various temperatures it appears that $d\rho_0/dT$ is constant between 30 and 300° K and has a large positive value.* Following Linde we have tried to correlate this coefficient with the volume change due to thermal expansion, but we find that $d\rho_0/dT$ is about six times too large to be accounted for in this way.

It thus appears that the resistance minimum while still the most outstanding aspect of the behaviour of ρ_0 is only one of many puzzling features.

(c) *The effect of pressure on the minimum of resistance*

MacDonald & Pearson (1953, 1954) found experimentally that dilute copper alloys which showed a minimum in the temperature dependence of their electrical resistance always had an anomalously high thermo-electric power at low temperatures. In discussing their results, they make use of a relation derived by Mott & Jones (1936) between the thermo-electric power, S, and the energy dependence of the electrical conductivity, σ,

$$S = \frac{\pi^2 k^2 T}{3e}\left\{\frac{\partial(\ln\sigma(E))}{\partial E}\right\}_{E=\zeta}. \tag{2}$$

Here k is Boltzmann's constant, e the electronic charge, and T the absolute temperature. E is the energy of the electrons and ζ is the Fermi energy. This is a very general formula, and, in particular, it should hold at temperatures sufficiently low that $\rho_i \ll \rho_0$.

MacDonald & Pearson point out that if the high thermo-electric power of these dilute copper alloys is interpreted by means of the relationship (2) the energy dependence of σ for these alloys must be enormous; in the present case, for example, $\partial\ln\sigma/\partial\ln E$ would have to be larger than 100. It was therefore suggested that this remarkable effect might show itself as a strong pressure dependence of the residual resistivity of such an alloy, since by changing the volume the energy of the electrons would also be changed.

Our results show clearly that there is *no* such large pressure dependence. The pressure coefficient of resistance at the temperature of the minimum is the same (within the experimental error) as that at 4·2° K, where the 'anomalous' component of resistance (roughly speaking, that part which is in excess of the minimum resistance) forms about 20 % of the total. Moreover, these pressure coefficients are very similar in magnitude to those of samples I and II which were much purer specimens and showed *no* resistance minimum.

6. Conclusions

It thus appears that the general behaviour of the pressure dependence of the ideal component of resistance in copper is in agreement with theoretical expectations and is governed chiefly by the effect of pressure on the lattice vibrations. On the other hand, while thermo-electric power measurements suggest a possible large pressure

* The calculated values of $d\ln\rho_i/d\ln T$ (after correction for the temperature change of ρ_0) agree quite well with those for pure copper. This indicates that the value we have assigned to $d\rho_0/dT$ is approximately correct.