

[Web Development Degrees](#)

misdegree.businessdegrees.uab.edu



Earn an Info Systems degree Online! Focus in Web & Mobile Development.

AdChoices

[FAS](#) | [Military Analysis](#) | [GAO](#) | | | | [Index](#) | [Search](#) |

[Donate Now](#)

GAO

United States
General Accounting Office

Precision-Guided Munitions: Acquisition Plans for the Joint Air-to-Surface Standoff Missile (Letter Report, 06/28/96, GAO/NSIAD-96-144).

GAO evaluated the Air Force's and Navy's Joint Air-to-Surface Standoff Missile (JASSM) program, focusing on: (1) the acquisition process; (2) schedule and cost risks; (3) the Air Force's plan to acquire 35 pilot production missiles; and (4) the Navy's commitment to the program.

GAO found that: (1) the Air Force is using an innovative acquisition process to procure JASSM; (2) the Air Force expects JASSM contractors to modify existing missile designs, use off-the-shelf technology, and apply best commercial practices to their design and production work; (3) some crucial JASSM technologies may not be mature in time for them to be integrated into JASSM; (4) JASSM may be vulnerable to jamming, and the Air Force is trying to identify a cost-effective countermeasure; (5) a JASSM automatic target recognition capability is still under development; (6) the Air Force will phase in integration of JASSM with combat aircraft, undertaking separate programs to integrate the missile with each type of aircraft as funds become available; (7) the Air Force plans to acquire 35 pilot production missiles, but those missiles may not be needed for testing, and may not represent the actual production configuration; (8) the Air Force's unit price goal for JASSM is optimistic when compared to similar missile procurement programs; (9) the Navy has not provided JASSM development funding, but carrier operability is a firm JASSM requirement, and the Navy expects to commit funds for JASSM integration with the F/A-18 aircraft after JASSM development; and (10) the need for JASSM may not be as urgent as the Air Force believes.

----- Indexing Terms -----

REPORTNUM: NSIAD-96-144
TITLE: Precision-Guided Munitions: Acquisition Plans for the Joint Air-to-Surface Standoff Missile
DATE: 06/28/96
SUBJECT: Advanced weapons systems
Military procurement
Missiles
Concurrency
Military cost control
Testing
Military aircraft
Combat readiness
Electronic warfare
IDENTIFIER: Joint Air-to-Surface Standoff Missile
Standoff Land Attack Missile
Tri-Service Standoff Attack Missile
F/A-18 Aircraft
Air Force JASSM Single Acquisition Management Plan
Joint Direct Attack Weapon
Tomahawk Cruise Missile

AGM-142 Missile
AGM-130 Missile

```

*****
** This file contains an ASCII representation of the text of a **
** GAO report. Delineations within the text indicating chapter **
** titles, headings, and bullets are preserved. Major **
** divisions and subdivisions of the text, such as Chapters, **
** Sections, and Appendixes, are identified by double and **
** single lines. The numbers on the right end of these lines **
** indicate the position of each of the subsections in the **
** document outline. These numbers do NOT correspond with the **
** page numbers of the printed product. **
**
** No attempt has been made to display graphic images, although **
** figure captions are reproduced. Tables are included, but **
** may not resemble those in the printed version. **
**
** Please see the PDF (Portable Document Format) file, when **
** available, for a complete electronic file of the printed **
** document's contents. **
**
** A printed copy of this report may be obtained from the GAO **
** Document Distribution Center. For further details, please **
** send an e-mail message to: **
**
** <info@www.gao.gov> **
**
** with the message 'info' in the body. **
*****

```

Cover
===== COVER

Report to Congressional Committees

June 1996

PRECISION-GUIDED MUNITIONS -
ACQUISITION PLANS FOR THE JOINT
AIR-TO-SURFACE STANDOFF MISSILE

GAO/NSIAD-96-144

Precision-Guided Munitions

(707107)

Abbreviations
===== ABBREV

- DOD - Department of Defense
- JASSM - Joint Air-to-Surface Standoff Missile
- JDAM - Joint Direct Attack Munition
- SLAM - Standoff Land Attack Missile
- SLAM-ER - SLAM-Expanded Response
- TSSAM - Tri-Service Standoff Attack Missile

Letter
===== LETTER

B-260439

June 28, 1996

Congressional Committees

The Air Force and Navy are developing the Joint Air-to-Surface Standoff Missile (JASSM) to attack, at nearly any time, high-value, well-defended targets while allowing the launch aircraft to stay outside the range of enemy defenses. We reviewed the JASSM acquisition plan under our basic legislative responsibilities because (1) the program has congressional interest, (2) it is a major acquisition program, and (3) we wanted to determine how the Air Force plans to overcome the difficulties in meeting stringent requirements similar to those of the canceled Tri-Service Standoff Attack Missile (TSSAM). This report, which contains a matter for congressional

consideration, is addressed to you because your committees have jurisdiction over this area.

This report discusses (1) the Air Force's plan to use a new acquisition process that balances capability and affordability requirements for acquiring JASSM, (2) schedule and cost risks because of the immaturity of essential technology and the complexity of integrating JASSM with multiple aircraft, (3) the Air Force's plan to acquire 35 pilot production missiles early in development that may not be needed, and (4) the need to strengthen the Navy's commitment to the program.

BACKGROUND

----- Letter :1

In 1986, the Air Force began developing TSSAM to provide a low observable conventional cruise missile. Key characteristics included long-range, autonomous guidance, automatic target recognition, and precision accuracy with a warhead able to destroy a well-protected structure. After the TSSAM procurement unit cost increased from an estimated \$728,000 in 1986 to \$2,062,000 in 1994 (then-year dollars), the Department of Defense (DOD) terminated the program.

Following a comprehensive reassessment of force requirements, the Air Force and Navy agreed they urgently needed an affordable missile with most of TSSAM's characteristics. They proposed a joint program that would build upon the lessons learned from TSSAM and more recent programs that use new acquisition approaches. On September 20, 1995, the Principal Deputy Under Secretary of Defense for Acquisition and Technology approved the initiation of the JASSM program, under Air Force leadership. It is to be developed, produced, and initially deployed over the next 5 years.

The Air Force's April 1996 schedule for JASSM development and early production calls for

- a 24-month competitive program definition and risk reduction phase beginning in June 1996 (milestone I);
- a 32-month engineering and manufacturing development phase beginning in June 1998 (milestone II);
- production of 75 low-rate initial production missiles beginning in January 2000;
- production of 90 full-rate production missiles beginning in April 2001 (milestone III); and
- initial JASSM deployment in June 2001.

Figure 1 shows the Air Force's schedule for JASSM development, missile deliveries, and testing.

Figure 1: JASSM Schedule

(See figure in printed edition.)

\a A critical design review is conducted to determine that the detailed design satisfies performance and engineering required of the development specification.

\b First capability is the first attainment of the minimum capability to effectively employ a weapon of approved specific characteristics and which is manned or operated by an adequately trained, equipped, and supported military unit or force.

The estimated development cost for the JASSM program is \$675 million (fiscal year 1995 dollars). The Air Force plans to buy about 2,400 missiles at an average unit procurement price of \$400,000 to \$700,000 (fiscal year 1995 dollars). Based on these unit prices, we estimate the procurement cost for 2,400 Air Force missiles is \$960 million to \$1.68 billion, and the total estimated acquisition cost (development and procurement) is \$1.64 billion to \$2.36 billion.\1 The Congress appropriated \$25 million to start the JASSM program in fiscal year 1996, and the President's fiscal year 1997 budget includes \$198.6 million for the program.

 \1 These cost estimates do not include the costs for Navy missiles because the Navy has not yet established its procurement plans for JASSM.

RESULTS IN BRIEF

----- Letter :2

The central theme of the JASSM program is to use acquisition reforms and commercial practices to obtain the best value for the government by meeting the users' requirements for a long-range standoff weapon at an affordable cost. We agree with this theme. However, we are concerned that procurement reforms will not be sufficient to overcome the technical challenges of producing a viable and affordable system in the desired time frames. The program plan calls for developing and initially deploying the Air Force's most capable precision-guided munition in 5 years for no more than \$700,000 a missile. It seems optimistic when compared to the cost experience for other less-capable precision-guided munitions in DOD's inventory or development. During the 24-month competition, the Air Force intends to use its new management strategies to address these schedule and cost risks before advancing into the final development, testing, and initial production phases. Considering today's less threatening security environment and the capabilities of other missile systems in DOD's inventory, more time, if needed, may be available to minimize these risks before low-rate initial production.

Compared to past programs with similar goals, the JASSM acquisition plan contains schedule and cost risk. Specifically, the plan does not appear to allow enough time to develop and test the complex technology needed for autonomous guidance and automatic target recognition, and then integrate the missile into the aircraft planned to carry it. Even though attempts were made throughout an 8-year period, to integrate TSSAM with these same aircraft, not one aircraft was certified to carry the missile during that period.

The Air Force's plan to manufacture 35 pilot production missiles early in development increases schedule risk and results in buying developmental missiles for about \$25 million that are not needed to support the planned test program.

Even though JASSM is a joint Air Force-Navy program, the Navy's commitment to the program is uncertain. JASSM is to be designed for use at sea, but no Navy funds are committed to its development, no requirement exists to integrate the missile with the Navy's F/A-18 aircraft during development, and no Navy missiles are included in the planned production quantity. In March 1996, the Chief of Naval Operations committed to providing funds for F/A-18 integration, but this is not expected to occur during JASSM development.

NEW ACQUISITION PROCESS BEING USED

----- Letter :3

The JASSM Single Acquisition Management Plan has an overriding theme of affordability. To provide the required capability at an affordable cost, the Air Force plans to use a series of new acquisition processes and encourage industry to use commercial practices to lower the missile's price and speed its deployment.

To accomplish these challenging goals, the Air Force intends to establish a unique partnership with industry. In contrast to its past practice, the Air Force intends to minimize (1) the requirements to use military specifications and standards and (2) government oversight. The JASSM request for proposal, for example, is significantly shorter than for TSSAM and other past missile acquisition programs, focuses on the desired capability, and does not tell industry how to develop the missile. The Air Force intends to offer industry the maximum possible flexibility to apply commercial practices and innovation. During the 24-month competitive phase, JASSM program office personnel plan to join with contractor personnel to form problem-solving teams and help facilitate the development of the proposed missile design.

The JASSM contractors are expected to modify an existing missile design, use available off-the-shelf technology, and use a variety of commercial business and technical practices. The use of commercial practices has been stressed to all potential JASSM developers. These initiatives are intended to lower development, production, and

operational support costs, as well as reduce the time needed to develop and produce the system. The principal focus of the 24-month competition, for example, is to eliminate unnecessary cost and allow the contractors to trade off performance and other requirements. JASSM cost is as important as technical performance and schedule. Another innovation is that the contractor is expected to provide a lifetime, total system warranty for each missile.

A similar approach using reforms and commercial practices is being used in a pilot program to acquire the Joint Direct Attack Munition (JDAM). Under this pilot program, the Air Force is developing a guidance system and steerable tail kit to significantly improve the accuracy of 1,000- and 2,000-pound general purpose bombs that are currently in its inventory. The JDAM program office is projecting at least a 50-percent reduction in the baseline average unit procurement price, which includes the cost of a full system warranty.

ESSENTIAL TECHNOLOGY MAY NOT BE
READY

----- Letter :4

Although the Air Force plans to rely upon existing missile designs and off-the-shelf technology to speed JASSM development, essential guidance and automatic target recognition technologies are not mature. The 2 to 3 years available before JASSM flight testing may not be sufficient time to fully develop, integrate, and test these complex subsystems. Because these technologies are essential to meeting the program's requirements, their successful development is one of the pacing items of the program.

RELIABLE GUIDANCE SYSTEMS

----- Letter :4.1

JASSM is expected to use an inertial navigation system integrated with a global positioning system receiver to navigate from its launch point to the target area. This navigation system is expected to be low-cost, reliable, and accurate to about 13 meters. Global positioning system receivers, however, are vulnerable to both intentional and unintentional interference, including jamming. Recent studies by DOD and the Air Force describe how properly placed jammers can cause an unprotected global positioning system-aided weapon to entirely miss its target. One problem facing the engineering community is defining the potential jamming threat so that a cost-effective countermeasure can be developed.

Although the Air Force is evaluating electronic and other countermeasures to develop an antijam capability, it appears a combination of techniques may be needed to ensure reliable and accurate missile guidance. Specially designed antennas and more rapid connection with global positioning system satellites are among the techniques being considered. The Defense Science Board recommended that DOD develop more accurate inertial navigation systems that do not rely on a global positioning system as much. The high cost of potential antijam devices or more accurate navigational systems has limited their use in precision-guided munitions.

An Air Force laboratory is conducting a program to develop and test a global positioning system antijam system suitable for precision-guided munitions such as JDAM. Development of the antijam system began in 1995, and it is scheduled to be tested in fiscal year 1998. Assuming the threat uncertainties are resolved and the antijam system's cost is acceptable, it could initially be added to JDAM. It may also be adaptable to JASSM and other precision-guided munitions. With this schedule, however, this system may not be available in time to meet JASSM's June 1998 critical design freeze when the missile design is to be finalized.

AUTOMATIC TARGET RECOGNITION

----- Letter :4.2

JASSM requires an automatic target recognition system for a true fire-and-forget\2

precision attack capability under adverse weather conditions. Other programs, such as the Tomahawk, are trying to develop this technology, but no precision-guided munition available today has that capability. Although navigating to the target using a global

positioning system-aided preprogrammed flight plan is a well-understood technology, reliably finding the target, and specifically, the desired aim-point without the aid of a pilot remains an unfilled DOD requirement. Precision accuracy in smoke, fog, and adverse weather conditions is a critical aspect of this technology that remains to be demonstrated in an operational system. Affordability and reliability are also important issues.

The three basic sensor technologies that have been evaluated in laboratory studies are imaging infrared, laser radar, and synthetic aperture radar. All three appear suitable for JASSM, with laser and synthetic aperture radar technologies offering better adverse weather performance and easier, less costly mission planning. None of them, however, are mature enough to incorporate into an existing design today. All would require, in the opinion of Wright Laboratory engineers, intensive development in an actual weapon system program like JASSM to become a fully operational system ready for production. Wright Laboratory and JASSM program engineers estimated 2 to 3 years would be needed to develop, integrate, and flight test this technology. With a June 1998 design freeze, this does not appear to support the JASSM development schedule.

According to JASSM program office officials, synthetic aperture radar technology could not be available in time for JASSM, and the availability of laser radar technology is questionable. They said an imaging infrared radar could be ready and is a likely candidate for JASSM. Based on our analyses of other programs, including TSSAM, developing imaging infrared technology and its associated mission planning elements in 2 years will be difficult. In an autonomous guidance system using an imaging infrared sensor, the system tries to match the sensor-detected image to a computer image of the target obtained earlier. Because the system relies on light intensity variation, the time of day, time of year, and atmospheric conditions are important and sometimes difficult to manage. Extensive laboratory testing by the Air Force has shown that such systems are error prone and unreliable. Also, the key problems of mission planning have not yet been satisfactorily resolved.

 \2 Fire and forget is a term applied to a weapon system that does not require operator assistance to guide it once it is fired.

AIRCRAFT INTEGRATION APPROACH
 ADDS COST AND SCHEDULE RISK

----- Letter :5

JASSM is to ultimately be carried by a variety of Air Force and Navy aircraft, including F-16, F-15, and F/A-18 fighters and B-52H, B-1B, and B-2 bombers. Because these aircraft have different structural and electrical systems, JASSM must be designed to be compatible with all of them. For example, the missile can weigh no more than 2,250 pounds based on a F-16 and F/A-18 carriage limitation. The missile can be no longer than 168 inches for it to fit on the B-1B's internal launcher. It must also be compatible with different electrical circuits and software systems applicable to the various aircraft launch platforms.

Integrating a missile with multiple aircraft is a complex task and has taken other programs years of wind tunnel testing, fit checks, electrical and software analyses, and extensive flight testing. Numerous changes, for example, were made to TSSAM to accommodate the idiosyncracies of the same aircraft that are planned to carry JASSM. Attempts to integrate TSSAM with these same aircraft occurred over 8 years, yet not one aircraft was certified to carry the missile during that period. Availability of suitable test aircraft and stable electrical and software configurations were among the problems slowing the integration of TSSAM. The JASSM program office identified these same problems as potential risk areas.

To speed JASSM's development, the Air Force has decided to initially integrate the missile only with F-16 and B-52H aircraft. Later, as funds are available, separate programs are to complete integration with the remaining aircraft. While the program manager expects this plan to reduce the complexity of the integration task during JASSM development, we believe it adds technical risk and undisclosed future costs. Technical risk remains because compatibility evaluations are not sufficient to identify all potential integration issues. Also, the costs of integrating JASSM on several other aircraft (i.e., F-15, F/A-18, B-1B, and B-2) are not included in the \$675-million

development cost estimate. Moreover, as currently planned, postponing these difficult tasks until after the government and contractor development team is dispersed risks losing essential experience and expertise.

SOME DEVELOPMENTAL MISSILES MAY
NOT BE NEEDED

----- Letter :6

The Air Force plans to buy 72 JASSMs during development and 75 during low-rate initial production. Of the 72 developmental missiles, 37 are to support the development test program, including initial operational test and evaluation, and 35 are to be pilot production missiles to demonstrate that the contractor can repeatedly produce quality missiles for no more than an average unit price of \$700,000 (fiscal year 1995 dollars). If the Air Force revised its JASSM acquisition schedule and used the low-rate initial production missiles for proving the production process and for initial operational test and evaluation, it could reduce the number of developmental missiles and save about \$25 million.

The Air Force plans to begin manufacturing the 35 pilot production missiles in November 1998, or soon after the start of the 32-month development and testing phase. Conducting pilot production early in the development phase, however, increases schedule risk and may result in manufacturing missiles requiring design and production process changes after production begins. A similar pilot production program was used for the Advanced Cruise Missile program, and none of those missiles were similar enough to the final configuration that they could be updated and deployed at a reasonable cost. In the case of the Advanced Cruise Missile program, as the flight test program identified design and manufacturing deficiencies, many changes were made to the missile's guidance set, sensor, actuators, and other subsystems; the program's schedule slipped; and projected costs increased.

According to DOD Regulation 5000.2, low-rate initial production is the minimum quantity necessary to (1) provide production-configured or representative articles for operational tests, (2) establish an initial production base for the system, and (3) permit an orderly increase in the production rate for the system sufficient to lead to full-rate production upon successful completion of operational testing. The regulation, therefore, contemplates that low-rate initial production missiles can be used for proving the production process and for initial operational test and evaluation. As now planned, however, 9 of the 37 developmental missiles will be used for initial operational test and evaluation and the 75 low-rate initial production missiles will be delivered only after this testing is completed. The 35 pilot production missiles, after proving the production line, will be used for additional testing, if needed, and to establish an early operational capability.

If the JASSM acquisition plan is revised to eliminate the 35 pilot production missiles, the Air Force could reduce some of the overlap between development and production, as well as the associated cost and schedule risk. Also, using low-rate initial production missiles would reduce the number of development test missiles required. Each of the early missiles is expected to cost approximately \$700,000; eliminating the 35 pilot production missiles would reduce development cost by about \$25 million.

JASSM UNIT PRICE GOAL IS
OPTIMISTIC

----- Letter :7

To ensure that JASSM is affordable, the Air Force established an average unit procurement price goal ranging from \$400,000 to \$700,000 (fiscal year 1995 dollars). The \$400,000 price is the program objective, while the \$700,000 price is the threshold beyond which the Air Force would reevaluate continuing the program. We support the Air Force's objective to acquire an affordable and capable replacement for TSSAM. However, we are concerned that the JASSM price is optimistic and could lead to acquisition problems as the program proceeds.

As a critical parameter for the JASSM program, the average unit procurement price is firm and not expected to increase. In fact, the program manager has challenged interested contractors to achieve the \$400,000 objective price, if possible. The Air Force believes the

price objective is achievable if (1) JASSM is derived from an existing missile in a competitive environment and (2) the Air Force and contractor are able to realize savings by implementing acquisition reforms and using best commercial practices. The program office prepared a cost estimate that supports the \$700,000 threshold price, and the Office of the Secretary of Defense is reviewing the estimate.

Attaining a price within the \$400,000 to \$700,000 range will be the focus of the 24-month competition when the contractors are to trade off performance and other requirements to obtain the most cost-effective system possible. A similar process was used in the JDAM program, a guidance and steerable tail kit for general purpose bombs. The JDAM program office expects to reduce the average unit procurement price by at least 50 percent.

Price goals were also proposed for other missile programs. For many of them, however, the average production unit price grew as the program matured. For example, the production unit price for TSSAM increased from an estimated \$728,000\3 to about \$2.1 million (then-year dollars). Although TSSAM's production price grew more than other programs, many of those we examined experienced cost growth.

Our comparison of the estimated unit prices for several missiles in DOD's inventory and development disclosed that JASSM is expected to cost less yet provide significantly greater capability. Several precision-guided munitions in inventory and development cost more than the \$700,000 average procurement price established for the JASSM program. Yet, none of these missiles have the automatic target recognition capability required for JASSM, which is expected to contribute significantly to the system's cost. Missile systems that most closely approximate the capability expected of JASSM, such as the Navy's Tomahawk and the Standoff Land Attack Missile-Expanded Response (SLAM-ER) missiles, cost significantly more. Others, such as the Air Force's AGM-130 and AGM-142, do not have the range, accuracy, or carrier flexibility required for JASSM, yet they cost about the same as the JASSM threshold price or more. Also, none of these missiles has the lifetime, full service warranty planned for JASSM.

Containing cost growth on other missile programs has led to some of the following acquisition problems:

- reduced performance and system capability,
- postponement of key capabilities until a later production block or modification program,
- reduced procurement quantities and higher unit price, and
- initiation of other programs to meet unfilled requirements.

In time, cumulative efforts to reduce costs led to contractor, user, and congressional dissatisfaction. Some programs were cut back significantly, while others were terminated. The TSSAM program, for example, was terminated after nearly 8 years and \$4.4 billion were invested, because of significant development difficulties and growth in its expected unit cost. Based on this extensive history of overrunning initial cost estimates, it is incumbent for DOD to watch this program closely.

\3 The production unit cost goal was \$405,000 (fiscal year 1984 dollars) when proposed.

NAVY COMMITMENT IS UNCERTAIN

----- Letter :8

Although JASSM is a joint Air Force and Navy program, the Navy has not provided development funding and, until March 1996, did not require carrier operability. Also, integration with the F/A-18 is not planned during the development program. Further, none of the 2,400 missiles planned for procurement are intended for Navy use. This brings the Navy commitment into question.

For JASSM to be carried on, stored within, and launched from an aircraft carrier or other ship, it must meet Navy environmental and supportability requirements. These requirements are significantly

more demanding than those for a land-based missile system. They must be designed into the missile system. Adding them later, according to the program office, would require a basic redesign of the system and a production block change. Until recently, these characteristics were optional, but, after a March 1996 meeting between DOD, service, and contractor personnel, carrier operability became a firm requirement and is to be designed into JASSM.

Integrating JASSM with the F/A-18 is not scheduled during the development program. This integration issue was debated by the Air Force and Navy during the formation of the JASSM acquisition plan. The issues appear to be funding, availability of test aircraft, and increased complexity of the development program. In March 1996, the Chief of Naval Operations committed to providing funds for F/A-18 integration, but this is not expected to occur during JASSM development.

RAPID DEPLOYMENT MAY NOT BE SO
URGENT

----- Letter :9

To meet the Air Force's urgent need for JASSM, the program's development and initial production is scheduled to achieve an initial deployment of the weapon system in late 2001, or about 5 years after the start of the program. While no other missile in DOD's inventory provides all the capabilities planned for JASSM, several in inventory or development offer significant capability, particularly for the Navy. Accordingly, the services may have more time, if necessary, to develop and test JASSM without excessive schedule risk.

The JASSM Mission Need Statement identifies an urgent need for a new missile, because current air-launched standoff weapons are very limited in number and do not provide the required capability. The Operational Requirements Document states that JASSM should provide the following required capabilities:

- long standoff range,
- autonomous guidance,
- precision accuracy,
- automatic target recognition,
- ability to destroy fixed hard and soft targets,\4
- carriage by the primary fighter and bomber aircraft, and
- survivability.

According to Air Force officials at the Air Combat Command, JASSM is urgently needed because (1) the Command expected to have TSSAM in the year 2000; (2) until JASSM is deployed, Air Force bombers and fighters will have only a limited number of long-range missiles; and (3) available weapons are unable to destroy enemy command and control operations and integrated air defenses with acceptable attrition rates. Until this need is met, Command officials believe less cost-effective and less-capable alternatives will have to be used, resulting in potentially higher attrition rates for both the weapons and launch platforms.

Although no existing weapon has all the characteristics planned for JASSM, several precision-guided munitions in the inventory or development have some of them. For example, the SLAM-ER\5 will provide much of the range planned for JASSM. SLAM-ER does not have an automatic target recognition capability, but can achieve precision accuracy with pilot assistance. The Tomahawk missile, widely used during Desert Storm, can be launched hundreds of miles from a target to attack a specific building. The Navy has several thousand Tomahawk missiles in its inventory, and an improved version is being developed. Table 1 shows the characteristics and quantities of precision-guided munitions in inventory and development.\6

Table 1

Precision-Guided Munition
Characteristics and Quantities

Missile system	Range	Guidance	Warhead type	Carrier	Quantity
Inventory systems					
AGM-130	over 15 nm	Television and infrared with man-in-loop\	2000-pound general purpose	F-15E , F-111	602
AGM-142 (Have Nap)	over 15 nm	Television and infrared with man-in-loop	750-pound blast/fragmentation or penetrator	B-52H	about 130
AGM-86C (CALCM)	over 350 nm	Autonomous	Blast/fragmentation	B-52H	over 200
AGM-84E (SLAM)	over 60 nm	GPS/INS plus IIR with man-in-loop	Blast/fragmentation	F/A-18	767
Tomahawk C/D	over 350 nm	Autonomous	Unitary or submunition	Ships, submarines	3,405
Developmental systems					
JASSM	over 60 nm	Autonomous	Blast/fragmentation and penetrator	F-16, B-52H	2,400
AGM-154 (JSOW)	over 15 nm	GPS/INS with man-in-loop	Blast/fragmentation, or penetrator	F/A-18, AV-8B, P3, S3	23,800
SLAM-ER	over 60 nm	GPS/INS plus IIR with man-in-loop	Blast/fragmentation	F/A-18	700\

Legend

nm = nautical miles

GPS/INS = global positioning system/inertial navigation system

IIR = imaging infrared

\a DOD uses the term "man-in-the-loop" when the operator can manually guide the munition to the target.

\b The Navy plans to upgrade and retrofit 700 of the 767 baseline SLAMs to the SLAM-ER configuration.

In addition to developing JASSM, the Air Force and Navy are buying and/or modifying additional precision-guided munitions. For example, the Navy plans to modify 700 SLAMs to the SLAM-ER version, which is planned to have greater standoff range, lethality, and accuracy than SLAM. About 1,000 Harpoon missiles could also be upgraded to SLAM-ER missiles if they are needed. The Air Force has increased its procurement of AGM-142 and AGM-130 missiles and is modifying 200 nuclear Air-Launched Cruise Missiles to the conventional configuration.

Although none of these weapons have all the characteristics planned for JASSM, the precision-guided munitions in the inventory and those planned to be added to the inventory in the next few years provide a strong capability for U.S. forces. Since several of these weapons were not available previously, this capability will be more effective than that used during the successful air campaign of Desert Storm.

\4 Fixed hard targets include bridges, port facilities, hardened aircraft shelters, underground command posts, and bunkers; fixed soft targets include factories and manufacturing sites, general purpose buildings, roads, and rail yards.

\5 The SLAM-ER is an upgrade and retrofit to the baseline SLAM. It will maintain baseline SLAM capability while improving performance in the areas of launch and control, aircraft survivability, immunity to countermeasures and probability of kill against hardened targets. SLAM-ER is also expected to provide improved range, hard target penetration and user interfaces for both mission planning and aircraft integration.

\6 For further information on these and other precision-guided munitions, see Weapons Acquisition: Precision-Guided Munitions in Inventory, Production, and Development (GAO/NSIAD-95-95, June 23, 1995).

RECOMMENDATIONS

----- Letter :10

The difficulties of developing critical technologies and the potential of cost growth, as well as our view that this missile is not urgently needed, are real concerns. To minimize them, we believe that the progress of this program should be managed by accomplishment of significant events and not just to meet a tight time schedule. Therefore, we recommend that the Secretary of Defense ensure that (1) required autonomous guidance and automatic target recognition technologies are mature before finalizing the JASSM design, (2) the Air Force does not acquire the 35 pilot production missiles early in development without a demonstrated need for additional test missiles, (3) missiles used during planned initial operational test and evaluation are production-representative missiles, and (4) the Navy participates fully in the program so the final JASSM design meets both Air Force and Navy requirements.

AGENCY COMMENTS AND OUR EVALUATION

----- Letter :11

In commenting on a draft of this report, DOD agreed with three of the four recommendations. It agreed to ensure that essential technology is mature before finalizing the JASSM design, production-representative missiles are used for initial operational test and evaluation, and the Navy participates fully in the program so that the JASSM design meets the needs of both services.

DOD did not agree with our recommendation that the Air Force not acquire the 35 pilot production missiles early in the development phase without a demonstrated need for more test missiles. DOD stated that the Air Force's plans to use these missiles for maturing the production process, for certain tests, for flight test spares, and for an early deployment option were justified.

Although we agree the pilot production missiles can serve all of these purposes, without a sense of urgency for fielding this weapon, we are not convinced that spending about \$25 million for these missiles so early in the program is necessary. Early pilot production increases the risk of manufacturing missiles that require significant changes to make them deployable. We further believe DOD would be better served if low-rate initial production missiles were used instead. Low-rate initial production missiles can serve all of the purposes identified by the Air Force for the 35 pilot production missiles, and they can be deployed.

The DOD response is included in appendix I.

MATTER FOR CONGRESSIONAL CONSIDERATION

----- Letter :12

Because the Air Force's plan to manufacture 35 pilot production missiles early in development increases schedule risk and results in buying developmental missiles that are not needed to support the planned test program, the Congress may wish to consider not providing the estimated \$25 million for the 35 pilot production missiles.

SCOPE AND METHODOLOGY

----- Letter :13

We reviewed Air Force and Navy requirements documents that are the basis for the JASSM program. We then reviewed the JASSM acquisition

plans to determine if the program will fulfill the requirement. We reviewed historical cost data on existing missile systems to determine how planned acquisition costs compared to actual production costs.

We identified Air Force and Navy precision-guided munitions that are in production or about to go into production to determine what interim capability will be available until JASSM becomes operational.

We discussed precision-guided munition technology with research engineers to find out what capabilities are available now and what is still in development. We interviewed Air Force and Navy personnel concerning requirements and acquisition. We visited or spoke with personnel at the following locations:

- JASSM Program Office, Eglin Air Force Base, Florida;
- Air Force Air Combat Command, Langley Air Force Base, Virginia;
- Naval Air Systems Command, Arlington, Virginia;
- Air Force Headquarters, Washington, D.C.;
- Wright Laboratories, Wright-Patterson Air Force Base, Ohio; and
- Wright Laboratories, Eglin Air Force Base, Florida.

We conducted our review between January 1995 and March 1996 in accordance with generally accepted government auditing standards.

----- Letter :13.1

We are sending copies of this report to the Secretaries of Defense, the Air Force, and the Navy; the Director, Office of Management and Budget; and other interested parties. We will also make copies available to others upon request.

Please contact Thomas J. Schulz, Associate Director, Defense Acquisitions Issues at (202) 512-4841 if you or your staff have any questions concerning this report. Major contributors to this report were Raymond Dunham, Matthew R. Mongin, and Gerald W. Wood.

Louis J. Rodrigues
Director, Defense Acquisitions Issues

List of Congressional Committees

The Honorable Strom Thurmond
Chairman
The Honorable Sam Nunn
Ranking Minority Member
Committee on Armed Services
United States Senate

The Honorable Ted Stevens
Chairman
The Honorable Daniel K. Inouye
Ranking Minority Member
Subcommittee on Defense
Committee on Appropriations
United States Senate

The Honorable Floyd D. Spence
Chairman
The Honorable Ronald V. Dellums
Ranking Minority Member
Committee on National Security
House of Representatives

The Honorable C.W. Bill Young
Chairman
The Honorable John P. Murtha
Ranking Minority Member
Subcommittee on National Security
Committee on Appropriations
House of Representatives

(See figure in printed edition.)Appendix I
COMMENTS FROM THE DEPARTMENT OF
DEFENSE

===== Letter

(See figure in printed edition.)

Now on p. 15.

Now on p. 15.

(See figure in printed edition.)

Now on p. 15.

Now on p. 15.

*** End of document. ***