

**INFORMATION
FOR THE
CARE AND OPERATION
OF THE
NO. 540-AW LOUD SPEAKING TELEPHONE**

Western Electric Company

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TELEPHONE UNIT

TERMINALS

STAY CORD

FIGURE 1. REAR OF THE NO. 540-AW LOUD SPEAKING
TELEPHONE WITH SCREEN REMOVED

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TO CONNECT IN CIRCUIT

Connect the tips of the cord securely to the binding posts on the receiving set or the amplifier, or to a plug if one is used. Either tip of the cord may be connected to either of the binding posts on the set or the plug.

This loud speaking telephone is shipped with the thumb screw on the front of the cone loosened and secured in place by a rubber band. The rubber band should be removed and the thumb screw securely tightened with the fingers. If the apparatus is moved from place to place, always loosen the thumb screw to avoid damage to the rod which connects with the apex of the cone.

OPERATION

The No. 540-AW Loud Speaking Telephone may be used in connection with any radio receiving set or audio-frequency amplifier capable of operating an ordinary type of loud speaker. As a rule two stages of audio-frequency amplification will be sufficient. However, to obtain the best volume and quality of reproduction, it is advantageous to use a receiving set or amplifier which contains

a power tube in the last stage. Care should be taken not to overload the vacuum tubes in attempting to increase the volume of sound as this will result in disagreeably destroying the naturalness of the reproduction.

To obtain the best results, the No. 540-AW Loud Speaking Telephone should be placed at least six inches away from any wall.

ADJUSTMENT AND MAINTENANCE

So far as the requirements which have to be met will allow, this instrument is of rugged construction. Reasonable care should, however, be exercised in handling it, the same as in the case of any other precision instrument.

To compensate for expansion or contraction of the cone caused by atmospheric conditions, loosen the thumb screw on the front of the cone for an instant, allowing the rod to assume a normal position, and then tighten the thumb screw again with the fingers. Should the instrument fail to operate satisfactorily at any time, it would be well to make this simple adjustment first, as this may be all that is necessary.

A screen is provided on the rear of the instrument to exclude dust and other foreign objects which might interfere with the proper operation of the telephone, and in order that trouble of this kind may be avoided the screen should be kept in place at all times, and the screws holding it should be tight.

Should the screws securing the cone to the upright be loosened, through error or otherwise, and not retightened,

“rattling” is likely to result. These screws should be tight.

Care should be taken to insure that the batteries used with the receiving set and amplifier are at all times in proper condition, since, if the voltage of these batteries falls to an appreciable extent, it may be detrimental to the quality of the sound produced.

TO REPLACE THE CONE

The replacement of the cone, when necessary, should be made in the following manner:

1. Release the rod which projects through the apex of the cone by releasing the thumb screw.
2. Remove the five screws in the rear which hold the wire screen in place, and remove the wire screen.
3. Remove the eight screws and nuts which hold the cone, and remove the cone. In doing this, be careful not to bend the rod which projects through the apex of the cone.
4. Attach the new cone to the frame, taking care that the rod projects through the bushing on the front of the cone. Then replace the screws and the nuts, assembling the lock washer on each screw under the nut, and tighten the screws firmly.
5. Connect the loud speaking telephone to a radio receiving set or amplifier which is in operation, leaving the thumb screw on the front of the cone loose. The loud speaking telephone should then give a chattering or buzzing sound. If speech and

music are reproduced when the thumb screw is released, it is an indication that the rod is not properly centered in the bushing on the front of the cone. The rod must be properly centered in order to obtain the best results.

To center the rod, loosen the three screws which hold the telephone unit to the frame just enough to allow the unit to be shifted. While doing this, hold the unit so that it cannot shift, as otherwise it might bend the rod through the cone. Then shift the unit until the rod is centered properly in the bushing on the front of the cone and a chattering or buzzing sound is heard.

6. Tighten the three screws which hold the telephone unit to the frame. These screws should be kept tight.
7. Replace the wire screen and fasten it in place.
8. Tighten the thumb screw on the front of the cone firmly with the fingers.

TO REPLACE THE CORD

Replacement of the cord is seldom required. However, should it become damaged, replacement may be made as follows: Remove the five screws in the rear which hold the screen in place. Then remove the screen, loosen the terminal screws, and untie the stay cord. In replacing the cord, fasten the ends of the cord having the "U" shaped terminals, securely to the terminals of the telephone (see figure 1), and insert the stay cord in the hole

near the terminals and tie it in such a manner that it will prevent any strain being placed on the cord terminals. Replace the screen and fasten it in place.

REPLACEMENT PARTS

The replacement parts listed below should be ordered from your dealer or from the nearest Western Electric Supply Distributing House. If any other parts or repairs are required the loud speaking telephone should be returned to the dealer from whom it was purchased or to the nearest Western Electric Supply Distributing House.

<u>Name of Part</u>	<u>How to Order</u>
Cord for Connecting the No. 540-AW Loud Speaking Telephone to receiving Set or Amplifier.	No. 862 Cord
Thumb Screw on the Front of the Cone	Thumb Screw for No. 540-AW Loud Speaking Telephone
Cone	Cone for No. 540-AW Loud Speaking Telephone

GENERAL INFORMATION

The above instructions contain all the information that is necessary for the operation of this loud speaking telephone. However, the information contained in the following paragraphs should be carefully studied, as it will assist you to get the best possible reproduction of sound from your instrument and consequently the greatest amount of enjoyment out of it.

At a broadcasting station, sound is converted into electrical energy and in this form is sent out into space.

A part of this electrical energy is picked up by the radio receiving set, amplified and passed on to the loud speaking telephone, which reconverts it into sound. Obviously, each part of this system must respond uniformly to all parts of the original sound, otherwise the delivered sound will be an imperfect reproduction. The degree of perfection of the reproduced sound depends upon two things, the volume and the extent to which all the tones of the original sound are present.

Many loud speaking telephones are efficient for tones of certain frequencies and very inefficient for others. They may produce a large volume of sound but the quality of the reproduction, that is, the naturalness of the sound, is frequently poor due to the fact that the instrument is not equally efficient for sounds of all frequencies.

Speech and musical sounds are composed essentially of between 50 and 5,000 vibrations per second. There are, of course, frequencies below 50 and above 5,000, but they are not important from the standpoint of quality; that is, if they were eliminated the effect on the naturalness of the sound would be scarcely noticeable.

Most types of loud speaking telephones at present in use reproduce most efficiently sounds in the neighborhood of 1000 to 1500 cycles per second, that is, about two octaves above middle "C" (256 cycles per second). Above and below this pitch the response is much less. At 200 cycles and at 5,000 cycles practically no sound comes through. This difference between the efficiency at about 1,000 cycles and other points above and below is responsible

for the harsh or "tinny" quality frequently experienced with such instruments.

The No. 540-AW Loud Speaking Telephone is so nearly uniform in efficiency throughout the audible range of frequencies that all the notes from the lowest to the highest are fully reproduced, and the natural qualities of the human voice and of musical instruments are preserved. It should be borne in mind, however, that good quality depends not only on the loud speaking telephone but also on the receiving set and the amplifier with which it is associated.

Some amplifiers are subject to limitations with respect to the frequencies which they can handle and the No. 540-AW Loud Speaking Telephone will not compensate for the defects of such an amplifier. Any properly constructed amplifier, however, is capable of handling, practically without distortion, all the frequencies necessary to the accurate reproduction of sound. The maximum possible volume of such undistorted sound will, however, depend upon the capacity of the amplifier and in particular of the vacuum tubes with which it is equipped. When an attempt is made to increase the output beyond that which the amplifier was designed to deliver, it will not be a faithful reproduction of the original sound and a "rasping" or "blatting" effect will result. This is commonly referred to as "overloading of the tubes", and a loud speaking telephone cannot compensate for this effect. The No. 540-AW Loud Speaking Telephone faithfully converts all of the frequencies delivered to it into sound, and such overloading may, therefore, be more noticeable

than with less efficient instruments since the very fact that the latter will not handle all frequencies may result in their refusing to reproduce some of the effects of overloading. The remedy for overloading rests in equipping the amplifier with tubes capable of a higher power output or in reducing the volume of sound by means of the controls on the amplifier or the radio receiver. As previously stated, the best results will be obtained when an amplifier with a power tube in the last stage is employed. In addition, as also stated above, the batteries should be maintained in proper condition at all times.

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