PROGRAM EXECUTIVE OFFICE MISSILES AND SPACE
SUPPORT TO ARMY AVIATION

Presented by
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Deputy Program Executive Officer,
Missiles and Space

Any Warfighter - Anywhere - All the Time
## PEO MS PORTFOLIO

### AVIATION
- Joint Attack Munition Systems (JAMS)
- Cruise Missile Defense Systems (CMDS)
- Counter - Rocket, Artillery, Mortar (C-RAM)
- Integrated Air and Missile Defense (IAMD)
- Lower Tier Project Office (LTPO)
- Precision Fires Rocket and Missile Systems (PFRMS)
- Close Combat Weapon Systems (CCWS)

### FIRES
- Joint Land Attack Cruise Missile Defense Elevated Netted Sensor System (JLENS)
- C-RAM
- RAM Warn
- IAMD Battle Command System (IBCS) Engagement Operations Center (EOC)
- PATRIOT/ Ground Support Equipment
- PATRIOT Advanced Capability (PAC-3)
- Medium Extended Air Defense System (MEADS)
- High Mobility Artillery Rocket System (HIMARS)
- Guided Multiple Launch Rocket Systems (GMLRS)
- Joint Tactical Ground Station (JTAGS)
- Joint Tactical Missile Systems (ATACMS)

### MANEUVER
- Joint Air-to-Ground Missile (JAGM)
- Small Guided Munitions
- Hellfire
- Launchers
- IFPC Inc 2-I
- NASAMS
- Sentinel
- STINGER
- Avenger
- Lightweight Counter Mortar Radar (LCMR)
- Forward Area Air Defense Command & Control (FAAD C2)
- Air & Missile Defense Planning & Control System (AMDCPS)
- A/B Plug and Fight Interface Kits
- Integrated Fire Control Network (IFCN) Relay
- Joint Tactical Ground Station (JTAGS)
- Army Tactical Missile Systems (ATACMS)

### SMDC
- Space
- JAVELIN
- SNaP-3 Nanosatellite
- Kestrel Eye (KE) Microsatellite
- Soldier-Warfighter Operationally Responsive Deployer for Space (SWORDS)

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Any Warfighter - Anywhere - All the Time

- System(s) will be discussed today
**HELLFIRE ROMEO**

### Characteristics

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter</td>
<td>7 inches</td>
</tr>
<tr>
<td>Overall Length</td>
<td>64 inches</td>
</tr>
<tr>
<td>Total Weight</td>
<td>107 lbs</td>
</tr>
<tr>
<td>Range</td>
<td>8km- Rotary / 12+ km - UAS</td>
</tr>
<tr>
<td>Seeker</td>
<td>Semi-Active Laser (SAL)</td>
</tr>
</tbody>
</table>

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### System Overview

- Provides Air-to-Ground target engagement from rotary-wing, fixed-wing and Unmanned Aerial Systems for the Army, Air Force, Navy, Marines and FMS Customers

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### Romeo Variant

- Romeo is the latest HELLFIRE variant
- System Qualification Testing completed in November 2012
- Improves safety, reliability and producibility of the missile
- Multipurpose warhead which can be utilized against all current target sets and from all platforms

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### Status

- HELLFIRE System is at Full Rate Production - 500/month
- > 14,000 Army HELLFIRE missiles (all variants) fired since 2003
- Integration onto at least 17 different air and ground manned and unmanned platforms
- A combined 1,072 missiles fired in combat in 2012 by Army, Air Force, Navy and Marines

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Any Warfighter - Anywhere - All the Time
JAGM SYSTEM CONCEPT

Characteristics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter</td>
<td>7 inches</td>
</tr>
<tr>
<td>Overall Length</td>
<td>70 inches</td>
</tr>
<tr>
<td>Total Weight</td>
<td>NTE 115 lbs</td>
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<tr>
<td>Range (increment 1/2)</td>
<td>8 / 12 km</td>
</tr>
<tr>
<td>Seeker (increment 1/2)</td>
<td>Dual Mode (SAL, MMW)/Tri Mode (SAL, MMW, I2R)</td>
</tr>
</tbody>
</table>

**Contractor provided guidance section/HF Back End**

System Overview

The JAGM System consists of:
- Tactical missile – new guidance section
- Updated launcher software
- Existing missile back-end & launchers

Capabilities

- Precision Point and Fire & Forget targeting modes address Capability Gaps:
  - Adverse weather, obscurants and countermeasures
  - Time sensitive, moving & fleeting targets
  - Increased Combat Effectiveness
- Replaces all Legacy Laser HELLFIRE variants and expiring Longbow HELLFIRE missiles
- Modular missile allows for incremental capability growth
- Threshold Platforms – Army AH-64E and USMC AH-1Z
- Future increments add tri mode seeker and increased range

Key Events

- Program Restructure/Restart TD Phase: 20 MAR 12
- Lockheed Martin Contract Award: 15 AUG 12
- Raytheon Contract Award: 29 NOV 12
- Preliminary Design Review: 2QFY13
- Critical Design Review: 1QFY14
- Prototype Test Flights: 1QFY15
- Platform Integration /EMD Phase: FY15-FY17
- Low Rate Initial Production/FUE: FY17
HYDRA-70 ROCKETS

Characteristics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter</td>
<td>2.75 inches</td>
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<tr>
<td>Overall Length</td>
<td>54.6-73.34 inches</td>
</tr>
<tr>
<td>Total Weight</td>
<td>22.9-30.6 lbs</td>
</tr>
<tr>
<td>Range</td>
<td>300M to 8KM</td>
</tr>
<tr>
<td>Warheads</td>
<td>Eight Types in Production</td>
</tr>
</tbody>
</table>

Provides air-to-ground suppression, smoke screening, illumination and direct and indirect fires to defeat area materiel and personnel targets at close and extended ranges.

Warhead Variants

- M151 10# High Explosive Point Detonating (HEPD) Round
- M229 17# HEPD Round
- M274 Training Round
- M257 (visible light) and M278 (InfraRed) Flares
- M255 Flechette Round
- M156 (White Phosphorus) Marking Round
- M264 (Red Phosphorus) Smoke Screening

System Overview

Status

- Employed by fixed and rotary wing aircraft
- Full Rate Production continues at 40,000/Month
- 109,289 Rockets Fired in Combat 2012.
MODERNIZED ROCKET LAUNCHER INCREMENT I

Characteristics
- Leverages on current launcher structure
- Leverages on HELLFIRE LEA effort
- Non-proprietary interfaces (JAMS JICWG)
- Addresses threshold requirements
- Digital Platform (MIL-STD-1760)
  - Digital Launcher (Digital to Analog converter)
  - Analog Rocket (Fuse)
- Individual rocket selection vs. zone selection

Challenges
- Funding for M261 only
- Schedule
- Qualification
- Digital requirements
- Incremental solution to a full digital “end to end” system that supports the possible migration to smart or guided rocket systems

Status
- Proceeding with limited funding M261 only
- Government lead Team
- Government owned TDP
- Development over the next 3 years
- Support AH-64E Fielding beginning in FY16


Any Warfighter - Anywhere - All the Time
Army Integrated Air and Missile Defense (AIAMD) integrates:
- Sensors
- Weapons
- Common mission command capability

IAMD Battle Command System (IBCS) provides:
- Single, integrated fire control network
- High-fidelity Single Integrated Air Picture

‘Plug and fight’ interface module

Benefits of AIAMD

- Significantly improves combat identification
- Defends larger area against full spectrum of threats
- More effective engagement operations and force operations
- Advanced engagement techniques
- Increased situational awareness/situational understanding
- Manages all sensors and shooters on the IFC net
  - No “single points of failure”
- Flexibility in choice of interceptors
- Scalable and tailorable force packages
- Training and logistics efficiencies
**Without IBCS**

- Fire Unit positioned primarily for TBM defense of co-located asset
- Low-flying threat is obscured from the Fire Unit Radar by terrain

**With IBCS**

- IBCS plans engagement and tasks Fire Unit Radar, Fire Unit Launcher & Forward Deployed Radar
- Fire Unit Radar receives Forward Deployed Radar data and uplinks data to the interceptor
- Allows threat to be intercepted along dashed portions of flight before forward asset is impacted

Shaded regions depict engagement footprint against low altitude threat.
• Demand for Aviation Continues; Demand for Rockets and Missiles Continues

• Integrated Air Picture is Critical to Preserve Critical Resources

• “Pivot to PACOM” will Demand a Full Spectrum Integrated Approach

• Balance of Requirements to Resources will Dictate Future Solution
BACK UP CHARTS
Any Warfighter - Anywhere - All the Time

**HF - JAGM CAPABILITY GAP**

- **Longbow (Radar)**
  - Shelf life expiration
  - Out of Production

- **HELLFIRE (Laser)**

- **Maritime Target**: FAC/FIAC

- **Air Defense Stand Off**

- **Moving/Fleeting Target**

- **Countermeasures**

- **Guidance Section**:
  - Increment 1 (Laser/Radar)
  - Increment 2 & 3 (Laser/Radar/Infrared)

- **Multi-target Fire & Forget**
### JAGM USER RECOMMENDED INCREMENTAL CAPABILITIES

<table>
<thead>
<tr>
<th>Capability</th>
<th>Original CDD</th>
<th>Increment 1</th>
<th>Increment 2</th>
<th>Increment 3</th>
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<tbody>
<tr>
<td>Range</td>
<td>16 km</td>
<td>8 km</td>
<td>12 km</td>
<td>16 km</td>
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<tr>
<td>Warhead</td>
<td>MP/Selectable Fuze</td>
<td>✓ HF Romeo</td>
<td>✓ USG Design MP/Selective Fuze</td>
<td>✓ USG Design MP/Selective Fuze</td>
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<tr>
<td>Seeker</td>
<td>Tri-mode</td>
<td>Dual mode (SAL, MMW)</td>
<td>Tri-mode reduced (SAL, MMW, IR for terminal guidance)</td>
<td>Tri-mode</td>
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<tr>
<td>Insensitive Munitions</td>
<td>✓</td>
<td></td>
<td>✓ USG Design</td>
<td>✓ USG Design</td>
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<tr>
<td>Shelf/Service life</td>
<td>15 yrs/25 yrs</td>
<td>10 yrs/not less than 25 yrs</td>
<td>10 yrs/not less than 25 yrs</td>
<td>15 yrs/not less than 25 yrs</td>
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<tr>
<td>Training aids</td>
<td>Full CATM</td>
<td>HF Romeo CFT, integrated training</td>
<td>HF Romeo CFT, integrated training</td>
<td>Full CATM</td>
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<tr>
<td>Targeting Modes:</td>
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<tr>
<td>Precision Point</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Active FF</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Passive FF</td>
<td>✓</td>
<td></td>
<td>✓ LOAL</td>
<td>✓</td>
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<tr>
<td>Threshold Platforms</td>
<td>AH-64D, AH-1Z, MH-60R, F/A-18E/F, OH-58F, MQ-1C</td>
<td>AH-64D AH-1Z</td>
<td>AH-64D AH-1Z</td>
<td>AH-64D AH-1Z</td>
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<tr>
<td>Temperature</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Operating</td>
<td>-54C to +71C</td>
<td>-43C to +71C</td>
<td>-43C to +71C</td>
<td>-43C to +71C</td>
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<td>Non-Operating</td>
<td>-54C to +71C</td>
<td>-46C to +71C</td>
<td>-46C to +71C</td>
<td>-46C to +71C</td>
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</tbody>
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JAGM TECHNOLOGY DEVELOPMENT PROGRAM SCHEDULE

Major Events
- Technology Development Phase
  - LMC PDR 1
  - RMS PDR 2
  - LMC CDR 1
  - RMS CDR 2
- MS B Decision
- EMD Phase
- MS C Decision

Test
- Developmental Testing
- USG AUR Test and Prototype Flights
- Component Qualification Testing

Contracting
- First Contract Award
- Second Contract Award

Now
- LRIP
MODERNIZED ROCKET LAUNCHER

Incremental Approach

Current (Legacy) Launcher
- Analog Platform
- Analog Launcher
- Analog Rockets

MRL Increment #1
Enhanced Rocket Launcher (ERL)
- Digital Platform
- Digital Launcher
- Analog Rockets
- Currently funded for M261 (FY12-13)

MRL Full Capability
Modernized Rocket Launcher (MRL)
- Digital Platform
- Digital Launcher
- Analog & Digital Rockets

Current (Legacy) Launcher
- ADD digital interface to platform (LEA)

MRL Increment #1
Enhanced Rocket Launcher (ERL)
- ADD Smart Interface

MRL Full Capability
Modernized Rocket Launcher (MRL)
- Launcher supports lock-on-before launch (LOBL) rockets with guidance

Multiple Sizes / Configurations

CURRENT
- USG Technical Data Package (TDP)
- No electronics
- Competitively acquired
- Arnold Defense & Electronics

NEAR-TERM
- Leverages on current launcher structure
- Leverages on HELLFIRE LEA effort
- Non-proprietary interfaces (JAMS JICWG)
- Addresses threshold requirements

FUTURE
- Leverages on ERL electronics (LEA)
- Adds digital smart interface to rocket
- Multiple configuration options
- Addresses objective / future requirements