obtained and handled in high purity, they in general do not follow the Debye-Mott model. This may be understood as follows: Fermi surfaces of the alkali metals at room conditions are more or less spherical, but as pressure is applied the Fermi surfaces distort from spherical shape and at some volume make contact with the Brillouin zone faces. This distortion of the Fermi surface due to compression results in additional electron scattering, countering the decrease in scattering by lattice vibrations. On the other hand, Fermi surfaces of noble metals are already distorted and touching the Brillouin zone faces at room conditions. Thus while compression does cause more distortion of the Fermi surface, there is not such a drastic change in electron scattering as in the case of alkali metals. One might then expect that resistivity changes due to changes in scattering cross-section of lattice vibrations might dominate in noble metals under pressure. Then one might hope to understand any deviations of shock data from static data from the standpoint of simple models. Hence, the choice was narrowed to the noble metals, available in high purity, following Debye-Mott theory under static pressure and quite resistant to surface oxidation. Silver was chosen because it has a Debye temperature well below room temperature, simplifying many calculations, and there exists a readily available anvil material, Al_2O_3, with mechanical shock impedance U_s/V_o (U_s is shock wave speed and V_o is initial specific volume) close to that of silver; the silver foil will be sandwiched between two discs of the anvil material during the impact experiment.

B. Constraints on Experimental Configuration

Reliable shock resistance experiments require that resistance changes under shock compression result in accurately measurable voltage changes as recorded on oscilloscopes. For the bandwidth necessary for these experiments, the voltage sensitivity limit of oscilloscopes is typically one millivolt per division. That this limit is physical may be understood from the formula for thermal voltage noise,

$$\overline{E^2} = 4Rk_BT(f_2 - f_1)$$

where $f_2 - f_1$ is the frequency band width, R is circuit impedance, T is absolute temperature, and k_B is Boltzmann's constant. For $R = 50\ \Omega$, $f_2 - f_1 = 10^9$ Hz, T = 300°K, we find $E_{rms} = 0.03$ millivolts. Since artifact voltage signals of the order of one millivolt are not unusual in shock experiments of the type considered here, it is desirable that the expected signal be at least 100 millivolts.

For experiments to be characterized by one-dimensional compression, the specimen should be in the form of a foil about 100 times wider than it is thick. Anomalous resistance changes due to two-dimensional deformation at the foil lateral edges will then be small compared to the total resistance change. Such effects arise when the foil edges are adjacent to a layer of material such as epoxy which reaches stress equilibrium with the anvil pieces more slowly than the specimen.

Since room temperature resistivity, ρ, of silver is 1.6 μΩcm, achieving the desired voltage levels will require high current I, long sample length L, and small sample cross-section A; i.e., $E = I\rho L/A$. Values for these experiments were