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THE ARMY'S ADVANCED ATTACK HELICOPTER IS NOT READY FOR PRODUCTI--ETC(U)
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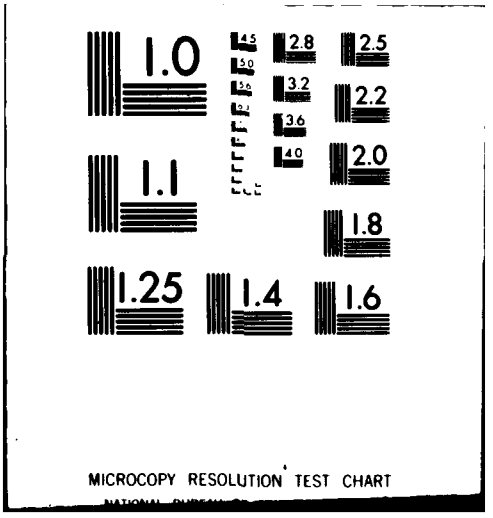
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MICROCOPY RESOLUTION TEST CHART

UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

MISSION ANALYSIS AND
SYSTEMS ACQUISITION DIVISION

B-201273

DECEMBER 1, 1981





The Honorable Caspar W. Weinberger
The Secretary of Defense

Attention: Assistant for Audit Reports

Dear Mr. Secretary:

Subject: The Army's Advanced Attack Helicopter Is Not Ready for Production (MASAD-82-8)

We have been reviewing the status of the Army's Advanced Attack Helicopter (AH-64) and laser Hellfire missile programs. Although our review is not yet complete, we have several concerns in view of the imminent decision on the merits of starting production of these two weapon systems.

New program cost estimates prepared by the Army indicate that AH-64 procurement costs would increase by 40 to 50 percent from the $4.8 billion reported in the September 1981 Selected Acquisition Report. This major increase created an affordability problem and the Army now intends to reduce the total program quantities from 536 to 446 aircraft. With this change, the projected AH-64 unit production cost now exceeds $13 million. The merits of producing the AH-64 and Hellfire must be weighed against resulting reductions in funds available for other programs.

Should you decide to continue with plans to produce AH-64/Hellfire, a number of risks and uncertainties still exist about the new systems that warrant delaying the start of their production until better information and more thorough analyses are provided.

We have five basic concerns:

--The data currently available for decision purposes includes data derived from tests of two key subsystems--the target acquisition designation sight (TADS) and the helicopter engine--whose configurations will differ from the subsystems to be made a part of the production aircraft.

--Caution should be used in accepting the AH-64's reported reliability, availability, and maintainability calculations

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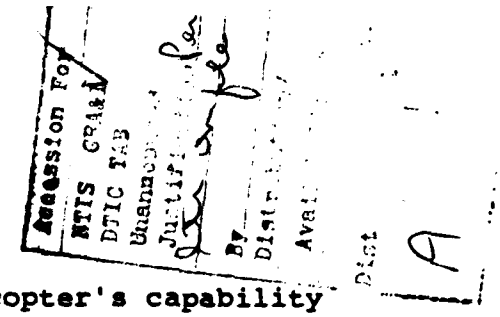

since they may be overstating the helicopter's capability in these areas.

--The Army's ability to adequately support the helicopter for an extended period after initial deployment is questionable.

--The laser Hellfire missile, although it has generally shown an advantage in testing in a clear environment, still has some serious shortcomings that could limit the AH-64's total system effectiveness.

--Contractor readiness to begin production is still at a point where it is not without some potential program-inhibiting risks.

Collectively, these concerns seem to justify a cautious approach in arriving at a production decision. We believe a decision at this time would necessarily be relying on incomplete information, questionable evaluations, and optimistic projections, and would result in considerable risk regarding system cost, performance, reliability, and supportability.

## TWO MAJOR SUBSYSTEMS WILL BE CHANGED FOR PRODUCTION AIRCRAFT

The configurations of two major subsystems presently on the AH-64 do not represent the final production design. TADS, which has not been very reliable, is undergoing major changes. In addition, the existing engines will be replaced by newly designed engines that have yet to be flight tested on the AH-64. Therefore, the true performance and reliability characteristics of the AH-64 will not be known until the latest subsystem configurations are adequately tested and evaluated.

TADS' development schedule has experienced several delays. Because the contractor was late in delivering upgraded preproduction units to the Army, the first of two scheduled 500-hour endurance tests was canceled and the second deferred. The AH-64's operational test was substituted for the first endurance test and demonstrated the need for further development of TADS. Army test officials reported that on the average TADS demonstrated about 20 hours between each failure against a criterion of 100 hours, judging it to be marginally acceptable.

The schedule for microminiaturizing TADS electronic components has also been delayed. Although component qualification of this effort was supposed to be completed before the AH-64's operational test, it will not be completed until April 1982.. In addition, the components will not complete flight testing at the system level until March 1983--15 months after the scheduled AH-64 production decision.

TADS' laser rangefinder/designator to be incorporated in production models has been extensively redesigned and is undergoing qualification testing. Due to a schedule delay, it is unlikely that the testing will be completed before the scheduled production decision. Because the AH-64 needs the laser system to engage targets with the Hellfire missile, considerable risk is involved in not qualifying it before the production decision.

The Army's decision to replace the existing T-700 engine with the more powerful T-701 engine was made to offset excessive aircraft weight to meet certain performance requirements. Although the T-701 is derived from the T-700 and is similar to the 401 engine to be used in the Navy's LAMPS helicopter, we believe that integrating the new engine into the AH-64 involves considerable risk.

Initial flight testing of the T-701 in the AH-64 is planned for March through June 1982. Our main question is whether the more powerful engines will place added stress on aircraft components, reducing their reliability and/or durability. The flight test should address aircraft performance, vibration, and torsional stability; engine reliability; cooling provisions; and effects on the infrared suppressor.

## RELIABILITY, AVAILABILITY, AND MAINTAINABILITY DATA SHOULD BE USED WITH CAUTION

Our primary concerns with reliability, availability, and maintainability data collected during operational tests is that conditions existed which may detract from the reliance that can be placed on the reported results. During the test, 49 percent of the maintenance actions were performed with contractors' assistance or solely by the contractors. Some of the automatic test equipment was not available because it was not completely developed, nor was the test equipment used in a representative operational mode. Test maintenance activities were also supported by a logistics system dedicated solely to the tests with direct access back to component manufacturers for parts support and expedited shipment.

Army test officials concluded that the AH-64, as a total system, met all intended reliability, availability, and maintainability objectives except for repair time. They calculated that the mean time to repair the AH-64 was 1.69 hours compared to the objective of not more than .9 hours. Overall, test officials judged AH-64 maintainability as marginal. Without extensive contractor assistance, maintainability would probably have been worse.

The Army evaluation of mission reliability shows 17.9 mean hours between mission failures, close to the objective of 17 hours. This calculation represents failures that caused actual

aborts and that were charged only to the hardware. By including other failures that represented potential aborts caused by the hardware, as well as those charged to crew and maintenance errors or to unknown causes, operational mission reliability dropped to 3.5 mean hours between failures. Although no goals were established for operational mission reliability, we believe this value reflects the effect of hardware complexity, the immaturity of the system, and what could be expected in an operational environment unless planned improvements are realized.

Test officials concluded that the operational test showed the AH-64 meets the requirement for achieved availability. Achieved availability does not consider the unavailability of the aircraft due to logistics delays. The material need document indicates a desired combat operational readiness rate of 80 percent which includes considering logistics time to provide repair parts. Using the Army's standard for calculating logistics time, we computed that operational availability was about 58 percent.

SYSTEM SUPPORTABILITY IS QUESTIONABLE

We question how well the AH-64's automatic test equipment will be able to support the aircraft. The AH-64's maintainability depends on (1) the fault detection/location system to identify faulty components and (2) the automatic test station to diagnose those faulty components so that they can be repaired.

The detection/location system's performance has not been fully demonstrated. Little testing of the system has been conducted to date, particularly with TADS. Since the system in essence triggers unscheduled maintenance actions and has a significant effect on the automatic test station's workload, its performance is key to the AH-64's maintainability and availability. Army logisticians are skeptical of the system's eventual ability to perform all needed fault detection/location functions. This could create the need for additional test equipment.

The test station's availability under operational conditions is a major issue. The computer system to be used in the test station has proven unreliable and unmaintainable in a field environment. In a recently completed development test of the computer system, the Army determined that the system achieved only 14 mean hours between each failure compared with the required 75 hours. The system was particularly sensitive to hot and cold temperatures and high humidity. In addition, Army personnel were unable to maintain it and eventually had to give the maintenance function to the contractor.

The test station is to be tactically mobile and is to accompany aviation units within the combat division. Each time it becomes necessary to move, it will probably take over 12 hours to shut down the station, move, setup, and warmup the system. Thus,

the time available for aircraft maintenance could be seriously restricted.

Critical development and testing of the automatic test station configured specifically for the AH-64 is yet to be accomplished, particularly software and associated peripheral equipment. An operational test of the station is not planned until 1984 when all the equipment pieces are intended to be integrated into expandable shelters aboard two semitrailers and operated and maintained by Army personnel.

## IMPROVEMENTS STILL NEEDED FOR HELLFIRE EMPLOYMENT

The laser Hellfire missile program is directly linked to the AH-64 program and has been scheduled to coincide with it. No other firing platforms are being seriously considered for Hellfire.

To date, the missile has generally demonstrated good reliability and accuracy, particularly in a clear environment and under controlled conditions. However, some improvements are still being considered and several critical tests, including bad weather, electro-optical countermeasure, and system qualification tests, have been delayed until after the production decision.

A prime operational issue is the missile's motor which produces significant amounts of smoke under many humidity and temperature conditions. The smoke makes the launch helicopter more visible to the enemy. In addition, it can obscure the crew's field of view, degrade autonomous designation, and impair rapid or ripple fire engagements.

Another operational problem involves approximately 13 Hellfire missile launch constraints that tend to detract from the system's tactical effectiveness. These constraints include the height of the aircraft, the distance to the target, the laser reflectivity angle, and others which are reported to complicate effective employment of the missile. This points to the need for effective training--a situation which will be impaired until the AH-64 combat mission simulator, now under development, becomes available in the late 1980s.

## CONTRACTOR READINESS FOR PRODUCTION POSES SEVERAL RISKS

As the AH-64 and Hellfire systems make the transition from development into production, problems could arise resulting in higher procurement costs. The Army has identified several risks associated with contractor production readiness. Whether these risks are acceptable is a matter of judgment. Nevertheless, we believe particular attention should be given to the adequacy of the risk assessment and translation of the risks into a range of likely costs. In other Army programs, specifically the Blackhawk

helicopter, Stinger missile, and M1 tank, procurement costs have increased substantially because of poor production risk assessments or unrealistic projections of the manufacturing processes. 1/

In July 1981, the AH-64 prime contractor decided that the helicopter's final assembly plant would be located in Mesa, Arizona. Before that time, the assembly was expected to take place at an existing plant in Culver City, California. This decision poses schedule risks because no buildings, flight test facilities, or utilities have been established on the contractor's 200 acres of land located in the Mesa area. Although plans are underway, it will take several months to construct the plant.

The Army also questions the availability of a sufficient number of workers with critically needed skills, specifically, industrial engineers and quality control inspectors. Recruitment from outside the Mesa area is considered necessary and a potential problem according to Army studies. Army officials have expressed similar apprehension about facility readiness and labor shortages at the Culver City plant where the AH-64 prime contractor intends to fabricate AH-64 components before shipment to Mesa. Labor shortages have also been identified in Ocala, Florida, where the Hellfire missile seeker is to be manufactured.

The AH-64 prime contractor's quality control program is still under development and portions of it may not be ready when helicopter production activities are scheduled to commence. Procedures are incomplete for acceptance testing of items procured from suppliers and for production testing of finished products. The Army has experienced quality control problems with its M1 tank which required additional work on tanks produced at the contractor's plant and significantly slowed their delivery.

Army officials have reported that plans to complete development and Government validation of the AH-64 prime contractor's performance measurement system are behind schedule and, unless promptly resolved, could lead to generating unreliable cost and schedule data for several months after production is scheduled to begin. Such a management information system is essential in controlling contract performance--a lesson the Army recently learned on the Blackhawk helicopter program.

## CONCLUSIONS

In our opinion, the AH-64/Hellfire program's high cost warrants serious consideration of more cost-effective alternatives such as an improved Cobra/TOW or other types of weapons. If the system must be produced, a sufficient number of risks and

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1/Report to the Congress dated October 20, 1981 (MASAD-82-5).

uncertainties still exist which warrant delaying the start of production. Until these matters are resolved on the AH-64, it would seem prudent to also delay production of the Hellfire missile. Obviously, the costs associated with postponing the decision must be weighed against the benefits of obtaining better information and greater confidence in the total system's merits.

We believe that during the past year, the AH-64 program has been hastily conducted and has resulted in insufficient information for decisionmakers. To ignore the information yet to be developed would essentially lower the use of several management tools, such as evaluations by independent test and system support agencies, that have been designed to ease the burden of making difficult choices.

RECOMMENDATIONS

In view of the high cost of adding the AH-64/Hellfire to the Army's weapon system inventory, and its effect on an already strained budget, we recommend that you explore other more cost-effective alternatives such as the Cobra/TOW or other types of weapons.

If you decide that the AH-64/Hellfire should be procured, we recommend that production approval be delayed until the satisfactory completion of Government tests and evaluations showing favorable results.

We would appreciate receiving your comments on the matters disclosed in this report. If desired, we will be happy to discuss the contents with you or your staff.

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As you know, section 236 of the Legislative Reorganization Act of 1970 requires the head of a Federal agency to submit a written statement on actions taken on our recommendations to the Senate Committee on Governmental Affairs and the House Committee on Government Operations not later than 60 days after the date of the report and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

Copies of this letter are being sent to the Chairmen of the House and Senate Committees on Armed Services, Appropriations, and Budget.

Sincerely yours,

W. H. Sheley, Jr.
Director


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