

To: Jim Snedeker
From: Scott Franz, Harold Davidson

(2/27/96)

Subject: **DROP TEST CHARACTERIZATION**

INTRODUCTION:

One of the Analytical Groups goals is to predict the behavior of firearms when dropped from various heights onto different types of surfaces and at different orientations. Our ADAMS kinematic package has the ability to do this. Characterization of the impact forces generated when a product is dropped is key to an accurate analysis. Instead of modeling the impact ADAMS can also utilize experimental data to drive a simulation. For example, instead of modeling the impact forces imparted to a gun when dropped on the butt stock at a height of 1 ft. onto the SAAMI mat we could measure the acceleration versus time signal with an accelerometer and use this as an input to the analytical model. With this approach the analytical model has a better chance of predicting what the actual mechanism will do when tested.

With this in mind we would like to build a library of acceleration versus time curves. To get started we would like to concentrate on the Model 700 rifle. Since we cannot do every model and stock configuration we will identify only a few models and configurations to start with. In addition we will only concentrate on drops onto the SAAMI mat since this is the medium that is used in our drop tests to qualify new products. Harold will be available to assist your people in the collection of this data. We see this test as the first of many, with the long range goal of characterizing our entire product line.

TEST PROCEDURE:

Perform drop tests on M/700 rifles and capture the acceleration versus time curve as measured with the specified accelerometer. Five drops are requested per test condition. Gun configuration, drop height and impact medium are listed below. Waveforms need to be stored on floppy disk in ASCII format.

- Instrumentation:
 1. Accelerometer: PCB Model 305A04 (Ser. No. 8295)
 2. PCB Power Supply and cables
 3. Mounting: Aluminum block drilled and tapped for accelerometer.
Mounts on receiver via scope mount threaded holes.
New mounting techniques may have to be developed as needed.
 4. Fluke portable oscilloscope with PC interface.
 5. Laptop PC interfaced to scope with Data Acquisition Software.

cc: Dale Danner

Subject to Protective Order - Williams v. Remington

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Test Matrix

All drops on the same SAAMI mat, 85 ± 5 Durometer(Shore A).

Use all long actions.

Use SAAMI drop test procedures unless noted otherwise.

<u>TEST</u>	<u>GUN</u>	<u>STOCK/PAD</u>	<u>ORIENTATION</u>	<u>DROP HEIGHT</u> <u>(ft.)</u>
1	M/700 ADL or BDL	wood/plastic butt plate	muzzle,butt,top, bottom,left,right	1.4
2	M/700 ADL or BDL	wood/recoil pad	muzzle,butt,top, bottom,left,right	1.4
3	M/700 ADL or BDL	synthetic/recoil pad	muzzle,butt,top, bottom,left,right	1.4
4	M/Seven	wood/recoil pad	muzzle,butt,top, bottom,left,right	1.4
5	M/Seven	synthetic/recoil pad	muzzle,butt,top, bottom,left,right	1.4
6	M/700 Sendero or Varmint Synthetic	synthetic/recoil pad	muzzle,butt,top, bottom,left,right	1.4