

To: Jim Snedeker  
From: Edward Ford  
Subject: October Progress Report

#### Bolt Velocity Software

The software program developed to automate the bolt velocity test is complete. Throughout the next three months the test lab technicians will document any problems they experience while using the software. If any problems are found, the program will be revised to eliminate the problems, otherwise the program is complete in its current revision.

#### Design/Develop Improved Test Jack

Three high speed videos were taken of Dennis Thomas firing a Model 11-87 from the shoulder. These videos were taken in the presence of representatives from Integrated Sensors Inc., a local company trying to incorporate their technology to the Kodak motion analysis workstation. We are awaiting their results. In the meantime, the motion analysis workstation was used to generate curves depicting the motion of various points on the gun and shoulder. These curves will be used to design a mechanism which gives similar motion during recoil.

The force gauge used in previous recoil tests was mounted on a Model 11-87 and sample data collected of Dennis Thomas shooting from the shoulder. The data did not agree with other recoil test data so the signal conditioners were checked for calibration. The Kistler dual mode amplifier used to amplify the force transducer output was within operating specifications. The Endevco signal conditioner used to amplify the accelerometer output was out of calibration. The instrument was shipped back to the factory for repair and calibration.

Literature from three companies marketing shock absorbers was read to determine if their product could be used for recoil suppression.

1. Suspa Incorporated markets a gas spring used for lifting, damping and counterbalancing. However, it is not recommended for use in applications involving a sudden actuating force.
2. Industrial Gas Springs Inc. also markets a gas spring. Their spring is not recommended for applications involving fast cycling (typically no more than 15 cycles per minute).
3. Ace Controls Inc. markets a linear deceleration device. From initial recoil data, the recoil force generated from shooting from the shoulder is not linear and therefore, this device will probably not be usable in its standard design. However, the principles on which these devices operate may be adaptable to a recoil suppression device.