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National Security and
International Affairs Division

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The Honorable John C. Stennis
Chairman, Subcommittee on Defense
Committee on Appropriations
United States Senate

Dear Mr. Chairman:

As you requested, we reviewed the Department of Defense's (DOD) Unmanned Aerial Vehicle (UAV) Master Plan to assess its adequacy and compliance with congressional intent. This was an interim assessment of the Master Plan's provisions. We did not evaluate the issues of service requirements for UAVs or the potential for commonality in UAVs. These issues are being addressed in a separate assignment.

DOD submitted the UAV Master Plan on June 27, 1988. We earlier briefed your representatives on our assessment. This letter summarizes the results of our analysis of the plan, and appendix I discusses it in more detail. Appendix II describes our objective, scope, and methodology.

BACKGROUND

Each of the military services is acquiring pilotless aircraft resembling small airplanes or helicopters, which are commonly referred to as UAVs¹ or Remotely Piloted Vehicles (RPVs) or drones. These UAVs are being developed to accomplish several military functions, such as surveillance of enemy activities, relay of friendly communications, or attack of enemy radars. Over the next few years, DOD expects to spend over \$6 billion on UAV programs.

Over the past few years, various congressional committees have expressed concern about duplication in service UAV programs. Their concern is that the services are developing and procuring systems that are different in design but have common service mission requirements such as reconnaissance

¹Some congressional reports use the term RPV. The Master Plan uses the term UAV, and this term is generally used in this report.

consider opposing funding any new UAV programs that do not promote commonality to the maximum extent practical.

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As requested, we did not obtain official agency comments on this report. However, we did discuss our results with DOD officials who participated in preparing the Master Plan. They generally agreed with our evaluation and explained that the Master Plan was the best that DOD could prepare given the short time that the Joint UAV Program Office has been in existence and the difficulties in negotiating the concerns of the services.

Unless you publicly announce its contents earlier, we plan no further distribution of this report until 10 days from the date of the report. At that time we will send copies to interested parties and make copies available to others upon request.

This report was prepared under the direction of Mr. Thomas J. Brew, Associate Director. Other major contributors are listed in appendix III.

Sincerely yours,



Frank C. Conahan
Assistant Comptroller General

EVALUATION OF DOD'SUAV MASTER PLANBACKGROUND

The military services are acquiring pilotless aircraft that resemble small aircraft or helicopters. These aircraft are commonly referred to as UAVs or RPVs, and are remotely controlled or preprogrammed to be controlled by on-board equipment.

Typically, a UAV system would include the air vehicle, launch and recovery systems, and a ground station for controlling the UAV's flight and processing information from the UAV. The UAV also includes what is often called the payload with the specific type depending on the military mission to be accomplished.

Missions for UAVs include reconnaissance or surveillance of enemy activities, identification and location of targets, relay of friendly communications, jamming of enemy communications, or attack of enemy radars. A surveillance UAV might have a television camera or infrared sensor as its payload, while an UAV to attack radars would be equipped with a warhead and associated guidance system.

Over the past few years, the military services have sponsored numerous UAV programs, and many are still underway or planned to start. Some of the more prominent programs include the Navy's Pioneer, medium-range UAV, and Amber; the Army's Aquila and Corps Operations UAV; and the Air Force's Tacit Rainbow. In addition, DOD is developing payloads under separate programs. Over the next few years, DOD plans to spend over \$6 billion on these and other UAV programs.

CONGRESSIONAL CONCERN OVER
DUPLICATION IN UAV PROGRAMS

In recent years, congressional committees have become concerned about the proliferation of UAV programs and have stressed the need to acquire UAVs that could meet the requirements of more than one service. During fiscal year 1986 budget proceedings, the Senate Committee on Appropriations expressed the view that each of the military services had too many UAV and drone programs and encouraged DOD to strive for commonality in its programs. The following illustrates more recent congressional concern and direction to DOD for eliminating the duplication.

During the fiscal year 1987 budget proceedings, the House Committee on Armed Services stated that to maximize commonality among the

MASTER PLAN DOES NOT ELIMINATE
DUPLICATION AT THIS TIME

DOD's UAV Master Plan provides for continuing generally single-service programs, at least until fiscal year 1990 and for expenditures in fiscal years 1988 and 1989 for UAVs that apparently will not meet common-service needs. The Master Plan also

- increases the risk of additional duplication by excluding from its coverage UAVs intended to destroy targets (called "lethal" UAVs) and target drones that involve largely the same technology,
- does not adequately consider the duplication between the capabilities of manned aircraft and UAVs that perform the same or similar missions, and
- gives insufficient attention to payload commonality.

Master Plan permits continued
proliferation of single-service programs

The Master Plan does not reconcile service UAV requirements and eliminate duplicative programs in the near term. The Master Plan provides for continuing generally single-service programs as well as starting new ones without regard to commonality. DOD plans to defer attempts to achieve commonality until fiscal year 1990 when the Joint Statement of Requirements will be completed. Until then, the Master Plan simply groups ongoing and planned programs under four categories of UAVs: close, short, medium-range, and endurance. The following are examples of ongoing programs and new programs all designed to satisfy the same basic requirements.

Ongoing and new
short-range UAV programs

The Master Plan recognizes that each of the services has a requirement for a short-range UAV. Short-range UAVs are those having a range capability of up to 150 kilometers. The Master Plan also shows that the short-range UAV is needed to perform several missions, the most important being reconnaissance and surveillance. The Master Plan provides for continuing two short-range programs as well as starting a new one. Each of the systems is to perform reconnaissance and surveillance missions, and each is to have the same type of sensor payloads.

The Army has developed its short-range Aquila to provide reconnaissance and surveillance and identify targets for its

available systems, such as Pioneer and Aquila, to test and refine requirements during fiscal years 1988 and 1989 rather than developing new systems.

Additional duplication is possible
by excluding other UAV technologies

The Master Plan increases the risk of additional duplication by excluding from its scope, programs which involve much of the same technology as the UAVs included in the Master Plan.

The Master Plan omits the Tacit Rainbow and Seek Spinner programs on the basis that they are lethal UAVs intended to attack enemy radars. However, the technologies associated with the airframe, propulsion, and navigation elements of these systems are similar to UAVs included in the Master Plan. The main difference from a technology standpoint between these and other UAVs is in the payload. Tacit Rainbow and Seek Spinner are equipped with warheads and associated sensor systems; whereas, other UAVs are equipped with other type payloads depending on the missions involved.

The Master Plan also excludes target drones, such as those used to simulate manned aircraft in testing surface-to-air missile systems. Again, target drones are based on largely the same technology as UAVs, and some UAVs are also advertised as targets. For example, the NV-144 air vehicle has been promoted as a target and nonlethal UAV.

We believe that lethal UAVs and target drones should be included in the Master Plan. Separate acquisition and management of these UAVs could increase duplication and, thus, result in redundant development costs, lost opportunities for lower production unit costs through higher production quantities, and excessive logistics support costs associated with maintaining multiple systems. According to Joint Project Office officials, they hope to include target drones in future master plans.

Master Plan does not adequately consider
cost savings potential from manned and
unmanned aircraft trade-offs

The Master Plan does not comply with congressional direction to incorporate trade-offs between using manned and unmanned aircraft to provide for future cost savings. During the fiscal year 1987 budget authorization process, the House Committee on Armed Services directed that DOD's UAV Master Plan incorporate, among other things, an analysis of trade-offs between manned and unmanned vehicles in order to provide for future cost savings. The Master Plan, however, provides for continuing current UAV programs and

accomplish the same types of reconnaissance missions as the Air Force developed payload is to accomplish.

We discussed this matter with officials at the Navy's medium-range UAV Project Office. They expected the Navy developed payload would be less expensive and available sooner than the Air Force version. However, the Air Force payload is scheduled to begin production in the same fiscal year as the Navy system. Although the Navy payload might prove less expensive, no evaluation has been done to determine which of the two payloads is most cost-effective. The Master Plan indicates that performance requirements for the medium-range payload have been identified and are the same. Therefore, only one of the payloads would be justified. The Joint UAV Project Office should select the payload that meets the requirements at the lowest cost.

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During informal discussions on the results of our assessments, DOD officials generally agreed with our conclusion that the Master Plan allows for continuation of current services programs until 1990. They noted, however, that the current Master Plan is only a first step toward a coordinated DOD UAV effort. They said it will take until 1990 to perform an orderly termination of existing programs and reconcile service requirements for acquiring a common family of UAVs. In the interim, existing systems will be used for developing employment doctrine, training, and operational contingencies. They pointed out that DOD joint UAV programs will have to be closely coordinated with other DOD organizations responsible for closely related programs, including target drone and lethal UAV programs.

MAJOR CONTRIBUTORS TO THIS REPORT

National Security and International Affairs Division,
Washington, D.C.

Thomas J. Brew, Associate Director, (202) 275-4841
James F. Morris, Group Director
Kenneth G. Feng, Evaluator
Cecilia F. Owens, Evaluator

Atlanta Regional Office

Jackie B. Guin, Evaluator-In-Charge
Coy E. Belew, Evaluator
Danise F. Stewart, Evaluator

(395091)

OBJECTIVE, SCOPE, AND METHODOLOGY

As requested by the Chairman of the Subcommittee on Defense, Senate Committee on Appropriations, we reviewed DOD's UAV Master Plan to assess its adequacy and compliance with congressional intent.

In evaluating the Master Plan for compliance with congressional intent, we used as the primary criteria, Congress' direction that the Office of the Secretary of Defense incorporate specific provisions into the plan. We also discussed this direction with Committee staff members to assure that we had an accurate understanding of the basic congressional intent. We then analyzed the Master Plan to determine if its provisions were consistent with that intent. Our evaluation of the Master Plan was not comprehensive in that we did not address such matters as the adequacy of the UAV management structure described in the Master Plan, the adequacy of funding to execute the Master Plan, or the validity of requirements for various UAVs to support contingency missions.

In a separate review, we are analyzing selected UAV programs to address such issues as service requirements and the duplication of aircraft, payloads, and support systems. We considered this information in drawing some of our observations on the Master Plan.

Our review was performed from May through July 1988 in accordance with generally accepted government auditing standards.

starting new ones with no analysis of many existing manned aircraft systems, such as the Army's Guardrail and the Joint Surveillance and Target Attack Radar System, which are intended to perform the same or similar missions.

The Master Plan recognizes that UAVs provide a technical alternative to manned aircraft and satellite systems. However, the responsibility of assessing the relative merits of each and deciding which requirements can best be satisfied by UAVs are left to the services. Service program officials stated that their UAV systems are to complement rather than compete with manned systems. Thus, congressional expectations for savings through reductions in manned aircraft programs may not be realized if the Master Plan is implemented.

Master Plan gives insufficient attention to payload commonality

Another shortcoming of the Master Plan is that it does not adequately emphasize the need for payload commonality for the various categories of UAVs. The Congress stressed the need to consider payload commonality as early as 1985. During fiscal year 1986 budget proceedings, the Senate Committee on Appropriations said that the Committee was encouraged that the Joint Chiefs of Staff had asked the Joint Requirements Management Board to review service requirements for reconnaissance drones and UAVs. The Committee said it would encourage the Board to also assess the feasibility of common payloads and not just common air vehicles.

Payloads are generally the most expensive component in an UAV system, but the Master Plan does not describe the numerous payload programs or show that attempts have been made to reconcile payload requirements among or within the UAV categories.

The Master Plan shows that all categories of UAVs need a "reconnaissance/surveillance" payload. It also shows that the Air Force is acquiring such a payload for the medium-range UAV at a cost of about \$268 million. But the Master Plan does not address why, for example, reconnaissance and surveillance payloads for the short-range or endurance UAVs could not be used instead of procuring a separate payload for the medium-range UAV for the Air Force or vice versa.

In addition, the Master Plan indicates the medium-range UAV program is a joint program with the Navy responsible for the UAV and the Air Force responsible for the payload. The Navy and Air Force plan to spend \$41.2 million in fiscal years 1988 and 1989 on the medium-range UAV. However, the Navy plans to acquire its own payload to

artillery units. The Aquila is equipped with a forward looking infrared sensor and television camera. The Master Plan provides for continuing funding for the previously terminated Aquila program at a cost of \$6.5 million in fiscal years 1988 and 1989. The Master Plan shows that the Navy and the Air Force have a need for a short-range UAV but will not participate in the Army program. The Marine Corps, also with a stated need, will participate, but its participation will be limited to training some of its personnel with an Army unit.

The Army plans to refurbish Aquila assets and conduct related development activities during fiscal years 1988 and 1989. The efforts are to include software improvements, modifications to air vehicles, and integration of payloads. The Master Plan also indicates that future procurement, though limited, might occur.

Similarly, the Navy is acquiring the short-range Pioneer system to perform reconnaissance and surveillance and identify targets for naval gunfire and Marine Corps artillery units. The Pioneer also has its own unique forward looking infrared sensor and television camera. According to the Master Plan, the Navy will continue its Pioneer program at a cost of \$194.9 million through fiscal year 1994. The Marine Corps is a participant in the Pioneer program, but the Air Force will not participate, and the Army's participation will be limited to use of one of the nine Pioneer systems. The Navy has spent or plans to spend \$45.4 million in fiscal year 1988 on additional Pioneer systems and components that are not to meet all service needs.

The Navy and Marine Corps recognize that despite major improvements, such as a new engine, Pioneer will still not satisfy all their requirements for a short-range UAV. The Navy plans to spend another \$26.9 million in fiscal year 1989 for additional Pioneer procurement and over \$100 million in the outyears in all appropriations.

According to the Master Plan, the Army is to initiate another short-range UAV in fiscal year 1988 to provide reconnaissance and surveillance. The Army plans to spend \$11.5 million in fiscal years 1988 and 1989 to develop this Corps Operations UAV and \$38.7 million in fiscal year 1989 to procure it. Total costs through fiscal year 1992 are estimated to be \$68.2 million. According to Army officials, the Corps Operations UAV is needed to meet contingency requirements until the planned system becomes available.

The Corps Operations UAV is to be an Army-only system. Its acquisition appears inconsistent with DOD's acquisition strategy stated in the Master Plan which provides for using currently

services, DOD should provide a master plan for UAVs to the House and Senate Committees on Armed Services. The Committee said that at a minimum, the master plan should incorporate: (1) harmonization of service requirements, (2) utilization of commonality, to the maximum extent possible, and (3) trade-offs between manned and unmanned vehicles in order to provide for future cost savings. The master plan was to be provided to the Committees along with the fiscal year 1988 budget request.

The House Committee on Armed Services report on the fiscal year 1988 Defense Authorization Act stated that the Committee was continuing to review DOD's progress in coordinating service requirements for a family of UAVs. The Committee concluded that each of the services appeared to be proceeding on its own with the development and procurement of systems that have mission and payload requirements common among the services. The Committee noted that the UAV Master Plan, which was requested in the conference report on the fiscal year 1987 Defense Authorization Act, was not submitted with the fiscal year 1988 budget request. The Committee recommended that the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence merge, in the near term, the programs of the services for all classes of UAVs.

Subsequently, the House Conference Report on the fiscal year 1988 Defense Authorization Act stated that the conferees agreed that DOD lacked focused management for UAVs and that the services were pursuing programs and technologies that should be merged to avoid duplication and to ensure cost-effective approaches.

The Senate Committee on Appropriations in its fiscal year 1988 Defense Appropriations Bill stated that separate program elements for UAVs and related efforts within each military service were eliminated and that the funds had been transferred to the Office of the Secretary of Defense. The Committee called for the Office of the Secretary of Defense to establish funding and program priorities, mandate requirements for single programs to meet the needs of more than one service, and eliminate duplicative programs.

Subsequently, the Congress agreed to eliminate funding within the services' separate research, development, test, and evaluation accounts for individual UAV programs and consolidate these efforts in a joint program in the Office of the Secretary of Defense. In addition, the fiscal year 1988 Defense Appropriations Bill provided that funds were available only for the joint program and could not be obligated or expended until the Secretary of Defense submitted a master plan addressing, among other things, efforts to coordinate UAV programs and eliminate duplication. DOD submitted its UAV Master Plan on June 27, 1988.

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ABBREVIATIONS

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| DOD | Department of Defense |
| RPV | Remotely Piloted Vehicle |
| UAV | Unmanned Aerial Vehicle |

and surveillance. The committees have encouraged the acquisition of UAVs to meet common-service needs. During fiscal year 1988 budget proceedings, this concern culminated in eliminating funds within the services' research, development, test, and evaluation accounts for individual UAV programs and consolidating these efforts in a joint UAV program in the Office of the Secretary of Defense. In addition, the fiscal year 1988 Defense Appropriations Act provided funds that were available only for the joint program which could not be obligated or expended until the Secretary of Defense submitted a master plan addressing, among other things, efforts to coordinate UAV programs and eliminate duplication. With submission of the Master Plan on June 27, 1988, the Joint Program Office considered these fiscal year 1988 appropriations to be available for the joint program.

RESULTS

The DOD UAV Master Plan offers promise of achieving some commonality in service UAVs by providing for an affordable family of UAV systems that will be operated by all services. This family of systems will maximize commonality consistent with different service operational missions and environments. The systems will be configured so that cost-effective block changes can be made to incorporate advance developments. However, the development of these systems is not scheduled to start until 1990 with delivery of production units in 1992.

Until then, the Master Plan provides for procurement of additional single-service systems, including a new short-range system for the Army that will not meet common service needs. (See app. I.) The Master Plan does not include lethal UAVs and target drone programs. Since these programs involve largely the same technologies as other UAVs, they should be included. The Master Plan has other limitations, such as its inattention to potential duplication between UAVs and manned aircraft, which perform the same or similar missions.

MATTERS FOR CONSIDERATION BY THE SUBCOMMITTEE

DOD officials indicated that in fiscal year 1990 an orderly termination of existing programs will be complete and service requirements for acquiring a common family of UAVs will have been reconciled. At that time the Subcommittee will be in a better position to evaluate funding requests and may wish to