



U.S. AIR FORCE

Global Hawk Program Update



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Integrity - Service - Excellence

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Overview

- **Description**
 - System Requirements
 - Air Vehicle
 - Ground Stations
 - Sensors
- **Recent Activities**
 - Australia Deployment
 - Accomplishments
- **Evolutionary Acquisition**
 - Global Hawk Transformation



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System Description





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System Description

- **Global Hawk is an unmanned, high-altitude, long-endurance air vehicle employing a high percentage of commercial off the shelf hardware**
- **Supports Department of Defense intelligence, surveillance, and reconnaissance missions with integrated sensors**
 - **Electro-optical (visible)/Infrared Images**
 - **Synthetic aperture radar (SAR) for all weather**
 - **Future signals intelligence (SIGINT) capabilities**
- **Other potential uses for future users**



Program Background

Global Hawk System Requirements

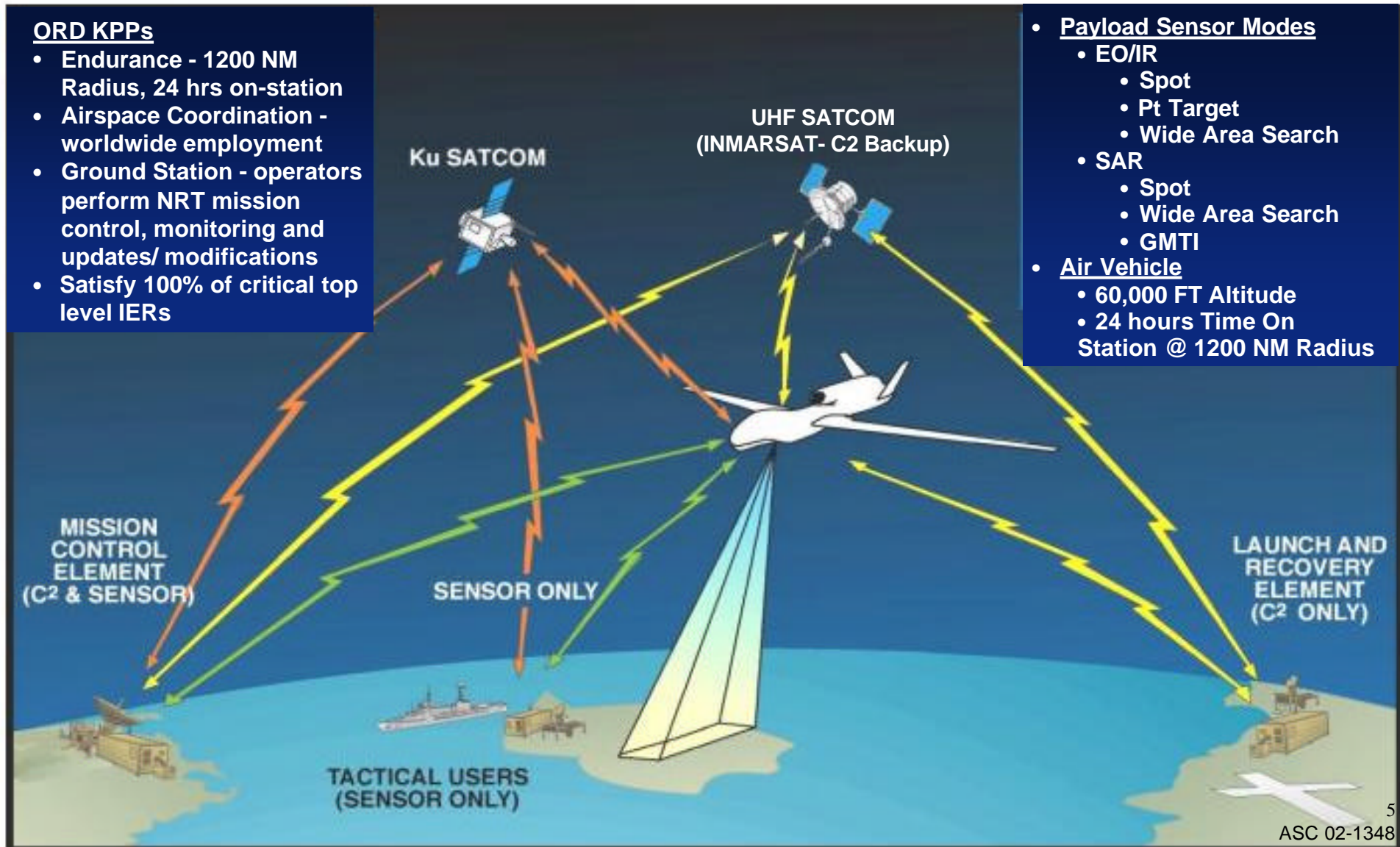
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ORD KPPs

- Endurance - 1200 NM Radius, 24 hrs on-station
- 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
 - 24 hours Time On Station @ 1200 NM Radius





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Global Hawk Air Vehicle RQ-4A



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: 25,600 lbs
 - Payload wt: 2,000 lbs
- Payloads: EO/IR and SAR
- Comms: SATCOM: UHF/Ku-Band
LOS: UHF and CDL



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Global Hawk Ground Stations



Launch & Recovery Element (LRE) Functions

- Takeoff & Land
- Mission Management
- Mission Planning
- Command & Control
- Command Comms



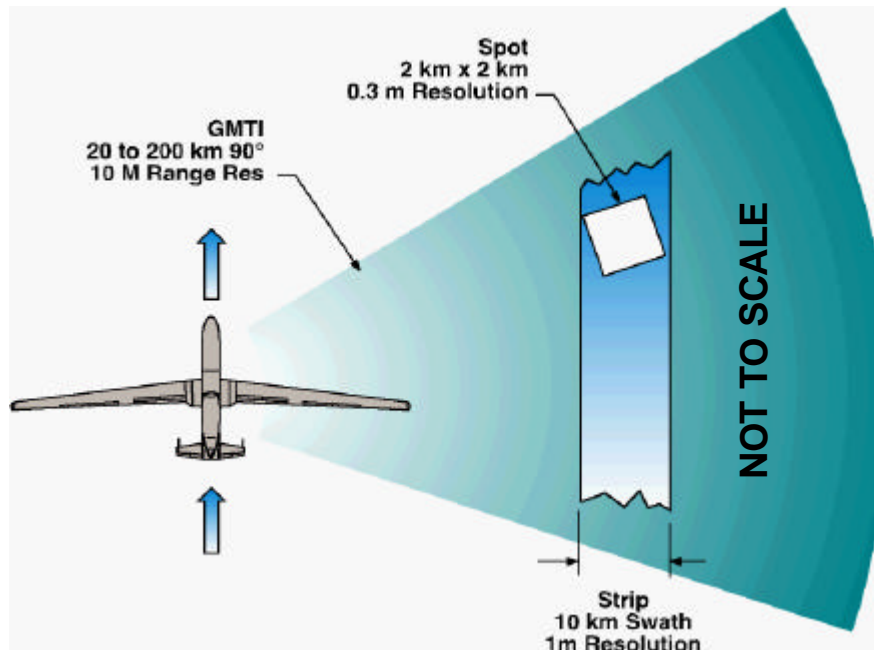
Mission Control Element (MCE) Functions

- Command & Control
- Interface to Users
- Mission Planning
- Command Comms
- Wideband Comms
- Image Processing
- Image Quality Control
- Mission Management



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Global Hawk Initial SAR/MTI Sensor Summary Data



Mode Performance

Spot: 20-200km Range
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

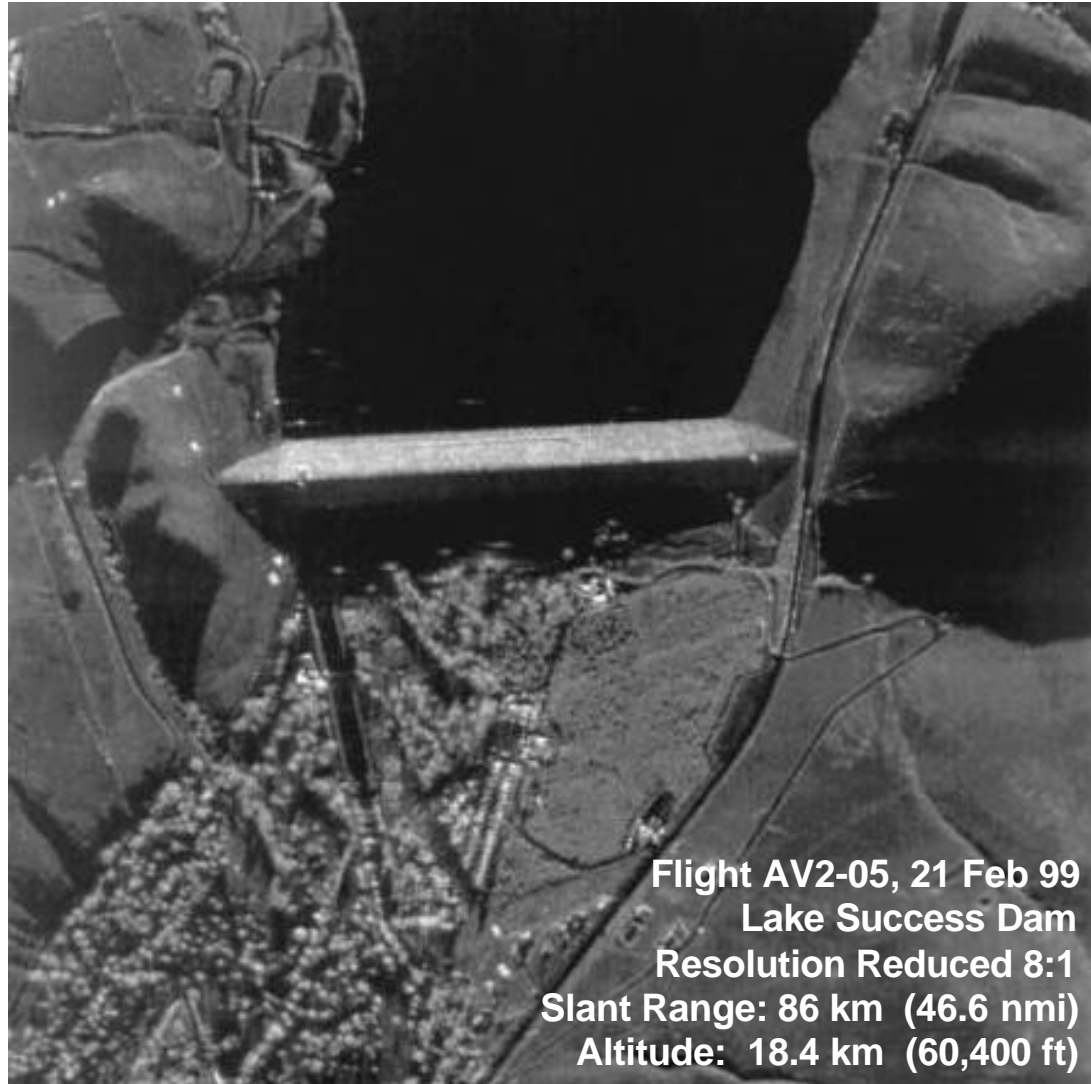
Data Formats

NITF 2.1
Complex Imagery



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Global Hawk SAR Spot Image

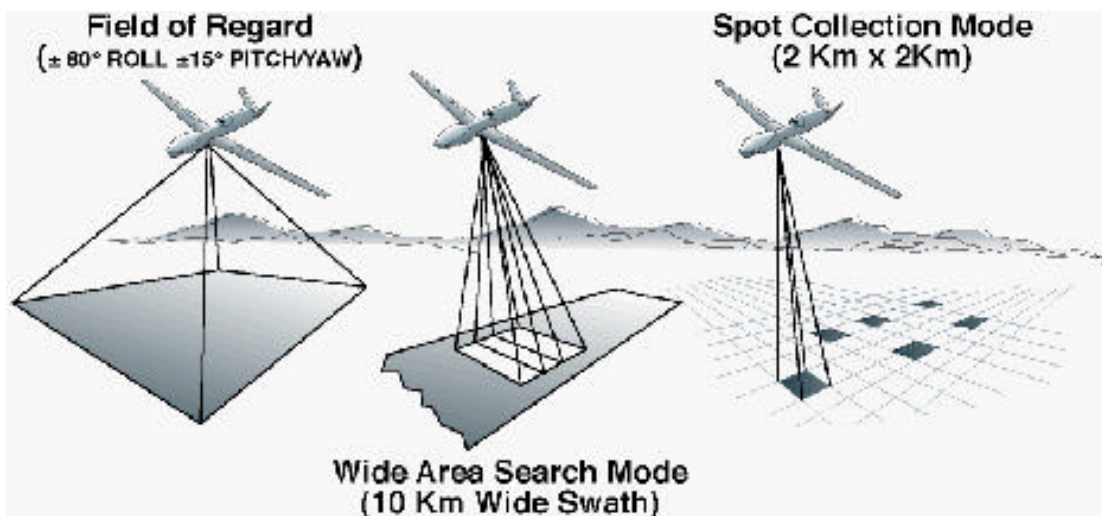


Flight AV2-05, 21 Feb 99
Lake Success Dam
Resolution Reduced 8:1
Slant Range: 86 km (46.6 nmi)
Altitude: 18.4 km (60,400 ft)



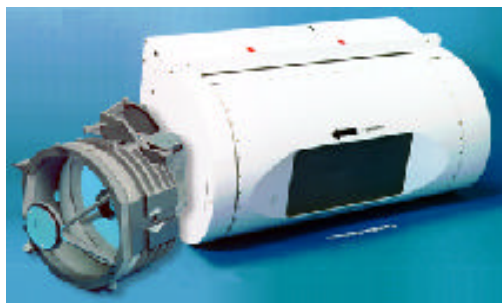
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Global Hawk Initial EO/IR Sensor Summary Data



Mode Performance

Spot: 1900 Spots/Day
 2km x 2km Spot
 (EO 10x14 Image Frames)
 (IR 7x14 Image Frames)
 EO-NIIRS 5.0 @ ~60km
 IR-NIIRS 5.0 @ ~30km



Physical Characteristics

Electro-optical Receiver Unit (ERU)
 16ft³; 300 lbs
 300 W AC/600 W DC

Wide Area Search: 10km Swath Width
 40,000 nmi²/day

Data Formats: NITF 2.0

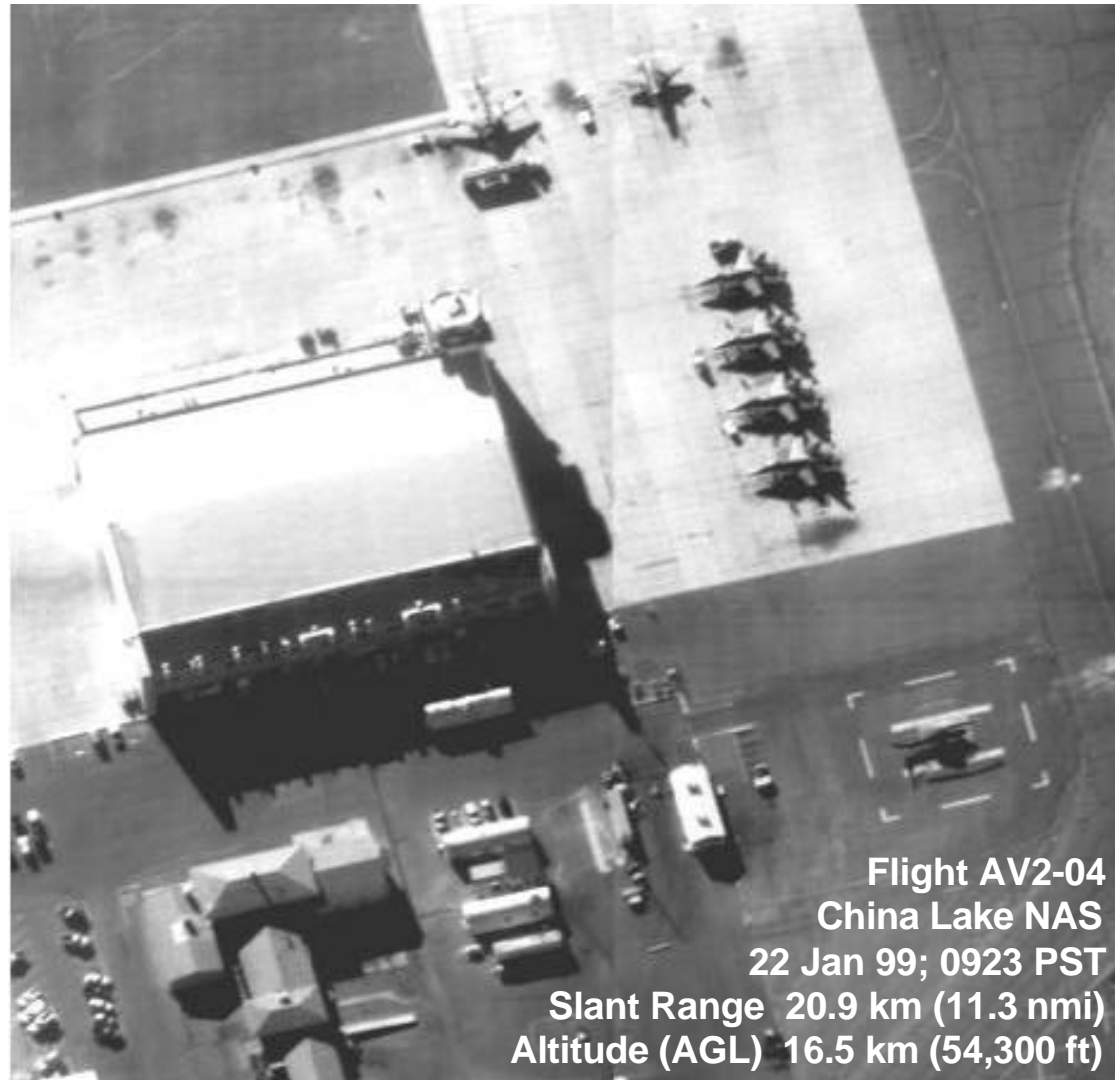
Other Sensor Parameters

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



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Global Hawk EO Image

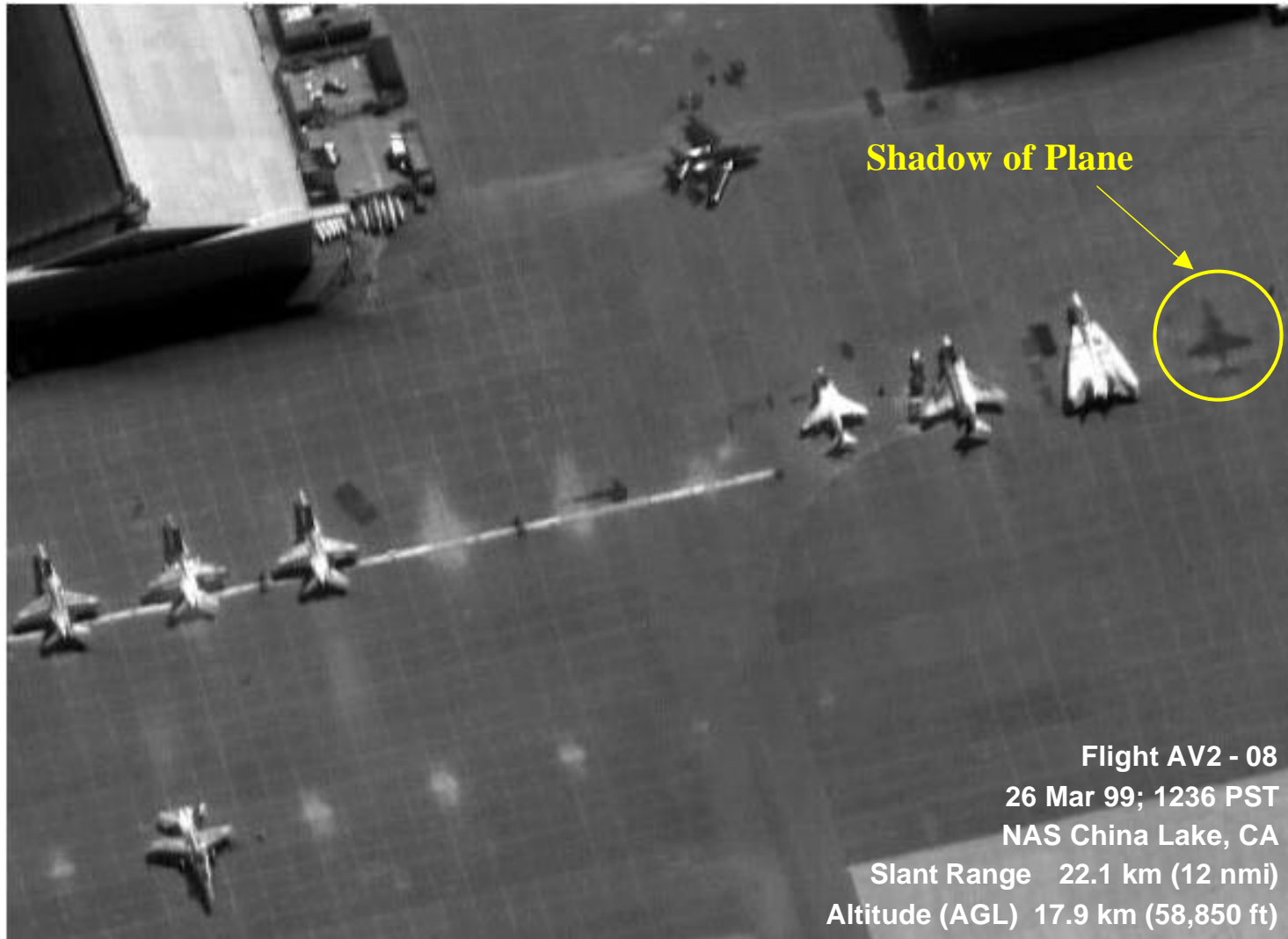


Flight AV2-04
China Lake NAS
22 Jan 99; 0923 PST
Slant Range 20.9 km (11.3 nmi)
Altitude (AGL) 16.5 km (54,300 ft)



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Global Hawk IR Image

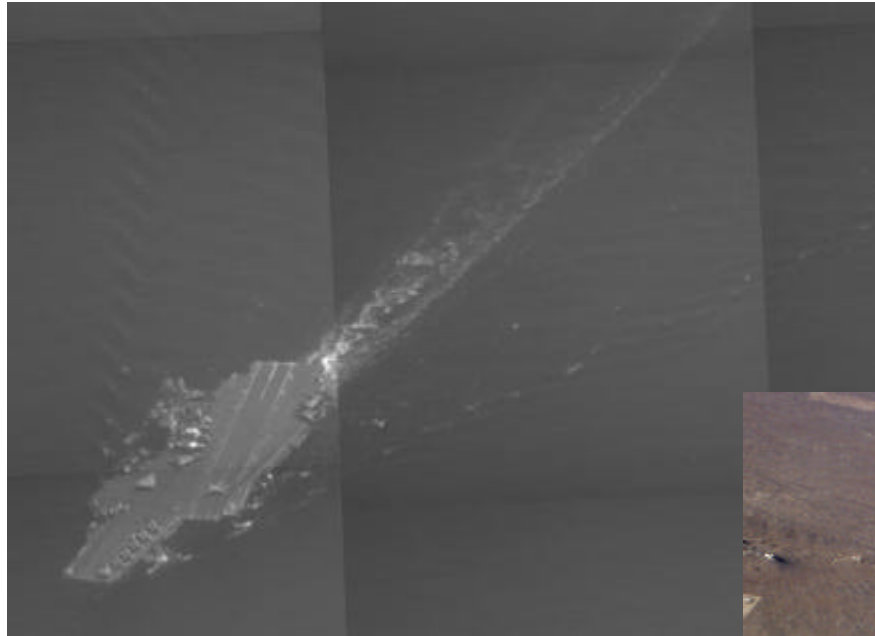


Flight AV2 - 08
26 Mar 99; 1236 PST
NAS China Lake, CA
Slant Range 22.1 km (12 nmi)
Altitude (AGL) 17.9 km (58,850 ft)



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Recent Activities





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Australian Demonstration -- Objectives



- Demonstrate the out-of-CONUS deployment capability
- Demonstrate in Surveillance/Maritime environment
 - Advanced surveillance technology – 11 sensor modes
 - Interoperability with Australian Ground Element (AGE)
 - Electronic Intelligence (ELINT) cueing capability
 - Enhanced operational utility assessment
- Safe operations
- Record Lessons Learned to support future operations



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Australian Deployment Review

- Fully Autonomous Crossing of the Pacific by a UAV
- First Operation of Maritime Surveillance by a Multi-sensor UAV
- First Use of ELINT on the GH Aircraft, Very Successful Cueing Device



- Found Moving and Stationary, Land and Maritime Targets Using All Modes of the Imaging Sensors
- Used IR Sensor for Long Range Target Detection
- IR Sensor Located Troops Using Campfires in the Northern Territory
- Successfully Located, Tracked and Imaged 40' Fishing Boat With LR-100 and ISAR Mode, Ground Truth Target for Score



SAR Spot Image

**UNCLASSIFIED
FOR PUBLIC RELEASE**

**Broken Hill
315638S1412754E**



GLOBAL HAWK PR001

UNCLASSIFIED

IMAGE DATE: 23100420ZAPR01



EO Spot
34:48:17 S Lat
138:31:09 E Lon

**UNCLASSIFIED
FOR PUBLIC RELEASE**

**Torrens Isle
Power Station**



GLOBAL HAWK PR -003

UNCLASSIFIED

IMAGE DATE: 4/27/01

ASC 02-1348



IR Spot

34:54:56 S Lat

138:35:45 E Lon

**UNCLASSIFIED
FOR PUBLIC RELEASE**

Adelaide Oval



GLOBAL HAWK PR -004

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IMAGE DATE: 4/27/01

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Australian Deployment Summary

- **Global Hawk considered a very successful deployment**
- **Met or exceeded all objectives**
- **Validated Global Hawk deployability and maritime surveillance mission**
- **Results being closely scrutinized by the US Navy for Navy application**



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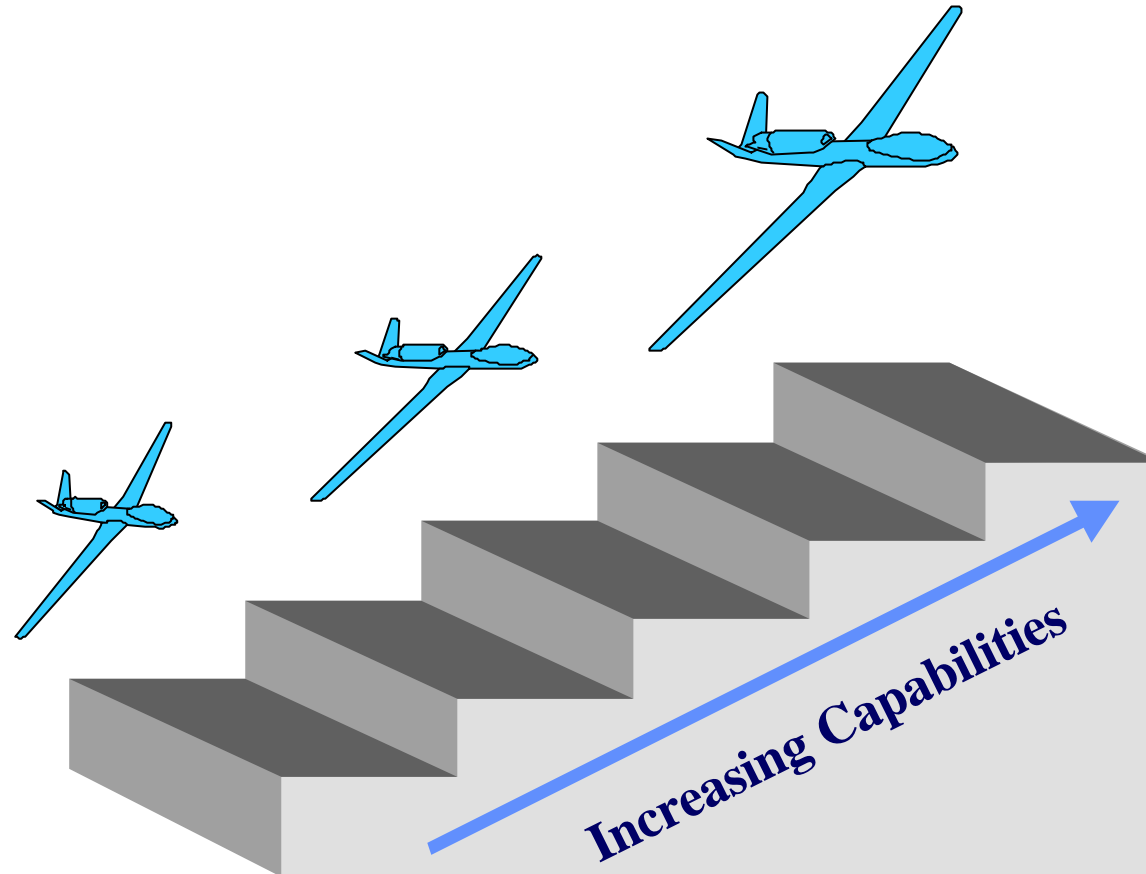
Accomplishments

- Fully autonomous flight in only 32 months from go-ahead
 - **FIRST FLIGHT:** Feb 28, 1998
 - **TOTAL FLIGHTS:** More than 100
 - **TOTAL FLYING HOURS:** More than 1500
 - **TOTAL IMAGES TAKEN :** More than 10,000
 - **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



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Evolutionary Acquisition





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Transformation Program Summary

- **Triggers for Transformation Update**
- **Transformed Program Description**



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Global Hawk's Spiral Transformation Triggers

- **User requirements and budget out pacing formal, validated requirements**
 - New missions and upgrades, including SIGINT
 - Experience with ACTD Global Hawks in Operation Enduring Freedom
 - Requirements Working Groups and Requirements Summits
- **Rapidly evolving technologic world**
 - Deliver more faster to maintain technologic edge
- **Original program phased in capability in 2 blocks**
 - Block 5/Block 10
 - Full capability (Block 10) scheduled for delivery in FY09
- **Real World requirements drove accelerated pace - Accepted moderate risk to develop and produce capability concurrently**
 - Pulled “Full” capability back to FY06 and increased production rate
 - Global Hawk, in its most fundamental configuration, can fill vital mission requirements in unique ways



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Transformation Program

	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07	FY08	FY09
Milestones		★ MS II/LRIP			■ OA		■ IOT&E	★ MS C/FRP		
Program Schedule	ACTD	Spiral Developments								
	Spiral 1 – Basic Infrastructure		Spiral 2 – Open Sys & SAR-EO/IR		Spiral 3 - SIGINT		Spiral 4 – AESA & Comp ORD		Spiral 5 – Ground Station	
									Spiral development and test; cut into production when ready. Spiral content fluid.	
									Spiral 6	
FUNDED* Air Vehicle Buys			2	3	4	4	4	10	10	10
DIRECTED** Air Vehicle Buys			2	4	4	6	6	6	6	6
LRE/MCE			MCE	LRE	CGS	CGS	CGS	CGS (2)	CGS (2)	CGS (2)

* FY03 PB

** Buy Profile is IAW SAF/XPPI Email dated 29 Jan 02

As of: 25 Feb 02



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Spiral Development Pros and Cons and Challenges

- **The Pros**
 - Incremental capabilities fielded quickly – good for the war fighter!
 - Risks spread across a series of spirals – demonstrated capability to the user
 - Lessons learned in earlier spirals can be added to later spirals
 - Quicker reaction to lessons learned from unplanned operations such as OEF
 - Technology can be incorporated faster – lean agile acquisition at its best

- **The Cons**
 - Won't work if the user won't can't accept an 80% solution in the beginning
 - Inherent flexibility dangerous during periods of budget reductions
 - » Tendency to say “We'll just push that to a later spiral.”

- **The Challenges**
 - Test community has to understand a partial capability can equal a success
 - Logistics must find a way to support multiple configurations
 - Communications and Trust must be inherent – what's in the job jar apparent
 - Leadership has to accept an unpredictable future for the program

Summary

- **Global Hawk is a program with demonstrated capability and great potential**
 - High expectations by senior leadership

