

## RQ-4 Global Hawk Unmanned Aerial Vehicle (UAV)

### SUMMARY

- Operational deployments, late deliveries of air vehicles and sensors, and slow development of sensor and mission software resulted in deferral of the operational assessment from FY04 to 2QFY05.
- The Air Force plans to continue to purchase and field Global Hawk systems without conducting and reporting the results of the operational testing outlined in the Test and Evaluation Master Plan (TEMP).
- The Air Force must submit a new TEMP with a new test strategy to account for program delays and reduce risk to the user.



*The Global Hawk UAV operates at high-altitude with long range and long endurance.*

### SYSTEM DESCRIPTION AND MISSION

The RQ-4 Global Hawk Unmanned Aerial Vehicle (UAV) system is a theater commander's asset designed to satisfy surveillance and reconnaissance shortfalls. The Air Force intends

the Global Hawk air vehicle to provide high-resolution Synthetic Aperture Radar and Electro-Optical/Infrared imagery, as well as signal intelligence data at long range with long loiter times over target areas. Potential missions for the Global Hawk cover the spectrum of intelligence collection capabilities to support joint combatant forces in worldwide peace, crisis, and wartime operations.

The Global Hawk UAV system consists of an air vehicle component with air vehicles, sensor payloads, avionics, and data links; a ground segment with a launch and recovery element; a mission control element with embedded ground communications equipment; a support element; and trained personnel.

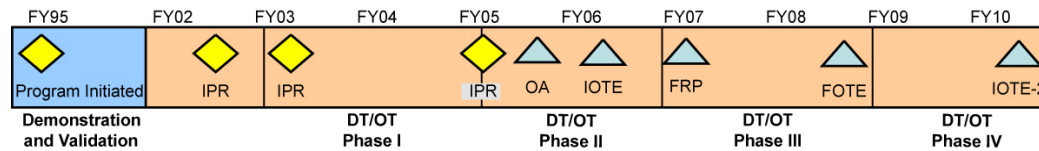
The Global Hawk air vehicle operates at high-altitude with long range and long endurance. It must provide 28 hours endurance while carrying 2,000 pounds (RQ-4A) or 3,000 pounds (RQ-4B) of payload and operating at 60,000 feet mean sea level. Each of the sensors provides wide area search imagery and a high-resolution spot mode. The radar also has a ground moving target indicator mode. Prior to the Initial Operational Test and Evaluation (IOT&E) in FY06, production aircraft will have an initial signal intelligence capability. The program plans include a more capable Airborne Signals Intelligence Payload prototype, available for operational testing prior to the full-rate decision. The Air Force intends for a follow-on operational test and evaluation of the production system. The program will integrate the Multi-Platform Radar Technology Insertion Program radar and test it in a second IOT&E.

Global Hawk operates autonomously using a satellite data link (either Ku-band or UHF) for sending sensor data from the aircraft to the mission control element. The common data link directly down-links imagery when the UAV is operating within line-of-sight of users with compatible ground stations. The ground segment consists of the mission control element for mission planning, command and control, and image processing and dissemination; the launch and control element for controlling launch and recovery of the UAV; and associated ground support equipment. By having separable elements in the ground segment, the mission control element and the launch and control element can operate in geographically separate locations. The user may then deploy and locate the mission control element with the supported

# AIR FORCE PROGRAMS

command's primary exploitation site. Military shelters with external antennas for line-of-sight and satellite communications with the air vehicles contain both ground segments.

## TEST AND EVALUATION ACTIVITY



The March 2003 TEMP provides for an FY04 operational assessment, IOT&E in FY06, follow-on operational test and evaluation on the full-signal intelligence system, and a second IOT&E on the Multi-Platform Radar Technology Insertion Program configuration. The Air Force intended to conduct combined phases of developmental test/operational test between dedicated operational test events. These systems-level developmental test/operational test evaluations were intended to support yearly Configuration Control Board decisions on technology integration into production lots, as well as entry into operational testing.

The Air Force did not execute the test strategy in FY04. There were no operational test events during FY04. The scheduled operational assessment did not occur because of delays in the delivery of sensors, software, and source data (required for developing technical orders and training courseware). The Air Force does not plan operational scenarios until the end of the current developmental test/operational test phase, projected to end in February 2005. At that time, they plan to conduct Integrated System Evaluation flights. These may provide the first end-to-end system-level evaluation of production-representative mission capability. In the meantime, the contractor will continue to deliver production air vehicles. The FY04 operational assessment was to be a dedicated, robust evaluation that provides an independent mission-level evaluation of the capability first fielded to the user. DOT&E has not yet received an adequate plan for the operational assessment, now scheduled for early FY05.

Developmental testing during FY04 included data acquisition for Synthetic Aperture Radar development, testing of the Spiral 1 Electro-Optical/Infrared/Synthetic Aperture Radar air data system, and communications using the test air vehicle. The test team demonstrated JP-8+100 fuel compatibility and a "see and detect" capability to improve situational awareness during launch, recovery, and ground operations using an infrared nose camera. Flight testing also characterized reported deficiencies in Air Traffic Control voice quality to help identify root causes. A technical order validation and verification effort examined the accuracy and usability of maintenance job guides. Ground testing of the new Automatic Contingency Generation software has also been ongoing in the 6-Degree Of Freedom simulators.

In addition to the Spiral 1 development efforts, flight testing supported a number of other activities. The contractor integrated and tested the Advanced Information Architecture payload. This payload provides storage and data links on the aircraft that allows users with line-of-sight to the aircraft to download stored imagery. A European aeronautic defence and space company signal intelligence sensor was integrated and its capability demonstrated during a deployment to Germany.

The contractor delivered Air Vehicles 9, 10, and 11 (designated AF-2, AF-3, and AF-4, respectively). Air Vehicle 9 participated in the technical order validation and verification effort. Air Vehicles 10 and 11 only underwent production acceptance flight tests.

## TEST AND EVALUATION ASSESSMENT

The program encountered unexpected difficulty in the development of the Airborne Synthetic Aperture Radar System Improvement Program Synthetic Aperture Radar modes. This delayed testing of the Spiral 1 sensor. The first flight test of the integrated Spiral 1 sensor took place on August 25, 2004.

## AIR FORCE PROGRAMS

Significant developmental/operational testing remains before an operational assessment can take place:

- Testing to verify image quality and geo-location accuracy.
- Automatic Contingency Generation capability—a significant change that the user needs to meet requirements for rapid mission planning.
- Manual Collection Management software, which provides the ability to manually re-task a sensor in real-time, will also be delivered and tested.

The program cannot execute the test strategy in the current TEMP. Delays in development and slips to significant test events will require a new test strategy and a new TEMP. The decoupling of production and fielding decisions to both testing and the progress of development contributes to a schedule-driven approach. This puts the user at increased risk of not being able to accomplish the mission.

