Program Overview

Special Operations Forces Industry Conference 2012

“Deeds Not Words”
TAPO Charter

- Responsible for life-cycle program management of the Army Special Operations Aircraft (ARSOA) fleet

A/MH-6M, MH-60L/K/M, MH-47G

- Single customer focus: 160th SOAR(A)
- Involved from Concept Refinement through Disposal
- Provide continuous Sustainment and Modernization
- Support growing rotorcraft fleet

- Manage the USSOCOM RW Aviation NVD and AASE Programs
  - Joint responsibility
  - Services Air Force Special Operations Command and Navy

- Item Manager for all Special Operations Aviation (SOA) unique components and equipment
The Army Special Operations Aviation Command (ARSOAC) provides command and control, executive oversight and resourcing of USASOC Aviation assets and units in support of National Security objectives.
Lean, responsive, and adaptable enterprise focused on equipping the soldiers of the 160th SOAR(A) with the most capable rotary wing aircraft in the world.
Portfolio Overview

**Platform Fielding / Upgrades**

- **MH-60L**
  - Production / Fielding

- **MH-60K**
  - Resolving Tech Issues

- **MH-47G**
  - Reconstitution
  - DAFCS Integration
  - Electrical Upgrade
  - “New Build” Machined

- **MH-60M**

**Integrated Mission Systems**

- **Aircraft Survivability**

- **Avionics**

**Sensors and Weapons**

- **Endstate:** 3 RW Aircraft Configurations
- **Common Mission Suite**
  - Common Avionics (CAAS)
  - Q2 FLIR System
  - Multi-Mode Radar
  - Advanced ASE (SIRFC / IR / HFIS)
  - Future DVE Integration

- **MH-60M**

- **MH-47G**

- **MH-6M**
  - Crashworthy Seat
  - 3.0 Block Upgrade
  - Rotor & Structure
  - Cockpit & Avionics

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  - Cockpit & Avionics
MH-47G

Rebuild Airframe Structure (New Elect. Wires/ Hydraulic Lines)

Standardize Aircraft Max Gross Wt (54,000 lbs)

Enhanced Air Transportability Provisions

CAAS Cockpit

Cockpit Structure New Build

Vibration Reduction (Airframe Stiffening)

CMWS & SIRFC

Refueling Probe

Expansion Left-FWD Gunner’s Window

New FLIR

Left-Aft Gunner’s Window

Dual Mode Searchlight (IR & White Light)

Standardized Engines With IES-47 Suppression

Component Recapitalization

Multi-Mode Radar

Improved Bilge Paint

Standardized Extended Range (Fat Tank) Configuration

Legend:

CH-47F Common

SOF Provided

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MH-47G

**SLEP**
- Remanufactures a combination of CH-47D and MH-47E airframes into MH-47G configuration
  - Production Complete
- Block Upgrade strategy to integrate SOF unique modifications
  - Includes Block 2.0-2.3
  - Block 2.2 includes accelerated integration of DAFCS
  - Block 2.3 includes:
    - Digital Intercom
    - 3rd/4th ARC-231
    - AC/DC Pwr Upgrades

**New Build**
- Completes NRE to integrate MH-47G SOF unique mods into a machined frame
  - Leverages CH-47F
  - Leverages Canadian H-47
- Common system configuration with latest fielded aircraft
- Produces 8 New Build aircraft
- Allows for future combat loss replacement

**Boeing**
- Remanufacture fuselage
- Splices new nose (41 Section)

**Summit Aviation**
- Install hydraulic tubing
- Limited Over and Above repair
- Prep for shipping and storage

**SOFSA**
- Install Engines and Transmission/Dynamics
- Conduct 2.1/2.2 modifications
- Install SOF unique components
- Ground / flight test
- Unit acceptance

**Reconstitution**
- 160th Delivery
  - Rapid response to aircraft loss
  - Aircraft equipped with latest modifications
  - Cost savings to command
  - Maximum flexibility

**UNCLASSIFIED**
### MH-47G Modernization Upgrades

<table>
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<tr>
<th><strong>Advanced Parallel Actuator System (APAS)</strong></th>
<th><strong>Engine Control Unit (ECU)</strong></th>
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| • Replaces existing Flight Control Pallets at STA 120 and 95  
  • Improved safety (i.e. Pilot situational awareness, Redundant systems, Improved control laws)  
  • Enable pilots to use maximum performance and increase productivity | • Increased Reliability and Maintainability  
  • Improved troubleshooting and upgrade capability  
  • Common with CH-47 fleet  
  • Currently fielding -02 |

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<tr>
<th><strong>Advanced Boresight (ABE)</strong></th>
<th><strong>Side Facing Gunner’s Seat (SFGS)</strong></th>
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| • Enables more efficient alignment of aircraft sensors and nav systems  
  • Reduces O&M cost  
  • Common STTE with MH-60 fleet | • Integrates 4xMartin Baker MFOS Seats  
  • 8G,300# Occupant Crash Load (All Axis)  
  • Ballistic tolerant  
  • Decreases fatigue level of the aft crew member and mitigate associated safety and operational risks |

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<th><strong>Advanced Chinook Rotor Blade (ACRB)</strong></th>
<th><strong>Engine Inlet Filter</strong></th>
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| • Increase lift approx 2,000 lbs @ 4K/95F  
  • Manufacturing and repair improvements  
  • Rotor Hub is common to current blades  
  • Common with CH-47 Fleet  
  • Fielding begins FY16 | • T55 Engine Air Particle Separator (EAPS) does not meet SOAR needs (i.e. power impact, weight, maintenance)  
  • Exploring lightweight, low-drag, little-to-no power impact T55 engine inlet filtration system to limit the ingestion of sand, rock and dust  
  • Similar solutions exist (UH-60M) |
MH-60M

UH-60M Baseline Aircraft

Comm / Identification Suite:
- ARC-201D
- Digital ICS
- APX-118 IFF
- 4x ARC-231 (2 SATCOM Capable)
- ARC-220
- MTX Blue Force Tracker

DAP Weapons:
- LASS Wing
- M230 30 mm Chain Gun (up to 2)
- M299 Hellfire (up to 16)
- M261 Rockets (up to 4 19-shot pods)
- M134 Miniguns (2)

Wide Chord Blades

Dual Digital AFCS

Rotor Brake

ALQ-144

CMWS / ICMD (4th Bucket)

YT706-GE-700 Engine

35 kVA APU Generator

Structural Mods to increase GW to 24,500 lbs

VMEP

60 kVA Main Generators

35 kVA APU Generator

Fuel Management Suite:
- Internal 185/200 Gallon Auxiliary Tanks
- Fuel Dump

Legend:
UH-60M Common
SOF Provided

Improved MonoHUD

Aerial Refueling Probe

APN-174B MMR

ZSQ-2 EOSS (FLIR)

CAAS Cockpit

Active Vibration Control

Electric Rescue Hoist

Structural Mods to increase GW to 24,500 lbs

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Integration Methodology

Structural Design
- Increase GW to 24,500 lbs
- Structural enhancements to base airframe and dynamics analysis

Propulsion
- Commercial Off the Shelf Engine
- FADEC Software Design

Mission Equipment
- Commonality with MH-47 Fleet
- Upgrades 60kVA Generators

Special Operations Forces Support Activity

Integrated Design and Production
- Sub-structure and Mission Equipment
- Production of 72 MH-60M Aircraft

Test, Evaluation, and Airworthiness
- Government executed DT
- Airworthiness via AED, AMRDEC
MH-60M Production and Fielding

SOFSA GOCO (LMCO) builds MH kit 1 year prior to install

TAPO procures 61 GFE components and provides to SOFSA Warehouse ISO Production and Provisioning

CAAS

Hoist

YT 706 Growth Engine

UH-60M "Baseline" Aircraft Deliveries

UH-60M LRIP - Fort Rucker
UH-60M New Production - Sikorsky Aircraft

13 month Modification

• GW increase to 24,500 lbs
• Growth Engine Integration
• SOF Mission Equipment

SOFSA GOCO (LMCO) Lexington, KY

Depopulate UH-60M unused components and return to UHPO

Field aircraft to 160th SOAR(A) FY11-FY15

UH-60M

MH-60M

MH-60L/K

Fly A/C to DeMod Facility and Harvest SOF components; A/C turn-in FY12-15

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Integration Methodology

Aircraft / Shell Induction

Station 0

Station 1

Station 2

Station 4

Station 3b

Station 3a

Flight Line Support

Ready for Delivery

Approx 12 months start-to-finish
A/MH-6M Block 3.0 Upgrade

**Purpose**

1. Safely extend the usable life of the fleet and keep the aircraft in the fight until a replacement is available.
2. Restore structural, performance, and safety margins for the aircrews.
3. Provide an acceptable level of SA in the cockpit and accommodations for rapid integration of future capabilities.

**Avionics Upgrades**

An avionics upgrade to replace obsolescent components and provide basic SA (NDI/COTS) (*Not a development program for state of the art mission processors, displays, or cockpit software*)

- SRTV Rover 6 / Vortex
- Digmap Processor
- CAAS Light (CASSL)
- Legacy CMS Cockpit

**Main Rotor, Tail Rotor, FADEC**

A main/tail rotor drive train and engine control replacement effort to reduce airframe loads and restore safety and performance margin (*Not a Government sponsored rotor blade development program*).

- Improved Rotor Systems
- Dual Channel FADEC

**Airframe Upgrades**

An airframe structural modification that address structural failures due to high intensity, high gross weight operations, and a decade of battle damage (*Not a complete redesign of the basic airframe features*)
Mission Equipment (MH-47G/MH-60M)

**Requirements**
- Aircraft Survivability Equipment
  - Multi-Spectral Threat
  - Detect and Defeat
- Sensors and Weapons
  - Navigation
  - Terrain Avoidance
  - Targeting
- Avionics and Software
  - Situational Awareness
  - Digital Connectivity
  - Airspace Management

**Programs**
- Radar (RF)
- Infra-Red (IR)
- Laser
- Small Arms/RPG
- Ballistic Protection
- Electro-optic
- FLIR
- Multi-Mode Radar
- Degraded Visual Environment (DVE)
- Common Avionics Networking
- Navigation

**End State**
- Integrated Advanced ASE
- Common Sensor/Weapons Suite
- Common Cockpit

**Common Mission Suite – MH-60 and MH-47**
Mission Equipment (A/MH-6)

Requirements

Aircraft Survivability Equipment
- Multi-Spectral Threat
- Detect and Defeat

Sensors and Weapons
- Navigation
- Terrain Avoidance
- Targeting

Avionics and Software
- Situational Awareness
- Digital Connectivity
- Airspace Management

Programs

Ballistic Protection
- POM Issue for LIRCM

FLIR
- Degraded Visual Environment (DVE)

Common Avionics
- Networking
- Navigation

End State

Light Weight
- ASE

AN-ZSQ-3 (V2)
- LRF/LD Capability

CAAS
- Light Cockpit

Common Mission Suite – Attack and Assault

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Advanced Aircraft Survivability (Roadmap – Past, Present and Future)

Radio Frequency Countermeasures (RFCM)
- RWR
  - APR-39 / APR-44
- Pulse Jammer
  - ALQ-136
- CW Jammer
  - ALQ-162

Infrared Countermeasures (IRCM)
- CMWS
- CIRCM
- IRSS
  - IES-47
  - UES-60
- ROSES
- AIRCMM

Advanced Aircraft Survivability Equipment (AASE) Suite

CORE = SIRFC LRU-1

GOALS
- Integrated ASE
- Multi Spectral Sensor Fusion
- Threat Correlation
- Threat Geolocation
- Coordinated Countermeasures
- Networked EW

Legend
- PAST
- PRESENT
- FUTURE

HFIS
MITAS/TBPS
AOBPS
Steel BPS

Unguided Threat Protection

Unmet Reqts
- A/MH-6 IRCM/HFI

Laser Threat Detection
- AN/AVR-2A Laser Detecting Set
Advanced Aircraft Survivability (Present)

- AN/AVR-2B
- MH-47 Infrared Exhaust Suppressor (IES)
- Reduced Optical Signature Emissions System (ROSES)
- Aircraft Occupant Ballistic Protection System (AOBPS)
- Suite of Integrated Radio Frequency Countermeasures (SIRFC)

SEPARATE ASE SYSTEMS
(Laser / UV / IR / RF / BPS)
Common Infrared Countermeasures (CIRCM)

- Same functionality as ATIRCM
- Multi-Service fleet-wide solution
- Improved reliability, reduced weight and cost
- The new configuration will include:
  - IR Pointer Tracker(s)
  - Pointer Tracker Control Unit(s)
  - Laser(s)
  - CMWS normal 5-Sensor system configuration

Hostile Fire Indicating System (HFIS)

- Purpose: Detect/Classify/Alert of small caliber, AAA & RPG fires
- Goals: Multi-Spectral (UV IR Acoustic) - Integrated & Geolocated Threat Alerts through SIRFC LRU-1 to Dedicated Electronic Warfare Display (DEWD) for evasive/counter fire actions

MH-60 IES

Replaces legacy HIRSS

Networked EW

- Hardware agnostic multi-spectral ASE sensor data processed, fused, displayed on a digital map, and passed thru threat network
- Multi-spectral threat data is available for display on Non-ASE platforms

Armor Systems

- Purpose: (Pilot Protection) Replaces opaque armor with transparent armor
- Two options: Multiple Impact Transparent Armor System (MITAS); Transparent Ballistic Protection System (TBPS)
- Goals: Reduce weight without sacrificing ballistic protection; improve pilot FOV

MITAS

TBPS
Sensors Roadmap

EO/IR Sensors Systems (1st Generation)

- **Q-16B, & Q-16D**
- **151 & 182 lbs.**

1st Gen Capabilities
- LWIR
- Laser Range Finder
- Laser Designator

Current EO/IR Sensors Systems (2nd Generation)

- **AN/ZSQ-2** (V1 – Assault)
- **AN/ZSQ-2** (V2 – Attack)
- **170 lbs**
- **150 lbs**

2nd Gen Capabilities
- MWIR
- Day CCD
- I2 CCD
- Image Fusion
- Laser Pointer
- Laser Range Finder
- Laser Designator
- Laser spot tracker

Future EO/IR Sensors Systems (3rd Generation)

- Two color engine
  - LWIR/MWIR
  - MWIR/SWIR
- High Definition
- SWIR (see laser spot)
- LIDAR (see thru brownout/foliage)
- Distributed Aperture
- New System for LCR

Leverage S&T, Big Army, Other Service Efforts

Legacy Force

- **Bendix King 1400 Weather Radar**
  - Weather Radar Only
- **Primus 700 Weather Radar**

Current Force

- **AN/APQ-174B Multi-Mode Radar**
  - Weather
  - Terrain Following/Terrain Avoidance (TF/TA)

Future Force

- **AN/APQ-187 Silent Knight Radar (SKR)**
  - Weather
  - Turbulence
  - Air to Air
  - Maritime
  - Single LRU
  - 70 lbs. lighter
  - Digital Radar
  - Anti-Ice Radome
  - Growth Capacity
DVE Architecture

- **DVE Building Blocks**:  
  - Foundation based Aircraft Flight Control System  
  - Symbology and Pilot-Vehicle Interface (PVI)  
  - Display  
    - Heads Up  
    - Helmet Mounted  
    - Flat Panel  
  - Software Architecture (FACE Compliant)  
  - See-thru Sensor Integration  
    - LIDAR/LADAR  
    - 94GHZ Radar  
    - LW IR  
- **Future Integration**:  
  - Dual Band Sensor  
  - Network Controller  
  - DARPA MFRF  
  - Passive TF/TA  
  - SKR SAR mode  
  - Weather  

**Degraded Visual Environment**  
- Increased Survivability  
- All phases of flight  
- Multiple DVE environments  
- Potential tactical enabler  

**Synthetic Vision Backbone**  
- Digital imagery  
- Threat Data  
- Sensor Fusion  
- Sensor Agnostic  

**Sensor**  
- Real Time obstacle detection  
- “See thru”  
- Potential integration with Q2  

**Advanced Aircraft Flight Controls**  
- Digital Flight Control System  
- Advanced Parallel Actuator  
- Modernized Control Laws  

- **SW Devel**  
  - DARPA Avionics Backbone  
- **Display**  
  - AFTD / NVESD HUD flight tests  
  - PM Air Soldier HMD POR  
- **LIDAR**  
  - SOCOM LIDAR tests  
  - NAVAIR H53 LIDAR  
  - USAF Q29 LIDAR  
  - Q2 Integration Study  
- **LW IR**  
  - NVESD “Notch Filter”  
- **Radar**  
  - BAE Blast tests  
  - DARPA TAZ  
  - NVESS  
  - AATD hall CAAS  
  - HALS (PEO AVN QRC)
Common Avionics Architecture System (CAAS)

- Identical Architecture for MH-47/60
  - Single Software / Hardware Configuration
  - Consolidated crew station working groups and integrated roadmap
  - Hardware commonality reduces logistics complexity and footprint
  - Training material, devices, methods shared between platforms

- Fusion center for all data / situational awareness

- Future Synthetic Vision Integration

Full Motion Video  Sensor Imagery  Threat Data  Health Monitoring
Discussion / Questions