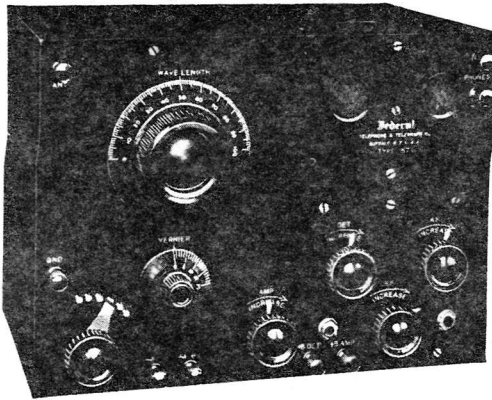


INSTRUCTIONS
for
Installation and Operation
of the

Federal



Type 57
Radio Broadcast Receiver

Radio in your home

Federal Telephone & Telegraph Co.
Buffalo, New York

INSTRUCTIONS FOR THE INSTALLATION AND OPERATION

of the

Federal No. 57 RECEIVER

THE RECEIVER: The Federal No. 57 receiver is of the single tuned circuit type supplied with one stage of radio frequency amplification and two stages of voice frequency amplification.

It is supplied with a number of control knobs for the tuning of the receiver and for the adjustment and control of the amplifier which is a part of the receiver. Two major controls are provided for tuning. These are the wavelength control knob and the vernier control knob. The rotation of these knobs alters the tuning of the receiver and allows the reception of the signals of any of the American or Canadian broadcasting stations operating between 275 and 600 meters.

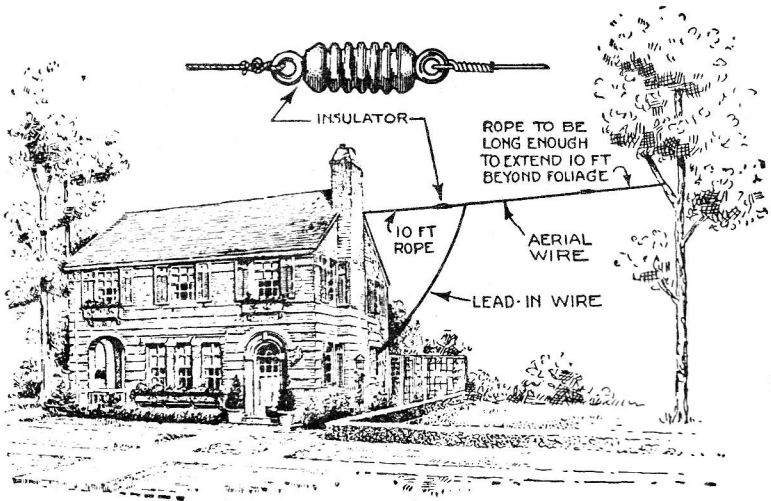
The "Wave Length" or antenna series control knob provides means for approximate tuning while the "Vernier" provides means for the very gradual and precise tuning of the receiver. The antenna inductance switch in the lower left hand corner of the panel may be used for making great changes in the tuning of the receiver, but its primary function is merely to make possible an initial adjustment of the receiver to whatever type of antenna it may be connected.

The three rheostat control knobs on the right hand half of the panel, control the brilliancy of the vacuum tube filaments. The telephone jacks provide convenient means for making connection between the telephones and the receiver, while the amplification control knob makes possible the easy control of the degree of amplification which is available in the receiver.

This receiver requires for its operation an antenna in the form of elevated wires, connection to the ground, four vacuum tubes, properly chosen storage and dry batteries, and headset telephones, loud speaking telephones or other sound reproducing mechanism. These are described in the following:

THE ANTENNA: To secure the best operation of this receiver an outdoor antenna suspended well above ground should be used. This antenna can be erected most simply as shown in the illustration. It should be supported as high above ground as possible, and its length should not be less than 70 ft., nor more than 150 ft. where a single wire is used.

Several wires secured to wooden spars may, of course, be substituted for the simple single wire antenna, and where such an antenna is used, it may be proportionately shorter than the single wire antenna. It is advisable, however, that the antenna be as high above ground as possible, and that the space between it and the ground be free of trees, shrubs or structures of any kind. It must be carefully insulated at its points of support by means of any of the commonly available antenna insulators, and when one end of it is supported in a tree or near a metal structure, the antenna conductor



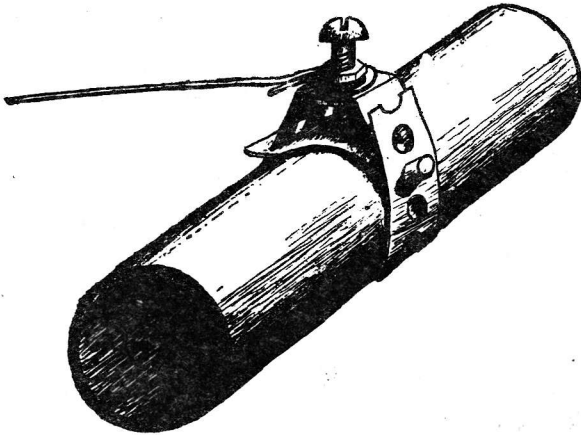
should not be less than 10 ft. away from the foliage of the tree or the metal of the structure. To this end it will be found best to use rope for supporting the antenna, so that the conductor of the antenna may be absolutely free from contact with the foliage, and be sufficiently removed from the influence of the metal structure.

A sturdy copper wire should be used for the antenna conductor. This should be not smaller in size than No. 16 B. & S. gauge, and the antenna should, if possible, be free of joints in the conductor. Where it is found impossible to make the antenna of one continuous piece of copper wire from its remote end to the apparatus, the joint should be carefully soldered and then protected against corrosion, by securely wrapping with tape. That part of the antenna conductor which connects the elevated portion of the antenna and the receiver, should be as short as it is possible to make it. Where it passes through the walls of the house use should be made of a porcelain or other insulating tube, and whenever it is supported it should be secured to porcelain or other insulators.

Where it is found impossible to erect a good outdoor antenna, the receiver may be used with antenna wires inside the building. Such an antenna will be found to serve perfectly satisfactorily under certain conditions, but in general it will be found that the indoor antenna will invariably sacrifice something in distance of reception which might be realized by the use of an outdoor antenna. In either event the higher the antenna wires above ground and the further they are kept away from metal structures, buildings, power wires, etc., the greater will be the range of reception and the more satisfactory the operation of the receiver. Where no other

type of antenna can be installed the electric lighting system or telephone wires may be found useful. The use of these wires as antennas will always result in a considerable sacrifice in the distance over which reception of signals can be accomplished, and their use should be avoided.

THE GROUND: The connection to the ground can best be made by providing a secure electrical contact to the water pipe, as near to the under-ground water pipe system as possible. For best operation it will be found that connection should be made to the pipe which leads from the water meter to the street, and this connection can be made most conveniently by means of a ground clamp as shown in the appended illustration. The connection from ground clamp to the receiver should be made with a sturdy copper conductor not smaller than No. 16 B. & S. gauge, run in as direct and short a line as possible.



It is advisable, that this conductor be insulated, as is the antenna conductor, on porcelain insulators. Where it is impossible to make connection to the water system as described above, connection may be made to other portions of the water system, to gas pipes where they are available, heating system pipes or to the metal structure of the building. These are given in the order of their preference, but it will be found that in any installation the cost and difficulty of making connection to the water system as described will be found well justified in the increased distance over which reception is possible.

It is to be borne in mind that in making connection by means of a ground clamp, it is necessary that the pipe to which connection is made, be cleaned of all corrosion, and that the bright metal be exposed to contact with the ground clamp; that the ground clamp be very tightly secured to the pipe, and that the copper connecting wire be scraped bright and clean, and then very securely fastened to the ground clamp. The expenditure of care in the proper laying out of the antenna and ground system will repay itself many times in the increased range of reception and the greater reliability in the operation of the receiving apparatus.

THE VACUUM TUBES: Four vacuum tubes are required for the operation of this receiver. Any type of vacuum tube may be used with this device, but it is recommended that a gas tube be used in the detector tube socket and hard tubes be used in the amplifier tube sockets.

The filament rheostats are so designed as to allow the use of one and one-half volt tubes or five volt tubes if the proper battery voltage is used as described below.

While this receiver will operate with various types of tubes, nevertheless it is recommended that for best operation, standard tubes be used. In the detector socket, which is the left front socket, the Radiotron U. V. 200 or other detector tube should be used. All other sockets should be supplied with Radiotron U. V. 201 tubes or their equivalents.

To insure a positive electrical contact between the tube and socket springs, the contact surface of the tube contact pins should be carefully cleaned before inserting them into their respective sockets. This is a common source of annoyance and may be easily avoided by this simple expedient.

THE BATTERIES: For the operation of the 57 receiver two separate batteries are required, one for supplying the filaments of the vacuum tubes—commonly called the “A” battery—and one for supplying the plate circuits of the tubes—commonly called the “B” battery.

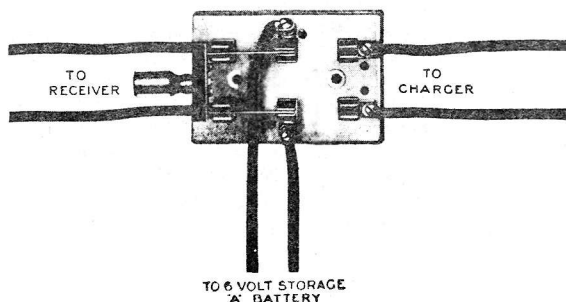
The type of battery required for supplying the tube filaments depends upon the type of tubes used. For the five and five and one-half volt tubes commonly available, a six volt “A” battery having a capacity of preferably 85 ampere hours or more should be used. Where tubes requiring only one and one-half volts are used, a single cell two volt storage “A” battery should be used, but under no conditions will it be found advisable to use a battery of smaller capacity than 40 ampere hours.

It is to be noted that any attempt to use a six volt storage battery when a one and one-half volt tube is used, will result in the burning out of the tubes. If there is any doubt as to what voltage should be used with the tubes, let your dealer advise you, and choose your battery accordingly.

It will be found that for the proper operation of the receiver, the connection between the storage battery and the receiving set should be made with a conductor not smaller than No. 14 B. & S. gauge, and the storage battery should be so located relative to the receiver, that these conductors need be no more than 3 ft. long.

It is absolutely necessary for best results, to keep the storage or “A” battery well charged at all times. Frequent charges for short periods are to be recommended, rather than allowing the battery to be discharged to the point where the set no longer functions normally. The ideal condition both for the operation of the set, as well as convenience, is obtained with the use of a home charging device, thus enabling the charging to be conveniently accomplished after any long period of discharge.

If it is found advisable to locate the storage battery at a greater distance from the receiver a much heavier conductor must be used. If the battery is so located it will be found convenient to install the storage battery



charging equipment in close proximity to the storage battery. Under these conditions, however, care must be taken to make it impossible for the receiver to be connected to the storage battery while it is being charged since if this occurs either the tubes or the receiver or both will be burned out in the process. The installation of a double pole, double throw switch as shown in the illustration will make this impossible and make the charging of the battery more convenient.

It is essential to the proper operation of the receiver that the storage battery and the inter-connection leads be carefully insulated from connection with ground. An accidental connection of this kind is easily possible where the storage battery stands on a moist floor or where the connecting leads come in contact with water pipes, gas pipes, heating pipes or the metal structure of the building and such a connection must be carefully avoided.

For the plate supply battery, dry or storage "B" batteries may be used. These batteries should be connected with one another as shown in the connection diagram for the receiver. The terminals of these batteries are usually labeled as to the polarity, the positive terminal being marked with a plus (+) sign, while the negative is marked with a minus (-) sign. In some types of batteries the polarity is indicated by colored terminal wires the positive usually being red. In inter-connecting them, the positive terminal of each battery should be connected to the negative of each succeeding battery, and the negative terminal of this group of batteries should be connected to the "+ A - B" terminal of the receiver. The positive terminal of this same battery should then be connected to the "+ B DET" terminal and the positive terminal of the entire group to the "+ B AMP" terminal on the receiving set.

These inter-connecting wires should be just long enough to connect conveniently to the terminals on the receiver, and should be made with a conductor sturdy enough to be proof against breaking, due to flexure, but need not be made of as heavy a conductor as is used for the connection of the storage battery. These connecting wires should, however, be very carefully insulated from one another, since the voltage difference between them is rather high, and damage may result unless care is taken in the installation. For the operation of the receiver it is preferable that three batteries in series be used, giving a total voltage of approximately 60 volts. Either 40 or 80 volts may be used, since it will be found, in general, that the higher the voltage, the louder will be the signals. There is, however, little to be gained by using more than 80 volts.

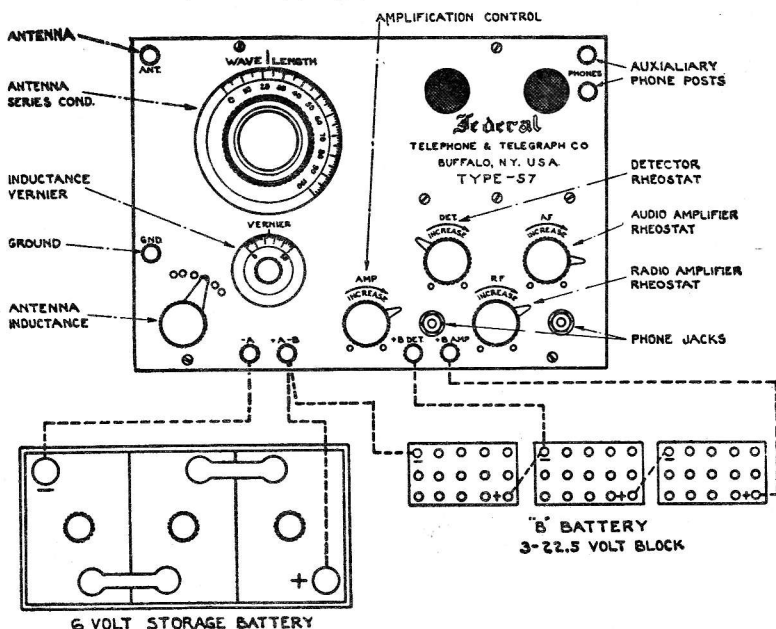
THE PHONES: The **Federal** 57 receiver may be used with either **Federal STANDARD HEAD TELEPHONES** or with a loud speaker. A telephone plug is supplied with the receiver for making connection between the phones or the loud speaking device, and the receiver itself. The receiver is supplied with telephone jacks suited to this plug, and connection is made by the mere insertion of the plug into the jack.

In addition to the standard No. 15 telephone plug a dummy plug is supplied for purposes of adjustment. By inserting the telephone plug into the jack on the left, the telephone is automatically connected so that the receiver operates with one stage of radio frequency amplification and detector, while if the plug is inserted in the jack on the right, two additional stages of audio frequency amplification are automatically added. The circuits of the receiver and the jacks are so designed that the insertion of the plug automatically lights the filaments of the vacuum tubes, and when the plug is not inserted into the jack it will be found impossible to light the filaments.

Terminals are provided on the upper right hand edge of the panel for making possible the connection of the telephones to the receiver without the use of the telephone plug. For this purpose the small dummy plug should be inserted in the right hand jack so that the filaments may be lighted when the telephones are connected directly to the above mentioned telephone terminals. This connection is operative, however, only when the dummy plug is inserted in the right hand jack. This dummy plug also serves as an aid in the adjustment of the receiver as described below.

It will be found that the use of a loud speaker connected into the jack on the right, thus furnishing maximum amplification, will serve quite satisfactorily for the reception of signals of comparatively nearby stations, but where the maximum possible range of reception is to be accomplished **Federal STANDARD HEAD TELEPHONES** should be used. Not only will it be found that these telephones will allow of the reception of signals over tremendously greater ranges than is possible with the ordinary loud speaker, but that the greater clearness of tone and purity of reproduction makes the telephones greatly to be preferred over the loud speaker.

THE FEDERAL #57 TUNER



THE INSTALLATION OF SET: The receiver should be located in such a position that the connection to the ground and the antenna wires be as short and direct as possible. It should be protected from moisture, excessive heat, dust and vibration, since all these things will make the operation of the device less satisfactory, and ultimately work it permanent harm. It will be found that the beauty of finish of the receiver and the dignity of its plainness will make it an acceptable part of any setting, and by the location of the receiver and the antenna and ground wires in a most accessible place, so that it will be most freely and frequently used, it will perform to the utmost its function of an entertainment and an educational device of highest order.

Having located the receiver, the connection of the antenna and ground to the terminals so labeled should be made. Then the connections from the storage battery to the two "A Bat." terminals should be made. It is essential that the positive terminal of the storage battery be connected to the receiver terminal marked "+A," and that the negative terminal of the battery be connected to the terminal marked "-A." The storage battery terminals themselves will usually be found properly labeled, either with the words "pos" or "neg" "+" or "-" or with a red mark on the positive terminal.

It is to be noted in connecting the batteries that if the filament battery and plate battery are interchanged, the connection of the plate battery to the filament battery terminal will invariably burn out the vacuum tubes, so that great care should be taken to avoid this error.

If the procedure described above is followed, that is, if the "A" battery is first connected as described and then either the dummy plug or the real plug is inserted into the jack on the right and the rheostat turned in a clock-wise direction, the filaments should light and become more brilliant as the rheostats are turned more and more in the clock-wise direction. When the "A" battery has been so connected, the "B" battery should be connected. The connecting wire from the negative terminal of the "B" battery should be connected to the "-B" terminal of the receiver, which will be found to be identical with the "+A" terminal, and the connecting wire from the positive end of the group of "B" batteries should be connected to the "+B AMP" terminal of the receiver, and the connecting wire from the positive terminal of the battery whose negative terminal is already connected to the receiver, should be connected to the "+B DET." The telephones should then be inserted in the jack on the right and assurance made that the "B" batteries are properly connected. This can be determined if the connection to the "+B AMP" terminal is opened and the connecting wire touched to the terminal. This should result in a loud noise in the telephone, as should the making and breaking of the connection between the "B" battery and the "+B DET" terminal of the receiver. If no noise is heard the connection between the several batteries which constitute the "B" battery should be examined as well as the connecting wires to the receiver, and assurance made that all connections are quite secure. If these connections have been properly made the receiver is ready for operation.

Before adjusting the receiver, however, the operator should accustom himself to the fact that the rotation of any one of three rheostats in a clock-wise direction increases the brilliancy of the filaments of the vacuum tubes, while its rotation in a counter clock-wise direction reduces the brilliancy, and if the rotation is far enough in this direction, it will extinguish the filaments.

ADJUSTMENT OF THE RECEIVER: It will be found that the expenditure of a little effort in accustoming the operator to the manipulation of the controls will well justify itself in the greater range of the

reception and absolute reliability of operation which can be accomplished with this receiver. It is therefore recommended that the following procedure be followed in tuning the receiver. No attempt should be made to secure signals over long distances until the operator has learned to use the receiver on nearby stations, and for this reason it is suggested that the procedure given below, be used when a nearby station is known to be in operation.

The inductance switch in the lower left hand corner of the panel should be set on one of the middle contacts; the wave length, vernier and the amplification controls should be set at mid-adjustment; the three filament rheostats should be rotated until all the tube filaments are burning brightly. The dummy plug should be inserted in the right hand jack and the real telephone plug with the telephone connected, should be inserted in the left hand jack. The antenna wire should then be temporarily disconnected to facilitate the adjustment of the detector tube filament to its proper brilliancy. This should be increased in brightness by rotating the rheostat knob labeled "Det." until the detector tube filament burns at excessive brilliancy. In making this adjustment it will be found that a distinct hissing sound will be heard in the telephone when the detector filament is very bright. This is an improper adjustment and should be eliminated by the gradual reduction of the brilliancy of the detector tube filament until the hissing barely disappears. The detector tube will be found to operate most satisfactorily at the highest possible filament brilliancy short of that which results in a hiss. Having adjusted the detector filament, the antenna should be re-connected, and the effect observed in the telephone when the radio frequency amplifying tube filament is increased in brilliancy, by the rotation of the knob of the rheostat labeled "R.F." It will be found that as the amplification control is rotated in a clock-wise direction, the signals or noises which come to the receiver from the antenna will be greatly increased until a point is reached at which a loud click is heard, and as the amplification control is rotated further in a clock-wise direction, these noises disappear. If any signals are present, these also will disappear when the click occurs as the amplification control is rotated, but will be replaced by a musical note, which may either be high or low in its pitch, depending upon the accidental setting of the Vernier or Wave Length Dials. If no musical note is heard the wave length dial should be slowly rotated in either direction from its center position, until such a musical note is heard.

It will be found by the rotation of the wave length dial or by the rotation of the vernier, that this musical note can be made higher or lower in its pitch. The wave length dial should be adjusted until the musical note is as low as possible to make it, and then the vernier should be rotated until this note becomes so low as to be inaudible. The amplification control should then be rotated in a counter clock-wise direction until the voice or music is heard clearly, and at its greatest intensity. It will probably be found when this final adjustment of the amplification control is made, that a slight re-adjustment of the vernier will be nec-

essary, and having made these two adjustments so as to give maximum signal, the telephone plug and the dummy plug should be removed from the jacks and the telephone plug inserted in the jack on the right. This should then give maximum signal.

The intensity of signals will not be seriously affected by the rotation of audio frequency amplifying tube rheostat (labeled "A.F."), but the filaments of the tubes controlled by this rheostat should be allowed to burn no more brilliantly than is absolutely necessary for loudest signals.

Best operation of the receiver can be secured by means of a successive adjustment of the R. F. filament rheostat and the amplification control, and since it is quite impossible to state what the best relation between these two adjustments is, it will be found well worth while to experiment by first increasing or decreasing the R. F. filament brilliancy by the adjustment of the R. F. filament rheostat, and then readjusting both the amplification control and the vernier, noting whether this series of adjustments has increased or decreased the signal; and then trying further adjustment in either the increase or decrease of the filament of the R. F. tube, and further adjustment of the amplification control and vernier until maximum possible signal is obtained.

When it is desired to pick up another station this will be readily accomplished by rotating the amplification control in a clock-wise direction until the signal is lost, but is replaced by the musical note, and then by rotating the wave length dial until a new musical note is heard, signifying that another station is being received. The pitch of this note should then be reduced until inaudible by the adjustment of the wave length dial and the vernier, and then the signal regained by the rotation of the amplification control in a counter clock-wise direction until the signal is at its maximum.

For those users of the **Federal** 57 Receiver who wish to acquaint themselves with the circuit arrangements of the receiver, the attached circuit diagram is given.

WIRING DIAGRAM OF THE FEDERAL #57 RECEIVER

