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DEFENSE INDUSTRY

Issues Concerning Five Weapon Systems Provided or Developed by McDonnell Douglas Corporation

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Mr. Chairman and Members of the Subcommittee:

As you requested, we are here today to provide information on several weapon systems involving the McDonnell Douglas Corporation. In particular, we will discuss the A-12 Avenger medium attack aircraft, C-17 transport aircraft, T-45 Goshawk trainer aircraft, the Apache helicopter, and the Longbow Apache helicopter.

RESULTS IN BRIEF

Each of these systems has experienced significant technical or production problems and often major cost increases. In fact, problems in one system--the A-12 Avenger--were of such magnitude that the Department of Defense cancelled the program.

The problems we note with the A-12, the C-17, and the T-45 involve cost overruns in their fixed-price development contracts. Once the cost has exceeded the ceiling price of a fixed-price contract, the contractor must bear any additional cost. On these three contracts, the combined overrun is estimated by some analysts to reach as high as $2.7 billion. In each of these programs, we have also noted technical or production problems that have contributed to cost problems and caused schedule delays.

The contract for the A-12, which was being developed by a team from McDonnell Douglas and General Dynamics, was terminated for default. McDonnell Douglas has already recognized a loss of $350 million and acknowledges that, unless its challenge to the government's determination of termination for default is upheld, it may have to recognize an additional $850 million loss. For the C-17, estimates of overrun on the $6.7 billion full-scale engineering development contract range from a low of about $350 million by the contractor to a high of about $1.4 billion by the Office of the Secretary of Defense (OSD). OSD has also estimated that design changes, which could require contract price adjustments, could push the development contract cost to $9 billion. On the T-45, the contractor estimates that costs will exceed the $512 million ceiling by about $110 million.

It should be noted that the contractor has filed or plans to file claims against the government on each of these programs. If upheld, these claims could cost the government hundreds of millions of dollars and could result in the Corporation's at least breaking even on the A-12, C-17, and T-45 contracts.

The Apache helicopter is a mature system that has been plagued with logistical support, reliability, and other problems that have yet to be resolved even though the system has been in production since 1982. We have brought the Apache's problems to your attention several times in the past. To a large extent these problems originated in the decision to proceed to full-rate production despite known technical problems and warnings from Army test and

evaluation agencies of serious logistical support problems. Lessons learned from the Apache, if properly applied to the development of the Longbow, could prevent a recurrence of those technical and logistics problems.

BACKGROUND

By almost any measure, McDonnell Douglas is the largest U.S. defense contractor, producing a wide variety of weapon systems and components for each of the military services. Besides the programs highlighted in my statement, McDonnell Douglas produces, for example, the F/A-18 Hornet, the F-15 Eagle, the KC-10 Extender, the Harrier II, and various missiles and electronic systems.

The McDonnell Douglas Corporation is a major participant in both the defense and commercial aerospace industries. The corporation, along with its subsidiaries and divisions, operates principally in four industry segments to provide (1) combat aircraft, which accounted for about 36 percent of the corporation's revenues in 1990 and which have historically contributed significantly to corporation profits; (2) military and commercial transport aircraft (built by the Douglas Aircraft Company), which accounted for about 36 percent of the corporation's revenues in 1990; (3) missile, space, and electronic systems, which accounted for about 20 percent of corporation revenues in 1990; and (4) financial services and other business, which accounted for the remaining 8 percent. In 1990, government contracts accounted for about 55 percent of McDonnell Douglas' total revenues.

McDonnell Douglas reported net earnings of $306 million in 1990, $250 million in 1989, and $350 million in 1988. However, 1990 net earnings reflect a one-time upward adjustment that resulted from a favorable pension settlement. Without this adjustment, the corporation would have reported a $105 million loss for 1990 and a third year of declining earnings. These earnings were on revenues of $16.2 billion in 1990, $14.6 billion in 1989, and $14.4 billion in 1988. The company attributes its weak earnings to significant capital investments to bring large development projects to production over the past several years.

According to the corporation's 1990 financial statement, major ongoing development efforts on the MD-11 commercial passenger plane and C-17 military transport have strained facilities and systems of the Douglas Aircraft Company and caused delays in meeting schedules. The company's transport aircraft business incurred an operating loss of $177 million in 1990, largely as a result of increased borrowing for the MD-11. The corporation has acknowledged that management problems have contributed to schedule delays at Douglas Aircraft. In an attempt to fix these problems, the company has replaced numerous managers and reduced total employment by about 15,000 in an effort to reduce costs by $700 million.

A-12 AVENGER ATTACK AIRCRAFT

In 1988, the Navy awarded a contract to a team comprised of General Dynamics and McDonnell Douglas for full-scale development of the A-12 Avenger medium attack aircraft to replace the A-6E attack aircraft. The development contract was a fixed-price incentive contract with a target price of $4.38 billion and ceiling price of $4.84 billion. The contract included development and delivery of eight full-scale development aircraft and four test articles.

In April 1990, at the conclusion of the Major Aircraft Review, the Secretary of Defense informed Congress that the A-12 program would meet its flight, schedule, and performance estimates. He also testified that, due to budget constraints, the A-12 requirements would be reduced from 858 to 620 aircraft. Shortly afterward, the contractors advised the Navy that the scheduled date for first flight had slipped significantly, the full-scale development effort would overrun the contract ceiling by an amount that the contract team could not absorb, and certain performance specifications of the contract could not be met.

On July 9, 1990, the Secretary of the Navy ordered an inquiry into the variance between the program's status and presentations to the OSD on behalf of the Navy during the Major Aircraft Review. The investigation determined that the Navy and OSD had information that should have been considered, but was not, during the Major Aircraft Review. Three high-level Navy officers were removed from the project.

On January 7, 1991, the Navy terminated the contract for default. The termination was based on the fact that the contractors could not complete the work within the contract schedule and deliver an aircraft that could meet the contract requirements. The problems in developing the A-12 revolved around excess weight caused by the thickness of the composite material necessary to provide the required structural strength, according to the Navy inquiry report. The weight growth resulted in late release of engineering drawings, which delayed tool design and fabrication and continually delayed production.

At termination, just under $3 billion had been spent on the program. Research and development and miscellaneous support costs accounted for about $300 million of the amount spent. The remaining $2.7 billion was paid to the contractors for the full-scale development effort and two production options. The Navy demanded $1.35 billion be returned. That amount represented progress payments for work that had not been accepted as of the date of termination.

As you are aware, on February 5, 1991, the Navy and DOD agreed that the contractor could defer repayment of the $1.35 billion until

litigation over the termination was resolved or a negotiated settlement was reached.

On June 7, 1991, the contractors filed a lawsuit asking that the court reform the contract to a cost reimbursement plus fixed fee type. The contractors have also asked that the court change the termination for default to a termination for convenience, which would mean that the contractors could be entitled to additional compensation, and that the government be barred from collecting the $1.35 billion in unliquidated progress payments.

C-17 MILITARY TRANSPORT

The C-17 is designed to airlift substantial payloads over long ranges without refueling. It is being developed under a fixed-price development contract that includes two production options for a total of six aircraft. In addition, a fixed-price contract for a third production lot of four aircraft was awarded at the end of July 1991. The ceiling price of the development contract is $6.65 billion. The Lot 3 contract has a target price of $1,026 million and a ceiling price of $1,209 million.

The Air Force originally planned to buy 210 C-17 aircraft. However, in April 1990 the Secretary of Defense reduced the program to 120 production aircraft at a currently estimated cost of $35.3 billion.

In August 1989, we reported that the C-17 program faced significant schedule, cost, and performance challenges. At that time, Douglas had missed major assembly milestones because of late engineering drawings and late delivery of tools and parts. Also, problems in the development and testing of the aircraft avionics and the company's management of subcontractors were contributing to cost, schedule, and performance problems.

As a result of these problems, the milestone of completing assembly of the first aircraft, originally scheduled for January 1990, had slipped to December 1990. Further, the date of first flight was rescheduled from August 1990 to June 1991, and first flight of a production aircraft slipped to September 1991. On September 25, 1990, the Air Force and Douglas signed a contract modification that in essence recognized the slipped schedule. However, first flight of the test aircraft did not occur until September 15, 1991.

The Air Force and Douglas have agreed to a new delivery schedule, which became effective when the Lot 3 contract was awarded. However, it does not appear that this schedule will be met, and the first flight of a production aircraft, scheduled for December 1991 under the new agreement, may not occur until about March 1992.

In June 1990, we testified before the Subcommittee on Projection Forces and Regional Defense, Senate Armed Services Committee, that

the schedule delays and resulting funds buildup provided the opportunity to defer the proposed fiscal year 1991 buy of two C-17 aircraft and reduce the advance procurement funds for six aircraft in fiscal year 1992. This step would help to limit production commitments until the critical elements of a realistic and achievable flight test program were completed.

Prior to our June testimony, the C-17 Administrative Contracting Officer (ACO) had requested that Douglas submit a revised estimate of the cost at completion (EAC). The ACO was concerned because the EAC is used to determine progress payments. Although Douglas claimed that the contract would be completed at ceiling price, the ACO estimated that the actual cost to complete would be about $7.1 billion. That estimate has increased, and the ACO is currently using $7.3 billion to determine the level of progress payments to provide the contractor. An EAC that exceeds the ceiling on the contract results in the application of a loss ratio on progress payments. That is, the amount of the progress payment is reduced to reflect a portion of the expected loss. As of August 1991, the company had billed about $530 million in work that the ACO has not approved for payment.

Since our 1989 report, Douglas has continued to have problems meeting schedules. Currently, the major challenges for Douglas are improving production efficiency and quality and completing avionics software development. The work performed continues to be less than the work scheduled, and the actual cost of the work performed is greater than planned. Major problems include the amount of out-of-position work, which creates production inefficiencies, and the amount of rework and repair, which indicates quality problems.

The dollar value of rework and repair is decreasing on each successive aircraft. However, rework and repair costs continue to rise when measured against every 1,000 hours of labor. About one-third of the production hours for each aircraft is spent on rework and repair. The dollar decrease results from the decreasing number of hours required to build each successive aircraft.

Another major problem area has been avionics software development. Originally, software on the first test aircraft was intended to support all avionic functions. However, because of software development problems and schedule delays, in late 1988, the Air Force reduced software requirements for the test aircraft. Douglas delivered the test aircraft with only enough software to support the first 100 hours of the flight test program. The Air Force waived capability shortfalls in 23 avionics and flight control subsystems on this aircraft. Douglas anticipates that most software deficiencies will be corrected by the improvements scheduled to be included on the first production aircraft.

At the direction of Douglas Aircraft and McDonnell Douglas management, an internal, independent team reviewed the C-17 program

and, in June 1991, made 23 recommendations for needed improvements. These included increasing the emphasis on quality and reducing out-of-position work. The team stated that "management needs to stress immediately to the entire C-17 program team a change in focus from a schedule priority to a quality priority." In our opinion, the degree of improvement that can be expected on the C-17 program is directly tied to the success Douglas has in implementing those recommendations.

T-45 GOSHAWK TRAINER AIRCRAFT

The T-45 Goshawk aircraft is the major component of a flight training system that the McDonnell Douglas Corporation is developing for the Navy. The T-45, a derivative of the British Aerospace Hawk, will replace the T-2 and TA-4 aircraft currently used for intermediate and advanced jet flight training. Full-scale development began in October 1984 with award of a $512 million firm-fixed-price contract. Two production lots for a total of 36 aircraft were subsequently added to the contract.

In 1988, during initial flight tests and after contracting for the first production lot of 12 aircraft, the Navy discovered that the aircraft's design was seriously flawed. The Navy concluded that the aircraft was not suitable for use in a carrier environment and could not be approved because of safety deficiencies.

After the test, OSD restricted the obligation of procurement funds for the second production lot, but this restriction was lifted in December 1989. At that time, the Defense Acquisition Board endorsed a program restructuring that stretched production of the second lot of 24 aircraft over 2 years and targeted initial operational capability for June 1991. However, that schedule became obsolete shortly after the Board's review when the contractor announced the move of its production facilities from California to Missouri.

By the end of December 1990, test results suggested that the 1988 deficiencies were being resolved, and the Navy committed to a new program schedule that moved initial operational capability to November 1992--which not only accommodated the move of the production facilities but reflected a sharp reduction in the concurrency of the program. This latest restructuring has not yet been approved by the Under Secretary of Defense for Acquisition, and a comprehensive agreement on contract price adjustments remains to be worked out.

The most recent System Acquisition Report estimates T-45 costs at about $6.7 billion for 300 production aircraft and 32 simulators. However, the Navy expects that the Secretary of Defense will soon approve a scaled-down program of 268 production aircraft and 24 flight simulators. Navy officials indicate that the total acquisition cost will remain about the same.

The contractor's estimate at completion for the development effort is $622 million, $110 million over the original contract price. However, the extent to which McDonnell Douglas will have to absorb costs beyond the fixed contract price is uncertain. A number of configuration changes were developed and are to be incorporated in the production aircraft. Currently, the Navy is negotiating the amount of price adjustments for configuration changes where liability is clear. Navy officials are also studying a related claim for an upward price adjustment of $281.5 million but have not yet acknowledged any liability. The Navy has targeted the end of calendar year 1991 to resolve the pricing questions.

APACHE HELICOPTER

The Apache is the Army's primary attack helicopter, designed for high-intensity battle against armored forces. Its forte is flying at night and destroying tanks with its laser-guided Hellfire missile. Starting in 1982, the Army negotiated a series of firm-fixed-price contracts to buy 807 Apaches at a total acquisition cost of $11.6 billion, or about $14.4 million per aircraft.

As you know, we have done a considerable amount of work on the Apache in the last 3 years. In April and September 1990, we reported that the Apache experienced a fully-mission-capable rate of 50 percent from January 1989 through April 1990, which was far short of the Army's goal of 70 percent. Rates were low despite favorable operating conditions, such as few flying hours, contractor support, and infrequent weapons firing.

During Operation Desert Shield, the Army reported that Apache helicopters were surpassing Army availability goals, and in September 1990, you asked us to take a firsthand look at the availability of the Apache in Saudi Arabia and actions taken to achieve high availability during Operation Desert Shield.

In February 1991, we testified that the high availability rates were attributable to (1) extensive preparations made prior to deployment, (2) the collocation of several battalions to increase the sharing of assets, (3) limitations placed on the Apache's flying hours, and (4) the overall high priority of maintenance support in theater.

Army efforts to improve the reliability of the selected hardware components have been ongoing for several years with varying degrees of success. The Army has made progress in resolving some issues on component reliability. Test results are encouraging on components such as the tail rotor swashplate. The Army is encouraged with testing results on other components such as the main rotor blades. However, problems persist on components such as the 30-mm gun, the target acquisition designation sight, and the shaft-driven compressor. The Army has numerous corrective actions underway to improve these components and has acknowledged it will be several

years before all fixes are incorporated on fielded aircraft. We issued a report today, Apache Helicopter: Reliability of Key Components Yet to Be Fully Demonstrated (GAO/NSIAD-92-19, Oct. 3, 1991), on the status of several key problem components.

LONGBOW APACHE

The Army plans to modify 227 Apache helicopters to a new configuration called the Longbow Apache. The modification program, which will cost about $5.4 billion, will add a new fire control radar to detect, classify, and prioritize targets and indicate when hostile radar has locked on to the Longbow Apache. In addition, the program includes a new Hellfire missile with a radio frequency "seeker" for locking on to targets. The Apache airframe will be modified to accommodate the Longbow enhancements.

A cost-plus-incentive-fee contract for full-scale development of the Longbow Apache was awarded to McDonnell Douglas Helicopter Company on August 30, 1989. The contract, which has a value of $194.7 million, is to run through June 1995. McDonnell Douglas Helicopter Company, the prime contractor for the Apache, is developing the airframe modifications and is responsible for the total integration of the airframe, fire control radar, and missile systems. The Longbow Apache Program Manager told us that the full-scale development contract is about 1 percent behind schedule, but he does not view this as a significant problem.

In September 1990,[1] we expressed reservations about the Army's plan to add the Longbow to the Apache. We recommended the Army defer production of the Longbow modification until it clearly demonstrates that (1) it has overcome the logistical support problems with the current Apache and (2) the Longbow will not exacerbate the Apache's logistical support problems.

DOD and Congress have also expressed concern. The Defense Acquisition Board, in December 1990, concluded that planned improvements to the Apache's reliability should be verified before proceeding with the Longbow Apache modifications. Congress, in the Conference Report on the 1991 Defense Authorization Act, barred the Army from obligating more than half the $159 million in authorized Longbow funds until the Secretary of the Army developed a comprehensive modernization program for the Apache fleet. The plan for that program was delivered to the Chairmen of the Senate and House Armed Services Committees on March 12, 1991.

The Army's plan for acquiring and fielding the Longbow Apache includes several features that, if adhered to, should help avoid

[1]Apache Helicopter: Serious Logistical Support Problems Must Be Solved to Realize Combat Potential (GAO/NSIAD-90-294, Sept. 28, 1990).

the problems experienced in fielding the Apache helicopter. Chief among these features is the Army's plan not to begin production of the Longbow Apache until the new radar technology has been demonstrated to work. As a result, the Army will delay production of the airframe modifications until development of the fire control radar, the RF Hellfire missile, and the airframe modifications are complete.

While the acquisition plan for the Longbow Apache appears on track, the Army plans to use outdated and narrowly defined Apache standards to measure Longbow Apache system reliability. Using these standards will likely yield the same results it did with the Apache--an enhanced helicopter that is not adequately supported. Further, the Army continues to exclude important data when calculating the man-hours that will be needed to maintain the Longbow Apache.

OVERALL OBSERVATIONS

With the exception of the Longbow Apache, which is early in development, each of the systems we have discussed has experienced technical problems and/or cost overruns. McDonnell Douglas has recently lost competitions for the new Light Helicopter and the Advanced Tactical Fighter. McDonnell Douglas is not alone in experiencing performance, cost, and schedule problems. However, to prevent the problems we have noted with these systems, the company needs to provide the kind of management that can better assure quality products within cost constraints.

One final observation. We have been critical of DOD for several years over the tendency to have too much concurrency in its weapon systems. By this I mean the rush to produce and field systems before adequate testing has assured that the system will fulfill its identified requirement. Concurrency has exacerbated the problems caused by system technical problems and contractor management inadequacies. The easing of world tensions should allow these systems to be more fully tested before committing to production.

Mr. Chairman, that completes my statement. I would be happy to answer any questions you may have.