U.S. ARMY COMBAT CAPABILITIES DEVELOPMENT COMMAND – ARMAMENTS CENTER

155MM ARTILLERY PLATFORM PROJECTILE FALLBACK SENSOR

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AGENDA

• NDIA 2019 Theme & Focus
• Modern US 155MM Platforms
• Fallback Definition
• M109 FoV Armament System
• Additional Challenges
• Path Forward
• Questions
“Leveraging Armament Technology Integration to Achieve Modernization, Overmatch, and Operational Readiness”

BLUF: Soldiers have no method of determining whether their round stays loaded after the breech is closed

• US Government to identify technology that can detect the following:
  – Poor Projectile Seating after Loading into chamber
  – Projectile Fallback

• Currently no system requirement exists for fallback sensor
MODERN US 155MM HOWITZER PLATFORMS

- **M777 Towed Howitzer**
  - 10,000lb, air drop capable
  - Manual crank to elevation
  - Hand-ram to load projectile

- **M109A7 Self-Propelled Howitzer**
  - 80,000lb armored vehicle
  - High Voltage drive system
  - Vehicle powered ram & hand-ram
  - Legacy Vehicles in the Field

- **Loading 155MM Projectiles**
  - Projectile pushed quickly into chamber
  - Projectile retained via interference with gun tube rifling
  - Propellant loaded separately
  - Screw-block breech is closed and primed to fire
• **Projectile Fallback:**
  - Projectile is loaded such that seating isn’t adequate
  - Propellant is loaded, breech is closed
  - Interference is unable to retain projectile when tube is elevated to fire
  - Projectile falls back onto propellant charges unnoticed
  - Crew fires fallen back round

• **Consequence:**
  - Propellant gasses blow by the rotating band and obturator
    - Exposes projectile aft to higher pressures (potential in-bore detonation)
  - Remaining propellant gasses launch round so it collides with origin of rifling at an angle (potential gun tube damage)
  - Round exits gun and falls short of intended target increasing risk to friendly forces
M109 FOV ARMAMENT SYSTEM

Long Recoil
36”

Gun Tube~3”

M182A2 Gun Mount

Breech

Primer Vent-Hole

Loaded Round + Propellant are Isolated
In addition to sensing seating/fallback with closed breech, sensor must be:
- Compatible with several 155MM systems in their required range of operating environments
- Compatible with all projectile and propellant types
- Automated
- Extremely reliable

“Good Seat” not well defined
- Soldiers believe they can hear a good seat
- Fallback difficult to hear, dampened by propellant
- Additional Vehicle Noise: engine, hydraulic motors, nearby firing howitzers, etc
PATH FORWARD

• Obtain proposals from Industry (August 2019)

• Feasibility Test(s) Complete (December 2019)
  – Simulate Projectile Fallback
  – Capture Data Live
  – Data reduction and Analysis
  – Present to Government

• Longer Term Initiative to Integrate Armament Solution
  – Into Howitzer Systems: Legacy, Current, and Future
QUESTIONS

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