

Hints on Operating a Loudspeaker

How Good Reproduction may be Obtained



NO matter how good your set may be, it is the loudspeaker which ultimately governs the reproduction, so that it is well that every listener should know how to test his loudspeaker on those occasions when it seems to have developed a fault.

Now, the complete and thoroughly scientific test of a loudspeaker is a task beyond the scope of any but a well-equipped laboratory, but if we pay attention to certain fundamental facts it is quite easy, with the apparatus at the disposal of almost every listener, to find out some very important facts. If, too, a second loudspeaker is available either as a permanent acquisition or borrowed for the evening from a friend, then the test can be made still more complete and satisfying.

"Falling-off."

ASSUMING that you have purchased a good loudspeaker and have in the past been satisfied with its reproduction, then the falling-off in quality can arise from three sources. The first is from some source prior to the entry of the signal into the receiver, the second is from the receiver itself (including under this heading valves and batteries), and the third is from the loudspeaker.

Only too often a sudden or slow falling-off in quality of reproduction is blamed to the loudspeaker whereas it

IN the following article Mr. Percy W. Harris, M.I.R.E., editor of the "Wireless Constructor," discusses a topic vital to listeners. The article is distinctly practical and should prove beneficial to all interested in quality reproduction—and who is not?

arises from some source under heading 1 or 2. If another loudspeaker, preferably of the same make and type is available, the first thing to do is to substitute the other loudspeaker for your own, whereupon if the cause is exterior to the loudspeaker the same faulty reproduction will be heard in both instruments.

Loudspeakers may be divided under the two headings of "moving iron" and "moving coil." In the first classification come those loudspeakers in which we have an electro-magnet which exerts a varying attraction upon a diaphragm, armature, or a reed according to the varying strength of the incoming signal.

The diaphragm, armature, or reed communicates the motion so set up in it to a cone of paper, fabric, or some suitable material which in turn moves the surrounding air, or in another type sets in motion an air column inside a horn.

L.S. Adjustment.

IN the second classification the currents from the receiver pass through a coil which is suspended in an intense magnetic field, the varying

current, passing through the coil and not through the electro-magnet, causing a variation in position of this coil in the field. As the coil is itself rigidly attached to some form of diaphragm, the diaphragm is moved and impulses are communicated to the surrounding air. As the vast majority of loudspeakers now in use fall under the first heading, we will deal with faults in these before the others.

Taking first the horn type, in the majority of these a stallo diaphragm, circular in form and varying in diameter from that of the diaphragm used in headphones to several inches across, is rigidly held at its periphery above the pole pieces of the electro-magnet in the windings of which the currents from the receiver circulate.

The sensitivity of this device will be largely dependent upon the air gap between the pole pieces and the diaphragm, the smaller the gap the greater the sensitivity of the instrument. Obviously, there are limits here, for the diaphragm has to move with varying attractions of the electro-magnet, and if we make the gap too small then a strong signal will draw the diaphragm down so much that it will touch the pole pieces.

In order that one may suitably adjust the gap a screw or lever is fitted to most loudspeakers of this type, the adjustment being such that either the diaphragm is moved nearer to or farther away from the magnet, or the whole magnet itself is moved, the latter being the more general practice.

Sometimes one may adjust a loudspeaker of this type to give maximum sensitivity without the diaphragm coming in contact with the pole pieces, even with the strongest signal, and then on leaving the set for a day or two we may find that even a weak signal makes the diaphragm touch. This is due in many cases to variations in temperature of the metal, for metal expands and contracts with changes in the room temperature, and these may arise from an alteration in the weather, or the lighting of a fire.

Effect of Plate Current.

IN many receivers loudspeaker windings are included in the plate circuit of the last valve, and when this is of the super-power variety quite a considerable direct current will flow through the windings in addition to the variations set up by the signals. This steady direct current would exert a continuous pull upon the diaphragm if the direction of current is such that it tends to accentuate the field of the permanent magnet.

On the other hand, if it is the opposite direction it will reduce the pull of the permanent magnet around the pole pieces of which electro-magnetic windings are wound. There is thus a right and a wrong way of connecting a loudspeaker in sets where the loudspeaker windings are directly in the plate of the last valve.

With the right way one not only obtains the best sensitivity, but the steady current tends to prolong the magnetism of the permanent magnet, whereas when connection is made in the opposite direction this steady current is tending all the time to demagnetise your loudspeaker magnet and reduce its sensitivity.

For this reason many makes of loudspeaker are marked with positive or negative leads or terminals, the former using red and black tips, or else the positive lead has a coloured thread wound into its insulation. Some speakers, in deed, are marked positive and negative by the conventional cross and dash. Not all speakers are so marked, however, for there is a particular form of magnet which is not appreciably influenced so far as its life is concerned, but in all cases it is just as well to keep the windings to the correct polarity.

Testing Polarity.

IF your loudspeaker leads are not marked for polarity, or what is just as important, if the loudspeaker terminals of your set give no indication of which is the positive and which is the negative, here is the way to proceed.

Connect up your receiver, switch on the loudspeaker and carefully adjust the speaker screw or lever until you can hear the rattling which indicates that the diaphragm is touching the magnets. Now carefully and delicately

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