Precision Guided Missiles and Rockets Program Review

Presented to

PRECISION STRIKE ANNUAL PROGRAMS REVIEW

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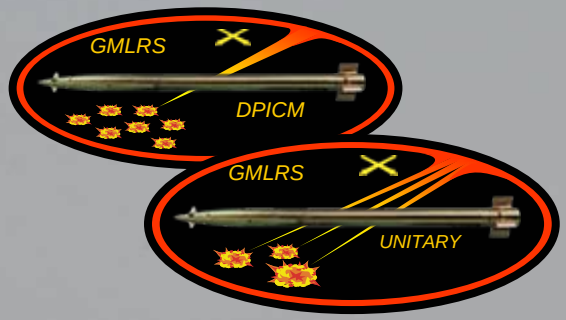
ANY WARFIGHTER, ANYWHERE, ALL THE TIME

Distribution A: Approved for Public Release

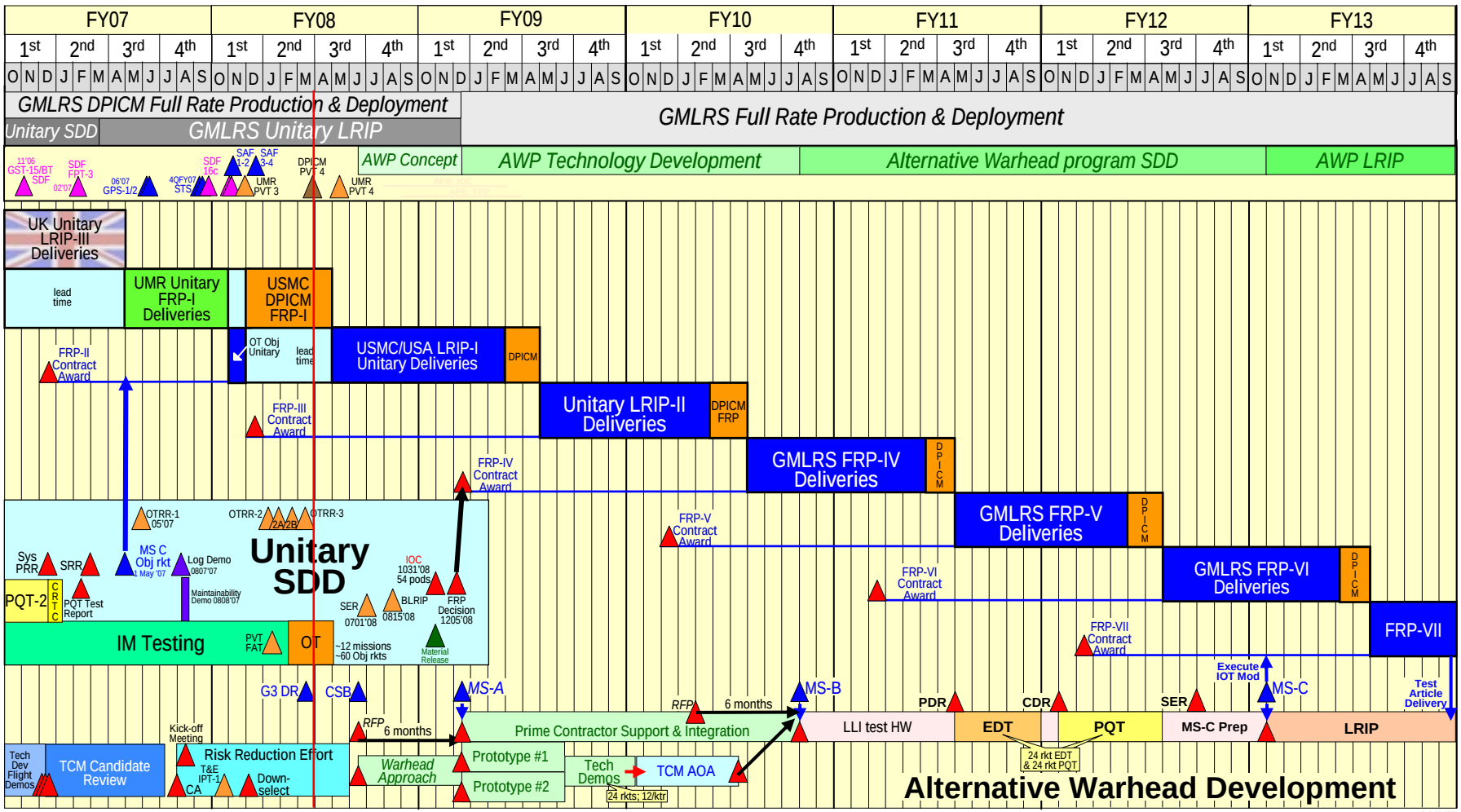
PGM/R Agenda

- GMLRS Program Review
  - Program Schedule/Evolution
  - GMLRS DPICM
  - GMLRS Unitary
  - Operational Update
- ATACMS Program Review
  - Program Schedule/Evolution
  - ATACMS Unitary
  - Operational Update



Guided MLRS Rockets

GMLRS Program Schedule



as of 281400Mar08

Any Warfighter, Anywhere, All The Time

MLRS/GMLRS History and Evolution

Area Suppression

- 13-45 km Range
- Free Flight Rocket
- Improved Accuracy
- 518 ea M77 DPICM Grenades
- 5% to 10% Dud Rate
- Defeats Soft Targets

- 15-70 km Range
- Inertial Guidance with GPS Assist
- 404 ea M101 DPICM Grenades
- 2% to 4% Dud Rate
- Significantly Reduced Target Footprint
- Defeats Soft Targets

- 15-70 km Range
- Inertial Guidance with GPS Assist
- 404 ea M101 DPICM Grenades
- <1% Dud Rate
- Significantly Reduced Target Footprint
- Defeats Soft Targets

- 15-70 km Range
- Inertial Guidance with GPS Assist
- Complies w/Latest Cluster Munitions Policy
- Significantly Reduced Target Footprint
- Defeats Soft Targets

Basic Rocket (M26)

1980

Extended Range Rocket (M26A2)

1996

1998

GMLRS

Guided DPICM Rocket(M30)

2004

2009

GMLRS DPICM

2014

Guided DPICM Rocket w/SDF (XM30E1)

Guided Advanced Warhead Rocket

Guided Unitary Rocket-UMR (M31)

2005

Guided Unitary Rocket (XM31E1)

2008

GMLRS UNITARY

- 10-32 km Range
- Free Flight Rocket
- 644 ea M77 DPICM Grenades
- 5% to 10% Dud Rate
- Defeats Soft Targets

- 15-70 km Range
- Inertial Guidance with GPS Assist
- 200 lb Unitary Warhead
- Defeats Hard Stationary Point & Soft Area Targets
- Dual Mode Fuze
  - Point Detonate
  - Delay
- Low Collateral Damage

Precision Strike

- 15-70 km Range
- Inertial Guidance with GPS Assist
- 200 lb Unitary Warhead
- Defeats Hard Stationary Point & Soft Area Targets
- Tri Mode Fuze
  - Point Detonate
  - Delay
  - Proximity
- Low Collateral Damage
- Trajectory Shaping

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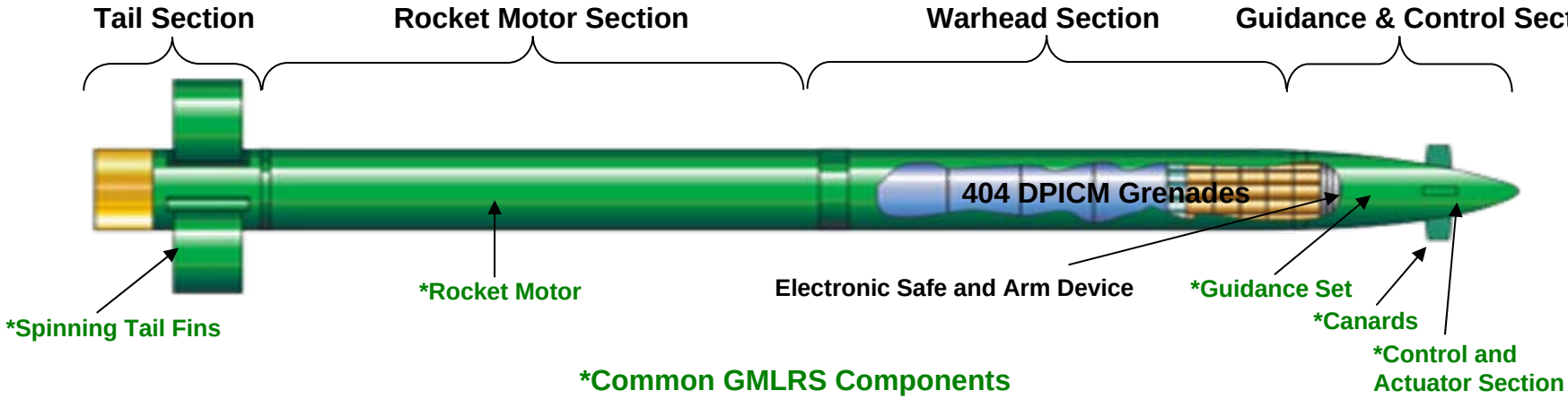
GMLRS DPICM Overview

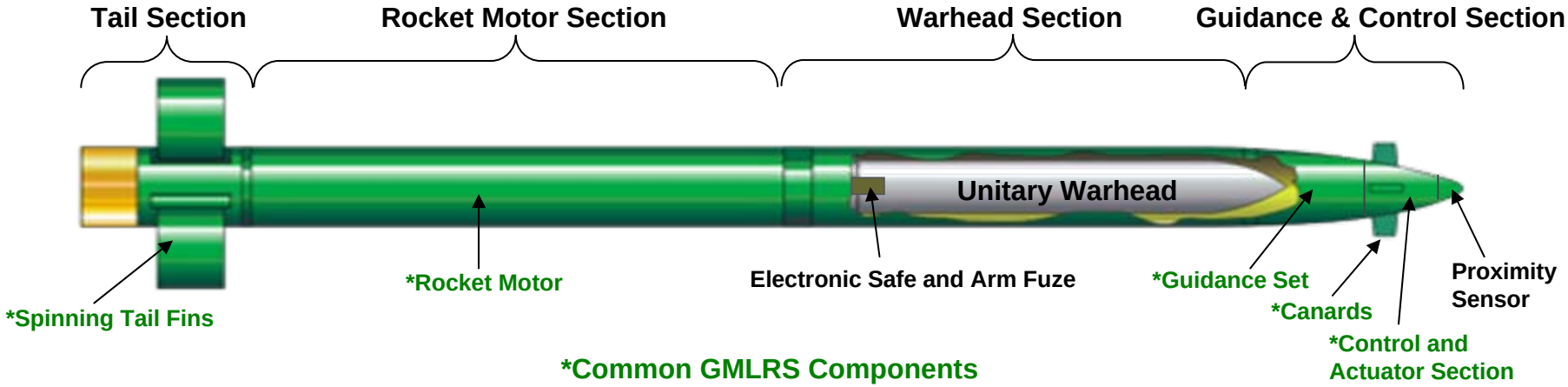


CHARACTERISTICS

- *Range - 70 Km*
- *Effectiveness - 30% Expected Fractional Damage*
- *Rocket Reliability: Threshold: 92%; Objective 95%*
- *Guidance - Inertial GPS Aided*
- *All Weather; Day/Night*
- *Immediate Response*
- *<2% Hazardous Dud Rate*
- *Launched From M270A1 or HIMARS*

Weight at Launch	668 lbs
Weight at Burnout	401 lbs
CG (X) at Launch	7" 2"
CG (X) at Burnout	5" 11"
Length	12"11"
Diameter	9"

GMLRS Unitary System Overview

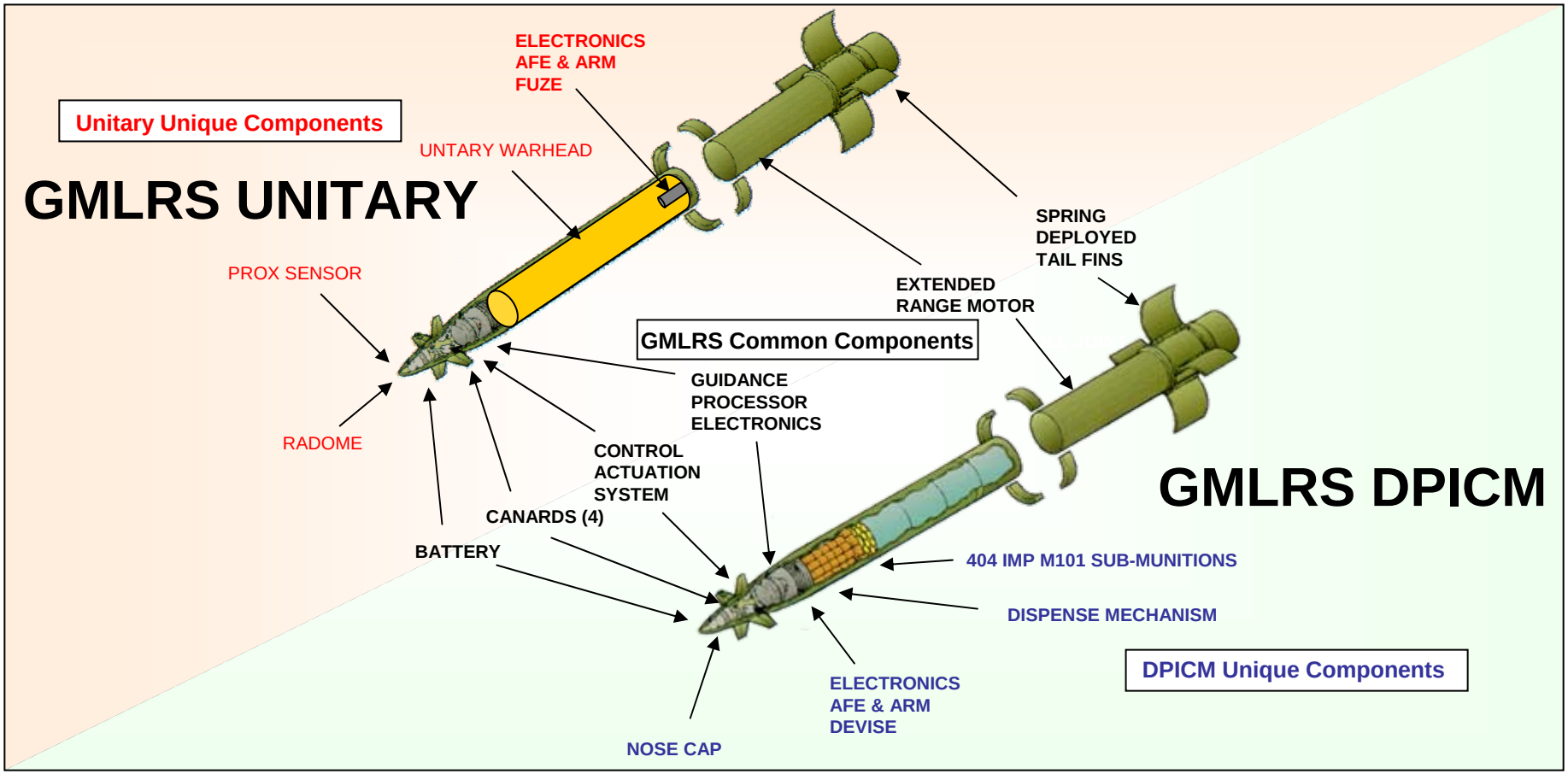


CHARACTERISTICS

- 80% Commonality of Components With GMLRS DPICM
- Additional Commonality With GMLRS Unitary UMR Rocket Currently In Production and Employment
- Launchers - HIMARS or M270A1
- Range - 70 Km
- All Weather; Day/Night
- Accuracy - Less than 5 meters Circular Error Probability (CEP)
- Guidance System (GS) - Contains Inertial Measurement Unit with GPS Updates
- Control Actuation System (CAS) - Commands Canard Steering
- Payload – 200 lb Class Unitary Warhead
- Tri-Mode Fuze: Point Detonate, Delay, Proximity
- Rocket Motor – Arcadene 361 HTPB (260.5 lbs) Propellant With Steel Case
- Spinning Tail Fins / Roll Joint Assembly - Decouples Rocket Roll from the GS
- Electronic Safe and Arm Fuze (ESAF) - Initiates Warhead

Weight at Launch	668 lbs
Weight at Burnout	401 lbs
CG (X) at Launch	7" 2"
CG (X) at Burnout	5" 11"
Length	12"11"
Diameter	9"

GMLRS Commonality



Self Destruct Fuze (SDF) Integration

- **In Production Qualification Tests Conducted in September and November 2007 the BT Fuze SDF Demonstrated a Hazardous Dud Rate of Less Than 0.15% and a Reliability Rate of Greater Than 96%**

- **Meets all Requirements Established in January 10, 2001, Secretary of Defense Policy Memorandum Stating That Beginning in FY 2005, All Newly Procured Cluster Submunitions Must Have a Dud Rate of Less Than 1%**

- **SDF will be Integrated into GMLRS DPICM Production at the Earliest Opportunity (FRP2 deliveries in FY 2009 from FRP2 Contract)**

GMLRS-Unitary Rocket Usage

672 Total Rockets Fired As Of 26 March 2008

Who Shoots GMLRS-U:		
US Army	564	83.93%
USMC	24	3.57%
UK	84	12.50%

US Army Missions

Who Requests GMLRS-U:		
Army	349	61.88%
Marines	121	21.45%
Other	94	16.67%
How GMLRS-U is employed:		
Troops In Contact	177	31.38%
Pre-Planned	387	68.62%
Environments GMLRS-U is employed:		
Urban/COIN	535	94.86%
Other (TD/Test)	29	5.14%

Capability Gap: Persistent, responsive, all-weather, rapidly-deployable, long-range, surface-to-surface, precision-strike capability.

Description

- GPS-Augmented Inertial Guidance
- 200lb-Class HE IM-Compliant Warhead
- Multi-Fuze Selection (Point Detonating, Delay, Proximity)
- 15-70km Range

Current Targets

- Precisely Located/Mensurated Point targets
- Congested/Complex Urban Targets
- Targets in Areas Where Collateral Damage is of Concern

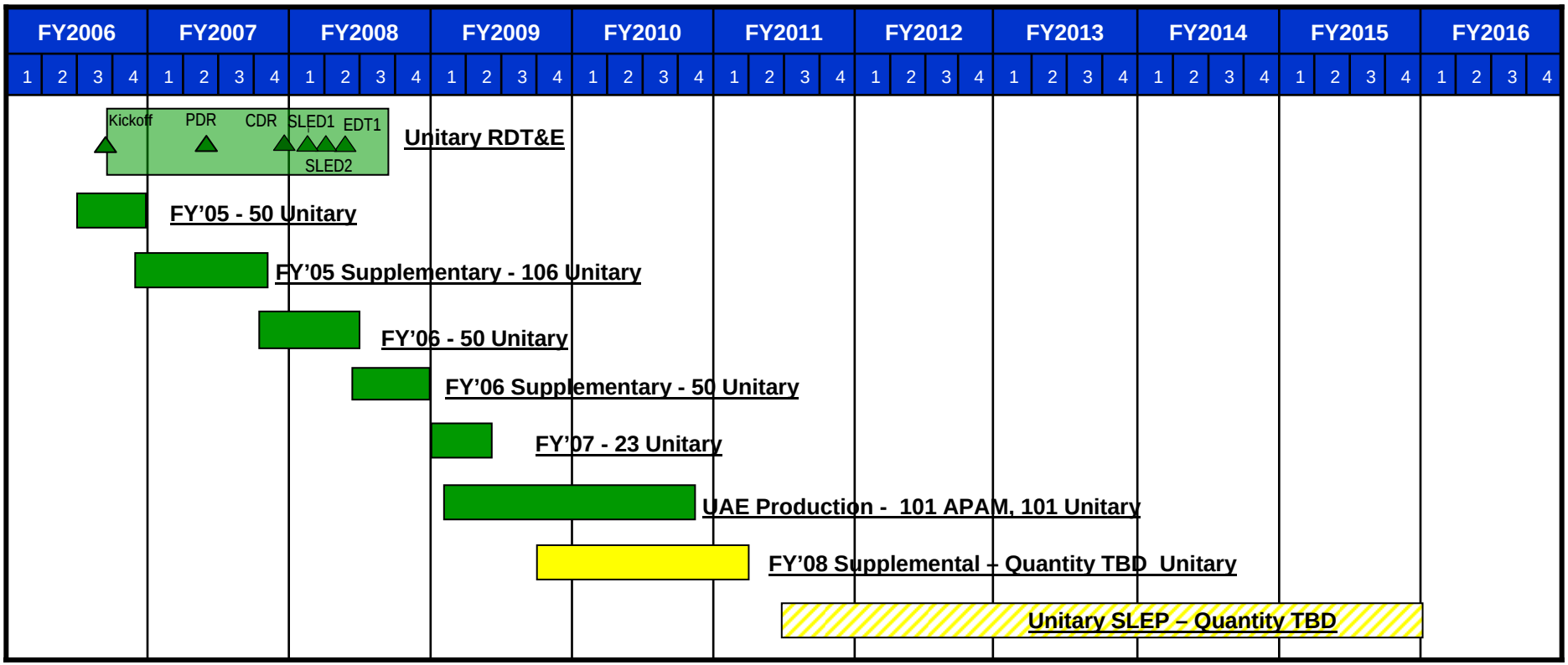
Effectiveness/Reliability

- BDA Shows High Level of Effectiveness
- Rare Reports of Minor Collateral Damage
- Reliability of US Army Missions: 98.6%

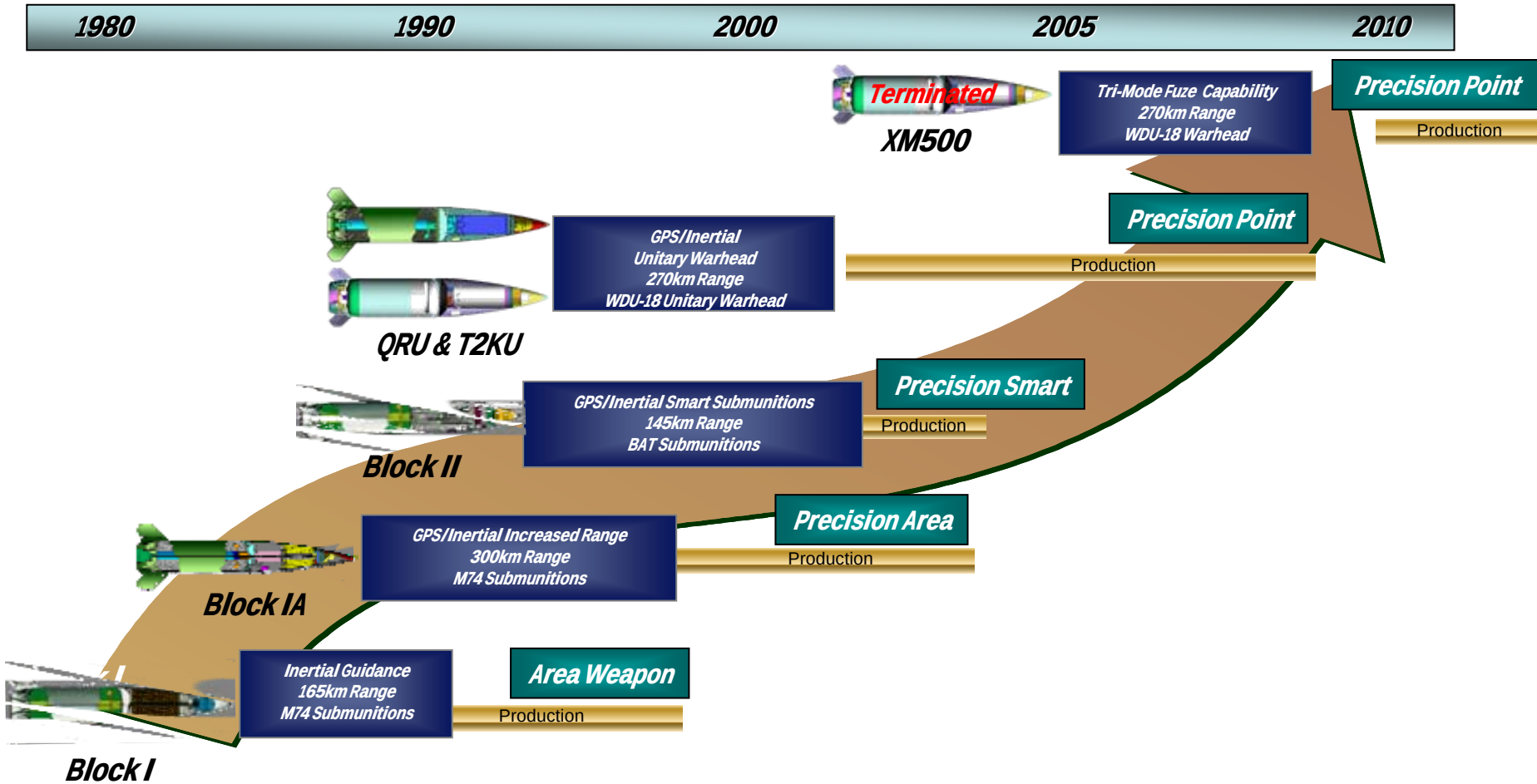
GMLRS Operational Video

Army Tactical Missile System

ATACMS Program Schedule



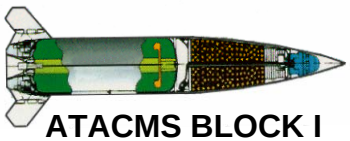
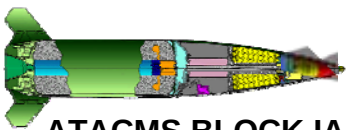
ATACMS History and Evolution



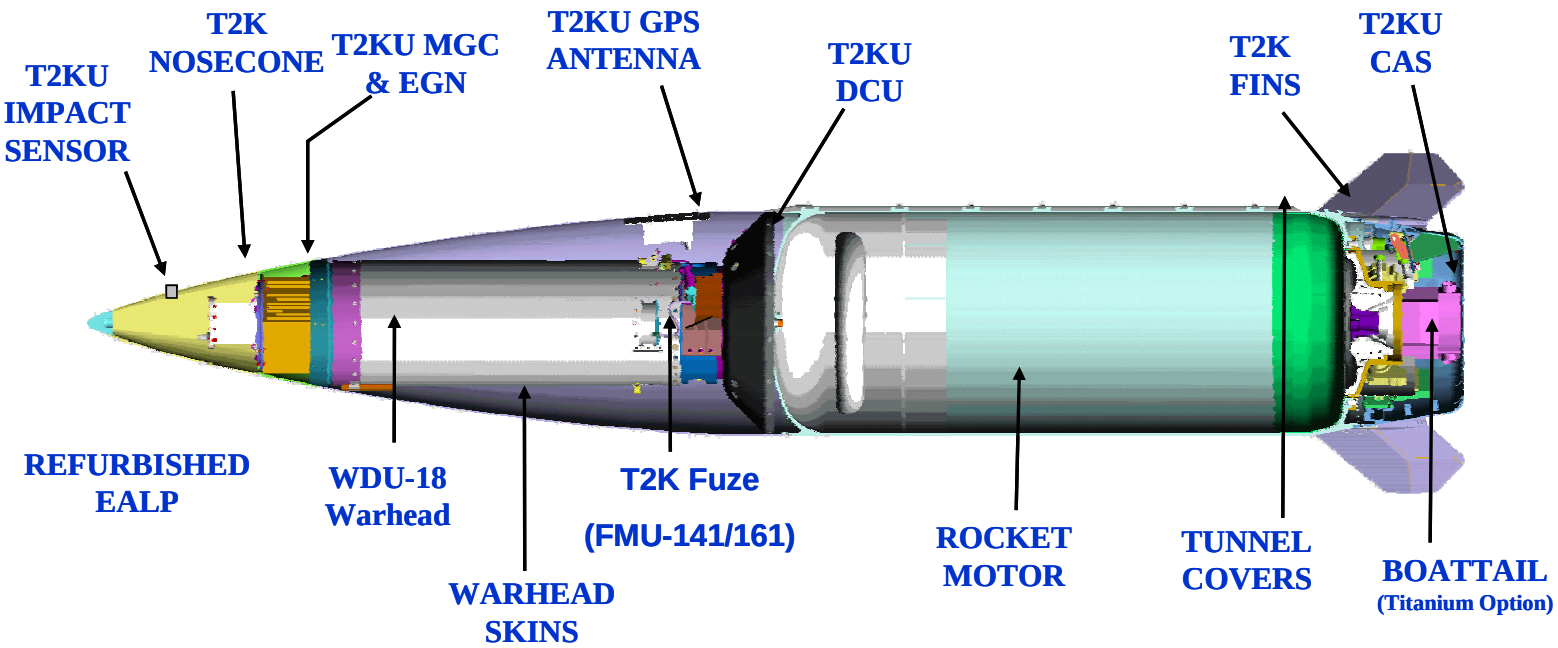
ATACMS Has Evolved From an Area to Precision Weapon

Any Warfighter, Anywhere, All The Time

ATACMS Family Of Munitions

Variant	Nom.	Navigation	Mission	Munition	Range
 ATACMS BLOCK I	M39	Inertial Guidance (MGS)	Area Weapon System (APAM)	M74 Submunition	Min – 25 km Max – 165 km
 ATACMS BLOCK IA	M39A1	GPS Aided Inertial Guidance	Area Weapon System (APAM)	M74 Submunition	Min – 70 km Max – 300 km
 ATACMS QRU	M48	GPS Aided Inertial Guidance (MGS II)	Precision Point	WDU - 18 Unitary Warhead, FMU-141/B PD Fuse	Min – 70 km Max – 270 km
 ATACMS T2K	M57	GPS Aided Inertial Guidance (T2K)	Precision Point (near vertical engagement)	WDU - 18 Unitary Warhead, FMU-161/B PD Fuse	Min – 70 km Max – 270 km

Army TACMS T2K Unitary M-57



CHARACTERISTICS

- Launchers - HIMARS or M270A1
- Range - 70 Km Minimum / 270 Km Maximum
- All Weather; Day/Night
- Accuracy - Less than 9 meters Circular Error Probability (CEP)
- Guidance System (GS) - Contains Inertial Measurement Unit with GPS Updates
- Control Actuation System (CAS) - Commands Canard Steering
- Payload – 500 lb Class Unitary Warhead
- Tri-Mode Fuze: Point Detonate, Delay, Proximity

ATACMS QRU Usage

44 Total ATACMS QRU Missiles Fired as of 13 March 2008

Total ATACMS QRU Fired: 44

Successful (Reliabilty)	***43***	***97.73%***
Failures	***1***	***2.27%***

How ATACMS QRU is employed:

Time-Sensitive Targets
Pre-Planned Targets
Urban/Non-Urban Environments

Mission Process

- **Target located by Multiple Sensors**
- **Target refined using Precision Strike Suite- Special Operation Forces or Mensuration via Rainstorm/Raindrop, etc.**
- **Passed to AFATDS for tactical fire control**
- **Launcher receives and executes mission**

ATACMS Video

Summary

- GMLRS And ATACMS Provide the Warfighter An Unprecedented Capability That is Proven in Combat
- GMLRS Unitary Continues To be Used In Current Operations
- GMLRS DPICM And Unitary Production Deliveries Ongoing
- GMLRS Unitary To Enter Full Rate Production In 2009

Contact Information

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Acronyms

AMRDEC – Aviation and Missile Research and Development Center
ATACMS – Army Tactical Missile System
CENTCOM – U.S. Central Command
DOD – Department of Defense
DPICM – Dual Purpose Improved Conventional Munitions
FRP – Full Rate Production
GMLRS – Guided Multiple Launch Rocket System
GPS – Global Positioning System
HIMARS – High Mobility Artillery Rocket System
IED – Improvised Explosive Device
IM – Insensitive Munitions
JROC – Joint Requirements Oversight Council
LRIP – Low Rate Initial Production
MIPA – Missile Production Allocation
QRU – Quick Reaction Unitary
RDT&E – Research, Development, Test and Evaluation
SLEP – System Life Extension Program
UXO – Unexploded Ordnance