

# Dynamic Cone Speakers Explained

Lecture by Mr. L. H. Wright to Radio Society



lecture:—

**B**EFORE the Wellington Amateur Radio Society on Tuesday last Mr. L. H. Wright, of the technical staff of the "Radio Record," delivered an address on the operation of dynamic cone speakers. The following is a resume of that

and a high one is determined purely by the rapidity of the alternate compression and rarefaction resulting from this vibration. It is well known that a high note is produced by rapid vibrations and a low note by slower vibrations. It is not every vibration that affects the auditory system, but providing these vibrations are within certain limits, varying with different people, the sensation of sound is produced.

Roughly, the useful limits of audibility are between 30 and 7000 vibrations per second. For the sake of demonstration the middle C on piano has a frequency of 256. Octaves above and below are double or half this number as the case may be.

No doubt the frequency tests from 2YA will be remembered by many.

Having a rough idea of what sound is, it is as well to study one or two of its sources. In the case of a stringed instrument the vibrations of the whole instrument set the surrounding air in motion. In a wind instrument the shape is such that by blowing into it, the air is set in rapid vibration. In the case of a loudspeaker the object is to be able to reproduce all frequencies in the audible scale with no undue prominence.

## Kinds of Speakers.

**T**HIS brings us to a study of the different kinds of speakers. The merit of the speaker can be judged by the extent of the variation in the intensity of sound at different points of the frequency scale. Thus a good speaker will have an even response curve, and a poor one will suppress some frequencies or make some frequencies predominate.

A horn type of speaker has the greatest response at the high frequencies. A cone (magnetic) type or reed driven has a high response at a middle frequency depending upon the construction and design of the speaker.

The M.C. speaker has a frequency response that can be adjusted by a process of varying the number of turns on the coil, alterations in the shape and size of baffle, and the introduction of filters for suppressing any frequency.

**T**HE principle of operation was first demonstrated in 1898 by Sir Oliver Lodge. It is not a new idea, but simply the revision of an undeveloped theory. Briefly, it can be said that when a wire, carrying alternating or fluctuating current is suspended in a powerful magnetic field, the wire tends to move in sympathy with the variations of current. In the case of a moving coil speaker, it is the speech or music variations of current that are passed through the wire, which is in the form of a coil. Fastened to this coil of wire is the cone or diaphragm of the speaker. Thus variations of current set the coil and cone in motion. The movement depends upon the nature of the variations of current, and this movement or vibration sets the surrounding air in vibration-producing sound waves.

Mr. Wright went on to say that the explanation could be made more comprehensive if the speaker was divided into sections suitable for individual discussion. To provide a powerful magnetic field several methods are available: (1) Permanent magnets; (2) electro magnet operated from 6 V. storage battery; (3) electro magnet operated from 100-200 DC supply; (4) 6-volt winding (rectifier for use from AC main).

To obtain the degree of magnetism required, permanent magnets have one or two drawbacks, namely, they can be magnetised only after assembling.

The use of an electro magnet with a 6-volt storage battery is, perhaps, the most common method, as the supply can be drawn from the storage battery operating the receiver, or from a battery charger. In the case of an AC operated amplifier employing smooth-

ing chokes the winding of a high resistance coil can be utilised in the place of one of the chokes. For this method M.C. speaker field coil are wound to operate on 100-200 V. direct current supplies.

One or two commercial firms supply some form of dry rectifier, and mount the whole as one unit. These can be plugged direct into the lighting socket.

The methods enumerated are the usual ones for the production of a suitable magnetic density, and the matter was explained very fully by the aid of blackboard diagrams. Mr. Wright went on to describe in detail the section comprising the cone and coil. The angle of the cone plays a great part in the reproduction. Although much

**Exhibition visitors will be able to see and hear the Amplifier described on pages 36 and 37. It will be on view at the "Radio Record" stall.**

stronger, a cone made with a more acute angle at the apex gives undesirable focusing, especially of the high notes. A shallow cone being mechanically weaker, tends to give undesirable resonance peaks.

This was explained by studying the movement of a cone at different frequencies. At low frequencies the cone moves as a whole, but a point is reached, depending upon the angle and material of which the cone is made, when the cone does not vibrate as a whole, but splits up into segments. At the point on the frequency scale where this change occurs a pronounced resonance is noticeable, and manufacturers try to get this undesirable point as high in the frequency range as possible.

Centring devices for the suspension and maintenance of the coil in the small air gap were discussed and examples were provided by the two speakers at the meeting.

The last section comprised different forms of baffles, and the modifications of these to regulate the low register. A large baffle is necessary to fully develop and reproduce low notes, and a M.C. speaker without a baffle is little, if any, better than the cheaper reed-driven cones on the market.

At the conclusion of the lecture several members discussed with the speaker different points relating to the subject. One speaker, referring to the operation of a six-volt accumulator model being operated from a battery charger pointed out that he had by the use of an electrolytic condenser so hunted across the terminals of the charger, all trace of hum had been eliminated from his speaker.

In response to a question as to the functioning of dynamic speakers, Mr. Wright stated that the best could be obtained from a M.C. speaker only when used with a power amplifier. However, excellent results could be obtained with less expensive equipment. One speaker stated in this respect that his results with a M.C. speaker used with a crystal and push-pull amplifier, convinced him nothing could be finer.

Finally, Mr. Wright was accorded a very hearty vote of thanks for his able and interesting lecture.

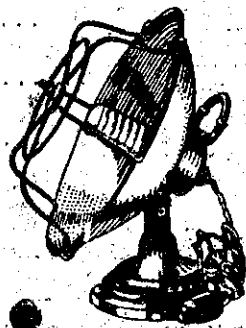
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