SECTION III

EXPERIMENTAL RESULTS AND ANALYSIS

1. Aluminum

The Hugoniot data for solid and porous aluminum are presented in Table I. All of the data reported in Ref. 2 are included, so that Table I is a complete summary. The data for porous aluminum are plotted in the shock velocity-particle velocity plane in Fig. 3. The straight lines in the figure are drawn as guides and do not represent fits to the data. The Hugoniots in the pressure-volume plane are presented in Fig. 4 (the labels t = 3/16 in. and t = 3/8 in. refer to the sample thickness). The Hugoniot for solid aluminum was taken from the work of Al'tshuler et al. (Ref. 6). They quote a value of 2.71 g/cm^3 for the initial density of aluminum. To make their Hugoniot comparable to the data reported here on aluminum of initial density 2.70 g/cm^3, each of their volumes at a given pressure was changed by a factor of 2.71/2.70. This maintains the shape of the curve but translates it slightly to the right, i.e., toward larger specific volumes. The solid Hugoniot curve was then fitted by

$$P_H = 16889.5 - 134327.5V + 363023V^2 - 333405V^3 \qquad (1)$$

where V is specific volume in cm^3/g and P_H is Hugoniot pressure in kilobars. To fit the porous aluminum pressure-volume (P-V) data, smooth curves were drawn through the points. From these curves and the solid aluminum Hugoniot, the internal energy as a function of pressure at a given volume was computed by using the Hugoniot energy relation

$$E_H = E_o + (1/2)P_H(mV_o - V) \qquad (2)$$

where m is the porosity. The values of the initial internal energy E_o and the initial specific volume V_o were taken as 1.66×10^9 ergs/gm and