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BY THE COMPTROLLER GENERAL

Report To The Congress

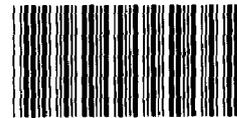
OF THE UNITED STATES

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Digests Of Major Weapon System Reports Issued January And February 1979

Each year billions of dollars are requested by the Department of Defense for funding individual major weapon system programs. GAO's reporting to the Congress on annual weapon system programs has been one method of providing information on the progress and problems on a selected number of programs for which funds are being requested.

GAO issued 19 individual weapon system reports to the Congress during January and February 1979. This report is a compilation of those report digests in an unclassified version.



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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

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To the President of the Senate and the
Speaker of the House of Representatives

This report contains unclassified digests of major weapon system reports issued during January and February 1979 and a listing of major acquisition reports issued from July 1978 through March 1979. We have prepared this compendium of digests primarily for the benefit of those who have not received the reports. We can provide the classified digests and reports if there is a need.

As you know, our annual weapon system reporting has been one method of providing information on individual programs for which funding is to be requested. We hope this report will be useful to you as a quick reference to our weapon system reports as well as provide a listing of other major acquisition reports.

We are sending copies of this report to the Director, Office of Management and Budget, and the Secretary of Defense.

James B. Atchefs
Comptroller General
of the United States



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COMPTROLLER GENERAL'S
REPORT TO THE CONGRESSISSUES CONCERNING AIR FORCE
KC-10A ADVANCED TANKER/
CARGO AIRCRAFTD I G E S T

The Air Force plans to buy 20 DC-10 convertible freighter aircraft modified with fuel tanks, an aerial refueling boom, and other equipment necessary to convert it to a refueling tanker. The contract, awarded to the McDonnell-Douglas Corporation in January 1978, provides for engineering effort to design the modifications and provides six options for procurement of up to 60 KC-10As at fixed prices with economic escalation provisions. Options for two aircraft were exercised on November 20, 1978, at a cost of \$151.1 million, which includes \$15.6 million for initial spares. The estimated program cost through fiscal year 1984 is \$1,055 million, including \$113.3 million for logistics support.

The primary mission of this advanced tanker, designated the KC-10A, is to provide improved mobility by

- permitting strategic airlift aircraft to fly from U.S. bases to most parts of the world with large payloads, thus eliminating or reducing the need for enroute refueling stops at bases on foreign soil;
- supporting long-range deployment of tactical fighters by providing in-flight refueling and cargo airlift simultaneously; and
- augmenting airlift forces by carrying palletized cargo and bulk fuel between major aerial ports.

The existing KC-135 tankers have neither the range, fuel offload capability, nor cargo capability to fulfill that Air Force mission.

In addition to planning the procurement of the 20 KC-10As, the Air Force has approved modification programs to the KC-135s--the current tankers--to extend their service life

and improve their performance. Additional modifications are being considered, the most expensive being to replace the KC-135 engines. The estimated cost to complete the current and proposed modifications could be as high as \$12 million an aircraft.

The Air Force has not yet evaluated the relative cost effectiveness of a mix of KC-10As, KC-135s, and other alternatives to fulfill total aerial refueling requirements. However, Air Force officials have told GAO that they are now in the process of gathering data to do a cost-effectiveness study.

GAO analyzed the capabilities of the KC-10A and the KC-135, considering two primary factors--offload capability and flying hour rates. Under the set of assumptions GAO used, though somewhat simplified, one KC-10A is equivalent in performance to as many as five KC-135s modified with new engines. Since the program unit cost of a KC-10A is about \$47 million and the cost to modify five KC-135s could be as much as \$60 million, it may be more cost effective to procure additional KC-10As than to modify 15- to 20-year-old KC-135s.

The Air Force stated that for some missions, such as support of the strategic bomber force, the reengineed KC-135 may be as effective as the KC-10A. While GAO's analysis is not conclusive in itself, it does illustrate that the cost effectiveness of all aerial refueling assets, including the KC-10A and the KC-135 modifications, needs comprehensive study.

The contract for procurement of KC-10As provides annual options for ordering production aircraft in specific quantities and prices, or within certain limitations, higher or lower quantities. Deviation from the specific option quantities, however, results in changes in the fixed unit price. Fixed prices for the aircraft are subject to adjustment for economic escalation. The Air Force's current procurement plan deviates from the most economical procurement schedule provided in the contract for the first 20 aircraft.

According to Air Force officials, funding for lower priority programs in fiscal year 1979 had to be reduced to stay within the overall Air Force budget. The KC-10A program did not have the priority to receive enough money for the full complement of four aircraft. As a result, funds for the KC-10As were reduced and the options were exercised for two rather than four aircraft.

Under the current plan, this will result in an additional cost of \$1,780,000 per aircraft for the first 20 aircraft.

Further changes in the Air Force procurement plan could cause additional increases in unit prices and charges for economic escalation.

The Air Force also awarded McDonnell-Douglas a contract for maintenance of the KC-10A fleet. The contractor is to perform major maintenance and inspections while the Air Force's responsibility will be limited primarily to flight-line maintenance and minor inspections. The Air Force estimated that using contractor support for a fleet of 20 KC-10As would be less costly over a 20-year period than establishing its own support system. While that estimate is premised upon procurement of a small fleet of KC-10As, the number of KC-10As that will eventually be procured is uncertain.

Four of the six contract production options for the advanced tanker must be exercised before operational tests are completed. Since both the aircraft and the refueling boom have already been tested extensively, the technical risk of entering production before operational tests are completed is considered low by both Air Force and McDonnell-Douglas officials.

RECOMMENDATIONS

The Secretary of Defense should

--evaluate all alternatives and determine the most cost-effective aircraft or mix

of aircraft to fulfill Air Force requirements for aerial refueling;

- establish a phased schedule for fulfilling the requirements in the most economical manner;
- determine at what total amount of KC-10As, if any, it becomes more cost effective to develop an Air Force logistics support system rather than to maintain a contract for logistics support; and
- expeditiously decide where the KC-10As will be based so that, if facilities are needed, construction can begin as soon as possible to have the needed facilities available when the first aircraft is delivered.

The Secretary of the Air Force should consider the impact on KC-10A unit prices when developing future year plans for procurement quantities and funding.

This report was reviewed by DOD officials associated with management of the program. Their comments have been incorporated as appropriate.

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESSTHE NAVSTAR GLOBAL POSITIONING
SYSTEM--A PROGRAM WITH COST
AND BENEFIT UNCERTAINTIESD I G E S T

The NAVSTAR Global Positioning System is a space-based navigation system designed to provide users with worldwide three-dimensional position and navigation information. Almost all military aircraft, surface ships, and submarines are potential users of the system, as are some land vehicles and ground troops. Military allies and civilians could also use it.

The system will consist of 24 satellites, ground control equipment, and user equipment. Four of the satellites have already been launched.

The Department of Defense's justification for the program was to

- consolidate navigation satellite research programs,
- improve weapon system effectiveness by increasing navigation accuracy and global coverage, and
- promote potential cost savings.

The program is currently in the validation phase and the next major Department of Defense program review is scheduled for May 1979. This review by the Defense System Acquisition Review Council, is to determine if the program should enter full-scale engineering development. The fully operational capability is programmed for 1986.

The most current program cost estimate for the Global Positioning System is \$1.7 billion. However, this estimate does not include over \$2.5 billion estimated by Defense for the costs of user equipment, replenishment satellites and Space Shuttle launch costs. In addition, an undetermined amount for escalation

costs is not included in this \$2.5 billion estimate. Consequently, the estimated total program cost is in excess of \$4.25 billion.

The cost savings and force effectiveness improvements anticipated if the Global Positioning System is deployed have not been fully defined. Although studies concerning the potential for force effectiveness have been and are being made, the accuracy, coverage and other characteristics required for individual users to significantly improve the effectiveness of their weapon systems have not been identified and summarized as a cohesive justification for the Global Positioning System.

Potential cost savings from the Global Positioning System have not been identified. To estimate potential savings, the following studies need to be completed:

- Phaseout study identifying specific systems to be replaced and the costs avoided by replacing these systems.
- Complete life-cycle cost study including all user and support costs.
- Although Defense has consistently emphasized the need for developing valid user information, the 27,000 potential users estimated by Defense have been slow in committing themselves to the system.

Available validation phase test results, although based on limited testing, are very promising and Defense believes the degree of accuracy envisioned with the Global Positioning System will probably be obtained. Testing has been affected by delays in obtaining the number of satellites required for meeting the test objectives. Despite these delays, program officials plan to have four satellite test data available for the upcoming May 1979 review.

Defense is currently studying user needs, force effectiveness, replacement plans, and cost savings opportunities in preparation for the May 1979 review. In view of the limited time remaining before the review and the significant amount of effort that has to be done, GAO is concerned about the completeness and depth of coverage of these Defense-wide studies. Defense officials are confident that all needed information will be available in time for this review.

The Secretary of Defense should determine that the following information has been adequately developed and analyzed before deciding on whether to proceed into full-scale engineering development. Specifically:

- The individual military users are identified and these users make specific commitments on how they will use the system.
- Force effectiveness benefits cited in any justification for acquiring the Global Positioning System are supported by a well defined need or significant savings.
- Any cost savings attributed to replacing existing navigation systems are supported by specific commitments and plans for the phaseout of these systems.
- All related system costs are computed and incorporated in the total estimated cost of the program.

The Congress should require the Secretary of Defense to identify the individual weapon systems that will use the Global Positioning System before it approves fiscal year 1980 full-scale engineering development funds. For each of these users, the Secretary should identify

- what required force effectiveness improvements will result,
- what commitments have been made by the Services to eliminate alternative navigation systems, and

--what net potential cost savings have been identified after all life-cycle costs have been considered.

This report was reviewed by agency officials associated with the management of the program. Their comments have been incorporated in the report as appropriate.

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESSIS THE AV-8B ADVANCED
HARRIER AIRCRAFT READY FOR
FULL-SCALE DEVELOPMENT?D I G E S T

In 1979 the Secretary of Defense is planning to authorize full-scale development of the AV-8B. However, he will do so not because the AV-8B will have been selected as the new Marine Corps light attack aircraft, but because a model of the AV-8B will be needed to conduct a test the Secretary has directed. If this happens, more than \$1 billion will be expended on the plane before a deployment decision is made. In GAO's opinion, it would be less costly to use available assets for such a test and to defer the start of full-scale development until after it has been decided to select the AV-8B for the Marine Corps.

PROGRAM STATUS

The AV-8B program started as a prototype development effort in 1976 to create a new model which would perform better than the currently deployed AV-8A. The Navy incorporated certain airframe modifications in two existing AV-8A Harrier aircraft which began flight testing on November 9, 1978, 6 weeks ahead of schedule. These flight tests are designed to demonstrate that it will be possible to double the range/payload capability of the AV-8A Harrier without developing a new engine for the plane.

Wind tunnel and other laboratory testing has given the Navy a great deal of confidence that the prototype flights will confirm the predicted improvement in performance. Assuming the prototype flight testing proceeds as the Navy anticipates, there should be little uncertainty about the degree of range/payload capability the AV-8B would be able to achieve if it is deployed.

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There is, however, no present commitment to deploy the AV-8B. The Marine Corps operates eight squadrons of light attack aircraft to provide close air support to its ground combat units. In the 1980s the Marine Corps must acquire 336 new aircraft to replace those which the eight squadrons now have. The replacement aircraft must have more capability--particularly in the area of range/payload--than the AV-8A Harriers with which three of the squadrons are now equipped.

Beyond this the Marine Corps insists that the replacement aircraft be capable of operating from small ships and short, austere bases which can be hastily established ashore. This additional qualification would rule out any conventional takeoff and landing aircraft, and, in effect, mean that only the AV-8B would qualify.

In 1977 the Secretary of Defense decided that the F/A-18 Hornet, a conventional takeoff and landing aircraft being produced to replace certain other Navy and Marine Corps aircraft, would be acquired as the Marine Corps' new light attack aircraft unless the AV-8B could be shown as a more cost-effective alternative.

A Marine Corps analysis indicated that the AV-8B would be more cost effective in a close air support role. The Secretary of Defense did not believe that this analysis conclusively demonstrated that the AV-8B was the more cost-effective alternative, and he has directed that a flyoff, or side-by-side comparative operational test and evaluation, be performed using a developmental model of each aircraft.

The AV-8B prototypes are not equipped with the subsystems that would be required in a realistic test of this nature, and the Secretary has proposed to authorize full-scale development of the AV-8B so that an engineering model can be obtained to participate in the flyoff. If this is authorized, about \$1.2

billion may be spent on development and production of the AV-8B before the results of the flyoff become available.

CONCLUSIONS

The results of the cost and effectiveness analyses to date do not indicate that either the AV-8B or the F/A-18 would be substantially superior to the other. If these results are considered insufficient to make a judgment, additional testing or operational exercises may be necessary to improve the data base. However, none of the officials GAO interviewed identified any data base inadequacies which the Secretary's flyoff proposal would resolve.

In GAO's opinion, full-scale development of the AV-8B should not be authorized unless and until a definite need has been established for this aircraft and there is an intention to deploy it operationally. The Secretary should either terminate the program or identify critical elements of uncertainty. These elements could then be resolved promptly through further analysis supported by additional testing or operational exercises using existing aircraft.

RECOMMENDATIONS

The Secretary of Defense should not authorize full-scale development of the AV-8B unless and until he is prepared to select it as the new Marine Corps light attack aircraft.

If selection of the AV-8B for this role depends on resolution of critical elements of uncertainty, any additional test and evaluation should be done with existing assets. In addition, resolution should be accomplished as quickly as possible to minimize potential delay in delivery of production aircraft.

If the Secretary of Defense eventually selects the AV-8B and decides to authorize

full-scale development, production of the aircraft before development phase testing is complete should be authorized only after the risk of concurrent development and production has been thoroughly analyzed.

AGENCY COMMENTS

A draft of this report was reviewed by Department of Defense and Office of Federal Procurement Policy officials. Their comments have been incorporated as appropriate.

According to Department of Defense officials, there are no critical elements of uncertainty about the relative cost effectiveness of the AV-8B that could not be resolved through further analysis. If additional data was needed to support further analysis, they said, the necessary testing probably could be accomplished with existing aircraft.

RECENT BUDGET ACTION

As this report was being prepared for issuance, GAO was advised by Department of Defense officials that the President and the Secretary of Defense had decided not to request any fiscal year 1980 funds for the AV-8B program and that the Under Secretary of Defense for Research and Engineering has refused to permit the Navy to obligate \$108 million of the \$123 million in full-scale development funds that was appropriated for fiscal year 1979. Unless this action is reversed by the Congress, GAO was told, the AV-8B program has effectively been terminated.

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESSINDECISION AND UNCERTAINTY
EXIST IN THE DEVELOPMENT OF AN
ADVANCED ICBM WEAPON SYSTEMD I G E S T

The Air Force is developing an advanced intercontinental ballistic missile system with improved survivability, better accuracy, and greater payload. This system involves the missile itself and its method of survivable basing.

According to the Air Force, a new missile system is needed because the Soviet Union is developing greater reliability, longer range, bigger payloads, and better accuracy for its intercontinental ballistic missile force. In addition, the Soviet Union is working to increase the survivability of its missile silos against nuclear attack.

A clearly defined national policy with respect to the role of the intercontinental ballistic missile force does not exist. In the absence of such a policy, the Air Force cannot be certain what specific capabilities are needed in the advanced system. Studies are being conducted that are intended to lead to a decision on the future role of the missile force.

Three different missile configurations considered during validation were:

- A new missile developed solely for land-based operations--called the MX missile.
- A modified Minuteman III missile developed solely for land-based operations.
- A new missile developed for both land-based and submarine-based operations--called the common missile.

In view of range, throwweight, and cost considerations, the Air Force has concentrated its efforts during the validation phase toward developing and evaluating technologies as they apply to the MX missile. Although all validation work has not been completed, the MX missile is the Air Force's preferred configuration.

In order to improve the survivability of the U.S. missile force, the Air Force has studied the following basing concepts:

- Multiple protective structure (including deployment in buried trenches, horizontal shelters, and vertical shelters).
- Air mobile.
- Existing silo.
- Unprotected random movement.

The Air Force's preferred concept, based on studies and tests, is the multiple protective structure concept with deployment in vertical shelters. Although this is technically a feasible way of achieving survivability, the cost is high and a number of critical issues remain, some of which may require congressional action.

The Air Force's estimated cost for the vertical shelter-based MX program from fiscal years 1974 through 2000 is between \$25.3 to \$26.4 billion, depending on the missile selected, the date of initial deployment, and whether the missile is to be deployed initially in existing silos.

On December 5, 1978, the Defense System Acquisition Review Council met to consider whether the Secretary of Defense should approve the program for the full-scale engineering development phase. A number of missile configurations and survivable basing options were presented.

The Council members concluded that a survivable intercontinental ballistic missile system is urgently needed. Questions were raised, however, regarding arms control verification and compatibility with the Strategic Arms Limitation Treaty if a multiple aimpoint concept is adopted.

As a result, on December 13, 1978, the Air Force was directed to restudy the air mobile basing concept and to continue the efforts to define other basing options. In addition, the Air Force was told to continue development of the MX missile and to maintain the option for the common missile. The Council is scheduled to reconvene in March 1979 to assess whether a full-scale engineering development recommendation is to be made.

The MX program could conceivably become essentially a different program compared to the one pursued by the Air Force during the validation phase. For example, if the air mobile concept is adopted, the program could include the procurement of wide-bodied aircraft as compared to the construction of vertical shelters. According to Department of Defense officials, the air mobile concept would draw upon an already established base of technology.

The December 1978 decision to postpone consideration for full-scale engineering development appears to be appropriate in view of the following:

- The future role and size of the missile force is uncertain.
- A clear understanding of the required missile performance does not exist.
- The cost and feasibility of some missile and basing related technologies have not been conclusively demonstrated.
- An agreement as to the most acceptable and cost-effective basing mode for ensuring survivability has not been reached.

In view of these uncertainties and the significant amount of funds and other resources required for an advanced intercontinental ballistic missile force, GAO recommends that the Secretary of Defense provide the Congress with firm estimates of cost, schedule, and performance characteristics for the individual missile configurations and basing concepts considered before a decision is made whether to proceed into full-scale engineering development. In preparing this data, the Secretary should first:

- Determine the future role of this missile force in view of national policy and the Strategic Arms Limitations Treaty.
- Resolve the uncertainty that exists concerning the required performance and the number of missiles needed in view of the future role of this force.
- Conclusively demonstrate the technology required to meet these requirements.
- Thoroughly review the basing concepts and identify any congressional action required to deploy a survivable missile force.

This report was reviewed by agency officials associated with the management of the program. Their comments have been incorporated in the report as appropriate.

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESSTHE TRIDENT AND SSN-688 SUBMARINE
CONSTRUCTION PROGRAMS--STATUS
AND ISSUESD I G E S T

The TRIDENT submarine and missile program is a sea-based weapon system designed to deter nuclear attack. It will replace the POLARIS/POSEIDON ballistic missile fleets. Each submarine will be able to carry 24 missiles with a full payload range of 4,000 nautical miles. While the ultimate size and cost of the TRIDENT fleet has not been determined, the Navy was reporting an estimated cost of \$24 billion for a 13 ship program as of September 30, 1978.

General Dynamics Corporation's Electric Boat Division has contracts to build the first seven TRIDENT submarines. In addition, Electric Boat has contracts to build 18 SSN-688 class submarines. The Newport News Shipbuilding and Dry Dock Company also has contracts to build 13 SSN-688s. As of September 30, 1978, the Navy reported an estimated total program cost of \$9.6 billion for a planned total SSN-688 force size of 37 ships.

DELIVERY OF THE FIRST TRIDENT

The construction of the first TRIDENT submarine continues behind the initial delivery schedule. Problems involving the SSN-688 program have also affected the TRIDENT program. Schedule slippages have occurred for both programs. In an attempt to alleviate these problems, Electric Boat brought in a new management team which has made significant changes in the shipyard.

The impact of these changes was not apparent to GAO at the time of our review. In November 1978, the contractor said that performance improvements were being achieved. However, because of the time constraints of our review, GAO did not audit the information provided at that time.

Electric Boat has also questioned whether the TRIDENT can move safely down the Thames River for sea trials. The Navy has determined that it will be necessary to dredge out about 4 feet from the river bottom in order to provide the TRIDENT with a prudent margin of safety. An environmental impact statement will have to be approved in order for this to be done. If this dredging is not completed according to schedule, the lead ship will be lightened and moved at high tide in order to allow the ship to transit the Thames River.

Estimates of ultimate TRIDENT force size have been presented by the DOD to the Congress. DOD continues to decline to estimate the potential costs associated with any force size beyond those contained in the Five-Year Defense Plan.

TRIDENT MISSILE PROGRAM ISSUES

The TRIDENT I missile is being built by the Lockheed Missiles and Space Company. The Navy has classified 12 of the first 14 missile flight tests as successful. Tests 11 and 13, however, have experienced a variety of problems. In addition, the Navy indicated that the recently flown missile tests 15 and 16 were successful but test results were not available.

Lockheed has proposed that the TRIDENT I test flight program be cut back from 30 flight tests to 25 due to the successes achieved. Navy officials have said that they will accept Lockheed's proposal even though one contract condition, a Deleted has not been demonstrated. This flight will be rescheduled later in the program.

The delay in the construction of TRIDENT hulls has caused a reduction in the planned procurement of TRIDENT I missiles through fiscal year 1980 (from 369 to 328), and an

acceleration of the POSEIDON backfit program. Delays in submarine delivery may result in missiles being available before they can be used, and these missiles could be then either stored for short periods of time or backfitted into POSEIDONs earlier than originally scheduled.

The direction of the TRIDENT II missile program remains to be decided. A study on commonality between the TRIDENT II and the MX Intercontinental Ballistic Missile is to be completed in early 1979.

SSN-688 PROGRAM ISSUES

Several current issues are unique to the SSN-688 program. These issues include:

--Additional construction delays at Newport News Shipbuilding and Dry Dock Company.

--Deleted performance problems.

--Ship control concerns at high speeds.

--Limited effectiveness of attack submarines (including the SSN-688) in performing the direct support role.

In addition, Navy fleet exercises have not tested the performance of the SSN-688 in a direct support role against projected future threats. The SSN-688 class submarines, however, are estimated to remain operational until the late 1990s.

RECOMMENDATIONS

The Secretary of Defense should provide the Congress with cost estimates for the ultimate force sizes currently being considered. While these estimates will contain a degree of uncertainty, the information should help the Congress in its deliberations on future

budget requests for the TRIDENT program. We also recommend that the Secretary of Defense closely monitor the progress of the Navy in getting the environmental impact statement approved and the actual dredging completed.

We recommend that the Secretary of the Navy:

- Maintain close oversight of Electric Boat operations to assure that touted productivity, skill mix, and attrition improvement goals are achieved.
- Closely monitor the production schedule of the missiles to assure that the effects of submarine delivery delays are minimized.
- Direct that comparisons of attack submarines used in the direct support role continue to be made with other antisubmarine warfare platforms, such as surface ships and aircraft, to evaluate the actual exercise performance capabilities and cost effectiveness of each and report the results of these comparisons to the Congress.
- Propose that the Chief of Naval Operations examine, during fleet exercises, the capabilities of the SSN-688 in the direct support role to meet both the current and a variety of projected future Soviet Union submarine threats as identified and defined in U.S. intelligence estimates.

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESSAIR-, SEA-, AND
GROUND-LAUNCHED CRUISE
MISSILES PROGRAM--
STATUS AND ISSUESD I G E S T

Cruise missiles are small, low flying, jet-powered airframes armed with nuclear or conventional warheads for use against a variety of targets. They can be launched from the air, sea, or ground. Estimates for development, procurement, and construction for the four currently planned variants of the cruise missile total \$8.3 billion as of September 1978. This is exclusive of warhead costs, some platform modifications, and support costs.

All four variants are in full-scale engineering development, and the Department of Defense is studying various other applications of the cruise missile. The four variants in development are

- the nuclear armed land-attack air-launched cruise missile for use with the bomber leg of the U.S. trilateral strategic offensive forces (TRIAD) of intercontinental ballistic missiles, sea-launched ballistic missiles, and bombers;
- the nuclear armed sea-launched and ground-launched land-attack versions for use primarily in a theater nuclear role; and
- the conventionally armed version of the sea-launched cruise missile for U.S. surface ships and submarines to use in an antiship role.

AIR-LAUNCHED CRUISE MISSILE ISSUES

The air-launched cruise missile is being competitively developed by two contractors, but the reduced scope of the competitive flyoff increases the risk of not meeting the scheduled initial operational capability date and

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could increase costs. This flyoff, to be held in 1979, was originally to be a total system evaluation of the air-launched cruise missile integrated with the B-52 bomber.

Full interoperability with the B-52 offensive avionics will not be demonstrated. Several components of the ground support system--loading and test equipment--will not be available. In addition, navigation accuracy will not be a competitive factor. Also, engines used for the flyoff will not have undergone military qualification testing for production although the engines will be flight certified. Defense officials assess the risk in development of the offensive avionics system as high and of the loading and test equipment as moderate to high.

Because of the high priority accorded development of the air-launched cruise missile program, some missiles will be produced before development is complete. The B-52 offensive avionics schedule is also compressed to meet the air-launched cruise missile schedule, resulting in concurrent development and production in that program as well. In the past, concurrence has proven costly if a system must be redesigned, reworked, or modified to overcome problems discovered after production begins.

SEA-LAUNCHED CRUISE MISSILE ISSUES

GAO's April 1978 report on cruise missiles recommended that specific mission need and cost effectiveness of the land-attack sea-launched cruise missile be established. A Decision Coordinating Paper is being prepared, which will define the mission need for the missile. In addition, the cruise missile is included in a study of the cost effectiveness of the Pershing II missile system.

The conventionally armed antiship sea-launched cruise missile, with an operational range of 300 nautical miles will use a Harpoon missile seeker modified (1) to increase detection

range, (2) Deleted and (3) to better discriminate between targets by including passive identification/direction equipment. The modified system is being tested but results to date are inconclusive, partly because the three free flights to test the guidance system terminated prematurely before the guidance capability could be demonstrated.

An over-the-horizon targeting system needed to support the antiship sea-launched cruise missile's long range is being developed using existing systems. A report on a recent test of the system stated that although target reporting has improved, present sensor information and distribution methods are inadequate when many nontarget ships are present. The report stated that improvements in ocean surveillance and additional tests are needed.

GROUND-LAUNCHED CRUISE MISSILE ISSUES

The Secretary of Defense initiated the ground-launched cruise missile program on the basis of recommendations of the Defense Systems Acquisition Review Council which met to consider whether the cruise missile should enter full-scale engineering development. As a result, the ground-launched cruise missile entered full-scale engineering development without a mission need statement, design reviews, or cost estimates as required by Department of Defense directives for newly developed systems. Although the missile is common with the sea-launched cruise missile, new support equipment with development costs now estimated at \$89 million and a new operational concept are required. However, since initiation of the program, the system has changed greatly; and recent contractor cost estimates have forced reconsideration of the design of support equipment. In commenting on GAO's draft report, Defense officials said that an Air Force System Acquisition Review Council would meet in early 1979 to reexamine the program because of changes in operational concept and system configuration.

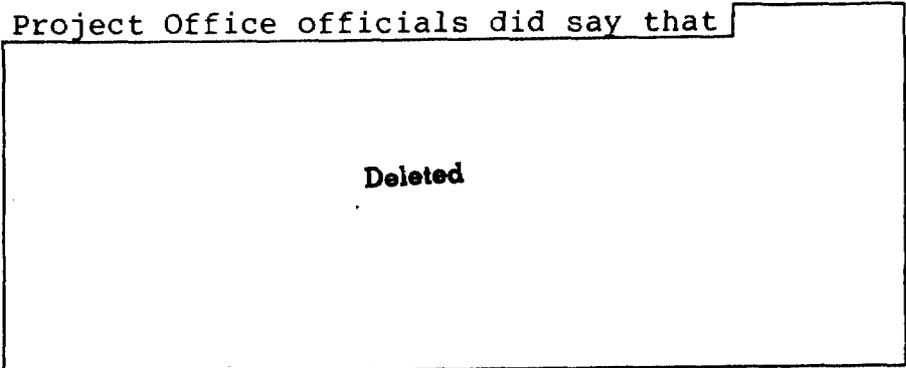
International considerations also have prevented technical discussions with the North Atlantic Treaty Organization and other potential host countries on the bases where the ground-launched cruise missile will be stationed and on where to locate the remote launch sites. Without such information, the operational concept and system design of the ground-launched cruise missile cannot be completed, and the availability of sufficient remote launch sites to meet user needs and enhance survivability is not certain.

TEST AND EVALUATION

Fourteen cruise missile test launches were conducted in 1978 and much useful data was obtained. Four of the missiles failed to achieve sustained flight. Three of the missiles that failed were launched from submarines, and one was from a ground launcher. The probable causes of the failures have been isolated, and corrective actions taken will be tested in future flights.

The first phase of the survivability test program (testing of the missile against defensive threats) was completed in October 1978. Final results were not available during GAO's review. Although preliminary reports on several of the tests were available, the Joint Cruise Missiles Project Office would not release them for GAO review until the final analyses are complete in early 1979.

Project Office officials did say that



LAND-ATTACK MISSILE GUIDANCE

The land-attack cruise missiles, with an operational range of 1,350 nautical miles, operate on an inertial guidance system that is periodically corrected for drift off course by the Terrain Contour Matching System. The effects of varying ground covers, including trees and snow, on the operation of the guidance computer has not been fully determined.

The Joint Cruise Missiles Project Office has been testing the guidance system since 1973 and is studying past tests over tree-covered areas. Project Office officials do not believe that

Deleted Tests

over snow are limited, but the Project Office officials believe

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A draft test plan to fully determine the effects of these environmental factors under controlled conditions has been developed. Results of the testing may not be known until 1980.

Deleted

In addition, the ability of the cruise missile to

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still unknown.

This is because (1)

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CRUISE MISSILE CARRIERS

The Department of Defense has directed the Air Force to study development of aircraft other

than the B-52 as potential cruise missile carriers. Several contracts have been awarded for system definition studies on seven aircraft. These studies will be completed in March 1979. However, a mission element need statement identifying the requirement for additional strategic capability has not yet been approved.

CRUISE MISSILES SELECTED
ACQUISITION REPORTING

The first Selected Acquisition Reports for the cruise missiles were issued for December 1977. The development estimates then and in the current reports do not reflect estimates used to support approval for the system to enter full-scale engineering development in January 1977. Consequently, current costs, schedule, and performance parameters are not being measured against the estimates as required by Department of Defense directives.

RECOMMENDATIONS

GAO recommends that the Secretary of Defense:

- Carefully monitor the reduced scope of the air-launched cruise missile flyoff, concurrent development and production, and resulting increased risks to the initial operational capability date and cost goals to assure that potential benefits are commensurate with the risk, and keep the Congress apprised of the flyoff status and any adverse effect on the initial operational capability or cost.
- Assure that a mission element need statement identifying any mission deficiency in strategic capability is validated prior to going further in the developmental process of the cruise missile carrier aircraft.
- Assure expeditious issuance of the Decision Coordinating Paper on the sea-launched cruise missile, including a statement of mission need.

- Closely monitor the development of the over-the-horizon targeting capability and testing of the seeker for the antiship sea-launched cruise missile.
- Review the results of the Air Force System Acquisition Review Council reexamination of the ground-launched cruise missile program and determine whether a separate Defense Systems Acquisition Review Council II is needed to review the mission need, system design alternatives, and cost estimates at the Office of the Secretary of Defense level.
- Obtain the authorization necessary to determine that sufficient remote launch sites are available to meet ground-launched cruise missile user needs and provide assurance to the Congress that such sites exist.
- Assure that test plans are expeditiously implemented to fully determine how the cruise missile's Deleted
- Assure that the targets in the National Target Base are reviewed to identify those for which it does Deleted
be determined and reported.
- Require that future Selected Acquisition Reports for cruise missiles report and explain changes between the estimates used to support approval for the system to enter full-scale engineering development and the current estimates to provide the Congress the visibility intended by the reporting system.

This report was reviewed by Department of Defense officials associated with management of the cruise missiles program. Their comments have been incorporated as appropriate.

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESSUNCERTAINTIES IN THE ARMY'S
GENERAL SUPPORT ROCKET SYSTEM
PROGRAMD I G E S T

The Army's General Support Rocket System is an unguided, multiple launch, surface-to-surface rocket system. It will be used primarily to supplement cannon artillery and will not replace existing weapon systems. Its targets are the enemy's field artillery weapons, air defense systems, light materiel, and personnel. Its normal range is from [Deleted] kilometers. It also is required to deliver the German antitank mine warhead to [Deleted] kilometers. The system has growth potential for permitting the attack of point and moving targets.

COST CONSIDERATIONS

The ultimate cost of the rocket system program may be almost double the \$3.5 billion program acquisition cost estimate made in October 1978.

There are deployment considerations still to be decided which could greatly affect program acquisition costs. These considerations include deploying increased numbers of rockets and launchers in each battalion as well as increasing the number of battalions.

The latest cost estimate does not include costs for development and potential procurement of terminally guided submissile warheads of about \$1.12 billion, which are a separate project within the Surface-to-Surface Missile Rocket System Program element. Other costs not included are those for land acquisition, the construction of ammunition storage facilities, and ammunition handling and transportation equipment.

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DEVELOPMENT SCHEDULE

The rocket system's initial operational capability is projected for Deleted Deleted months after beginning concept validation. Plans show the system may enter production without the benefit of test data from full-scale engineering development. The production decision will be based on test data from the validation phase only, thus creating a potential risk that production units will require substantial modification or may be unfit for tactical use.

LAUNCHER VEHICLE SELECTION

The Army selected a derivative of the Infantry Fighting Vehicle as the rocket system's launcher vehicle. However, the Mechanized Infantry Combat Vehicle, from which the Infantry Fighting Vehicle was developed, has had a long history of transmission and track/suspension system problems. The Army believes these earlier vehicle problems have been corrected by design changes. If, however, these problems have not been resolved, they could affect the system's effectiveness on the battlefield. Tests will be performed to determine whether the problems have been resolved. Test results will be available later this year.

NORTH ATLANTIC TREATY ORGANIZATION
STANDARDIZATION

The United States, the United Kingdom, the Federal Republic of Germany, and France are negotiating a memorandum of understanding for cooperative development of the system. The rocket will be capable of delivering both the dual-purpose M-42 submunition warhead and a German-developed scatterable mine warhead.

The Army is studying procurement of the German scatterable mine warheads for the rocket systems

it will deploy with its own forces. Army evaluations indicate the General Support Rocket System is not the most cost-effective system for delivering scatterable mines. These evaluations also show the scatterable mines developed in the United States to be both more operationally effective and more cost effective than the German scatterable mines. The participation of the Germans is considered critical to any cooperative development in order to gain the associated benefits of NATO standardization and sharing of acquisition costs. Consequently, a decision to buy the German scatterable mine may be significantly influenced by these factors notwithstanding the Army's evaluation of the system.

RECOMMENDATIONS

GAO considers it important that the Congress be aware of the potential budget outlays that will be required, both directly and indirectly, before the General Support Rocket System receives further funding. GAO recommends that the Secretary of Defense provide the Congress with a cost estimate showing all costs before further funding is approved. These costs should include costs for development and potential procurement of terminally guided submissile warheads, land acquisition, construction of ammunition storage facilities, and ammunition transportation vehicles and handling equipment.

GAO also recommends that the Secretary of Defense take steps to ensure that the General Support Rocket System capabilities are sufficiently proven before a production decision is made.

A draft of this report was reviewed by agency officials associated with the management of the program, and their comments have been incorporated as appropriate.

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESSTHE NAVY'S SURVEILLANCE
TOWED ARRAY SENSOR:
TECHNICAL PROBLEMS AND
UNRESOLVED ISSUESD I G E S T

The Navy is developing the Surveillance Towed Array Sensor system to overcome the deficiencies in the existing fixed surveillance system by providing a mobile, long-range detection capability against enemy submarines. The Congress appropriated \$69 million for fiscal year 1979 for two tow ships and related electronics equipment. However, the funds for the electronics equipment may not be obligated until the Navy certifies that technical problems have been resolved.

The Navy is planning to introduce the first ship in 1982, and the 12th and final ship is scheduled for delivery in 1984. Before recent cost increases the Navy projected a 30-year life-cycle cost for the 12-ship program of

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The program has a history

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Also, the practical length of an average mission and the number of ships needed for mobile undersea surveillance are open to question. If more ships are required, the cost of the system in relation to its effectiveness must be seriously considered before continuing the program.

COST GROWTH AND DELAYED SCHEDULES

The system's program costs have grown significantly and will grow more. As reported in the September 30, 1978, selected acquisition report, program costs had increased by \$230.4 million to \$489.7 million since the start of full-scale development in October 1974. This does not include \$27.5 million that the Navy has recently estimated as the

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cost of extending full-scale development until May 1980.

The program's key milestones have been delayed at least 3 years from the original estimates. The start of technical and operational evaluations have been postponed until October 1979 and January 1980, respectively, and the Defense Systems Acquisition Review Council meeting to decide whether or not to produce the system is now scheduled for May 1980--a delay of 3 years.

ARRAY PROBLEMS

During its limited sea testing, the system experienced technical problems.

[Deleted] The Navy has yet to demonstrate that these problems have been corrected and the array will be capable [Deleted]
[Deleted]

The project office prematurely reduced the involvement of its designated technical agent during system development. By reducing the involvement of its technical experts, the project office did not utilize all possible technical advice for the high risk technology of the system. If this step had not been taken some of the technical problems that subsequently occurred may possibly have been avoided.

DATA PROCESSING PROBLEMS AND COMMUNICATION VULNERABILITY

The system's data communication and processing network has not been satisfactorily tested as a whole. Parts of it have been tested; but, because of the numerous technical problems, these test results are not conclusive. In fact, one of the system's primary functions--

[Deleted] --has not been demonstrated.
[Deleted] it is reasonable

to expect many problems in these untested areas. Testing is continuing to resolve these issues.

The system's satellite data relay system is not required Deleted

Deleted Defense Intelligence Agency information indicates Deleted

by the mid-1980s.

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See pp. 15 and 17.)

AREAS OF UNCERTAINTY

The practical length of an average mission is uncertain. Initial Navy plans provided for 98 continuous days at sea per mission and over 300 days at sea per year. This lengthy time at sea was rejected as unrealistic by the Military Sealift Command, which is responsible for operating the ships. The Navy is actively considering reducing the mission to less than 90 days, thereby reducing the surveillance coverage the 12-ship program will be able to provide on a yearly basis.

Whether the 12-ship program will be able to meet the Navy's mobile undersea surveillance requirement is questionable. Initially, a 1974 study determined that 28 ships would be required, but this number was reduced to 12 because of budget constraints. However, Navy planning scenarios using 12 ships assume that missions will be 98 days long, which is now considered to be unrealistic. The Navy has recently restudied the number of ships required, but the results were not available at the time of our review.

CONCLUSIONS AND RECOMMENDATIONS

GAO believes that because of technical problems encountered and mission limitations, the Surveillance Towed Array Sensor system may not be able to satisfy the Navy's mission

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GAO believes that there is no assurance	Deleted

and, considering that more ships may be required or less coverage provided, GAO believes that the system may not be cost effective.

Therefore, in light of the technical problems of the system and its questionable cost effectiveness, GAO believes that the Navy should reexamine the feasibility of continuing the development of the Surveillance Towed Array Sensor system and consider other alternative methods

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GAO recommends that, before the \$69 million already appropriated for the first two ships is obligated, the Secretary of Defense obtain assurance from the Secretary of the Navy that

- critical technical problems have been corrected,
- key areas have been successfully tested, and
- major uncertainties have been resolved.

GAO recommends that the Congress, before appropriating additional acquisition funds, require that the Navy justify the system with respect to

- its technical feasibility,
- the number of ships required, and
- the cost effectiveness of the system in light of increasing costs and mission limitations.

Defense officials have reviewed a draft of this report and do not disagree with its basic recommendations. Their informal comments are included at appropriate places throughout the report. Hughes Aircraft Company also reviewed the report. Hughes representatives stated that at the time of their involvement as

prime contractor, they considered the system design and concept to be sound. Specific observations by Hughes are noted in the report where appropriate.

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESS.

HOW READY IS THE
ARMY'S ROLAND MISSILE
FOR PRODUCTION?

D I G E S T

The Roland is a European-developed air defense missile system designed to be capable of operating in clear or adverse weather. The Hughes and Boeing Aircraft companies fabricated a U.S. version for testing, from system technology transferred to this country. Thus, the Roland program is not a typical weapon system research and development effort. With the test program underway in mid-1978, the Army started Roland's production process by procuring production facilities. The Defense Department's decision to manufacture Roland for deployment is to be made in March 1979.

The Roland test program has revealed performance problems which, if not solved before production and deployment, could result in the Army fielding a weapon less effective than planned. Among others, these problems are:

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--Several crucial system components are unreliable.

--Certain system components, including the missile, cannot withstand environmental conditions, such as cold weather, likely to be encountered.

--The system's limited adverse weather testing has shown that it may be difficult to engage targets during rainy periods.

--The Roland may not be able to operate effectively

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--Testing shows that the system [redacted]

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The Army has initially judged Roland's test firing program to be generally successful. However, most of the firings were made at targets not fully representative of the threat, and it is questionable whether the results are indicative of how the system will perform in combat.

Roland's estimated costs are \$2.1 billion. This represents a \$268 million increase in fiscal year 1978. The estimate is likely to increase further.

The acquisition of Roland represents a significant step consistent with the U.S. objective to increase standardization in NATO. The interchangeability of U.S. and European missiles has been demonstrated, but the minimum level of system interchangeability prescribed by the Congress may not be met.

In response to congressional direction, the Army has completed the all-weather Chaparral firing demonstration program, including five missile firings, all of which were successful.

At the end of GAO's field work, the Army was doing a cost-effectiveness analysis to support the upcoming Roland production decision. GAO observed that some of the procedures followed in conducting the analysis were faulty and, unless changed, could lead to questionable conclusions.

RECOMMENDATION

GAO recommends that, before deciding whether to enter Roland into production, the Secretary of Defense require the Army to provide satisfactory evidence that the system has demonstrated, through adequate testing and analysis, that it will meet the Army's needs.

GAO recommends to the Congress that future funding for Roland be contingent on the Congress being furnished such evidence.

A draft of this report was reviewed by agency officials associated with the management of the program and their comments have been incorporated as appropriate.

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESS

SHOULD THE DEFENSE DEPARTMENT
SPEND OVER \$1 BILLION FOR
THE PRECISION LOCATION STRIKE
SYSTEM?

D I G E S T

The Air Force is developing the Precision Location Strike System to fulfill a requirement for an all-weather, day/night, target location and strike system. The development effort is geared to the location of electronic emitters, primarily air defense radars and is to guide strikes on those targets, as well as on nonemitting targets such as airfields, tank depots, etc., which are located by other reconnaissance and intelligence systems.

The total program cost is \$1,066.4 million for development and production of three systems. The Deputy Secretary of Defense approved full-scale development of the Precision Location Strike System in September 1977. A production decision is scheduled for January 1982, and Initial Operational Capability is planned in Deleted

Before the start of full-scale development, the Air Force made important cost/performance trade-offs to reduce the cost and complexity of the System. As a result, the approved System development program will not meet all the requirements specified by the Tactical Air Forces. To fully meet these requirements, the Air Force will have to

- procure Deleted as now planned;
- provide for each System to handle Deleted Deleted rather than Deleted; and
- expand the frequency coverage of the System to locate Deleted emitters.

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Further, additional development effort may be necessary to counter the effect of certain countermeasures on the System's ability to detect and locate some emitters.

Since the System is not only to locate targets, but also to guide strikes on targets, an all-weather, day/night, standoff weapon is needed to be interfaced with the Precision Location Strike System guidance system. Without such a weapon, the System cannot fulfill its mission.

The only standoff weapon being developed by the Air Force is the GBU-15 Planar Wing Weapon, a glide bomb. However, we were informed by the Office of the Secretary of Defense that the President's budget for fiscal year 1980 and the out-year periods contain no request for funds for the Planar Wing Weapon program. This decision leaves the Precision Location Strike System without the capability to strike located targets, since no other suitable standoff weapon has been selected.

The Air Force is considering the possibility of interfacing several Army missiles with the System and also the feasibility of developing a powered Planar Wing Weapon. However, a schedule for interfacing, testing, and producing standoff weapons for use with the System has not been established. Since the System's strike capability is critically dependent on appropriate weapons, the schedule for the development of the System should be synchronized with schedules for weapon development and testing.

The cost effectiveness of the Precision Location Strike System has not been established. In addition, the decision coordinating paper questions whether the System's contribution to defense suppression is worth the cost. An Air Force study was used to support a conclusion that the System is cost effective; however, the study itself indicates that the System is redundant with the EF-111A and Wild Weasel. Several analyses in the

study concerning (1) the System's ability to perform as advertised, (2) the System's performance when no warning time is available, and (3) the total cost of the System including weapons, indicate that the cost effectiveness is questionable when compared to the Wild Weasel and EF-111A. In GAO's opinion, there is a question of whether the System is worth the cost.

Although development efforts for the Precision Location Strike System are primarily geared to the location and strike of emitters, the primary benefit of the System as set forth in the study is its ability to strike nonemitting targets identified and located by other reconnaissance assets. GAO believes the study raises a question of whether the development effort needed to enable the System to locate and strike emitters is worth the cost.

If the System is developed and produced to meet Tactical Air Forces' stated requirements, its cost will grow. Furthermore, there are indications that the contractor may not be able to meet schedules and the production design-to-cost goal included in the contract. In addition, certain terms of the contract are vague and subject to varied interpretation by the contractor and the Air Force, such as the computer capacity.

GAO recommends that the Secretary of Defense, before allowing this System to proceed further

--independently review and thoroughly reevaluate the need for and direction of the System's program, including the impact of reductions in System capabilities

--certify its need and cost effectiveness

--identify available standoff weapons for use with the System, assess their potential for successfully performing the mission

as related to the System, and synchronize the System's program schedule to the weapons' program schedule

GAO also recommends that the Secretary of the Air Force closely monitor the design-to-cost program and assess whether the contractor can meet contractual goals for cost, schedule, and performance. Further, GAO recommends that the Secretary of the Air Force also resolve the potential contract dispute concerning computer capacity and assess the potential impact on the System cost and performance.

During this review GAO experienced unreasonable delays in obtaining access to documents which the Air Force categorized as internal working papers.

This report was reviewed by Department of Defense officials associated with management of the program. Their comments have been incorporated as appropriate.

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESSTHE ARMY'S COPPERHEAD AND
THE NAVY'S 5-INCH AND 8-INCH
GUIDED PROJECTILE PROGRAMSD I G E S T

Current Army artillery systems and Navy gun systems lack the accuracy needed to defeat hard-point targets, such as tanks and bunkers, and other targets such as aircraft and ships. To improve the accuracy of these systems, the Department of Defense initiated three development programs:

(1) the Army's 155-millimeter cannon-launched, laser-guided projectile (Copperhead) program, (2) the Navy's 5-inch laser and infrared-guided projectile programs, and (3) the Navy's 8-inch laser and infrared-guided projectile programs. The programs are managed by a joint Army/Navy project office. The suspension in August 1978 of the 8-inch Major Caliber Lightweight Gun Program resulted in the recent suspension of a large part of the development program for 8-inch guided projectiles intended for use with the gun.

These projectiles should have a higher probability of hitting their targets than current systems. Laser-guided projectiles will home in on reflected energy of a laser beam focused on the target from a laser designator. To be effective, line of sight from the designator to the target and from the projectile to the target must be maintained until the projectile hits. Infrared-guided projectiles will home in on heat emitted from the target.

At present, there is a question as to whether an effective laser designator will be on hand when the Copperhead is ready to be fielded. The primary designator for Copperhead is the Ground Laser Locator Designator. Testing has disclosed some

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performance problems which could limit this designator's operational availability. Some of the important original performance requirements have already been lowered. The designator's range is designed to be far less than the Copperhead's. When initially fielded, penetration into enemy territory will be limited.

To designate more distant targets, the Army believes that it could use laser designators installed in helicopters or use remotely piloted vehicles. These aerial designators, however, will not be available until several years after the Copperhead is fielded.

Even then the availability of designators in helicopters for use with the Copperhead is uncertain because of a priority requirement for these designators to be used with other laser-guided systems.

The Army is continuing to evaluate environmental and enemy-induced conditions which can degrade or negate the Copperhead's effectiveness.

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interrupts the laser signal necessary for the seeker to find its target. Alternate seekers, which may overcome some of these conditions, are being considered for use with the Copperhead's warhead and guidance sections.

Of 28 firings of the Copperhead since our last review in November 1977, 18 were judged successful. Some hardware problems have been identified, such as the

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The Army believes these and other problems disclosed by testing are solvable,

and they are being addressed. However, they have caused the test schedule to slip, and future test schedules will be compressed.

Many of the environmental and enemy-induced conditions that affect the Copperhead's performance also affect the Navy's projectiles. For the most part, the Navy is awaiting the results of the Army's studies to find solutions.

The Navy's efforts to evaluate the operational effectiveness of the 5-inch laser-guided projectile program is especially important in view of the Defense Department's recent suspension of the 8-inch major caliber lightweight gun program. Since the 5-inch gun system has less range than the 8-inch system its use requires a ship's moving closer to shore, increasing the risk of its coming under enemy attack from shore defenses. This could mitigate the benefits the Navy anticipates from the greater accuracy of the laser-guided projectiles.

In 1977 the Congress enacted Public Law 95-79, which directed the Defense Department to strive for the maximum possible degree of commonality of components in the Copperhead and Navy's projectiles. As subsequently amended, the law also called for the projectiles to have an initial operational capability by July 1981. The Navy has indicated it will be unable to meet that date.

The Army has reported that 61 parts, or 2.4 percent, developed specifically for the Copperhead have been determined to be common to the Navy projectiles. The Army estimates this has saved \$2 million in development costs. The contractor believes there are considerably greater savings, but has not demonstrated this to the Army's satisfaction.

GAO recommends that the Congress:

- Withhold funds to procure the Copperhead until the Army has demonstrated, through testing and other evaluations, that it will be cost effective and provide added capability sufficient to warrant bringing it into the inventory.
- Require the Secretary of Defense to clarify how the shipboard 5-inch laser-guided projectiles can be used effectively in view of the risks to the ships which would be forced to operate close to shore-based enemy defenses.
- Reconsider the urgency of the ~~Deleted~~ ~~Deleted~~ date established for the Navy's laser-guided projectiles achieving an operational capability and determine whether the date should be extended or whether the Navy should be directed to intensify its efforts to meet it.

A draft of this report was reviewed by agency officials, and their comments have been incorporated as appropriate.

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESSOPERATIONAL PROBLEMS FACING
THE ARMY'S ADVANCED ATTACK
HELICOPTER AND HELLFIRE MISSILED I G E S T

The advanced attack helicopter, designated the AH-64, is primarily an antiarmor weapon system. It is being developed to provide an adverse weather, day and night attack capability against enemy armor and troops. The helicopter will be armed with Hellfire air-to-surface laser-guided missiles, 2.75-inch rockets, and a 30-millimeter cannon. The capabilities planned for the helicopter and missile, if realized, would give more lethal and more accurate firepower, greater payload, increased agility, and enhanced survivability over the existing Cobra attack helicopter which is armed with the tube-launched, optically tracked, wire-guided (TOW) missile.

The combat effectiveness of the AH-64 and Hellfire Systems may be less than anticipated due to limitations on the use of remote laser designation from air or ground sources. Unless potential problems associated with remote designation are overcome, the AH-64 may have to operate predominately in the autonomous mode with increased risk to survivability.

Several factors may adversely affect the AH-64 and Hellfire operational capabilities:

- The ground laser locator designator, whose purpose is to identify and illuminate targets, has questionable survivability.

- Effective communication is difficult to maintain while helicopters fly at very low altitudes following the terrain contour.

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- Scout helicopters, which could perform the function of the ground laser locator designator, are still in a conceptual phase with no assurance they will become operational.
- When operating in the autonomous mode, at less than the optimum standoff ranges, the risk to attack helicopter survivability is increased because of the likelihood of greater exposure times to enemy anti-aircraft guns.
- When operating in the autonomous mode at optimum standoff ranges, the terrain in Europe would frequently preclude line of sight to the target unless the helicopter flew at higher altitudes, but this would subject the aircraft to additional enemy weapon systems.

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These limitations may prevent the AH-64 and Hellfire from realizing their full potential. In addition, an Army proposal to increase the TOW missile's range, flight time, and kill probability may narrow the relative differences between the AH-64 and Cobra attack helicopters.

Production of 536 AH-64 helicopters is scheduled to begin in December 1980 with a total estimated program cost over \$4 billion. The Army's Hellfire program is currently estimated to cost \$805 million.

Success of the AH-64 program also hinges on successful development of the major subsystems, but only about 30 percent of Government operational testing of the entire weapon system with the integrated subsystems will be completed prior to the

production decision. The program's optimistic test schedule may not allow for sufficient time to demonstrate the effectiveness of the AH-64 and its subsystems as an integrated fighting weapon. Additional weight increases could significantly degrade the System's performance.

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GAO recommends that the Secretary of Defense

- reevaluate the relative contribution that the AH-64/Hellfire and the Cobra/TOW can realistically be expected to make toward supporting ground forces and consider the results before supporting production decisions for either the AH-64 or the Hellfire;
- direct the Army to revise the AH-64 test schedule to include more operational testing as a total system prior to the production decision; and
- direct the Marine Corps to reevaluate the cost and operational effectiveness of deploying the Hellfire on its Cobra helicopters.

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESS

STATUS OF THE NAVY'S TORPEDO
DEVELOPMENT AND IMPROVEMENT
PROGRAMS

D I G E S T

The Soviet submarine force of about 350 units is a formidable threat to the security of the United States and to the Navy's free use of the world's oceans.

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Future Soviet submarines are projected to become faster, deeper diving, and quieter and to have improved

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To [Deleted]

and to develop torpedoes that will be effective against the projected threat, the Navy has implemented three major torpedo development and improvement programs: (1) the MK-46 Near Term Improvement Program, (2) the Advanced Lightweight Torpedo Development Program, and (3) the MK-48 Advanced Capability Program. GAO's review of these programs disclosed the following:

--The MK-46 Near Term Improvement Program (NEARTIP) has met its major performance goals and has been approved for service use at a program development cost of about \$36.2 million. The improved torpedo, however, has not yet demonstrated the capability

[Deleted] Tests of the torpedo's performance [Deleted] were being conducted at the completion of GAO's review.

[Deleted]

--The Advanced Lightweight Torpedo Program has completed a 3-year \$55 million technology assessment phase which resulted in several major technology advancements. The program is scheduled to enter advanced development in March 1979 and it appears most of the performance goals are attainable. Because of warhead technology advancements, two types of warheads--

Deleted --are now being seriously considered for the torpedo; however, there are still unknowns in the directed energy type warhead, making it unclear which warhead is best for the advanced torpedo.

--The MK-48 Advanced Capability Program improvements planned will not be realized until **Deleted** Program options are under review within Defense and the cost, schedule, and performance status has not been established.

--The Navy's analyses **Deleted** are based on tests of recovered samples, on simulations, on models, and on direct in-water measurements **Deleted**

Deleted but there are some concerns within the Navy about the adequacy of the data to be acquired.

CONCLUSIONS

Deleted Improvements are needed if the Navy's torpedoes are to be capable of meeting current and projected threats.

GAO believes that while the MK-46 NEARTIP torpedo is a much improved torpedo, [REDACTED]

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Also if the torpedo is found to be [REDACTED]

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Regarding the Advanced Lightweight Torpedo Program, GAO believes that the Navy's technology assessment phase was a valuable program resulting in some major advancements which potentially could be implemented in the advanced torpedo. It is not possible at this point in the program to determine which warhead would be more cost effective [REDACTED]

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[REDACTED] GAO believes that the Navy, in developing this program, should thoroughly consider the concerns expressed over the adequacy of the data to be provided.

AGENCY COMMENTS

Defense officials associated with these torpedo programs reviewed a draft of this report. Their informal comments have been incorporated where appropriate.

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESS

WILL WIDE APERTURE ARRAY
SONAR MEET THE NAVY'S
NEEDS WHEN IT IS DEPLOYED?

D I G E S T

The Navy's rapid passive acoustic localization sonar program, which includes the wide aperture array sonar and the low ship impact techniques, needs to be reevaluated.

This program was authorized by the Chief of Naval Operations in 1975 to support rapid aiming of the Mark 48 torpedo and encapsulated Harpoon missile by SSN 637 and SSN 688 class nuclear-powered submarines. Such a capability was stated as being necessary for these submarines [redacted]

[redacted] Deleted

[redacted] submarines as well as surface ships.

Under the Navy's present development plan, the primary rapid passive acoustic localization sonar, wide aperture array, will be installed on future classes of nuclear-powered attack submarines at an estimated cost of [redacted] Deleted [redacted] Deleted. An evaluation will also be conducted by the Navy upon completion of wide aperture array development to determine the cost effectiveness of retrofitting it on SSN 688 class submarines. A secondary sonar system, called low ship impact techniques, is being developed, but will have only limited capability against the prescribed threat. However, it could become operationally available beginning in 1980 and could be retrofitted on most nuclear-powered attack submarines, including SSN 688, at a cost of about \$115,000 per submarine.

WIDE APERTURE ARRAY SONAR SYSTEM

The Navy's wide aperture array sonar system will be used by U.S. attack submarines to quickly locate and establish the relative position of enemy submarines. It has been under development for several years, during which the design concept has been materially changed. Several development risks in the present design have

not been resolved. The risks are associated with new technologies that may be needed to achieve the required performance.

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Developing acceptable solutions to these risks will delay introduction of the wide aperture array sonar for operational use

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acceleration of their development by the Navy may make it feasible for them to be operationally available about the same time as the wide aperture array. It may also be feasible to incorporate these arrays, along with a portion of the wide aperture array, into a

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LOW SHIP IMPACT TECHNIQUES PROGRAM

Low ship impact techniques, the Navy's secondary rapid passive acoustic localization system, will involve development and installation of additional software packages and some minor hardware changes to the AN/BQQ-5 sonar now being installed on most nuclear attack submarines. The Navy's estimated cost of procuring and installing the low ship impact techniques is \$115,000 per submarine.

Although the low ship impact techniques are not expected to have the performance capabilities of the wide aperture array sonar, they will have some useful acoustic localization capability against Deleted

submarines. This capability could become operationally available for SSN 688 and most earlier classes of nuclear-powered attack submarines during fiscal year 1980. This will be about the same time Deleted

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RECOMMENDATIONS

GAO recommends that the Navy reevaluate its rapid passive acoustic localization program and submit a revised development plan for approval by the Secretary of Defense. This plan should:

- Continue planned installation of the low ship impact techniques to provide a limited rapid passive acoustic localization capability to as many submarines as quickly as possible.
- Continue development of the technologies needed to produce a wide aperture array and demonstrate the feasibility and performance capabilities of externally mounted arrays with actual testing at sea.

GAO also recommends that, prior to approving any rapid passive acoustic localization development plan submitted by the Navy, the Secretary of Defense assure himself that the plan addresses the following unresolved questions:

- If the Navy does not install the wide aperture array on SSN 688 class submarines, will they be capable of passive localization soon enough Deleted

- Will the current wide aperture array performance requirements be adequate Deleted

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--Will other externally mounted sonar arrays be needed

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--If the wide aperture array is expected to have a useful localization capability

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can it be incorporated with other arrays

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AGENCY COMMENTS

Defense officials associated with the wide aperture array program reviewed a draft of this report. Their informal comments have been incorporated where appropriate.

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESSSHORTCOMINGS IN THE ARMY'S
PROGRAM TO DEVELOP THE STANDOFF
TARGET ACQUISITION SYSTEMD I G E S T

The Standoff Target Acquisition System is being developed by the Army to provide its divisions with a long-range reconnaissance, surveillance, and target acquisition capability in a difficult electronic warfare environment. The purpose is to obtain timely information on enemy forces so that tactical commanders have adequate time to position friendly defense forces and weapons to counter an attack. In August 1978 the Secretary of Defense approved the start of full-scale engineering development. Initial operational capability for production systems is planned for Deleted

The system will be composed of three primary subsystems:

- A modified Black Hawk helicopter equipped with radar and communications gear.
- Ground stations in mobile vans which receive, process, and display information received from the helicopter via an air-to-ground data link.
- A ground-based positioning system for the helicopter.

The program will cost about \$913 million exclusive of inflation occurring in future years. Estimated costs could increase due to development uncertainties such as the need for additional testing before a production decision, and development and acquisition of additional equipment after mission performance characteristics are resolved.

Because of a desire for early fielding of the system, the Army did not completely resolve specific mission requirements for

providing target acquisition capability.

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The principal value of the system to be tested for production approval will be to gather intelligence data.

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The decision on whether to incorporate the additional features will be made after the system completes testing.

The cost-effectiveness analysis which was used as support for the engineering development decision, did not satisfactorily cover several operational issues. Therefore, the system's mission performance levels predicted by the Army may not be valid. The study did not fully address threats to system survivability, analyze reliability and availability of the helicopter under realistic operating conditions, consider whether enemy air defenses would prevent tactical aircraft from using the system's data to attack long-range targets, or measure the effect of a hostile environment on radar performance and helicopter availability.

Advanced development testing has not provided sufficient information to verify that the radar design concept is sound. Therefore, it is questionable whether the Secretary of Defense had a sufficient basis for approving full-scale engineering development.

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Other basic performance characteristics having technical risk have not been simulated or cannot be evaluated until a prototype of the advanced radar design is developed.

RECOMMENDATIONS

GAO recommends that the Secretary of Defense require the Army to:

--Fully resolve the requirement for target acquisition capability before the system's operational testing is begun. This would provide a better basis to measure the system's military value.

--Further analyze the system's cost effectiveness before the production decision to address issues such as the threat to system survivability, reliability, and availability under realistic operating conditions;

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and the effect of a hostile environment on system performance.

A draft of this report was reviewed by agency officials, and their comments have been incorporated as appropriate.

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESSNEED TO DEMONSTRATE F-18 NAVAL
STRIKE FIGHTER WEAPON SYSTEM
EFFECTIVENESS BEFORE
LARGE-SCALE PRODUCTIOND I G E S T

The F-18 Naval Strike Fighter is a new tactical aircraft designed to meet Navy fighter and light-attack requirements. The aircraft has been designed to perform four missions: (1) fighter escort, (2) fleet air defense, (3) interdiction, and (4) close-air support. The F-18 will also be used by the Marine Corps. The total cost of developing and procuring 811 aircraft is estimated to be about \$14.3 billion.

According to the Navy, F-18 aircraft weight has increased, and degradation may occur in single engine rate-of-climb, acceleration speed, combat ceilings, and minimum landing speed. If this degradation continues, the F-18's ability to achieve its specified objectives will be reduced.

A number of ordnance items planned for use on the F-18 aircraft have known performance deficiencies. These include the Sparrow AIM-7F missile and the Sidewinder AIM-9L missile. In addition, it is questionable whether the GBU-15, to be used as a stand-off weapon, will go into production. Present programs are ongoing to correct Sparrow and Sidewinder performance limitations/deficiencies. However, these improvement programs will not be completed for several years. Since the purpose of the F-18 weapon system is to destroy enemy air and ground targets, weaknesses in these weapon systems will reduce the F-18's effectiveness in performing its missions.

PSAD-79-25

GAO believes that there is a large degree of planned concurrent development and production present in the F-18 program. The program is in full-scale development. Development flight testing began in November 1978, and operational evaluation is expected to be completed in October 1980. However, the Navy plans to contract for 2 lots of production aircraft, which could consist of from 24 to 39 airplanes and long-lead production items, before completion of operational test and evaluation. Program cost would go as high as about \$1.5 billion before completion of operational evaluation. The tightly scheduled flight test program is highly optimistic and leaves little time to correct deficiencies identified during testing.

In the past on other programs, where risks were high, concurrency was frequently demonstrated to be a costly procedure because it usually resulted in either the system's performance being degraded and/or the incurring of additional costs to bring the system to the required level of performance. In GAO's opinion, the risk of problems arising during the development of this weapon system is high because the airframe, engine, and radar are new.

In view of the past problems the Department of Defense has had with concurrency in high risk situations, the degradation in performance of the F-18 aircraft, and the performance deficiencies of certain F-18 weapons, GAO believes that it would be desirable to practice concurrency with caution and accelerate efforts to solving performance and weapon system problems. GAO further believes that it would be desirable to restructure the test program to allow sufficient time to determine and resolve risks.

F-18 selected acquisition reports did not explicitly set forth changes in the performance of the F-18.

Consequently, GAO recommends that the Secretary of Defense:

- Restructure the test program to insure complete testing and evaluation of F-18 effectiveness and suitability before approving full production of F-18 fighter aircraft.
- Conduct an analysis of F-18 performance degradations to evaluate the effect these problems will have on the ability of the F-18 to accomplish its missions.
- Insure that the F-18 operational test and evaluation program will give sufficient emphasis to fully disclosing capabilities and limitations of existing weapon systems which the F-18 will use, and the impact identified problems will have on F-18's ability to perform its missions.
- Accurately disclose the performance changes in the F-18 selected acquisition reports.

A draft of this report was reviewed by agency officials and their comments were incorporated as appropriate.

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESSCRITICAL ISSUES ON THE MAVERICK/
CLOSE AIR SUPPORT WEAPON SYSTEMS
PROGRAM NEED TO BE RESOLVEDD I G E S T

The Maverick missile was developed to provide the Tactical Air Forces an air-to-surface weapon capable of destroying tanks, armored personnel carriers, small field fortifications and similar hard targets. The television-guided Maverick was intended for use in daylight and good weather operations; however, such capabilities are also needed at night and in undesirable weather conditions, in an expanded target spectrum, and for weapons flexibility. As a result, the Air Force is developing, under the Close Air Support Weapon Systems Program, a laser seeker, an imaging infrared guidance unit, an alternate warhead, and a single rail launcher.

Current program cost estimates for the laser-guided Maverick and imaging infrared Maverick as of December 1978, were \$66.9 million and \$1,861.2 million, respectively. Estimated development costs for the alternate warhead is \$22.5 million, but procurement costs are unknown because of the uncertainty of what missiles will be procured and in what quantity. Cost estimates for the single rail launcher totals \$44.8 million.

GAO's review of the Close Air Support Weapon Systems Program disclosed the following important matters.

--The Air Force, as lead service in a joint program with the Navy, ended development and plans for its procurement of the laser-guided Maverick missiles in August 1978, after spending \$58 million on it. This action was taken because laser designator deficiencies caused low operational utility and because of budget limitations. Numerous issues, such as the

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[Deleted] are critical to the operational effectiveness of this system (and other systems)

[Deleted] The Air Force began developing laser-guided Maverick missiles about 3 years ago at the direction of the Office of the Secretary of Defense. At the time, the Air Force questioned the operational value of laser designators but was overruled by the Office of the Secretary of Defense. The laser Maverick development program was recently restructured to satisfy potential Navy requirements.

- Although the Marine Corps supports a requirement for laser Maverick, the Navy has yet to decide whether to continue the program.- Nevertheless, the problems associated with laser-guided weapons experienced by the Air Force may also plague the Navy and Marine Corps as well.
- Until recently, development and procurement of a laser Maverick missile for the Navy was the basis for the requirement for an alternate warhead and a single rail launcher. In December 1978, the Navy commented that an imaging infrared Maverick variant may be procured and this would establish further need for the alternate warhead and single rail launcher.
- The alternate warhead is about 175 pounds heavier than the standard Maverick warhead. The effect of the warhead's additional size and weight on the performance of the aircraft and missile has not been fully determined. Also, use of the alternate warhead will increase the minimum launch range required for safe separation and will jeopardize the survivability of the launch aircraft.

As an interim measure, the launch range can be increased to enhance aircraft survivability. As a permanent correction of the problem, the Air Force determined through studies that revised fuze arming times provide an increase

in safety with minimal loss of operational utility and minor revisions to the fuze. The Navy agreed with this, and the revised fuze arming times will be incorporated into contract specifications.

--The Air Force has not fully demonstrated significant benefits of the single rail launcher over the existing triple rail launcher to justify its procurement. Also, modifications to the triple rail launcher are planned, which may provide the same capabilities planned for the single rail launcher.

--Imaging infrared Maverick testing has shown problems in target acquisition and target lock on; however, improvement is anticipated by the Air Force in these areas during full-scale development.

GAO recommends that the Secretary of Defense:

--Assess the operational value and cost effectiveness of a laser-guided weapon for the Navy and Marine Corps. The ability of a laser-guided system to perform as required should be clearly established before additional millions of dollars are unnecessarily spent.

--Suspend development of the alternate warhead and single rail launcher until the Navy and the Marine Corps make a firm commitment to fund and procure the laser Maverick or imaging infrared Maverick variant.

--Evaluate the effect that the increased size and weight of the alternate warhead will have on aircraft/missile performance and effectiveness.

--Demonstrate major benefits of the single rail launcher over the existing triple rail launcher before the Air Force proceeds with its launcher program.

--Closely monitor the results of test and evaluation of the imaging infrared Maverick during full-scale development to assure that

the weapon being developed will be effective
in the projected operational environment.

Agency officials reviewed a draft of this re-
port, and their comments have been incorporated
where appropriate.

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESSAN ASSESSMENT OF THE
JOINT TACTICAL INFORMATION
DISTRIBUTION SYSTEMD I G E S T

The Joint Tactical Information Distribution System is designed to furnish secure digital information, relative navigation, and positive user identification to all the military services and the North Atlantic Treaty Organization. It is a high-cost (\$3 billion to \$4 billion), high-visibility major acquisition that will interface with Navy and Air Force tactical aircraft, naval ships, and almost all ground tactical control systems.

The System research and development started about 1970, and the first operational command and control terminals for the E-3A aircraft and ground installations are not expected to become operational until Deleted. Deleted Other aircraft, naval ships, and ground troops will be equipped with fighter aircraft and man-portable terminals when they are expected to become available in the late Deleted.

Current communications with most U.S. military aircraft are neither secure nor jam-resistant. The Department of Defense believes that it is questionable whether U.S. Forces would be able to survive a North Atlantic Treaty Organization-Warsaw Pact conflict without being able to reliably communicate with airborne and surface units in an environment where electronic countermeasures are present.

The Tactical Air Command stated that the need for a Joint Tactical Information Distribution System is of the highest priority and although it is not 100-percent jam-proof, it is highly resistant to electronic countermeasures.

PSAD-79-39

Also, Air Force officials believe that this System is urgently needed by the tactical forces to command and control units in near real time for more effective battlefield management. The Air Force further believes that this capability could assist the U.S. Forces to survive the early days of a conflict and may compensate for our deficiency in manpower and weapons.

The System was designated as a major weapon system in November 1977, but it has not been subjected to any Defense System Acquisition Review Council milestone meetings. Although some System equipment has been tested, other System equipment is being developed as full-scale development models. The first E-3A terminal production decision is planned for December 1979.

Also, the System has not been included in the Department of Defense selected acquisition reporting system. These quarterly reports provide the Congress and the Department of Defense with the status of cost, schedule, and performance of major acquisitions.

GAO identified a number of issues which it believes will have a serious impact on this program, unless corrective action is taken.

--The System currently planned for development may not be able to

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Specifically, the contractor's threat analysis did not consider the deployment of

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--The Air Force has not demonstrated that the System is interoperable with fighter aircraft terminals. Furthermore, the

E-3A terminals tested were not representative of a production prototype. Also, several other limitations were present during the E-3A terminal tests.

--Uncertainty exists concerning the required number of terminals needed by the Navy and Air Force and the weapon systems which will use the Joint Tactical Information Distribution System equipment. Also, the Army has not yet determined its requirements. Other than for the Deleted Deleted fighter aircraft, the Air Force is not sure whether the system will be installed inside the aircraft or carried outside in a pod-type container.

--Although the Office of the Secretary of Defense directed that a specific technology be used in the System, the Air Force and the Navy do not agree that this directed technology can meet their respective operational concepts and needs.

Although the System is still in the development stage and many of these issues will be resolved as the program progresses through production, GAO believes that better program direction by the Office of the Secretary of Defense and better management by the military services is required.

Accordingly, GAO recommends that the Secretary of Defense:

--Conduct an analysis Deleted Deleted

- Decide on the modifications needed to the System to overcome the threats in the Deleted time frames and establish priorities for implementation.

- Defer a production decision on E-3A terminals until interoperability with fighter aircraft terminals can be demonstrated.

- Direct the Air Force to conduct additional initial operational test and evaluation on E-3A terminals to reduce the limitations that were present during previous tests.

- Provide more visibility to the Congress by placing the Joint Tactical Information Distribution System on the Selected Acquisition Reporting System.

- Resolve the dispute existing between the Navy and Air Force concerning the terminal technology to be used in the Joint Tactical Information Distribution System.

- Evaluate the cost and feasibility of installing pods in designated aircraft and the impact of the pods on mission effectiveness.

A draft of this report was reviewed by Department of Defense officials, and their comments were incorporated as appropriate.

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESS

THE EFFECTIVENESS OF THE
F-14A/PHOENIX WEAPON SYSTEM IS
MARGINAL AT BEST AGAINST THE
CURRENT AND POSTULATED THREAT

D I G E S T

The F-14A/Phoenix weapon system, in production seven years, was designed to be a principal contributor to fleet air defense for the U.S. Naval Fleet. However, operational testing conducted by the Navy's Operational Test and Evaluation Agency prior to and during fleet introduction and fleet exercises showed that the effectiveness of the F-14A/Phoenix is marginal at best against the current and postulated threat

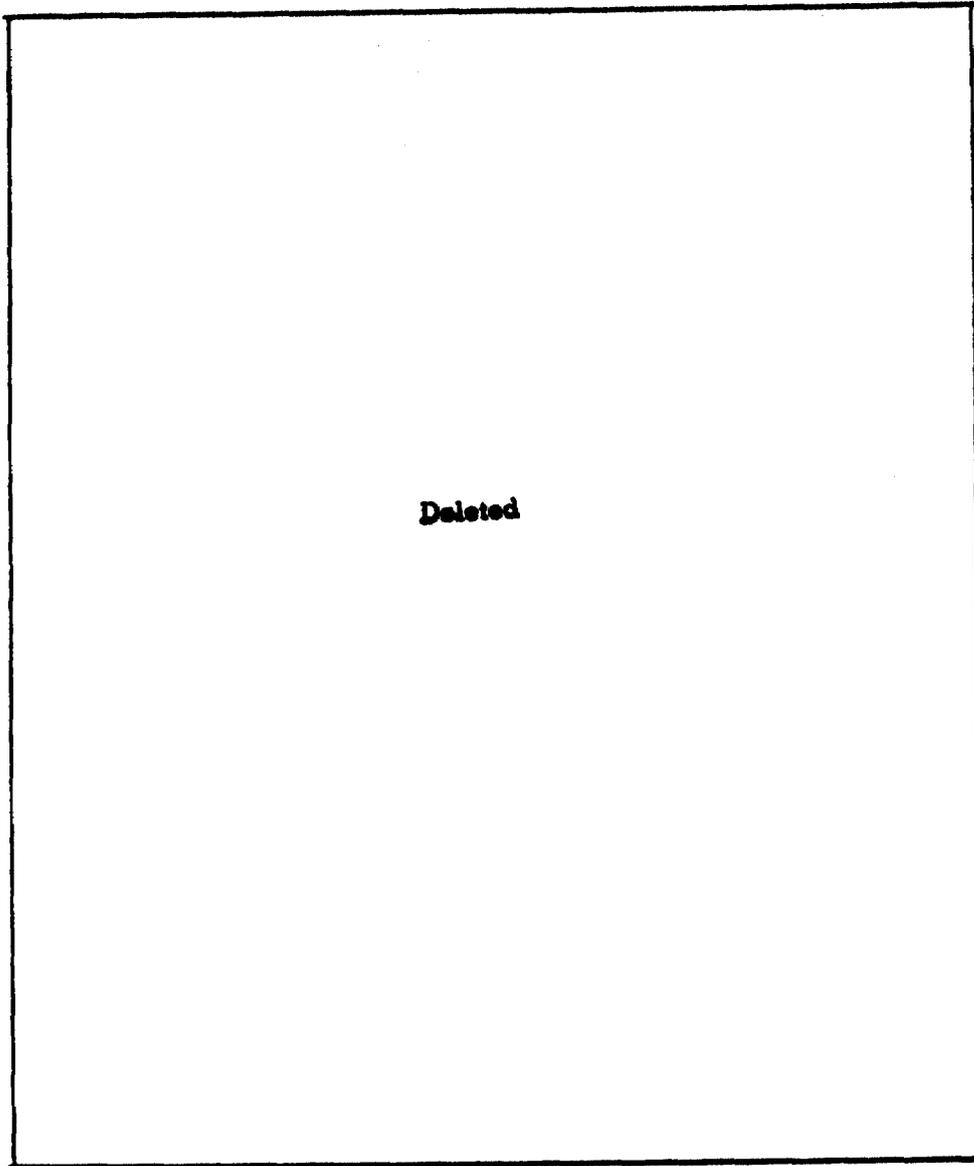
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The testing further showed the F-14A/Phoenix weapon system was seriously degraded
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The Navy testers found the F-14A/Phoenix weapon system to be operationally effective against the threat for which it was designed, fighter/bomber size targets. It was effective

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Specifically, the Navy testers found the F-14A/Phoenix weapon system to be

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In addition, the Navy testers found that the:

--Defensive electronic countermeasures suite Deleted

--Communications data link Deleted

Operational and fleet testing of the free-flight performance of the Phoenix missile showed

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Several improvements to the weapon control system and Phoenix missile are being developed or planned to correct many of the operational limitations identified during operational and fleet testing. However, they will not correct or improve the capability of the F-14A/ Phoenix weapon system to counter antiship missiles or aircraft

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All of of these improvements, except a software change to the AN/AWG-9, are in an early stage of development; and their effectiveness will not be demonstrated for some time.

In addition to its limited operational capabilities,

Deleted

During the 12-month periods ending June 30, 1977, and 1978, the F-14A aircraft was mission capable (capable of performing one of its missions)

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The prime reasons for the readiness rates involve inadequate supply support which is due to lower than predicted reliability performance of some F-14A equipment.

To cope with parts shortages and to meet operational requirements, F-14 squadrons have resorted to extensive cannibalization (taking parts from one aircraft for another). In addition, they are constantly cannibalizing parts from flyable aircraft to put other aircraft down for parts back in a flyable status to prevent the down aircraft being reported on a special report. Last year about 100,000 maintenance man-hours were

used to cannibalize approximately 20,000 parts.

Readiness of the Phoenix missile **Deleted**
Deleted Maintenance records show **Deleted** percent of total Navy Phoenix assets were serviceable and ready for issuance on a given date. Further, testing showed that only **Deleted** percent of pre-1975 missiles would survive 72 flight hours, and follow-on testing of post-1975 missiles with improved reliability features showed that they met the standards **Deleted** carriers tested.

Besides the F-14A/Phoenix's limited effectiveness and lack of readiness, flight safety is a major concern. Thirty-eight F-14As have crashed or been severely damaged, 24 since June 1976. The majority of these accidents was engine or system failure related.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of Navy tests and fleet exercises, GAO found that the effectiveness of the F-14A/Phoenix weapon system to defend the fleet against the current primary threat **Deleted**

Deleted Further, the ability of the improvement programs to correct the F-14A/Phoenix operational problems **Deleted**

Therefore, GAO recommends that the Secretary of Defense:

- Certify to the Congress, before requesting further procurement funding, that the Navy's improvement programs for the F-14A/Phoenix weapon system will enable it to counter the current and postulated threat to the Naval Fleet.

- Review the need to improve the defensive electronic countermeasures capabilities of the F-14A since the Navy's current projection of F-14A utilization does not include an air-to-ground or antiship role and since future utilization of it as a fighter escort may be limited because of the planned fighter escort role of the F-18.
- Improve the operational readiness and logistic support of the F-14A/Phoenix weapon system by (1) reevaluating the data used for life expectancy of high-failure parts, (2) taking steps to improve the life expectancy of such parts, and (3) ordering a stop to the Navy's wasteful practice of cannibalizing parts from operational aircraft.
- Take the necessary steps to resolve the F-14A engine problems and assure himself that any solution adopted will substantially improve the flight safety of the weapon system.

VIEWS OF RESPONSIBLE OFFICIALS

This report was reviewed by Department of Defense and Navy officials associated with the F-14A/Phoenix program. The thrust of their comments was that (1) the F-14A/Phoenix provides a significant increase in the maritime air superiority role and electronic countermeasures capabilities compared to previous weapon systems; (2) the F-14A/Phoenix is effective against the threat for which it was designed--bombers and antiship platforms--but was not designed to counter antiship missiles; (3) the Navy's testing was conducted for a more severe threat than existed during the design phase of the system; and (4) readiness and availability has been increased significantly as a result of the operational readiness improvement program initiated in 1976. GAO has considered these comments in developing its recommendations.

LISTING OF MAJOR ACQUISITION REPORTS ISSUED FROM
JULY 1, 1978, THROUGH MARCH 23, 1979

	<u>Date</u>	<u>PSAD number</u>
Recommendations for Improving Testing of EF-111A Tactical Jamming System (SECRET)	6/30/78	78-130
Status Report on the ROLAND Missile Program (Chairman, House Armed Services Committee) (CONFIDENTIAL)	7/ 7/78	78-128
Managing Weapon System Software: Progress and Problems (CONFIDENTIAL)	7/10/78	78-112
Operational Test and Evaluation of Foreign Built Weapon Systems	7/25/78	78-131
Strategic Need and Cost Effectiveness of the C-141 Stretch Program (SECRET)	7/31/78	78-121
An Assessment of the Major Caliber Lightweight Gun System (SECRET)	8/ 4/78	78-122
Reconnaissance/Intelligence Assets of the DOD (SECRET)	8/ 4/78	78-114
Foreign Military Sales of Selected Weapon Systems (CONFIDENTIAL)	8/ 9/78	78-117
Analysis of the Joint Chiefs Study on Mobility: Further Study Recommended (SECRET)	8/14/78	78-126
Assessment of Testing Verticle Line Array DIFAR Sonobuoy AN/SSQ-77 (CONFIDENTIAL)	8/18/78	78-120
Issues to be Resolved Before Continuing the Air Force's GBU-15 Program (SECRET)	8/24/78	78-49
Observations of the Proposed DDH-997 Procurement (SECRET)	8/29/78	78-140

	<u>Date</u>	<u>PSAD number</u>
Ballistic Missile Defense: Some Work Should Be Stopped and Remaining Effort Evaluated (SECRET)	9/ 1/78	78-109
Assessment of the Navy's Undersea Surveillance System and Planned Improvements (SECRET)	9/13/78	78-142
Newport News Shipbuilding Claims	10/ 6/78	78-137
Defense Department Is Not Doing Enough to Maximize Competition When Awarding Contracts for Foreign Military Sales Programs	10/17/78	78-147
Practices and Procedures for Follow-on Operational Testing and Evaluation of Weapon Systems by the Military Services	10/19/78	79-1
Review of the Development Test and Evaluation Program for the MK-12A Reentry Vehicle System Intended for Deployment on Minuteman III Missiles	10/23/78	79-2
Assessment of Joint DT&E/IOT&E Results of EF-111A (SECRET)	11/ 3/78	79-5
Nuclear Warhead for Cruise Missiles-- Development Problems and Issues	11/ 7/78	79-4
Review of the Navy's Ship Acquisition Process	12/29/78	79-21
Issues Concerning Air Force KC-10A Advanced Tanker/Cargo Aircraft	1/ 5/79	79-8
Financial Status of Major Federal Acquisitions, September 30, 1978	1/11/79	79-14
The 140-Foot Harbor Tugboat: Does the Coast Guard Need It on the East Coast	1/15/79	79-17

APPENDIX II

APPENDIX II

	<u>Date</u>	<u>PSAD number</u>
The NAVSTAR Global Positioning System--A Program with Cost and Benefit Uncertainties	1/17/79	79-16
Congress Needs Reliable Cost Estimates and Established Priorities for Allocating Funds for Water Resources Projects	1/29/79	79-13
Is the AV-8B Advanced Harrier Aircraft Ready for Full-Scale Development?	1/30/79	79-22
The U.S. Antisatellite Capability: Its Progress and Future (SECRET)	2/ 7/79	79-12
Indecision and Uncertainty Exist in the Development of an Advanced Intercontinental Ballistic Missile Weapon System (SECRET)	2/ 8/79	79-40
The Trident and SSN-688 Submarine Construction Programs--Status and Issues (SECRET)	2/ 9/79	79-18
Air-, Sea-, and Ground-Launched Cruise Missiles Program--Status and Issues (SECRET NO FORN)	2/12/79	79-19
Uncertainties in the Army's General Support Rocket System Program (CONFIDENTIAL)	2/13/79	79-31
The Navy's Surveillance Towed Array Sensor: Technical Problems and Unresolved Issues (SECRET)	2/14/79	79-35
How Ready is the Army's ROLAND Missile for Production? (SECRET)	2/14/79	79-28
Should the Defense Department Spend over \$1 Billion for the Precision Location Strike System? (SECRET)	2/15/79	79-37
Operational Problems Facing the Army's Advanced Attack Helicopter and Hellfire Missile (SECRET)	2/20/79	79-33

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The Army's Cooperhead and the Navy's 5-Inch and 8-Inch Guided Projectile Programs (CONFIDENTIAL)	2/20/79	79-34
Observations on Office of Management and Budget Circular A-109--Major System Acquisitions by DOD	2/20/79	79-9
Status of the Navy's Torpedo Development and Improvement Programs (SECRET)	2/21/79	79-36
Will Wide Aperture Array Sonar Meet the Navy's Needs When It Is Deployed? (SECRET)	2/26/79	79-32
Shortcomings in the Army's Program To Develop the Standoff Target Acquisition System (SECRET)	2/26/79	79-29
Better Management of Metro Subway Equipment Warranties Needed	2/27/79	79-41
Critical Issues on the Maverick/Close Air Support Weapon Systems Program Need To Be Resolved (CONFIDENTIAL)	2/27/79	79-42
Need to Demonstrate F-18 Naval Strike Fighter Weapon System Effectiveness Before Large-Scale Production (SECRET)	2/27/79	79-25
An Assessment of the Joint Tactical Information Distribution System (SECRET)	2/28/79	79-79
The Effectiveness of the F-14A/Phoenix Weapon System Is Marginal at Best Against the Current and Postulated Threat (SECRET)	2/28/79	79-44
Information on the Navy's Surveillance Towed Array Sensor Program (SECRET)	3/ 6/79	79-49

	<u>Date</u>	<u>PSAD number</u>
Need for a Reassessment of DOD's Laser Guided Weapons Programs (SECRET)	3/ 8/79	79-56
Need for More Accurate Weapon System Test Results To Be Reported to the Congress (SECRET)	3/ 9/79	79-46
The Navy's Strategic Communications System--Need for Management Atten- tion and Decisionmaking (SECRET)	3/19/79	79-48
Transatlantic Cooperation in Developing Weapon Systems for NATO--A European Perspective	3/21/79	79-26
Tennessee Valley Authority Can Improve Estimates and Should Re- assess Reserve Requirements for Nuclear Power Plants	3/22/79	79-49
Improving Warship Survivability-- A Billion Dollar Problem (SECRET)	3/23/79	79-43

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