helium, is the source of the difference. The reproducibility is very good, amounting to about $\pm$ 1% at velocities above 0.2 mm/μs.

B. Tilt

The major question with regard to this design is whether or not adequate control of the tilt of the projectile face with respect to the target face can be maintained. In order not to seriously degrade the time resolution of the recording instrumentation it is desirable that the closure time of the two surfaces (of four-inch diameter) be less than about 50 ns. The time required for the induced stress wave to sweep past a gauge whose lateral dimensions in a plane parallel to the impact surface is 10 mm or less will then be no more than 5 ns. This time is comparable to the response time of the oscilloscopes in use (85 MHz frequency response).

The geometrical tilt required is thus a function of projectile velocity and varies between 0.2 milliradian at a projectile velocity, v, of 0.1 mm/μs to 2.0 milliradian at v = 1.0 mm/μs.

Our experience to date shows that, with a few exceptions probably attributable to errors in initial alignment or to faulty target construction, the tilts achieved are frequently 0.1 to 0.2 milliradian and are consistently below 0.5 milliradian. This degree of tilt could arise solely from the allowed clearance (3 to 3.5 x 10^{-3} inch) between the projectile and the barrel. Thus the tilt is adequate for most experiments and, where it is demanded by an unusual experiment, improvements in tilt can probably be achieved with tighter fitting or longer projectiles.

VI. RESEARCH PROGRAM

Several research problems are currently underway, simultaneously with the development of recording techniques. The quartz technique[9] is reasonably well established in the laboratory and manganin gauges[10] are beginning to be used. As confidence is developed in the use of these techniques