M870REV SHOTGUN

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TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

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Development of the M870REV Non-Lethal Shotgun System for use with the EM113REV

Kevin G. Adams, R&D Gunsmith, Armament Technology Facility

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INTRODUCTION

- The United States Army Military Police expressed a requirement in obtaining a riot control vehicle to meet the unique mission needs of entering prisoner of war camps.
- In executing their mission, the US Army Military Police faces the risk of lethal weapons falling into the hands of prisoners when using standard small arms weapons systems and must consider not using lethal force in certain situations.

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REQUIREMENTS

- The US Army Military Police requires a vehicle employing a Non-Lethal weapons system that will be capable of engaging and defeating a variety of barricades and personnel targets, while minimizing the potential for soldiers to be injured or captured.
- It is required that this vehicle be armed with a Non-Lethal weapon platform, using standard 12ga non-lethal ammunition.

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DEVELOPMENT

- In 2005 the Armament Research, Development and Engineering Center at Picatinny Arsenal began development of an innovative approach to using non-lethal shotguns for riot control in the theater internment facilities in Iraq.
- The non-lethal weapons part of the project was given to the Research & Development Gunsmith Shop at the ARDEC Armament Technology Facility (ATF).
- A pump shotgun was needed since the weapon system had to fire M1012 and M1013 non-lethal rounds.

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DESIGN

Current design fielded in October 2006 includes:

- Enhancements to structural design of the shotguns to handle the unique impulses experienced by the hull-mounted shotgun.
- Ventilation concept borrowed from the early Bradley Fighting Vehicles.
- An immediate, armor-protected non-lethal response that can be used to deter riots or restore order.

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EM113REV

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M870

- The ATF R&D Gunsmith shop started with the 12 gauge Remington M870 Police shotgun since it has a steel receiver and is in the US Army system.

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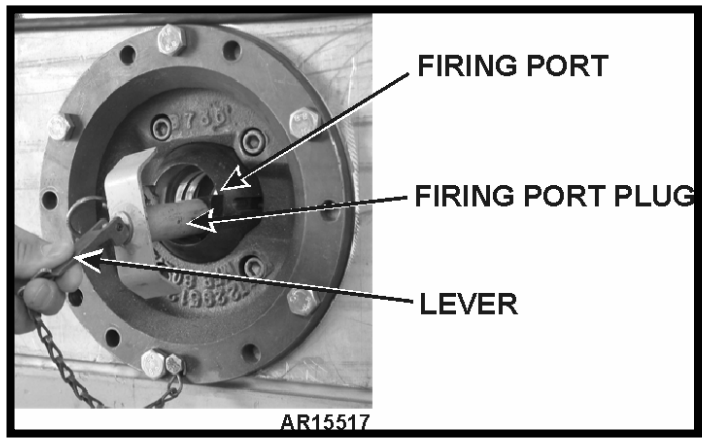
M231 FIRING PORT



- Port for the M231 5.56mm firing port weapon from the M2 Bradley Fighting Vehicle.
- This port had already been tested and safety released.
- Threaded collars from the M231 barrels were used to attach the shotguns to the firing port.

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DESIGN

On the first prototype the following modifications were done to the shotguns:

- Replace buttstock with pistol grip.
- Replace standard forearm with pistol grip forearm.
- Bore out and TIG weld the M231 threaded collar to the shotgun barrel.

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TESTING

- Initial ATF testing in a test fixture with 00 buckshot, for increased recoil, showed no problems with the design.
- Aberdeen Proving Grounds (APG) testing in the EM113REV, using M1012 and M1013 non-lethal ammunition, showed problems with the brazed joint on the magazine support breaking and the barrel pulling out of the receiver.

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TESTING

- High speed video using 00 buckshot, in the EM113REV showed that there was some flexibility in the test fixture and none in the actual vehicle.
- It also showed that the pistol grip forend allowed the operators to exert forces on the magazine joint like a slide hammer, exceeding the strength of the joint.
- In a normal configuration and fired from the shoulder, all the firing and recoil forces are directed rearward and all the weapon components are compressed against the shoulder/buttstock.
- In the modified configuration, all the recoil forces are still directed rearward, but because the muzzle end is attached to the mount, all the forces caused the components to separate.

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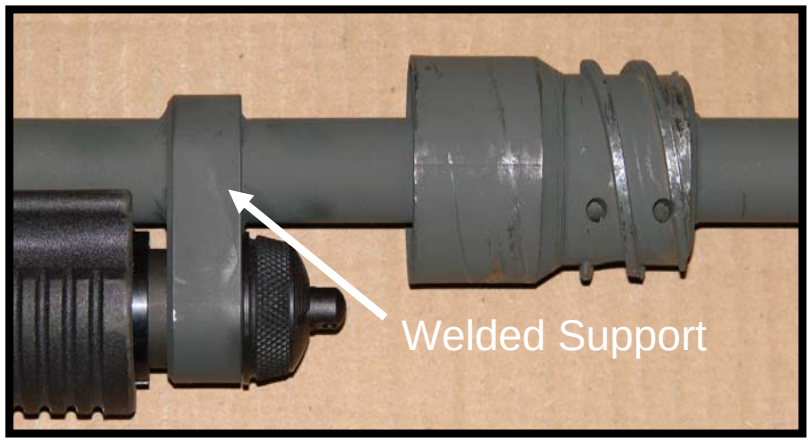
SOLUTIONS

- The ARDEC design team experimented with various ideas through computer simulation and modeling and came up with several solutions.

- The ATF R&D Gunsmith shop built two of the leading designs for further live fire testing.

DESIGN – Two New Prototypes



- Welded figure-8 magazine support
- Two 10-32 receiver screws
- Solidly welded M231 collar

- Spring surrounding barrel, allows M231 collar to absorb some recoil.
- Figure-8 magazine support was TIG welded to the barrel.
- Added two 10-32 machine screws through the left side of the receiver, into the barrel extension.

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FURTHER TESTING

- During testing at the ATF in the EM113REV using high speed video and 12 gauge 00 buckshot, it was found that the spring loaded design gave a double recoil impulse to the weapon.
- The non-spring design worked better and was easier to manufacture.
- This is the design that was settled upon

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TESTING: ATF

- Five guns built.
- M1012 and M1013 non-lethal ammunition fired through each weapon.
- Results: build-up of irritating fumes inside the EM113REV.

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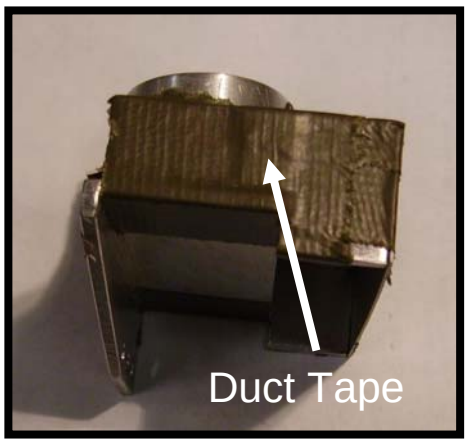
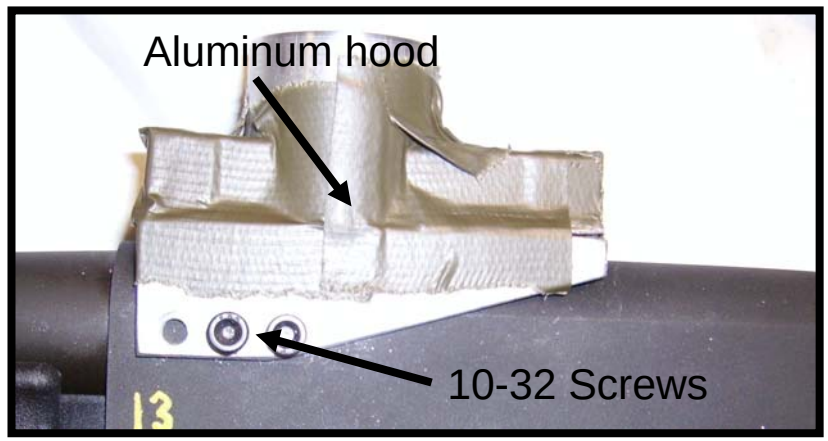
FUME HOOD: DEVELOPMENT





- Attached using the 10-32 barrel retention screws
- M2 Bradley Cabin exhaust fans used with hoods

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FUME HOOD: TESTING

- Hood tied into the exhaust fans using PVC pipe and plastic vacuum cleaner hose.
- Initial testing at ATF with aluminum prototypes.
- Further testing at APG with the TIG welded prototype.
- The weapon system was safety released and fielded.

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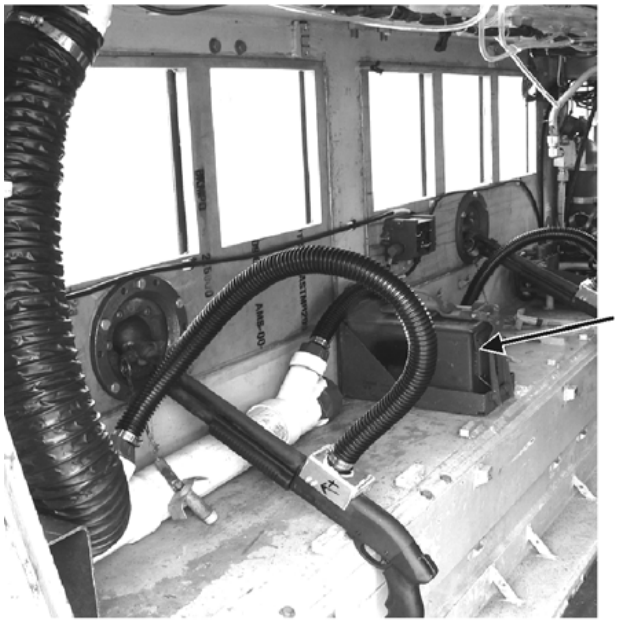
FIELDED DESIGN



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AWARDS

- EM113REV and its weapon systems validated by combat veterans
- US Army's Top Ten Greatest Inventions Award 2006.
- Patents pending on EM113REV and M870REV.

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2006 US ARMY TOP TEN GREATEST INVENTIONS

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ANY QUESTIONS?