International Armaments Technology Symposium & Exhibition

Long Range Trainer Technology
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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

M865 vs. M829A2

Improvements Needed:

- Weight
- Length
- Exterior profile
- TID 3000-4000m, meet max range req.
- Wind sensitivity
# 120mm Long Range trainer

## Program Goals

<table>
<thead>
<tr>
<th>Goals</th>
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<tbody>
<tr>
<td>• Current TID to 3000m</td>
</tr>
<tr>
<td>• Tracer Visible to 3000m</td>
</tr>
<tr>
<td>• Weight (+0/-6.48 lbs) compared to M829A2</td>
</tr>
<tr>
<td>• Match M829A2 exterior appearance and length</td>
</tr>
<tr>
<td>• Not exceed 8 km @10 degrees gun @ 70F</td>
</tr>
<tr>
<td>• CG +/- 3 inches</td>
</tr>
<tr>
<td>• Similar cost as M865</td>
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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

<table>
<thead>
<tr>
<th>Goals</th>
<th>Design 1</th>
<th>Design 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Current TID to 3000m</td>
<td>.17x.21 @ 800 m</td>
<td>.25x.26 @ 800 m</td>
</tr>
<tr>
<td></td>
<td>.19x.19 @ 2400m</td>
<td>.27x.29 @ 2400 m</td>
</tr>
<tr>
<td></td>
<td>.21x.18 @ 3000 m</td>
<td>.28x.27 @ 3000 m</td>
</tr>
<tr>
<td>• Tracer Visible to 3000m</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>• Weight (+0/-6.48 lbs) compared to M829A2 (45.3lbs)</td>
<td>LRT 1 = 36.2 lbs</td>
<td>LRT 2 = 42 lbs</td>
</tr>
<tr>
<td>• Match M829A2 exterior appearance and length</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>• Not exceed 8 km @ 10 degrees gun @ 70F</td>
<td>8.8km drag adjustment</td>
<td>8.8km drag adjustment</td>
</tr>
<tr>
<td>• CG +/- 3 inches</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>• Similar cost as M865</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
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