.30 Caliber Blank Function and Safety Testing

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Background

M1909 Blank:

- Designed in 1909 for use in .30 Caliber (.30-06) weapon systems
- Currently used by veteran organizations for use in funeral ceremonies
- Only currently approved weapon is U.S. .30 Caliber M1 Rifle (M1 Garand)
- M1 Rifle must have a Blank Firing Adapter (BFA) affixed to the muzzle to fire blank ammunition
- U.S. Army provides M1909 blanks to veteran organizations
- Reports of failures have increased over the past decade
- M1909 was redesigned in 1999
- M1 Rifle is not supported by the U.S. Army
- Multiple manufacturers for M1909 Blanks
- Injury to a veteran spurred a U.S. Army Malfunction Investigation on the M1909 Blanks

Agenda

Purpose:

Determine the cause of failures and whether it is attributed to the .30 Caliber Blank ammunition. If failures are due to the blank cartridges, determine the best solution to ensure the M1909 Blanks are safe to fire in the M1 Rifle.

Agenda:

- M1909 .30 Caliber Blank / Weapon System
- M1909 Blank Malfunctions
- Phase 1 Testing
- Phase 2 Testing
- Phase 3 Testing
- Results / Conclusions
- Contact Info

M1909 .30 Caliber Blank / Weapon System

U.S. Rifle Cal. .30 M1 (M1 Garand)

BFA Attached

Pre-1999

Bottlenose/
Wad closure

Post 1999

Rosette Crimp
(New Propellant)

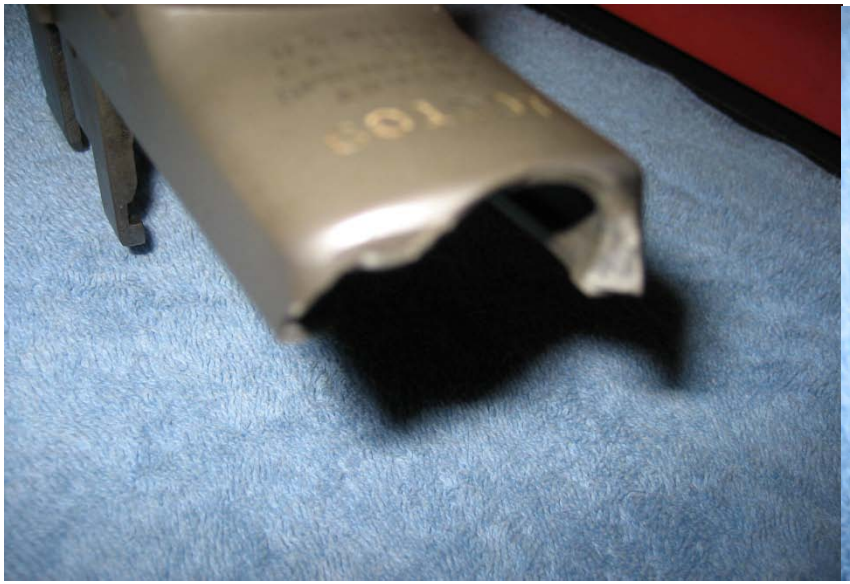
M1909 Blank Malfunctions

Charging Handle

Firing Pin

BFA

Receiver



Phase I Testing

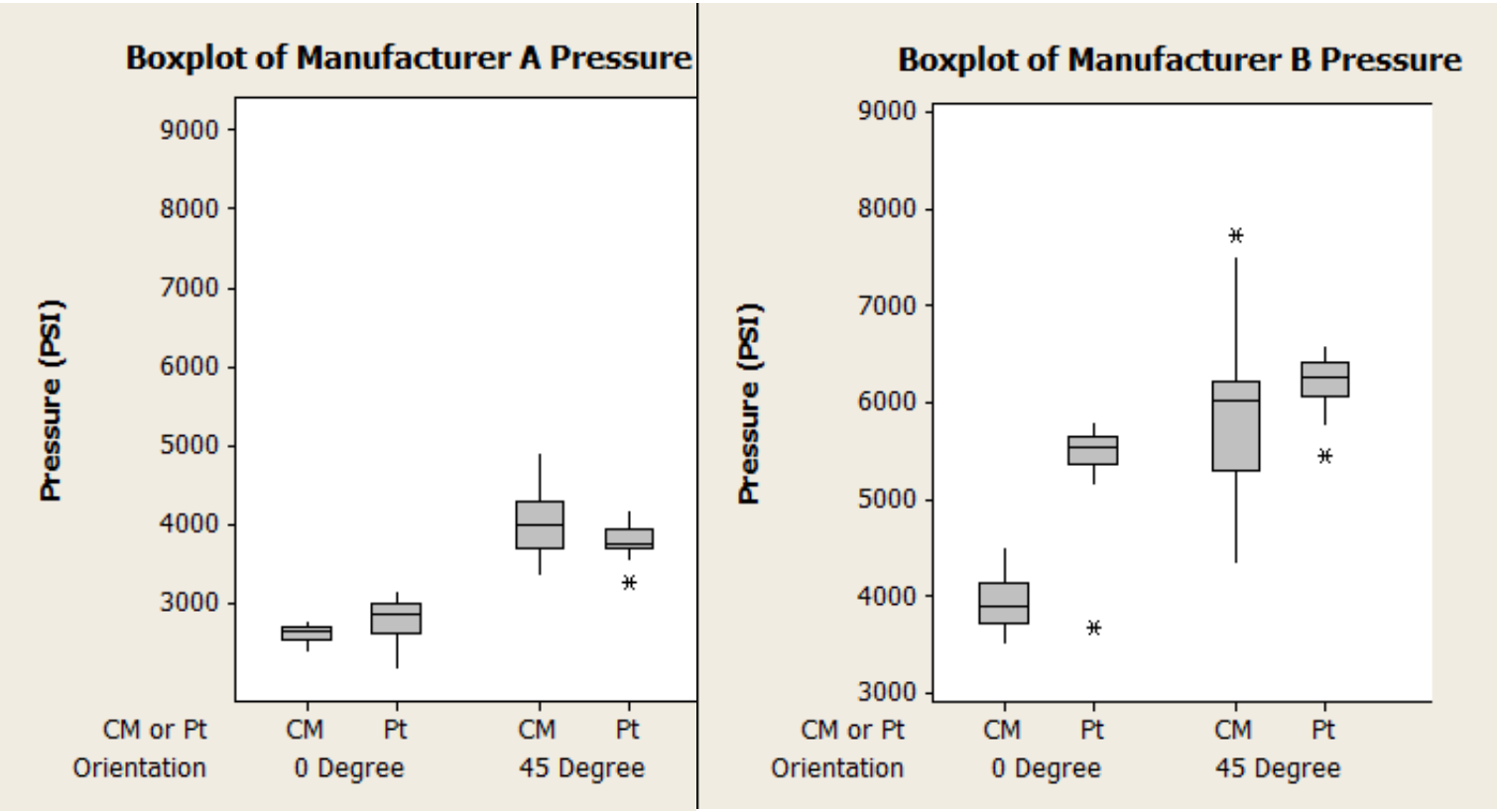
Purpose:

Determine how different orientations affect Case Mouth and Port pressure and record M1 Garand bolt velocity.

Weapons:	1 M1 Garand Rifle & 1 Universal Receiver w/ Mann Barrel
Orientation:	0, +45, +90, & -90 degrees to horizontal (Both Weapons)
M1909 Blanks:	376 Cartridges Manufacturer A 376 Cartridges Manufacturer B
BFA:	0.098 in. (Navy Design)
Data Acquisition:	Case Mouth and Port Pressure (Mann Barrel)
	Port Pressure and Bolt Velocity (M1 Garand)

Pressure vs. Orientation

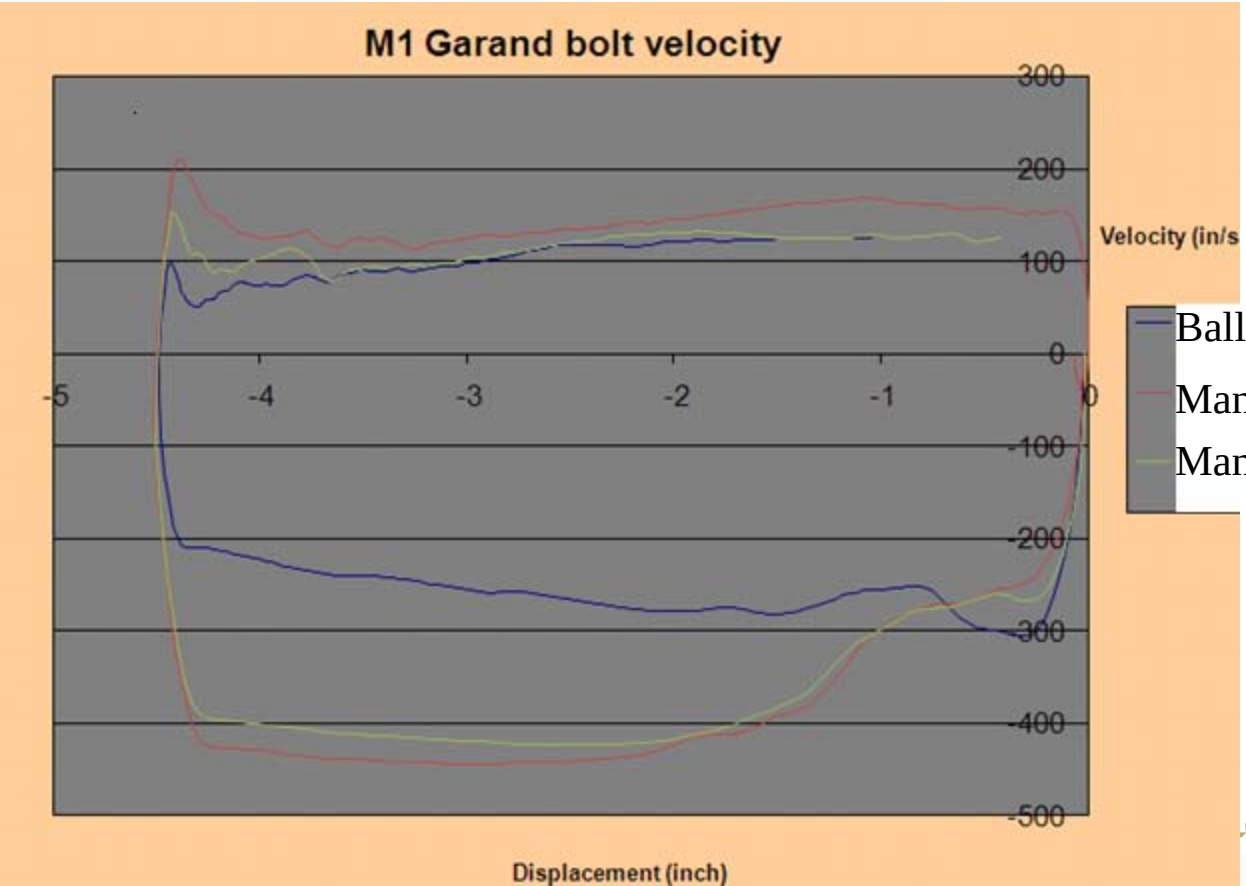
- Weapon orientation affects pressure
- Manufacturer B has higher peak pressures than Manufacturer A



Phase I Testing

Results:

- Fractured M1 Receiver
- M1 bolt velocity too high
- 0.098 in. Navy BFA not acceptable for M1909 blanks



Phase II Testing

Purpose:

To measure port pressure and bolt velocity while firing in the approved orientation using five different BFA hole sizes

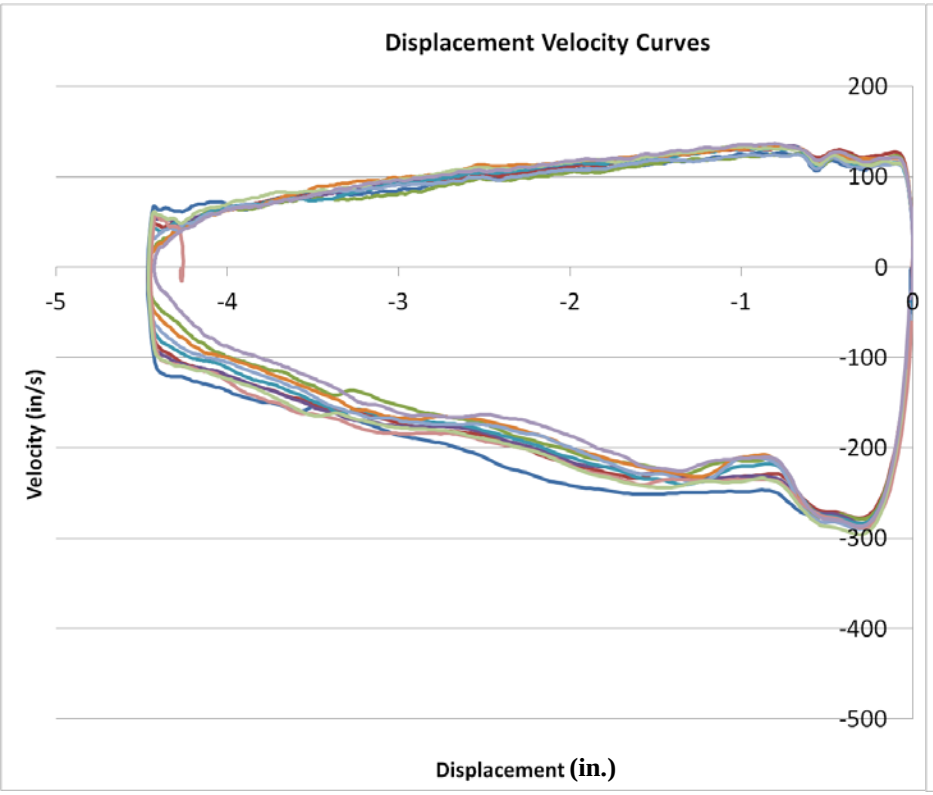
Weapon:	2 M1 Garand Rifles
Orientation:	+45 degrees to horizontal
M1909 Blanks:	Manufacturer A & B (Rosette Crimp) and Bottlenose 8 Cartridges/Weapon/Manufacturer/BFA (240 Total)
Ball Ammunition:	M2 Ball (8 Cartridges/Weapon)
BFAs:	**0.155**, 0.165, **0.172**, 0.185, 0.205 in. (hole diameter)
Data Acquisition:	Port Pressure & Bolt Velocity

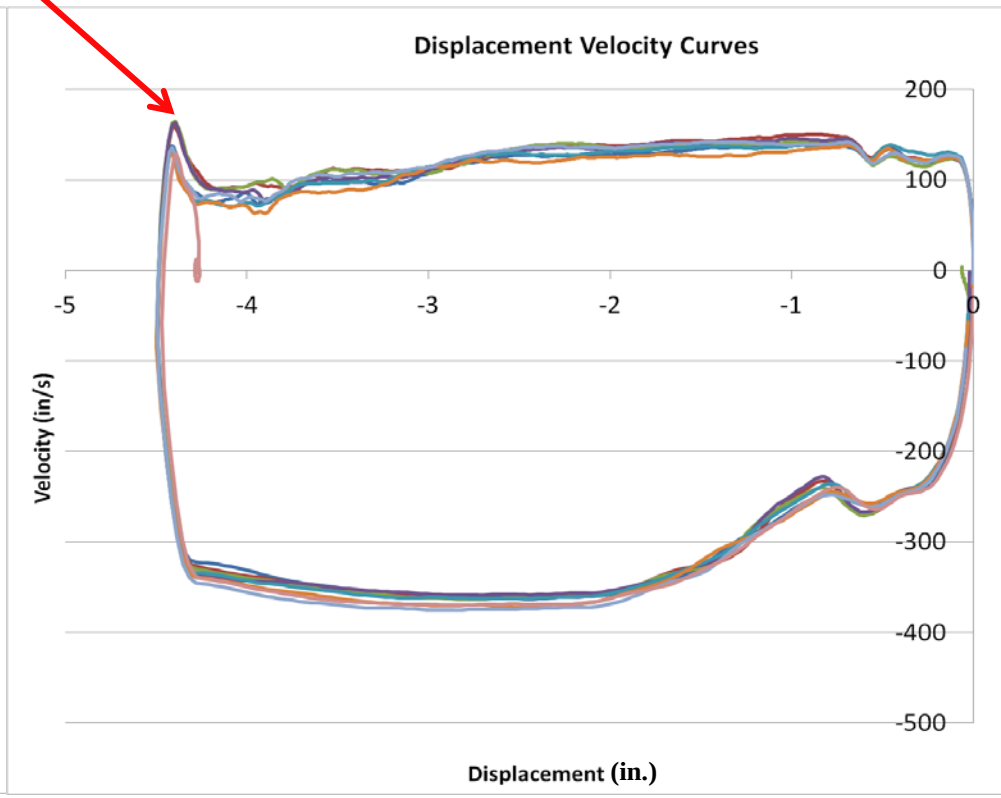
Bolt Velocity

M2 Ball

Bolt "Bounce"

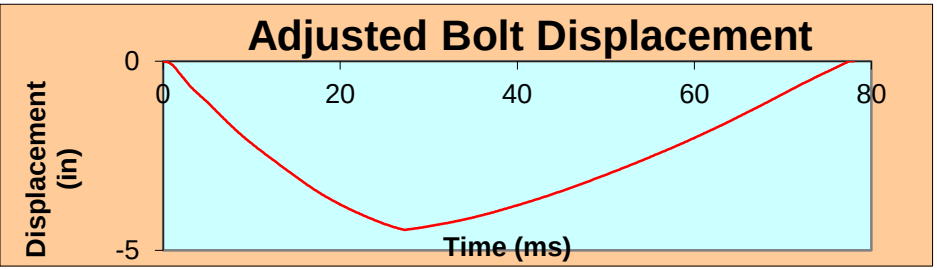
M1909 w/ 0.155in. BFA



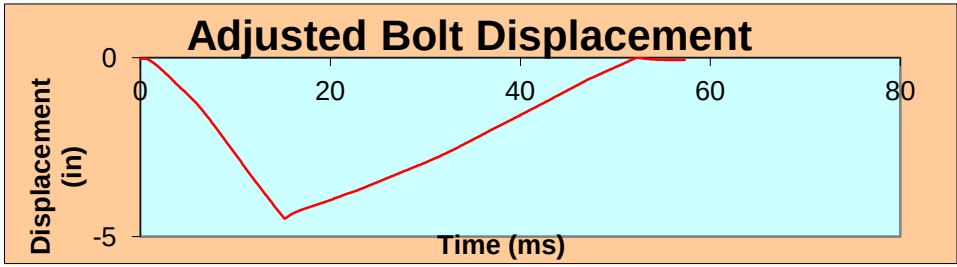


Bolt Velocity

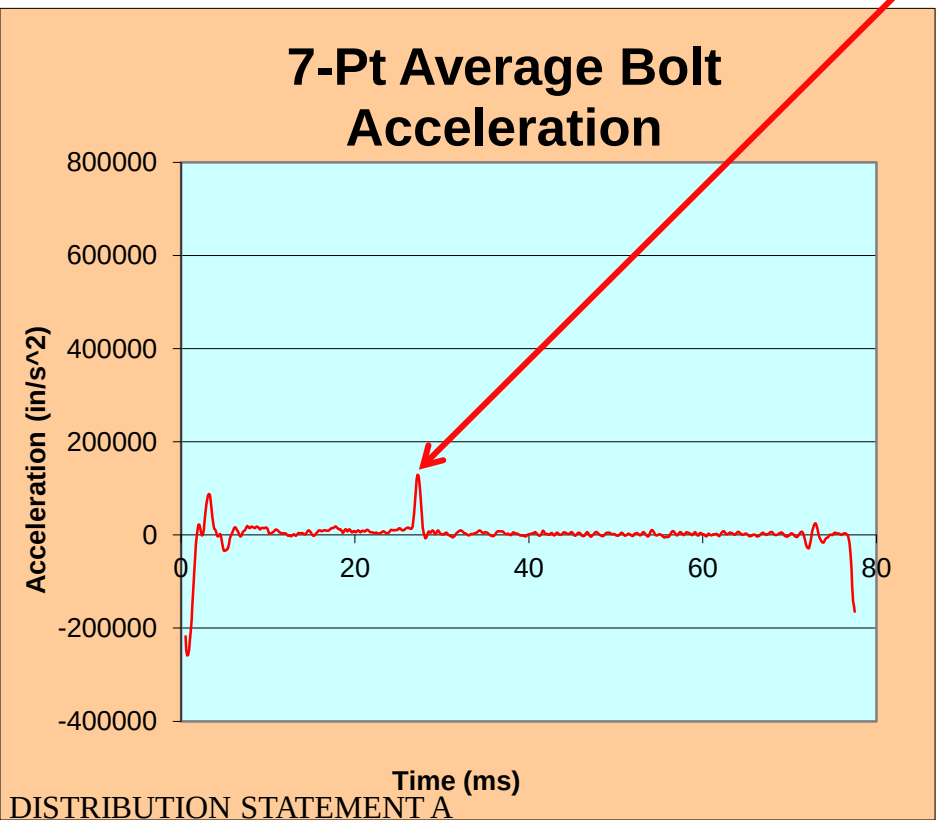
M2 Ball

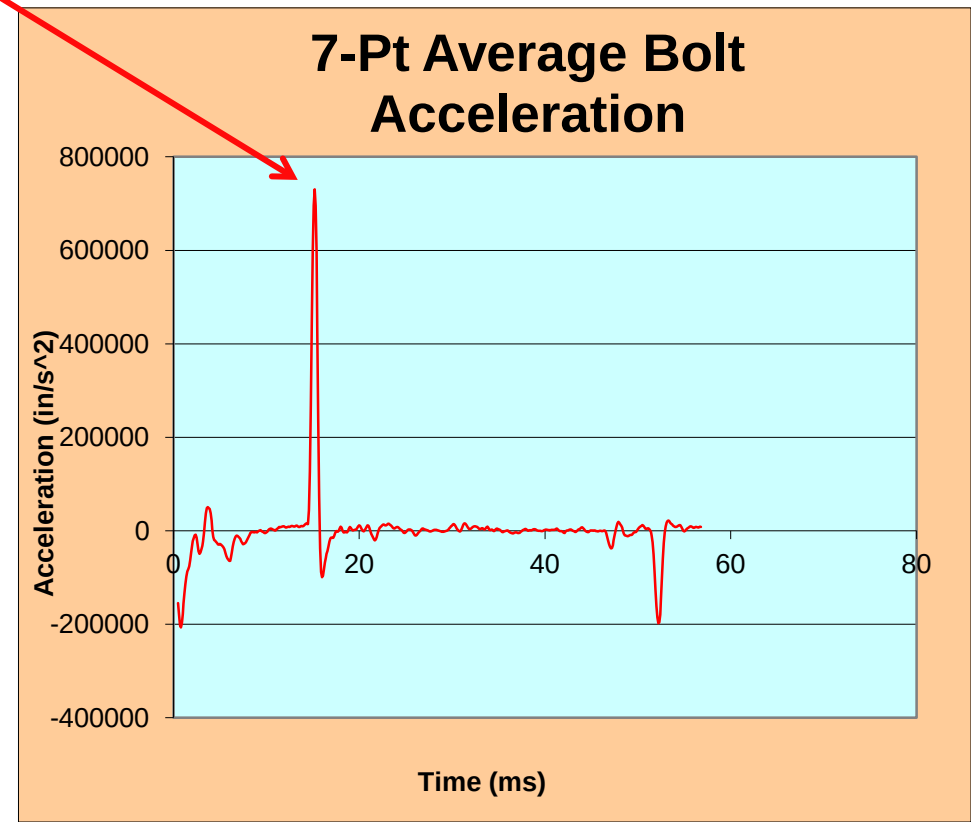


M1909 w/ 0.155in. BFA



Bolt "Bounce"

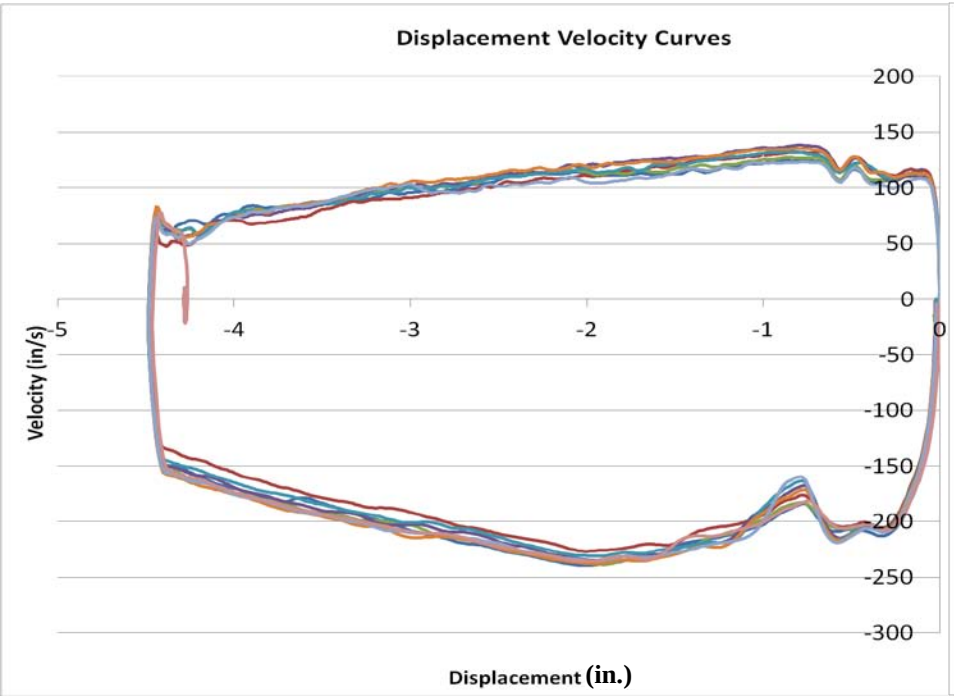




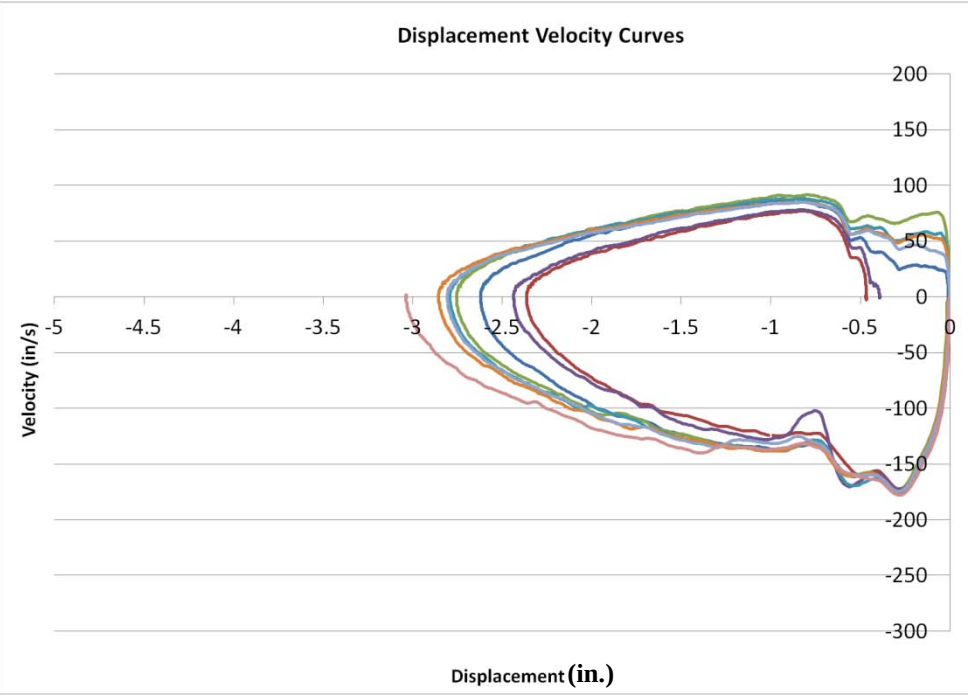
Bolt Velocity

- 0.185 in. BFA functioned properly
- 0.205 in. BFA did not cycle the weapon

0.185 in. BFA



0.205 in. BFA



Phase III Testing

Purpose:

To perform a function and casualty test with a large round count to determine the safety of firing the M1909 Blanks with a 0.172 in. BFA.

Weapons:	6 M1 Garand Rifles (1500 Cartridges/Weapon)
Orientation:	0 Degrees (Horizontal)
M1909 Blanks:	9000 Cartridges (4500 Man. A & 4500 Man. B)
Inspection/Cleaning:	Every 160 rounds
BFA:	0.172 in.
Data Acquisition:	Malfunctions, damage, part replacement

Phase III Testing

Results:

-None of the weapons had any major damage

-All weapons required replacement parts

-Manufacturer B had more malfunctions

-Manufacturer B required more part replacement

-Failures to feed typically rounds 5-8 (8 rnd. clip)

.30 Caliber Blank Function and Safety Testing

Results:

- M1909 Blank maximum pressure is ~10% that of M2 Ball
- M1909 Bolt Velocity 1.5 – 3.5 times greater than M2 Ball (BFA dependent)
- First 3 rounds functioned reliably (lower bolt velocities)

Conclusions:

- Case has too much ullage
- Weapon orientation has large effect on functionality of the system
- M1909 Blanks cause greater wear & require more frequent cleaning and part replacement compared to M2 Ball
- M1909 Blank safe to use at 0 and +45 degrees with 0.172 in. BFA

Contact Information

Acknowledgements

-Project Manager Maneuver Ammunition Systems (PM-MAS)
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-Munitions Engineering Technology Center (METC – ARDEC)
-Civilian Marksmanship Program (CMP)

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