EXPEDITIONARY FIGHTING VEHICLE (EFV)

National Defense Industrial Association (NDIA) Combat Vehicle Division Conference
21 Oct 08
Provide High Speed Transport of Embarked Marine Infantry From Ships Located Beyond the Horizon to Inland Objectives

Provide Armor Protected Land Mobility and Direct Fire Support During Combat Operations
EFV
Revolutionizing Expeditionary Maneuver Warfare

**Future: EFV**

- EFV directly supports the Marine Corps’ Capstone Concept: Expeditionary Maneuver Warfare
- The EFV will provide the tactical mobility asset required to spearhead the EMW concept and permit the Marine Corps to fully exploit littoral areas as maneuver space
- The EFV will allow immediate, high speed maneuver of Marine infantry units as they emerge from ships located beyond the horizon (25 nm and beyond)
- The EFV’s unique combination of offensive firepower, armor, NBC protection, and high speed mobility on land and sea represent major breakthroughs in the ability of Naval and Marine expeditionary forces to avoid an enemy’s strength and exploit its weakness

**Present: AAV**

- WWII Doctrine
- No Standoff Distance for ATF
- Slow Speed Amphibious Assault
- 1960’s Technology
- Limited Survivability
EFV
Mission Essential Functions

- Move (Land)
- Move (Water)
- Shoot
- Communicate
- Carry
- Protect
# EFV - Key Performance Parameters

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Threshold</th>
<th>Objective</th>
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<tbody>
<tr>
<td><strong>High Water Speed</strong> - 2’significant wave height, for not less than one continuous hour</td>
<td>20 knots</td>
<td>25 knots</td>
</tr>
<tr>
<td><strong>Land Speed</strong> - Forward speed on hard surface road</td>
<td>69 kph</td>
<td>72 kph</td>
</tr>
<tr>
<td><strong>Firepower</strong> - Maximum effective range Interoperability/standard ammunition with other service(s)</td>
<td>1500m</td>
<td>2000m</td>
</tr>
<tr>
<td><strong>Armor Protection</strong> - Any azimuth</td>
<td>14.5mm/300m</td>
<td>30mm/1000m</td>
</tr>
<tr>
<td><strong>Reliability</strong> - Mean Time Between Operational Mission Failure</td>
<td>43.5 hrs</td>
<td>56 hrs</td>
</tr>
<tr>
<td><strong>Carrying Capacity</strong></td>
<td>17 Marines</td>
<td>18 Marines</td>
</tr>
<tr>
<td><strong>Net Ready</strong></td>
<td>100% of Critical *IERs</td>
<td>100% of Top Level *IERs</td>
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</table>

* Information Exchange Requirements (IERs)
PROGRAM UPDATE
SIGNIFICANT EVENTS

• System Requirements Review (SRR) completed 28 Jun 07
• System Functional Review (SFR) completed 11 Dec 07
• DFR Contract Mod Definitized 17 Jan 08
  – 51 Mission Essential Components included
  – Fault Tree Model continues to predict a design of 60.7 hrs Mean Time Between Operational Mission Failure (MTBOMF)
• System Software Review (SSR) conducted 28 Feb 08
• Capstone Preliminary Design Review (PDR) conducted 2 May 08
• Systems Development & Demonstration - 2 (SDD-2) Defense Acquisition Board Review conducted 30 May 08
• SDD-2 Contract awarded 31 Jul 08
• Component Design Review (CDR) Nov 08
• Integrated Baseline Review (IBR) Jan 08
PROGRAM UPDATE
13 AUGUST 2007 EFV PROGRAM STRUCTURE

- Program Certification
- DAB
- CDR
- Contracting for SDD-2
- Design for Reliability
- Fabricate New Prototypes
- DT/RGT
- Del.7
- Trng DA 2
- KP-1
- KP-2
- KP-3
- KP-4
- KP-5
- LRIP Lot 1 (17)
- LRIP Lot 2 (24)
- LRIP Lot 3 (28)
- LRIP Lot 4 (31)
- FUSL LFT&E (LRIP 2P & 1C)
- IOT&E
- Delivery

2,078 244 316 212 189 174 88 77 51 RDT&E
186 0 0 0 70 484 598 614 680 PMC

Quantity

KP-1 New Predicted Reliability after redesign (43.5 – 54.4 hours MTBOMF)
KP-2 New Demonstrated Reliability (≥ 22 hours MTBOMF) combined with an achievable growth rate will meet KPP by IOT&E
KP-3 New Projected Reliability after reliability growth mods (on curve)
KP-4 New Demonstrated Reliability after reliability growth mods (on curve)
KP-5 New Projected Reliability Meets KPP Requirement
Program Efforts Leading To MS C

• Redesign for reliability
  – Instituting robust systems engineering processes
  – Extensive segments/subsystems/components developmental testing

• Build new prototypes
  – Prototypes will be fabricated as parts “earn their way in” through the design release/verification process

• Conduct extensive testing on new vehicles
  – Developmental Testing and Reliability Growth Testing
  – Confirmation program is on reliability growth curve
  – Operational Assessment to support Milestone C
SDD-2 PROGRAM GOALS

• Reduce Vehicle Weight
• Reduce Vehicle Cost
• Improve Vehicle Performance
• Improve Vehicle Reliability, Availability, Maintainability, Durability (RAM-D)
• Introduce New Warfighting Capabilities
PROGRAM OBJECTIVES

• Emphasize near term technology, but anticipate for future upgrades through production and fielding.

• Reduce Vehicle Weight
  – Lighter Weight Track
  – Lighter Weight Armor
  – Material Substitution

• Reduce Vehicle Cost / Life Cycle Cost
  – Identify Substitute Line Replaceable Units
  – Improve Manufacturing Processes
  – Improve Logistic Support Programs
PROGRAM OBJECTIVES

• Improve Vehicle Performance
  – Improve Power Transmission
  – Increase Armor Protection

• Improve Vehicle RAM-D
  – Corrosion Prevention
  – Robustness

• Introduce New Warfighting Capabilities
  – Wireless Technology
  – Advanced Displays

• Introduce Design Enhancements
  – Dissimilar Metal Avoidance
  – Modeling & Simulation of Battle Damage
Small Business Innovation Research Program Initiatives

• **Reduction of Ground Vehicle Observables**
  – Reduce the vulnerability of ground vehicles to detection and weapon-targeting systems

• **Blast and Impact Resistance of Polyurea Coatings on Metallic and Non-Metallic Materials**
  – Research, develop and characterize polyurea materials ability to increase blast and fragment protection

• **Directional High Flow Ballistic Exhaust Grille**
  – Research, design and build a high flow rate ballistic exhaust grille that allows directional output control
Small Business Innovation Research Program Initiatives

- **Low Cost, Low Weight, Self-Sealing Fuel Tank Technology Development**
  - Conduct research in self-sealing fuel tank technology and the development of an integrated material solution that is low cost, rugged, lightweight, and non-flammable; solution will enable vehicle operation in hostile environments and minimize loss of fuel due to a direct / indirect hit

- **Air Flow Noise Reduction Techniques**
  - Develop techniques to reduce engine cooling system noise levels to mitigate the potentially adverse health affects on crew members
Small Business Innovation Research Program Initiatives

• SBIR Point of Contact is
  – Craig Harvey Program Manager, Advanced Technology
  – (703) 780-2458
• Appliqué Armor Kit
  – Provides Mine Blast Protection for Extended Land Operations
  – Belly/appliqué integration has minimal impact on reliability, production, Land Operation Modes
  – Reduced Water Mode Capabilities
## PROGRAMMABLE AIRBURST MUNITIONS (PABM)

<table>
<thead>
<tr>
<th>FY08</th>
<th>FY09</th>
<th>FY10</th>
<th>FY11</th>
<th>FY12</th>
<th>FY13</th>
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<tbody>
<tr>
<td>• PABM qual effort (1200 rds)</td>
<td>• RDT&amp;E PABM buy (4000 rds) /$3.6 mil purchased</td>
<td>• PABM system integration (2520 rds)</td>
<td></td>
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<tr>
<td>B004 MK310</td>
<td></td>
<td></td>
<td></td>
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<td>Unfunded</td>
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- PM AAA is the lead in a joint (US Army, Navy & USMC) effort to qualify PABM round
- Testing and lethality modeling prove 30mm AB Munitions have 4-6 greater lethal effects against Infantry and light to medium material targets
- Approximately eight 30mm AB rounds as lethal as a 155mm round
- The significant increase in lethality provided by the 30mm PF/AB round will provide ~$10M cost savings over the Life Cycle
- PABM efforts currently on hold due to lack of funding

Note: Our CPD requirement is – 1 EFV will take out a MRPlatoon (T), take out a MRCompany (O). MPLD/HEI meets the threshold requirement, PABM gets us closer to the objective requirement