

## **SENSITIVE SECURITY INFORMATION**

**WARNING: This record contains Sensitive Security Information that is controlled under 49 CFR parts 15 and 1520. No part of this record may be disclosed to persons without a need to know, as defined in 49 CFR parts 15 and 1520, except with the written permission of the Administrator of the Transportation Security Administration or the Secretary of Transportation. Unauthorized release may result in civil penalty or other action. For U.S. government agencies, public disclosure is governed by 5 U.S.C. 552 and 49 CFR parts 15 and 1520.**

SENSITIVE SECURITY INFORMATION

<small>DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION</small>	
<h2 style="margin: 0;">CERTIFICATE OF WAIVER OR AUTHORIZATION</h2>	
<b>ISSUED TO</b> <b>Department of the Air Force</b>	
<b>ADDRESS</b> <b>HQ AFMC/DO</b> <b>Bldg 262 Rm D101</b> <b>4375 Chidlaw Road</b> <b>Wright-Patterson AFB, OH 45433-5006</b>	<b>HQ ACC/DO</b> <b>205 Dodd Blvd Ste 101</b> <b>Langley AFB VA 23665-2784</b>
<p>This certificate is issued for the operations specifically described hereinafter. No person shall conduct any operation pursuant to the authority of this certificate except in accordance with the standard and special provisions contained in this certificate, and such other requirements of the Federal Aviation Regulations not specifically waived by this certificate.</p>	
<b>OPERATIONS AUTHORIZED</b>  <b>SEE ATTACHED SPECIAL PROVISIONS</b>	
<b>LIST OF WAIVED REGULATIONS BY SECTION AND TITLE</b>  <b>N/A</b>	
<p style="text-align: center;"><b>STANDARD PROVISIONS</b></p> <ol style="list-style-type: none"> <li>1. A copy of the application made for this certificate shall be attached and become a part hereof.</li> <li>2. This certificate shall be presented for inspection upon the request of any authorized representative of the Federal Aviation Administration, or of any State or municipal official charged with the duty of enforcing local laws or regulations.</li> <li>3. The holder of this certificate shall be responsible for the strict observance of the terms and provisions contained herein.</li> <li>4. This certificate is nontransferable.</li> </ol> <p><small>Note: This certificate constitutes a waiver of those Federal rules or regulations specifically referred to above. It does not constitute a waiver of any State law or local ordinance.</small></p>	
<p style="text-align: center;"><b>SPECIAL PROVISIONS</b></p> <p>Special Provisions Nos. <u>one to fourteen</u> inclusive are set forth and attached.</p> <p>This certificate is effective from August 21, 2003, and is subject to cancellation at any time upon notice by the Administrator or his/her authorized representative.</p>	
<p style="text-align: center;">FAA Headquarters</p> <p style="text-align: center; font-size: 1.2em; font-weight: bold;">AUG 13 2003</p> <p style="text-align: center; font-size: 0.8em;">(Date)</p>	<p style="text-align: center;">BY DIRECTION OF THE ADMINISTRATOR</p> <div style="text-align: center;">   <small>(Signature)</small> </div> <p style="text-align: center;">Michael A. Cirillo Program Director Air Traffic Plans and Procedures</p>

FAA Form 7711-1 (7-74)

**Attachment to FAA Form 7711-1****ISSUED TO:** Department of the Air Force

HQ AFMC/DO

Bldg 262 Rm D101

4375 Chidlaw Road

Wright-Patterson AFB, OH 45433-5006

HQ ACC/DO

205 Dodd Blvd Ste 101

Langley AFB, VA 23665-2784

**NAME:** Global Hawk Remotely Operated Aircraft (ROA) Operating Area.**DESCRIPTION:** Operations in the National Airspace System, outside of restricted and warning areas, including oceanic controlled airspace under the jurisdiction of the FAA.**DATES OF USE:** This authorization is effective August 21, 2003.**SPECIAL PROVISIONS:**

1. All personnel connected with this ROA operation shall comply with this authorization and its special provisions.
2. The Department of the Air Force shall ensure a level of safety equal to or greater than that provided by a chase aircraft for all non-emergency operations outside of restricted or warning areas. This is accomplished by:
  - A. Filing and flying an IFR flight plan while in Class A, Class E above Class A, or oceanic controlled airspace.
  - B. Filing and flying an IFR flight plan with:
    - 1) Primary radar or visual observation by military air or ground sites while operating within domestic airspace below Class A airspace.
    - or
    - 2) Forward and side looking cameras and/or electronic detection equipment while operating within domestic airspace below Class A airspace.

Any operations in Class B Airspace require advance coordination and approval.

3. The Mission Commander (MC) and/or Command and Control Operator (CCO) shall be present during ROA flight(s). The MC/CCO shall ensure compliance with all Air Traffic Control (ATC) clearances and instructions. Simultaneous RQ-4A operations will require a dedicated MC/CCO for each RQ-4A.
4. The MC/CCO shall maintain direct two-way radio communication with ATC in domestic airspace. In oceanic controlled airspace, the MC/CCO shall forward position reports to ATC via direct landline/telephone a minimum of once each

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hour. If coordinated with the appropriate ARTCC, ARINC may be used to relay position reports and/or ATC instructions.

5. The Department of the Air Force shall provide the appropriate ATC facility(s) a current phone number to the MC/CCO for instant communication.
6. ROA shall operate external navigation and strobe anti-collision lights at all times. ROA shall operate with an operational transponder with mode C altitude encoding set at the code assigned by ATC. All primary, secondary, and redundant flight control systems shall be operational prior to RQ-4A takeoff.
7. Prior to each flight, the Department of the Air Force shall coordinate the mission with the affected ATC facility. For most Air Route Traffic Control Centers (ARTCC), this coordination should be accomplished with the Military Operations Specialist (MOS) or Traffic Management Officer (TMO). For facilities without MOS or TMO personnel, such as Airport Traffic Control Towers and Terminal Radar Approach Controls, the coordination should be accomplished with the operations supervisor. This coordination shall be initiated no later than 5 business days prior to the planned flight to allow for essential inter-facility controller briefing and coordination.
8. The Department of the Air Force shall ensure that ROA operations deconflict with all known operations above FL600.
9. The Department of the Air Force, and/or its representative(s), is responsible at all times for collision avoidance with non-participating aircraft and the safety of persons or property on the surface during all phases of the ROA's flight.
10. In the event of malfunction or lost communications the Department of the Air Force and/or its representative(s) shall proceed in accordance with paragraph 14 (see attachment) of the application for Certificate of Authorization dated August 7, 2002 and immediately notify all affected FAA Facilities. It is recommended that emergency descents should be performed within a restricted area to the extent possible.
11. Contingency plans shall be coordinated during the coordination above. Items should include possible landing sites for route of flight, phone numbers of ROA MC/CCO and ATC Facilities, primary and backup frequencies to be used, and any other information deemed appropriate by the operator or ATC.

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12. If deemed necessary by an affected ATC facility or the MC, a post-flight critique shall be conducted to identify and mitigate any operational problems encountered. This debriefing may be accomplished via telcon and should be conducted by the ATC MOS and/or operations supervisor and MC.
13. The Department of the Air Force shall enter into a Letter of Agreement (LOA) with all affected ATC facilities for operations into and out of specific airports outside of restricted areas. The Letter of Agreement shall address operational and ATC requirements unique and specific to each location and/or airport. Under special circumstances where time is critical and development of a LOA may delay the mission, the servicing Regional Office may issue a one time Certificate of Authorization to the Air Force to allow for a specific operation. Requests of this nature should only be submitted when no other options are available. In such a case, the request must be submitted to the Regional Office as soon as possible to allow for coordination with affected ATC facilities.
14. This COA does not, in itself, waive any Federal Aviation Regulation (FAR), nor any state law or local ordinance. Should the proposed operation conflict with any state law or local ordinance, or require permission of local authorities or property owners, it is the responsibility of the Air Force to resolve the matter. This COA does not authorize flight within Special Use Airspace without specific approval from the Using Agency. The Department of the Air Force is hereby authorized to operate ROA(s) in the areas described, and during the times specified, in this COA.



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**Application for  
RQ-4A Global Hawk Remotely Operated Aircraft  
National Certificate of Authorization**

1. **PURPOSE.** This Application for Remotely Operated Aircraft (ROA) National Certificate of Authorization (COA) is for the Global Hawk ROA to conduct flight operations within the continental US (CONUS), off shore airspace, and international airspace controlled by United States Air Traffic Control (ATC) facilities.

2. **EFFECTIVE.** August 7, 2002

3. **PROPONENT.** Air Combat Command. Other users: Air Force Materiel Command.

4. **ROA SYSTEM.** The Global Hawk ROA system has three components: (a) Global Hawk aircraft, (b) Launch and Recovery Element (LRE), and (c) Mission Control Element (MCE).

4.1. **Global Hawk Aircraft.** Northrop Grumman Corporation, Ryan Aeronautical Center, Rancho Bernardo, California manufactures the Global Hawk, RQ-4A. The Global Hawk ROA is a fully autonomous aircraft that includes pre-planned responses to onboard system failures. Autonomous pre-planned responses may be overridden from the ground control elements when required. Phase II of the program, completed in March 1999 at Edwards AFB, California, established airworthiness to fly in civil airspace. To date the aircraft has flown over 1500 hours in civil airspace worldwide. The FAA Western Pacific Region, AWP-520 issued the first COA for Global Hawk in March 1999 and has since granted renewals and addendums as required. Since June 1999, Global Hawk has flown several missions in the NAS throughout CONUS as well as oceanic/international operations in the Atlantic and the Pacific.

4.2. **LRE.** The LRE is used for aircraft command and control primarily during launch and recovery until handoff to the MCE. The LRE provides precision Differential Global Positioning System (DGPS) corrections for navigational accuracy during takeoff, approach, and landing. The LRE normally is located at a main or forward operating location with the aircraft. Prior to take-off, the LRE verifies the health and status of various aircraft subsystems. Upon the issuance of a takeoff command, the aircraft executes an autonomous takeoff, climb and proceeds enroute to a designated waypoint for handoff to the MCE. The LRE is staffed by a pilot who initiates commands and monitors aircraft health and status until handoff. The LRE pilot will communicate with ATC authorities until handoff. The pilot can override mission planned heading, route, and/or altitude in near-real time. Exemption 3; 49 USC, 40119, 49 CFR, 1520.5

Exemption 3; 49 USC, 40119, 49 CFR, 1520.5

4.3. **MCE.** The MCE provides for aircraft and mission control during the enroute and on-station mission phases. The MCE is staffed by a Mission Commander (MC) or Pilot (P), communications specialist, and an imagery analyst. The MC has overall responsibility for mission execution. The MCE possesses all functionalities of the LRE (except DGPS capability), plus the capability to receive, examine, store, and disseminate sensor image data. The MCE need not be collocated with the aircraft at the operating base and may be collocated with the Task Force Commander or intelligence units. Exemption 3; 49 USC, 40119, 49 CFR, 1520.5

5. **INTENDED FLIGHT OPERATIONS.** Global Hawk is a self-deploying, long-dwell, high-altitude military reconnaissance aircraft. This aircraft completed a Department of Defense Advanced Concept Technology Demonstration and received a favorable military utility assessment in September 2000. Global Hawk is currently in an Engineering, Manufacturing, and Development (EMD) phase and will be assigned to Air Combat Command. During transition to operations, Global Hawk will continue supporting joint and service exercises and real-world contingency operations. Missions may require flight operations out to 1200 miles to a mission area, up to 24 hours on-station, and then return flight to the operating base. Flight operations in the NAS are necessary to achieve the military's operational objectives. All operations in the airspace over the CONUS, outside of restricted and warning areas, will be accomplished in compliance with Instrument Flight Rules (IFR). Specific procedures for takeoffs, landings, climbs/descents (below Class A airspace) will be coordinated with the affected ATC facilities. An equivalent level of

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safety, comparable to see-and-avoid requirements for manned aircraft will be provided as required by FAAI 7610.4, e.g., radar monitoring, visual observation by chase/patrol aircraft, etc.

**6. ROA PHYSICAL CHARACTERISTICS.** A Global Hawk line drawing is presented in attachment 1. The aircraft equipment includes:

**6.1. POWERPLANT.** A single Rolls-Royce Allison turbofan (AE3007H) that uses JP-8 fuel and is capable of generating 7,000 lbs. of thrust. This engine is a derivative of the certified AE-3007 jet engine that is used on the Citation X and Embraer 145 aircraft.

**6.2. DATA LINKS.** The system provides continuous duplex command and control communications from the LRE/MCE to the ROA via line-of-sight (LOS) and/or satellite communication (SATCOM). These links allow dynamic aircraft control, command updates by the MC/P, and also provide continuous monitoring of aircraft health and status.

**6.3. NAVIGATION.** Global Hawk possesses a quadruple redundant navigation system of coupled Inertial Measurement Units (IMU) and Global Positioning Systems (GPS) that navigates the ROA by autonomous means from point to point.

**6.4. LIGHTING.** Global Hawk is equipped with standard aircraft position lights and anti-collision strobe lights, IAW FAA directives. All external lighting can be controlled by the MC/P from the LRE/MCE while the ROA is in-flight.

**6.5. IFF TRANSPONDER.** Global Hawk is equipped with a Mode 3/A, 4096 code, Mode C altitude encoding transponder. The MC/P can change the transponder codes in-flight and command the transponder to "ident". In addition, in the event of a command and control data link loss, the system recognizes the loss of the data link and automatically changes the transponder to code 7600. In the event of a failure, which initiates an emergency-landing contingency (e.g. engine failure), the system automatically changes the transponder code to 7700.

**6.6. VOICE COMMUNICATION.** Exemption 3; 49 USC, 40119, 49 CFR, 1520.5

Exemption 3; 49 USC, 40119, 49 CFR, 1520.5

**6.7. BATTERY SYSTEM.** Global Hawk is equipped with a backup battery system which provides a minimum of 45 minutes continuous DC power to flight critical components should the primary electrical generating system fail.

**6.8. SITUATIONAL DISPLAYS.** The LRE/MCE situational displays include: aircraft performance, system/subsystem health and status, aircraft equipment configuration, and a moving map navigational display.

## 7. OPERATING CHARACTERISTICS

**7.1. RUNWAY REQUIREMENTS.** Global Hawk is capable of operating from airfields with an 8,000 x 150 foot runway and can handle up to 15 knots of crosswind component. The Global Hawk is self-deploying and can takeoff/recover anywhere there is a compatible SCAT-1 DGPS landing system. The aircraft is also equipped with a commercial, satellite-based OmniStar system to provide worldwide differential GPS corrections for use as a backup, or when beyond line-of-sight from the LRE's SCAT-1 system. Emergency landings can be accomplished with the on-board P-Code GPS aided inertial navigation system.

**7.2. CLIMB PERFORMANCE.** Initial climb rate is 3500 ft/min at 150 KIAS. Climb rate decreases with altitude. At FL 300, climb rate is approximately 1500 ft/min. At FL 500, climb rate is approximately 250 ft/min at 130 KIAS. Above FL 450, Global Hawk transitions to a cruise climb profile with climb rate predicated on aircraft weight. Time to climb from sea level to FL 550 is approximately 1 hour. Maximum ceiling altitude is 65,000. Descent rate from cruise altitude is approximately 2600 ft/min.



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**7.3. CRUISE SPEED.** Cruise speed at altitude is 100-110 KIAS. Nominal cruise is 0.6 Mach (approximately 340 KTAS) at or above FL500.

**7.4. MANEUVERABILITY.** Turns performed at normal route turn points or when initiated by the MC/P are made at 20 degrees angle of bank (AOB) below FL 240 and 15 degrees AOB above FL 265 without losing altitude. During Emergency Landing contingencies, turn rates increase to 35 degrees AOB below 10,000 feet.

**7.5. RESPONSIVENESS.** Global Hawk responds to override heading and/or altitude commands Exemption 3; 49 USC, 40119, 49 CFR, 1520.5

**7.6. FLIGHT DURATION/RANGE.** Global Hawk's flight duration is up to 36 hours and has a one-way transit range of approximately 12,500 nautical miles.

## 8. METHOD OF PILOTAGE

**8.1. AUTONOMOUS CONTROL.** The aircraft automatically executes the mission plan loaded into the on-board mission computer. After the takeoff command is issued by the MC/P, a complete mission can be flown with no interaction with a ground element. The navigation mission plan consists of a series of waypoints defining the latitude, longitude, and altitude through which the aircraft is guided during both normal and emergency flight conditions.

**8.2. CONTINGENCY SEGMENTS.** In addition to basic mission plan waypoints, alternate (contingency) mission segments are associated with each waypoint. Contingency routes provide the capability to return to base (RTB) on command from the MC/P, or automatically RTB because of low fuel, loss of data link communications, loss of mission essential equipment such as sensors, or aircraft subsystem failures.

**8.3. OVERRIDE CONTROL.** MC/P override aircraft control is available if emergency situations dictate or when response to ATC direction is required. The MC/P has the capability to override the mission plan and "manually" control the aircraft heading, and altitude (up to FL450). Above FL450, the aircraft is in a continuous climb to FL650 and cannot be leveled off. The MC/P can initiate a "Suspend Mode" at ATC direction, which results in a standard holding pattern of one-minute legs below 14,000 feet and one and one-half minute legs above 14,000 feet at normal turn rates. The MC/P may also exit override control and return the aircraft to autonomous operation by directing the aircraft to a mission waypoint. The MC/P may also command subsystem functions such as lights, strobe, ATC radio, radar altimeter, IFF, etc.

**9. MISSION COMMANDER QUALIFICATIONS.** The Global Hawk MC and/or the pilot is an FAA certified IFR pilot or military equivalent rated officer. The MC is in charge of mission execution. The pilot may concurrently fill the MC role.

## 10. METHODS TO AVOID OTHER TRAFFIC

**10.1. IFR AIR TRAFFIC.** Global Hawk currently does not have a "see and avoid" capability. All Global Hawk flights within Class A airspace and Class E airspace (above FL600) will be accomplished on an IFR flight plan in compliance with ATC clearances and instructions. Separation from other IFR traffic will be provided by ATC in both the Class A and E airspace environments.

**10.2. VFR AIR TRAFFIC.** The DoD organization responsible for Global Hawk operation is responsible for deconflicting with any possible traffic operating VFR in Class E airspace above FL600 through prior coordination. Departure/arrival operations below FL180 will rely on radar monitoring or one of the other methods outlined in FAAH 7610.4, Chapter 12, Section 9.

**11. COORDINATION PROCEDURES.** All routine flights into the NAS must be coordinated at least 3 working days in advance with the local FAA Enroute Center. The Global Hawk MC or designated representative is directly responsible for the safe aircraft operation and is responsible for coordination with all affected ATC facilities to develop and/or ensure compliance with standard operating procedures. Likewise, the MC or designated representative is responsible for coordinating with and obtaining scheduling authority approval for any restricted/warning area for any



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Global Hawk flight operation that is performed in special use airspace. Normal operations will be in special use airspace, Class A airspace, or Class E airspace above FL 600. Exceptions will be coordinated with the affected air traffic facilities 30 days in advance of initial planned operations(s).

**12. COMMUNICATION PROCEDURES.** All flights must be in direct communication with ATC. Voice communications between the MC/P and ATC shall be as directed by the affected ATC facility. Frequency changes from ATC will be performed in the same manner as manned aircraft operations. **Exemption 3; 49 USC, 40119, 49 CFR, 1520.5** direct voice communication will be the same as manned aircraft operations. Direct voice communication with all affected ATC facilities will be accomplished, unless an affected facility authorizes another means of communication **Exemption 3; 49 USC, 40119, 49 CFR, 1520.5**

### 13. ROUTE AND ALTITUDE PROCEDURES

**13.1. ROUTE.** All routes will be coordinated with each affected ATC facility in advance. All flights will be performed on an IFR flight plan using standard navigational aids and five-letter fix identifiers, and/or fix/radial/distances to identify the route of flight.

**13.2. ALTITUDE.** The filed altitude will be FL650. Above FL450, Global Hawk is in continuous cruise-climb status and it takes several hours for the aircraft to reach its final altitude.

**14. CONTINGENCIES.** The Global Hawk flight management system is programmed, for each route segment, to autonomously perform a specific contingency mission profile in the event of specified anomalies or system/subsystem failures. Contingency mission segments provide the capability to RTB on command from the pilot, or automatically RTB because of low fuel, loss of communications, or onboard subsystem failures. Global Hawk has three primary contingency modes: 1. Lost Data Link Communications, 2. Return to Base and 3. Emergency Landing. Lost Link contingency (1) routes will always be designed to avoid special use airspace that has not been pre-coordinated. The RTB contingency (2) results in an immediate return to the departure airport or an alternate pre-coordinated airfield via a direct, pre-planned route. The Emergency Landing contingency (3) results in immediate return to an alternate, pre-coordinated airfield, or a nominal safe surface impact area (dry lake beds, unused military auxiliary fields, etc). The affected ATC facility/facilities shall be immediately notified of the contingency course of action the aircraft will execute whenever a contingency route is executed. A list of telephone numbers for each ATC supervisory position responsible for airspace the aircraft is programmed to operate in shall be prepared as part of the advance coordination action.

**14.1. LOST DATA LINK PROCEDURES.** In the event of loss of command and control data link between the aircraft and the LRE/MCE, the aircraft executes the preplanned lost communications contingency mission plan and the Global Hawk's transponder automatically changes to code 7600. Because ATC voice relay is precluded whenever data links are lost, the affected ATC facility/facilities shall be apprised immediately via telephone of the contingency course of action the aircraft will execute whenever a lost link occurs.

**14.2. LOST VOICE COMMUNICATION PROCEDURES.** In the event direct voice radio communications between the MC/P and ATC are lost, the MC/P will command Global Hawk's transponder to code 7600 and the aircraft will continue to operate along its pre-programmed route. MC/P will also notify ATC by telephone that the ROA has lost ATC voice capability.

**14.3. MISSION ABORT PROCEDURES.** In the event of subsystem problems, which jeopardize the aircraft operational capability, the aircraft is programmed to autonomously return to the departure airport or a pre-selected alternate landing site. The MC/P will ensure that appropriate ATC facilities are apprised of the emergency and RTB routing. If the emergency is flight critical requiring immediate recovery, the aircraft transponder will automatically change to code 7700.

**14.4. REFUSED TAKEOFF PROCEDURES.** The takeoff and mission can be aborted by the MC/P in the LRE or by the aircraft itself. Refused takeoffs are initiated by a Takeoff Abort command. Takeoff abort is inhibited once the main gear weight on wheels sensors detect lift off at which point the aircraft initiates one of three contingency plans previously described.

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14.5. **LANDING ABORT PROCEDURES.** A landing can be aborted by the MC/P in the LRE or by the aircraft itself. MC/P directed landing aborts are initiated by a Land Abort command. In response to a land abort, the aircraft executes a preplanned missed approach.

//signed//

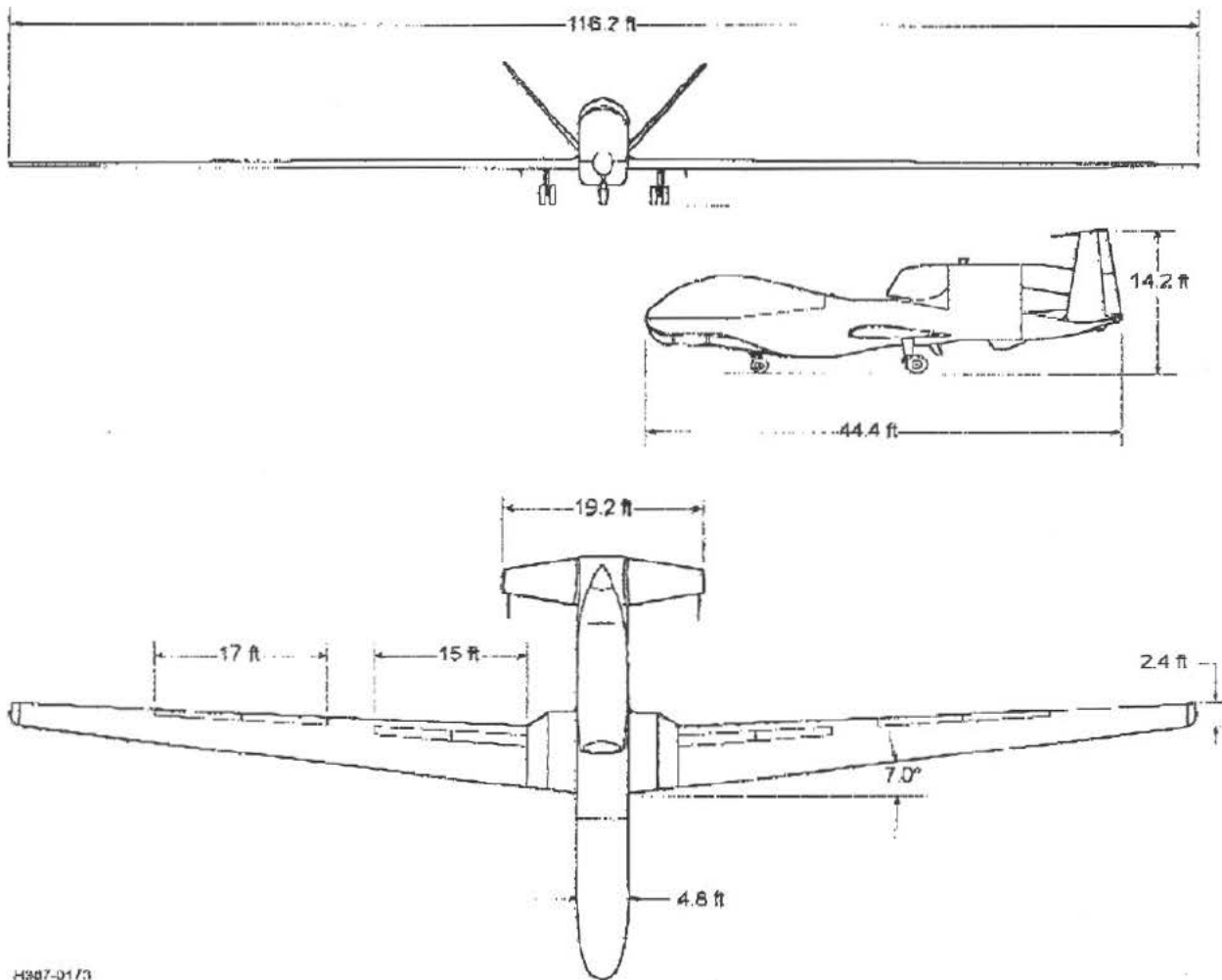
(b) (6)

Director of Aerospace Operations

SENSITIVE SECURITY INFORMATION

Attachment 1

**Global Hawk Aircraft**



H807-01/73