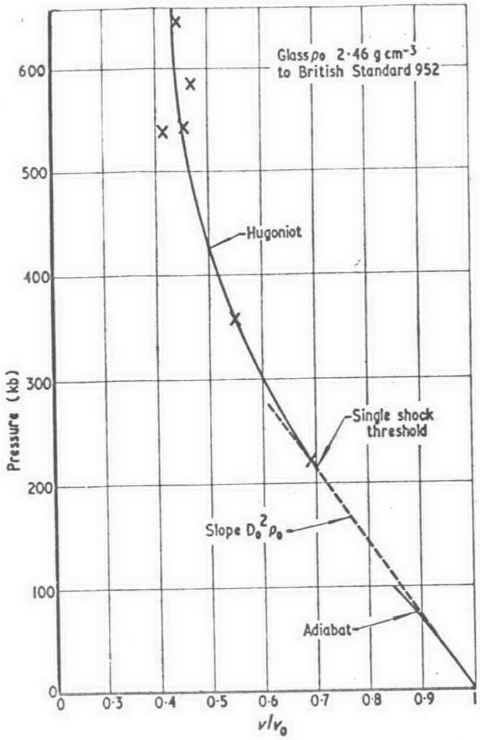

Figure 7. The pressure–volume relation for glass to BS 952, showing the adiabat calculated from the velocity–pressure curve and the high pressure Hugoniot measurements.

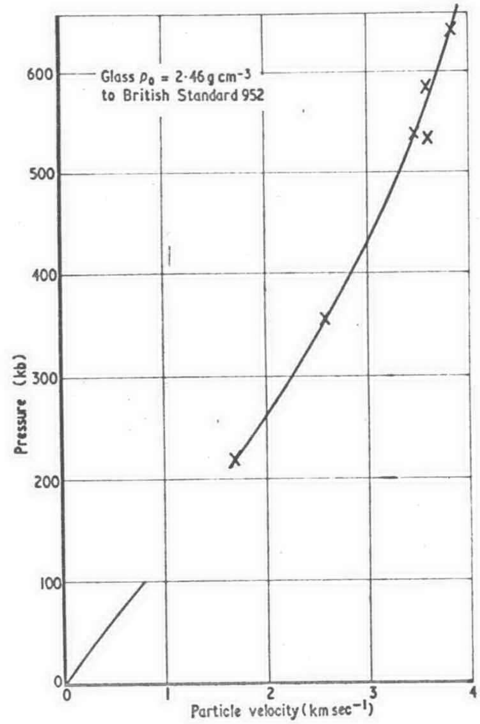

Figure 8. The relation between particle velocity and pressure for glass to BS 952.

calculation was carried out taking $D = g(p)$ to be the mean of the curves shown in figure 6, ignoring any particular curve after a shock had been detected.

The initial adiabatic portion of the pressure–volume curve has the opposite curvature to that usually found in solids. A similar curvature for the isothermal compression of several glasses has been found by Bridgman (1944–48). When the peak pressure in an experiment exceeded about 230 kb only a single shock was seen. Six points were measured on the glass Hugoniot in this high pressure single shock region, using the conventional switch pin technique. In figures 7 and 8 the simple compression measurements are compared with the Hugoniot data. The agreement is seen to be quite satisfactory in the sense that the two sets of data appear to represent different regions of a common curve. A line drawn from $p = 0$, $v/v_0 = 1$ with slope $-D_0{}^2\rho_0$ divides the pressure–volume plane into two areas; above the line single shocks exist and below it a simple compression wave can separate from the shock. This line cuts the Hugoniot measurements at about 220 kb, agreeing with the single shock threshold as determined from pressure profiles. In addition the shape of the pressure–volume relationship obtained implies that when two waves are seen, the peak pressure of the simple compression wave should decrease with increase in peak shock pressure. This has been observed consistently in numerous experiments.

4. Conclusions

A pressure transducer has been developed using the linear increase in resistance of a manganin wire, and is capable of measuring the pressure–time profiles of pressure pulses generated in an epoxy resin block by a variety of explosively driven systems. Pressures in