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

MISSION ANALYSIS AND
SYSTEMS ACQUISITION DIVISION

B-201505

MARCH 31, 1981

The Honorable Caspar W. Weinberger
The Secretary of Defense

Attention: Assistant for Audit Reports

Dear Mr. Secretary:

Subject: Reliability and Maintainability Requirements Need More Emphasis in Weapon System Development (MASAD-81-25)

We have completed a review of the Department of Defense (DOD) and the military services' efforts to improve the reliability and maintainability (R&M) of their weapon systems. This review was conducted as a result of a number of our prior reviews which indicated that poor reliability had become a key issue in a number of our newest and most important weapon systems, including the Army's new main battle tank (XM-1), the Air Force's Air-Launched Cruise Missile, and the Navy's Harpoon missile.

R&M are important because of their effects on the ability of our forces to accomplish their mission. There has been a growing perception among DOD personnel and others that poor performance of deployed systems is caused by complex equipment which is technologically advanced but unreliable and too complex to be maintained by field personnel. Whether a system can be supported in the field is dependent upon many factors, including such things as transportability, durability, quality, and R&M.

Our recently issued report entitled "Effectiveness of U.S. Forces Can Be Increased Through Improved Weapon System Design" (MASAD-81-17), dated January 29, 1981, deals with the issue of why many of today's military

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systems cannot be adequately operated, maintained, or supported. It focuses on three key "ownership considerations"--logistics support, human factors, and quality assurance--and concludes that inadequate attention to these factors during the design and development cycle leads to many of these problems.

Our current effort focuses on two of the issues within the broad category of ownership considerations--R&M. We reviewed nine systems (see enc. I) with R&M problems to identify those factors which contributed most to these problems.

In almost all of the systems we reviewed, R&M problems were known to exist in the development cycle; yet, the systems were fielded with the problems unsolved. Overall, we believe that DOD and the services were not getting a true measure of what a system's operational reliability was when there was still an opportunity to take corrective action to assure the system would function properly. We believe that the weapon system development process could be enhanced by

- --establishing adequate management information systems to develop realistic R&M requirements,
- --establishing valid R&M requirements for each system entering the research and development cycle,
- --testing operational reliability rather than hardware reliability,
- --conducting earlier independent R&M demonstrations, and
- --emphasizing accurate and realistic R&M reporting at all levels of the decision-making process.

RECENT DOD EFFORTS

DOD issued a new directive (DODD 5000.40), dated July 8, 1981, which provides for a number of actions

designed to correct shortcomings of the past relating to the R&M problems discussed above. This directive concentrates on

--raising the level of attention that R&M considerations receive during the development process and

--improving the quality and timeliness of R&M data available to decisionmakers.

These changes must also be viewed in light of the recent reemphasis on supportability and R&M caused by changes to the Major Systems Acquisition Directive (DODD 5000.1) and changes to the Major Systems Acquisition Procedures Instruction (DODI 5000.2). These later changes clearly emphasize the importance of supportability factors, including R&M, in the acquisition cycle.

CONCLUSIONS

R&M have not received appropriate emphasis in the decisions to design, produce, and field a weapon system. Emphasis in the past has centered on cost, schedule, and performance requirements. For many of the systems reviewed, realistic operational testing, especially as it relates to R&M, did not appear to have been an important factor leading up to the initial production decision. Most of the systems reviewed were procured with little assurance that the R&M requirements would be met or even approached. We believe that in the rush to meet cost, schedule, and performance goals, R&M and other supportability factors were knowingly or unknowingly traded away. There has been a lack of sustained concern on the part of service and DOD decisionmakers in the R&M aspects of developing systems.

DOD's recently issued R&M directive plus the reemphasis on supportability factors caused by changes to the DOD Directive 5000.1 and DOD Instruction 5000.2 should, if properly implemented, redress many of the problems discussed in this letter. Because these changes have only recently been directed, we could not observe the effects of the implementation. However, it is our intention to followup

on the implementation of these regulations and their effects on the R&M of newer, more recently developed systems.

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We are sending copies of this letter to the Director, Office of Management and Budget; the chairmen, Senate and House Committees on Appropriations and Armed Services; the chairman of the House Committee on Government Operations; the chairman of the Senate Committee on Governmental Affairs; and the Secretaries of the Army, Navy, and Air Force.

Sincerely yours,

W. H. Sheley, Jr.
Director

Enclosure

ENCLOSURE I

SYSTEMS REVIEWED

U.S. ARMY:

XM-1 tank
10 kW GTED generator
M60-A2 tank

U.S NAVY:

Harpoon
Mark 86 fire control system
AN/BQS-15 sonar

U.S. AIR FORCE:

Air-Launched Cruise Missile
F-15
A-10