

Conclusions

The response-frequency characteristics, which depict the performance of a direct-radiator loudspeaker mechanism in various enclosures of fundamental shapes, show that the outside configuration plays an important part in determining the response as a function of frequency. For example, in some of the enclosures the variation in response produced by diffraction exceeds 10 db.

All of the response-frequency characteristics depicted in this paper were taken on the axis of the loudspeaker mechanism and enclosure combination. In this connection, it should be mentioned that the variations in response are mitigated for locations off the axis. The reason for using the axial response is that the reference response-frequency characteristic of a direct-radiator loudspeaker is always taken on or near the axis. Practically all serious listening to direct-radiator loudspeakers is carried out on or near the axis.

The response of a loudspeaker in an enclosure will be modified by the directivity pattern of the mechanism, because the diffraction effects are influenced by the direction of flow of sound energy from the diaphragm. However, the performance in the frequency range in which the dimensions of the cone are less than a wavelength will not be markedly different.

The experiments described in this paper show that the deleterious effects of diffraction can be reduced by eliminating all sharp boundaries on the front portion of the enclosure upon which the mechanism is mounted, so that the amplitude of the diffracted waves will be reduced in amplitude and by making the distances from the mechanism to the diffracting edges varied so that there will be a random phase relationship between the primary and diffracted sound waves.