



***SMALL CALIBER AMMUNITION
BRANCH
CAL .50 NO-PRIMER VENT HOLE
EVALUATION TEST***

***PRESENTED BY
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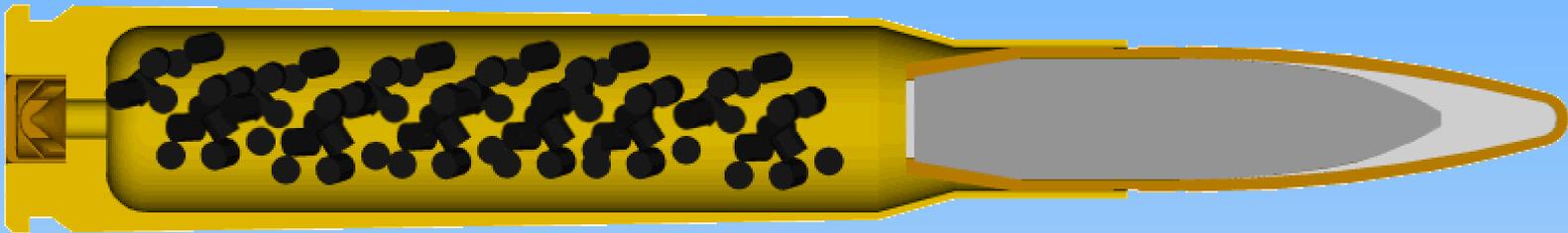


BACKGROUND

- At the request of the Operations Support Command (OSC), TACOM-ARDEC developed and executed a test to determine whether or not a no-primer vent hole condition in the Cal .50 Cartridge Case should be considered a critical defect.
- While a no-vent is currently classified as a critical defect, no test data existed to definitively support this assessment.



Cal .50 M8 API



- **THE PRIMER VENT HOLE ALLOWS THE BURNING PRIMER MIX TO IGNITE THE PROPELLANT. THE PROPELLANT GASES PRODUCE THE REQUIRED PRESSURE TO PROPEL THE BULLET OUT OF THE WEAPON.**



CRITICAL DEFECT DEFINITION

- **“A characteristic that judgment and experience indicate must be met to avoid hazardous or unsafe conditions for individuals using, maintaining, or depending upon the product; or that judgment and experience indicate must be met to assure performance of the tactical function of a major item such as a ship, aircraft, tank, missile or space vehicle.”**

MIL-STD-1916



TEST OBJECTIVES

The test was designed:

- **To evaluate the potential health and safety hazards to the user**
- **To determine if the no primer vent hole condition jeopardizes the tactical function of the Caliber .50 weapon systems**



WEAPONS EVALUATED

CAL .50 M2 MG





WEAPONS EVALUATED





M2 SAFETY ASPECTS

- **To determine the risk of injury to user from high velocity fragments**
- **The second concern was the risk of health and safety hazards to the user from radiant and non-radiant thermal energy (flame or heat)**



WEAPON STOPPAGES ARE CLASSIFIED AS FOLLOWS

Class I: Can be cleared in 10 seconds

Class II: A failure that requires more than 10 seconds but not more than 10 minutes. Only the equipment and tools issued with the weapon may be used to clear the failure.

Class III: Severe nature. The failure is operator correctable but requires more than 10 minutes, (2) operator cannot correct and requires assistance (no time limit), (3) requires higher level of maintenance, or authorized operator correction cannot be accomplished because of unavailability of necessary tools, equipment or parts. Also includes catastrophic failure.



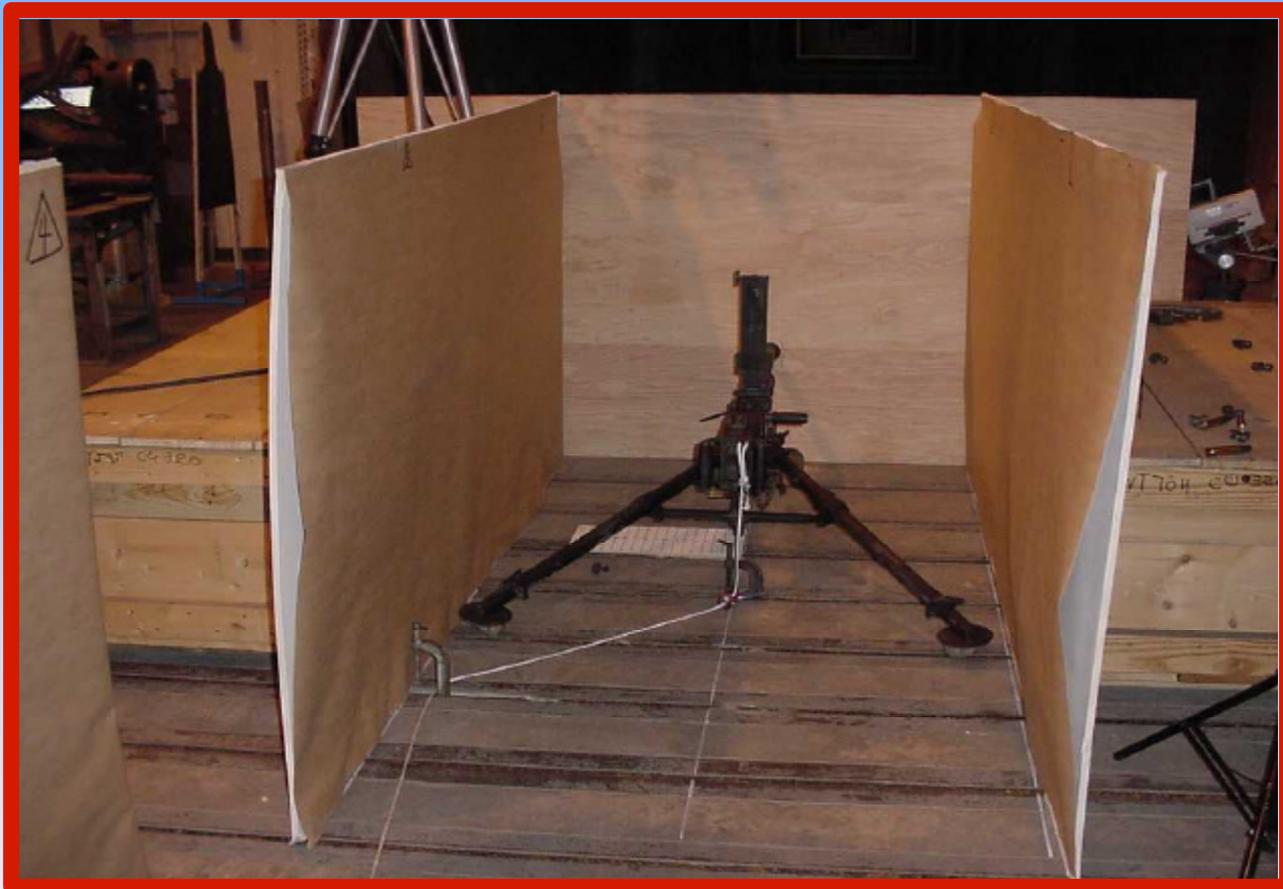
TEST PROCEDURES FOR THE M2 MG

THREE HUNDRED ROUNDS WERE
FIRED AS FOLLOWS IN THE M2 MG:

- 220 RDS @ 70°F
- 20 RDS @ +125°F
- 20 RDS @ -65°F
- 20 RDS @ -25°F
- 20 RDS @ +155°F



M2 TEST SETUP FOR HIGH VELOCITY FRAGMENTS



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M2 TEST SETUP FOR THERMAL ENERGY HAZARDS

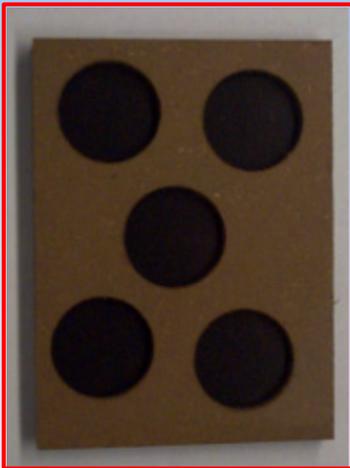
***Mr. TERRY
LYON FROM
THE U.S. ARMY
CENTER FOR
HEALTH
PROMOTION
AND
PREVENTIVE
MEDICINE
(CHPPM)***



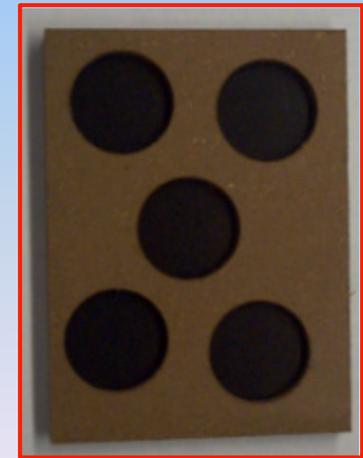


M2 TEST SETUP FOR THERMAL ENERGY HAZARDS

Lyon Panels



Lyon Panels





M2 TEST PROCEDURES

- **Short Burst Test** - In a 50 round belt of M33 cartridges, every 5th M33 cartridge was replaced with a no-primer vent hole cartridge.
- **Long Burst Test** - In a standard 100 round belt of Cal .50 M33 cartridges the 95th round was replaced with a no-primer vent hole cartridge



SAFETY ASPECTS FOR THE M82 SNIPER RIFLE

- To determine if the gunner and assistant gunner were at risk of injury from high velocity fragments
- To determine if the user was at risk of injury from radiant and non-radiant thermal energy (flame or heat) produced by firing the M82 Sniper Rifle using Cal .50 M33 rounds with no primer vent hole.



TEST PROCEDURES FOR THE M82 SNIPER RIFLE

**THREE HUNDRED ROUNDS
SCHEDULED TO BE FIRED AS
FOLLOWS:**

- 260 RDS @ 70°F
- 130 rounds from Weapon 1 @ 70°F
- 130 rounds from Weapon 2 @ 70°F
- 20 RDS @ -65°F
- 20 RDS @ +155°F



M82 SNIPER RIFLE SETUP FOR HIGH VELOCITY FRAGMENT TEST





M82 TEST SETUP FOR THERMAL ENERGY HAZARDS



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TEST INCIDENTS FOR THE M82 SNIPER RIFLE

- **The 130 rounds ambient temperature testing of the no-vent cartridges was initiated on first using Weapon 1-M82A1M**
- **Every round had to be cleared with the Cal .50 cleaning rod**
- **After firing the 35th round, it was noted that the extractor spring was crushed and the extractor plunger was lodged in its hole. This caused the extractor to fall from the bolt of the weapon.**



TEST INCIDENTS FOR THE M82 SNIPER RIFLE

- **At this point it was decided to change to weapon 2–M82 and initiate the 130 round ambient temperature testing with this weapon.**
- **After the 16th round was fired, weapon 2 stopped extracting the cartridges.**



TEST PROCEDURES FOR THE M82 SNIPER RIFLE

The M82 rifles were fixed and testing resumed using Weapon no. 1, M82A1M with the following results:

- Round # 1 broke the new ejector spring that had been replaced in the morning
- Round # 3 - The flexible rod provided with the M82 failed to remove a lodged cartridge in less than ten minutes
- Round #11 - the weapon stopped extracting the cartridges



VIDEO CLIP OF BROKEN EJECTOR M82 SNIPER RIFLE





CONCLUSIONS

The Cal .50 Integrated Product Team (IPT) has concluded that the absence of primer vent hole:

- Will not adversely affect the Caliber .50 M2 weapon system function/mission while in combat or training.
- The gunner and the assistant gunner are not at risk of injury from high velocity fragments and radiant and non-radiant thermal energy when firing the M2 MG and M82 Rifle
- M82 Sniper Rifles suffered four critical failures: one stoppage that required more than ten minutes to correct and three spring failures that requires a higher level of maintenance to fix