CHAPTER 1

PURPOSE AND NEED
FOR THE PROPOSED ACTION

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1.1 INTRODUCTION

The United States Air Force (Air Force) proposes to establish a main operating base for the Global Hawk, an unmanned aerial vehicle (UAV), at one of five Air Force bases within the contiguous United States. As part of the decision-making process, the Air Force is conducting an environmental analysis to determine the potential environmental impacts of this beddown. This proposal involves locating 18 high-altitude, long-endurance unmanned aerial vehicles, associated equipment, and approximately 900 personnel at an Air Force base. The beddown would start with an initial set of up to four aircraft the first year (2001), with two aircraft delivered per year until the full complement of aircraft is based in 2012. The proposal includes construction of support facilities and use of existing airspace around the base.

The Global Hawk is a high-altitude unmanned aerial vehicle (UAV) that flies missions up to 24 hours in length.

Five Air Force bases are being considered for the main operating base Global Hawk beddown: 1) Beale Air Force Base (AFB), California; 2) Edwards AFB, California; 3) Ellsworth AFB, South Dakota; 4) Tinker AFB, Oklahoma; and 5) Wright-Patterson AFB, Ohio (Figure 1.1-1). The Air Force has identified Beale AFB as the preferred alternative (see Section 2.1.4).

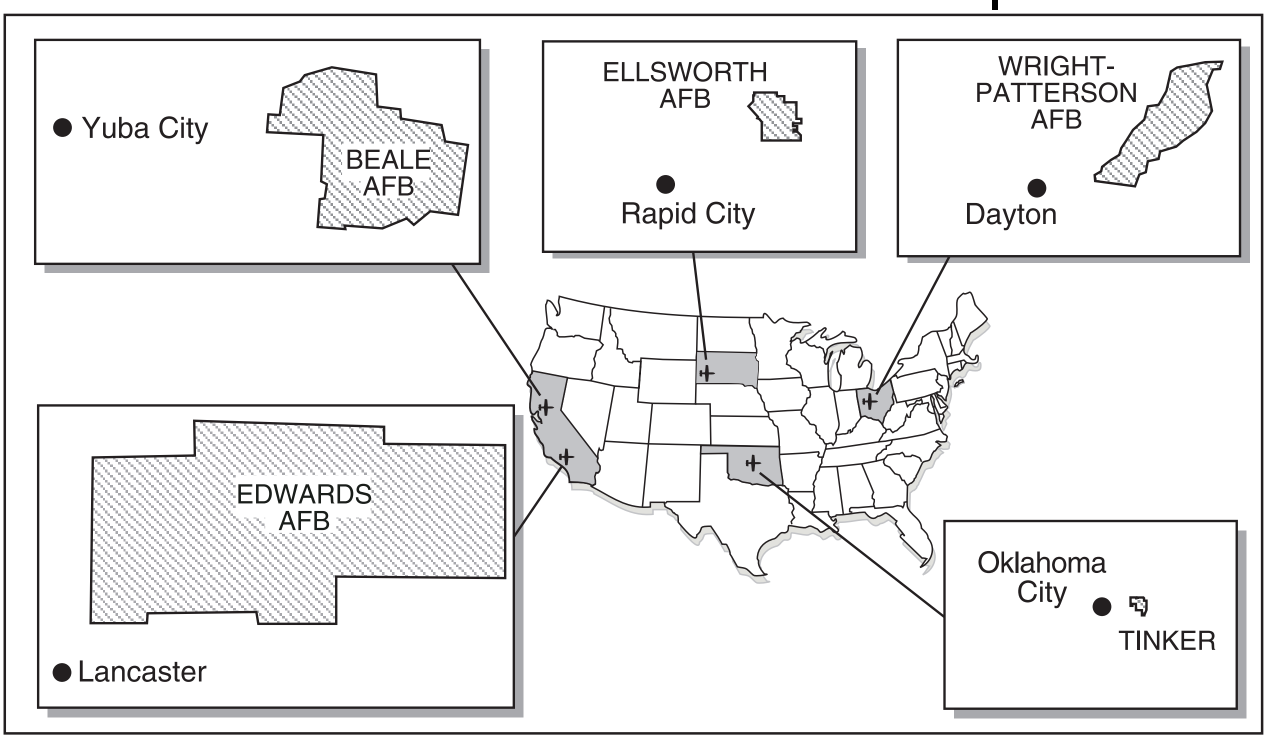


Figure 1.1-1 Potential Locations of Global Hawk Main Operating Base

In addition, the Air Force will analyze the no-action alternative, which considers the potential environmental impacts of the Air Force deciding not to select one of these five bases for the beddown location of the Global Hawk.

The Air Force proposes the beddown to occur in two phases:

- Initial Phase - 2001 to 2002: At the selected main operating base, beddown of up to four Global Hawks, supporting equipment, and personnel used for the previous testing phase would move to existing base facilities and infrastructure without new construction.

- Final Build-up Phase - 2002 to 2012: Two aircraft would be added each year. Infrastructure would be developed, facilities constructed, and personnel added.

By about 2012, during the final build-up phase, the main operating base would support 18 Primary Aircraft Assigned (PAA), the full complement of personnel, and the necessary ground equipment for controlling and maintaining two squadrons of aircraft. All the infrastructure (such as hangars and housing) to support these aircraft, equipment, training, and personnel would be in place at this time, and the Global Hawk program would be fully operational. The 18 aircraft would continue operational and training missions from 2012 into the foreseeable future.

The Global Hawk main operating base beddown would occur between 2001 and 2012.

This environmental assessment (EA) has been prepared in accordance with the requirements of the National Environmental Policy Act (NEPA), Council of Environmental Quality (CEQ) regulations, Air Force Instruction (AFI) 32-7061 as promulgated in Title 32 of the Code of Federal Regulations (CFR) Part 989, and the Department of Defense (DOD) Directive 6050.1.

1.2 BACKGROUND

Commanders in charge of combat areas, peacekeeping operations, and humanitarian support around the world need to collect, process, and report intelligence quickly and accurately. Commanders must also be able to obtain those data from anywhere within the territory for which they are responsible, day or night, regardless of weather. The Global Hawk system fulfills the need for near real-time, on-demand images and will complement and enhance current capabilities, providing many advantages for reconnaissance, intelligence, and surveillance activities:

The Global Hawk provides rapid, accurate information without risking pilots' lives.

- It can linger (or loiter) over an area for more than 24 hours, providing constant near real-time information. Commanders can remain informed about a situation on a minute-by-minute basis. They can also alter the location and nature of the reconnaissance to adapt to changing conditions.

- It flies at extremely high altitudes (above 60,000 feet mean sea level [MSL]) to maximize performance of reconnaissance sensors.

- It offers multiple information-gathering radars, cameras, and sensors and can transmit data almost instantaneously via satellite.

- It allows commanders to conduct essential missions without endangering pilots.

With the successful completion of the Global Hawk demonstration and evaluation phase in 2000, the Air Force proposes to move aircraft, associated ground equipment, and personnel used in this phase from the current location (Edwards AFB) to the selected main operating base to start operational missions as soon as possible. Initial beddown components for the program may consist of up to four Global Hawk aircraft, two mission control elements, three launch and recovery elements, and up to 50 Air Force personnel, plus contract support staff. In about 2002, the Air Force proposes to start the final build-up at the main operating base, resulting in the eventual beddown of 18 Global Hawk aircraft.

1.2.1 Global Hawk Characteristics

The Global Hawk is designed to provide long-endurance, on-station intelligence, surveillance, and reconnaissance by using electro-optical, infrared, and synthetic aperture radar sensors at altitudes between 50,000 to 65,000 feet MSL. By operating at higher altitudes and for longer durations than available systems, the Global Hawk can better avoid airborne and ground-based threats and be more flexible in responding to new intelligence-gathering requirements. The Global Hawk collects and disseminates imagery (e.g., photographs), which directly input into the Air Force's existing airborne reconnaissance and ground-based intelligence systems. The Global Hawk system can disseminate collected intelligence directly to another ground system or to battlefield commanders.

During a Global Hawk mission, the aircraft is always under direct command and communication with ground personnel.

Each Global Hawk system (Figure 1.2-1) is composed of

- *Global Hawk UAVs* (Figure 1.2-2) with radar, sensors, cameras, software, and other instrumentation, as well as line-of-sight and satellite communications datalinks.

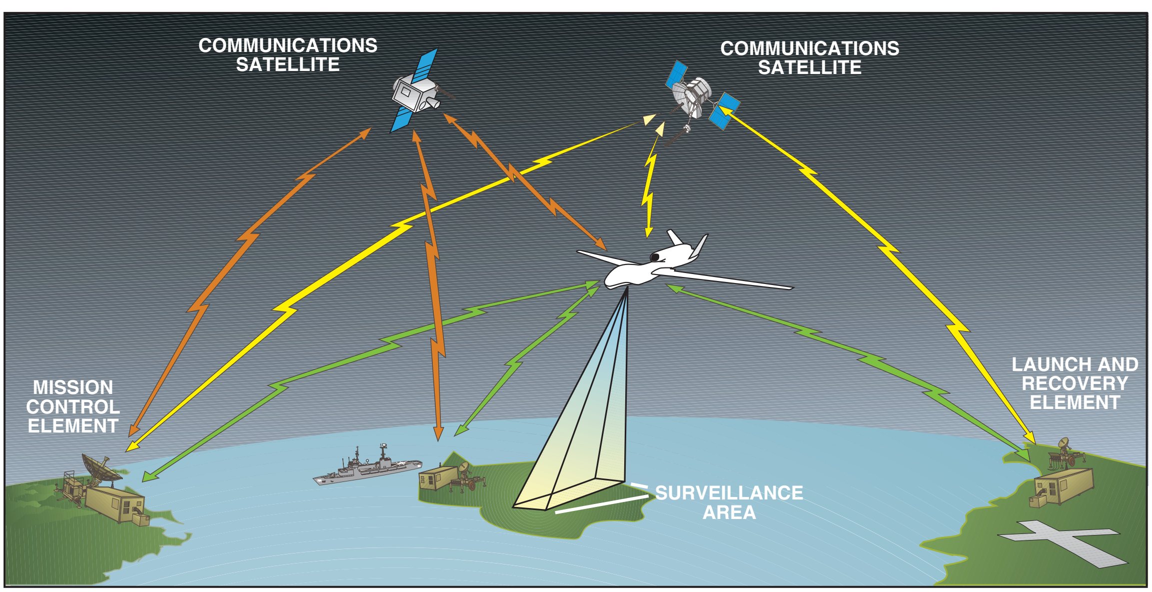


Figure 1.2-1 The Global Hawk/Satellite Ground Control Units

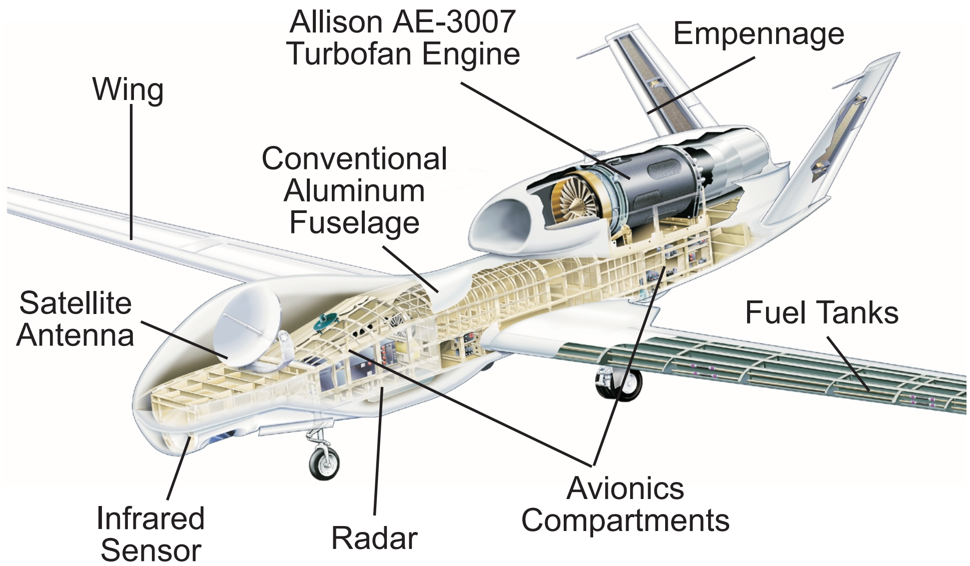


Figure 1.2-2 Global Hawk Air Vehicle Features

The Global Hawk has multiple backup systems and safety features.

The Global Hawk incorporates numerous features to ensure successful missions and safe operations:

- Redundant Systems - Duplicate systems exist for all major functions on the aircraft; if one fails, the other automatically engages.

- Pilot Command and Control - A qualified pilot constantly monitors and communicates with the aircraft from the common ground segment so he or she can react to changing situations.

- Autonomous Fail-Safes - Through design and preprogramming, autonomous fail-safe processes ensure the aircraft operates within safe thresholds. For example, if communications with the common ground segment are broken, the aircraft will fly to a preprogrammed base to land safely.

- System/Component Reliability - Design, development, and testing of the Global Hawk has focused on making each system and component of the aircraft extremely reliable under all conditions.

- Air Safety Components - The Global Hawk employs essential components (e.g., radio, altimeter, global positioning satellite data, transponder) to enable the Federal Aviation Administration (FAA) to track and manage flights within the airspace of the United States. Combined with direct communication between the Global Hawk pilot and the FAA air traffic controllers. These components allow the Global Hawk to operate similar to other aircraft from an air traffic control perspective.

- A *common ground segment* consisting of a launch and recovery element (LRE) and a mission control element (MCE) with ground communications equipment. These facilities support the personnel and equipment that fly the aircraft, communicate with air traffic controllers, and download data images from the aircraft.

- A *support segment and trained personnel* who maintain and fly the aircraft.

The *Global Hawk aircraft* measures about 45 feet long with a 116-foot wingspan. Powered by a single Allison AE-3007 turbofan jet engine, (such as the one in a Cessna Citation 10), it has about 7,000 pounds of thrust and uses regular jet fuel (JP-8). Constructed of standard materials used in modern aircraft, it contains no "exotic" composites or other unusual equipment or components. The electronics and communications systems operate in frequencies designed not to pose a biological risk or to interfere (or be interfered) with other communications systems (e.g., telephones and televisions), aircraft navigation, or household electronics. The Global Hawk radio frequency emissions are comparable to those generated by a residential television satellite dish. All frequencies used by the Global Hawk and the ground segments are assigned by the Federal Communications Commission to not conflict with other civilian, military, and commercial uses.

The Global Hawk is constructed of standard materials and uses regular jet fuel.

The Global Hawk can operate autonomously, using preprogrammed flight and mission instructions. It is designed to take off, fly its mission, and land automatically, yet remain under the direct command and control of qualified pilots in the common ground segment. The Global Hawk can also be flown with direct commands from the ground segments. Pilots and other mission specialists in the ground segment are in constant, immediate communications with the aircraft (using satellite or line-of-sight communications) to monitor system status and function and to alter the mission as needed. Such communication allows the aircraft to be commanded from anywhere in the world.

Common ground segments (Figure 1.2-3) consist of LREs and MCEs. These two ground systems are used to remotely control the Global Hawk. Both are mobile (like trailers) to enhance loading and transport for deployment. Two personnel, including a local mission commander, operate the LRE. The LRE operators monitor the aircraft for takeoff and landing and coordinate with the local air traffic controllers. They maintain control of the aircraft to a predetermined point and then turn control over to the MCE. The LRE can also provide mission planning and aircraft command and control.

The MCE is the Global Hawk ground control station for mission planning, aircraft and mission control, and image processing and dissemination. The MCE has four operator workstations: mission planning, command and control, image quality control, and communications management. The fifth person in the MCE, the mission commander, manages the overall mission. The MCE is composed of a standard shelter that houses the crew members at their workstations.

During operations when the MCE and LRE are not collocated (such as when the Global Hawk is deployed to a foreign base), the senior operator at the LRE serves as the local mission commander until aircraft control is passed to the MCE. The LRE and MCE differ in two important ways. First, the LRE lacks the capability to receive and process intelligence data and imagery. Rather, the MCE performs these functions. Second, the LRE has a Differential Global Positioning System (DGPS) to

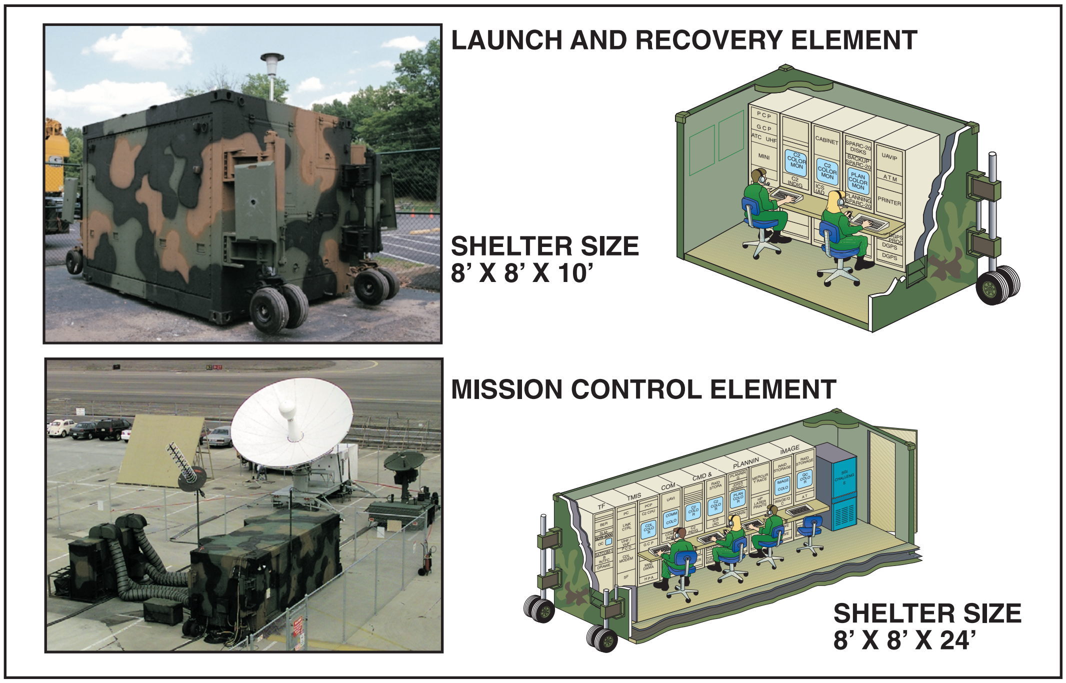


Figure 1.2-3 Global Hawk Common Ground Segment

provide precise navigation required for ground operations, takeoff, and landing; the MCE does not have this system.

The *ground support segment* includes all equipment required to operate and maintain the system, spare and repair parts, and personnel trained to maintain the air vehicles and ground elements.

1.2.2 Global Hawk Mission

The Global Hawk's mission is to collect intelligence data to support combat, humanitarian, and peacekeeping operations in locations outside the United States as designated by the President and Secretary of Defense. It is designed to either fly from the United States to complete its mission or be deployed to and operate from a base nearer the area requiring reconnaissance.

Depending on the nature, location, and duration of the need for intelligence data, the Global Hawk mission would vary. Three basic scenarios are presented below:

1. The Global Hawk aircraft would fly from the main operating base to the area needing surveillance, conduct its mission, and then return to the main operating base.

2. Because the Air Force expects to place additional LREs, MCEs, and personnel in a few strategic locations around the world, the Global Hawk aircraft would depart the main operating base and fly to an overseas base associated with a pre-positioned LRE and MCE. The Global Hawk would operate from this overseas base until no longer needed, with different aircraft transitioning in and out, depending on the duration of the assignment.

3. To respond to situations in locations without pre-positioned equipment, the Global Hawk aircraft would fly from the main operating base to an assigned overseas base. Reserve LRE, MCE, and maintenance equipment would be air-lifted from the main operating base to the overseas base. The Global Hawk would operate from the overseas base just as it would in the second scenario.

The Global Hawk mission profile would be similar in all three scenarios (Figure 1.2-4). The aircraft would take off from its base and climb at an average of 160 nautical miles per hour (knots) to about 18,000 feet MSL within 5 to 6 minutes.

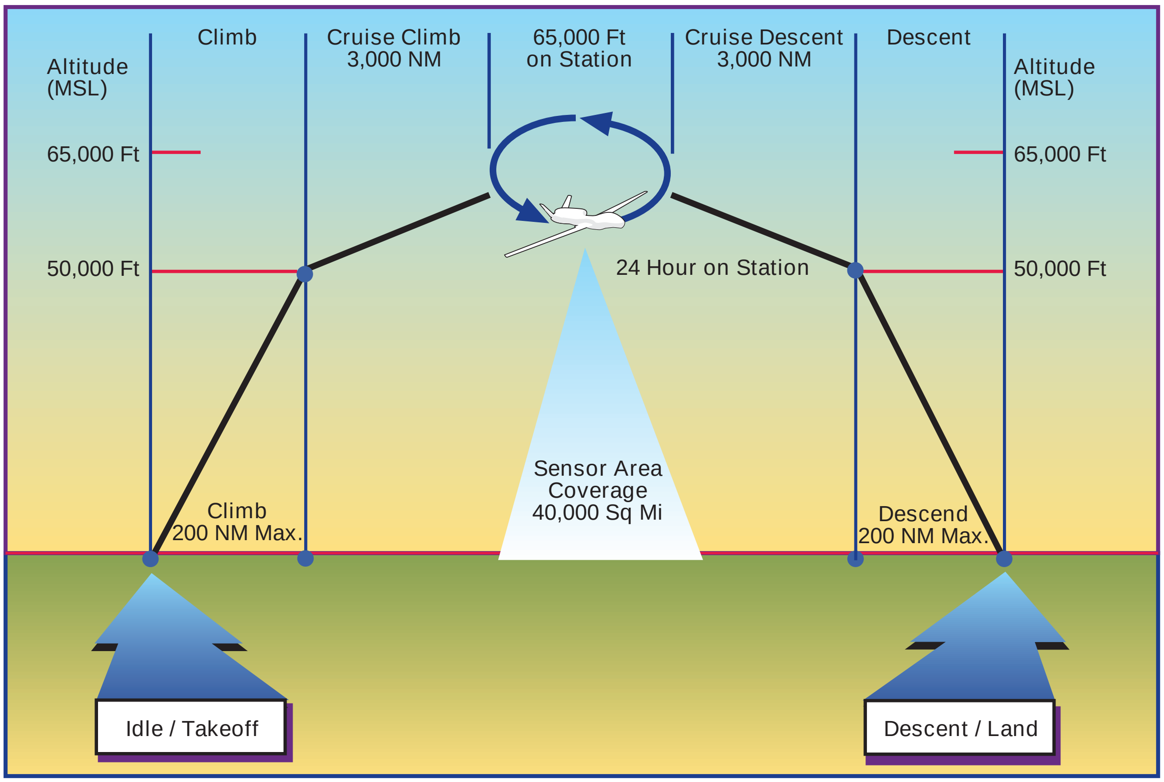
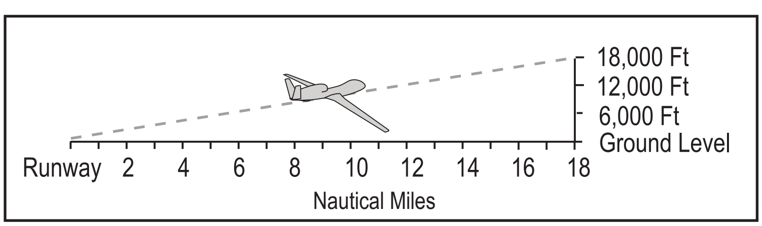


Figure 1.2-4 Global Hawk Mission Profile

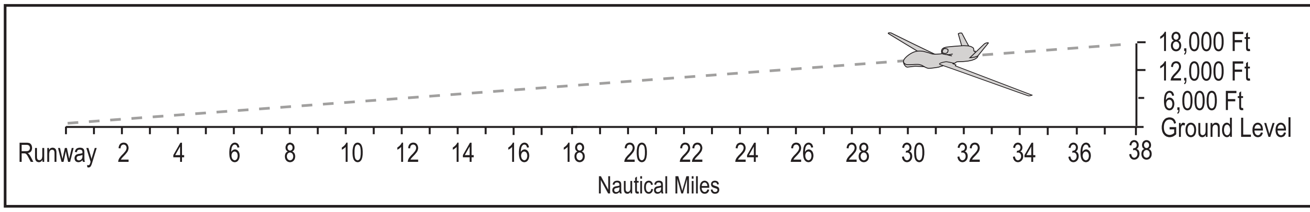
During each mission, the Global Hawk flies above 50,000 feet MSL over 90 percent of the time.

The Global Hawk climbs at a rate of 3,000 to 3,500 feet per minute. It would continue its climb from 18,000 feet MSL through 50,000 feet MSL where it would begin to cruise at 350 knots on its way up to 65,000 feet MSL. The aircraft would remain at this altitude to conduct the reconnaissance mission of the area requiring surveillance for as long as 24 hours.



Departure Profile

After completing its mission, the Global Hawk would descend to 18,000 feet MSL. The aircraft would descend below 18,000 feet MSL about 38 nautical miles (NM) from the airfield where it would land. The Global Hawk would descend using a 4.5-degree glide slope rather than a 2.5- to 3-degree glide slope used by manned aircraft. The Global Hawk, therefore, would spend less time below 18,000 feet MSL than comparable manned aircraft.



Approach Profile

The Global Hawk aircraft would always fly using Instrument Flight Rules (IFR) procedures. All communications for aircraft control would be between air traffic control personnel and the current instrument-rated pilot who is controlling the aircraft from either the LRE or MCE.

Air traffic personnel would continuously monitor Global Hawk's position, altitude, airspeed, and direction of flight using its onboard transponder and ATC automation. All aircraft must be equipped with a transponder to operate at 18,000 feet MSL and above. Air traffic control personnel use transponder information to issue traffic advisories to help separate aircraft. If there is a possible conflict, air traffic control personnel would direct the ground-based pilot in charge of the Global Hawk aircraft to delay a takeoff or change its heading and/or altitude to separate it from other aircraft. As the Global Hawk traversed the airspace system during its climb or descent, air traffic control personnel would direct the pilot controlling the Global Hawk to change radio frequencies to communicate directly with various air traffic control personnel. Such communication and direction would occur throughout all the different segments of airspace in which the Global Hawk flies. These procedures are no different from those used by commercial airliners.

The Global Hawk would fly using the same procedures as manned aircraft.

The Global Hawk aircraft has redundant communications and navigation equipment. Redundant line-of-sight and satellite communications systems are installed in the Global Hawk aircraft to reduce the possibility of losing communications. Though the aircraft's generator is the primary source of electrical power, the battery provides backup power.

In the unlikely event that communication between air traffic control personnel and the ground-based pilot could not be maintained through primary and secondary systems, the aircraft would return to the departure base for landing according to a preprogrammed profile. In this scenario, the transponder would emit an identifying beacon to alert air traffic control that the aircraft has lost communications. Air traffic control personnel would then provide advisories to all aircraft to ensure everyone's safe passage through the airspace and allow the Global Hawk to land.

The Global Hawk's route for all operational missions will keep the aircraft within 250 miles of a suitable landing location. This ensures the aircraft can land safely at an alternative location if a problem arises.

1.3 PURPOSE AND NEED FOR THE ACTION

The Global Hawk comprises an essential asset for worldwide intelligence gathering and near real-time information dissemination. No other Department of Defense asset provides the current or future intelligence-gathering capabilities offered by the Global Hawk. Therefore, the purpose of the proposed action is to implement the Global Hawk program at a main operating base within the contiguous United States. This program would begin in late 2001, with beddown of two fully operational squadrons by about 2012.

To fulfill the Global Hawk program requirements, the beddown needs to be implemented at a single Air Force base within the contiguous United States. Although Global Hawk aircraft and support capabilities would be deployed to different locations worldwide, a single main base is required to provide a consistent, dedicated location for overall command, maintenance, data collection, upgrade, and training.

The Global Hawk is an important and unique intelligence-gathering asset.

In addition, the main operating base needs

- Adequate facilities to allow immediate (Fall 2001) initial beddown of up to four aircraft and associated equipment and personnel.
- An existing runway to support the Global Hawk aircraft.
- Sufficient capacity to accommodate the full Global Hawk beddown.
- Minimal communications interference from other sources.