To: Derek Watkins and Will James

CC: Dale Danner and Danny Diaz

From: Harold Davidson

Date: 3-31-98

Subject:

A dynamic analysis of the M710 fire-control linkage assembly, shown in FIGURE 1, was conducted to simulate its response during drop testing. The analysis was performed using ADAMs 9.0.2 and these results were compared to a similar analysis performed using Working Model 2-D.

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Final version of this report never completed. Derek's working Model results have not been completed.

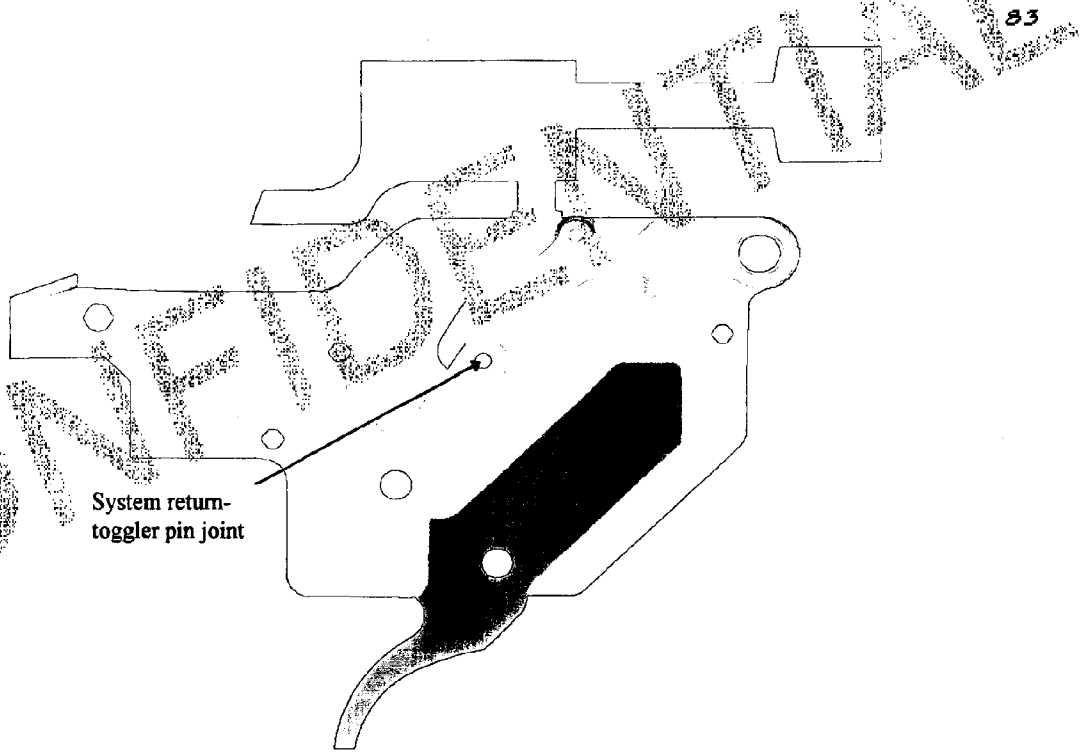

FIGURE 1. M710 fire-control assembly.

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Modeling:

Mass properties for each fire-control component were taken from its CADDS5 solid model assuming a density for steel of 0.283 lb/in^3. A single part representing the remaining mass of the gun was attached to the linkage assembly giving the entire gun a mass of 7.5 pounds.

The equilibrium position for the ADAMs model, the location of the system return- toggler pin joint, was set at 0.0143 inches past toggle. When this distance becomes negative, the gun fires. Joint slop was not considered and all parts of the linkage were modeled as rigid.

Testing:

The firearm was dropped from 4 ft and allowed to accelerate due to gravity. It then impacted a hard surface approximating steel. Four orientations were analyzed; top down, bottom down, muzzle down, and butt down.

Results:

The table below lists the motion of the system return-toggler pin joint relative to its equilibrium position for the ADAMs analysis.

ADAMS DROP TEST RESULTS

Drop Orientation	Equilibrium Position	Minimum Position	Total Displacement
Top down	0.0143	0.0117	0.0026
Bottom down	0.0143	0.0141	0.0002
Butt down	0.0143	0.0141	0.0002
Muzzle down	0.0143	0.0125	0.0018

TABLE 1. Equilibrium position and minimum toggle position during drop tests.

Conclusions:

Based on simulation results, it is believed the proposed M710 fire-control will pass a two foot drop test in all orientations on an 80 durometer mat with safety off. It is recommended prototype fire-controls be built and tested.

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