Global Hawk Program

Integrity - Service - Excellence

Program Overview

U.S. AIR FORCE

ASC/RAV
Wright-Patterson AFB

11/9/2009
Global Hawk
Global Hawk
Purpose

• Global Hawk is an unmanned, high altitude, long endurance air vehicle
• Supports Department of Defense intelligence, surveillance, and reconnaissance missions with integrated sensors
  – Electro-optical/Infrared Images
  – Synthetic aperture radar (SAR) for all weather
  – Future signals intelligence (SIGINT) capabilities
• Other potential uses for future users
RQ-4A, Global Hawk

**General Design**

- **Specifications**
  - Wing span: 116 ft
  - Length: 44 ft
  - Height: 15 ft

- **Performance Goals**
  - Range: 12,500 nmi
  - Approx. Endurance: 35 hrs
  - Endurance @1200nm: 24 hrs
  - Altitude: 65,000 ft
  - True Airspeed: 335 kts
  - Gross T/O wt: 26,750 lbs
  - Payload wt: 2,000 lbs

- **Payloads:** EO/IR and SAR
- **Comms:** SATCOM: UHF/Ku-Band
  - LOS: UHF and CDL

**Milestones**

- Advanced Concept Technology Demonstration: FY95 - FY00
- 32 months to 1st flight - Feb 98
- AF assumed program responsibility - 1 Oct 98
- Entered EMD – Mar 01
Global Hawk
System Requirements

ORD KPPs
• Endurance - 28 hours
• Airspace Coordination - worldwide employment
• Ground Station - operators perform NRT mission control, monitoring and updates/ modifications
• Satisfy 100% of critical top level IERs

Payload Sensor Modes
• EO/IR
  • Spot
  • Pt Target
  • Wide Area Search
• SAR
  • Spot
  • Wide Area Search
  • GMTI
• Air Vehicle
  • 60,000 FT Altitude
Global Hawk Contractor Team

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Global Hawk
Size and Performance

- Weights
  - Empty 9,200 lbs
  - Payload 2,000 lbs
  - Take-Off Gross 26,750 lbs
- Length 44 ft
- Wing Span 116 ft
- Height 15 ft

- Altitude 65,000 ft
- Approximate Endurance 35 hrs
- Loiter Velocity 342 KTAS
- Range 12,500 nm
Global Hawk AV6 EAFB
**Common Ground Segment**

**GENERAL DESIGN**

- Operates up to 3 Global Hawks at one time
  - Multiple mission plans
  - Receives imagery from one UAV at a time
  - Mosaics EO/IR
- Disseminates exploitable data via external theater comms
- Deploys on 3 C-141s or 2 C-17s or 1 C-5
- Comms: SATCOM: UHF/Ku-Band
  LOS: UHF/VHF/CDL
Global Hawk MCE

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Global Hawk LRE

Raytheon
Command and Control
Mission Planning
BAE SYSTEMS

L3 communications
Communication Equipment

MOOG
DGPS Processing

Shelter
MOBILIZED SYSTEMS

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SAR/MTI Sensor Summary Data

**Mode Performance**

**Spot:**
- 0.3m (1ft) Resolution
- 2km x 2km Spot (>50km)
- 1km x 2km Spot (<50km)
- 1900 Spots/Day

**Wide Area Search:**
- 40,000 nmi²/Day
- Squinted/Canted Search w/ High, Medium & Course Resolution & Swath Width
- (1.0m, 2.0m & 3.0m Res; 10km, 30km & 50km Swath)

**GMTI:**
- 20-200km Range
- +/- 45° Field of Regard (FOR)
- 2 Minute Revisit Rate (Full-Scan)

**Radar Characteristics**
- Mechanically Scanned Array (MSA)
- X-Band Frequency
- 3.0 kW AC/1.6 kW DC
- +/- 45° Field of Regard
- 612 lbs; Air cooled

**Data Formats**
- NITF 2.1
- Complex Imagery
Global Hawk SAR Spot Image

Flight AV2-05, 21 Feb 99
Lake Success Dam
Resolution Reduced 8:1
Slant Range: 86 km (46.6 nmi)
Altitude: 18.4 km (60,400 ft)
Global Hawk
EO/IR Sensor Summary Data

Mode Performance

Spot: 1900 Spots/Day
2km x 2km Spot
(EO 10x14 Image Frames)
(IR 7x14 Image Frames)

Wide Area Search: 10km Swath Width
40,000 nmi$^2$/day

Data Formats: NITF 2.1

Other Sensor Parameters
Field of Regard +/-15° Az; +/-80° Nadir
Visual Band 0.55 – 0.9 micron
MWIR Band 3.7 – 5.05 micron

Physical Characteristics
Electro-optical Receiver Unit (ERU)
16ft$^3$; 300 lbs
300 W AC/600 W DC
Global Hawk EO Image

Flight AV2-04
China Lake NAS
22 Jan 99; 0923 PST
Slant Range 20.9 km (11.3 nmi)
Altitude (AGL) 16.5 km (54,300 ft)
Global Hawk IR Image

Flight AV2 - 08
26 Mar 99; 1236 PST
NAS China Lake, CA
Slant Range  22.1 km (12 nmi)
Altitude (AGL)  17.9 km (58,850 ft)
Accomplishments

- Fully autonomous flight in only 32 months from go-ahead
- FIRST FLIGHT: Feb 28, 1998
- TOTAL FLIGHTS: 178
- TOTAL FLYING HOURS: 2590.8
- HIGHEST ALTITUDE: 66,400 ft
- LONGEST DURATION: 31.5 hours
- PAYLOAD INTEROPERABILITY: Army, Navy, Air Force, Marines, Coast Guard, NATO

- WORLD RECORDS (as recognized by NAA):
  - Highest altitude by an autonomous, unmanned jet-powered aircraft: 65,191 ft
  - Longest endurance of an autonomous, unmanned jet-powered aircraft: 30 hrs 24 min
  - First non-stop flight across Pacific Ocean by an autonomous aircraft

- AWARDS
  - 2000 Robert J. Collier Trophy
  - 2001 Flight International Award for Military Aviation
  - 2001 Air Force Level Packard Award Winner
Customer: SOUTHLAN

Provide imagery to Joint Task Force Commander to support amphibious landings and air operations in “Linked Seas” Demo

Firsts:
  - Inter-continental operation
  - Operation in foreign airspace
  - Support of NATO customer
U.S. - Australia Cooperative Project Agreement

- 3 Stage Effort (Study/Development/Deployment)
- Comprehensive analysis of Global Hawk System & Australian Ground Equipment (AGE) Interoperability and Deployment Requirements
- Modification of Common Ground Segment to Support Imagery Dissemination to AGE
- Modification of Global Hawk Radar to Support Maritime Modes
- System Deployment to Australia CY01
Early User Feedback

• ACC’s 31st Test & Evaluation Squadron (18 people) at Edwards AFB since early 98
  – Performing pre-flight, launch, recovery and post-flight operations
  – “Very reliable and easy to maintain air vehicle”

• USN sensor-to-shooter demo: 12 minutes from request to SAR image on F-18 cockpit display (9 Nov)

• Dynamic sensor retasking routine: USN, USMC, USAF have retasked up to 40 times per mission, 4 minute response time
# Transformation Program

## Milestones

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## Spiral Developments

- **Spiral 1 – Basic Infrastructure**
- **Spiral 2 – Open Sys & SAR-EO/IR**
- **Spiral 3 – SIGINT**
- **Spiral 4 – AESA**
- **Spiral 5 – Ground Station & SIGINT**
- **Spiral 6 – Future Development**

* FY03 PB

## FUNDED* Air Vehicle Buys

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* FY03 PB

## LRE/MCE

- MCE
- LRE
- CGS
- CGS
- CGS
- CGS (2)
- CGS (2)
- CGS (2)

* FY03 PB
Summary

- Global Hawk is a program with high potential
- High expectations by senior leadership
- Proven capability with 2500+ flight hours and a successful Military Utility Assessment
- Proceeding to execute directed program
Global Hawk

Questions?????