Persistent Maritime Unmanned Aircraft Systems Program Office Overview

AUVSI Media Briefing
August 2010

CAPT Bob Dishman
Program Manager, PMA-262
UAS Family of Systems
BAMS-D ≠ BAMS UAS ≠ Global Hawk

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited, 10-1136, 23 Aug 2010
Broad Area Maritime Surveillance – Demonstrator (BAMS-D)
BAMS-D Integrated System

- AIR VEHICLE
- LAUNCH & RECOVERY ELEMENT (LRE)
- MISSION CONTROL ELEMENT (MCE)

• Other system modifications
  • INMARSAT
  • Dual Band CDL
  • LR-100 ESM System
  • Automatic identification System (AIS)

Launch and Recovery, Mission Planning and Backup Control
Mission Planning, Command and Control, Communications Monitoring and Image Dissemination
Maritime Surveillance with “Integrated Sensor Suite +”

- **EO/IR Imagery**
  - Range: to 100nm
- **NRL AIS (M-ID)**
  - Range: Horizon ~300 nm @ 60k'
- **Inverse Synthetic Aperture Radar**
- **Maritime Search (MS)**
  - 15,000 sq.k.m./hr
  - 34 to 110 nm
  - 10 m Range Res.
- **LR-100 ESM**
  - Range: Horizon ~300 nm @ 60k'
- **Moving Target Acquisition (MTA)**
  - 1-2 Range Bars
  - 6° Scan Cue for ISAR
- **ISAR**
  - +/-45 deg Squint
  - 3 Resolutions
- **EO/IR**
  - Range: to 100nm
BAMS-D Operational View (OV-1)

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Recent Accomplishments
(As of 13 August 2010)

• OCONUS operations continuing in CENTCOM AOR
  • Combat Missions to date: 151 sorties / 2800.5 flight hours

• On-going activities:
  • BAMS-D Block 10 “Schoolhouse” activities at Pax River will begin 1 Sept.
  • Testing and experimentation will continue on “available opportunities”

• FY09 Flights (Totals): 99 sorties / 1217.8 flight hours
• FY10 Flights (Totals): 103 sorties / 1732.4 flight hours
• Program Totals: 341 sorties / 4253 flight hours
Airframe Comparison
BAMS ≠ BAMS-D

RQ-4A (BAMS-D)
Only 9 aircraft built
2,000 lb payload
10 kVA electrical power

MQ-4C (BAMS UAS)
3,000 lb payload
30 kVA electrical power
Continuous sensor operation

BAMS airframe features increased payload, de-icing capability and hail/birdstrike protection

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Comparative Persistent UAS Capabilities
(Maritime Mission)

**BAMS D**
- Radar: SAR / ISAR / Maritime Search (Single side, no operation in turns)
- EO/IR: +/- 15 deg
- ESM, AIS
- Airspeed: 340 KTAS
- Endurance: 28 hrs

**BAMS UAS**
- Radar: SAR / ISAR / Maritime Search: 360 deg
- EO/IR: 360 deg
- ESM + SEI, AIS
- Communications Relay
- Mission Radius: 2000 NM
Comparative Persistent UAS Capabilities

(Maritime Mission)

GH Block 20

- EO/IR/SAR:
  - Enhanced Integrated Sensor Suite (EISS)
  - 50% increase in range / resolution
- Communications Relay (BACN – 2 Blk 20’s only)

BAMS UAS

- Radar: SAR / ISAR / Maritime Search: 360 deg
- EO/IR: 360 deg
- ESM + SEI, AIS
- Communications Relay
- Mission Radius: 2000 NM
Comparative Persistent UAS Capabilities
(Maritime Mission)

GH Block 30
- Airborne Signals Intelligence Payload (ASIP)
  - Multi-INT: ELINT/COMINT (detect/id/locate)
- EISS

SIGINT: 360°
Radar: ± 45°
EO/IR: 15°

BAMS UAS
- Radar: SAR / ISAR / Maritime Search: 360 deg
- EO/IR: 360 deg
- ESM + SEI, AIS
- Communications Relay
- Mission Radius: 2000 NM

ESM: 360°
Radar: 360°
EO/IR: 360°
Comparative Persistent UAS Capabilities
(Maritime Mission)

GH Block 40
- Radar: Multi-Platform-Radar Technology Insertion Program (MP-RTIP)
  - Simultaneous SAR/GMTI

Radar: ± 45°

BAMS UAS
- Radar: SAR / ISAR / Maritime Search: 360 deg
- EO/IR: 360 deg
- ESM + SEI, AIS
- Communications Relay
- Mission Radius: 2000 NM

ESM: 360°
Radar: 360°
EO/IR: 360°
Broad Area Maritime Surveillance (BAMS) Unmanned Aircraft System (UAS)
BAMS ≠ Global Hawk
BAMS UAS Program Status

- Preliminary Design Review (PDR) complete
- Progressing towards Critical Design Review
- Meeting all Acquisition Performance Baseline (APB) parameters
- Pursuit of joint synergies with Global Hawk
- Maintaining cost and schedule targets
BAMS UAS OV-1

Narrowband SATCOM

Wideband SATCOM

Global Positioning System

Joint Navy HQ(MOC)/Allied/Coalition Battle Management Nodes

Joint Allied/Coalition Exploitation Sites

Maritime Forces

Teleport

Maritime Forces

Radar, ESM & AIS

BAMS Payload Data

BAMS Air Vehicle C2

Defense Info System Network/Global Info Grid

Airspace Control Authority

Airspace Communications

Airborne Communications Relay

BAMS UAS Nodes (UA, MOB/FOB MCS)

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited. 09-983
Integrated Maritime Patrol Concept

Transformational Mixed Force: Effective, Efficient Mission Capability Tailored to the Warfighter’s Requirements

Responsive Multi-Mission
- Robust Sensor Suite
- Cue to Kill
- Onboard Fusion
- Large Weapons Payload

Persistent ISR
- Long Dwell Sensor Suite
- C4I Network Node (FORCEnet)
- Combat Info from MCS
- Data Available to Intel Centers
- High Altitude, Fast, Reliable

Navy Maritime Patrol Missions
- ASW Kill
- ASW Track
- ASW Search
- SuW Kill
- SuW Track
- SuW Detect
- Maintain Maritime COP
- FRP Tripwire
- ISR in Support of IPE
World Wide Presence

IOC: One forward based unit with sufficient assets, technical data, training systems, and enough spares and support equipment to support one persistent ISR orbit.

FOC: Full operating capability supports continuous orbits for worldwide access from five simultaneous theaters.

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited. 4 June 2008; 08-554
BAMS UAS Air Vehicle Configuration

**MQ-4C BAMS UAS Specs**

- **Length**: 47.6 ft
- **Wingspan**: 130.9 ft
- **Max Takeoff Wt**: 32,250 lb
- **Cruise Speed (KTAS)**: 330 knots
- **GTOW Rate of Climb (SL)**: 2,800 fpm
- **Operational Ceiling**: 60,000 ft
- **Max Un-refueled Range**: >9,550 nm
- **Endurance**: >28 hr

**MTS-B EO/IR Sensor**
- **360° Field of Regard**
- **Auto-Target Tracking**
- **Hi Res EO/IR at Multiple FOVs**
- **Multi-Mode Color Video**

**Rolls-Royce AE3007H**
- 23+ Million hrs
- 8,500 lb Thrust (SL)

**Advanced Mission Management System (AMMS)**
- Onboard Server
- Data Correlation
- Payload & Bandwidth Control

**Due Regard Radar**
- Safe Separation

**Merlin ESM**
- **360° FOR**

**External Provisions**

- **Space, Weight & Power**
  - **Internal Payload**: 3,200 lb
  - **External Payload**: 2,400 lb
  - **Power AC**: 30.0 kVA
  - **Power DC**: 450 A
  - **Backup Battery Power**: 45 min

- **Back-up Radar**
- Safe Separation

- **9” CDL Dish Antenna** (Port and Starboard)

- **Metallic Fuselage**

- **De-icing**

- **Graphite Empennage**

- **Hail and Bird Strike Resistance**

- **Graphite Wing**

- **Automatic Identification System (AIS)**

- **Graphite Satcom**

**BAMS UAS Air Vehicle Configuration**

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SAR Over Land
SAR Over Water
### BAMS UAS Overview

#### Subsystems
- Improved ECS/LCS Cooling
- Upgrade to 30 KVA Generator
- New 270 V power convertor
- PDC redundancy improvements
- DC power tray improvements

#### Avionics
- Improved power distribution units
- Ethernet hub/switch replacement
- LN-251 replace LN-100s
- KN-4074 PGE
- IMMC refresh
  - G4V Viper processors
  - DO-178B

#### Engine
- Bleed Air Engine Inlet Anti-icing
- Environmental delta qualifications
- FADEC SW changes
- Additional BIT
- Accessory gear box improvements

#### Safety
- Fire Sensing
- Fire containment, resistive materials and suppression bottle
- Lightning protection
- Crash recorder

#### Structure
- Wing Strength improvements for gust loads
- Forward fuselage strength for sensors
- Radomes and fairing all re-lofted
- Fixed fairing for EO/IR

#### Leading Edges
- Deicing System
- Hail and bird-strike resistance

#### Radomes
- Hail and bird strike resistance
- Lightning protection
- WB SATCOM; X band/Ka band

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Air Worthiness

- BAMS leading the way with several UAS firsts:
  - Ice Protection System
    - Combination of TMEDs and heater patches
  - DO-178B Compliant
    - DoD-wide airworthiness software certifications
  - Due Regard Radar
    - Sense and avoid capability for non-cooperative targets

- Redundant flight control and communication systems
Air-to-Air Radar Subsystem

- Provides detection and tracking capability to enable safe flight in national and international airspace
- Description: Electronically scanned, air cooled, Ku band radar
- Pilot in the loop response to contacts
- Growth to autonomous capability
Preliminary MOB MCS Concept
BAMS UAS Program Schedule

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- Integrated Test CT/DT/OT
- OPEVAL
- OTRR

Schedule Version 3.1 25 Mar 10

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BAMS UAS Progress to CDR

- Eleven (11)* subsystem/segment Critical Design Reviews (CDR) to be held leading up to the System CDR (2QFY11)
  - To date, 4 segment/subsystem CDRs have been completed:
    - Electronic Support Measures (ESM)
    - Wideband Command/Control Communications System (WCCS)
    - Advanced Mission Management System (AMMS)
    - BAMS UAS Airframe

* Does not include Air-to-Air Radar Subsystem (AARSS)
BAMS UAS Airframe Production

- Forward fuselage tooling complete and installed at the Moss Point Manufacturing Facility.
  - BAM UAS forward fuselage construction (jig load) scheduled to begin 1 September 2010.
Takeaways

• BAMS UAS is key to the Integrated Maritime Patrol Concept

• BAMS UAS program will deliver a persistent maritime ISR capability never before available to the fleet and warfighter

• BAMS-D delivering maritime ISR to the fleet today

• Pursuing key joint efficiencies to maximize operational effectiveness and affordability

BAMS-D ≠ BAMS UAS ≠ Global Hawk
Questions?