A new machine gun - the right weapon for today's environment

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Identified Problem

- 2009 GDATP identified some key deficiencies in current war fighter technology
  - Lack of range and/or lethality in current selection man portable weapon systems.
  - Providing range and lethality requires significant overburden to the war fighter with the current selection of heavier weapons.
- Can we do better for the war fighter?

GDATP started an IR&D initiative to understand and develop a technology that would greatly benefit the war fighter.
Identified Problem Confirmed

- In December 2011, 7 major items identified as problems that Army Science and Technology must help solve.
- Items 2, 5 and 6
- Overburden
- Tactical Overmatch
- Maneuverability

Big Army Problems that S&T Must Help Solve

Current focus: “Soldier as the Decisive Edge”

1. There is insufficient FORCE PROTECTION to ensure the highest degree of survivability across the spectrum of operations.
2. Soldiers in Small Units (cavalry/infantry teams) are OVERBURDENED (physically and cognitively), this degrades performance and may result in immediate, as well as long term consequences.
3. U.S. Army squads are often SURPRISED in tactical situations. Soldiers in Small Units lack sufficient timely MISSION COMMAND & TACTICAL INTELLIGENCE to understand where their assets are, who and where the enemy is, who and where non-combatants are and to document and communicate this information to each other and higher echelons.
4. We spend too much time and money on STORING, TRANSPORTING, DISTRIBUTING and WASTE HANDLING of consumables (water, fuel, power, ammo and food) to field elements, creating excessive risks and opportunities for operational disruption.
5. Soldiers in Small Units have limited capability to integrate maneuver and fires in all environments to create TACTICAL OVERMATCH necessary to achieve mission objectives.
6. Operational MANEUVERABILITY (ground & mounted) is difficult to achieve in complex, adverse, and harsh terrains and at high OPTEMPO.
7. We do not understand WHAT MAKES THE HUMAN TICK in a way that can lead to assured ability to perform operational, high OPTEMPO missions effectively and without secondary negative effects.

Problems listed in no particular order—validated by Senior Army Leadership
## GAP Analysis

**CURRENT STATE: EXISTING SOLDIER CARRIED WEAPONS RESTRICT MAXIMUM EFFECTIVE RANGE OR RESTRICTIVE WEIGHT**

<table>
<thead>
<tr>
<th>Caliber</th>
<th>Maximum Effective Range</th>
<th>System Weight + 100 Rounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.62 NATO (M80)</td>
<td>M240B 800m (A)</td>
<td>M240B = 33.6 lbs</td>
</tr>
<tr>
<td></td>
<td>M240L 600m(A)</td>
<td>M240L = 28.5 lbs</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Man Portable</strong></td>
</tr>
<tr>
<td>.50 BMG (M33)</td>
<td>1800m (A)</td>
<td>130 lbs</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Stationary or Vehicle Mounted</strong></td>
</tr>
</tbody>
</table>

**GAP**

Longer Range and lethality with Man Portability

**SOLUTION:** DEVELOP LONG RANGE, HIGHER CALIBER WEAPON AT 7.62 mm SYSTEM WEIGHT
Gap Analysis (Continued)

System Weight Vs Max Effective Range

- M2 With Tripod
- M2 Cal .50 Machine Gun
- M240B Medium Machine Gun
- M249 Squad Automatic Weapon (SAW)

CONVENTIONAL GUN TECHNOLOGIES

REQUIRES NEW TECHNOLOGY FOR A WEAPON/AMMO WITH M2 RANGE AT M240B WEIGHT
System Architecture

**Weapon System**
- **Ammunition**
  - Energy 2x over 7.62mm approaching .50cal effects
  - Minimize Weight and volume
  - Leverage existing/emerging technology
- **Weapon**
  - New technology to handle 2-3x impulse
  - Same Ergonomics (wt, size, recoil) as 7.62mm MMG
  - Provide same functionality as a MMG (Firing rate, sustain rate etc.)
  - Simple and low cost
- **Accessories (Leverage existing Light Weight Technology)**
  - Mounts
  - Sights
Ammunition

- Leverage Emerging/Existing Technology/Programs
  - Emerging Technology/Program
    - Precision Sniper Rifle Program
      - Energy/Accuracy at 1500 yd
      - .338, Norma Magnum and Lapua 300 gr.
  - Existing Technology
    - .338 Lapua 300 gr. Family of ammunition
    - Mk248 MOD 1, .300 Winchester Magnum Match Grade (lower performance)
Ammunition (Continued)

- Energy over 7.62mm approaching .50 cal effects on soft targets (Requirement)
  - 2x the energy at Muzzle
  - Defeat level III Body armor at 1000 yards
  - Defeat light body armor at 1500 yards
  - Ballistic drop equivalent to .50 cal: “decrease error budgets”

.338 Norma Magnum Meets all the energy requirements
Ammunition (Continued)

- Weight and Size
  - Cartridge Volume (Energy) drives weapon weight
  - .338 Cal (8.38mm) Pushing the limit on maintaining man portability
  - .338 Norma has a slight advantage in size and weight over Lapua

GDATP Baseline Design around the .338 Norma Magnum also compatible with Lapua and Mk248
Weapon System Requirements

- Handle 2.5x round energy but have the same feel as 7.62mm Medium Machine Gun.
- Firing rate 500 SPM
- Provide 10 minutes of continuous suppressive fire at 50-100 SPM without barrel change

Weapon Ergonomics

- Same footprint as M240B with weight approaching an M240L
- Weapon cost competitive with existing technology
Weapon System Concept

- MMG .338 Variant
- ACOG TA648MGO-50 With LRF
- Bipod (COTS)
- 50 round Soft Pouch
- .338 Norma Magnum
- Forward/Side strip Link
- M192 Mount
- GFE
Weapon System Solution

- **Weapon System Characteristics**
  - Ammunition: .338 Norma Magnum
  - Projectile: 300 gr. Sierra HPBT, FMJ, AP
  - Muzzle velocity: 2650 fps
  - Max Range: 5642 m
  - Max Effective Range: 1700 m
  - Weapon weight: 24 lbs
  - Length: 49” collapsed
  - Height of MMG on M192 Tripod: 11.4”
  - Barrel Length: 24 in.
  - Mounts: M192, tripod, Vehicle mounts

**Completed new design and development to a man safe firing weapon in 14 Months**
Weapon System Solution (Continued)

- **Weapon System Characteristics**
  - The LWMMG features a revolutionary recoil mitigation system known as Short Recoil Impulse Averaging.
    - Substantially reduces recoil despite .338NM cartridge which has 2.5x energy of NATO 7.62mm round
    - Improves target retention during automatic fire
    - The LWMMG recoil profile is similar to a 7.62mm NATO machine gun.
    - Eliminates the need for “Soft mounts”
  - At 1000 yards the LWMMG is capable of defeating Level III body armor and incapacitating soft skinned vehicles by delivering more than 4x the terminal effects of the 7.62mm NATO cartridge.
Weapon System Solution (Continued)

- The LWMMG weighs 24 pounds and features a fully collapsible stock and integrated bipod offering superior mobility and portability in both mounted and dismounted operations.

- The LWMMG features a quick change barrel with fixed headspace and timing as well as integrated MIL-STD M1913 rails allowing the use of a variety of optics, lasers and / or accessories within the warfighter’s portfolio.
### System Weight Comparison

<table>
<thead>
<tr>
<th>Min Combat System M240</th>
<th>Min Combat System MMG</th>
<th>Min Combat System M2</th>
</tr>
</thead>
<tbody>
<tr>
<td>M240</td>
<td>MMG .338 Variant</td>
<td>M2HB</td>
</tr>
<tr>
<td>28. lbs</td>
<td>25. lbs</td>
<td>84 lbs</td>
</tr>
<tr>
<td>ACOG Sight</td>
<td>ACOG Sight</td>
<td>ACOG Sight</td>
</tr>
<tr>
<td>2.5 lbs</td>
<td>2.5 lbs</td>
<td>2.5 lbs</td>
</tr>
<tr>
<td>M192 Tripod</td>
<td>M192 Tripod</td>
<td>M3 Tripod</td>
</tr>
<tr>
<td>11 lbs</td>
<td>11 lbs</td>
<td>44 lbs</td>
</tr>
<tr>
<td>Spare Barrel</td>
<td>Spare Barrel</td>
<td>Spare Barrel</td>
</tr>
<tr>
<td>6.6 lbs</td>
<td>6.2 lbs</td>
<td>25 lbs</td>
</tr>
<tr>
<td>800 Linked Rds 53 lbs</td>
<td>500 Linked Rds 60 lbs</td>
<td>500 Linked Rds 145 lbs</td>
</tr>
<tr>
<td>Total 100 lbs</td>
<td>Total 104.7 lbs</td>
<td>Total 300 lbs</td>
</tr>
</tbody>
</table>

**Load Break Down**

<table>
<thead>
<tr>
<th>Gunner (wpn, sight 100 rd)</th>
<th>37 lbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Gunner (Trpd, S.Brl 300 rd)</td>
<td>37 lbs</td>
</tr>
<tr>
<td>Ammo Bearer (400 rds)</td>
<td>27 lbs</td>
</tr>
</tbody>
</table>

**LWMMG performance of .50 cal with weight of a M240**

- Gunner (wpn, sght 100 rds) 40 lbs
- A. Gunner (Trpd, S.Brl 200 rds) 41 lbs
- Ammo Bearer (300 rds) 36 lbs

1 HUMMV
Future Work

- Continue LWMMG maturation program
  - Reliability/Durability
- Polymer Case (Reduce weight)
- Lube-less Weapon (Reduce Maintenance)
- Marketing and Partnerships
- Early adopters

THANK YOU

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Weapon System Movie