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Report to Secretary, Department of Defense; by Richard W. Gutmann, Director, Procurement and Systems Acquisition Div.

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Studies by the Department of Defense (DOD) of management of the development and procurement of airborne electronics equipment (avionics) revealed a consensus that: too many similar avionics systems are being developed and procured, resulting in proliferation and higher costs than necessary; the services have neither the policies nor management continuity to acquire reliable avionics equipment for common application among weapon programs; and low reliability of avionics is often a factor in the readiness of operating weapon systems and could hinder effective military operations. The studies highlight increased standardization as a key to reducing proliferation and high cost and to increasing the reliability of avionics. DOD officials estimated that in excess of $15 billion is spent annually for developing, buying, and supporting avionics. The Under Secretary of Defense for Research and Engineering is formulating a policy which will require maximum standardization, but progress in issuing this policy has been slow. Emphasis should be increased toward standardization of avionics and other electronics items by accelerating the efforts to develop, issue, and fully implement a standardization policy. The development of standard items separate from the acquisition of individual weapon systems should be encouraged. The Office of the Secretary of Defense should monitor the development and procurement of avionics and other electronic items to assure that the policy is implemented. (Author/HTW)

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

PROCUREMENT AND SYSTEMS
ACQUISITION DIVISION

B-163058 May 12, 1978

The Honorable
The Secretary of Defense

Dear Mr. Secretary:

We have reviewed the management of the development and procurement of airborne electronics equipment (avionics) by the Department of Defense (DOD). This review was made to analyze the many related studies that have been sponsored by the Office of the Secretary of Defense (OSD), the services, and other DOD organizations. We found a consensus among the studies that:

--Too many similar avionics systems are being developed and procured, resulting in proliferation and higher-than-necessary development, procurement, and support costs.

--The services have neither the policies nor management continuity to acquire reliable avionics equipment for common application among weapon programs.

--Low reliability of avionics is often a factor in the readiness of operating weapon systems, and could hinder effective military operations.

The studies highlight increased standardization as a key to reducing proliferation and high cost, and to increasing the reliability of avionics. DOD officials estimate (based on a 1974 study) that in excess of $15 billion is spent annually for developing, buying, and supporting avionics.

Recognizing the benefits of standardization, the Under Secretary of Defense for Research and Engineering is formulating a policy which will require that avionics and other electronics be standardized to the maximum practical extent on a triservice basis. Progress in getting this policy issued has been slow. In view of the potential offered by standardization we believe the policy being considered should be finalized and implemented without further delay.

PSAD-78-105
(951320)

SIGNIFICANT SAVINGS CAN BE ACHIEVED BY STANDARDIZING AVIONICS EQUIPMENT

A substantial life cycle cost savings can be achieved by standardizing many avionics items, even though the development of a standard item may require a greater initial investment of time and money. This initial investment must be spent to assure that the item will meet or nearly meet most user requirements, will fit and function properly in various applications, and will be highly reliable.

A DOD study reported that Defense spent $15.3 billion in fiscal year 1974 for procurement and support of electronic equipment. Since then, OSD officials stated that this amount has probably increased.

The Logistics Management Institute released a report in May 1974 called "Economic Feasibility of Standardized Avionics." A hypothetical example in that report shows how 13 to 26 percent of the life cycle costs can be saved by standardizing. The savings would be realized by developing and fielding one item of equipment rather than two, and by reducing the unit price through competitive, large quantity buys. Reductions in recurring logistics costs are not always inherent, but can be achieved with an investment to improve the reliability of standard equipment.

The monetary effect of standardization cannot be measured accurately because the amount of savings depends on the number of items that are standardized, the development efforts that are avoided, the quantities procured, the methods of procurement, and various other factors. However, if 13 to 26 percent of the life cycle costs of avionics could be saved, potential savings would approach several hundred million dollars. The examples in the enclosure, although limited, demonstrate how savings could be achieved.

DOD AND THE SERVICES ARE BEGINNING TO EMPHASIZE STANDARDIZATION

Defense is aware of the proliferation, high cost, and low reliability of avionics and recognizes that those problems are also present to varying degrees in other electronics areas, such as command, control, communication, and intelligence systems. The stated intent of DOD is to vigorously pursue a policy of standardization of avionics and electronics, and DOD has been working toward issuing such a policy since 1976. Progress, however, has been slow, and as of March 1978 a policy had not been formally issued.

The policy is expected to result in increased interoperability of equipment among the military services and U.S. allies. The latter benefit is particularly being sought as a key to strengthening the NATO capability.

At the time of our review, even though the policy had not been issued we found that the triservice standardization concept was being applied to several programs. Different approaches were being considered--such as standardizing selected items of equipment; establishing standard specifications relating to the form, fit, and function of selected items; and relying on commercial systems. Programs to standardize avionics and other electronics that have been started anticipate projections of increased readiness as well as substantial savings over the life of affected systems. Some programs are aimed at standardizing equipment for all services, while others are for a single service.

The services have recently begun to emphasize the development of standard items separate from the acquisition of a single weapon system. This is a step in the right direction, since individual weapon system program managers generally would not attempt to develop a highly reliable standard item for use in multiple weapon systems.

Standardization of an item must be preceded by a comprehensive analysis of the users' current and future needs, long-term planning, and extensive, costly development and testing to assure reliability, supportability, and a proper interface with other weapon systems. The manager of a weapon system is not in the proper organizational position to command the attention of and coordinate with other program managers, logistics managers, and using commands. The added time, expense, and technical risk involved in meeting the needs of multiple users tend to conflict with the program manager's objective of meeting performance and schedule requirements for the system within the constraints of the research and development and the production budgets. Thus, avionics equipment is designed predominately to meet program schedule and performance requirements of a single aircraft--less consideration is given to reliability and potential use on other aircraft.

Another barrier to the use of standard items is that standard items, when they do exist, would generally be provided by the Government to an airframe contractor as Government-furnished equipment (GFE). Program managers are often reluctant to use GFE because they must depend on the GFE contractor to deliver, on schedule, equipment which performs to the specifications of the airframe contractor. Delivery of equipment which does not meet specifications or late delivery adversely affects the program, and permits the airframe contractor to make claims against the Government. The program manager would prefer avoiding the risks of GFE by requiring the airframe contractor to provide as many subsystems as possible.

Unless reliable standard items meeting user requirements are developed separately from weapon systems, and program managers are strongly encouraged to use those standard items, proliferation of avionics will continue. We found instances where the weapon system program managers were aware that standard items were in development but, rather than select the standard item, they used a more costly item already in production or embarked upon a new program to develop a similar item for the weapon system. (See encl. I.)

CONCLUSIONS

Increased standardization can result in reduced proliferation, lower life cycle costs, and increased reliability of avionics and other electronic items. In addition, standardization may be necessary for effective employment of U.S. forces alone or in conjunction with U.S. allies. Through studies and several ongoing standardization projects, it has been demonstrated that savings--as well as increased military readiness--can be achieved by increasing standardization of avionics and other electronics.

The actions that are being taken are commendable. But, the progress in issuing and implementing the policy has been slow. The real effect of a well implemented standardization policy will not be felt unless reliable standard items meeting users' needs are developed, and program managers are required to look first to these items before attempting to justify the development of unique items for the weapon systems they are responsible for acquiring.

The issuance of DOD-wide standardization policy and guidance is essential. The policy being formulated by the Under Secretary of Defense for Research and Engineering should be finalized and implemented without further delay.

RECOMMENDATIONS

We recommend that you increase the emphasis toward standardization of avionics and other electronics items by accelerating the efforts to develop, issue, and fully implement a standardization policy.

We encourage the development of standard items separate from the acquisition of individual weapon systems. This approach facilitates the necessary comprehensive analyses of current and future user needs, the costly initial investment, and the required testing to assure reliability, supportability, and the proper interface with other weapon systems.

Finally, we recommend that OSD monitor the development and procurement of avionics and other electronic items to assure that the policy is implemented as intended.

As you know, section 236 of the Legislative Reorganization Act of 1970 requires the head of a Federal agency to submit a written statement on actions taken on our recommendations to the Senate Committee on Governmental Affairs and the House Committee on Government Operations not later than 60 days after the date of the report and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

Copies of this letter are being sent to the Director, Office of Management and Budget; the Chairmen, Senate and House Committees on Appropriations and Armed Services; the Chairmen, Senate Committee on Governmental Affairs and House Committee on Government Operations; and the Secretaries of the Army, the Air Force, and the Navy.

Sincerely yours,

R. W. Gutmann

R. W. Gutmann
Director

EXAMPLES OF SAVINGS ACHIEVABLE BY STANDARDIZING AVIONICS

Air Force standard UHF 1/ radio and TACAN 2/

The Air Force initiated full-scale development of a standard UHF radio in 1974. The program was begun as a result of the high cost of maintaining existing radios in inventory, rather than as a result of a policy to standardize equipment. In August 1975 deliveries of the Air Force standard AN/ARC-164 UHF radio started. The radio is designed to meet the communication requirements of the 1980s, and is lighter, smaller, and less costly to procure and maintain than other radios in inventory. The standard radio costs about half as much as nonstandard radios recently procured by the Air Force, and is about 11 times more reliable than other UHF radios in inventory.

In December 1975, following a development program, deliveries of the Air Force standard AN/ARN-118 TACAN equipment also started. The standard equipment costs about one-third as much as a nonstandard TACAN recently procured by the Air Force, and will be about 10 times as reliable as the widely used ARN-21 equipment currently in inventory. These standard items have been selected for use in new aircraft (such as the A-10 and F-16) and will also be installed in many existing aircraft. The F-15 program manager was, however, reluctant to use the standard equipment.

In 1969 the Air Force selected ARC-109 UHF radios and ARN-111 TACANs for installation in F-15 aircraft. Those items had been used on previous aircraft and were already in inventory. The Air Force decided that the prime airframe contractor would procure the items and install them in the aircraft. The program manager became aware of the low-cost, more reliable ARC-164 and ARN-118, but he had not planned to install those items in the F-15. He contended that the change could be directed only by the Air Force Headquarters.

1/UHF--ultrahigh frequency.

2/TACAN--tactical air navigation.

In a letter dated July 20, 1976, we outlined to the Secretary of Defense the significant life cycle cost savings of installing the ARC-164 and ARN-118 standard items in the F-15 aircraft, replacing the ARC-109 and the ARN-111. We stressed the need for early action because of the ease of installing the standard equipment on the production line instead of through retrofit procedures.

On August 30, 1976, Air Force Headquarters directed the F-15 Program Office to install standard UHF and TACAN radios in F-15 aircraft as production line equipment as soon as possible, but no later than the fiscal year 1977 buy. Previously delivered F-15 aircraft are to have the standard equipment retrofitted. The program manager estimated that, for the F-15 program alone, procurement costs will be reduced $1.7 million and operation and support costs will be reduced $12.1 million (1976 dollars). The mean time between failure for the UHF radio in the F-15 has increased from 107 to 1,140 hours and from 550 to 800 hours for the TACAN; thus, reliability has increased significantly.

<u>Low altitude radar altimeters</u>

The Navy used an APN-141 standard radar altimeter in most fixed-wing aircraft bought in the 1960s. The APN-141 had a mean time between failure of only 50 hours. In 1969 the Navy initiated an advertised procurement to replace the APN-141. Proposals were received from eight contractors.

The Navy's new standard radar altimeter resulting from the advertisement was numbered the APN-194. It was installed on production aircraft in 1971 and was retrofit on most Navy aircraft. The APN-194, with a unit price of about $7,200, is expected to exceed 1,000 hours mean time between failure.

Although the APN-194 is the Navy standard altimeter, it is not used on the S-3A aircraft. The S-3A was being developed about the same time as the APN-194. Since the program manager was uncertain whether the APN-194 would be successfully developed and available in time to met the S-3A development schedule, he directed the prime contractor to furnish a radar altimeter.

This resulted in the prime contractor furnishing a nonstandard altimeter, the APN-201. Development of the APN-201 cost $679,000, and the average unit price is $14,237, for a total cost of $3.5 million for 200 units. Purchase of the standard APN-194 would have cost $1.4 million, and development cost could have been avoided.

Inertial navigation systems

Low reliability of the large number of different inertial navigation systems (INS) in inventory has caused the Air Force to pursue development of a reliable standard INS applicable to all Air Force weapon systems. In July 1975 the Air Force began developing a standard specification to integrate a standard INS with other proposed avionics systems, such as the global positioning system and the joint tactical information distribution system.

The Air Force preliminary estimates show unit costs of the standard INS should be between $50,000 and $60,000. Diverse INS equipment in inventory has cost from $70,000 to $300,000. Annual maintenance costs of the present equipment amount to 20 to 33 percent of the purchase price. The operating and support costs of the standard INS have not been established, but Air Force officials predict that the costs will be much less than present inventory equipment.

In 1967 the Navy initiated a project to develop and test the technical concepts of a standard INS. The Currier Aircraft Inertial Navigation System, designated AN/ASN-92, evolved as the Navy standard INS. The INS was bought as Government-furnished equipment for F-14, S-3, and E-2C aircraft; later the A-6E also used the INS. INS is also being retrofitted into other Navy aircraft.

From the start the program managers for the F-14 and S-3 did not favor the joint development effort because of the risks and management burdens associated with Government-furnished equipment. The unit price of the INS varies from $80,000 to $217,000, depending on which aircraft it is installed into and the various components which make it a system. An Institute for Defense Analysis study (dated October 1975) showed the average unit price for the Navy standard INS was $160,000. A Logistics Management Institute study estimated that, by avoiding development and purchase of another INS, the Navy saved at least $32 million.