B. Electrical Pin Techniques

As mentioned in Chapter II, the Hugoniot can be determined for an unknown sample through a knowledge of the shock and particle velocities and the initial density. The usual procedure for solids is to measure the shock and free surface velocities and then use the free surface approximation, twice the particle velocity equals the free surface velocity, as a first step in an iterative procedure to obtain the particle velocity. Measurement of the shock velocity in the liquids is straightforward but the particle velocity is more difficult to measure. To this end, the impedance-match technique, discussed in Chapter II, affords a convenient means of accurately determining the particle velocity.

The two velocity measuring methods most extensively used in dynamic pressure experiments are electrical pin contactors and high speed camera devices. The optical method was not used in this study and hence will not be discussed. Several accounts are available in the literature.[21-23] The electrical pin contactor,[32,33] commonly called a pin, is an electrical switch that is closed by the action of a shock wave induced motion. With appropriate electronic circuitry and oscilloscope arrangement, the time of closure can be recorded. Electrical pins, as originally used, were designed for solids with good electrical properties but many liquids are normally very good insulators. Consequently, a coaxial pin[34] or self-contained pin was designed to determine the shock velocity in the liquid samples. Fig. 9 is a diagram of the coaxial pin and the associated electronic circuitry. The coaxial pin consists of an insulated center electrode