INSTRUCTIONS

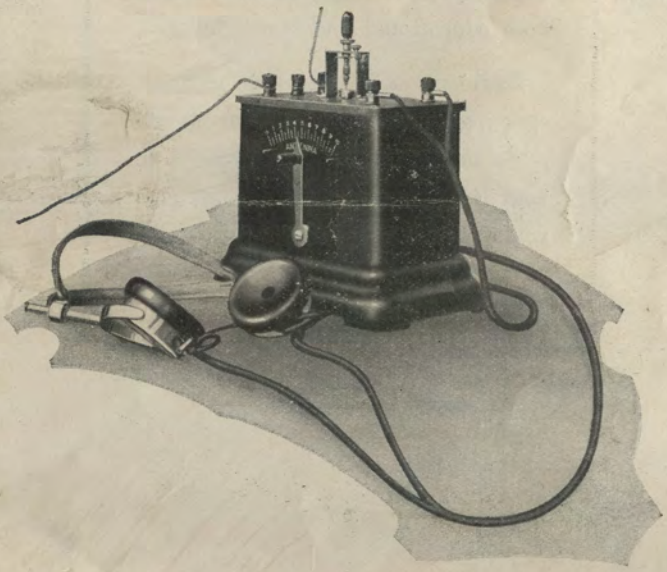
for

INSTALLATION *and* OPERATION

of

Federal Jr.

RADIO TELEPHONE RECEIVER



RADIO IN YOUR HOME

Federal Telephone & Telegraph Co.

Buffalo, New York

The **Federal Jr.** Telephone receiver is designed to be easily and quickly installed by anyone. It offers a splendid home pastime that is both educational and entertaining.

Radio messages, concerts, lectures, sporting and other news from all parts of the country are brought to your living room with the same convenience and simplicity of the telephone or the phonograph.

INSTRUCTIONS

for the

INSTALLATION AND OPERATION

of

Federal Jr.

THE **Federal Jr.** radio telephone receiver is a complete radio receiving system especially designed and built for the reception of radio telephone broad-casting stations, amateur radio stations and commercial ship and shore stations.

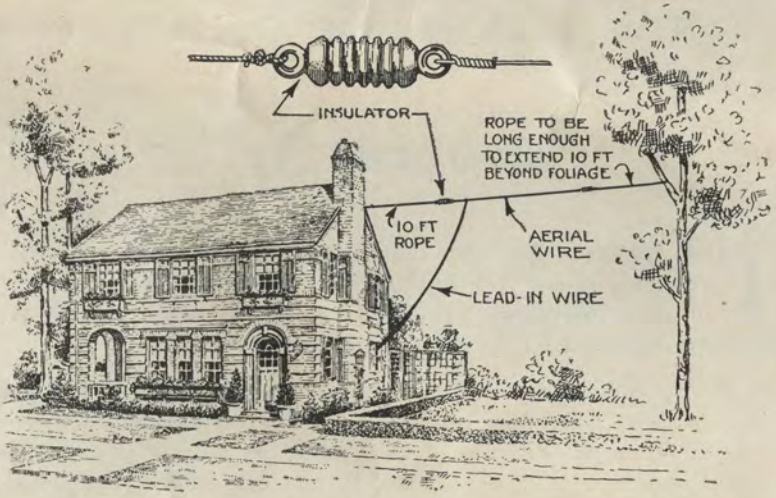
It requires for its operation only the usual aerial and ground wires and with these it may be used for the reception of radio telephone signals over distances of from 15 to 30 miles and radio telegraph signals over distances of from fifteen to five hundred miles, depending on the length and heighth of the antenna and on the power of the station transmitting the signals.

The aerial and ground wires serve to intercept a portion of the electric waves that are being sent out by the transmitting station and to conduct the power in these waves into the receiver proper where it is converted into the power which makes itself evident by the sound in the head telephones. The higher the aerial wires are above ground the more of the electric waves will it intercept, and the louder will be the signal in the head telephones. The further the aerial wires are removed from trees and shrubbery, metal structures, telephones, telegraph or power wires or other conducting materials which also intercept the waves the louder will be the signal in the head telephones and the greater will be the receiving range. The shorter the length of the conductor between the elevated aerial wires and the receiver and between the receiver and the ground, and the further these wires are removed from the interfering materials mentioned above, the more effective will be the receiver.

It is essential then that the aerial wires be as high as possible, that the conductor running down to the receiver be as short and as direct as possible, and that the connection to ground be made as short as the place at installation will allow.

ERECTION OF ANTENNA

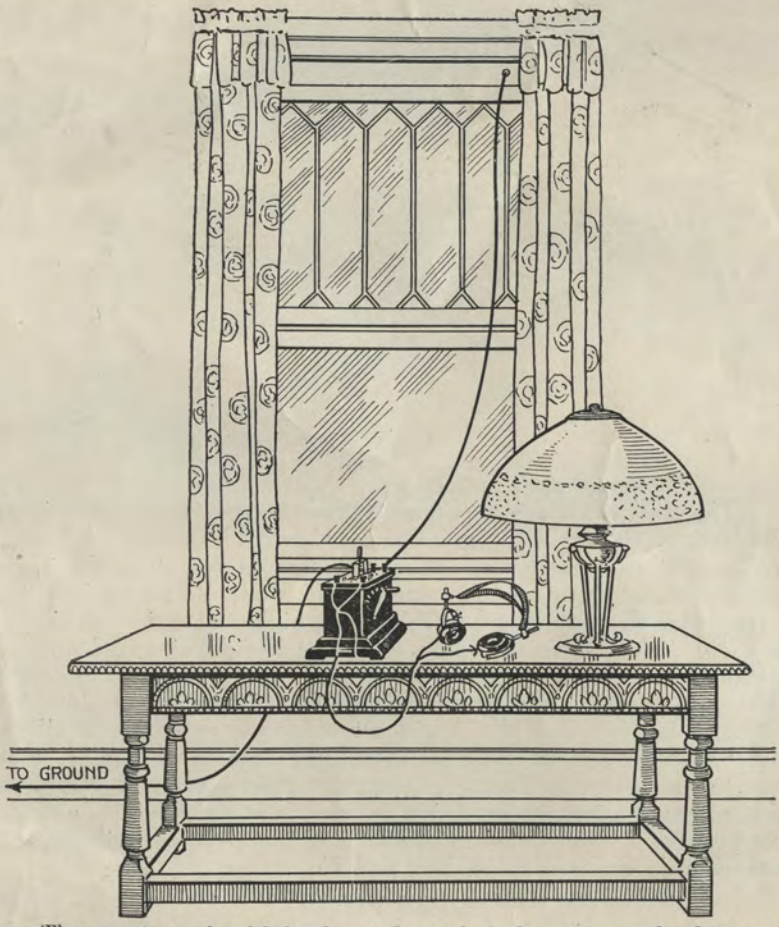
For the reception of broad-cast telephone signals it is necessary to have only a single aerial wire about 100 feet long and at least 30 feet from the ground, carefully insulated from ground by insulators placed at its ends.



Such a wire may be supported at one end by the house in which the receiver is to be used and at the other on a pole, house or tree. Where a pole carrying other wires or a tree is used for support it is desirable to keep the aerial wire at least ten feet removed from these interfering bodies. This may best be done as shown in the sketch. In erecting the antenna a screw eye or other fastener is secured to the house, pole, tree or other support and to this a length of rope is fastened. The end of this rope is secured to the antenna insulator and the wire in turn is attached to the insulator. The rope should be of such a length that the wire is at no place less than ten feet from the foliage of the tree or other wires or the metal roof gutters or leader pipes on the house. Where the two ends of the aerial wire are at different heights it is highly desirable that the distant end is fartherest removed from ground and other interfering material. In installing it, the wire should not be cut unless it is impossible to do otherwise but should, if possible, be continuous from the distant end of the antenna to the receiver. In the event that it must be cut to make installation possible, the joint should be carefully soldered and thoroughly bound with insulating tape to protect it against corrosion.

The lead in wire should be brought down directly from the antenna and where it passes through the walls of the house it should be care-

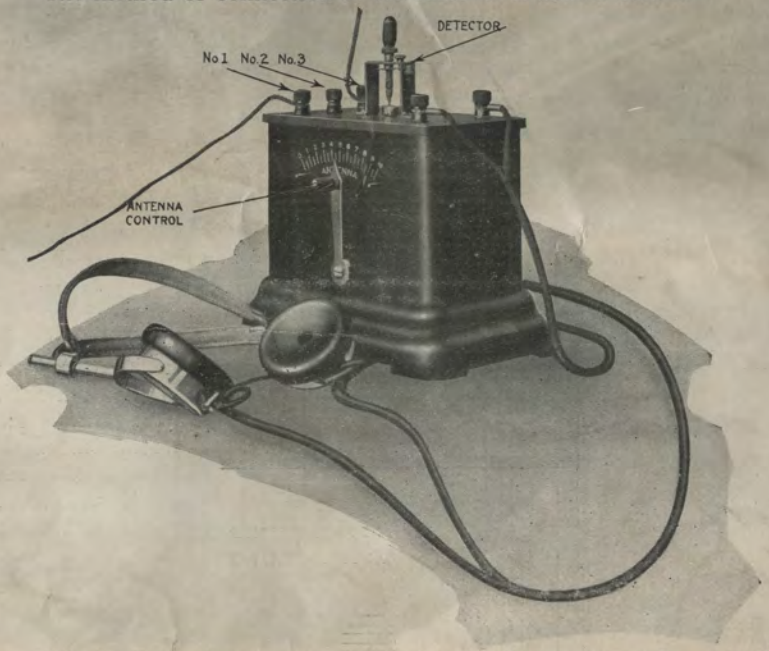
fully insulated. This can be most simply accomplished by drilling through the wall or window frame and passing a porcelain, mica, or a tube of other good insulating material through the wall and passing the wire through this tube. If drilling through the wall is found objectionable a wooden panel may be fitted into the window frame and the wire and insulating tube passed through a hole in this panel. This method of installation is shown in the sketch.



The receiver should be located so that the antenna lead-in and the wire to the ground are as short as possible. The connection to ground should be made to the nearest cold water pipe. For this purpose a ground clamp will serve most satisfactorily. The pipe to which connection is to be made should be filed or sand papered until the clean bright surface of the metal is exposed and the ground clamp fastened to this clean surface. The ground wire from the receiver is then securely fastened to the ground clamp.

CONNECTION OF RECEIVER

The method of connection to the receiver is shown below.



The head telephones are connected to binding posts as shown in the illustration. The ground wire is connected to binding post No. 1 while the antenna is connected to either binding post No. 2 or No. 3, depending on the size of the antenna, and the station to be received. For an antenna 100 feet long and thirty feet high, connection to binding post No. 2 will serve to receive telephone broadcasting and amateur stations, while connection to binding post No. 3 will serve to receive ship and commercial land radio telegraph stations. For very long low antennas binding post No. 2 will serve for the reception of all the above types of stations while for short high antennas, it may be necessary to connect to tap No. 3 for reception from broadcasting stations. the amateur stations always being received most satisfactorily on binding post No. 2 while commercial ship and shore stations will be most satisfactorily received on binding post No. 3.

OPERATION

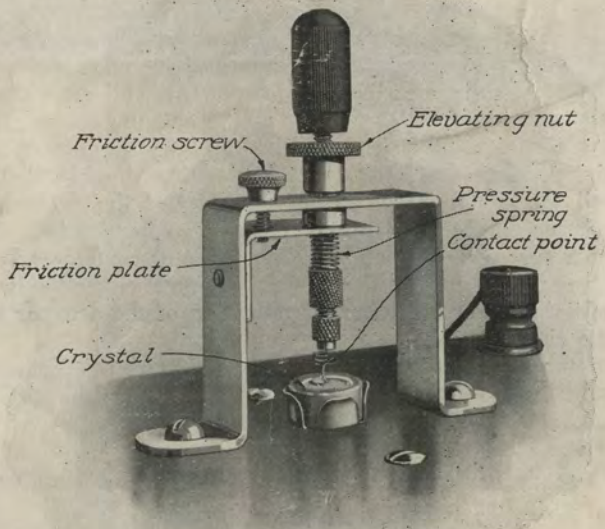
To operate the receiver it is merely necessary to connect the aerial and ground wires and the head telephones to the receiver and to adjust the detector and control levers until the desired signals are heard.

For first trial the antenna wire should be connected to binding post No. 3 and the detector control lever should be set at about the middle of its scale. The detector is then adjusted by bringing the fine wire point of the detector into contact with the crystal. The antenna control is then moved slowly over its scale until signals are heard.

Further adjustment of the detector, the detector control and antenna control are made until signals are loudest. If the signals are those of a broadcast telephone station or those of an amateur station the antenna connection should be changed to binding post No. 2 and the antenna and detector controls carefully readjusted.

While the cursory handling of the receiver outlined above will make possible its satisfactory use for the reception of nearby radio stations the exercising of greater care in the adjustment of the receiver and crystal detector will repay itself in greatly increased strength of signal and make possible the reception of radio signals over almost unbelievably great distances and since when it is once properly adjusted it will maintain its sensitive adjustment over long intervals of time. The following detailed instructions are given for those who desire to operate this highly efficient device at its maximum effectiveness.

An examination of the functions of the various parts of the detector will greatly assist in making sensitive adjustment. The relation of the several parts are shown below. The crystal which is of a highly sensitive type of galena is mounted in a special metal alloy. The extremely fine contact spring makes very light contact on the active surface of the crystal and the less this contact pressure is the more sensitive will be the detector. The pressure of this contact is determined only by the compression of the contact spring and this in turn is determined by the elevation of the entire contact member.



The elevation of this member can be varied by means of the milled elevating nut and the pressure spring serves to maintain the entire contact member at the elevation determined by the position of the elevating nut. The contact member is supplied with a ball joint to give

freedom of motion to this part so that contact may be made on any part of the surface of the crystal. The ball is seated in the friction plate and by means of the friction nut the pressure and hence the friction between the friction plate and the ball may be varied. The friction between these two members determines the ease with which the contact member can be moved about and by the adjustment of the friction nut this can be varied between wide limits.

The detector is carefully adjusted during factory inspection and when received should require only such readjustment as to make it suit the operator's touch. The friction nut should be loosened or tightened until the ease of rotary motion of the contact member is suitable and then the entire contact member raised by the motion of the elevating nut until the contact spring barely makes contact with the crystal. Then the contact rod and spring may be raised against the pressure of the pressure spring by grasping the detector knob and set down upon different points of the crystal until any signals that are being heard are of greatest intensity.

Having adjusted the detector itself the detector control should be varied until loudest and clearest signals are heard.

It will be noted that several stations may be heard simultaneously for rather high scale settings of the detector control and that as the scale setting of this control is reduced and the antenna control readjusted only the desired signal may be heard and other signals eliminated. It is desirable in operating the receiver to take advantage of this fact so that the locating of the desired signal may be done most easily and so that signals which cause interference may be eliminated. For this reason the detector control should be set in the middle or upper half of its scale while first listening for signals and after the desired signal is located by the slow moving of the antenna control from one end of its scale to the other it should be carefully set at the position of loudest signal. Then the detector control setting should be slowly reduced until the signal is somewhat reduced and the antenna control then readjusted until the signal is restored to its previous intensity. Then further successive reductions of the detector control and readjustments of the antenna control should be made until either the interfering signal is eliminated or until further reduction of the detector seriously reduces the signal.

When the receiver is once properly adjusted no further adjustment should be necessary as long as reception from the same station is continued. It is essential, however, that the receiver be protected against severe mechanical shock or vibration while in use since such shocks are likely to destroy the adjustment of the detector and to require its readjustment.

IN GENERAL

The **Federal Jr.** is a sturdy instrument, well designed and built in every detail. There is nothing in it that will wear out and no replacements will ever be required. It should, however, be protected from moisture, excessive temperature and from very severe mechanical shocks. If given the care due, such an instrument will serve as a source of education and amusement indefinitely.