gan

ity in this procedure because
h affected by the transforma-
this method of correction for
y is a function of density, the
measurements of the volume
to confirm that, for our high
ne limits of precision of our

al resistivity as a function of
We confirmed that the curves
stic of the substance studied),
e to the value of the *absolute*
ure. The absolute accuracy of
e resistivity at room tempera-
ne half per cent; the relative

resistivity

e experiments were values of
ed atmospheres for a series of
esistance–pressure curves for
erences; the smooth curves we
8). From a knowledge of the
al resistivity as a function of
asured residual resistivity we
ity as a function of pressure.
easons that we have already
or example, the experiment on
siderable accuracy, and in the
ed (i.e. at high temperatures
egion) it turns out that for our
nits of error we have given for
ude a specific contribution to
a contribution would be very
pressure coefficient of residual
naterial).

ient of ideal resistivity

t theories of electrical conduc-
ensity. For metals with a large
it is obvious that the thermal
ve behaviour. This is particu-
ized before (cf. Meixner 1940 :

Kelly 1954; Bradshaw & Pearson 1956), but up till now the information needed to apply the corrections fully has not existed.

We have made a first attempt on this problem by calculating the resistive properties of sodium and potassium under the condition of constant density. We have chosen the density to be that of 0 °K under zero pressure, because all the high-pressure data needed to make such corrections to constant density lie in the range of our high-pressure experiments. It would be most interesting to be able to calculate what the resistive behaviour is for other densities too, but the accuracy of the basic data does not as yet warrant doing this.

The method we have adopted is to calculate from the data on the equation of state of our specimens the pressure required to compress them to the volume that they would occupy at the absolute zero under zero pressure; we call this new pressure p'. From the same data we also calculate the instantaneous compressibility at p'. From this information, and from our measured resistance–pressure curves, we are then able to calculate the resistivity and the pressure coefficient of resistivity at pressure p'; these we call ρ_i' and $(\partial \ln \rho_i'/\partial p)$. We are of course interested in the temperature dependence of these quantities; in particular, from ρ_i' we calculate the quantities $(\partial \ln \rho_i'/\partial \ln T)$ and θ_G' as functions of temperature. We convert the values of $(\partial \ln \rho_i'/\partial p)$ to volume derivatives (using the values calculated for the instantaneous compressibility at p') and plot $(\partial \ln \rho_i'/\partial \ln V)$ against $(1 + \partial \ln \rho_i'/\partial \ln T)$ which gives us, according to equation (2), the quantities $(\mathrm{d}\ln K/\mathrm{d}\ln V)$ and γ_R appropriate to the density at 0 °K. That the difference between the coefficient evaluated at constant density and at constant pressure can be large is illustrated in figure 3 by the curves showing θ_G and θ_G' for potassium.

APPENDIX B. DATA FOR THE EQUATION OF STATE

We have tabulated in table A 1 the values *we have used* for the equations of state of lithium, sodium and potassium. The data are based on values of specific volume given by: Richards & Brink 1907 (K); Simon & Vohsen 1928 (K); Siegel & Quimby 1938 (Na); Pearson 1954 (Li); Barrett 1956 (Li, Na, K); Basinski & Verdini 1959 (Li, Na); and on values of volume compression given by: Bridgman, 1923 (Na), 1935 (Li, Na, K); Kleppa 1950 (K); Swenson 1955 (Li, Na, K); Nash & Smith 1959 (Li); Beecroft & Swenson 1961 (Na).

We have assumed that the shape of the P-V curves may be represented by the quadratic expression

$$V_p = V_0[1 + ap + bp^2] \equiv V_0[1 + ap(1 + cp)]. \tag{1 A}$$

We have tabulated 'a' ($\equiv \beta$, compressibility) as a function of temperature, and 'c' ($\equiv b/a$) we have assumed to be independent of temperature. The quantity 'a'' is the value of 'a' corresponding to the specific volume at 0 °K.

The units of pressure used in this paper are those of the normal atmosphere

$$1\,\mathrm{atm} = 1{\cdot}033_2\,\mathrm{Kg\,wt./cm^2} = 1{\cdot}013_3\ \mathrm{bar}.$$