



United States Marine Corps

PM-AAA

Expeditionary Fighting Vehicle



43rd NDIA-Guns & Missile Systems
Major John L. Medeiros
Product Group Turret Systems, Guns/Ammo



Topics



- Program Update
- MK44, 30x173mm Guns/Ammo IPT
- Current PG-TS efforts





“Revolutionizing Expeditionary Maneuver Warfare”



Future: EFV

Present: AAV

- WWII Doctrine
- No Standoff Distance for ATF
- Slow Speed Amphibious Assault
- 1960's Technology
- Limited Survivability



- 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 the enemy's strength and exploit its weakness



**Leap Ahead to 21st Century
Technology**



Program Status

- **Where we are:** Certified Program, June 07
- **Essentially- latter phases of SDD-1 (reliability focused)**
- **Vehicle meets KPP's, but not reliability-wise**
 - **Nunn-McCurdy**
 - Stems from Operational Assessment, reliability not as expected
 - Blue Ribbon Panel review (Dec 06)
 - Bottom-Up requirements review by MCCDC (Jan 07)
 - Congressional Inquiry (May 07)
- **ASN to Final approved contract award for SDD-2 vehicles.**
 - SDD-2 Contract Award to build 7 new EFV's
 - 5 P7s, 2 C7s
 - Mileage/hours on current models exhausted
 - Extending LRIP to 2012 (likely)
- **SecDef/SecNav- USMC will field this vehicle**



EFV PROGRAM HIGHLIGHTS BY ACQUISITION PHASE



FY88 - FY95

Concept Exploration

Component Technology Demonstrators



Hydrodynamic & Automotive Test Rigs

Design Cycles →

FY95 - FY01

Program Development & Risk Reduction (PDRR)

1st Generation Prototypes



Integrated Functionality, Full Up System



FY01 - FY12

System Development & Demonstration (SDD)

*Prototypes
2nd Generation - 10
3rd Generation - 7*



Mature the Design, Prepare for Production



FY12 - FY15

Low Rate Initial Production (LRIP)

LRIP Vehicles



Production, IOT&E, and Live Fire Testing



FY15 - FY20

Full Rate Production (FRP)

FRP Vehicle



Fielding the "EFV"





Product Group Breakdown

ASN

**PEO Land Systems
Colonel Taylor**

**Program Manager
Colonel Bryant**

**Deputy PM
Mr. Joe Teets**

PM AAA Staff functions:

- T & E
- Comptroller
- Operations
- Systems Engineer
- Budgets

**PG
Distributed
Mechanical System**

**PG
Powertrain**

**PG
Turret Systems**

**PG
Structure/Armor &
Attachment**

**PG
Vetronics, C4I,
Electronics**

**Systems Engineer
Chris Melkonian**

**Fire Controls
Will Sedmak**

**Lasers/VTC
Mike Kreiner**

**MK44
Shawn Haag**

**Ammo/Logistic
Lou Hearrell**

**Business Manager
Skip Benyo**

**Publication
John Wright**

**Operational
MSgt Baker**

**Turret Structure
Jeff Snyder**

**Guns/Ammo
Major Medeiros**



MK44 30x173mm Guns and Ammo IPT

Mission Statement:

The MK44 Guns/Ammo IPT exist to bring together all Military/Government and Industrial users of the the MK44 Gun and 30mmx173 Ammunition in order to increase the information flow within the MK44 and 30mmx173 guns/ammo community.

- Meets Semi-Annually Chaired by the US Marine Corps, PM Advance Amphibious Assault (EFV)
- User needs and Industrial solutions.
- IPT- Integrated Product Team- "Team"

ENDSTATE: Increased information flow!





MK44 30x173mm Guns and Ammo IPT



Previous IPT notes:

- IPT overview
- US Forces/Foreign Military updates
- Industrial updates
- NATO update
- Vendor/industry briefs
- USMC/USA/USN Joint spec. briefs
- Other vendor briefs
- Test results
- Specification discussions





30mm Guns and Ammo IPT Meetings



- *Jan 1998 – DRPM-AAA Barrel Symposium (MAJ Richter hosts) Forerunner of IPT.*
- *Aug 1998 - NSWC Crane and Camp Atterburry. First IPT meeting.*
- *Oct 1998 - DRPM-AAAV Woodbridge.*
- *Jan 1999 - DRPM-AAAV Woodbridge. Ammo producers welcomed*
- *Oct 1999 - DRPM-AAAV Woodbridge. (Govt and Boeing)*
- *Mar 2000- IPT receives DoD Top Acquisition David Packard Award*
- *May 2000 - DRPM-AAAV Woodbridge*
- *Sep 2000 - Quantico (MAJ Cushing hosts)*
- *Oct 2001 - DRPM-AAAV Woodbridge*
- *Mar 2002 – DRPM-AAAV Woodbridge*
- *Aug 2002 – DRPM-AAAV Woodbridge*
- *Dec 2002 – DRPM-AAAV Woodbridge*
- *Feb 2004 – DRPM-AAAV Woodbridge (MAJ Mullins hosts)*
- *Jul 2004 – Mesa, AR. ABM Program Re-established. Plan for FCT*
- *Mar 2005 – DRPM-AAAV Woodbridge. UK MOD welcomed*
- *Aug 2005 - Mesa, AR. Norwegian AMC welcomed*
- *Feb 2006 – Hawthorne, NV. Pre-ABM Lethality Evaluation.*
- *Aug 2006 – Mesa, NV. (MAJ Medeiros hosts). Austria and Switzerland welcomed.*
- *Oct 2006 – Crane, IN. WIPTs established.*
- *Mar 2007 – Carlsbad, CA.*
- *Oct 2007 – Fredericksburg, VA.*
- *April 2008 - Tampa, FL.*



30mm Air Burst Munition Down Select



- ATK/Diehl cartridge recommended by SSP for down select and qualification.



– General Information

– Warhead

- High Explosive Air Burst with Base Mounted Fuze
- SAPHE Performance Against Materiel Targets (MK240 Hardened Nose Design from Diehl)
- Explosive: PBXN-5
- Incendiary: Zirconium
- Inductive Fuze Setting in Gun Feed

– Cartridge

- Aluminum Case
- Propellant: Single Base
- Primer: M36A2 Percussion

– Fuze: Operates with or without the Inductive Fuze Setter

- Point Detonate Mode
 - Default Fuze Configuration
 - Fuze Detonates Upon Target Impact
- Point Detonate Delay Mode
 - Fuze Detects Impact with Target and Delays up to 1 ms before Detonating
 - Several Fixed Delays are Offered
- Air Burst Mode
 - Fuze Detonates at User Programmed Distance
 - Fuze has Point Detonate Capability if impact with Target Occurs before Set Point
- Self-Destruct: Detonates at Maximum Mission Time





30-mm Ammunition Qualification Tests



AT-1	Interior, Exterior, and Terminal Ballistics: Baseline	AT-12	Seq. Rough Handling	AT-28	HERO
AT-1B	Interior, Exterior, and Terminal Ballistics: Post Environment Tests	AT-13	5-Foot Drop	AT-29	ESD
AT-2	Sequential Environment - 28 Day Temperature and Humidity - Transportation Vibration - Shipboard Vibration - 4 Day T&H	AT-14	40-Foot Drop	AT-30	EMV
AT-3	Fast Cook-Off	AT-15	Shipboard Shock	AT-31	ESD
AT-4	Slow Cook-Off	AT-16	Waterproof	AT-32	Brush Impact No Fire
AT-5	Bullet Impact	AT-17	Energetic Qualification		
AT-6	Fragment Impact	AT-18	Function and Casualty		
AT-7	Sympathetic Detonation	AT-19	Fuze Function		
AT-8	Shaped Charge Impact	AT-20	Fuze Arming Distance		
AT-9	Salt Fog	AT-21	Primary Expl. Safety		
AT-10	Sand and Dust	AT-22	Numerical Effectiveness		
AT-11	Arena	AT-23	Jolt		
		AT-24	Jumble		
		AT-25	Extreme Temperature		
		AT-26	Thermal Shock		
		AT-27	Lead Azide		
		AT-28	HERO		



Recent & Upcoming Test Events



- Dynamic Arena Testing: Nov 07 and Feb 08
 - Data reduction on-going
- Lightning & ESD Testing: 26-29 Nov 07
 - Sending test articles to ATK for inspection Apr 08
- 28 Day T&H Testing: Begins 11 Apr 08
 - Begins Environmental Sequence to include: Vibration, Sequential Rough Handling, 4 Day T&H, Extreme Temperature, 40ft Drop, Thermal Shock
- Fast Cook-off Testing: Rescheduled to 24 Apr after weather prevented testing 8 Apr
- Numerical Effectiveness of Interrupter Testing
 - Late May-Early June
- Primary Explosive Safety Testing
 - Early July
- Jolt and Jumble Testing
 - Mid May
- Bullet and Fragment Impact Testing
 - May/June
- Salt Fog Testing
 - May/June



Systems Integration / User Jury



- User preference and functional integration on-going.

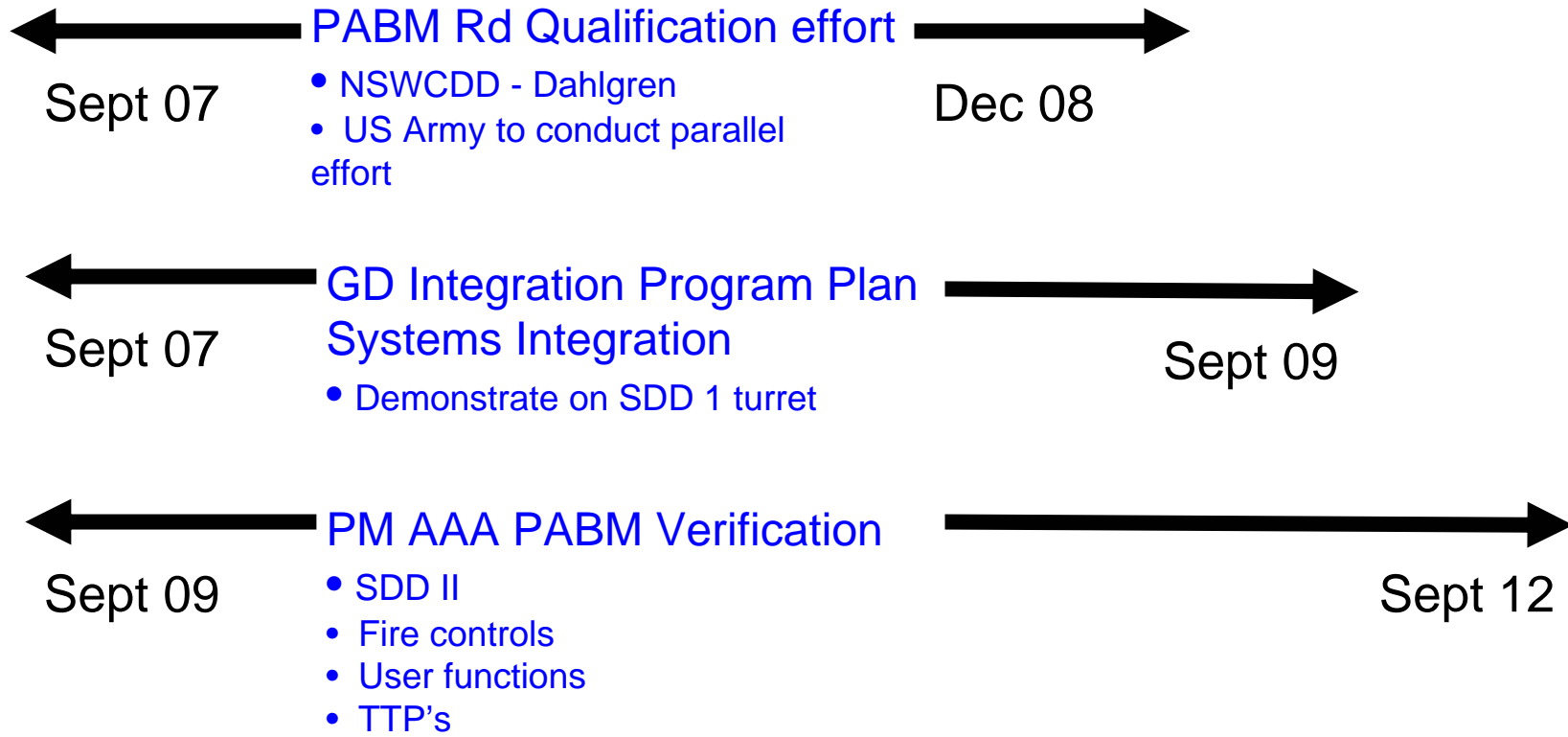


Gunner's Control Handle

VC's Control Handle



PG-TS Timeline



• PM AAA (PG-TS) intends to have PABM fully integrated for LRIP Lot 1



Other Ammo Efforts



- Armor Piercing Training Round Need
 - RFI on the street
 - Price/cost
 - Training value
- 30x173mm Surface Danger Zone Testing
 - ATC
 - Validate SDZ for ammo inventory
- PABM Trainer?
 - How to train with PABM
 - Training/spotting round, turret Simulators?



SURFACE DANGER ZONES

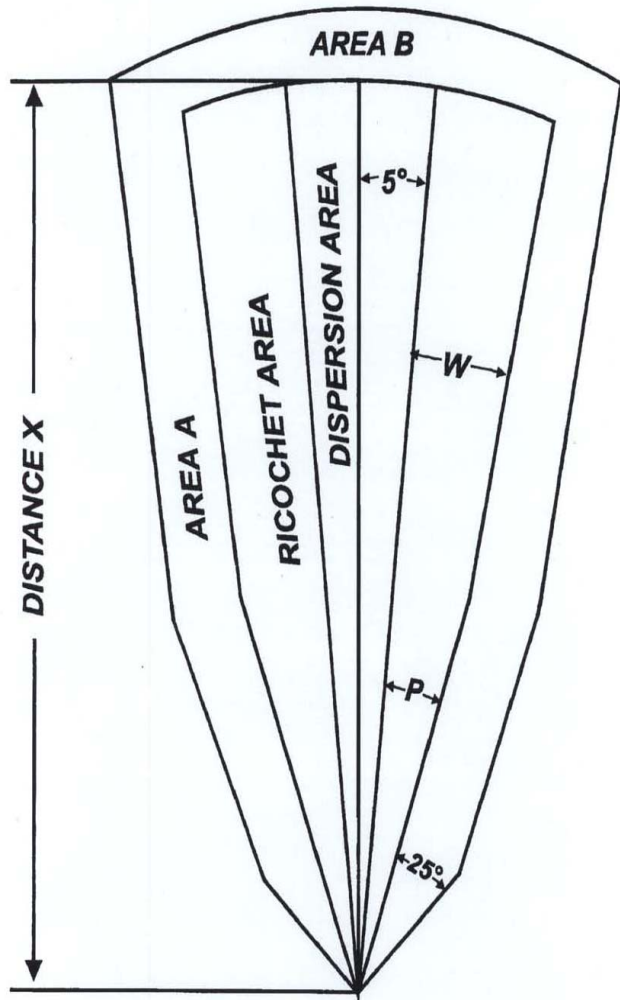


Figure 1

Background:

- 2004- Data review, MCPD/USMC Safety/ARDEC Safety insufficient data statistically
- 2005-06- USMC continued utilizing waivers

UPDATE:

- John Riley- Test Director Ammo Systems Division
- April 08- rounds down range Aberdeen (New Bombing Field)
 - MK239, MK258, MK268, AP trainers...
 - planned 7-8 week test



MK44 incident

- Date – 27 February 2008
- Location – Marine Corps Base, Camp Pendleton, Ca.
- Activity – Gunnery Skills Training
- Failure – Barrel Separation
- Injuries – Minor
- Damage to MK44 - Major



Feeder





Feeder & Receiver Assembly





How/prevention

- There are three plausible causes as to how the barrel came to be unlocked
 1. Hardware - The barrel came unlocked on its own
 2. Procedure & Training - The barrel was inadvertently unlocked while performing maintenance on the coax mg the previous day
 3. Procedure & Training - The barrel was not properly installed
- Because none of the three possible causes can be disproven beyond question, the EFV program has decided to address them all



Hardware/Training



- ECP being processed by ATK that will:
 - Increase spring tension in the barrel release pin
 - Provide visual indication within the turret to ensure the barrel release pin is fully seated
- PM AAA and GDAMS is revising EFV gunnery skills training program
- Gunnery Skills Test (GST) will be administered to all test personnel expected to operate the MK46 Weapon System
- Only certified personnel will be allowed to operate as gunner or vehicle commander



Procedure

- Ensure established operational checks are completed daily while on a live fire range
- Greater detail provided on how to inspect barrel status
- Increase the frequency of barrel status inspection



Questions

