

*Nonlinear Distortion.* A sound wave produces an expansion and a compression of the air in which it is traveling. We find from Eq. (2.6) that the relation between the pressure and the volume of a small “box” of the air at 20°C through which a sound wave is passing is

$$P = \frac{0.726}{V^{1.4}} \quad (9.30)$$

where  $V$  = specific volume of air in  $\text{m}^3/\text{kg} = 1/\rho_0$

$P$  = absolute pressure in bars, where 1 bar =  $10^5$  newtons/ $\text{m}^2$

This equation is plotted as curve  $AB$  in Fig. 9.11

Assuming that the displacement of the diaphragm of the driver unit is sinusoidal, it acts to change the volume of air near it sinusoidally. For