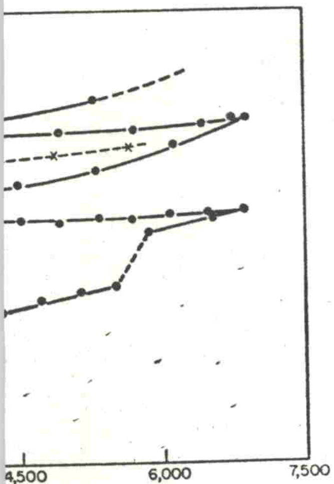
te pressures at which solid
), this method yields a very
pressure. In addition Goree
nparisons of various methods
trical resistivity at low tem-
the "helium gas" technique



Ag compressed in piston-cylinder
nst sample pressure. (From Goree

the fluid at the same pressure)
ng both hydrogen and solid

they say (p. 826): "We have
ble deformation or hysteresis
e experiments were carefully

l, they chose a soft metal, sil-
both solid helium and solid
l that there was significantly
imated from hysteresis in its
s used rather than hydrogen.
cycle on silver obtained by the
ium.

Although they recognized that their experiments were not comprehensive, Goree and Scott concluded: "(1) helium is a superior quasi-hydrostatic pressure transmitting medium to hydrogen in piston-cylinder apparatus, but the difference . . . . . may not be great . . . . . (2) Piston-cylinder experiments performed with care can give results in fair agreement with accurate hydrostatic gas experiments but they are tricky and unreliable . . . . . (3) The two ice-bomb measurements [due to Kan and Lazarew (1958)] are in marked and quite unreasonable disagreement with all the others . . . . . (4) The helium gas system gives consistent, reproducible results and is greatly to be preferred over the other pressure systems considered."

As we shall see below, there is other evidence to show that the ice-bomb and related techniques do not give rise to hydrostatic pressures. Goree and Scott also comment on the use of the sharpness of superconducting transitions as a criterion for having a good hydrostatic pressure. Because the ice-bomb technique could give such a sharp superconducting transition, this has been taken as evidence that the pressure was hydrostatic. Clearly this does not follow; a uniform (but non-hydrostatic) stress (e.g., a uniform shear) would give rise to a sharp transition. But even this may not be a necessary condition; it is, however, a reasonable assumption.

We now turn to the application of these methods to the determination of the properties of the Fermi surface in metals under pressure.

III. The Fermi Surface as a Function of Pressure

There have been several attempts to determine how the shape of the Fermi surface of a metal changes with pressure. Here we are primarily interested in the monovalent metals, since these are in some ways the simplest theoretically, particularly from the point of view of transport properties, and since their properties have been studied more intensively than those of other metals. On the other hand metals such as Zn, Pb and Al (on which pressure measurements have recently been made), have been shown to approximate well to the nearly free electron model of a metal. For this reason and because the work on Zn makes possible a direct comparison of several high pressure techniques we shall begin by having a look at some of the work on the Fermi surface of these metals. In order to understand the results and the significance