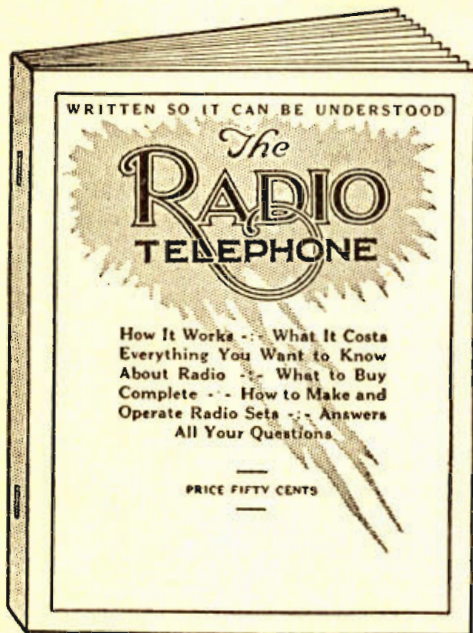
Bellevue, CFCO  
 Calgary, CFAC, CFCN,  
 CHBC, CHCM, CKCX  
 Edmonton, CFCK, CJCA  
 Halifax, CHAC  
 Hamilton, CHCS, CKOC  
 Iroquois Falls, CFCH  
 Kingston, CFRC  
 London, CFCW, CJGC  
 Mont-Joli, CJCM  
 Montreal, CFCF, CFUC,  
 CHYC, CKAC  
 Nanaimo, CFDC  
 New Westminster, CFXC  
 Olds, CJCX  
 Ottawa, OA, CKCO, CNRO  
 Quebec, CFCJ, CHCD,  
 CKCI  
 Regina, CKCK  
 St. John, CJCI  
 Saskatoon, CFQC  
 Sudbury, CFCR  
 Toronto, CFCA, CHCB,  
 CHNC, CJCD, CJCN,  
 CJSC, CKCE  
 Vancouver, CFCQ, CFYC,  
 CHCL, CJCE, CKCD  
 Victoria, CFCL, CHCE  
 Winnipeg, CKY

**Cuba:**

Havana, PWX



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A	---	N	---
B	----	O	-----
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F	-----	S	----
G	-----	T	---
H	----	U	-----
I	--	V	-----
J	-----	W	-----
K	-----	X	-----
L	-----	Y	-----
M	-----	Z	-----

Period ---

Interrogation -----

Error -----

Comma -----

1	-----	6	-----
2	-----	7	-----
3	-----	8	-----
4	-----	9	-----
5	-----	0	-----

**Continental (International Morse) Code**



## STATIONS HEARD

CALL	LOCATION	DATE	REMARKS
<u>Monday</u>			
WEAF	Hillsborough	8.30 P.M.	
WEAFA	P. Gypsy	9 P.M.	
<u>Tuesday</u>			
WJZ	To be wed	8.15 P.M.	
"	Champion Jack	8.30 P.M.	











## Stations Heard—Continued

CALL	LOCATION	DATE	REMARKS
WPCB	- 29		
WVCA	- 41		







