I. INTRODUCTION

This paper describes the gas gun and associated instrumentation that has been designed and installed at Washington State University. The first year of the two-year program was spent in design and construction of the gun.[1] It was installed at the beginning of the second year, and active research began some three months later after a number of shakedown experiments and minor modifications of the gun.

A gas gun was chosen as the principal experimental tool of the Shock Dynamics Laboratory for several reasons. These devices are capable of very precisely controlled impacts in which initial conditions of the projectile and target are well determined. Their velocity range (up to about 1.5 mm/μ s) is adequate for the study of a wide range of physical phenomena including, for example, the study of phase transformations and constitutive relations. They are relatively safe and can be operated by a small number of personnel in a campus environment.

Although powder-driven guns can be shorter for a given projectile velocity, and are therefore less expensive, they are less suitable for precision impact studies because of problems of cleanliness and high recoil forces. Further, the problems of storage and handling of gunpowder in a campus environment, while not insurmountable, are substantial inconveniences.

Some of the conceptual design considerations leading to the choice of length, diameter, operating pressure, and mode of operation are discussed in Section II. Section III includes detailed descriptions of the major features, and Section IV describes the instrumentation developed for use with the gun. Sections V and VI describe the performance of the gun and some of the current research problems.