ion of low temperatures and

work at low temperatures
d its complications. As we
ndition where all changes are
thermodynamic, criteria of
e energy become negligible).
ement can reveal and reflect
solid. Or again the mechani-
cial simplicity in the absence

may itself require low tem-
dard methods of determining
tion electrons involved have
plies the use of low tempera-
s.
ed mainly with the effect of
metals, in particular at low
nderstand these effects, we
t their high-temperature be-
must also have as much infor-
face, the velocities of the con-
erefore also be concerned with
asurements of the change in
g studied.
he discussion to the effect of

UES

high pressures introduces its
preciable pressure become solid
have to contend first with the
ures as good an approximation
ure. Various methods have been
some of these techniques are not
s for using high pressure at low
cently by Swenson (1964). We

therefore mention here only those that are of particular relevance to work on Fermi surfaces and electrical conductivity. (But see also Dugdale, 1965; Stewart, 1965; Levy and Olsen, 1965.)

A. LIQUID HELIUM

This is a straightforward method of producing pressure changes at low temperatures, used originally by Kamerlingh Onnes and his collaborators to study how pressure alters the superconducting transition temperature (Sizoo and Onnes, 1925; Sizoo *et al.*, 1925). The method is severely limited because helium solidifies under quite small pressures at low temperatures; at 1° K, the solidification pressure is about 25 b and at 4° K about 140 b (both pressures refer to ^{4}He). The method has, however, found useful applications recently (see below) and is often valuable as a check against methods of transmitting pressure that involve a solid transmitting medium.

B. THE ICE-BOMB TECHNIQUE

This method was introduced by Lazarew and Kan (1944). It uses the pressure generated (up to about 1800 b) when water solidifies on cooling at constant volume.

C. DIRECT COMPRESSION IN PISTON-CYLINDER ARRANGEMENT

In this method as originally used at low temperatures, the pressure is transmitted by solid hydrogen, the hydrogen itself being first condensed into the working cylinder and then compressed by means of a piston. The method was first used by Hatton (1955) to measure changes in residual resistivity and superconducting transition temperature under pressure. This direct-compression method, but using solid helium as the medium, has also been used by Goree and Scott (1966) (see below). The original reason for using hydrogen rather than helium was that hydrogen, at low enough temperatures, condenses as a solid whereas helium does not, except under pressure. For this reason, hydrogen is rather easier to deal with.

Brandt and Ginzburg (1962) used a direct-compression method in which friction between the specimen and the piston and cylinder was