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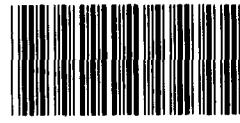

March 31, 1992

The Honorable Daniel K. Inouye
Chairman, Subcommittee on Defense
Committee on Appropriations
United States Senate

The Honorable John P. Murtha
Chairman, Subcommittee on Defense
Committee on Appropriations
House of Representatives

House Report 102-328, the Conference report on the Department of Defense's fiscal year 1992 appropriations, directed us to analyze the capabilities of two Air Force systems: the Core Automated Maintenance System (CAMS) and the Reliability and Maintainability Information System (REMIS). The conferees expressed concern about the capability of these two systems to provide timely, accurate, and comprehensive information to Air Force managers. They further directed that we provide our analysis by March 31, 1992.

In subsequent meetings with your offices, we agreed to 1) provide an overview of both systems' capabilities; 2) identify systems problems reported by the Air Force; and 3) develop a funding profile estimating the additional funds required to complete and operate both systems.

We gathered this information from January through March 1992. As such, we did not have sufficient time to test the accuracy of the CAMS and REMIS data bases or to interview a random, statistically significant sample of users. We did, however, interview officials from and reviewed documentation supplied by the Air Force, the CAMS and REMIS program offices, Litton Computer Services, I-NET Inc., and Dynamics Research Corporation. In addition, we used a structured questionnaire to interview CAMS users at four Air Force bases.

BACKGROUND

CAMS is an Air Force standard base-level automated maintenance management information system. The system will support all aircraft, communications-electronics, and equipment maintenance activities at 109 bases, 153 National Guard and Reserve sites, and selected North Atlantic Treaty Organization sites. CAMS automates aircraft history, aircraft scheduling, and the aircrew debriefing process and provides a common interface for entering base-level maintenance data into other standard logistics management systems, such as REMIS. Since initiating CAMS in 1982, the Air Force has developed and fielded 8 CAMS subsystems, with the final two subsystems due to be fielded in mid-1992. CAMS has been largely developed by in-house personnel at the Standard Systems Center at Gunter Air Force Base, Alabama.

REMIS is an automated information system that is intended to provide the Air Force with the capability to receive, process, store, and retrieve performance and readiness information on Air Force weapons systems and equipment. From a site in Dayton, Ohio, REMIS is expected to support over 2,100 users at Air Force headquarters, Air Force Logistics Centers, and major command headquarters. Its database is comprised mainly of CAMS data transmitted from 104 bases. (Five bases do not send CAMS data to REMIS because the equipment they maintain is not reportable under REMIS.) REMIS includes three subsystems: Equipment Inventory, Multiple Status, Utilization Reporting Subsystem (EIMSURS); Product Performance Subsystem (PPS); and Generic Configuration Status Accounting Subsystem (GCSAS). These REMIS subsystems respectively manage data on equipment inventory and utilization, maintenance activity, and configuration status for aircraft and support equipment.

REMIS is expected to replace 20 existing systems with a single, on-line data base system. The program began in March 1984 and a contract was awarded to Litton Computer Services in September 1986 to develop and implement the system. The Air Force is incrementally developing the three subsystems: EIMSURS and PPS have entered initial operating capability, and GCSAS is under development. The Air Force currently plans to complete REMIS system development and implementation in April 1994.

In December 1991, the management of the CAMS and REMIS programs was consolidated, and the REMIS program manager was appointed as the CAMS/REMIS program director.

INFORMATION ON CAMS PERFORMANCE

The Air Force has not conducted a comprehensive review of CAMS to assess its overall performance. However, a number of studies at particular bases or involving specific CAMS subsystems have disclosed some system performance and data accuracy problems. Further, our interviews with CAMS users revealed that the system's performance has improved, but data accuracy concerns remain.

The Air Force Audit Agency reported in 1987 that at four Air Force bases CAMS frequently was not available to users and its system capabilities had been curtailed to meet required response times. Also, the report stated that at those bases some maintenance data were not completely accurate or were not entered at all because supervisors were not reviewing data entries and lacked sufficient training. In a 1990 report, the Air Force Audit Agency reported that the data in CAMS' status and inventory subsystem were not completely accurate at four bases because edits were insufficient and supervisors were not adequately reviewing data that was put into the system. According to the report, users could enter incorrect data into the system, such as showing a B-52 engine being placed on a KC-135 tanker, and the system would accept the transaction.

According to the audit manager responsible for conducting an ongoing follow-up review of CAMS, the Air Force has made progress toward resolving the performance problems identified in the prior reports. For example, this official stated that the use and reliability of CAMS improved dramatically after the Air Force upgraded the hardware being used to support CAMS and other base-level systems.

Other studies show that, despite the Air Force's efforts to improve CAMS, the system's data accuracy and completeness may be a continuing concern. For example, MacDill Air Force Base officials analyzed CAMS input generated by four aircraft maintenance units from August through November 1991. For November 1991, these officials found that transactions to update the data base were 77 to 88 percent accurate. The Air Force official responsible for the analysis told us that CAMS lacked sufficient edits to prevent inaccurate data from being entered into the system. In addition, an October 1991 study by General Dynamics reported that F-16 aircraft

component changes (changes to installed equipment) were not being accurately captured by CAMS. During August 1991, according to this study, only 50 percent of component changes to the F-16 were reported to CAMS.

During our visits to four bases, a number of CAMS users told us that the system was generally available when they needed it and provided adequate response times. However, some also stated that it was easy to enter incorrect data into CAMS--such as an invalid work unit code--by using a "cheat sheet" which lists codes that the system will accept whether they are correct or not. The work unit code is important because it indicates the equipment subsystem where the maintenance action occurred. In addition, Air Force maintenance management and technical personnel at the bases we visited stated that some evening shift workers are often more concerned about performing maintenance and do not always enter maintenance information into CAMS.

INFORMATION ON REMIS PERFORMANCE

According to the CAMS/REMIS program office, poor system performance is a continuing concern. Users at Air Force Logistics Command Headquarters had complained to the CAMS/REMIS program office about the system's slow response and frequent inability to retrieve data in a timely manner. In addition, users told us that the system is often so slow that they are disconnected from the network and must then start over. A March 5, 1992, evaluation of REMIS, sponsored by the program office, confirmed the users' complaints about poor response time, unexplained keyboard locks, and input backlogs. The CAMS/REMIS program director told us that these system performance problems could result from a number of factors involving system operation, hardware capacity, and software design.

The Air Force hired an Independent Verification and Validation (IV&V) contractor (I-NET, Inc.) in October 1990 to analyze and test REMIS software, specifically the PPS subsystem. The contractor's August 1991 report identified 49 category 1 (catastrophic) errors that need to be resolved. For example, one catastrophic software error produced incorrectly calculated maintenance hours, resulting in unreliable reports. Through subsequent testing and development, Litton has reduced the number of PPS catastrophic errors identified by the IV&V contractor and others to 25, as of February 19, 1992.

Litton, the REMIS contractor, has hired a consulting firm to review the system's hardware and software to determine the causes of REMIS performance problems. This review will provide Litton with recommendations to improve system performance and provide a methodology for Litton to perform its own system performance measurements. Litton initiated this review in September 1991 and plans to have it completed in May 1992.

REPORTED CAMS/REMIS INTERFACE PROBLEMS

The REMIS data base is comprised mainly of CAMS data transmitted from 104 Air Force bases; however, REMIS is rejecting a significant number of the CAMS data transactions. According to the CAMS/REMIS program office, REMIS rejected approximately 50 percent of the CAMS transactions (about 470,000) during a 21-day period ending on February 19, 1992. The rejected transactions went into an error file that at the time contained 2 million errors. Further, as of March 20, 1992, REMIS was receiving 350,000 transactions a week from CAMS, still with a 50 percent error rate.

The CAMS/REMIS program director has established action teams composed of program office, contractor, and functional personnel to identify corrective measures. According to the program director, the action teams have determined that the interface errors result from edit, communications, and data definition anomalies. The action teams also determined that CAMS is transmitting data that REMIS does not need; as a result, REMIS rejects the data, creating thousands of errors.

The CAMS/REMIS program director told us that REMIS rejects many CAMS data transactions because REMIS has implemented required standard edits, but many CAMS base-level systems have not done so. The required edits have been distributed to the bases that provide CAMS data to REMIS; however, these edits will only work with the latest version of CAMS software, issued in January 1992.

Despite direction from Air Force Headquarters, a large number of bases transmitting CAMS data to REMIS are not using the required software. In December 1991, Air Force headquarters directed all bases using CAMS to install the January 1992 CAMS software release. However, as of March 25, 1992, only 60 of 104 bases were running the required

CAMS software release. As a result, according to the CAMS/REMIS program office, the REMIS database may not be complete because it may not be receiving all the CAMS data it should.

CAMS/REMIS FUNDING PROFILE

The Air Force has spent approximately $186 million through fiscal year 1991 to develop, deploy, and maintain CAMS. Since the system is nearly fully deployed, most of the current CAMS funding estimates are for operations and maintenance. The Air Force estimates it will spend $19 million on CAMS in fiscal year 1992, $16 million in fiscal year 1993, and $16.3 million in fiscal year 1994.

The Air Force has spent $102 million on REMIS through fiscal year 1991--$76 million for development, $16.4 million for investment, and $9.6 for operations and support. It estimates it will spend $16.5 million on REMIS in fiscal year 1992, $10.6 million of which is for system development. For fiscal year 1993, the Air Force estimates it will spend $19.4 million, $11.4 million of which is for system development. In fiscal year 1994, projected REMIS funding requirements total $19.3 million, $1.3 million of which is for development.

As arranged with your offices, unless you publicly announce the contents earlier, we plan no further distribution of this letter until 30 days from the date of this letter. If you have any questions about this letter, please contact me at (202) 336-6240 or Frank Deffer, Assistant Director, at (202) 336-6226.

for James R. Watt

Samuel W. Bowlin
Director, Defense and Security
Information Systems

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