the thermoelectric power.
magnitude and the quantity
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over a wide range of volum-
haviour in the alkali metals;
the variation of resistivity
, as far as it is known, to be
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ook at some of the theoretical
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WORK

ventional way of calculating
il the geometry of the scatter-
knowledge of the electron–
on dispersion curves enables
Bardeen, 1937; Ziman, 1954;
stivity varies with volume we
es change under compression.
effect of pressure on the resis-
, the electron properties were
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aviour of Li well. His results
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gdale, 1961; Ham, 1962). The
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l the work of Hasegawa.

Hasegawa (1964) made calculations of the pressure dependence of the resistivity of Li, K and Na. In all three metals he assumed that the phonon anisotropy was essentially unchanged by pressure. Experiments have shown that this is true for Na and K, and approximately so for Li (see Table III). In Na and K, Hasegawa assumed that, the shape of the Fermi surfaces was also unchanged by pressure, i.e., that the surfaces remained effectively spherical. This means that in these two metals the geometry of the scattering processes is not altered by pressure, and therefore apart from the change in lattice vibrations the main effect of pressure is on the Fermi energy, the screening effects of the conduction electrons and on the matrix elements. In Li, on the other hand, Hasegawa had to take account of the distortion of the Fermi surface under pressure. In order to do this he used the results of Ham's calculations: these, as we saw above, almost certainly exaggerate the distortion of the Fermi surface both at normal pressure and under compression. Hasegawa's results are shown in Table IV and compared with the corresponding experimental data. It is seen that there is reasonable agreement between the two; on the other hand, because of the reliance on Ham's band structure calculations for Li, it is hard to judge how significant the agreement is in this case.

Dickey *et al.* (1967) used a different approach that has been remarkably successful in accounting for the main features of the pressure dependence of resistivity in the alkali metals. The model of a metal used by Dickey *et al.* is based on the idea of the neutral pseudo-atom (see for example, the exposition of this idea by Ziman, 1964).

The first problem to be tackled is that of a single ion of the metal under consideration immersed in a free-electron gas of the appropriate Fermi energy, i.e., the Fermi energy that corresponds to the volume of the metal occupied by the number of conduction electrons proper to that metal. Obviously, varying the volume of the metal will vary the Fermi energy. A calculation is now made, in terms of phase shifts, of the scattering of electrons at the Fermi energy by the potential due to this ion. The potential of the ion is a combination of:

(1) The electron–ion potential; this is derived for the free ion by means of a Hartree–Fock–Slater calculation (and is taken over from existing calculations).

(2) A screening potential chosen to satisfy the Friedel sum rule. This rule essentially ensures that the screening charge around any ion is just sufficient to provide electrical neutrality.