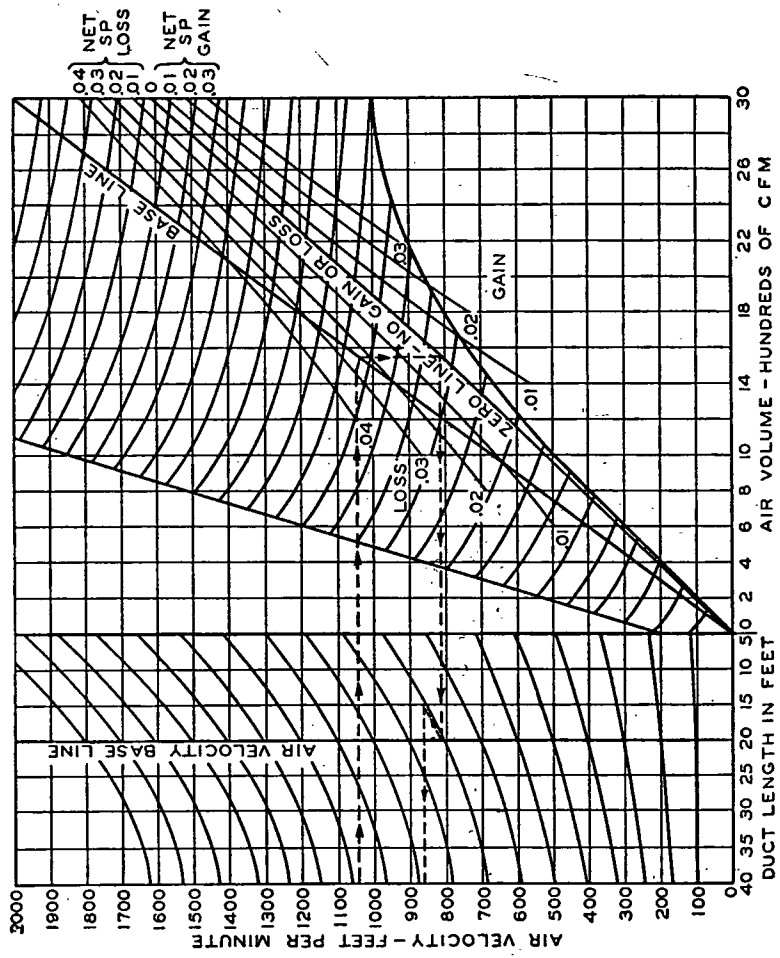

FIG. 12. STATIC REGAIN CHART[a]
For Determining Velocity in Ducts Carrying 0 to 3000 cfm
[a] Based on Equation 13.

Under the best practice, 0.7 to 0.8 of the change in velocity pressure is actually recovered, but for practical design an average recovery of 0.5 is assumed. Hence, the actual regain P_r is:

$$P_r = 0.5\left[\left(\frac{V_1}{4005}\right)^2 - \left(\frac{V_2}{4005}\right)^2\right] \qquad (13)$$

Design charts based on Equation 13 and rectangular ducts having aspect ratios of 3 to 1 or less are presented in Figs. 12 and 13.

The *duct length* of any section should include the equivalent length of any elbows or transitions within the section. The charts apply to constructions where regain takes place unaccompanied by radical change in direction; namely, to *straight-through sections* of divided-flow fittings.

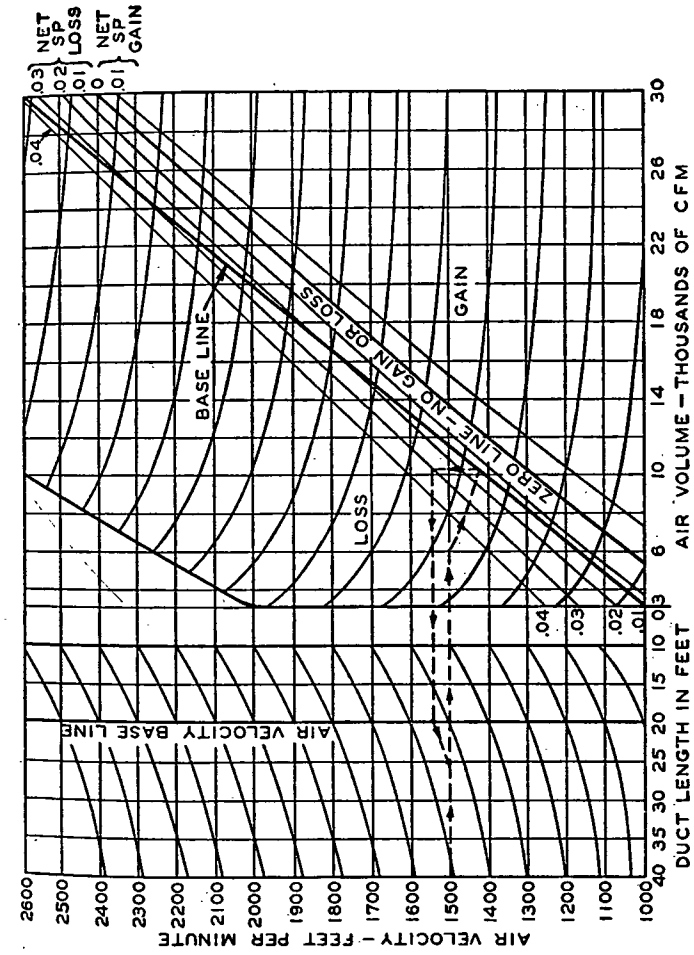

FIG. 13. STATIC REGAIN CHART[a]
For Determining Velocity in Ducts Carrying 3000 to 30,000 cfm
[a] Based on Equation 13.

Example 6: (Static Regain Method). A duct layout is shown in Fig. 14. The fan delivers 8000 cfm. Outlets 1, 2, 3 and 4 deliver 1500 cfm each, and outlets 5 and 6, 1000 cfm each. The operating pressure loss at all outlets is 0.12 in. water. Initial trunk velocity is assumed as 1500 fpm; the area of the trunk duct will then be 5.33 sq ft, and the size will be 48 x 16 in. It is assumed that for this example it is desirable to maintain a 16-in. depth on all duct sections. Determine the sizes of duct Sections B, C, D, E, F and G so that substantially the same static pressure will be obtained at each of the outlets, and find the total pressure loss of the system.

Solution:

1. Size Section F by the equal friction method so that it has the same rate of friction loss as Section A. Section A is equivalent to a 29.2 in. round duct (Table 1) and the pressure loss from Fig. 3 is 0.13 in. per 100 ft. For 2000 cfm flowing at this rate of pressure loss, the indicated round duct diameter for Section F is approxi-