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Ref. Sym: 1611 (351)
Project No. ET-3930

vibration at resonance for one hour, and vibration cycling between 10-500-10 cps for four 15-minute cycles, all in each of three mutually perpendicular axes. The amplitude should be maintained at 1 g from 10 to 26 cps, 0.036 inch from 26 to 73 cps, and 10 g from 73 to 500 cps. Since the resonance of the detonator must be determined visually, and detailed observation by television was not possible, two accurate inert mock-ups were fabricated by IASL. They were mounted on the Calidyne vibration table and vibrated according to the above limits along each of three mutually perpendicular axes. While slowly cycling the frequency, their motion was observed by means of a Strobotac, and at no time was a resonance detected. Therefore in lieu of the required hour of vibration at resonance, it was decided by the consultant to increase the cycling time to two hours in each axis for the live units.

The second group consisted of 80 detonators, 20 of which were vibrated at one time. The following is a tabulation of the serial numbers of each batch of 20:

Batch I		Batch II		Batch III		Batch IV	
56,096	56,506	56,382	56,561	56,201	56,526	56,153	56,497
56,401	56,519	56,386	56,564	56,349	56,541	56,173	56,548
56,411	56,521	56,423	56,578	56,362	56,549	56,309	56,568
56,421	56,533	56,444	56,588	56,420	56,550	56,327	56,579
56,432	56,544	56,478	56,594	56,427	56,583	56,416	56,581
56,442	56,546	56,530	56,597	56,459	56,592	56,445	56,589
56,461	56,577	56,532	56,614	56,472	56,598	56,453	56,593
56,463	56,629	56,537	56,657	56,473	56,632	56,455	56,596
56,476	56,638	56,545	56,671	56,482	56,643	56,475	56,600
56,496	56,976	56,557	56,672	56,487	56,647	56,482	56,619

The detonators of Batch I were attached to an adapter plate by their normal means. Short lead wires were connected to each of them and were held by a clamp placed within an inch of the connector end. The plate was bolted to the Calidyne in three orientations so that the direction of vibration was along each of the three desired axes. These axes were: X, perpendicular to the connector pins and in the plane of bottom surface of the detonator; Y, parallel to the connector pins; and Z, perpendicular to the plane of the bottom surface. The sequence of vibration was axis Z, Y, and then X.

The connectors were observed by means of television during vibration, and no trouble was encountered until the third axis. After 50 minutes in this axis, and while at a frequency below 30 cycles, the cap of No. 56,096 fell out causing the detonator to be held in place by the lead wire only. This allowed the detonator to vibrate within its recess and caused chipping of the PBX pellet on its periphery. The unit was reassembled and the test completed.

The detonators of Batch II were attached to the adapter plate for vibration along axis Z only. While installing them, the pins on No. 56,557 were inadvertently bent out of alignment, but after straightening them the lead con-

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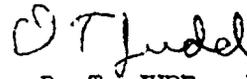
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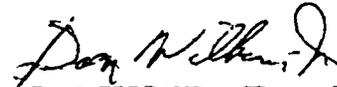
necter, fit properly. The two hours of cycling were completed without mishap.

Batch III was vibrated along axis Y only, and all the units except No. 56,632 completed the two hours without damage. This one had its cap come off after 14 minutes while at 450 cps. The pellet was chipped and the plastic cup was cut through at this point. The rivets holding the cap in place were spread apart slightly, allowing the cap to be too loose. This was probably due to the assembly on the aluminum adapter plate, so the screws holding the body of the holder were loosened and the rivets were held closer together while the screws were tightened. The detonator and cap were replaced and the vibration resumed. Three minutes before the end of the test this cap again came off. The pellet acquired another chip on its periphery, and the plastic cup another hole. The cup and the cap were replaced with new ones and the test was completed.

The fourth batch completed two hours of vibration along axis X with no damage.



Test Conducted by D. T. JUDD - 1611-1



Approved by D. WILLIAMS, JR. - 1611

DTJ:1611-1:dr

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