corresponding change in the internal energy of the alloy.

Disordering of Cu_3Au results in a volume increase. Pressure therefore stabilizes the ordered phase and increases the ordering energy. It will also increase the energy barrier to be overcome in taking a pair of atoms from correct to incorrect lattice sites. To allow for this in Eq. 2 both U and W should be replaced by the free energies G_U and G_W. Since $(\frac{\partial G}{\partial P})_T = V$ and $(\frac{\partial G}{\partial T})_P = -S$, a consistent first order approximation to the effect of pressure will be to add terms PV^* and PV_t to Eq. 2:

$$\alpha = \alpha_o \exp[(U + PV^* + 1/2W + 1/2PV_t)/kT] \qquad (3)$$

where V_t is the volume increase of transformation for a disordering interchange of a pair of atoms and V^* is the activation volume associated with the activated process represented in Fig. 1. To a higher order of approximation, the pressure and temperature dependence of V and S defined by the above equations would have to be considered. However, most high pressure experiments on atomic mobility are sufficiently accurate to require use of only the first order approximation.

If the activation-volume model of the effect of pressure on the order-disorder transformation is adequate, then Eqs. 3 and 1 should fully describe the ordering rate observed at constant temperature and pressure. The first aim of the experiments is to