The slight decrease in the size of the pressure effect that occurred when we cleaned our samples and made them more homogeneous, discussed in Sec. III, might be due to a decrease in $|C_1|$. There is no reason for expecting our cleaning process to decrease $|C_1|$ rather than increase it; however, changes in $|C_1|$ can provide a reason for the dependence of the size of the pressure effect on sample homogeneity. Furthermore, the large differences in the size of the rubidium pressure effect with different samples, observed before we made clean, one-piece rubidium samples, can be understood on the same basis.

The initial dependence of the pressure data on sample preparation raises the question of whether the pressure results would be altered by further cleaning of the sample. Since the inhomogeneities removed were relatively large and should vary from sample to sample, we take the reproducibility finally achieved to indicate that the cleaning process has eliminated most of the effect of inhomogeneities. If the cleaning process could be carried further, as by the growth of single crystals and the consequent elimination of grain boundaries, we expect that at worst the size of the pressure effect would decrease. We do not expect the direction of the pressure effect to change. It was the direction of the pressure effect that forced us to consider anisotropic scattering times; this anisotropy is the dominant feature of the interpretation. The proposal that the scattering time is anisotropic is unaltered by the presence of <u>some</u> scattering due to inhomogeneities, although the exact size of the anisotropy might be altered. This is not crucial for us since we cannot fit the data in detail and are concerned only with the order of magnitude of the anisotropy, $|C_1|$. The assumption is made here that the scattering is dominated by the lattice vibrations and the effect of inhomogeneities is relatively small, so that most of the anisotropy must be attributed to lattice scattering.

The pressure data and the changes in the warping parameter $A_1$ obtained from Ham's calculations agree semi-quantitatively if we consider anisotropic scattering times with values of $C_1$ of about $-.3$. We must now examine possible sources of the proposed anisotropy in $C_1$.

## D. The Scattering Time

In the last section we found that in order to fit the experimental data we needed to introduce an anisotropic scattering time $\tau(\vec{k})$. In this section we shall indicate possible sources of this anisotropy and make some estimate of its order of magnitude.

It is tacitly assumed that the scattering time for the case of applied electric and magnetic fields is the same as that for an applied electric field only. We follow the derivation of the expression for $\tau(\vec{k})$ given by Mott and Jones [9], modifying it only at those places where assumptions that lead to an isotropic $\tau$ are introduced.

If the distribution function is given by $f(\vec{k})$, the probability that a state at $\vec{k}$ is occupied, then in the steady state

$$\left(\frac{\partial f(\vec{k})}{\partial t}\right)_{\text{fields}} + \left(\frac{\partial f(\vec{k})}{\partial t}\right)_{\text{collisions}} = 0 \ . \qquad \text{(IV-12)}$$

We write the distribution function as

$$f(\vec{k}) = f_o + \left(\frac{\partial f(\vec{k})}{\partial t}\right)_{\text{fields}} \tau(\vec{k}) \qquad \text{(IV-13)}$$

where $f_o$ is the Fermi-Dirac distribution function. We take the z axis along that particular direction in k space for which we wish to compute $\tau(\vec{k})$ and apply the electric field F along this direction. Since

$$dk_z/dt = eF/\hbar \qquad \text{(IV-14)}$$

the equilibrium Fermi-Dirac distribution is shifted in k space and becomes

$$f(\vec{k},t) = f_o(k_z - eFt/\hbar, k_y, k_x) \ . \qquad \text{(IV-15)}$$

We now assume spherical constant energy surfaces so that $E(\vec{k}) = E(|\vec{k}|)$; thus

$$\frac{f(\vec{k}) - f_o}{\tau(\vec{k})} = \left(\frac{\partial f(\vec{k})}{\partial t}\right)_{\text{fields}} = -\frac{\partial f_o}{\partial k_z}\frac{eF}{\hbar} = -\frac{\partial f_o}{\partial E}\frac{\partial E}{\partial k}\frac{k_z}{k}\frac{eF}{\hbar} = -\left(\frac{\partial f(\vec{k})}{\partial t}\right)_{\text{collisions}}$$

(IV-16)