

et al. 1961). For sodium there should be little ambiguity in this procedure because we believe that here the residual resistivity is not much affected by the transformation (Dugdale & Gugan 1960). Another objection to this method of correction for residual resistivity is that, since the residual resistivity is a function of density, the correction should vary with temperature. From our measurements of the volume dependence of the residual resistivity we were able to confirm that, for our high purity specimens, this effect is negligible within the limits of precision of our results.

In this way we have obtained curves of *relative* ideal resistivity as a function of temperature for specimens of different shape factor. We confirmed that the curves all had the same form (and were thus truly characteristic of the substance studied), and we then normalized the smoothed, average curve to the value of the *absolute* resistivity which we had measured at room temperature. The absolute accuracy of our results is thus limited by our value for the absolute resistivity at room temperature, and this we believe to be accurate to about one half per cent; the relative accuracy is of course much greater than this.

(b) *The pressure coefficient of ideal resistivity*

The immediate results given by our high-pressure experiments were values of total resistance at pressure intervals of a few hundred atmospheres for a series of constant temperatures. We first of all tested the resistance-pressure curves for smoothness by constructing tables of the divided differences; the smooth curves we then fitted to a polynomial expression (tables 4 and 8). From a knowledge of the equation of state we then calculated curves of total resistivity as a function of pressure, and by subtracting the curves for the measured residual resistivity we converted these to curves of ideal (relative) resistivity as a function of pressure. This last correction can be criticized for the same reasons that we have already given in (a) above, but where the correction is large (for example, the experiment on potassium at 4.2 °K) it is possible to make it with considerable accuracy, and in the conditions where the correction is less clearly defined (i.e. at high temperatures generally, and for sodium and lithium in *all* the b.c.c. region) it turns out that for our high-purity specimens, the correction is small. The limits of error we have given for the pressure coefficient of ideal resistivity do *not* include a specific contribution to include these uncertainties, but we believe that such a contribution would be very small even in the worst cases (e.g. lithium, where the pressure coefficient of residual resistivity depends on the phase composition of the material).

(c) *The ideal resistivity and the pressure coefficient of ideal resistivity at constant density*

As we mentioned in the introduction, the simplest theories of electrical conduction assume that the conductor remains at constant density. For metals with a large thermal expansion and a large value of $\partial \ln \rho_i / \partial \ln V$ it is obvious that the thermal expansion can have a considerable effect on the resistive behaviour. This is particularly true for the alkali metals and it has been recognized before (cf. Meixner 1940: