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ON ARMED SERVICES**

**TESTIMONY OF**

**DR. GLENN F. LAMARTIN**

**DIRECTOR, DEFENSE SYSTEMS**

**OFFICE OF THE UNDER SECRETARY OF DEFENSE**

**(ACQUISITION, TECHNOLOGY AND LOGISTICS)**

**BEFORE THE UNITED STATES HOUSE**

**COMMITTEE ON ARMED SERVICES**

**SUBCOMMITTEE ON TACTICAL AIR AND**

**LAND FORCES**

**March 9, 2005**

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SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES  
HOUSE ARMED SERVICES COMMITTEE  
UNITED STATES HOUSE OF REPRESENTATIVES  
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**INTRODUCTION**

Good afternoon Mr. Chairman, Mr. Abercrombie, and Members of the Committee. I am the Director of Defense Systems within the Office of the Under Secretary of Defense (Acquisition, Technology and Logistics). Oversight of Unmanned Aerial Vehicle systems acquisition is one of my responsibilities, and that is why I am here today. I appreciate the opportunity to express the Department's views on the progress we have made in our Unmanned Aerial Vehicles – or UAVs as this technology area is commonly known. I would first like to thank the members of this subcommittee. Your committee has consistently provided direction and support to our efforts in development and migration of UAV systems to the joint force. We owe many of our UAV-related successes in large part to the unwavering support this committee has provided.

What a difference a year makes! Last year, when I testified before this committee, UAVs were playing a major combat support role in both Operation IRAQI FREEDOM (OIF) and Operation ENDURING FREEDOM (OEF). During the past year, not only have UAV operations continued in support of the Global War On Terror (GWOT), they have expanded dramatically. UAV systems are playing an ever increasing role in a wide range of DoD missions, including counter-insurgency operations, force and infrastructure protection, collection of vital intelligence, and strike of time-critical targets. Today, the military departments boast a force of

over 1200 small UAVs and over 200 tactical and theater UAVs supporting military operations worldwide. The largest increase in quantity has been in small UAVs. As a result of Congress' approval of Fiscal Year 2004 supplemental funding, the Army bought 185 Raven systems (555 aircraft), all of which have been delivered during the past year and most of which are operating today in OEF and OIF. This is noteworthy when one recalls that the Department operated only one UAV type in support of Operation DESERT STORM in 1991; and as late as 2000, we had less than 50 operational tactical UAV systems. Tables 1 and 2, below, provide information on the types and numbers of operational UAVs in inventory. The information on types and numbers of systems deployed is included in the Joint Staff's presentation.

**TABLE 1. Operational DoD Small UAVs in Inventory, as of February 1, 2005**

System	Military Department /Command	First Flight	Total Aircraft Inventory
Pointer	Air Force	1986	32
	SOCOM		94
Raven	Army	2002	555
	Air Force		84
	SOCOM		225
Dragon Eye	USMC	2000	135
Force Protection Airborne Surveillance System (FPASS)	Air Force	2002	126
<b>Total</b>			<b>1251</b>

**TABLE 2. Operational DoD Tactical and Theater UAVs in Inventory, as of Feb 1, 2005 \***

System	Military Department /Command	First Flight	Total Aircraft Inventory
Pioneer	Navy & USMC	1985	35
I-Gnat	Army	2004	3
Shadow 200	Army	1998	96
Hunter	Army	1991	32
Predator A	Air Force	1994	59
<b>Total</b>			<b>225</b>

Note: Some systems (e.g., Global Hawk and Predator B prototypes) support OIF and OEF but are not yet operational. Also, Scan Eagle is supporting Marine Expeditionary Forces with two systems that are contractor owned.

In addition to the operational use of UAVs, the Department is conducting significant UAV-related development and acquisition activity which also demands a good deal of attention. I can assure you that the Acting Under Secretary for Acquisition, Technology and Logistics, Mr. Michael Wynne, is personally involved; and he continues to have weekly UAV meetings with his UAV Planning Task Force members.

## **OVERVIEW**

Let's start by discussing the broad nature of UAVs. In fact, I feel somewhat constrained by the term "UAV," as it tends to put emphasis only on the air platform, almost ignoring the other essential components of an effective system – like the ground control station, the sensors and payloads, the communication links, and the data distribution infrastructure. We think that the term "Unmanned Aircraft Systems" better captures the maturing nature of systems taken as a whole. We have begun using the UAS term as we refer to systems, most notably in our update of the technology roadmap. This terminology encompasses the combination of components in the system, rather than focusing on a single element. It also properly identifies the airborne component as an *aircraft*, which is consistent with the Federal Aviation Administration's view of these platforms. Since "UAV" is pervasive within the Department and nearly a household term, you will likely hear UAVs and UAS used interchangeably – even by me today. I expect that it will take a while before the new terminology takes hold.

In addition to the hardware components of Unmanned Aircraft Systems, many other elements are essential to order our thinking, guide our engineering, and enable us to operate these systems. They include a systems architecture that allows data to be moved for a variety of uses either a few miles or a few thousand miles away, adequate spectrum and bandwidth for communication, airspace management and deconfliction, common data standards and formats to allow sharing and data fusion, deliberate contingency mission planning to deal with signal loss, common operating systems, and system interoperability. While most of these are not unique to unmanned systems, there are distinct challenges in applying them to unmanned systems. Since cost is very important, all of these related elements, as well as the hardware components of the systems, must be balanced with an eye on controlling system life-cycle costs.

## OVERSIGHT

In 2001, the Under Secretary of Defense for Acquisition, Technology and Logistics (USD(AT&L)) formed the UAV Planning Task Force to provide oversight for all of the Department's major UAV acquisition programs and to provide guidance, as necessary, to maximize interoperability and commonality. Under my management, the Task Force works to guide the Services in their acquisition planning, prioritization, and execution of Unmanned Aircraft System programs. During the past year, the Office of the Secretary of Defense (OSD) has been actively involved in molding the long-term Department vision for UAVs with regular exchange of information with the military departments, and for major UAV programs, through Defense Acquisition Board-level reviews when appropriate. During the past year we have held six Executive Committee meetings for the Joint Unmanned Combat Air Systems program alone, as well as several meetings on Predator and Global Hawk programs. To emphasize the need for better UAV common support elements, including testing, training, logistics support, maintenance, basing and operations, the Acting USD(AT&L) wrote to each of the Secretaries of the military departments and to the Director of the Defense Advanced Research Projects Agency requesting that they actively plan for maximum commonality in all UAV acquisition programs. OSD also worked to fulfill the goals laid out in the December 2002 OSD UAV Roadmap. One of the goal-related studies resulted in the Airspace Integration Plan for Unmanned Aviation, the first such Department-wide plan, establishing top-level timelines to achieve the safe, routine use of the National Airspace System by DoD unmanned aircraft. Another study is addressing UAV frequency spectrum issues, a key challenge in current operations.

The UAV Planning Task Force leads the development of the OSD UAV Roadmap. This document has become one of the key methods to provide a plan for the future of UAS development. This roadmap provides guidance to ensure that Service-developed systems and capabilities support the Department's goals of fielding transformational capabilities, establishing joint standards, and controlling cost. The roadmap is being updated for release later this spring. As I mentioned before, it will be published under a new title, the *OSD UAS Roadmap*, and it will set the framework for future Unmanned Aircraft Systems and related efforts. We have expanded this document to address some associated technologies, including airships and unmanned ground

vehicles, because of their synergy with Unmanned Aircraft Systems. The Joint Staff authored a classified appendix to the roadmap, detailing the current UAV operational capability and process for U.S. Central Command (CENTCOM). We have also responded to the recommendation of this committee by including in the roadmap a discussion of potential UAV capabilities for Department of Homeland Security (DHS) missions. Working through the DoD Office of Homeland Defense, we have shared acquisition experience and provided valuable expertise to DHS as a good foundation for deciding how UAS might best be applied to homeland security.

In response to the 2004 Defense Authorization Act, the Office of the Under Secretary for Intelligence is completing an Intelligence Surveillance and Reconnaissance (ISR) Integration Roadmap. This initial roadmap relates the Department's ISR investments, including the UAVs, into the context of an investment strategy centered around the concepts of ISR recapitalization and achievement of the emerging concept of persistent surveillance. For example, the initial findings highlight that the current investment in endurance UAVs will significantly mitigate the current ISR Low Density/High Demand shortfalls by 2010. This initial effort will form the baseline for future ISR capability based assessments, including a better understanding of the full motion video requirements, primarily provided by UAV systems, which is in increasing demand by our ground forces in Iraq and Afghanistan.

UAV systems have become the preferred capability for a wide variety of missions, including collecting critical intelligence data, taking lethal action, or providing situational awareness. Recent operational events have clearly demonstrated the ability and likelihood that UAVs procured by one military department can support a broad range of users, including those from other military departments. Therefore, while the majority of the Department's acquisition programs are funded and managed by an individual military department, it is critical that each UAS be designed to be interoperable for joint operations. To help ensure this interoperability and alignment with capability needs, all major DoD acquisition programs are reviewed in the new Joint Capabilities Integration and Development System (JCIDS) process. This process focuses on building joint capability, promoting information sharing, identifying areas for cooperation, and making program adjustments to correct capability gaps and redundancies. My staff reviews acquisition plans for each major UAV program and makes recommendations to

improve interoperability for the joint force. My organization works closely with Joint Staff on the acquisition programs as well as a wide range of related elements necessary for effective UAV operations. A recent example is our cooperation and engagement with the Joint Staff and Services, recommending improvements to the Predator B Capabilities Development Document. Additionally, my staff supported the Joint Staff UAV Tiger Team in assessing current operations and recommending near-term materiel and non-materiel solutions to increase capability and improve effectiveness of the current assets. The Joint Staff will report the results of the Tiger Team to you later this afternoon in a closed session. This close working relationship improves the Department's ability to develop the right capability, field combat systems more rapidly, and resolve challenges earlier for full employment of UAS capability.

In addition to participation in the JCIDS process, OSD participates in the budget preparation process, influencing decisions that affect commonality and interoperability where possible. An example of OSD influence to improve interoperability and commonality is the establishment of the Joint Unmanned Combat Air Systems (J-UCAS) program. The consolidation of separate Air Force and Navy demonstration programs has already invigorated the contractor teams and motivated work on a common operating system. Along these same lines, to extend our ability to cooperate with our allies, we are expanding our use of STANAG 4586, a jointly-developed NATO standard, defining common interfaces for UAV tactical control. This standard is a requirement for the Army's Extended Range / Multi-Purpose UAV program. This is very encouraging.

## **UAV MIX**

UAV systems are increasingly being selected as materiel solutions to perform a wide variety of missions. The current capabilities align in a multi-level construct, ranging from the bungee/hand-launched small UAV (such as Raven, Dragon Eye, Pointer and FPASS), through the tactical-level systems (such as Pioneer, Shadow, and Hunter), through the operational-level systems (such as Predator A and Predator B), and finally up to the theater-level systems (such as Global Hawk). This expansive multi-level construct of capabilities cannot be efficiently satisfied by a single UAV type. Rather, it results in tailored designs for specific operational capabilities

and functions at each of the various levels. While this might seem to proliferate a larger than necessary mix of UAV types, it should be noted that having the multi-level construct allows for inexpensive UAVs where less sophisticated equipment can satisfy the capability. It also is beneficial for the industrial base, providing opportunities for non-traditional suppliers to participate. Further, it promotes innovation in design and cost control to have competition at the various levels. We will continue, however, to strive to reduce unnecessary duplication, as we have, for example, with small, hand-launched UAVs which share common components including sensors, avionics, and data links. To ensure that we get the most out of our mix of systems, it is also important that we work the details of sharing and fusion of data products between systems and users. This can be enabled via common standards and formats and a robust systems architecture.

As we have seen in the past, the roles and missions for UAS on the battlefield are still dynamically expanding. This has benefits and drawbacks. As technology evolves, it is good that we are finding more militarily useful capability that can be performed by unmanned systems. However, it is important to settle on stable requirements for system designs and to develop the associated Concepts of Operation (CONOP). A case in point is Predator, which was initially developed for an Intelligence, Surveillance, and Reconnaissance capability only; but now, it carries and employs weapons, providing teeth to the battlefield commander, as needed. I will defer to the Joint Staff and the Services to discuss specifics on UAV CONOPs, employment, and capability needs.

## **PRESIDENT'S BUDGET 2006**

For the President's Fiscal Year 2006 Budget (PB06), the Department had to make some tough choices. Like other Department acquisition and modernization programs, we reduced funding for some UAVs to help balance the broader financial needs of the Department. The Unmanned Combat Armed Rotorcraft, Broad Area Maritime Surveillance UAV, and Joint Unmanned Combat Air Systems were three programs that sustained budget reductions. On the other hand, the Department accelerated the fielding of operational UAVs to support OEF and OIF, including the Raven and Shadow UAV systems. In the next few paragraphs, I will provide

a very top-level look at what the Department has funded in the budget, but I will defer to the Services to address program specifics.

#### Defense Advanced Research Projects Agency (DARPA) UAV Programs

DARPA continues to fund research and development of UAVs. Major changes for PB06 include: the cancellation of the Unmanned Combat Armed Rotorcraft program and the restructuring of the Joint Unmanned Combat Air Systems (J-UCAS) program. However, the A-160 Hummingbird, the Canard Rotor/Wing, Micro-UAV, Peregrine, and Cormorant are still ongoing DARPA programs.

The Department established the Joint Unmanned Combat Air Systems program in October 2003, to provide a joint DARPA/Air Force/Navy effort to demonstrate unmanned combat capabilities for high-threat Suppression of Enemy of Air Defense (SEAD); penetrating intelligence, surveillance, and reconnaissance; electronic attack; and related strike missions. The J-UCAS program will culminate in a four-year Operational Assessment (OA), beginning in Fiscal Year 2007. The OA capability demonstration will help the Services to determine what capabilities and program options could be carried into acquisition program(s), beginning in the Fiscal Year 2010 to 2012 timeframe. The program includes the Boeing X-45C and the Northrop Grumman X-47B aircraft. Each contractor is participating in an industry consortium, with Johns Hopkins University Applied Physics Laboratory as an integrator/broker, to leverage a common architecture and operating system, and common air vehicle subsystem software (for sensors, communications, and command & control) to maximize system flexibility, operational utility, and interoperability.

For PB05, the Department kept the unmanned combat air vehicle technology programs under DARPA management, delaying the planned transition to the Air Force, and instead consolidating funding from both the Air Force and Navy programs into a single program element. This was done to promote this transformational technology. We infused competition, encouraged the Services to establish requirements, pushed for early demonstration hardware, outlined a program to let the warfighters actually see what capabilities are available, and set the foundation for a common operating system. We have made good progress in these areas,

continued to advance unmanned air technology through the X-45A and other surrogate demonstrations, and have a draft Joint Strike Enabler Initial Capabilities Document which underpins the roles and missions for J-UCAS. In PB06, we show that we are now ready to transition management to the Air Force, as lead Service for this joint program. The Department reduced funds and restructured the J-UCAS program in PB06 to rationalize the program budget. The decision to reduce the J-UCAS program funding was taken in the context of many competing needs, and does not alter the Department's commitment to develop this transformational capability. The Air Force and Navy continue to have a requirement for unmanned combat capability; and together, they will propose a plan to USD(AT&L) for transition from DARPA management to a joint program office. The restructure will emphasize the demonstration of aircraft capabilities that contribute to future joint warfighting concepts of operations. We are still working through the details of the restructure, but we have high expectations.

#### Army UAV Programs

The Army now has three types of operational tactical UAV systems – the Shadow, the Hunter, and the I-Gnat. Each is currently deployed in Iraq and is providing outstanding support to the warfighter. Thirteen Shadow systems have flown over 22,000 hours; three Hunter systems have flown over 8,000 hours; and the I-Gnat system has flown over 4,000 hours in support of CENTCOM. The Army plans to field the “one shelter” ground control station that standardizes the control units for Shadow, Hunter, I-Gnat, and the Extended Range / Multi-Purpose (ER/MP) systems. The one shelter automatically digitizes the UAV products for faster dissemination and provides for interchangeable control of UAVs across the battlefield. Using Fiscal Year 2004 supplemental funding, the Army also fielded 185 hand-launched Raven systems. With regard to their UAV acquisition programs, the Army's Future Combat System includes four classes of UAVs, ranging from the micro-UAV to a tactical, long-endurance UAV. The Army is also currently conducting a competitive fly-off for its ER/MP UAV, which will replace the Hunter system. The competition is between General Atomics and Northrop Grumman. The Army will provide you specifics on their programs.

### Air Force UAV Programs

The Air Force is supporting the Global War On Terror with Predators, Global Hawk, and small, bungee/hand-launched UAV systems including Pointer, Raven, FPASS, and some innovative micro systems. Predator A has flown over 80,000 hours in support of CENTCOM, and it is one of the most requested systems in the CENTCOM theater. The Air Force is working hard to increase Predator availability. However, increasing capability will require much more than just building additional aircraft. Communications architectures, trained pilots, sensor operators, ground stations, and logistics support are all necessary to field a useable combat capability. While not yet officially “operational,” the first Global Hawk aircraft – one of the stars of the Department’s Advanced Concept Technology Demonstration program – is supporting CENTCOM. This aircraft should be replaced later this year with two production aircraft. Five of the first seven “A” version aircraft have been delivered, along with the first of two Navy Global Hawks. The overall Global Hawk development program is currently replanning, addressing development cost growth and schedule delays on the larger “B” version, and revisiting capability needs and timelines. The Air Force has commenced activities supporting an in theater U.S. Southern Command demonstration later this year. In development, Predator B is progressing as a larger cousin of Predator A, and it can pack a more substantial punch. For example, the 500-pound GBU-12 laser guided weapon is the first of a number of weapons to be integrated onto the Predator B system. The Air Force will provide you specifics on their programs.

### Navy and Marine Corps UAV Programs

The Marine Corps’ tactical Pioneer UAV and the bungee-launched Dragon Eye UAV are operating in support of OIF. (The Pioneer systems were transferred to the Marine Corps from the Navy.) Additionally, two Scan Eagle UAV systems are operating in support of the Marine Expeditionary Forces in OIF. The Navy has plans to acquire Fire Scout, an unmanned helicopter, to provide the Littoral Combat Ship an organic UAV capability. They are also planning to develop the Broad Area Maritime Surveillance UAV for world-wide access, persistent maritime surveillance capability. This year, the Navy will conduct the Global Hawk Maritime Demonstration program, leveraging two aircraft from the Air Force’s Global Hawk A

production line. The Navy also operates one Pioneer system for test and evaluation, and supports one Predator system for the U.S. States Joint Forces Command's Joint Operational Test Bed System. The Marine Corps has funding for developing Eagle Eye, an interim solution to their vertical UAV program. The Navy and Marine Corps will provide specifics on their programs.

## CONCLUSION

I remain excited about the progress and prospects for Unmanned Aircraft Systems. Only two weeks ago, I was at the Predator Operations Center at Nellis Air Force Base, outside of Las Vegas. I watched three different Predator operations in progress, all from a single room. It was impressive to watch Air Force Predator pilots and sensor operators working missions over 5,000 miles away, many in combat conditions. Their demeanor was calm, efficient, and professional. It was comforting to know that these men and women could operate from the safety of a room in the middle of the United States and go home to their families after their shifts and sleep in their own beds. I want to highlight what I believe is the beginning of an incredible change in the conduct of warfare. Unmanned systems allow us to maintain our technological advantage and engage in high threat, non-permissive environments, while honoring the value of life we hold so dear. Unmanned systems including ground, surface, and sub-surface systems are at the threshold of fundamental changes in the way this country conducts warfare across the full spectrum of conflict. In 20 years, when we look back, I believe that it will be difficult for us to imagine how we fought without these systems, much the same way that over the last 20 years, computers have become an integral part of our everyday life.

Mr. Chairman, this concludes my prepared remarks. Again, thank you for the opportunity to express the Department's views on the progress we have made in our Unmanned Aircraft Systems. And thank you for this committee's continuing support. I will entertain any questions you might have.