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STATEMENT OF

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PROCUREMENT, LOGISTICS AND READINESS DIVISION

BEFORE THE

SUBCOMMITTEE ON INTERNATIONAL TRADE,

FINANCE AND SECURITY ECONOMICS

JOINT ECONOMIC COMMITTEE

ON

[LOGISTICS PLANNING FOR THE M1 TANK]

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Mr. Chairman, we are pleased to appear before your Committee to discuss our recent report entitled "Logistics Planning For The M1 Tank: Implications For Reduced Readiness and Increased Support Costs" (PLRD-81-33, July 1, 1981).

We initiated our review in response to broad congressional concern that, although support costs for weapon systems have been drastically increasing, recently fielded systems are not achieving required operational readiness goals. The digest of our report is Attachment A to my statement.

Since the status of M1 testing and development has already been discussed, I would like to highlight some other important issues related to our work on the M1 tank.

1. The nature and causes of problems the Army experienced in developing logistics support for the M1 and recent DOD initiatives to avoid similar problems on future systems.
2. Readiness implications of the upcoming September 1981 decision on fielding the M1 in Europe.
3. The current status of the Army's efforts to develop logistics support for the M1.
4. Opportunities that still exist to reduce M1 logistics support costs.

Problems with development of
M1 logistics support

The pressures to attain specific performance goals (such as survivability, speed, range and fire power) within tight time and acquisition cost restraints led Army management to give inadequate consideration to the development of M1 logistics support and long-term ownership costs. For example:

- It was decided not to fund integrated logistics support development during prototype competition. Instead, it was planned that low-rate initial production would provide sufficient time for development of logistics before large quantities of tanks were fielded.
- While the Army believes the M1 has been the most tested combat vehicle in its history, prototypes were not available when needed to design and test logistics support.
- Program requirements and testing have been directed primarily at seeing whether the tank can achieve established performance goals.

As a result, the development of logistics support lags behind the tank's development. This is critical because current M1 program milestones call for decisions this September on whether to authorize full production and to field the M1 in Europe. In the last few months there have been several DOD initiatives aimed directly at some of the causes of the M1's problems. A recent example is a June 13, 1981, memo providing guidance on improving the DOD

acquisition process, in which the Deputy Secretary of Defense reemphasized that "improved readiness is a primary objective of the acquisition process of comparable importance to reduced unit cost and reduced acquisition time." Also, readiness goals--that can be quantified in terms of hardware reliability and maintainability and manpower and logistic resource requirements--will be established early in a weapon system's development and will be used as a principal management tool.

These actions are highly commendable. If aggressively implemented, they should help prevent problems similar to the M1s from occurring in future systems.

Readiness implications of fielding
the M1

In September the Army and DOD plan to determine whether the M1 is ready for fielding to Europe. In our opinion, great care should be exercised in reaching this decision because there are already tank support problems in Europe that could become exacerbated by premature fielding of the M1.

Army officials have stated that from a user's perspective the M1 tank "even at its current configuration and reliability level, has more operational utility and combat effectiveness than the current main battle tank." But we believe this has to be weighed against the potential consequences of early fielding of the M1.

While it is impossible to predict the consequences of a decision to go ahead and field the M1, history has shown that premature fielding can be costly and can adversely affect readiness. For example, the M60A2 tank was deployed to Europe in 1974 with hardware design problems and inadequate logistics support (trained personnel, test equipment, spare parts, and technical manuals), which resulted in high support costs and a general reputation as an unsupportable tank. Similar logistics support problems currently exist for the M1.

Some of the logistics support problems currently affecting the M60s in Europe would be exacerbated by fielding the M1 at its current level of logistics supportability. For example

--The M1 will use 30 to 90 percent more fuel than the M60, but there are already too few petroleum supply vehicles and inadequate fuel storage facilities in Europe.

--Problems with transportation and storage of ammunition will be aggravated because the M1 carries fewer rounds and therefore needs more supply vehicles. Also when it begins using the 120-mm. round instead of the 105 mm. round, additional storage space (which is already inadequate) will be needed.

Other areas where the M60 is experiencing logistics support problems--such as retaining personnel with critical skills, outdated and inadequate maintenance facilities, and a general

shortage of trucks--would likely be further strained by early fielding of the M1.

Also, if an immature system is fielded, additional costs are likely for such things as (1) extensive contractor support, (2) additional spare parts or other equipment, (3) special procedures to work around the unavailability of support equipment, and (4) added transportation and retrofit costs.

Status of logistics support
for the M1

The early emphasis on fielding a tank within a 7-year development cycle heavily influenced the Army's decision to move the program forward and meet specific program milestones. For example, in an early 1979 report, the Army's Logistics Evaluation Agency stated that logistic elements trailed end item tank development so much that extended engineering development would be required to catch up. Also, the report pointed out that the end item tank status was such that extensive engineering development would be required to demonstrate mission reliability, maintenance burden, and power train durability thresholds.

At that time the Logistics Evaluation Agency recommended that the M1 program remain in full-scale engineering development and that the Army verify correction of deficiencies identified during phase II testing before making a production decision. However, despite these deficiencies, the Army and DOD review councils recommended that the M1 program proceed from the engineering development phase to the production phase.

Not only has M1 logistics support development lagged behind the tank's development but the scheduled completion dates for various support needs are still several years away. (See attachment B.)

In February 1981, however, the Army concluded that "the tank is supportable in the near-term considering the relatively low production rate and intensive management of logistics issues." (Emphasis added.) The Army also concluded that the majority of M1 development was reasonably complete, support planning was sufficiently mature, and remaining development items could be completed without undue risk to M1 readiness. Given the status of M1 logistical development and current testing results, these conclusions seem overly optimistic.

Because of our concerns about the status of M1 logistics development, testing results, and readiness implications, we have recommended that the Secretary of Defense provide key congressional committees with the information DOD uses to arrive at its full production and fielding decisions and to quantify the potential consequences of proceeding with these actions or delaying them.

Opportunities to reduce
M1 logistics costs

While the supportability and fielding issues are paramount, there are also some opportunities for DOD to reduce M1 support costs. Because of the emphasis on design-to-unit-cost criteria and the lack of attention to logistics development early in the M1

program, many potential life-cycle cost reductions are no longer available. However, DOD can still achieve some savings by

- implementing some M1 equipment design and logistics support alternatives which could reduce costs without affecting readiness,
- increasing support for M1 reliability and maintainability improvement programs,
- implementing alternative strategies for procuring M1 spare and repair parts, and
- reevaluating the number of M1s planned for training purposes.

Equipment design and logistics support alternatives

As discussed earlier, many decisions were made based on what was cheaper to initially acquire rather than what would be cheaper in the long run. For example, the state of the art in wiring harnesses is the convoluted cable, which is being successfully used by the British Chieftan and other foreign-made armored vehicles. But Chrysler and Army officials said that convoluted cables were rejected for the M1 because of their high initial acquisition costs.

Army Armament Material Readiness Command studies in 1979 concluded that the M1 wiring harnesses were not as effective as the convoluted cable. The Command also studied the potential savings of substituting the convoluted cable for 1 of the 60 harnesses in an M1 and concluded that for the M1

fleet more than \$18 million could be saved over its 20-year life. Because each harness on a tank is subject to various wear and usage factors, we do not know how many of the 60 M1 harnesses should use convoluted cables nor can we estimate the total potential savings by using convoluted cables. However, we believe the Command's study demonstrates that potential savings are substantial. Therefore, the use of convoluted cables and other decisions made because of the design-to-unit-cost rather than life-cycle-cost criteria should be reevaluated.

M1 reliability and maintainability
improvement programs

Recognizing that the future impact of logistics support costs has not received adequate consideration, the Army is now identifying areas where reliability and maintainability improvements are needed and establishing programs to accomplish these improvements. For fiscal years 1981-83, \$87 million has been programed for such improvements. However, the Army said increased funds will be required to fully realize the potential M1 life-cycle cost reductions suggested in our report.

Alternative strategies for
procuring spare and repair
parts

Primarily because the needed data was not available, the Army was generally unable to use standard systems for determining initial requirements for M1 spare and repair parts. The systems that were used to determine needs for the first 3 years of production resulted in the purchase of parts which may greatly exceed requirements for that

period. Furthermore, because of continuous engineering design and tank production changes, many of the spare parts procured may become obsolete before they are needed. We recommended that DOD reevaluate M1 requirements and delivery schedules for spare and repair parts considering such things as changes in M1 design, maintenance plans, and tank production schedules, and more recent data on parts failure rates.

In addition, we recommended that DOD adopt alternative procurement strategies that could ensure that future spare and repair parts are procured using the most cost-effective methods available. DOD agreed to review alternative procurement strategies and to implement them where readiness and cost effectiveness can be enhanced.

M1s planned for training purposes

The Army's plan to buy 348 M1 tanks for training at a cost of \$887 million seems excessive given (1) the low use being made of training M60s on which M1 training needs were based and (2) the potential use of training devices which could substitute for M1s.

We were unable to identify firm criteria on how much usage training tanks should receive. However, our analysis of data on the extent to which M60 tanks were being used for training at the Army's primary tank training center, Fort Knox, indicated that training needs could be satisfied with about 73 percent of the tanks on hand. If planned purchases of training M1s could be similarly reduced, 96 M1s valued at \$245 million would not be

needed for training purposes. In addition, the Army plans to spend over \$250 million for training devices which could further reduce the need for training M1s. In response to our report, DOD has begun a reevaluation of the number of training tanks used in the M60 program and the number projected for the M1 program.

Mr. Chairman, we will be happy to respond to any questions you may have at this time.

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESSLOGISTICS PLANNING FOR THE M1
TANK: IMPLICATIONS FOR REDUCED
READINESS AND INCREASED SUPPORT
COSTSD I G E S T

The M1 tank, the Army's new main battle tank, was designed by the Chrysler Defense Division and is being produced in the Army's Tank Plant in Lima, Ohio. On the basis of the Army's projection of a 7,058-M1 fleet, acquisition costs are currently estimated at \$19 billion--\$2.5 million for each tank. This figure includes research and development and production costs, but does not include the anticipated costs of operating and supporting the M1 over its 20-year projected life cycle.

Integrated logistics support planning--the approach to weapons system development which attempts to link development and production to deployment and operation--has not been adequate or timely for the M1 tank program. Although recent planning efforts have improved, many supportability questions remain. Also, opportunities exist to reduce M1 support costs.

M1 program emphasis, as supported by the Congress, has been on achieving established design-to-cost objectives and fielding a tank within a 7-year development cycle. As a consequence of this program momentum, there was little early emphasis on logistical support and life-cycle cost issues. For example:

- It was decided not to fund integrated logistics support development during prototype competition between Chrysler and General Motors. Instead, it was planned that low-rate initial production would provide sufficient time for supportability to mature before large quantities of tanks were fielded.
- While the Army believes the M1 has been the most tested combat vehicle in its history, prototypes have not been available when needed for designing and testing logistical support.
- Program requirements and testing have been directed at inherent tank design performance, and the development of logistics supportability lags far behind the tank's development.

The Department of Defense (DOD) and the Army recognize the need to more thoroughly evaluate M1 operational support characteristics and improve supportability. For example, the Army has proposed over \$200 million for design improvements in reliability, availability, maintainability, and durability, but the Army's proposal has not been fully funded.

ONGOING M1 TESTING MAY NOT PROVIDE
INFORMATION NEEDED FOR SOUND DECISIONS
OF FULL PRODUCTION AND FIELDING

Supportability questions, still to be answered, include

- Can the M1 tank be operated and supported in a realistic operational environment at acceptable levels of operational readiness?
- Have reliability, availability, maintainability, and durability requirements been achieved or are they achievable?
- What will be the operation and maintenance costs associated with the M1--considering currently demonstrated levels of reliability?
- Have sufficient quantities of required logistics support resources been identified and acquired?
- Has the M1 maintenance concept been fully evaluated and has the required number of personnel been identified and trained?

DOD's ongoing operational and developmental M1 testing (scheduled for completion in May 1981 and January 1982, respectively) is supposed to provide the data needed to answer such questions on operational supportability. However, GAO believes that emerging results from current testing raise serious doubts that the M1 will be proven supportable before full production and fielding decisions are made in September 1981. GAO is concerned that the past momentum of the M1 program will push the program forward, even though many supportability issues remain.

DOD believes the M1 is supportable in the near-term, considering the relatively low-production rate and intensive management of logistics issues. DOD also believes that current testing will provide adequate supportability information

on which to base a sound full production and fielding decision at the scheduled System Acquisition Review Council meeting in September 1981.

GAO believes that improvements can be made in evaluating test data to better measure supportability and provide better data on which to base upcoming production and fielding decisions. Also, because of past congressional concern regarding M1 supportability and the potential that insufficient data will be available to support the upcoming M1 program decisions, the Congress should be provided the information DOD uses for these decisions. (See p. 38.)

M1 SUPPORT COSTS CAN BE REDUCED

While there are still supportability issues to resolve, DOD has opportunities to reduce M1 life-cycle ownership and support costs, which are projected in the billions of dollars. The following are possible opportunities.

- Since the Army considered acquisition costs, as opposed to total ownership costs, in developing the M1, the contractor was encouraged to select systems, components, and parts based upon initial procurement costs. The contractor rejected components that would initially be more expensive but which would be cheaper over the tank's life because of improved reliability or maintainability. (See p. 18.)
- In support of proposed M1 fielding requirements for the first 2 years, the Army has spent over \$400 million to procure spare and repair parts. Delays in tank deployment and reductions in initial tank productions will reduce initial spare and repair parts requirements and continued modification of various tank systems may make many parts obsolete before they are needed. (See p. 61.)
- Army plans to buy 348 M1 training tanks, costing over \$887 million, appear excessive given the low use of M60 training tanks and also the planned expenditure of \$250 million to acquire M1 training devices. The reduction of tanks at training activities could allow earlier distribution of tanks to operational units. (See p. 70.)

RECOMMENDATIONS

Because of the need to demonstrate the M1's supportability, GAO recommends that the Secretary of Defense direct the Secretary of the Army to:

- Establish additional criteria, at the system and subsystem levels, for evaluating tests that place greater emphasis on operational effectiveness measures and assessments of future support costs. This criteria should include goals and thresholds for logistics burden and operational availability. (See p. 38.)
- Quantify and evaluate the potential impact (in terms of increased support and retrofit costs, reduced operational readiness capability, etc.) of producing and fielding the M1 with currently demonstrated levels of reliability, availability, maintainability, and durability. (See p. 38.)
- Reevaluate current M1 program plans for increasing production capacity, monthly tank production goals, deployment to Europe, and acquisition of long lead production items and spare parts, considering the current level of design maturity of the tank and its support system, tank production and quality control problems, and other factors. (See p. 38.)
- Increase support for the development, acquisition, and evaluation of required logistics support capability (for example, maintenance capability, test equipment, and technical manuals). (See pp. 47 and 59.)

GAO also recommends that the Secretary of Defense provide key congressional committees with information on the M1's logistics burden and quantify (in terms of increased maintenance costs and reduced operational readiness) the impact of fielding the M1 system at its current level of maturity or delaying the program. (See p. 38.)

To reduce potential life-cycle costs of the M1, GAO recommends that the Secretary of Defense:

- Increase support for M1 reliability and maintainability improvement programs, recognizing the potential to increase operational readiness and decrease future operational support costs through implementation of an effective life-cycle cost reduction program. (See p. 23.)
- Direct the Secretary of the Army to implement alternative procurement strategies to ensure that future spare and repair parts are procured using the most cost-effective methods consistent with the level of maturity of the tank and required technical data. (See p. 69.)
- Direct the Secretary of the Army to reevaluate the number of training tanks used in the M60 program and projected for the M1 program and to reallocate unneeded M60s and reduce the projected purchase of M1s or reallocate them to operational needs. (See p. 76.)

Other specific recommendations appear on pages 23, 47, 59, 68, and 76.

AGENCY COMMENTS

DOD concurs with GAO's major recommendations. (See app. IV.) DOD said that numerous steps are being taken to resolve or minimize the impact of the problems discussed. According to DOD, adequate supportability testing information, as well as results of actions described in response to the GAO report, should be available as a sound basis for a full production and fielding decision in September 1981. In this decision process, DOD says appropriate weighting will be given to all elements of the M1 system's performance.

The Army says it is committed to proceeding with M1 production buildup and deployment plans while recognizing the near-term potential for supportability problems. The Army anticipates some problems and is developing ways to minimize them until the problems are successfully resolved.

GAO's analysis of DOD and Army comments are included in each report chapter.

STATUS OF M1 LOGISTICS SUPPORT DEVELOPMENT, APRIL 1981

	Date		Date <u>completed</u>	Date scheduled for <u>completion</u>
	<u>Begin</u>	<u>End</u>		
Conduct validation of technical manuals	Feb. 1977	Nov. 1980	Incomplete	Feb. 1981 to Nov. 1982
Conduct physical teardown and maintenance evaluation	Not originally scheduled		March to May 1978	
Conduct maintenance evaluation	Dec. 1976	Dec. 1979	Incomplete	1982
Submit technical documentation	June 1978	Nov. 1979	Incomplete. Baseline established as of Sept. 1979	Must be con- tinually updated as the tank configura- tion changes
Verify support and test equipment capability	Mar. 1978	Sept. 1979	Incomplete	
Prepare depot maintenance support plan	June 1979	May 1980	Incomplete	
Develop and submit final require- ments for main- tenance staff hours	Dec. 1976	Nov. 1979	Incomplete	June 1981 or after com- pletion of phase III tests
Prepare depot main- tenance work requirements (note a)	June 1979	Nov. 1980	Incomplete	1982 to 1984
Perform pilot depot overhaul	Dec. 1980	Mar. 1981	Incomplete	Feb. 1983 to Dec. 1984
Develop full Gov- ernment depot capability		Mar. 1981	Incomplete	Anniston Depot - 1983 Mainz Depot - 1986

	<u>Date scheduled to</u>		<u>Date completed</u>	<u>Date scheduled for completion</u>
	<u>Begin</u>	<u>End</u>		
Conduct final verification of personnel re- quirements	June 1979	Nov. 1979	Incomplete	Final person- nel require- ments sub- mitted but not approved
Field M1 train- ing devices	May to Sept. 1980		Incomplete	July 1981 to 1986

a/Although the original M1 maintenance concept called for full organic depot maintenance capability before initial fielding in Europe, delays in depot support planning resulted in the necessity for contractor depot support of key M1 systems and components.