Supporting Army Aviation in OIF / OEF

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Army Aviation in OIF / OEF

- Indispensable to Combat Operations
- Extremely High OPTEMPO
- Extremely Harsh Operational Environment
- Continued MANPADS Threat
Requirements to Support Army Aviation OIF / OEF Operations

- Reconstitute the Fleet
  - Replace Attrited Aircraft
  - Repair Crash/Battle Damage
  - Conduct Reset (Return Aircraft to Predeployment Condition)
  - Complete Recapitalization Program

- Improve Readiness
  - Maintain Focus on Spares
  - Preset the Fleet - Implement “Desert Kits” Designed to Reduce Environmental Effects
    - Barrier Filters
    - Aircraft Covers
  - Implement Enhanced Desert Maintenance (EDM)
    (Maintenance Tailored for Sustain Desert Operations)

- Improve Aircraft Survivability
  - Revised Tactics, Techniques, & Procedures
  - Fix Current & Field Future ASE
### Maintenance Spectrum

<table>
<thead>
<tr>
<th></th>
<th>Normal/Routine</th>
<th>Enhanced Desert Maintenance</th>
<th>Full Reset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase</td>
<td>Scheduled Segment</td>
<td>Scheduled Segment</td>
<td>All Segments</td>
</tr>
<tr>
<td>Black Boxes</td>
<td>Detailed Inspection/Test</td>
<td>Open &amp; Clean/Repair</td>
<td></td>
</tr>
<tr>
<td>Engines</td>
<td>IROAN*</td>
<td>- Open All But OH-58D</td>
<td>Open All</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Increased Cleaning</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Frequency</td>
<td></td>
</tr>
<tr>
<td>Wiring Harnesses</td>
<td>Detailed Inspection</td>
<td>Remove &amp; Clean/Replace</td>
<td></td>
</tr>
<tr>
<td>Fuel Cells</td>
<td>Inspect</td>
<td>Remove &amp; Repair/Replace</td>
<td></td>
</tr>
<tr>
<td>MWOs</td>
<td>Critical</td>
<td>Critical &amp; Desert Kit</td>
<td>All</td>
</tr>
<tr>
<td></td>
<td></td>
<td>In Theater</td>
<td></td>
</tr>
</tbody>
</table>

* Inspect Repair Only As Necessary
Aircraft Survivability

- Objectives
  - Avoid the Hit
  - Minimize Hit Impacts
  - Survive the Crash

- Path Ahead
  - Revised Tactics, Techniques, and Procedures
  - Improved Aviation Survivability Equipment (ASE)
OEF/OIF ASE Issues

- Current Capabilities vs Projected Threats
- High False Alarm Rates
- High System Failure Rates

ASE Must Be Integrated & Automatic
System & Component Condition
OIF ASE Systems Readiness

- Readiness Problems Experienced in FY03
  - Sand and Dust Intrusion
  - Vibration
  - Rigid Cabling
  - Corrosion (Exposed Connectors)
  - Maintenance Training

- Reported Readiness Dramatically Improved During FY04
  - Improved Filtration Systems (Sand, Dust)
  - Improved Shock Mounts
  - Improved Cabling And Connectors
  - More Experienced Maintenance Personnel
  - Field Assistance Support and Training (FAST) Team Visits to Deploying/Deployed Units
Field Assistance Support & Training (FAST) Team Visits

- **Balad, Iraq, Jun 04**
- **Ft. Lewis, WA, Aug 04**

- FAST Support Provided to Reserve, NG, and Active Army Units
  - Over 45 Units Visited (CONUS and SWA) By PM AES
  - Additional Units Scheduled for Visits Through Nov 04

- Routine Forward Area Assistance
  - EWO/Aircrew Training
  - ASE Repairs
  - Operator/Maintenance Training
  - Spare Parts Deliverables
Summary

- Aviation Operations Continue to Be Indispensable in OIF / OEF

- Actions Have Been Taken and Are Being Taken to Improve System Readiness
  - Reset
  - Desert Kits
  - Enhanced Desert Maintenance

- Actions Have Been Taken and Are Being Taken to Improve Aircraft Survivability
  - Revised TTP
  - ASE Training, Modifications, Modernization
Our Army at War: Relevant and Ready

ATIRCM/CMWS Update
For
MANPADs Conference 3-4 Nov 04
The Infrared Missile Continues to Evolve as the Primary Threat Driver for Missile Warning

Missile Kinematic Trends
- Maneuverability:
  - 8-15 Gs
  - +20 Gs
  - +30 Gs
- Mach:
  - 1.5 Mach
  - 2.0 Mach
  - 2.5 Mach
- Motors:
  - Conventional Propellant
  - Signature Suppressing Propellant

Missile Seeker Trends
- Tracker:
  - Spin
  - Conical
  - Rosette
  - Cruciform
  - Imaging
- Detector:
  - Band I (Hot Metal, Solar Glint)
  - Band II (Hot Metal, Exhaust Plume)
  - Band IV (Skin)
  - Multi-Band (Hot Metal, Exhaust, Skin, Negative Contrast)
- Infrared Countermeasures
  - Flare Rejection

Aircraft Countermeasure Response
- Maneuver
- Flares
- IR Jamming
- Suppression
  - Conventional
  - Advanced
  - Wide Field of View
  - Directable

The modern countermeasure response requires passive, spatial, missile warning with adequate warning time.
# Threat List

<table>
<thead>
<tr>
<th>Tier 1</th>
<th>Tier 2</th>
<th>Tier 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>IR SAMs</td>
<td>RF SAMs, AAMs, ATGMs</td>
<td>Laser Guided, Command Guided, Imaging, and Emerging Electro-Optical Missiles</td>
</tr>
</tbody>
</table>

- T1-1
- T1-2
- T1-3
- T1-4
- T1-5
- T1-6
- T1-7
- T1-8
- T1-9
<table>
<thead>
<tr>
<th>T1-1/T-1V</th>
<th>Fielded</th>
<th>Upgrade</th>
<th>Upgrade</th>
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<tbody>
<tr>
<td>T1-4</td>
<td>G</td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td>T1-5</td>
<td>G</td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td>T1-6</td>
<td>Y</td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td>T1-7</td>
<td>Y</td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td>T1-8</td>
<td>Y</td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td>T1-9</td>
<td>R</td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td>Future Threats</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Legend**

- **R**: < 50% Probability of Countermeasure
- **Y**: 50-75% Probability of Countermeasure
- **G**: 75-100% Probability of Countermeasure

**AN/ALQ-144A(V)1/3**

- Fielded: Y
- Upgrade: G

**CMWS/ICMD/AIRCMM (per spec.)**

- Fielded: G
- Upgrade: G

**AN/ALQ-212 ATIRCM/CMWS (SIIRCM) (per spec.)**

- Fielded: G
- Upgrade: G

**Notes**

- UH-60, AH-64A/D, OH-58D
- AH-64D, UH-60M, CH-47
- SOA & SEMA

- * Aircraft & Aspect Dependent
- ** Flare Trajectory Dependent
ALQ-156 Missile Warner Limitations on CH-47

- FAR
- Pd
- TTG
- Active System
- Diminishing Manufacturing Sources
- Hand off to Jammer
SIIRCM, ATIRCM, CMWS
Component Relationships

AN/ALQ-212 Advanced Threat Infrared Countermeasures (ATIRCM)

AAR-57(V)3/5 Common Missile Warning System (CMWS)/ICMD

Improved Countermeasures Dispenser (ICMD)
CMWS and ATIRCM Operational Concept

- Common Missile Warning and Improved Countermeasure Dispensers for Helicopters
- Directable Active Jamming for Helicopters

- Missile Warning
- Pointing and Tracking
- Laser and/or Lamp Jamming
- Decoys
How ATIRCM Works

Rapid Response Timeline

- Acquisition FOV
  - Sized for High Probability of Acquisition within airframe integration tolerances/under aircraft flexure

- Tracker FOV
  - Sized for Post Burnout Sensitivity

- Laser Beamwidth
- Pointing Accuracy
- Lamp Beamwidth

- Architecture Meets Probability of Countermeasure (P_CM) Requirement

- Start Track
- Declare
- Launch
- Handoff
- CMWS
- ATIRCM
- Slew
- Acquire Missile
- Boresight
- Change FOV
- Correlate with CMWS
- Track Missile and Jam
- IR Intensity
- UV Intensity
- Tracking Error
- Missile Miss
- UV
Purpose

1. Respond to Acting SecArmy Directive
2. Provide current ASE status for OIF / OEF
3. Request approval of proposed acceleration strategy

"I want to see, as soon as possible, a plan to equip all our helicopters in Iraq and Afghanistan with the most effective defensive systems we have in development or procurement. Affordability is not the constraint for such a plan-- only what is doable considering technology, production, acquisition, and application."

Hon RL Brownlee, Acting Secretary of the Army – 7 Nov 03
SIIRCM System Components

ATIRCM / CMWS U.S. Host Aircraft Platforms

<table>
<thead>
<tr>
<th>Army</th>
<th>Navy</th>
</tr>
</thead>
<tbody>
<tr>
<td>MH-47E</td>
<td>AH-64A/D</td>
</tr>
<tr>
<td>MH-60L</td>
<td>UH-60A/L</td>
</tr>
<tr>
<td>MH-47D</td>
<td>CH-47D</td>
</tr>
<tr>
<td></td>
<td>C-12R/T</td>
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<tr>
<td></td>
<td>RC-12</td>
</tr>
<tr>
<td></td>
<td>UC-35</td>
</tr>
<tr>
<td>Intn'l</td>
<td>MH-60R</td>
</tr>
<tr>
<td></td>
<td>UK Apache</td>
</tr>
<tr>
<td></td>
<td>UK RMPA</td>
</tr>
<tr>
<td></td>
<td>ASTOR</td>
</tr>
</tbody>
</table>

Improved Countermeasures Dispenser (ICMD)

AN/ALE-47 Sequencer (GFE)

Smart Dispensers

Jam Head Control Unit (JHCU)

Electronic Control Unit (ECU)

Electro-Optic Missile Sensors (EOMSS)
# Potential IRCM Component Configuration Options

1. **Standard IRCM A-Kit Only**

2. **CMWS / ICMD* - CH-47 & Fixed Wing**

3. **CMWS / ICMD / ALQ-144 IRCM Set – UH-60 / AH-64**

4. **CMWS / ICMD / ATIRCM** Post FY07
   - *ICMD = Improved Countermeasures Dispenser*
   - **Upgraded Multi-band Laser, with Integrated Jam Head and Control Unit**

## CMWS with ICMD

**Option 2**
- Common Missile Warning System (CMWS)
  - Four sensors and one ECU
  - Currently in production
- Improved Countermeasures Dispenser (ICMD)
  - ALE-47 Sequencers and eight Dispensers
  - ICMD in production
  - Compatible with advanced flares
- For CH-47D

## CMWS with ICMD and ALQ-144

**Option 3**
- Common Missile Warning System (CMWS)
  - Same as Option 2
- ICMD – 2 ALE-47 + 3 Dispensers
  - Same as Option 2
- ALQ-144A(A)3
  - Maintain / upgrade existing Jammer
  - Compatible with advanced flares
- For UH-60 & AH-64

## CMWS with ICMD and New ATIRCM

**Option 4**
- Common Missile Warning System (CMWS)
  - Same as Option 2
- ICMD
  - Same as Option 2
- Multi-band Laser, Jam Head and Control Unit
  - Compatible with advanced flares and CMWS Sensors
- Upgrade to Option 2 & 3
# ATIRCM Size, Weight, and Power

## Dimensions
- **5.32" D Flange**
- **3.7" D Body**
- **9.1" W x 5.5" H x 10.7" D**
- **9.7" W x 13.8" H x 9.9" D**

## Components
- **EOMS**
- **ECU**
- **JHCU**
- **IRJL**
- **IRJH**
- **Sequencer**
- **Smart Dispenser**

## Specifications

<table>
<thead>
<tr>
<th>Component</th>
<th>AH-64/H-60 Config.</th>
<th>Weight (each)**</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECU</td>
<td>1</td>
<td>16 lbs</td>
<td>400 Hz</td>
</tr>
<tr>
<td>EOMS</td>
<td>4</td>
<td>2.8 lbs</td>
<td>Powered by ECU</td>
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<tr>
<td>JHCU</td>
<td>1</td>
<td>11.6 lbs</td>
<td>300W</td>
</tr>
<tr>
<td>IRJH</td>
<td>1</td>
<td>41.3 lbs</td>
<td>1028W**</td>
</tr>
<tr>
<td>IRJL</td>
<td>1</td>
<td>23.3 lbs</td>
<td>250W**</td>
</tr>
<tr>
<td>SEQ</td>
<td>2</td>
<td>3.8 lbs</td>
<td>N/A</td>
</tr>
<tr>
<td>SD</td>
<td>3</td>
<td>7 lbs</td>
<td>Powered by SEQ</td>
</tr>
</tbody>
</table>

*No External Cooling Required*

- 616W for 50 msec when firing 4 squibs
- ** when jamming
- *** As Measured - 5/21/03
Apache Missile Warning and Dispensing
Weight/Power Changes to Baseline

<table>
<thead>
<tr>
<th>Component</th>
<th>AAR-57 Configuration</th>
<th>Weight (Each)</th>
<th>Total Weight</th>
<th>Power 400 Hz</th>
<th>Power 28 VDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECU</td>
<td>1</td>
<td>16.0 lbs</td>
<td>16.0 lbs</td>
<td>175W</td>
<td>103W</td>
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<tr>
<td>EOMS</td>
<td>4</td>
<td>2.8 lbs</td>
<td>11.2 lbs</td>
<td>Powered by ECU</td>
<td></td>
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<tr>
<td>Sequencer</td>
<td>2</td>
<td>3.8 lbs</td>
<td>7.6 lbs</td>
<td>N/A</td>
<td>N/A*</td>
</tr>
<tr>
<td>Smart Dispenser</td>
<td>3 (1 chaff, 2 flare)</td>
<td>7.0 lbs</td>
<td>21.0 lbs</td>
<td>Powered by SEQ</td>
<td></td>
</tr>
<tr>
<td>Missile Warning Control</td>
<td>1</td>
<td>2.0 lbs</td>
<td>2.0 lbs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dispenser Control</td>
<td>1</td>
<td>2.6 lbs</td>
<td>2.6 lbs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A-Kit Mechanical</td>
<td>1</td>
<td>~19.0 lbs**</td>
<td>~19.0 lbs**</td>
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<td></td>
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<tr>
<td>A-Kit Electrical</td>
<td>1</td>
<td>~15.0 lbs**</td>
<td>~15.0 lbs**</td>
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<tr>
<td>Existing Weight Removed</td>
<td>Chaff dispenser, wiring, switch, sequencer, programmer</td>
<td>~ (25 lbs)</td>
<td>~ (25 lbs)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Estimated Weight Impact 69.4 lbs

*616W for 50 msec when firing 4 squibs
**estimate based on MH-60K/CMWS only
Advanced IR Countermeasure Munitions (AIRCMM)

- Characteristics: The AIRCMM solution consists of a combination of three decoys: the M206 (existing), M211 (new development), and M212 (new development). The AIRCMM solution is employed in the ICMD with a maximum load of 30 decoys per dispenser. Each decoy is approximately 1" x 1" x 8" (Army standard), and the AIRCMM solution of three decoys weighs a total of 1.55 lb (0.43 lb for M206, 0.66 lb for M211, and 0.46 lb for M212). The AIRCMM is an ACAT III development program. This advanced decoy solution complements the active jamming capability of the ATIRCM/CMWS.
• AIRCMM Flares in operational use since 01
• Vendor Production Rates increasing to meet demand
• AIRCMM Flares Shipped to support OIF/OEF
• PEO Ammo manages AIRCMM buys for the services
Our Army at War: Relevant and Ready

ATIRCM/CMWS Test Efforts
# Previous Test Events Summary

<table>
<thead>
<tr>
<th>TEST</th>
<th>DATES</th>
<th>THREATS</th>
<th>LAUNCH RANGE(S)</th>
<th>ALT(S)</th>
<th>SPEED</th>
</tr>
</thead>
<tbody>
<tr>
<td>DT PFAS</td>
<td>JAN-FEB 01</td>
<td>N/A</td>
<td>N/A</td>
<td>100&lt;500FT</td>
<td>HOVER</td>
</tr>
<tr>
<td>CTMF (ACR) 1</td>
<td>MAR-APR 01</td>
<td>T1-4/8/9</td>
<td>1.5-4 KM</td>
<td>&lt;500FT</td>
<td>0-80KTS</td>
</tr>
<tr>
<td>CAPTIVE SEEKER</td>
<td>MAY 01</td>
<td>T1-1/2/4/6/8/9</td>
<td>1-5 KM</td>
<td>100-1000FT</td>
<td>0-100KTS</td>
</tr>
<tr>
<td>SLED TEST</td>
<td>JUL 01</td>
<td>AIM9*</td>
<td>1.5+KM</td>
<td>&lt;200FT</td>
<td>HOVER</td>
</tr>
<tr>
<td>PDU PFAS</td>
<td>AUG 01</td>
<td>N/A</td>
<td>N/A</td>
<td>100&lt;500FT</td>
<td>0-80KTS</td>
</tr>
<tr>
<td>DTMF</td>
<td>FEB-MAR 03</td>
<td>T1-4/7/8</td>
<td>3+KM</td>
<td>3000FT</td>
<td>400KTS</td>
</tr>
<tr>
<td>M&amp;S (ARMY SPT)</td>
<td>OCT 03</td>
<td>T1-1/4/7/8</td>
<td>750M-5KM</td>
<td>150/300FT</td>
<td>1-120KTS</td>
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</tbody>
</table>

* Standard Sled Track motor. System was used in test mode for the test – threat type not relevant
Recent / Upcoming Test Events

- BIT Validation in progress (TFT)
- CFT (Contractor Flight Test)
- Eglin Live Fire Test
- Dry-Run RDT to be preformed at BAE (Risk Reduction)
- RDT (Reliability Demonstration Test)
- ACR #2 (Aerial Cable Range)
- Operational Testing
- Captive Seeker #2 (SOAR)
Eglin CMWS Missile Signature Test (MST)

- **The test objectives of the CMWS MST are:**
  - Collect missile signature data to build confidence in the modeling and simulation tools for cases below 500 ft.
  - Collect CMWS system data to verify improved $P_D$ performance with updated V4.02 algorithm

- **Method**
  - The test objectives will be met by firing a number of different threats from various ranges at a single heat source
  - Three (3) CMWS Test Instrumentation Equipment (TIEs) will be deployed at various altitudes in order to collect performance data
  - An EOMS Data Acquisition Units (DAU) will be deployed to collect UV Imagery Data to increase current missile signature database
  - UV/IR Radiometric Instrumentation will be deployed for model comparison and verification
Eglin Test Results

• Concerns
  – Low altitude performance
  – LRU malfunctions

• Response
  – Additional live fire testing at altitudes of concern
  – Software / hardware revisions to accommodate harsh aircraft environment

• Results
  – **Live fire tests**: excellent low altitude (below xxx ft.) performance – successfully responded to 23 of 24 (96%) threat opportunities (exceeding ORD requirements)
  – **CMWS performance**: over 212 cumulative operating hrs on 6 production systems with zero failures to date; includes 84.4 hrs on operating aircraft

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Excellent CMWS / ICMD low altitude performance
Our Army at War: Relevant and Ready

CMWS
Integration Efforts
Platform Integration Efforts

• PM AES working aircraft integration for 15 platform configurations

• Each QRC effort has been compressed from 2 years to 6-9 months

• Efforts support multiple platforms and users

• First Aircraft to Field – Nov 04

• Each integration effort similar to a “Mini-Program”
# Platform Types Under CMWS QRC Development Integration

<table>
<thead>
<tr>
<th>Platform</th>
<th>Effort</th>
<th>Status</th>
<th>Fielding AWR</th>
</tr>
</thead>
<tbody>
<tr>
<td>UH-60L</td>
<td>QRC</td>
<td>Awaiting fielding airworthiness release</td>
<td>Oct 04</td>
</tr>
<tr>
<td>UH-60A</td>
<td>QRC</td>
<td>Awaiting fielding airworthiness release</td>
<td>Oct 04</td>
</tr>
<tr>
<td>CH-47D</td>
<td>QRC</td>
<td>Awaiting Fielding Airworthiness Release</td>
<td>Oct 04</td>
</tr>
<tr>
<td>AH-64A</td>
<td>QRC</td>
<td>Kick Off Meeting scheduled 28 Sep 04</td>
<td>Aug 05</td>
</tr>
<tr>
<td>AH-64D</td>
<td>QRC</td>
<td>Kick Off Meeting scheduled 28 Sep 04</td>
<td>Aug 05</td>
</tr>
<tr>
<td>C-12T</td>
<td>QRC</td>
<td>Aircraft scheduled for Mod-Install</td>
<td>Dec 05</td>
</tr>
<tr>
<td>C-12R</td>
<td>QRC</td>
<td>Aircraft Undergoing Testing</td>
<td>Nov 04</td>
</tr>
<tr>
<td>RC-12</td>
<td>QRC</td>
<td>Integration and Development underway</td>
<td>Aug 05</td>
</tr>
<tr>
<td>C-37</td>
<td>QRC</td>
<td>RFP TO Gulf Stream, Preliminary Evaluations, MIPR to USAF</td>
<td>Aug 05</td>
</tr>
<tr>
<td>UC-35</td>
<td>QRC</td>
<td>Kick Off Meeting 21 Oct 04</td>
<td>Apr 05</td>
</tr>
</tbody>
</table>
Platform Types Under ASE Development Integration (Cont)

<table>
<thead>
<tr>
<th>Platform</th>
<th>Effort</th>
<th>Status</th>
<th>Fielding Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>AH-64D, BLK III</td>
<td>Regular Army</td>
<td>Software Development Efforts to Begin in Nov 04, ICD developed</td>
<td>Feb 07</td>
</tr>
<tr>
<td>CH-47F</td>
<td>Regular Army Total Integration</td>
<td>TIMs underway with PM</td>
<td>Mar 06</td>
</tr>
<tr>
<td>UH-60M</td>
<td>Regular Army Total Integration</td>
<td>TIMs underway with PM</td>
<td>Mar 06</td>
</tr>
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</table>