

July 2001

DEFENSE LOGISTICS

Information on Apache Helicopter Support and Readiness



GAO

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Contents

Letter		1
	Results in Brief	2
	Agency Comments	4
	Scope and Methodology	4
Appendix I	Scope and Methodology	7
Appendix II	Are the Apache's Sustainment Systems Technical Support Need Being Met?	9
Appendix III	Have Obsolete Parts Been Procured?	13
Appendix IV	Do Available Technical Manuals and Technical Data Packages Meet User Needs?	15
Appendix V	Are There Unfunded Component and Airframe Upgrade Requirements?	17
Appendix VI	Have the Mandate Issues Affected Apache Fleet Readiness?	21
Appendix VII	Comments From the Department of Defense	26
Appendix VIII	GAO Contacts and Staff Acknowledgments	27

Tables

Table 1: Army Materiel Command Sustainment Support Requirements, Funds Received, Unfunded Requirements, and Percent Funded for Fiscal Years 2000 and 2001	10
Table 2: Aviation and Missile Command Sustainment Support Requirements, Funds Received, Unfunded Requirements, and Percent Funded for Fiscal Years 2000 and 2001	10
Table 3: Aviation and Missile Command's Apache Sustainment Support Requirements, Budget Estimates, and Percents for Fiscal Years 2001-2003	11

Table 4: Fiscal Year 2001 Unfunded Requirements for Component Upgrades (as of September 1999)	18
Table 5: Fiscal Year 2002 Unfunded Requirements for Component Upgrades (as of February 2001)	19

Figures

Figure 1: Total Apache Fleet Fully Mission Capable Rates (Sept. 1997 through Jan. 2001)	22
Figure 2: Active Army Apache Fully Mission Capable Rates (Sept. 1997 through Jan. 2001)	23
Figure 3: Army Reserve Apache Fully Mission Capable Rates (Sept. 1997 through Jan. 2001)	24
Figure 4: Army National Guard Apache Fully Mission Capable Rates (Sept. 1997 through Jan. 2001)	25



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United States General Accounting Office
Washington, DC 20548

July 17, 2001

Congressional Committees

The AH-64 Apache helicopter is considered the most advanced attack helicopter in the world. The Army expects the Apache to be the cornerstone of the Army's aviation fleet for many years to come. The Army plans to rely on the Apache until the fleet reaches its replacement point in fiscal year 2020.¹ In recent years, aircraft groundings due to flight safety issues have raised questions about the long-term reliability of this weapon system.

From the time a weapon system is fielded until it is retired, the Army routinely provides ongoing engineering and technical support to identify and correct problems that could affect safety, performance, and readiness. These services are referred to by the Department of Defense as sustainment systems technical support and are funded from its operation and maintenance appropriation. Sustainment systems technical support includes engineering services to support safety and capability modifications to weapon systems, updates to engineering drawings and parts specifications, updates to technical manuals, and technical assistance to field units. In addition to sustainment support, the Army must provide significant, often costly, improvements and upgrades to address component limitations and deficiencies and to improve capabilities. These upgrades are primarily funded through the Army's procurement appropriation.

Section 376 of the Floyd D. Spence National Defense Authorization Act for Fiscal Year 2001² requires that we examine selected logistics, funding, and readiness issues pertaining to the AH-64 Apache helicopter program. Specifically, the act requires that we determine the following: (1) Are the Apache's sustainment systems technical support needs being met? (2) Have obsolete Apache parts been procured? (3) Do available technical manuals and data packages of engineering specifications and drawings meet user needs? (4) Are there unfunded requirements for component and airframe upgrades? (5) Have any of the above issues affected fleet readiness? The Army's Aviation and Missile Command and the Aviation

¹2000 Army Aviation Modernization Plan, submitted to Congress in April 2000.

²P.L. 106-398.

Program Executive Office have primary management responsibility for these issues.

Results in Brief

In fiscal years 2000 and 2001, the Apache's identified sustainment systems technical support requirements have not been fully met. In fiscal year 2000, the Aviation and Missile Command was able to provide only about \$27.9 million of the \$28.6 million needed for Apache sustainment support. However, the Command projects that it will be able to meet only about 56 percent of the Apache's sustainment support requirements for fiscal years 2001-2003. Recognizing that all weapon systems must compete for limited funds, the Army has prioritized sustainment support requirements and funds its most critical needs. As a result, some Apache sustainment support projects that affect the efficient management of Apache parts and the helicopter's flight safety have been limited in scope or delayed. For example, a faulty tail rotor swashplate identified in June 2000 could not be analyzed for over 5 months because the Army did not have the funds available. When the contractor examined the swashplate, it was determined that 88 additional swashplates might be affected, and the entire Apache fleet was grounded to prevent the potential loss of lives and equipment. An Aviation and Missile Command official stated that procedures are in place to elevate a request for additional funding when circumstances indicate a potential safety risk. However, upon initial examination the external condition of this particular component did not warrant elevation to a higher level.

The Army and the Defense Logistics Agency have not procured obsolete, unusable parts for the Apache. We analyzed the Army and Defense Logistics Agency inventory databases and found no instances in which obsolete Apache parts were ordered. However, older versions of parts that are still usable are sometimes ordered because the inventory database used by both the Army and the Defense Logistics Agency is out-of-date. While these parts are still usable, they may not include the latest technological upgrades or be as reliable as the newer versions. The database has not been updated since 1995 due to constrained sustainment system technical support funding and does not contain the latest information on all Apache parts. Consequently, the Army relies on its suppliers to ensure that erroneous orders are corrected and the latest versions of the parts are provided. The Army has an effort under way to update the inventory database to include changes to over 7,000 Apache part numbers by September 2001.

Although technical manuals used to maintain the Apache are sometimes outdated, field and depot personnel told us the manuals are sufficient to

meet their needs. Army maintenance personnel told us that the manuals provide the information on parts and maintenance procedures that they need to maintain the helicopter. Although the manuals are generally updated only once per year, the Aviation and Missile Command issues technical bulletins as necessary to augment the information contained in the manuals between updates. However, technical data packages, including engineering drawings and specifications, are not available for all Apache parts because the Army decided during the helicopter's procurement in the early 1980s to limit the amount of technical data purchased. As a result, the Army uses alternative methods to compensate for the lack of data. These methods include using reverse engineering to develop drawings and specifications needed to purchase required spare parts. Additionally, the Army is not purchasing any technical data for the upgraded Apache Longbow helicopter and plans to rely on the original equipment manufacturer for all of its technical data support.

There are unfunded requirements for Apache component upgrades for fiscal years 2001 and 2002, but the Army has no airframe upgrade requirements for either year. Needed component upgrades totaling over \$168 million will not be funded in fiscal year 2001 according to Army officials. Further, as of February 2001, the Army projected over \$158 million in component upgrades that will not be funded in fiscal year 2002. Examples of unfunded component upgrades include the purchase and installation of an internal fuel tank that would give each aircraft one additional hour of flying time and an upgrade to the Aerial Rocket Control System to eliminate uncommanded rocket launches. Army officials recently stated that they are considering withdrawing the 2002 requirements to focus on the Longbow procurement and aviation recapitalization efforts. However, the Army has not provided any documentation supporting the withdrawal of the requirements and program officials stated that those decisions are still under review within the Army.

These issues have not prevented the Apache fleet from meeting its readiness goals. While sustainment support funding is critical to maintaining weapon system readiness, we did not find that constrained funding has directly affected Apache fleet readiness. However, as discussed previously, we noted one instance where operational risk was increased as a result of funding constraints. Although the fleet has not

always met the Army's fully mission capable goal,³ our examination of readiness data for the period September 1997 through January 2001 did not reveal a link between the issues addressed by the mandate and low readiness rates. During the period we examined, active Apache units generally met or exceeded the Army's fully mission capable goal with the exception of periods in which safety issues grounded the entire fleet. However, Army Reserve and National Guard units generally reported fully mission capable rates below the Army's goal due to insufficient funding, low priority for parts, and a shortage of experienced maintenance personnel.

Since the Army has actions under way to update its inventory database and technical manuals, we are not making recommendations in this report.

Agency Comments

In commenting on a draft of this report, the Department of Defense concurred with the information presented and stated that it supports the concerns raised in the report as well as ongoing efforts to correct them. The Department stated that it strongly supports efforts to elevate and correct potential safety hazards in an expeditious manner. The Department further stated that updating the Army's inventory database by September 2001 is a priority to assure that the most current versions of Apache parts are provided to field users. The Department's comments are reprinted in their entirety as appendix VII.

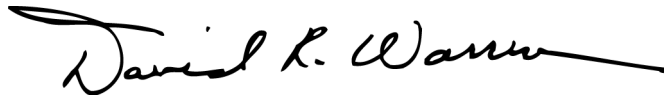
Scope and Methodology

To address the issues in this report, we interviewed and obtained information from officials of the Army's Aviation and Missile Command and the Aviation Program Executive Office in Huntsville, Alabama; Army Forces Command, Atlanta, Georgia; Apache battalions at Fort Bragg, North Carolina, and Fort Hood, Texas; the Defense Logistics Agency; and the Boeing Company, Mesa, Arizona. We conducted our review from August 2000 through May 2001 in accordance with generally accepted government auditing standards. Appendix I provides additional detail about the scope and methodology of our work. Detailed information on the issues discussed in this letter is provided in appendixes II through VI.

³Fully mission capable means that the aircraft is capable of performing all of its assigned missions. The Army's fully mission capable goal for the Apache is 70 percent.

We are sending copies of this report to the Secretary of Defense; the Secretary of the Army; the Director, Office of Management and Budget; and interested congressional committees. We will also provide copies to others on request.

If you or your staff have any questions on this report or wish to discuss these matters further, please call me on (202) 512-8412. Key contacts and staff acknowledgments are listed in appendix VIII.

A handwritten signature in black ink that reads "David R. Warren". The signature is written in a cursive style with a long horizontal flourish extending to the right.

David R. Warren
Director, Defense Capabilities and Management

List of Congressional Committees

The Honorable Carl Levin
Chairman
The Honorable John Warner
Ranking Minority Member
Committee on Armed Services
United States Senate

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

The Honorable Bob Stump
Chairman
The Honorable Ike Skelton
Ranking Minority Member
Committee on Armed Services
House of Representatives

The Honorable Jerry Lewis
Chairman
The Honorable John P. Murtha
Ranking Minority Member
Defense Subcommittee
Committee on Appropriations
House of Representatives

Appendix I: Scope and Methodology

To address each of the five issues set forth in the 2001 Defense Authorization Act, we interviewed and obtained information from officials of the Army's Aviation and Missile Command and the Aviation Program Executive Office in Huntsville, Alabama, and Forces Command, Atlanta, Georgia. We also interviewed and obtained information from additional Army and Defense Logistics Agency (DLA) officials in other offices and locations pertaining to each of the specific questions, as described below.

To determine whether the Apache's sustainment system technical support needs are being met, we met with officials from the Office of the Secretary of Defense (Comptroller), the Office of the Assistant Secretary of the Army (Financial Management and Comptroller), and the Army's Office of the Deputy Chief of Staff for Logistics, Washington, D.C.; the Army Materiel Command, Alexandria, Virginia; and the Aviation and Missile Command and Aviation Program Executive Office, Huntsville, Alabama. In addition, we obtained and analyzed guidance, requirement information, budget documents, and funding data from fiscal years 1998 through 2003. We also analyzed processes for determining requirements for the Apache's sustainment system technical support and prioritization for funding. While these issues dealt with funding requirements and priorities, it was not within our scope to assess the validity of the Army's sustainment system technical support requirements or prioritization decisions. We also interviewed Apache program officials to determine the effect of funding constraints on sustainment system technical support, particularly as it related to readiness.

To determine whether the Army and DLA had procured obsolete Apache parts, we analyzed Army and DLA inventory data to identify items coded obsolete and with inventory on order. We limited this analysis to the activities that manage the largest number of Apache parts—the Army's Aviation and Missile Command and DLA's Richmond, Virginia, and Philadelphia, Pennsylvania, Supply Centers. We also interviewed and obtained information from officials of the Aviation and Missile Command, DLA offices in Richmond, Virginia, and Philadelphia, Pennsylvania; Apache battalions located at Fort Hood, Texas, and Fort Bragg, North Carolina; and the Boeing Company, Mesa, Arizona.

To determine whether Apache technical manuals meet user needs, we interviewed officials of Apache battalions at Fort Hood and Fort Bragg as well as maintenance personnel at Corpus Christi Army Depot, Texas. Additionally, we selectively reviewed the technical manuals at the Apache battalions we visited. We also interviewed responsible officials at the Aviation and Missile Command to identify deficiencies and methods used

to augment technical manuals between annual updates. Regarding technical data packages, we interviewed Aviation and Missile Command officials to determine whether sufficient technical data is available to meet the needs of the Apache engineering community. Because many of the decisions affecting technical data packages were made during procurement of the weapon system in the mid-1980s, available information on this issue was limited. We also discussed potential readiness implications with the Aviation and Missile Command officials we interviewed.

To determine whether there are unfunded requirements for airframe and component upgrades, we interviewed and obtained data from officials of the Army's Office of the Deputy Chief of Staff for Operations and the Aviation Program Executive Office to document the requirements determination and funding processes. We also obtained and analyzed Army budget documents listing upgrade requirements for fiscal years 2001 and projected for 2002. We compared the requirements to the actual budget information to identify projects not included. However, we did not attempt to validate the Army's upgrade requirements.

To determine the extent to which these issues affected Apache fleet readiness, we analyzed readiness data from September 1997 through January 2001 to identify instances in which reported readiness levels were below established Army goals. Where readiness problems were identified, we reviewed commanders' comments that accompanied unit readiness reports and interviewed Apache battalion and Aviation and Missile Command officials to determine whether reported readiness problems were caused by any of the conditions described in the mandate. We also discussed factors affecting fleet readiness levels with Aviation and Missile Command officials.

We conducted our review from August 2000 through May 2001 in accordance with generally accepted government auditing standards.

Appendix II: Are the Apache's Sustainment Systems Technical Support Need Being Met?

Background

Sustainment systems technical support comprises engineering and technical services for fielded weapon systems. Sustainment support begins the first full fiscal year after the last item (e.g., helicopter, tank, truck, and missile) is produced and continues until the weapon system is retired from the Army inventory. Specific support provided includes

- engineering services in support of safety and capability modifications;
- updates to technical manuals that field and depot personnel use to maintain weapon systems;
- updates to technical data packages, which include engineering drawings and parts specifications; and
- on-site technical assistance to field units.

All Army sustainment support projects are funded from the “central supply activities” subactivity group of the Army’s operation and maintenance account. While the Army Materiel Command is responsible for managing the funds for all Army weapon system sustainment support, the Aviation and Missile Command has primary responsibility for about 95 percent of the Apache’s sustainment support funds. The Army’s Communications-Electronics Command and the Tank-Automotive & Armaments Command also provide some limited sustainment support for the Apache components they manage.

Army Process for Funding Apache Sustainment Requirements

The Army considers all sustainment support requirements identified by the Aviation and Missile Command in developing the proposed operation and maintenance budget. However, sustainment support competes with many other programs for operation and maintenance funding. Consequently, sustainment support funding usually falls short of identified requirements at all levels. For example, as shown in table 1, the Army Materiel Command received only 78.7 percent and 66.1 of the funds required for sustainment in fiscal years 2000 and 2001, respectively.

Table 1: Army Materiel Command Sustainment Support Requirements, Funds Received, Unfunded Requirements, and Percent Funded for Fiscal Years 2000 and 2001

Dollars in millions

Fiscal year	Requirement	Funds received	Unfunded requirement	Percent funded
2000	\$346.0	\$272.3	\$73.7	78.7
2001	449.5	297.2	152.3	66.1

Source: Compiled from data provided by the Army's Office of the Deputy Chief of Staff for Logistics and the Army Materiel Command.

Since the amount of sustainment support the Army Materiel Command received was less than its requirements, the amount it could provide to its subordinate commands, such as the Aviation and Missile Command, was also constrained. According to an Army Materiel Command official, the Aviation and Missile Command received \$260.6 million for sustainment support for fiscal years 2000 and 2001. As shown in table 2, the Aviation and Missile Command received \$60.3 million less than its sustainment support requirements in fiscal year 2000 and about \$28.7 million less in fiscal year 2001.

Table 2. Aviation and Missile Command Sustainment Support Requirements, Funds Received, Unfunded Requirements, and Percent Funded for Fiscal Years 2000 and 2001

Dollars in millions

Fiscal year	Requirement	Funds received	Unfunded requirement	Percent funded
2000	\$171.5	\$111.2	\$60.3	64.8
2001	178.1	149.4	28.7	83.9

Source: Compiled from data provided by the Army Materiel Command and the Aviation and Missile Command.

The Aviation and Missile Command provided about \$27.8 million of the \$28.6 million needed for Apache sustainment support in fiscal year 2000. However, funding projections for fiscal years 2001-2003 are at a lower level. As shown in table 3, the Aviation and Missile Command projects that it will be able to provide only 55.6 percent of the \$146.2 million Apache sustainment support requirement during the next 3 years.

Table 3: Aviation and Missile Command's Apache Sustainment Support Requirements, Budget Estimates, and Percents for Fiscal Years 2001-2003

Dollars in millions

Fiscal year	Requirement	Budget estimate	Percent
2001	\$31.4	\$15.3	48.7
2002	50.2	21.0	41.8
2003	64.6	45.0	69.7
Total	\$146.2	\$81.3	55.6

Source: Compiled from data provided by the Aviation and Missile Command.

Army's Priorities for Sustainment Projects

The Army has provided guidance for prioritizing the sustainment of all fielded weapon systems, including the Apache. The guidance breaks sustainment requirements into six categories:

- senior leader-directed, legal, and emergency safety;
- near-term readiness;
- recapitalization;
- industrial base;
- force modernization fielding plans; and
- routine sustainment.

While the Apache is the first priority among aviation weapon systems, such requirements as strategic intelligence; small arms; nuclear, chemical, and biological defense; strategic mobility; and initial sustainment have higher priorities in each of the above categories. According to an Aviation and Missile Command official, sustainment support funding levels are generally sufficient to satisfy the senior leader-directed, legal, and safety requirements but not all of the near-term readiness requirements. Consequently, lower priority projects are rarely funded.

For example, in June 2000, maintenance personnel removed a tail rotor swashplate from an Apache helicopter after finding excessive play between the rotating and nonrotating swashplates. Although the Army forwarded the swashplate to Boeing (the contractor that manufactured the helicopter) for inspection and analysis in July 2000, due to limited sustainment support funds a contract did not exist to cover the needed engineering analysis and investigation. Consequently, Boeing did not perform its analysis and investigation of the tail rotor swashplate until December 2000 when the Army had sustainment support funds available to award a contract for the required work. The contractor's analysis and investigation identified a faulty overhaul process that affected 88

swashplates and resulted in the grounding of the Apache fleet until the potentially faulty swashplates could be accounted for. Once the suspect swashplates were identified and inspected, it was determined that only the first one was defective. However, according to Army officials, more could have been defective, and helicopters and lives could have been lost during the 5 months the part was on the shelf awaiting funding. An Aviation and Missile Command official stated that in the absence of sufficient sustainment support funding to routinely investigate all quality deficiency reports that could affect flight safety, the Command has procedures in place to elevate the level of review and request additional funding for specific engineering investigations when circumstances indicate a potential safety risk to personnel or equipment. However, the external condition of this particular component did not prompt such a request.

In another example, the Army has ordered older, but still usable, versions of some Apache parts when newer versions are available because its inventory records are outdated. The Army has not updated the records since 1995 because of insufficient sustainment support funding. Consequently, the Army must rely on its parts suppliers to identify and correct its errors when parts are ordered. (This issue is discussed in more detail in appendix III.)

Appendix III: Have Obsolete Parts Been Procured?

Background

The Army and DLA manage over 15,500 Apache parts. Within the Army, the Aviation and Missile Command manages the majority of the Apache parts. The Aviation and Missile Command manages higher dollar value repairable parts, while DLA primarily manages lower dollar value consumable parts.¹ The Command maintains the Provisioning Master Record—an inventory database used by the Army to manage and procure Apache parts.

The Apache fleet consists of two models of the AH-64 helicopter—the basic A-model and the upgraded D-model, including the D-model Longbow, which is equipped with the radar-guided missile. The D-model Apache differs from the A-model in that it is equipped with a global positioning system, enhanced cockpit controls, an improved cooling system, and advanced Hellfire missiles. The Longbow Apache is also equipped with radar to give it “fire-and-forget” radar-guided Hellfire missiles. About 175 A-model helicopters have been upgraded to the D- and Longbow models by Boeing at its Mesa, Arizona, facility. Production of the upgraded models is expected to continue until approximately 2006.

Obsolete Parts

We found no evidence that the Army or DLA had procured obsolete (i.e., unusable) spare parts for the Apache helicopter. Further, Aviation and Missile Command, DLA, and Apache program officials as well as representatives of each of the nine major Apache parts suppliers told us that they could not recall any instances in which obsolete or unusable Apache parts had been purchased. Apache battalion maintenance officers at Fort Hood and Fort Bragg also told us that they had not received obsolete parts to fill their requisitions.

Army’s Inventory Database

We found no evidence of obsolete parts being procured; however, the Provisioning Master Record is outdated and the Army and DLA are vulnerable to ordering old versions of some parts. While these parts are still usable, they may not include the latest technological upgrades or be as reliable as the newer versions. According to Aviation and Missile Command officials, the Army’s Provisioning Master Record is outdated for two reasons. First, as discussed previously, it had not been updated since 1995 because of constrained sustainment support funds.² Second, the

¹Repairable parts are expensive items that can be fixed and used again, such as hydraulic pumps, navigational computers, engines, and landing gear. Consumable parts, such as bolts and screws, are used extensively to fix repairable parts and aircraft.

²This issue was addressed in app. II.

contract governing the upgrade of A-model aircraft to the D-model allows Boeing to make configuration changes—which may result in newer versions of some parts—without notifying the government. These D-model configuration changes may also affect A-model aircraft.

Because the master record is outdated, the Army sometimes orders older versions of spare parts when newer, more up-to-date, versions are available. In these instances, the Army must rely on its spare parts suppliers to identify the error and notify the Army that a newer spare part is available. Once notified, the Army then revises its order so that it receives the latest version. According to representatives of the Army's nine largest suppliers of Apache spare parts, each has procedures in place to identify such errors and has in the past notified the Army of incorrect orders.

Corrective Actions Under Way to Update the Provisioning Master Record

The Army has contracted with Boeing to update the Provisioning Master Record to reflect the most current version of all spare parts by September 2001 to reduce the likelihood that it will order old versions of Apache parts in the future. Boeing officials expect to make over 33,000 changes to the master record, affecting over 7,000 parts. This update will include the latest information available as of December 30, 2000, and will not reflect any changes made after that date. However, the Army plans another update of the master record in fiscal year 2002. Additionally, the new D-model production contract awarded in September 2000 requires Boeing to notify the Army of all configuration changes it makes to the D-model during production. According to Apache program officials, this change is intended to allow the Army to better track configuration changes that might also affect the A-model aircraft.

Appendix IV: Do Available Technical Manuals and Technical Data Packages Meet User Needs?

Background

Technical manuals contain parts lists and maintenance information that field unit and depot personnel use to maintain the Apache helicopters. Apache manuals are provided in three formats: paper manuals, electronic technical manuals, and integrated electronic technical manuals. The paper and electronic technical manuals are used for the A-model Apache helicopters and integrated electronic technical manuals are used for the D-model Apache helicopters. All of the manuals contain inspection requirements, maintenance procedures, and drawings and diagrams of Apache parts, components, and systems. Electronic technical manuals are searchable Acrobat files created by scanning the hard copy paper manuals and are provided to the units on compact discs. Integrated electronic manuals are accessed through an interactive computer program that contains drop-down menus and offers options for obtaining information on specific parts and repairs. The integrated electronic technical manuals are provided through specially designed laptop computers.

Technical data packages are engineering drawings, parts lists, source data, and process and procedure specifications that enable the Army to procure spare parts for the helicopters. The information defines engineering and manufacturing processes and is used to design, procure, produce, support, maintain, operate, repair, or overhaul Apache parts.

Technical Manuals

Army officials and field and depot maintenance personnel believe the Apache technical manuals provide the information on parts and maintenance procedures that is necessary to maintain the helicopter. Apache technical manuals are generally updated annually; however, changes often occur between annual updates. The Aviation and Missile Command issues technical bulletins to augment the information contained in the technical manuals between annual updates. For example, technical bulletins are used to notify maintenance personnel of safety of flight¹ messages, new inspection requirements, or a change in maintenance procedures.

The Aviation and Missile Command attempted to update the A-model Apache technical manuals in fiscal year 2000 but experienced problems that prevented the update. According to Command officials, the contractor used an old version of the paper manual as the basis for identifying and

¹A safety of flight restriction pertains to any defect or hazardous condition, actual or potential, that can cause personal injury, death, or damage to aircraft, components, or repair kits for which a medium to high safety risk has been determined.

making changes to the technical manual. Consequently, the updated electronic files contained errors and lacked some information. The Command identified the error during its review and acceptance of the new file and has directed the contractor to correct the file in fiscal year 2001.

Efforts are under way to update the Apache technical manuals by September 2001. Under this effort, the contractor will change approximately 900 pages. According to Aviation and Missile Command officials, this effort will include all required changes identified as of December 30, 2000. However, it will not include any changes made after that date.

Technical Data Packages

According to Army officials, only a limited amount of technical data is available for the A-model Apaches. Consequently, the Aviation and Missile Command employs alternative procedures to overcome the deficiencies. Insufficient technical data has been an ongoing problem since the early 1980s, when the Apache was procured. Technical data is often very expensive to obtain from the original equipment manufacturers, and program officials decided to limit the amount purchased.

To compensate for the lack of technical data, Aviation and Missile Command officials often use alternative methods such as reverse engineering to develop the information they need to procure spare parts. The information gained from the reverse engineering process is also used to update the maintenance processes in the technical manuals. This process is time-consuming and can result in delays in getting spare parts to the field units.² However, we did not find a direct link between technical data and reported readiness rates.

² This process does not apply to the D-model Apache, since it is still in production and the manufacturer provides technical support for the helicopter. Further, the Army intends to rely on the manufacturer for technical data support throughout the life of the D-model helicopters and does not intend to purchase technical data packages for that model.

Appendix V: Are There Unfunded Component and Airframe Upgrade Requirements?

Background

Responsibility for development, justification, prioritization, and funding decisions for Apache component and airframe upgrades rests with weapon system program managers and the Army's Deputy Chief of Staff for Operations. Program managers determine upgrade requirements based on safety and reliability information received from Apache units and contractors. The Apache program manager prioritizes and ranks the requirements based on his knowledge of reliability and maintenance issues and those items users identify as the highest priority. The program manager's requirements are forwarded to the Army's Office of the Deputy Chief of Staff for Operations, where the requirements for the Apache, as well as all other weapon systems, are reviewed and validated. The Deputy Chief of Staff for Operations makes final decisions on the projects to be funded and may or may not choose those projects designated as highest priority by the program manager. The two highest priority requirements are generally funded. The remaining requirements are considered unfunded in the current fiscal year and may appear on the next fiscal year's requirement list.

Component upgrades are primarily paid for using procurement funds from the Army's aircraft procurement account. These funds are used for projects related to procurement, production, modification, modernization, engineering, and acceptance testing of the aircraft and its related ground support equipment.

Component Upgrades

In fiscal years 2001 and 2002, the Army identified unfunded requirements totaling over \$168 million and \$158 million, respectively, for component upgrades to the Apache helicopter. As shown in tables 4 and 5, the component upgrades include various projects, ranging from a new onboard video recorder to an upgrade of critical aircraft components such as main transmissions, the main rotor head, and the main landing gear. Additionally, items such as internal auxiliary fuel systems, advanced rotor systems, drive system improvements, and video transmission receptions appear as unfunded requirements in both fiscal years. With the exception of the Common Engine Program, all of the component upgrade projects are to be paid for with procurement funds.

Appendix V: Are There Unfunded Component and Airframe Upgrade Requirements?

Table 4: Fiscal Year 2001 Unfunded Requirements for Component Upgrades (as of September 1999)

Dollars in millions

Project	Purpose	Amount unfunded
Internal Auxiliary Fuel System	Provide integration and retrofit for 98-108-gallon extended range fuel tank and approximately 240-round 30-millimeter ammunition pack.	\$16.2
APR-39(v) Radar Warning Receiver 1553 Card	Eliminate obsolete parts on the radar warning receiver circuit card assembly and recurring costs to procure 298 assemblies.	1.4
Advanced Apache Rotor System	Procure 530 sets of new, lower cost, composite rotors with improved performance, reliability, and maintainability.	79.3
Drive System Improvement	Upgrade the Apache Drive System to include intermediate, tail rotor, and nose gearboxes; transmissions; and tail rotor drive shafts.	47.5
Common Engine Program	Provide a new, more powerful engine, to be used on the AH-64D, UH-60 and SH-60 aircraft.	2.7
Fire Control Radar Air-to-Air Enhancement	Procure and integrate the air-to-air enhancement modification on 227 aircraft equipped with fire control radar.	1.6
Multimode Laser	Upgrade the Laser Range Finder/Designator of the Target Acquisition Designator Sight.	17.6
Video Transmission Reception	Provide ability to transmit battlefield video to desired location, providing/receiving intelligence and damage assessments in 530 aircraft.	1.0
Apache Main Rotor Blade Repair	Repair 252 main rotor blades.	1.0
Video Recorder Upgrade	Upgrade onboard mission video recorder for 530 aircraft.	0.3
30MM Turret Diagnostic Testing	Ensure 30-millimeter turret meets Multi-Role Area Weapon System specifications and accuracy requirements.	0.2
Total		\$168.8

Source: Aviation Program Executive Office.

Appendix V: Are There Unfunded Component and Airframe Upgrade Requirements?

Table 5: Fiscal Year 2002 Unfunded Requirements for Component Upgrades (as of February 2001)

Dollars in millions

Requirement	Purpose	Projected amount unfunded
Internal Auxiliary Fuel System	Purchase and integration of A and B kits for internal, crashworthy, ballistically tolerant 100-gallon fuel tank, and 246-round 30-millimeter ammunition storage magazine. Army expects to fund \$10.7 million for this project in fiscal year 2002.	\$4.6
Video Recorder Upgrade	Upgrade onboard mission video recorder for 505 Apache aircraft (214 A-models and 291 D-models).	4.8
Video Transmission Reception	Provide ability to transmit battlefield video to desired location, providing/receiving intelligence and damage assessment (upgrade for entire fleet of 743 aircraft).	1.0
Aerial Rocket Control System	Rebuild rocket control panel for 408 Apache aircraft to correct uncommanded rocket launches.	2.6
RFI Frequency Extension	Expand frequency coverage of the Radio Frequency Interferometer to enable identification of newly deployed emitters.	4.0
AH-64A Reliability and Safety Enhancement	Accelerate program for A-model Apache upgrades for multiple components including main transmissions, main rotor heads, gun turrets, and main landing gear. Army expects to fund \$2.86 million for this project in fiscal year 2002.	44.9
AH-64 D Multi-year II Procurement	Procure 6 Longbows in fiscal year 2002 out of 99 additional aircraft planned to achieve a total requirement of 600 Longbows.	48.7
AH-64D Reliability and Enhancement	Accelerate program for D-model Apache upgrades for main transmission overhauls with new sprag clutches, main rotor head with new strap packs, engine nose gearboxes, and other upgrades. Army expects to fund \$5.7 million for this project in fiscal year 2002.	25.5
Advanced Apache Rotor System	Develop and procure a new lower cost composite rotor for 600 Apache A- and D-model aircraft with improved performance, reliability, and maintainability.	15.7
Drive System Improvement	Upgrade the system to include intermediate, tail rotor and nose gearboxes; transmissions; and tail rotor drive shafts.	6.9
Total		\$158.9

Source: Army Deputy Chief of Staff of Operations.

In discussing our draft report in early May 2001, Army officials told us that they are rethinking how the Apache will be used in the future and are considering withdrawing the fiscal year 2002 unfunded requirements for component upgrades described in Table 5. According to program officials, this decision is part of an effort to alleviate pressure on the Army to cancel the second phase of the Longbow procurement contract and to focus on the Army's aviation recapitalization effort. However, Army officials did not provide documentation supporting the planned withdrawal of the fiscal year 2002 unfunded component upgrade requirements.

Unfunded Requirements for Airframe Upgrades

According to Army officials, there are no unfunded requirements for airframe upgrades because such upgrades are a part of the recapitalization program. Recapitalization is defined as the rebuild and selected upgrade of currently fielded systems to ensure operational readiness and extend the operational life of the system. The purpose of the program is not only to restore equipment to its original condition but also to insert new technology to enhance the system's capability, reliability, safety, and sustainability. Airframe upgrades include strengthening the metal in the airframe by improving the bulkhead mounts, slot closures to repair vibrations to the tail of the aircraft, and stiffening of the aircraft's frame to reduce vibrations.

Appendix VI: Have the Mandate Issues Affected Apache Fleet Readiness?

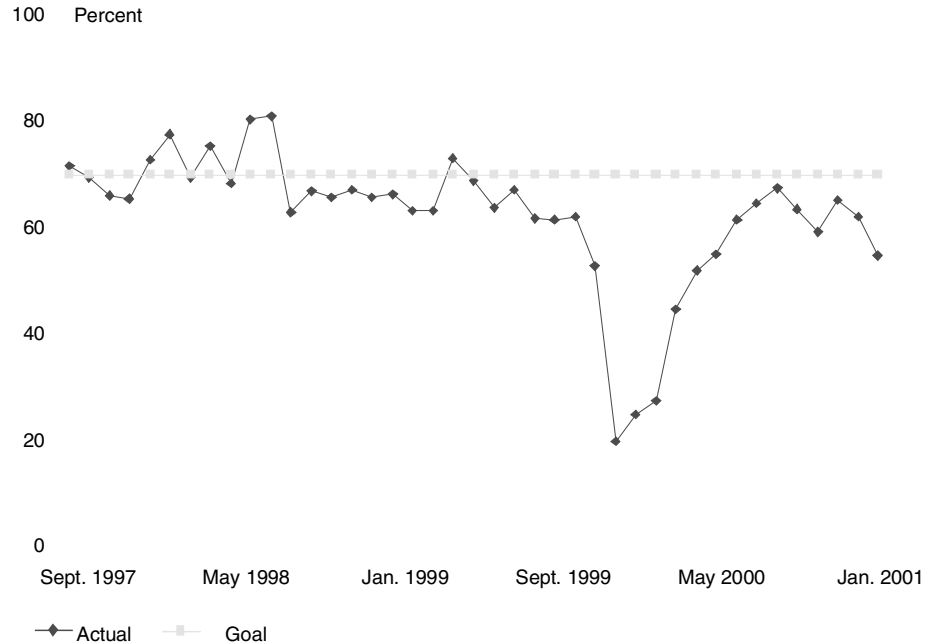
Background

The Army has established procedures for reporting on the physical condition and ability/inability of its weapon systems to perform their intended missions. The Army uses a weapon system's availability for missions to indicate its reliability, maintainability, and associated problems. The Army's measures of availability are "fully mission capable," "partially mission capable", and "not mission capable." The Army designates a weapon system as fully mission capable when it can perform all of its assigned combat missions without endangering the lives of its crew or operators. A weapon system is partially mission capable when it is safely usable and can perform one or more but not all of its missions. The Army considers a weapons system "mission capable" when it is in either the fully or partially mission capable category. A weapon system is not mission capable when it cannot perform any of its assigned missions because of either maintenance or supply problems. The Army's fully mission capable goal for the Apache is for the helicopter to be able to perform its intended mission 70 percent of the time. The mission capable goal for the Apache is 75 percent.

Apache's Ability to Meet Readiness Goals

As indicated in figure 1, the Apache fleet generally did not meet the Army's fully mission capable goal from September 1997 through January 2001.

Figure 1: Total Apache Fleet Fully Mission Capable Rates (Sept. 1997 through Jan. 2001)



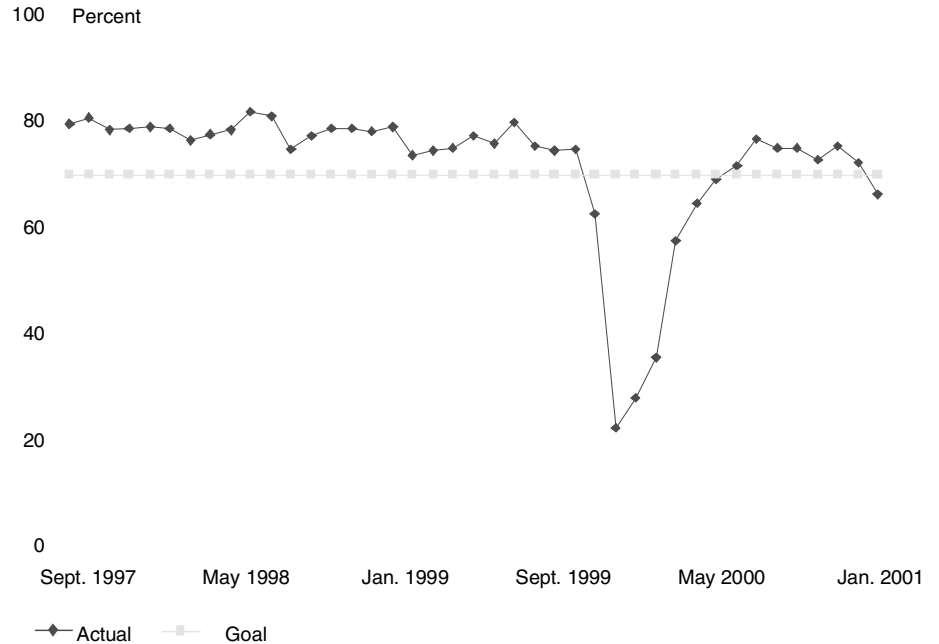
Source: Aviation and Missile Command.

Our examination of Apache readiness data and interviews with readiness officials did not indicate that any of the issues we reviewed contributed to the failure to achieve readiness goals. Rather, the fleet fell short of the Army’s fully mission capable goal because of safety-of-flight actions and low readiness levels experienced by Army Reserve and National Guard units. However, sustainment support is critical to maintaining weapon system readiness. For example, in an October 2000 information paper proposing a change in sustainment support budgeting practices, Army officials noted that the deferral of engineering efforts required to eliminate technical obsolescence and to process engineering changes has affected Apache readiness.

Active Apache Units' Fully Mission Capable Rates

Although overall fleet fully mission capable rates were generally below the Army’s goal, active units met or exceeded the goal with the exception of two periods when safety-of-flight actions grounded the entire Apache fleet, as shown in figure 2.

Figure 2: Active Army Apache Fully Mission Capable Rates (Sept. 1997 through Jan. 2001)



Source: Aviation and Missile Command.

Between November 1999 and April 2000, the fleet was grounded because of two flight safety issues that occurred almost simultaneously in November 1999. In the first instance, the Apache fleet was grounded following an accident caused by the failure of transmission accessory gearbox clutches.¹ The second problem resulted from the failure of hanger bearing assemblies in the tail rotor drive shaft.² The fleet was grounded again in December 2000 because of the tail rotor swashplate assembly problem described in appendix II.

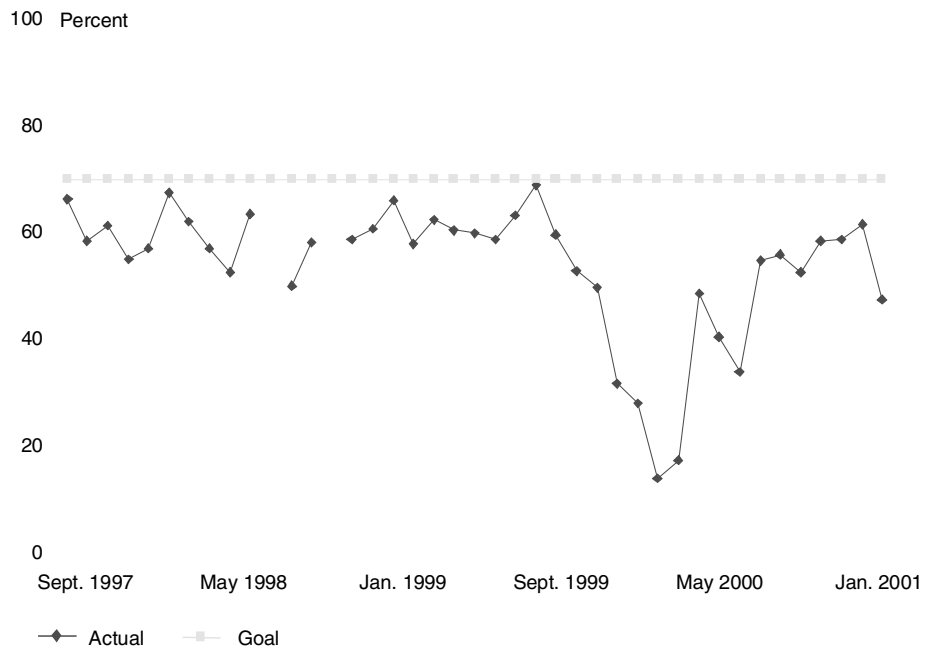
¹The transmission accessory gearbox clutches provide a primary and backup mechanical drive between the main transmission and the accessory gearbox. If both accessory gearbox clutches fail in flight, the helicopter will lose its primary electrical, hydraulic, and pneumatic power systems.

²Hanger bearing assemblies (two per helicopter) provide alignment, coupling and support for three of the helicopter's tail rotor drive shaft sections. If either hanger bearing assembly fails, the helicopter will lose power to its tail rotor system.

Reserve Component Units'
Fully Mission Capable
Rates

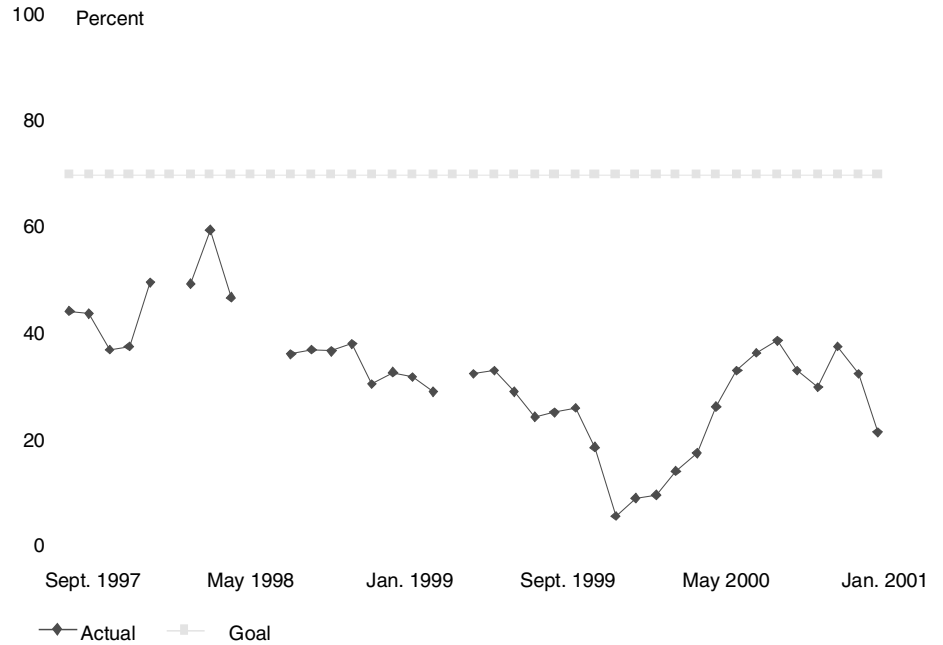
Army Reserve and National Guard Apache units reported readiness rates lower than the Army's goal during the period we examined, as shown in figures 3 and 4.

Figure 3: Army Reserve Apache Fully Mission Capable Rates (Sept. 1997 through Jan. 2001)



Source: Aviation and Missile Command.

Figure 4: Army National Guard Apache Fully Mission Capable Rates (Sept. 1997 through Jan. 2001)



Source: Aviation and Missile Command.

According to an Army Reserve official, the Reserve units generally report lower readiness rates than the active units because they have (1) a lower priority for obtaining spare parts and (2) a shortage of maintenance personnel in their Apache battalions. Army National Guard units report even lower readiness rates than their Army Reserve counterparts. An Army National Guard official stated that that National Guard Apache units report lower readiness rates because they (1) are funded at a lower level than active units; (2) have a lower priority for obtaining spare parts, and therefore, do not receive parts as quickly as their active counterparts; and (3) have some of the oldest Apaches in the fleet that are less reliable.

Appendix VII: Comments From the Department of Defense



ACQUISITION,
TECHNOLOGY
AND LOGISTICS

OFFICE OF THE UNDER SECRETARY OF DEFENSE

3000 DEFENSE PENTAGON
WASHINGTON, DC 20301-3000

26 JUN 2001

Mr. David R. Warren
Director, Defense Capabilities and Management
U.S. General Accounting Office
Washington, DC 20548

Dear Mr. Warren:

This is the Department of Defense (DoD) response to the GAO draft report, "DEFENSE LOGISTICS: Information on Apache Helicopter Support and Readiness," dated May 24, 2001 (GAO-01-630/OSD Case 4003). The Department concurs in the draft report.

The Department supports the concerns raised by the GAO as well as efforts to correct them. We strongly support efforts to elevate and correct potential safety hazards in an expeditious manner. In addition, updating the inventory database by September 2001 to assure that the most current versions of parts are provided to the field is a priority.

The Department appreciates the opportunity to comment on the draft report.

Sincerely,

George R. Schneider
Director
Strategic and Tactical Systems



Appendix VIII: GAO Contacts and Staff Acknowledgments

GAO Contacts

Gary Billen (214) 777-5703

Penney Harwell (214) 777-5611

Acknowledgments

In addition to those named above, Lou Modliszewski, Pam Valentine, John Brosnan, and Nancy Ragsdale made key contributions to this report.

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