5. Plotted data are loudness levels of *supply openings only*, correction having been made for test room level.

6. Data taken with a direct reading sound-level meter with frequency weighing network intended to approximate the response of the human ear.

If the published ratings are in terms of decibels per square foot, correction must be made for area to secure to total sound level of supply openings of more or less than one square foot area. This can be done by use of the following formula:

$$\text{Decibel Addition} = 10 \log_{10} A \qquad (1)$$

where

A = core area, square feet.

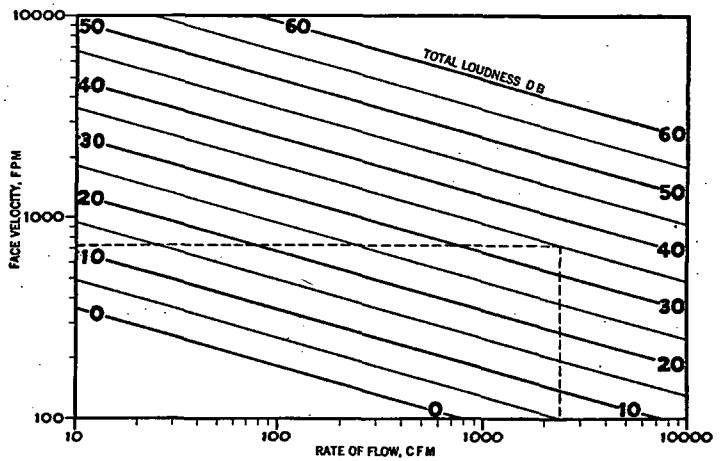

FIG. 11. AIR FLOW AND LOUDNESS CHART

In practice the allowable total sound and the required air flow are usually known, and it is desired to determine the maximum allowable velocity. Since total loudness and air flow are both functions of velocity and area, the solution of the problem by use of the previous analysis implies a trial and error method. It has been found possible to present these data with sufficient practical accuracy as a family of uniform curves as illustrated in Fig. 11. With this chart it is possible to find directly the velocity in feet per minute which will give a predetermined total loudness at a predetermined rate of flow expressed in cubic feet per minute. The values used are arbitrarily chosen for the purpose of discussion and do not necessarily represent data referring to any particular make of grille, register or air supply opening. It is assumed that Fig. 11 is based on a room having 100 sabins of sound absorption. In such a room the sound level due to other sources may be 40 db. As previously stated a supply opening having a noise level of 35 db would be substantially inaudible in such a room.

If 2400 cfm are required with a total noise due to supply opening of

35 db, a velocity (Fig. 11) of about 725 fpm may be used. From this velocity and the rate of flow, the core area can be computed. This determination was on the basis of a room absorption of 100 sabins. If the absorption is greater, the 725 fpm velocity is safe, since the loudness level will go down. However, correction can be made if desired by the use of the chart of Fig. 12. Thus, if the absorption is 200 sabins, a cor-

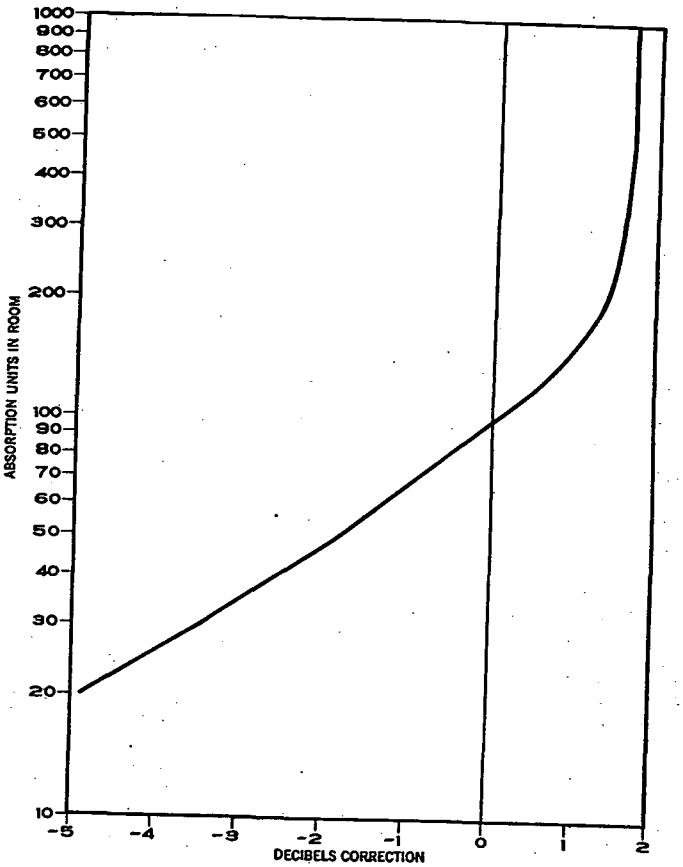

FIG. 12. ROOM ABSORPTION CORRECTION CHART

rection of +1.3 db may be made and the permissible velocity becomes that corresponding to a total loudness level of 36.3 decibels or approximately 800 fpm. If the room is highly reflecting and has an absorption of less than 100, correction is much more important. For instance, for 35 sabins a correction of −3 db must be made and the maximum velocity corresponding to 32 db total loudness chosen; that is, approximately 600 fpm.