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PROCUREMENT

Analysis of DOD's Fiscal Year 1986 Multiyear Candidates

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The Honorable Ted Stevens
Chairman, Subcommittee on Defense
Committee on Appropriations
United States Senate

Dear Mr. Chairman:

In response to your request, we analyzed the 10 multiyear procurement candidates proposed in the Department of Defense's (DOD's) fiscal year 1986 budget request to determine if they met the criteria established by the Congress. We presented our preliminary views on May 23, 1985, and July 2, 1985, in discussions with your staff and with staff of the Subcommittee on Defense, House Committee on Appropriations.

We continue to support the concept of multiyear procurement as a method of achieving cost savings, reducing administrative cost, improving contractor performance, and increasing competition. However, we believe the desirability of using the technique must be determined on a case-by-case assessment of potential benefits and added risks that can result from awarding a multiyear contract instead of a series of annual contracts. Public Law 97-86 established the conditions that must be met by multiyear candidates to ensure a reasonable balance of benefits and risks.

Public Law 97-86 requires that the government benefit from a multiyear contract by saving money and improving contractors' productivity, and that estimated contract costs and projected savings be realistic. The act also stipulates that a system being procured have a stable design, requirement, and funding.

We reviewed the justification for each of the 10 candidates to determine their adherence to the multiyear criteria. Appendix I discusses the objective, scope, and methodology we used to evaluate DOD's multiyear candidates. Information on the criteria for multiyear contracting and its potential for enhancement to the defense industrial base is provided in appendix II. The details of our review for each individual system are in appendix III.

In our review of the systems or components proposed as multiyear candidates, we found that the T700 aircraft engine, M1A1 tank engine, M1A1 tank fire control, MK-46 torpedo and modification kits, and LHD

ship, for the most part, met the multiyear criteria of Public Law 97-86. The other candidates, however, did not clearly meet one or more of the criteria, or had undergone program budget changes that warrant the submission of a revised justification package. A brief overview of candidates which appear to present risks are included below:

- The M1A1 tank production rate for fiscal year 1986 and the future is uncertain. The Army proposed multiyear procurement at either a 70 a month or 60 a month rate, but indications from officials in the Office of the Secretary of Defense and the Army are that the Army is considering production as low as 50 a month for future years. It is essential that the M1A1 production rate for the future be firmly established before a multiyear contract is awarded or that the proposed multiyear contract provide the flexibility to accommodate production rate changes. While we believe the Army will provide funding for whatever production rate is decided, justification packages for the M1A1 systems and subsystems will be obsolete if the Army does not request funding to produce M1A1 tanks in future years at either a 70 a month or 60 a month rate as proposed.
- M1A1 tank chassis, to be acquired in fiscal years 1986 through 1989 or 1990, are to have a number of modifications and classified changes incorporated. Because of the highly classified nature of the classified changes, the Army only provided us with information on the cost of the changes—$100,000 per chassis. Though we did not review these classified changes, the dollar magnitude suggests that the design may not be stable.
- Army acceptance of M1A1 ballistic computers, expected to begin in February 1985 under a prior contract, had not begun as of July 30, 1985. Army officials told us the problems are primarily related to interfacing the computer with tank electrical systems, not whether the computer is functioning properly. We believe a 5-month period of failure to accept deliveries is significant. Until the Army begins accepting the computers, the stability of design is questionable.
- The Armored Combat Earthmover does not appear to be a high priority program, and funding stability has not been achieved in past years. Further, operational reliability and effectiveness test results are not yet available and the methodology used to make cost estimates provides little confidence in the savings expected.
- The Army expects the planned annual quantities and associated funding for the Bradley Fighting Vehicle to be reduced substantially in fiscal years 1987 and beyond. Accordingly, future funding for the vehicle and the transmission funding profile described in the justification package may no longer be accurate.

- Funding stability of the P-3C is a concern since the Navy and the Office of the Secretary of Defense (OSD) have often differed as to the most appropriate production plan for the P-3C. Fiscal year 1986 deliberations were no exception. Further, savings available from multiyear procurement of the P-3C airframe are relatively small at 5.5 percent on a discounted basis—$27.7 million savings on a total discounted contract cost of $500 million.

We also attempted to assess the effect of the fiscal year 1986 candidates on enhancement of the defense industrial base. Generally, we believe the stability in contractor and subcontractor operations associated with multiyear procurement (provided the procurement is substantial) can create a level of business certainty more conducive to enhancement of the industrial base than annual procurements. Prior multiyear programs have demonstrated that enhancement of the industrial base is supported in some instances by multiyear procurement. Nevertheless, we found it difficult, if not impossible, to specifically identify in advance, the enhancements that will occur as a result of a multiyear contract that would not occur if procurement were by annual contract. Most program offices had little additional information concerning enhancement of the industrial base other than that already included in justification packages.

At your request, we did not obtain official comments on our report. We did obtain the views of agency officials from individual program offices, Army and Navy Headquarters, and OSD. Their views were included where appropriate.

We are sending copies of this report to the Chairmen, House Committee on Government Operations, Senate Committee on Governmental Affairs, and the House and Senate Committees on Appropriations and Armed Services. Copies are also being sent to the Secretaries of Defense, Army, Navy, and Air Force.

Sincerely yours,

Frank C Conahan

Frank C. Conahan
Director

DOD's Fiscal Year 1986 Multiyear Procurement Candidates

Objective, Scope, and Methodology

Our objective was to evaluate the justifications for the 10 multiyear candidates included in DOD's fiscal year 1986 budget to determine if they met the criteria established by the Congress. We visited the DOD and military services headquarters and the program offices that prepared the justifications for each of the candidates. For candidates submitted to the Congress, we visited the program offices to review the

- acquisition strategy;
- estimating methods used to prepare the justification package;
- funding, production, and delivery history;
- testing results;
- engineering changes not yet tested or incorporated in the production item;
- schedules for implementing the multiyear program; and
- specific benefits involving enhancement to the industrial base.

As requested, we did not obtain official agency comments on this report.

We discussed our findings and conclusions on each candidate with the appropriate program offices, OSD officials, and Army and Navy Headquarters officials. Their views are included in this report where appropriate. Our work was performed in accordance with generally accepted government auditing standards.

We performed our work at the following locations:

- Office of the Assistant Secretary of Defense (Comptroller), Washington, D.C.
- Headquarters, U.S. Army, Washington, D.C.
- Headquarters, U.S. Navy, Washington, D.C.
- Naval Air Systems Command, Washington, D.C.
- Naval Sea Systems Command, Washington, D.C.
- Army Aviation Systems Command, St. Louis, Missouri.
- Army Tank Automotive Command, Warren, Michigan.

Analysis of Multiyear Procurement Candidates Included in DOD's Fiscal Year 1986 Budget Request

On September 21, 1984, the Chairman of the Subcommittee on Defense, Senate Committee on Appropriations, requested us to analyze multiyear procurement candidates in the DOD fiscal year 1986 budget request. DOD identified 10 candidates and provided the multiyear justifications for our review in early April 1985.

The Criteria for Multiyear Procurement

Multiyear procurement is a method for acquiring several years requirements (no more than five as defined in the Public Law 97-86) of systems or subsystems with a single contract. DOD identified multiyear procurement as a key initiative for improving the weapon systems acquisition process; and in 1981, the Congress authorized DOD to use multiyear procurement for major systems. Since fiscal year 1982, DOD has proposed weapon systems or subsystems to be acquired using multiyear procurement.

Multiyear procurement can produce benefits to the government, but it also entails certain risks. Public Law 98-369, which amended Public Law 97-86, reiterates the benefits and establishes the criteria that multiyear candidates must meet to limit the risks. The law states,

". . . it is the policy of the Congress that such contracts, when appropriate, provide incentives to contractors to improve productivity through investment in capital facilities, equipment, and advanced technology."

The risk limiting criteria require that the: requirement for the property be expected to remain substantially unchanged, funding be requested by DOD to carry out the contracts, design be stable, and estimated cost be realistic.

Some of these criteria have been further refined by DOD and the congressional committees. A further discussion of the criteria—benefit to the government, degree of cost confidence, and stability of requirement, funding, and design—is included below.

Benefit to the Government

The savings to be achieved by multiyear contracting should be significant since multiyear contracting can reduce future budget flexibility and can entail some added risks, particularly if the requirement, design, and/or funding prove not to be stable or if cost estimates ultimately prove to have been inaccurate. If a multiyear contract were awarded and later changed significantly or terminated, the ultimate cost of the

effort could be higher than under annual contracting. Further, cost savings must offset additional government borrowing costs associated with accelerated expenditures under multiyear contracting.

Each proposed multiyear contract should be evaluated on its own merits, weighing the margin of savings against added risks and any other uncertainties. The savings should be high enough to offset any additional risks of entering into a multiyear contract. For example, a candidate with no risks in terms of requirement, funding, or design stability, and in which a high degree of confidence in the cost estimate does exist, may provide only a small percentage or amount of savings. If the savings are essentially ensured, they may be judged substantial enough to take advantage of them. In contrast, a candidate with high projected savings may be inappropriate for multiyear contracting if the design, funding, and/or requirement is unstable or if the cost estimate is not based on sound information and logic.

Accordingly, savings should be assessed in relation to the risk or absence of risk which is reflected in (1) the confidence in the cost estimate, (2) requirement stability, (3) funding stability, and (4) configuration or design stability.

Degree of Cost Confidence

This criterion requires that the contract cost and the anticipated cost savings be realistic. Cost savings is the difference in cost estimates, proposals, or negotiated prices for the multiyear contract and the cost of procuring the same quantities, in the same timeframes, with successive annual contracts.

Initially, the military services produce budgetary estimates of the potential savings available from multiyear contracting. These estimates are usually based on prior history, information received informally from contractors, and/or in-house estimates. They are usually the basis for the original multiyear justifications submitted to the Congress. Confidence in the cost estimates may be increased by receiving firm proposals from the applicable contractor, on an annual and multiyear basis, and then comparing and analyzing those proposals. In some instances, both the annual and multiyear proposals are carried through negotiations and agreed to firm prices. Negotiating both the annual and multiyear prices with the contractor does provide the best method of defining the savings. However, this is not always practical, and DOD officials stated that the additional administrative effort and the cost to negotiate both proposals must be considered.

The fiscal year 1985 Defense Appropriations Act states that funds for multiyear contracts for major systems will not be available until the House and Senate Armed Services and Appropriations Committees are notified at least 30 days in advance of contract award. This allows the Committees to compare the estimates presented in the justification packages with the actual proposed contract amounts.

Stability of Requirement

The need for the system or subsystem must be stable and remain relatively stable throughout the multiyear procurement period. A stable requirement means the total quantity or procurement rate will not vary significantly over the term of the multiyear contract, particularly downward. Decreases in the requirement and quantities to be procured can require termination of the multiyear contract, and create unit cost increases, which could adversely affect savings.

Stability of Funding

The services and DOD must be committed to ensure that sufficient funds will be requested to complete a multiyear contract at planned production rates. A turbulent funding history for a weapon system may suggest an unstable requirement, a relatively low funding priority, or wavering support, making it inappropriate for multiyear contracting. Disagreements among the military services, OSD, and the Congress concerning the appropriate production rate for a system are often signals that the basis for funding stability has not been firmly established.

Pressures to reduce budgets increase the discipline necessary for using multiyear contracts for major weapon systems. Consequently, although DOD may have provided amounts in its Five-Year Defense Program for proposed multiyear efforts, it may require extra and continued discipline to ensure the stability of funding that is required to sustain the contractual production schedule over the life of the contract.

Stability of Design

The design of a system or subsystem should be stable before multiyear procurement is initiated. Test and evaluation should be complete and demonstrate that the item is operationally effective. We believe a program should be judged mature and stable only after research and development and one or two production runs have been successfully completed. The Senate Committee on Appropriations, in its fiscal years 1983 and 1984 reports on the DOD appropriations bill, indicated a similar view that the multiyear approach must be reserved for established production operations and low risk, state-of-the-art technology.

Plans for future modifications to a system or component, which is proposed for multiyear procurement, may indicate a lack of design stability in some instances. However, adding equipment in future production which is properly planned for and managed and which does not affect the design of the main production item, is not necessarily a symptom of design instability.

Industrial Base Enhancement

The multiyear justification packages include statements about industrial base enhancements related to each of the candidates. The categories discussed in multiyear justifications include

- improved competition,
- enhanced investment,
- improved vendor skill levels,
- training programs,
- progress payment changes,
- use of multiyear contracting for vendors, and
- increased production capacity.

The stability in contractor/subcontractor operations associated with multiyear contracts can create a level of business certainty more conducive to enhancing the industrial base than annual procurements which are more likely to fluctuate. Nevertheless, in most instances, it is difficult if not impossible, to identify in advance the enhancement that will occur as a result of a multiyear contract that would not occur if procurement were by annual contract.

Several examples of what we found concerning the effect of multiyear contracting on industrial base enhancement are described below.

MK-46 Torpedo

The MK-46 torpedo was procured under a multiyear contract in fiscal years 1983-85. The Navy described certain benefits in terms of enhanced competition that resulted from the multiyear contract.

"A stable multiyear contract has broadened the competitive base of Honeywell's subcontractor network. Six major components previously procurable only from limited sources were able to be competed as a result of the large quantities associated with the multiyear contract. A total of fourteen different vendors bid on the six items with nine of them receiving contract awards. Two items that have had a history of technical problems were able to be dual or multiple sourced to minimize the possibility of schedule

delays. Improvements in quality and reliability as well as reduced costs for these various components have been realized as a result of enhanced competition based on the multiyear procurement."

In contrast, the MK-46 production is expected to be essentially completed under the proposed multiyear contract covering fiscal years 1986 to 1988. Since the production rate is not increasing and the program is nearing completion, it appears to us that the vendor network will probably not be expanded by the multiyear contract for fiscal years 1986-88.

T700 Series Engine

The industrial base enhancement information in the fiscal year 1986 T700 multiyear justification package is identical to the Army's fiscal year 1984 submittal. Army officials stated they simply copied the last submittal.

Some of the benefits enumerated in the justification package included improved competition, $90 million in facilities investment, improved vendor skill levels, initiation of new training programs, and increased production capacity. The contractor has since projected $112.2 million in T700 related capital investments for 1985 to 1988. An Army official stated, however, that the contractor would probably invest the same amount if annual contracts were awarded, since they are becoming concerned about the possibility of dual sourcing for the engine. Consequently, they are investing heavily in new machinery and facilities to make it more difficult and expensive for another company to compete with them. The official also said the contractor has increased production capacity—thereby increasing surge capability—in the event of an outbreak of hostilities.

P-3C Airframe

The justification package for the P-3C cites only minimal benefit to the industrial base. The airframe is the only portion of the P-3C aircraft that is proposed as multiyear.

The justification package identifies improved competition as a potential source of cost benefits to the government. Further, the prime contractor has asserted that its suppliers are very positive about the proposed procurement plan and that several of the suppliers would make capital improvements because of the stability created by a multiyear program. The justification package does not identify positive effects from the

P-3C multiyear contract on improvement in vendor skills, training programs, or progress payment changes. The justification package states that:

"Multiyear contracts with vendors other than the airframe contractor is not anticipated at this time; however, the program intends to pursue this avenue wherever possible . . . The prime contractor intends to award multiyear contracts to its sub-vendors where applicable."

Increased production capacity is not anticipated through the multiyear contract. The multiyear request for 9 airframes per year is below the contractor's annual production capacity of 24 aircraft on a single shift.

Estimated Savings for the 10 Candidates Submitted to the Congress

In the fiscal year 1986 budget, DOD submitted 10 candidates for approval of multiyear procurement authority. DOD estimated a total potential savings of $1,608.8 million in then-year dollars, or about 12.9 percent less than the cost of procurement on an annual basis as shown in the following table.

Table II.1: Fiscal Year 1986 Multiyear Candidates' Savings Estimates

Millions of Then-Year Dollars

System	Estimated contract cost			
	Annual	Multiyear	Savings	Percent[a]
Army:				
T700 engine[b]	$ 974.6	$ 871.2	$103.4	10.6
M1A1 tank chassis[c]	4,125.2	3,734.7	390.5	9.5
M1A1 tank engine[c]	1,283.0	1,122.2	160.8	12.5
M1A1 tank fire control[c]	667.2	570.4	96.8	14.5
M1A1 tank computer[c,d]	54.9	44.4	10.5	19.1
Bradley fighting vehicle—transmission	285.7	260.2	25.5	8.9
M9 armored combat earthmover	444.1	412.9	31.2	7.0
Navy:				
P-3C airframe	756.0	690.5	65.5	8.7
MK-46 torpedo and kits	554.5	503.1	51.4	9.3
LHD ship	3,296.0	2,622.8	673.2	20.4
Total	**$12,441.2**	**$10,832.4**	**$1,608.8**	**12.9**

[a]Percent of savings compared to annual contract cost.

[b]Reflects revised justification packages for all services' procurement of T700 engines.

[c]M1A1 tank systems are shown in this chart at a procurement rate of 840 per year.

[d]This chart reflects a revised justification package prepared by the Army.

Since the rates of government expenditures differ for annual and multiyear procurement methods, present value analysis is used to put the annual and multiyear estimates on a comparable basis. Present value analysis is a method to compare the two procurement alternatives by taking into account the time value of money.

Although present value analysis is a generally accepted practice, selecting an appropriate interest rate has been a subject of controversy. The rate applied has a direct effect on the results of an analysis. For federal government investment analyses and decisionmaking, arguments have been presented for interest rates ranging from the cost of borrowing by the U.S. Treasury to rates of return that can be earned in the private sector of the economy. Since most government funding requirements are met by the Treasury, its estimated cost to borrow is a reasonable basis for establishing the interest rate to be used in present value analyses. Accordingly, for our analyses, we used the average yield on outstanding marketable Treasury obligations that have remaining maturities similar

to the period involved in the analysis. DOD uses the Office of Management and Budget Circular A-94's prescribed present value method, which applies a flat 10-percent discount rate to constant dollars.

Our present value analysis of all the fiscal year 1986 candidates as shown on the following table, indicates projected savings of about 9.7 percent. DOD's present value analysis shows savings of about 8.1 percent.

DOD's and our present value savings estimates for the multiyear candidates are shown in the following table.

Table II.2: Comparison of DOD and Our Present Value Savings for Fiscal Year 1986 Multiyear Candidates

Millions of Dollars

	DOD present value savings		Our present value savings	
	Amount	Percent[a]	Amount	Percent[b]
Army:				
T700 engine[c]	$ 61.4	10.1	$ 69.6	10.2
M1A1 tank chassis[d]	209.5	8.9	245.6	9.1
M1A1 tank engine[d]	84.5	11.5	99.7	11.8
M1A1 tank fire control[d]	49.9	12.8	59.2	13.3
M1A1 tank computer[d,e]	3.5	11.0	5.4	13.7
Bradley fighting vehicle—transmission	14.9	8.0	16.0	8.3
M9 armored combat earthmover	21.4	8.4	21.2	8.0
Navy:				
P-3C airframe	19.1	4.0	27.7	5.5
MK-46 torpedo and kits	28.5	7.1	31.9	7.9
LHD ship	79.8[f]	4.8	199.1	10.4
Total	**$572.5**	**8.1**	**$775.4**	**9.7**

[a]Percent of savings compared to DOD's present value annual contract cost.

[b]Percent of savings compared to our present value annual contract cost.

[c]Reflects revised justification packages for all services' procurement of T700 engines.

[d]M1A1 tank systems are shown at a procurement rate of 840 per year.

[e]This chart reflects a revised justification package prepared by the Army.

[f]Navy program officials told us that they apply escalation by using the DOD major systems index differently for ships to arrive at then-year dollars shown in the justification package because of the manner in which ships are constructed. A different series of then-year dollar figures would have been developed if the major systems index had been directly applied. Our present value analysis for savings was applied consistently to all 10 systems by using then-year dollars shown in the justification packages as we have in prior years.

Source of Savings

Just as the percentage of savings for each candidate varies so does the source of the savings. The largest category of savings for the fiscal year 1986 candidates is associated with vendor or subcontractor procurement. In addition, much of the savings related to inflation also relates to the procurement of subcontract or vendor items in economic order quantities. The sources of estimated savings for the 10 candidates are shown in the chart below.

Table II.3: Sources of Estimated Savings

	Percent of total savings
Vendor procurement	53.9
Inflation	29.0
Manufacturing	6.9
Other	10.2

The majority of the savings in a typical multiyear arrangement are associated with procurement of vendor and subcontracted items on a more economical basis than is possible with a series of annual procurements. The technique is called economic order quantity procurement or expanded advance buy. Rather than procure subcontracted parts and materials in annual lots of limited sizes, the prime contractor can procure parts in larger lots, thereby obtaining lower prices from subcontractors because the subcontractor can be more efficient in buying materials and in scheduling production. However, the government must make a contractual commitment to the prime contractor to either procure the larger multiyear total quantity or pay termination costs if quantities are later reduced. That commitment usually requires additional funding in the early years of a multiyear contract.

Candidates Considered for Multiyear Procurement

Most candidates considered for multiyear procurement were approved by DOD. Those not approved, and the reasons given are shown below.

Table II.4: Candidates Not Approved by DOD

Army	Reasons for disapproval
10-ton truck	Rear axle problems in tests
Navy	
Standard missile	Production profile change
Modular control equipment	Testing incomplete and cost growth

Our Assessments of the Fiscal Year 1986 Candidates

We reviewed the justification submitted to the Congress for each of the 10 candidates to assess their conformance to the multiyear criteria outlined in Public Law 97-86. The chart below summarizes our views of each candidate compared with the criteria. The Xs identify instances in which the multiyear contract candidate does not clearly meet the legislative criteria. We placed an X under cost confidence in all cases where firm proposals were not available at the time the estimates in the justification packages were prepared. Until the firm proposals are received and analyzed, the budgets for fiscal year 1986 and following years and the savings estimates in the justification package should be considered preliminary or budgetary estimates. Percentage savings on a discounted basis for each candidate are also displayed.

Table III.1: Summary Schedule Showing Questionable Conformance With Legislative Criteria

	Percentage savings—discounted	Cost confidence	Stability		
			Requirement	Funding	Design
Army:					
T700 engine	10.2	•	•	•	•
M1A1 tank chassis	9.1	X[a]	•	•	X
M1A1 tank engine	11.8	X[a]	•	•	•
M1A1 tank fire control	13.3	•	•	•	•
M1A1 tank computer	13.7	•	•	•	X
Bradley fighting vehicle—transmission	8.3	X[a]	•	X	•
M-9 armored combat earthmover	8.0	X	•	X	X
Navy:					
P-3C airframe	5.5	X	•	X	•
MK-46 torpedo and kits	7.9	X	•	•	•
LHD ship	10.4	X	•	•	•

[a]Firm proposals were received after the multiyear justification package was prepared and confirm the level of savings.

T700 Series Engines

The T700 series of engines is used in a variety of helicopters. The total requirements or procurement objective for the Army helicopter programs using T700 engines have been stable and the Navy's is growing. But, the Air Force procurement objective for the Night Hawk helicopter, which uses the T700, has been declining since 1982. The Air Force's total requirements for the Night Hawk helicopter have declined from 243 to 90 since 1982. Considering the decline, the Air Force planned to support multiyear procurement for T700 engines based on a procurement of 63 Night Hawk helicopters (140 engines, including spares) in fiscal years 1986-88. Overall, the requirements or procurement objectives have been stable.

The Army Black Hawk and Apache helicopters involve the majority of engines and have been stable programs, and the Army intends to include a clause in the multiyear engine contract permitting a 10-percent variation in quantity (up or down). Those factors limit the risk relating to requirement and funding stability in acquiring T700 engines on a multiyear contract through fiscal year 1988.

Although the Army intends to procure 1,770 T700 series engines on the fiscal years 1986-88 multiyear contract, the justification package submitted to the Congress in April 1985 included only the Army requirements of 1,368 engines. The Air Force, Navy, and Marines prepared justification packages for their engines, but they were not submitted to the Congress until July 1985. The requirements for all T700 series engines for fiscal years 1986-88 are as follows.

Table III.2: Requirements for T700 Series Engines

Service	Weapon system	Engine quantity
Army	Black Hawk, Apache, Quick Fix	1,368
Navy	Sea Hawk, SH60F	196
Air Force	Night Hawk	140
Marines	Sea Cobra	66
Total		**1,770**

The designs of the T700 engines being procured are stable and deliveries of engines on the prior contract (a multiyear contract covering fiscal years 1983-85) are on schedule. However, the T700 engines to be procured in fiscal years 1986-88 (to be delivered January 1986 through December 1989) may not meet future Army and Navy power needs because of the mission weight growth of the Black Hawk and Sea Hawk helicopters. The contractor, according to an Army official, is pursuing a

growth version of the commercial model of the T700 engine which is expected to be available in late 1986 or early 1987 with certification by the Federal Aviation Administration.

Firm decisions on the part of the Army and the Navy to procure a growth version of the engine had not been made as of July 30, 1985. Army officials said they did not plan to procure the growth version until 1988, at the earliest. They said they expect no difficulty in adjusting a multiyear contract to procure the upgraded engine.

The Army received proposals from the contractor in January 1985, and the justification package is, to a large extent, based on data from that proposal and the prior multiyear contract requirements covering fiscal years 1983-85.

Savings from using multiyear rather than the annual procurement of T700 engines were projected to be $103.4 million, or 10.6 percent in then-year dollars, and about 10.2 percent in terms of discounted dollars. Most of the savings are expected to be achieved as a result of vendor procurement on an economic order quantity basis.

M1A1 Tank Systems

The M1A1 tank is an upgraded version of the basic M1 Abrams tank, which has been in production for 5 years. The Army proposed four contracts for M1A1 tank systems on a multiyear basis. The systems include the chassis, engine, and certain fire control system components. Each of those proposed contracts is discussed later. The discussion below applies to all four proposed multiyear contracts.

Total requirements for the M1 tank have been stable, yet the production rates for fiscal year 1986 and the future were uncertain as of July 30, 1985. The remaining requirement is 3,299 tanks. Recognizing the uncertainty of the production rate, the Army proposed two alternative multiyear schedules (70 a month and 60 a month) for completing the acquisition of M1A1 tanks on a multiyear basis. The fiscal year 1986 budget assumed procurement at the 70 a month rate.

The M1A1 tank is a high priority weapon system. The Army stated that funding will be provided through the multiyear contract period for whatever production rate is decided, even if other systems must be delayed or canceled. Although the Army requested 840 tanks (70 a month) in the fiscal year 1986 budget, and provided multiyear plans for both 70 a month and 60 a month production rates, we understand the

Army has considered future production plans for fiscal years 1987-1991 at a rate of as low as 50 a month.

The M1A1 version of the tank completed operational testing in April 1984. Delivery of the first tank, under the fiscal year 1984 contract, had not been made at the time we completed our review. Prior production of the basic M1 Abrams tank was over 2,300 units. Major changes from the M1 tank to the M1A1 include improvements referred to as Block I: the gun mount for the 120mm gun; ammunition and fire control system; microclimatic cooling system; integrated nuclear, biological, chemical system with warning device; modified transmission and final drive; modified road wheels; increased capacity shock absorbers; and increased armor protection.

Further changes are planned to tanks included in the fiscal year 1986 and future years' budgets. Those changes referred to as Block II changes and classified improvements are discussed later. Those changes primarily affect the chassis.

For the M1A1 systems or subsystems being proposed for multiyear contracting, it is essential that the M1A1 production rate be firmly established and adhered to through the end of the program, or that the multiyear contracts provide for some fluctuation in quantities over the period of procurement activity.

M1A1 Tank Chassis

The chassis is the basic M1A1 tank excluding armament, communication equipment, fire control equipment, suspension and power train components and control equipment, and basic issue items. The fiscal years 1986 to 1989 production quantities are to include not only Block I changes which have been tested by the Army, but also Block II changes, and certain classified changes which have not been fully identified and tested. The Block II changes include commander weapon station modifications, drivers all weather viewer, improved track, and improved wiring harness and involve an estimated $100,000 per chassis. Army officials said the Block II changes are not expected to result in significant changes in tank design, but rather primarily involve added equipment. Because of the highly classified nature of the classified changes, the Army only provided us with information on the cost of the changes— $100,000 per chassis. Though we did not review these classified changes, the dollar magnitude suggests that the design may not be stable.

The justification package indicates a savings of $390.5 million (then-year dollars), or about 9.5 percent, and about 9.1 percent in terms of discounted dollars by using multiyear as compared with sequential annual contracts at a production rate of 70 a month. The justification package cost estimate was prepared by the Army without the benefit of firm contractor proposals on a multiyear and annual basis. In May 1985, the Army received the contractor's proposal which indicated savings slightly higher than the Army's estimate.

In summary, it appears that savings can be achieved in multiyear contracting of the chassis, but planned changes to the chassis and lack of production of the M1A1 version of the chassis indicate that some risk may be associated with the stability of design. If the proposed production rate for future budgets is reduced below 60 a month, the justification package would be obsolete.

M1A1 Tank Engine

The AGT1500 turbine engine used in the M1A1 provides power to the transmission mounted accessories and final drive. Over 2,000 engines had been delivered by early 1985. Engineering changes to the engine have been minor except for two approved in 1984. Test results have produced a passable failure rate.

The Army's justification package indicated a potential savings of $160.8 million, or 12.5 percent from procurement of the engine on a multiyear basis. When discounted to present value, savings are an estimated 11.8 percent. The contractor's proposal received in May 1985 confirmed the savings available from use of multiyear procurement.

M1A1 Tank Fire Control

The proposed multiyear contract is to cover five components (the laser range finder and four units of the thermal imaging system) of the M1A1 tank fire control system which are acquired from the same contractor. The Army has procured these components since 1982. Development and testing is complete and the contractor is delivering the components on schedule under existing contracts.

The justification package indicates an intent to procure 3,299 of each of the thermal imaging system components and 2,520 laser range finders. At a rate of 70 a month, the Army estimated a savings of $96.8 million, or about 14.5 percent, in then-year dollars as a result of using multiyear instead of annual contracts. Discounted, the savings are estimated to be about 13.3 percent.

We believe the acquisition strategy is not clear from reviewing the justification package alone. The Army, since 1979, has been developing an improved laser range finder, referred to as the carbon dioxide (CO_2) laser range finder. The CO_2 laser range finder is expected to enter production in August 1988, replacing the current laser range finder.

The Army intends to acquire the existing laser range finder only through fiscal year 1988 and the CO_2 laser range finder beginning in fiscal year 1989. Yet, Army officials said the strategy is to procure the existing laser range finder on a multiyear contract through fiscal year 1988, with an option to purchase more of the existing laser range finders, or the CO_2 laser range finder in fiscal year 1989.

We believe the acquisition of a laser range finder (either the existing one or the CO_2) for fiscal year 1989 should not be funded as part of the multiyear procurement because the Army is not sure what laser range finder it will purchase in 1989.

M1A1 Ballistic Computer

The ballistic computer is another component which makes up the tank fire control system. In fiscal year 1984, electronic components of the ballistic computer system were modified for implementation with the modified M1A1 tank. The Army proposed a multiyear contract for procurement of 3,299 systems at a rate of either 70 a month or 60 a month.

Deliveries of the computers were expected to begin in February 1985 under a prior contract. While the computer systems for the M1A1 system have been delivered for installation in tanks, the Army did not formally accept any computers through July 30, 1985. Army officials said the computer units delivered did not properly interface with tank electrical systems. Army officials said formal acceptance will begin when the problems are solved. We believe a 5-month period of failure to accept deliveries is significant.

The contractor submitted a revised proposal in March 1985, prompting the Army to revise its multiyear justification package for the ballistic computer. The multiyear and annual procurement prices were both decreased, and estimated savings were increased. The Army expects a savings of about $10.5 million, or about 19.1 percent, based on the revised proposal. Discounted to present value, the savings are about 13.7 percent.

While the requirement and funding appear stable, we are uncertain of the design stability of the modified computer since deliveries have not been formally accepted under the prior contract. Until the interface problem is resolved and the Army begins formal acceptance of the computers, we cannot be certain the design is stable.

Bradley Fighting Vehicle—Transmission

The HMPT-500 transmission for the Bradley Fighting Vehicle is a unique design which provides power to the right and left final drives, produces variable steering ratios at all speeds, and includes service and parking brakes.

The Army intends to buy a total of 6,882 transmissions. Out of 2,955 transmissions on contract through fiscal year 1985, 774 had been delivered by March 1985. Fiscal years 1983-85 requirements are being procured on a multiyear contract.

Deliveries of transmissions on the current contract were slightly behind schedule in June 1985 as a result of labor disputes at the contractor's plant. By July 22, 1985, Army officials told us the contractor had recovered and was 68 transmissions ahead of the contract schedule.

The Army proposed procurement of 2,466 transmissions by multiyear contract for fiscal years 1986-88 requirements. Estimated savings are 8.9 percent in then-year dollars, or 8.3 percent on a discounted basis.

Quality has been emphasized as needing improvement. The multiyear contract for fiscal years 1983-85 included durability audits, extended control testing, and product quality audits. The emphasis has improved the mean miles between failure of transmissions in the field to 6,639 miles through April 1985. It is slightly less than the goal of 6,740 miles. Army officials believe the historical performance problems are primarily due to the lack of quality rather than lack of proper design. We found that few significant engineering changes had been made.

The potential for competition in procurement of the transmission has been recognized by the Army. A technical data package has been acquired and was expected to be suitable to initiate competitive procurement beginning in fiscal year 1986. In late June 1985, the package was available but a few drawings had yet to be finalized. Army officials told us that they intend to pursue a competitive procurement beginning sometime in fiscal year 1987 for fiscal years 1989 and beyond. They intend to pursue a multiyear contract with the current contractor for

fiscal years 1986-88 and have requested proposals from the current contractor on an annual basis for fiscal year 1986 and a multiyear basis for fiscal years 1986-88. Proposals were received in July 1985 after our review was concluded and indicated savings can be achieved.

The justification package shows a procurement quantity of 2,466 transmissions in fiscal years 1986-88. Army officials told us that fiscal year 1987 and later Bradley Vehicle quantities are now planned at 600 per year by the Army rather than over 800 a year. Accordingly, future funding for the vehicle and the transmission funding profile described in the justification package may no longer be accurate. An Army official told us the multiyear contract could be sustained by procuring spare transmissions under the contract to support the production level proposed. We are uncertain what effect the reduced quantities might have on the potential for future competition.

In addition to uncertainty of a funding commitment, we noted that quality problems have not yet been fully resolved, though they are close to goals.

Armored Combat Earthmover (M9)

The M9 Armored Combat Earthmover (ACE) is a highly mobile multipurpose combat vehicle which is to fill craters and ditches, prepare and maintain routes, prevent enemy movement by construction of antiarmor obstacles, dig tank ditches, and so forth. The vehicle is amphibious and air transportable. It provides light armor and nuclear, biological, and chemical protection for the operator and armor protection for the engine and key components.

The M9 ACE was approved for a 5-year multiyear procurement of 1,318 vehicles beginning in fiscal year 1984, but because of test deficiencies which led to delays in awarding the contract, the Congress denied the fiscal year 1985 funding request. The Army test group had concluded in 1984 that the M9 ACE was neither effective nor suitable for fielding. The Army is now proposing a multiyear program for M9 ACE beginning in fiscal year 1986, but at a reduced quantity of 529 vehicles. The Army's minimum procurement objective is 1,318 vehicles, but the current proposal is to procure only 40 percent or 529 of the vehicles between fiscal years 1986 and 1990.

The conceptual vehicle now known as the M9 ACE has been in development for over 25 years. Although production was proposed in 1978, 1982, and again in fiscal year 1984, it has never materialized except for

15 vehicles acquired in 1982 on a sole-source basis. With a 25 year history of development and aborted attempts at production, it appears that the M9 ACE is not very high in priority compared with other needs of the Army.

We understand that a follow-on evaluation of the vehicle has been required by the Under Secretary of the Army. The evaluation, which Army officials said was concluded on June 6, 1985, was intended to demonstrate the operational reliability and effectiveness of the M9 ACE using the commercial D-7 bulldozer system (truck, tractor, and low-bed trailer) as a basis for comparison. A report of the evaluation had not been prepared at the time we completed our review. Until we review the follow-on evaluation results, we are unable to conclude that the M9 ACE design is stable, or that it is cost effective for fulfilling the requirement.

The Army's cost analysis included in the justification package indicates savings from multiyear procurement of about 7 percent. The Army did not attempt to define the relevant differences between multiyear and annual procurements, but rather, simply assumed the savings would be about 7 percent and produced figures to agree with that basic assumption. Further, the M9 ACE has not been produced in quantity or in a continuing production atmosphere previously, making it difficult to establish the production cost on either an annual or multiyear basis.

In reviewing the Army's cost estimate, we identified inconsistencies with other multiyear estimates and with the prior Army multiyear submission for multiyear procurement. First, the Army does not anticipate the use of economic order quantity (EOQ) funding on the multiyear contract. Typically, purchases from subcontractors are the major source of savings in a multiyear arrangement. While the justification package description indicates the Army would encourage the contractor to enter into multiyear subcontracts, no EOQ funding is requested and no specific amount of savings is attributed to EOQ procurement from vendors. Second, the cost estimate assumes an estimated 5-percent savings to result from competition. We noted that the fiscal year 1984 multiyear package assumed a 15-percent savings to result from competition. Use of a 15-percent savings factor from competition would lower the multiyear cost estimate by $40 million in total ($6 million in fiscal year 1986).

In summary, the history of the M9 ACE is not a convincing demonstration that it is a high priority in the Army's procurement plans. Accordingly, before further consideration is given to multiyear procurement, we believe a new justification package should be submitted certifying that

the system is cost effective and is of such high priority that the Army will guarantee sufficient funding through future years for the contract.

P-3C Airframe

The P-3C is a land based antisubmarine warfare patrol aircraft. The airframe (excluding engines and avionics), which is planned for procurement on a multiyear basis, was first produced as the P-3A more than 25 years ago. Major changes since introduction of the P-3C model in 1969 have primarily involved the avionics.

The total procurement objective of the P-3C program is 317 active force aircraft and has not changed throughout the program's history. The Navy has yet to procure 64 of the aircraft. Nevertheless, budget deliberations within DOD in past years have resulted in a changing plan of annual procurement quantities. Fiscal year 1986 was similar—the Navy proposed procurement of five aircraft and DOD increased the planned procurement to nine aircraft to continue production at a "reasonably efficient" rate.

The airframe contractor initiated the plan to procure P-3C airframes on a multiyear basis at a rate of 9 or 12 per year for fiscal years 1986 through 1990, with funding beginning in fiscal year 1985 to cover long-lead release and EOQ order quantity buys of materials and components from vendors. A revision to the plan also proposed procurement of 9 aircraft in fiscal year 1986 on an annual basis and 36 aircraft on a multiyear basis in fiscal years 1987 to 1990. The Navy declined to pursue the contractor's multiyear initiative because the Navy considered the savings to be insufficient and the price growth over the multiyear period to be excessive. OSD directed the Navy to submit the P-3C airframe as a multiyear candidate and also modified the Navy's procurement and budget plan for fiscal years 1986-1990 to accommodate a multiyear procurement.

Although the contractor proposed procurement of 36 P-3C aircraft at 9 per year for fiscal years 1987-1990, the OSD directed procurement plan differed. OSD directed procurement of 33 P-3Cs and 3 RP-3D aircraft in fiscal years 1987-1990 as follows:

Table III.3: OSD Procurement Plan for P-3Cs and RP-3Ds

	Fiscal years				
	1987	1988	1989	1990	Total
Multiyear procurement					
P-3C airframe	9	8	8	8	**33**
RP-3D airframe	•	1	1	1	**3**
Total	**9**	**9**	**9**	**9**	**36**

We found inconsistencies between the amounts for EOQ advance funding between the justification package and the contractor's proposal. While the contractor proposed on the basis of three more aircraft (about 10 percent) than included in the justification package, the proposal requested 65 percent more advanced funding in fiscal year 1986 than shown in the justification package. Since most of the multiyear savings are projected to result from vendor procurement on an economic order quantity basis, the identification of the appropriate advance funding is necessary. We are uncertain whether the savings projected in the justification package (5.5 percent on a discounted basis) are achievable based on the advanced funding requested by the Navy for fiscal year 1986. We believe the justification package must be reconciled with the contractor proposed advanced funding requirements to provide a reasonable basis for analysis.

With a projected 5.5 percent savings on a discounted basis, the P-3C indicates a marginal level of savings. With only a 5.5 percent margin of savings involving a 4-year procurement and expenditures extending into 1992, we believe it is critical that cost estimates be as accurate as possible both on a multiyear and annual basis. Nevertheless, Navy officials told us they have not requested a proposal on an annual basis from the contractor nor do they intend to unless the Congress denies the proposed multiyear procurement.

The multiyear justification package displays an increasing price for the P-3C airframe if procured on an annual or a multiyear basis, as shown below.

Table III.4: P-3C Airframe Unit Price Increases

Millions of Then-Year Dollars

Procurement method	Unit price for fiscal years 1987	1988	1989	1990	Percent change 1987-1990
Multiyear	$19.3	$20.4	$21.7	$22.5	
Percent increase		5.7	6.4	3.6	16.6
Annual	$20.8	$22.2	$23.7	$25.2	
Percent increase		6.7	6.8	6.3	21.2

While the justification package indicates an increase in unit price of the airframe of 16.6 percent if procured on a multiyear basis and 21.2 percent if procured on an annual basis, neither estimate includes the potential effect on the Navy's price if foreign military sales develop. And, according to the Defense Security Assistance Agency (OSD for Policy), about 30 airframes can possibly be delivered for foreign military sales in the delivery period covered by the Navy's P-3C multiyear procurement.

In summary, savings are relatively small at 5.5 percent and there is a risk that cost estimates are not sound. If the Navy does not request a contractor proposal on an annual basis, there will be no better information available to judge whether savings would occur. Further, the contractor's initial proposal and the Navy's justification package differ substantially in terms of the amount of funding required in fiscal year 1986. Funding stability is still a concern since annual procurement quantities have fluctuated for several years.

MK-46 Torpedoes

The MK-46 is a lightweight homing torpedo which can be launched from submerged craft, surface ship, or aircraft. The Navy inventory contains several configurations of the torpedo: Mod 1, Mod 2, Mod 4, and the most recent, Mod 5. The Mod 5 has been procured beginning with fiscal year 1978, and operational testing was completed in 1979. The most recent procurement of MK-46 Mod 5 torpedoes is under a multiyear contract covering fiscal years 1983-85 requirements of 3,205 torpedoes.

The proposed multiyear procurement is planned to cover fiscal years 1986-88 requirements. It involves procurement of 1,500 MK-46 Mod 5 torpedoes, and 1,663 modification kits to upgrade Mod 1 and Mod 2 torpedoes to the Mod 5 configuration.

While requirements and funding plans for the MK-46 program appear stable, two other Navy weapon systems could have an effect on the requirements for the MK-46 torpedoes and modification kits—the CAPTOR deepwater mine and the MK-50 Advanced Lightweight Torpedo.

The CAPTOR mine houses an encapsulated MK-46 Mod 4 torpedo. The Navy's procurement plan was based on an assumption that the CAPTOR mine program would be canceled in fiscal year 1985. Continued procurement of CAPTOR mines could reduce the number of MK-46 Mod 1 and Mod 2 torpedoes available for upgrading to the Mod 5 configuration since some torpedoes could be used for the CAPTOR program instead. Approval of procurement of 150 CAPTOR mine systems in fiscal year 1986, as suggested by the Senate Armed Services Committee, would not in itself affect the multiyear program for MK-46 Mod 5 kits. Navy officials told us that the inventory of Mod 1 and Mod 2 torpedoes is about 2,700. Through fiscal year 1985, 840 are committed to prior CAPTOR mines and 1,663 are committed to upgrading to the Mod 5 version. Accordingly, about 200 are available for an additional quantity of CAPTOR mines, and the approval of 150 CAPTOR mines in fiscal year 1986 could be accommodated with no change in the multiyear program.

The MK-50 torpedo, being developed as a successor to the MK-46, is expected to enter limited production in fiscal year 1987, with full-scale production planned for 1990. Delays in MK-50 production plans could lead to procurement of additional MK-46 Mod 5 torpedoes after fiscal year 1988, the last year of the planned multiyear period.

The 3-year multiyear procurement, as compared with annual procurements, is expected to result in savings of 9.3 percent in then-year dollars, and about 7.9 percent when discounted to present value. Most of the savings are attributable to procurement by the prime contractor of components from vendors on an EOQ basis.

The Navy expects to receive firm proposals from the contractor shortly. At that time, a closer evaluation of the proposed cost of the MK-46 program can be made.

In summary, the MK-46 Mod 5 torpedo and Mod 5 kits appear to be logical candidates for multiyear procurement. But, actions on the CAPTOR mine program in fiscal years 1986 through 1988 could affect the plan to procure 1,663 MK-46 Mod 5 kits. Approval of up to 200 CAPTOR mines would not have a significant effect, but approval of quantities larger

than that could affect the multiyear contract or result in procurement of torpedoes specifically to support the CAPTOR program.

LHD Amphibious Assault Ship

The LHD mission is to embark, deploy, and land elements of a Marine landing force in an assault. The LHD is to carry helicopters, landing craft, and amphibious vehicles. Total firm requirements are for five LHD ships—one is already on contract (February 1984); three are proposed for multiyear procurement in fiscal years 1986, 1988, and 1989; and one is planned for procurement in fiscal year 1990.

Several plans and contracting methods for the three-ship multiyear procurement have been considered. An important consideration in all the plans and contracting methods is the Navy's intent to acquire LHD ships competitively. They believe competition is not feasible on an annual procurement basis since other bidders could not compete with the contractor constructing the first LHD. Accordingly, the Navy intends to pursue a multiyear contract which should allow other bidders to spread nonrecurring start-up costs over several ships and improve their potential for competing in price.

Although the requirement seems stable at five ships, the procurement profile has been accelerated several times. The Navy's original program plan for LHD indicated a shipbuilding start in fiscal year 1987. The Navy later accelerated the first ship to fiscal year 1985. The Congress further accelerated the first LHD to fiscal year 1984 and follow-on quantities were also adjusted. The Navy's current strategy is to procure the second ship in fiscal year 1986, none in fiscal year 1987, and the third and fourth ships in fiscal years 1988 and 1989. Navy officials indicated their requirements can be met with sequential procurements in fiscal years 1987, 1988, and 1989, but a multiyear program to begin in fiscal year 1986 provided more savings than other optional schedules. OSD and Navy officials confirmed their support for funding the program on the schedule proposed in the multiyear justification.

The first ship, LHD-1, is scheduled for delivery in March 1989. Accordingly, test and evaluation is not complete. However, Navy officials believe there are no major design uncertainties because the LHD is not a completely new ship—it is a modified LHA class ship. Further, OSD and Navy officials said shipbuilding is unlike other production programs for tanks, aircraft, and components. They believe the program meets the design stability criteria as nearly as is possible and the program schedule includes the standard 1 year gap between the first and second ships.

Only $6 million of research, development, test, and evaluation funding is requested for fiscal year 1986. Considering the desirability of competition and lack of obvious design issues, we have not taken exception to the stability of design.

Navy officials estimated the cost on an annual basis using the proposed and negotiated costs for the LHD-1 contract which was awarded in February 1984. Because that negotiation was so recent, Navy officials have a high degree of confidence in the estimated cost to acquire LHDs 2, 3, and 4 on an annual basis. They are not as confident in the multiyear cost estimate included in the justification package. Navy officials indicated the multiyear cost could be lower than shown in the justification package.

The justification package indicates potential savings of $673.2 million (roughly 20 percent in then-year dollars) by using a multiyear contract as compared with successive annual contracts. Our present value analysis indicates savings of about 10.4 percent. According to Navy officials, the savings in then-year dollars are achievable as a result of competition ($164.2 million); economic order quantity buys of vendor items ($124.5 million); increased effectiveness of the contractor's planning and labor force ($69.2 million); and reduced escalation as a result of starting ships 3 and 4 construction earlier, buying materials earlier, and better use of the labor force ($315.3 million).

While the justification package is constructed assuming three annual procurements, compared with a multiyear procurement, the acquisition strategy is to request contractor proposals on a multiyear basis and on the basis of an annual procurement in fiscal year 1986 with priced options for fiscal years 1988 and 1989.

The Navy acquisition strategy also is built around the combined procurement of government-furnished equipment for LHDs 2, 3, and 4 in fiscal year 1986. Even though future year requirements are to be acquired on the contract, OSD and Navy officials told us multiyear authority is not required to procure the government-furnished equipment because it is all to be funded in fiscal year 1986. The justification package submitted includes no specific information about the government-furnished equipment items.

Because of the competitive nature of the intended procurement, a firm estimate of the cost to acquire the ships competitively on either a multiyear contract or an annual contract with options cannot be made at this

time. Accordingly, if the Congress is inclined to approve multiyear procurement of LHDs 2, 3, and 4, we suggest close adherence to a two-step process. Final congressional approval of the multiyear authority should be withheld until firm contractor proposals are received and evaluated by the Navy.

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