

# RQ-4B Global Hawk High-Altitude Long-Endurance Unmanned Aerial System (UAS)

## Executive Summary

- DOT&E approved the Air Force Capstone Test and Evaluation Master Plan (TEMP) in June 2016, which provides an overarching test approach for the system architecture and capability upgrades included in the new program baseline and future modernization programs. DOT&E anticipates that the program will develop TEMP annexes according to the requirements and schedule documented in the approved Capstone TEMP.
- The Air Force is currently planning to conduct RQ-4B Block 30/Airborne Signals Intelligence Payload (ASIP) FOT&E in either FY18 or FY19 depending on ASIP Increment 1 development progression and availability of RQ-4B Block 30 developmental test assets. This test will include a re-evaluation of the RQ-4B Block 30 Signals Intelligence (SIGINT) mission capabilities with the ASIP sensor, as well as an assessment of previously identified ground station, air vehicle, communication system, interoperability, and cybersecurity shortfalls.
- The MS-177 sensor radiated high levels of electromagnetic interference (EMI) during Northrup Grumman developmental testing in an anechoic chamber. This high-level EMI can interfere with the ASIP system, producing false signal detection reports. The program is in the process of investigating this problem to determine an acceptable solution.
- There is a significant delay when the RQ-4B platform is transferring MS-177 sensor images to the Distributed Ground Station (DGS) installations using the legacy system link. Although the RQ-4B is a strategic platform, these delays do not allow the operator to determine when to reacquire an image or allow the exploitation of imagery in near real-time to support warfighter intelligence needs.
- Testing of the new weather radar showed three deficiencies all associated with the Keyboard-Video-Monitor switch: (1) the switch location adversely effects pilot operations because switch usage requires the pilot to leave his position to access the switch; (2) the switch button logic does not allow the ground system to display the weather radar information while allowing the pilot to also manipulate SECRET Internet Protocol Router Network (SIPRNET) functions; and (3) when the switch needs to be power-cycled to regain functionality, it requires a minimum of 10 minutes to allow maintenance personnel to remove a panel and disconnect then reconnect power to the switch thus adversely interrupting the intelligence collection process. The program is in the process of addressing all three of these deficiencies with full implementation of a new switch planned to occur by the end of December 2017.



- In July 2016, DOT&E published the classified RQ-4B Global Hawk Block 40 IOT&E report based on test results from the RQ-4B Block 40/Multi-Platform Radar Technology Improvement Program (MP-RTIP) IOT&E conducted from September 2015 through January 2016. DOT&E discontinued oversight of the RQ-4B Block 40 program in September 2016 since the IOT&E had completed and the Air Force did not plan to implement any major capability enhancements to the platform.

## System

- The RQ-4B Global Hawk is a remotely piloted, high-altitude, long-endurance airborne intelligence, surveillance, and reconnaissance (ISR) system that includes the Global Hawk unmanned air vehicle, various intelligence and communications relay mission payloads, and supporting command and control ground stations.
- The RQ-4B Global Hawk Block 30 system is equipped with a multi-intelligence payload that includes both the Enhanced Integrated Sensor Suite imagery intelligence payload and ASIP SIGINT sensor. The Air Force is in the process of retrofitting two Block 30 aircraft with the Multi-Spectral (MS)-177 sensor to provide high resolution MS imaging capability with accurate and automatic geolocation capabilities at high stand-off ranges.
- All RQ-4B systems use line-of-sight and beyond line-of-sight communication systems to provide air vehicle command and control and to transfer collected intelligence data to ground stations for exploitation and dissemination.

# FY17 AIR FORCE PROGRAMS

- The Air Force Distributed Common Ground System (AF DCGS) supports ISR collection, processing, exploitation, analysis, and dissemination for the Block 30 Global Hawk system. The AF DCGS employs global communications architecture to connect multiple intelligence platforms and sensors to numerous DGS installations where intelligence analysts produce and disseminate intelligence products.
- The Air Force has taken delivery of all 21 RQ-4B Block 30 air vehicles along with 9 Mission Control and 10 Launch and Recovery ground stations. Each Launch and Recovery ground station controls one air vehicle. The Air Force does not intend on procuring any additional Mission Control or Launch and Recovery ground stations.

## Mission

- Commanders use RQ-4B Global Hawk reconnaissance units to provide high-altitude, long-endurance intelligence collection

- capabilities to support theater operations. Units equipped with RQ-4B Global Hawk use line-of-sight and beyond line-of-sight satellite datalinks to control the Global Hawk system and transmit collected intelligence data.
- Operators collect imagery and SIGINT data to support ground units and to identify intelligence-essential elements of information for theater commanders.
- Ground-based intelligence analysts exploit collected imagery, ground-moving targets, and SIGINT to provide intelligence products that support theater operations.
- Forward-based personnel can receive imagery intelligence directly from Global Hawk.

## Major Contractor

Northrop Grumman Aerospace Systems, Strike and Surveillance Systems Division – San Diego, California

## Activity

- The Air Force is currently planning to conduct FOT&E in FY18 or FY19 depending on ASIP Increment 1 development progression and availability of RQ-4B Block 30 developmental test assets. This test will include a complete re-evaluation of the RQ-4B Block 30 SIGINT mission capabilities with the ASIP sensor, as well as an assessment of previously identified ground station, air vehicle, communication system, interoperability, and cybersecurity shortfalls.
- DOT&E approved the Air Force Capstone TEMP in June 2016, which provides an overarching test approach for the system architecture and capability upgrades included in the new program baseline and future modernization programs. DOT&E anticipates that the program will develop TEMP annexes according to the requirements and schedule documented in the approved Capstone TEMP.
- The Air Force is currently developing a comprehensive program test strategy and TEMP to correct previously identified RQ-4B Block 30 capability shortfalls and test a series of modernization upgrades. This strategy will identify the next set of RQ-4B Block 30 FOT&E events planned for FY18. Events include re-evaluation of previously identified ASIP/SIGINT mission capability shortfalls, interoperability deficiencies, MS-177 sensor integration, weather radar integration, mission planning upgrades, and other system modernization changes.
- The 53 Test and Evaluation Group, Detachment 2 conducted a Force Development Evaluation under an Air Combat Command-approved test plan from July through August 2017 to support fielding of the new weather radar system installed on the RQ-4B platform.

## Assessment

- Since the RQ-4B Block 30 combined with ASIP IOT&E in 2011, the Air Force has corrected most RQ-4B air vehicle reliability and availability problems and implemented many of previously planned system improvements. However, because of programmatic difficulties resulting from the previous DOD decision to retire the RQ-4B fleet, the Air Force has not yet conducted a comprehensive FOT&E to verify correction of all major IOT&E deficiencies.
- In July 2016, DOT&E published the classified RQ-4B Global Hawk Block 40 IOT&E report based on test results from the RQ-4B Block 40 MP-RTIP IOT&E conducted from September 2015 through January 2016. DOT&E discontinued oversight of the RQ-4B Block 40 program in September 2016 since the IOT&E had completed and the Air Force did not plan to implement any major capability enhancements to the platform.
- The MS-177 radiated high levels of EMI during Northrop Grumman developmental testing in an anechoic chamber. This high-level EMI can interfere with the ASIP system, producing false signal detection reports. The program is in the process of investigating this problem to determine an acceptable solution.
- There is a significant delay when the RQ-4B platform is transferring MS-177 sensor images to the DGS installations using the legacy system link. Although the RQ-4B is a strategic platform, these delays do not allow the operator to determine when to reacquire an image or allow the exploitation of imagery in near real-time to support warfighter intelligence needs.
- The Force Development Evaluation testing for the new weather radar showed three deficiencies all associated

with the Keyboard-Video-Monitor switch: (1) the switch location adversely effects pilot operations because switch usage requires the pilot to leave his position to access the switch; (2) the switch button logic does not allow the ground system to display the weather radar information while allowing the pilot to also manipulate SIPRNET functions; and (3) when the switch needs to be power-cycled to regain functionality, it requires a minimum of 10 minutes to allow maintenance personnel to remove a panel and disconnect then reconnect power to the switch thus adversely interrupting the intelligence collection process. The program is in the process of addressing all three of these deficiencies with full implementation of a new switch planned to occur by the end of December 2017.

## Recommendations

- Status of Previous Recommendations. The Air Force has made progress toward addressing FY16 recommendations. The Air Force has begun to develop RQ-4B Capstone TEMP annexes to guide developmental and operational testing of these systems, articulate a plan to complete the FOT&E for the RQ-4B Block 30 SIGINT mission using the ASIP sensor, and address cybersecurity deficiencies observed during the RQ-4B Block 40/MP-RTIP IOT&E. The Air Force still needs to develop AF DCGS training, procedures, tools, communication, and management enhancements to allow exploitation of RQ-4B Global Hawk Block 40 GMTI data in near-real time.
- FY17 Recommendations. The Air Force should:
  1. Complete development of RQ-4B program Capstone TEMP annexes to guide execution of the RQ-4B Global Hawk Block 30 FOT&E and to define operational test requirements for future Block 30 system upgrades.
  2. Develop a plan to complete the FOT&E for the RQ-4B Block 30 SIGINT mission using the ASIP sensor.
  3. Conduct adequate flight tests to characterize the MS-177/ASIP EMI problem to determine an acceptable solution for Air Combat Command.
  4. Address the image transfer latency problem from the MS-177 to the DGS when using the legacy system link.

# FY17 AIR FORCE PROGRAMS