

Notes on the Loudspeaker

"By Megohm"

BECAUSE a speaker is of a particular type is no guarantee that the speaker is a good one. Design plays a great part in a speaker's reproduction of broadcast, and a badly-designed moving-coil speaker may compare very badly with good makes of older type.

For best operation by a good receiver the speaker should be fed through an output filter or transformer, preferably the former. The merits of loud-speakers can only be properly judged by being connected to a good receiver. Care must then be taken not to overload the detector. A throw-over switch forms a handy means of comparing two speakers, as several changes may be rapidly made during one item. Notice on speech the sounds of f, s, b, v, p, and th. If these can be clearly distinguished, the speaker is good on high frequencies. Low notes of music are a test for the lower audio frequencies.

THE more of a musician a person is, the more readily will the lower notes be recognised and separated from delusive overtones. Low notes, if properly reproduced, are full and rich, just as in the original, from which there should be little departure. A really good radio outfit needs few apologies for the quality of its output as compared to the original.

Balance of tone—that is, equal amplification of both high and low notes—is aimed at in the construction of receivers, but not always realised by a long way. As a rule the tendency at the present time is towards exaggeration or over-amplification of the low notes, and this usually results in a weakening of the high notes and sometimes complete loss of the very high audio frequencies. Resistance and transformer couplings have this tendency to high-note loss when the low notes are emphasised. A double-im-

pedance amplifier gives the most even amplification through the entire musical scale, with least tendency to distortion. This is just by the way, to show that in judging a loud-speaker the tendencies of the receiver must be taken into account.

IT is an interesting experiment, given a receiver that has fairly even amplification throughout, to test various speakers and note the great differences in reproduction under the same circumstances. Undoubtedly the double-roll speaker recently described in this column shows up to advantage in equal amplification when it is available to be reproduced. A medium horn speaker gives quite a different version of the music. It loses all notes below a medium frequency, and, reproducing a band item, does not give the separateness of instruments that is apparent with a good cone type. This confusion of sounds is a fault in many horn-type speakers, especially the smaller sizes. Large-sized horn speakers vary considerably in the range of notes they will reproduce, and, whilst some will descend well down in the scale, some will fall off at almost the same frequencies as their smaller brethren. Some makes of horn speaker fall off badly at both high and low notes, only satisfactorily reproducing the centre portion of the musical scale.

Purchasing a Loud-Speaker.

SELECTING a speaker is not a simple matter for a person new to the ranks of radio. To hear a number of speakers demonstrated one after the other, and an immediate decision of choice to be made, is not the method that will secure a beginner the best speaker for his requirements. By far the safest plan is to carefully listen to several, pick out two or three, and take them home for a leisurely test under

the actual conditions under which one of them is to be used.

It does not pay to give too low a price for a speaker, and as far as possible the purchase should be made on quality of reproduction rather than on price. If you buy a high-grade speaker it will give satisfaction for a couple of years or perhaps longer—two years is a long time in radio matters. A mediocre speaker will not charm the ear very long, and perhaps in three months you will be yearning for something better, as your musical ear is being developed. It is easy to figure out the difference between the cost of one high-grade speaker and the cost of two—a "half-pie" and a "top-notcher." It is a tempting proposition to save a pound on a purchase—we all do it at times, not only in radio, but in other lines, but experience shows us that sorrow and further expense frequently follow very rapidly upon such action.

Cone Speakers.

THE cone-type speaker is the popular one at the present time; and great improvements have been made in these speakers of late, ensuring a reproduction that is high-class in every way. Balanced armatures and double-acting or "push-pull" movements of varied design have contributed towards improving the range in an upward direction. For few cone speakers have tended to suppress the lower portion of the scale, except where the design has, in a few instances, been particularly bad. Certain well-known makes that have made their name may be relied upon for satisfactory reproduction, and choice after test of a couple of such will leave little to be desired.

Too much emphasis cannot be laid upon the fact that the speaker is very frequently blamed for defects that exist in the receiver, so that great care should be taken to ensure that not only is a good speaker in use, but that the receiver is giving the best possible from a quality point of view, and tests should be carried out on the local station.

Choke Filter or Transformer.

WHEN a super power-valve is used in the last audio stage, as mentioned above, a filter is necessary in order that the heavy B current in the plate circuit of the last valve may not traverse the speaker windings, tending to overloading and magnetic saturation, thereby spoiling quality of reproduction. The method of employing a choke-coil and a 2 mfd. condenser as an output filter has frequently been dealt with in this column, and forms the most popular and adaptable method. The alternative system is to employ an output transformer, similar to an audio transformer, but with a 1 to 1 ratio winding. The primary of this transformer is connected in the plate circuit of the last valve, and its secondary terminals form the output and connect to the speaker.

In either case the direct B current returns to the battery without traversing the speaker windings, but the speaker is actuated by the alternating-current voltage, which is a demodulated

form of the original signal. When either type of filter is in use there is no need to worry about correct polarity of speaker leads—they can be connected irrespective of positive and negative markings.

The choke-condenser type suits any conditions, but when an output transformer is used, the best effect is obtained when the impedance of the transformer primary is approximately double the plate resistance of the valve.

Exponential Horns.

A NUMBER of exponential horn speakers are on the market, usually with the horn folded up in order to economise space. There is a tendency in some of these to overdo the low notes at the expense of the high.

For the home constructor the five or six-foot square exponential horn offers an inviting field, and when such is carefully made of wall-board, results are highly satisfactory. The unit of an ordinary horn speaker will usually give greatly improved performance when fitted to one of these horns, the low notes being then well in evidence, the high being at the same time preserved.

The velocity of sound in air is 1120 feet per second, so that the wavelength in feet corresponding to any particular frequency may be found by dividing 1120 by the frequency. The diameter of the (round) horn in feet must then be made equal to this wavelength divided by 4.

When the horn is made square, the area of the mouth should be made equal to that of the equivalent round horn. The taper of the horn is to be calculated upon the recognised exponential system.

Balsa Wood Speakers.

IN America a rather popular type of speaker is made with a square diaphragm of Balsa wood, which is extremely light. The diaphragm is large, of square shape, often fashioned as a fireplace screen and decorated. By this construction a high ratio of stiffness to mass is obtained, slats radiating from the centre to consolidate the whole.

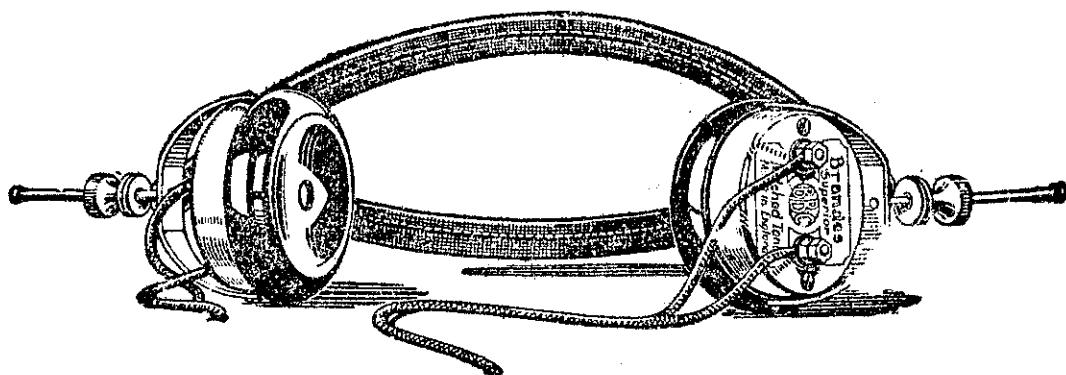
Coil-Driven Speakers.

THE coil-driven or dynamic loud-speaker has already become very popular in England and America, but is not expected to very rapidly displace the many excellent speakers already on the market. To obtain heavy volume from this type of speaker a special direct-current supply must be fed to energise the field-magnet, which constitutes an additional running expense, though where electric mains are available the cost is certainly small. Some patterns are made with permanent magnets, but will not yield volume equal to those employing an electro-magnet.

Coil-driven speakers lend themselves well to home construction when the requisite machined castings can be purchased finished ready for use. The field magnet may be excited by direct current of any voltage from 6 up to 230 or more, the winding being suited to the particular supply available,

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