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### **RQ-4 Global Hawk**

#### High-Altitude, Long-Endurance Unmanned Aerial Reconnaissance System

Cruising at extremely high altitudes, the Northrop Grumman-produced U.S. Air Force RQ-4 Global Hawk unmanned aerial system (UAS) can survey large geographic areas with pinpoint accuracy, giving military decision-makers real-time information regarding enemy location, resources and personnel.

Once mission parameters are programmed into Global Hawk, the air vehicle can autonomously taxi, take off, fly, remain on station capturing imagery, return, and land. Ground-based operators monitor the system's health and status, and can re-task the air system's navigation and sensor plans during flight as necessary.

Global Hawk provides not only unmatched capabilities to the warfighter but also meets domestic needs, including homeland security, border / coastal patrols, and disaster relief.

Global Hawk is the only UAS to meet the military and the Federal Administration Aviation's airworthiness standards and have approval to fly regular flights within U.S. airspace.

Global Hawk is part of the 9th Reconnaissance Wing based at its main operating base, Beale Air Force Base, Calif. In addition, the systems flight test program is conducted at the Air Force Flight Test Center, Edwards Air Force Base, Calif. The program is managed by the 303rd Aeronautical Systems Group, Aeronautical Systems Center, Wright-Patterson Air Force Base, Ohio.

The Global Hawk system began supporting the global war on terrorism in 2001. Global Hawk provided Air Force and joint war-fighting commanders more than 17,000 near-real-time, high-resolution intelligence, surveillance and reconnaissance (ISR) images to support Operation Enduring Freedom, flying more than 60 combat missions and logging more than 1,200 combat hours. The system is continuing its operational support having logged more than 9,000 combat flight hours with 95 percent mission effectiveness.

During Operation Iraqi Freedom, the system flew only 5 percent of the Air Force's high-altitude reconnaissance sorties, but accounted for more than 55 percent of the time-sensitive targeting imagery generated to support strike missions.

Following is a brief summary of the system's performance supporting Operations Enduring Freedom, Southern Watch and Iraqi Freedom:

- More than 15 combat missions
- More than 350 combat hours
- Collected more than 4,800 images including:
  - 1,296 electro-optical
  - 1,290 infrared
  - 2,246 synthetic aperture radar
- Located more than:
  - 13 full surface-to-air missile (SAM) batteries
  - 50 SAM sites
  - 300 SAM canisters
  - 300 tanks, 38% of Iraq's known armor
  - 70 SAM transporters

Global Hawk began as an Advanced Concept Technology Demonstration in 1995, to give warfighters a rapidly-developed prototype that can be used for military utility assessment and early operational activities. In June 1999, Global Hawk began a series of exercises sponsored by U.S. Joint Forces Command to determine its future military uses.

On April 20, 2000, Global Hawk Air Vehicle No. 4 deployed to Eglin Air Force Base, Fla., to participate in two exercises that included its first trans-oceanic flight to Europe, and first mission flown in one theater of operations while under control from another.

The first exercise, Linked Seas 00, which ran May 1-12, 2000, involved joint and service warfighters, the North Atlantic Treaty Organization's Supreme Allied Command Atlantic, its regional command, and several NATO nations, among them Portugal. Global Hawk provided direct support to amphibious operations in a joint-force environment involving air, sea, sub-surface and land-based assets.

During the second exercise, Joint Task Force Exercise (JTFEX) 00-02, which took place from May 14-26, 2000, Global Hawk provided direct support for the joint maritime mission of a Navy Carrier Battle Group and an Amphibious Ready Group/Marine Expeditionary Unit in a littoral (land-sea) environment. Global Hawk returned to Edwards AFB, Calif., on June 19, 2000, concluding the deployment exercise demonstration program.

According to U.S. Joint Forces Command, during 22 individual sorties it flew during the yearlong series of joint deployment exercises, Global Hawk proved its military worth by providing critical ISR capabilities to the war-fighting community.

To demonstrate interoperability between U.S. and Australian military systems, Global Hawk flew 7,500 miles nonstop across the Pacific to Australia on April 22-23, 2001, setting several new world records for UAS endurance. U.S. and Australian Defence Science Technology Organisation officials evaluated the UAS' performance and future

military potential during 11 sorties in the land-sea environment before it flew home to Edwards AFB, Calif., six weeks later.

In October 2003, the Air Force demonstrated Global Hawk's capabilities to the German Ministry of Defence (MoD) in northern Germany. Following a ferry flight from Edwards Air Force Base to Nordholz, Germany, an RQ-4A Global Hawk high-altitude, long-endurance (HALE) UAS equipped with a EADS electronic intelligence (ELINT) sensor prototype performed a series of flight demonstrations over a six-week deployment.

In Jan. 31, 2007, the German MoD awarded a \$559 million contract to EuroHawk GmbH, a joint-venture company formed by Northrop Grumman and EADS, for the development, test and support of the Euro Hawk<sup>®</sup> unmanned signals intelligence (SIGINT) surveillance and reconnaissance system. With a wing span larger than a commercial airliner's and an endurance projected at up to 30 hours, the Euro Hawk<sup>®</sup> unmanned aerial system will serve as the German Air Force's HALE SIGINT system. Under this contract, EuroHawk GmbH will also provide aircraft modifications, mission control and launch and recovery ground segments, flight test and logistics support.

The Euro Hawk<sup>®</sup> is a derivative of the Block 20 Global Hawk, equipped with a new SIGINT mission system developed by EADS. The SIGINT system provides stand-off capability to detect electronic intelligence (ELINT) radar emitters and communications intelligence emitters. EADS will also provide the ground stations that will receive and analyze the data from Euro Hawk<sup>®</sup> as part of an integrated system solution. A joint team will conduct integration and flight test activity in Germany in late 2009.

The Block 10 Global Hawk has a wingspan of 116 feet (35.4 meters) and is 44 feet long (13.5 meters). It has a range as far as 12,000 nautical miles (22,236 kilometers) at altitudes up to 65,000 feet (19.8 km), flying at speeds approaching 340 knots (about 400 mph) for as long as 35 hours. During a typical mission, the aircraft can fly 1,200 miles to an area of interest and remain on station for 24 hours.

As a prelude to the Broad Area Maritime Surveillance (BAMS) development effort, the Navy has procured two Block 10 Global Hawk Maritime Demonstration vehicles from the Air Force, and is using them for CONOPS development, sensor technology experimentation, and fleet orientation.

The two Navy Global Hawks have participated in the Navy's Trident Warrior '05 and RIMPAC '06 exercises. Equipped with sensors carrying new maritime software modes, GHMD captured images of various RIMPAC activities, including a ship-sinking exercise, expanded maritime interdiction operations, and wide-area search and surveillance to locate target vessels at sea. GHMD flew more than 2,500 miles each way for a total of more than 100 flight hours and provided more than eight hours on-station time during each mission. Additional maritime demonstrations will be conducted at Naval Air Station Patuxent River, Md.

In the spring of 2006, Global Hawk completed a congressionally directed demonstration of its ability to conduct maritime drug interdiction surveillance. During test flights,

Global Hawk's integrated sensor suite successfully detected, tracked and imaged maritime targets as well as detected and tracked airborne targets off the coast of Corpus Christi, Tex., and Key West, Fla. After all pre-planned targets were located; Global Hawk proceeded into the Caribbean, where it located multiple maritime ad-hoc targets of interest. The target locations were passed to a Navy P-3 Orion surveillance plane in the area and, using that information, the P-3 crew was able to confirm and classify the targets.

The system currently carries an integrated sensor suite consisting of an electro-optical and infrared sensor and a synthetic aperture radar/ground moving target indicator. The cloud-penetrating, day or night, sensor package can image an area the size of the U.S. state of Illinois (40,000 nautical square miles) in just 24 hours. Through satellite and ground systems, the imagery can be relayed in near-real-time to battlefield commanders. The next-generation configuration will be outfitted with open system architecture that will allow the air vehicle to carry multiple payloads including systems for collecting signals and electronics intelligence.

The Block 20 Global Hawk represents a significant increase in capability over the Block 10 configuration. The larger Block 20 aircraft will carry up 3,000 pounds of internal payload and will operate with two-and-a-half times the power of its predecessor. Its open system architecture, a so-called "plug-and-play" environment, will accommodate new sensors and communication systems as they are developed to help military customers quickly evaluate and adopt new technologies.

When fully fueled for flight, the Block 20 variant weighs approximately 32,250 pounds (14,628 kg). More than half the system's components are constructed of lightweight, high-strength composite materials, including its wings, wing fairings, empennage, engine cover, engine intake, and three radomes. Its main fuselage is standard aluminum, semi-monocoque construction.

On March 1, 2007, the first Block 20, designated AF-8, successfully completed its first flight from Northrop Grumman's manufacturing facility in Palmdale, Calif., to the Birk Flight Test Center at Edwards Air Force Base, Calif. The air vehicle took to the skies at approximately 6:58 a.m. PST, climbing to 32,000 feet before landing at 8:31 a.m. PST. Two F-16s served as chase aircraft.

On the same day, March 1, 2007, employees at the Unmanned Systems Center manufacturing facility in Moss Point, Miss., celebrated the on-time delivery of the first Mississippi-built center fuselage of a Block 30 variant. The delivery was a significant milestone for the Global Hawk program, making progress of the manufacturing and assembly of the first Block 30 variant, which will be equipped with the enhanced integrated sensor suites and Airborne Signals Intelligence Payload designed to locate and identify radar and other types of electronics and communications signals. The ceremony also commemorated the first jig load of a Block 40 air vehicle equipped with the Multi-Platform Radar Technology Insertion Program sensor payload.

Global Hawk's fuselage consists of three sections – forward, mid and aft – which are built and mated in Moss Point then shipped to the primary production facility in Palmdale for final assembly and testing. Of the 54 Global Hawks planned for production, all seven Block 10 air vehicles have been completed and delivered to the Air Force. There are currently four Global Hawks in Moss Point and seven in Palmdale in various stages of production.

To date, the Global Hawk program has been on-cost/schedule for 15 consecutive months. Cost to deploy and maintain a Global Hawk is approximately half of its manned counterpart. Each new copy of Global Hawk Block 20/30/40 costs approximately \$27 million without sensor package.

The principal team-members for Global Hawk are:

- V-tail assembly and other composite structures: Aurora Flight Sciences of West Virginia, Bridgeport, West Va.
- Communication system: L-3 Communications, West, Salt Lake City, Utah.
- Integrated sensor suite: Raytheon Space and Airborne Systems, El Segundo, Calif.
- Ground station: Raytheon Intelligence and Information Systems, Falls Church, Va.
- Engine: Rolls-Royce Corporation, Indianapolis, Ind.
- Wing: Vought Aircraft Industries, Dallas, Texas

**RQ-4 Global Hawk Specifications:**

Wingspan: 130.9 feet (39.9 meters)

Length: 47.6 feet (14.5 meters)

Height: 15.4 feet (4.6 meters)

Maximum Gross Takeoff Weight: 32,250 pounds (14,628 kg)

Payload: 3,000 pounds (1,360 kg)

Ferry Range: 12,300 nm (22,780 km)

Maximum Altitude: >60,000 feet (18.3 km)

Loiter Velocity: 310 knots True Air Speed (TAS)

Maximum Endurance: 36 hours, 24 hours time on station

Sensors: Synthetic Aperture Radar, Electro-Optical, Infrared

Communications: Ku SATCOM Datalink, CDL LOS, UHF SATCOM/LOS,

INMARSAT, ATC Voice, Secure Voice

Aircraft Type: Jet-powered Unmanned Air Vehicle

Power Plant: Rolls Royce AE3007H turbofan engine

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