

# International Armaments Technology Symposium & Exhibition

## Long Range Trainer Technology 16 June 2004

**Presenters: Leon Manole and Stewart Gilman**

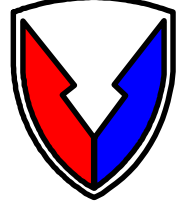
RDECOM-ARDEC

Armaments Engineering and Technology Center

Munitions System and Technology Directorate

973-724-6753/7088

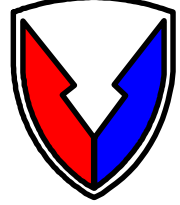
Lmanole or Sgilman @pica.army.mil



# 105 and 120mm Tank Long Range Trainer (LRT)



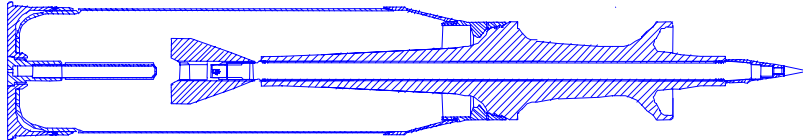
- **Requirement: ORD exists for a 120mm Long Range Trainer (LRT).**
  - TID similar to tactical, 3000-4000m
  - Maximum 8000m at 10degree gun elevation, 70 degree F.
- **Testing of various designs was performed on 120mm LRT in the late 1990s.**
- **1990s Conclusion: technology did not exist to meet ORD requirements and still have an affordable cartridge (price similar to M865).**
- **ARDEC patented technology (30 Sept 2003) allows ORD requirements to be met. Technology is applicable for 120mm,105mm and small-medium caliber KE cartridges.**
- **ARDEC Royalty \$\$ and PM MAS funding provided for technology demonstration.**
- **Ballistic tests at APG and YPG, 2002-2004, were conducted on patented technology for 120mm and 105mm Low Mass LRT.**



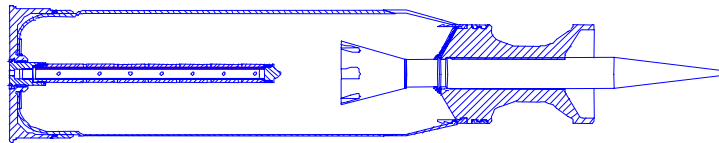
# Comparison of Existing 120mm Trainer M865 with Tactical and LRT



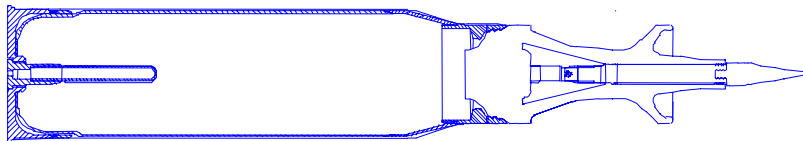
OLD ART: M829A2 TACTICAL



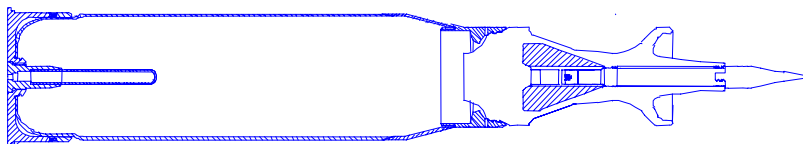
OLD ART: M865 TRAINER



NEW ART: LONGRANGE TRAINER WITH CONE

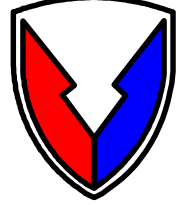


NEW ART: LONG RANGE TRAINER WITH FIN



M865 vs. M829A2  
Improvements Needed:

- Weight
- Length
- Exterior profile
- TID 3000-4000m, meet max range req.
- Wind sensitivity

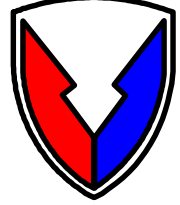


# 120mm Long Range trainer Program Goals



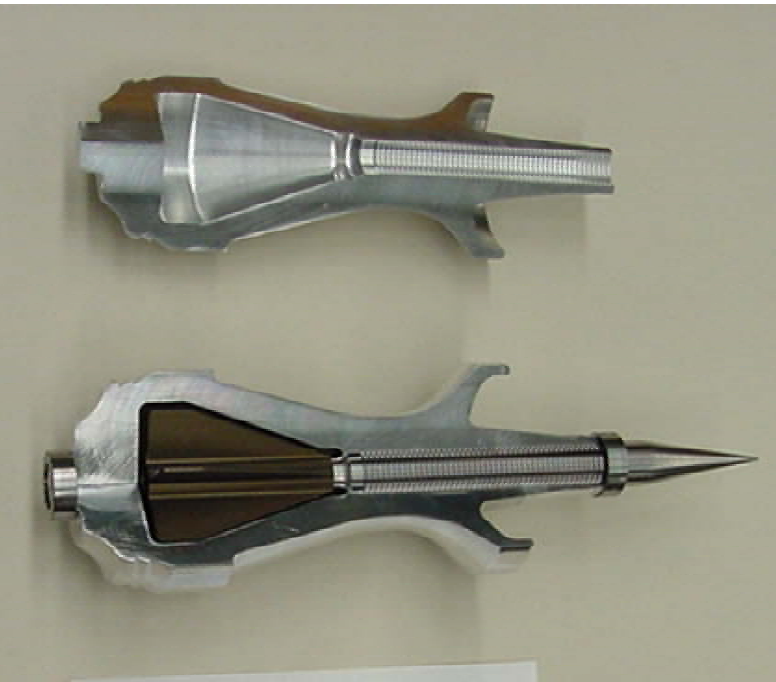
## Goals

- **Current TID to 3000m**
- **Tracer Visible to 3000m**
- **Weight (+0/-6.48 lbs) compared to M829A2**
- **Match M829A2 exterior appearance and length**
- **Not exceed 8 km @10 degrees gun @ 70F**
- **CG +/- 3 inches**
- **Similar cost as M865**

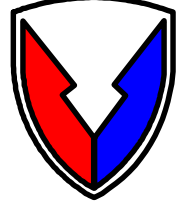


# 120mm Long Range trainer

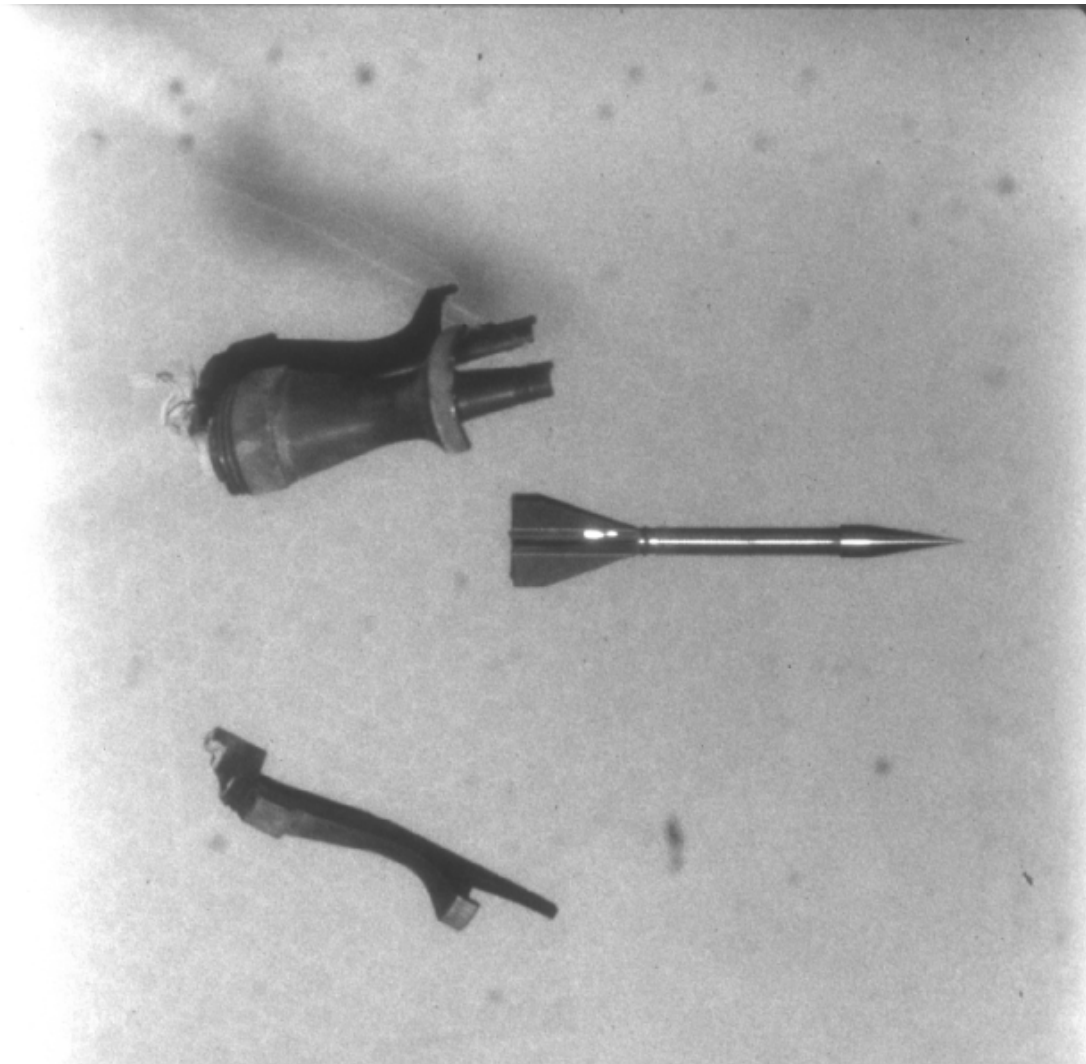
## Key Design Features

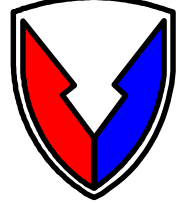


- Low mass projectile to limit flight to short range.
- Ability to use high drag cone or standard KE fin.
- Projectile is encapsulated in sabots.
  - shorter projectile tailored to length and weight needed.
  - projectile not subjected to propellant –dp or gases.
- Sabots designed to lift off without touching flight projectile (Double tipping ring (not shown)).
- In-flight projectile designed for minimum pitch and Yaw.
- Projectile length reduces cross wind sensitivity.
- Incorporates Special tracer Cup (not shown).

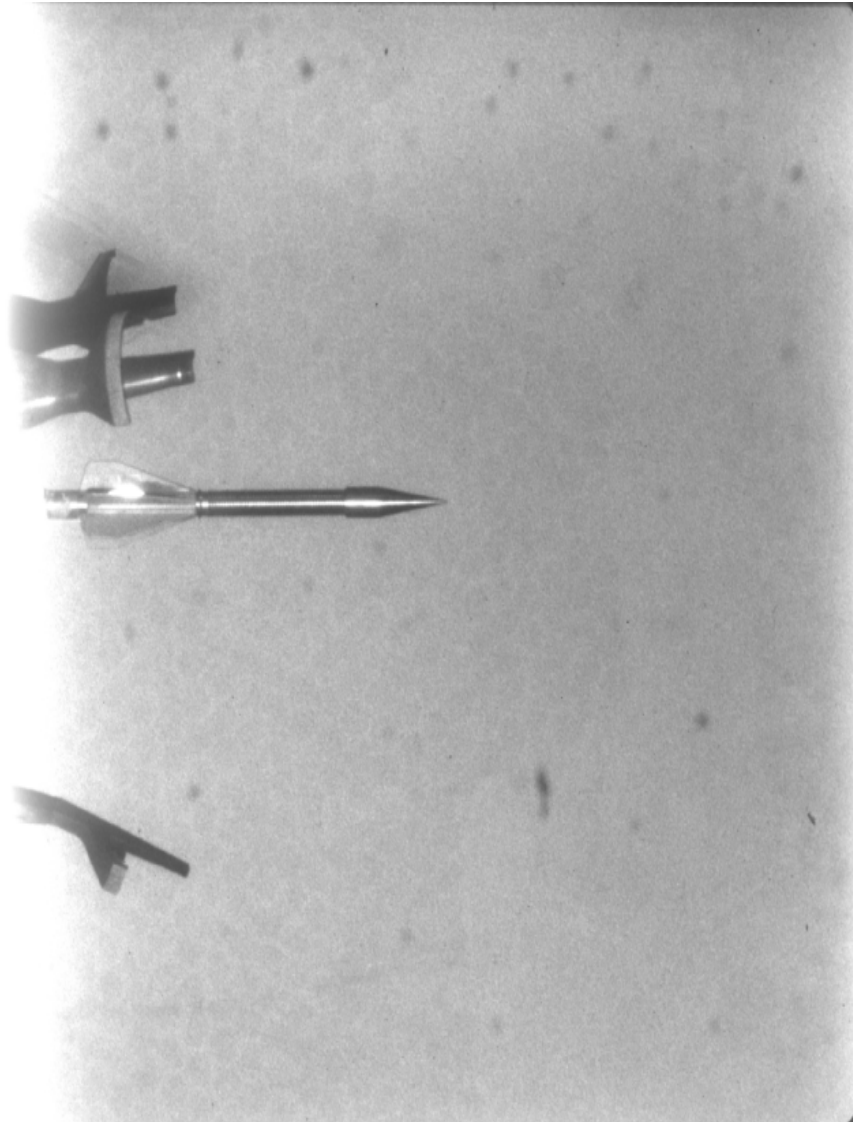


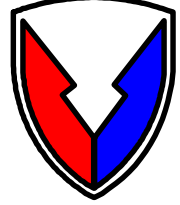
**120mm LRT Hadland Photo  
15m from gun  
APG, 18 Feb. 2004**



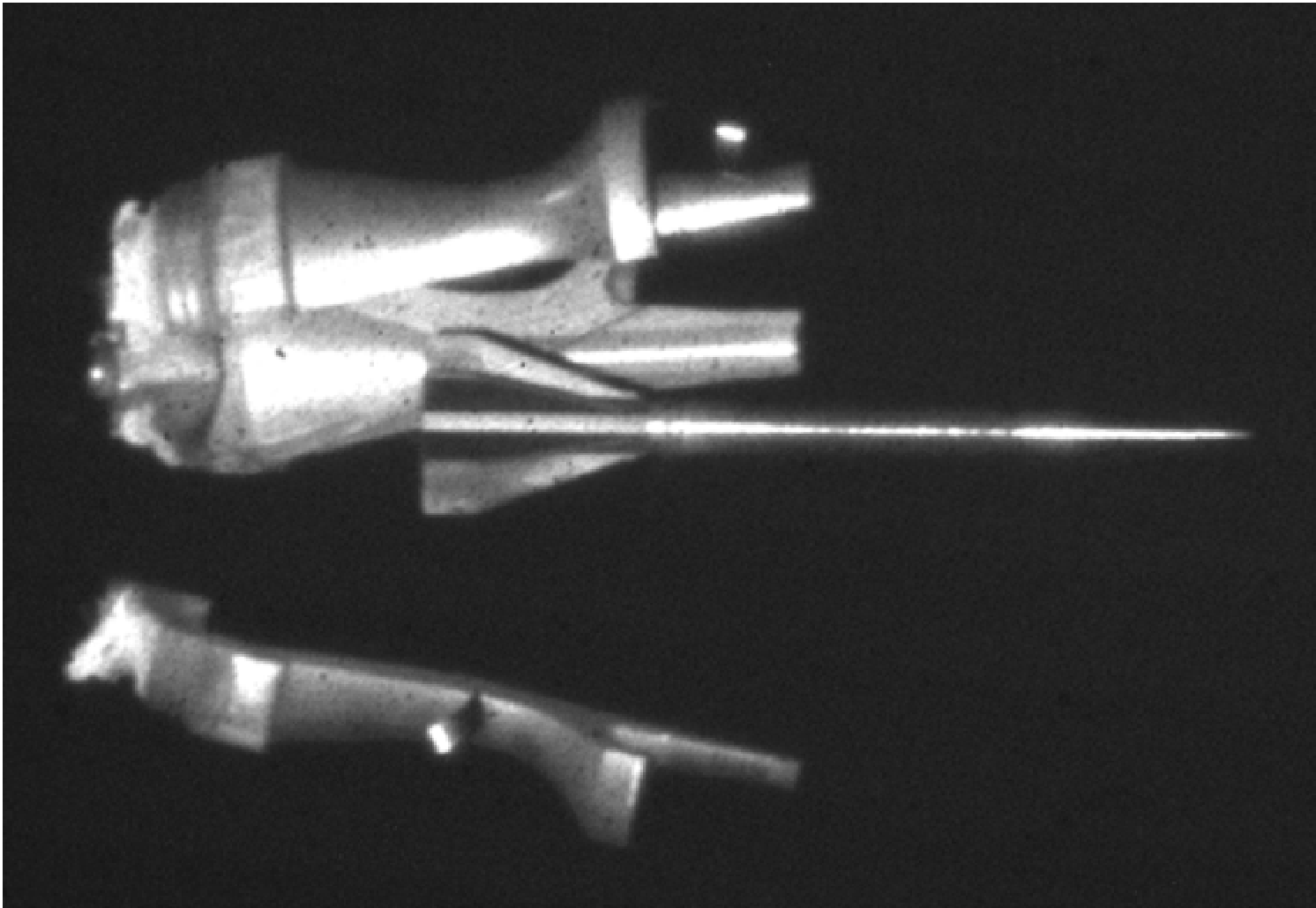


**120mm LRT Hadland Photo  
15m from gun  
APG, 18 Feb. 2004**

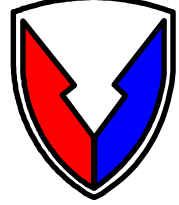




**120mm LRT Hadland Photo  
15m from gun  
Fired YPG 2002**



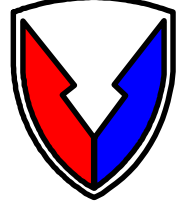




# 120mm Long Range trainer Program Results



<b>Goals</b>	<b>Design 1</b>	<b>Design 2</b>
<ul style="list-style-type: none"><li>• Current TID to 3000m</li></ul>	.17x.21 @ 800 m .19x.19 @ 2400m .21x.18 @3000 m	.25x.26 @ 800 m .27x.29 @ 2400 m .28x.27 @ 3000 m
<ul style="list-style-type: none"><li>• Tracer Visible to 3000m</li></ul>	Yes	Yes
<ul style="list-style-type: none"><li>• Weight (+0/-6.48 lbs) compared to M829A2 (45.3lbs)</li></ul>	LRT 1= 36.2 lbs	LRT 2 = 42 lbs
<ul style="list-style-type: none"><li>• Match M829A2 exterior appearance and length</li></ul>	Yes	Yes
<ul style="list-style-type: none"><li>•Not exceed 8 km @10 degrees gun @ 70F</li></ul>	8.8km drag adjustment	8.8km drag adjustment
<ul style="list-style-type: none"><li>•CG +/- 3 inches</li></ul>	Yes	Yes
<ul style="list-style-type: none"><li>• Similar cost as M865</li></ul>	Yes	Yes



# Long Range (Low Mass) Trainer Conclusions



- Low mass projectile solution is applicable for 105 and 120mm, small and medium caliber trainers.
- Present design has ability to meet maximum range requirement of 8000 meters for 105 and 120mm designs with slight increase in drag.
- Designed to engage targets up to 3000 meters and beyond.
- Projectile can use modified conventional fins for maximum projectile stabilization.
- Ability to use high drag cone for max. range control for very high hyper velocity application.
- Comparable cost to conventional trainers.



# Long Range (Low Mass) Trainer Future Goals



- Redesign fin to add drag to projectile and reduce length of LRT to lighten projectile to meet max range .
- Test TID at -25, 70 and 125F.
- Perform Maximum Range Test.
- Report test results to community.
- Work with PM MAS to get Future User Support/Funding