United States General Accounting Office

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Report to the Honorable William V. Roth, Jr., U.S. Senate

December 1986

ELECTRONIC WARFARE

Navy's New Radar Warning Receiver Needs More Testing

GAO

United States
General Accounting Office
Washington, D.C. 20548

National Security and
International Affairs Division

ELECTRONIC WARFARE
NAVY'S NEW RADAR WARNING
RECEIVER NEEDS MORE TESTING

B-260441

June 20, 1996

The Honorable William V. Roth, Jr.
United States Senate

Dear Senator Roth:

At your request, we examined the ALR-67(V)3 radar warning receiver (RWR) program. The ALR-67(V)3 is intended to help protect Navy aircraft and the program is expected to cost about $1 billion. We are issuing this report to bring to your attention certain aspects of the Navy's acquisition plans that we believe will unnecessarily increase the Department of Defense's (DOD) risk on the program.

Background

RWRs are electronic warfare devices that help protect aircraft against radar-controlled weapons. RWRs sense the signals from hostile radars, provide an audio warning to the pilot, and display the warning information on a video screen in the cockpit. The display identifies the threats, provides their location or relative bearings, and ranks the threats in order of danger to the aircraft. Based on the warning, the pilot chooses from various options for defeating the threat, such as employing electronic jamming to interfere with the radar.

The ALR-67(V)3 is intended to be the Navy's next generation RWR for use on its future F/A-18 E/F aircraft. The ALR-67(V)3 is also planned for use on some current F/A-18 C/D aircraft, and with minor antenna modifications, can also be retrofitted as the ALR-67(V)4 into the F-14 and AV-8B aircraft.

The Navy expects the ALR-67(V)3 to significantly outperform the current RWR, the ALR-67(V)2. The ALR-67(V)3 is expected to be capable of detecting threats at a greater range and identifying more types of threat radars than its predecessor.

Results in Brief

Despite numerous performance problems that surfaced in developmental testing of the ALR-67(V)3, the adverse consequences from the premature procurement of the original ALR-67 and the ALR-67(V)2, and having already produced sufficient test articles for all operational testing, the Navy plans to commit to low-rate production of the ALR-67(V)3 before determining through completion of operational testing that the system is

operationally effective and operationally suitable.[1] As a result, the Navy risks procuring a deficient system that may require expensive modifications and retrofit to achieve adequate performance.

Adverse Impact of Premature Production of ALR-67 RWRs

Despite the importance of operational testing[2] as a management control to ensure adequate system performance, DOD started production of the original ALR-67 and its successor, the ALR-67(V)2, before they were operationally tested. The adverse consequences included deploying an unsatisfactory system to the operational forces and placing newly produced systems in storage rather than having them enhance the Navy's combat posture.

The Navy began producing the original ALR-67 in the early 1980s before proving it was operationally effective. Subsequently, the system performed so poorly during operational testing that the testing had to be curtailed. However, the Navy continued production while the system's performance problems remained unresolved.

As a result, the Navy installed the unsatisfactory system in operational aircraft for use by the combat forces. Subsequently, some Navy pilots during Operation Desert Storm distrusted the system to the extent that they stopped using it to detect threat radars and relied instead on other means that DOD considers classified.

To solve the ALR-67's problems, the Navy acquired the ALR-67(V)2. Once again, however, the Navy started production before correcting performance deficiencies. After operational testing showed that the ALR-67(V)2 did not meet the Navy requirement, some 230 production units, costing $75 million, were placed in storage pending modifications to achieve satisfactory performance.

[1]Operational effectiveness refers to the ability of a system to accomplish its mission in the planned operational environment. Suitability is the degree to which a system can be placed satisfactorily in field use considering such factors as reliability and maintainability.

[2]Operational testing is DOD's primary means of evaluating weapon system performance. It is also a key internal control to ensure that decisionmakers have objective information available on a weapon system's performance to minimize risks of procuring costly and ineffective systems.

Developmental Tests Reveal Problems With ALR-67(V)3 Prototype

The Navy is developing the ALR-67(V)3 to overcome the problems with the previous versions of the ALR-67. However, developmental testing of ALR-67(V)3 prototypes conducted so far has disclosed numerous deficiencies with its performance. According to the System Anomaly Reports[3] the Navy provided to us, some of the deficiencies include

- misidentification of threat radars or identification of friendly radar as a threat,
- warnings of multiple threats when only one is present or vice-versa, or
- failure to detect radars tracking the aircraft.

Moreover, developmental tests show that it has not been proven compatible with the F/A-18 aircraft's radar. For example, normal operation of the F/A-18 radar can cause the ALR-67(V)3 to warn of nonexistent threats.

The System Anomaly Reports indicate that some of the reported deficiencies were identified as early as mid-1993, and the contractor's recommended action for many of the reported deficiencies was not to proceed to operational evaluation until corrected. Without operational evaluation, however, the Navy cannot have complete assurance that any planned fixes for those deficiencies will work.

In addition to the developmental tests of effectiveness conducted earlier, the Navy conducted an operational assessment of a developmental model of the ALR-67(V)3 in September 1994. However, because the system was not production representative, that is, it was not of the final design planned to be produced, the Navy deferred testing of operational suitability. Thus, the Navy has no assurance yet that suitability considerations, such as reliability and maintainability, will be adequate.

Legislative Requirement Imposed on ALR-67(V)3 Program

Because of concerns that the Navy was proceeding with a high-risk acquisition plan for the ALR-67(V)3, the Congress included, among other requirements in the fiscal year 1995 Department of Defense Appropriation Act, a requirement that DOD certify, based on the results of joint developmental tests and operational test flights, that the ALR-67(V)3 was potentially operationally effective and potentially operationally suitable before low-rate production. This requirement was applicable only during fiscal year 1995. In its comments on a draft of this report, however, the

[3]System Anomaly Reports are official records created to document instances when a system fails to perform as expected.

Navy states that it will adhere to this and other fiscal year 1995 requirements pertaining to the ALR-67(V)3.

The Navy has defined an operational test program for the ALR-67(V)3 calling for a first phase of joint developmental tests with 1 month of operational test flights, which it calls OT-IIA. OT-IIA will occur primarily in the Navy's indoor chamber facility at Patuxent River, Maryland, and is planned to be completed in August 1996. This is to be followed by a 4-month phase of operational flight testing called OT-IIB that is planned for the Navy's open air range at China Lake, California. The Navy's program schedule indicates that OT-IIB is scheduled to be completed during the spring of 1997. According to the program office, potential fixes for the developmental problems described above will be tested and confirmed using 20 production representative assets procured specifically for the operational tests.

ALR-67(V)3 Schedule Contains Unnecessary Risk

Notwithstanding the unresolved deficiencies in the ALR-67(V)3's effectiveness, the unknown nature of its suitability, and the Navy's experiences with earlier versions of the ALR-67, the Navy plans to commit to the ALR-67(V)3's low-rate initial production before completing the second phase of operational testing (OT-IIB) in the spring of 1997. According to the program schedule, the Navy plans to award a low-rate production contract in the first quarter of fiscal year 1997 for the manufacture of ALR-67(V)3 systems for deployment on F/A-18 aircraft after the first phase (OT-IIA) of joint developmental and operational testing. However, while OT-IIA may demonstrate potentialities, the Navy will not be able to conclude from this testing phase alone that the system is operationally effective and suitable; such a conclusion must be based on a large number of flight hours in a realistic environment that only OT-IIB can provide. Furthermore, because the Navy intends to conduct both operational test phases using ALR-67(V)3 production representative systems previously procured as test assets, low-rate production of additional new systems is not needed to complete operational testing.

While the Navy's stated intent to adhere to an earlier requirement that the ALR-67(V)3 be potentially effective and suitable may provide some assurance of future success, we do not believe that this goes far enough. Past failures with earlier versions, unresolved deficiencies with the ALR-67(V)3, and the availability of test assets for all operational tests, leads us to conclude completion of OT-IIB rather than an early

commitment to low-rate initial production after OT-IIA would be a far more prudent acquisition strategy.

Recommendation

To minimize the risk of procuring another deficient RWR, and because the Navy does not need additional ALR-67(V)3 units to complete operational testing, we recommend that the Secretary of Defense require that the ALR-67(V)3 complete both phases of operational testing (OT-IIA and OT-IIB) to determine its effectiveness and suitability, and that the deficiencies identified during developmental testing have been resolved before committing to low-rate production.

Matter for Congressional Consideration

Because the Navy has not modified what we believe is a high-risk acquisition strategy, the Congress may wish to restrict DOD from spending any funds on ALR-67(V)3 production until both phases of operational testing (OT-IIA and OT-IIB) are complete and the system is certified effective and suitable by DOD.

Agency Comments

DOD generally concurred with this report, but indicated it did not agree with our draft report recommendation that the Secretary of Defense require the Navy to do sufficient testing before production to ensure that developmental deficiencies have been resolved. DOD maintained that because of the congressional reporting requirements, it saw no need to place any additional requirements on the Navy. However, when the requirements were enacted, the deficiencies identified during developmental testing were not generally known. As we stated in this report, the Navy's intent to adhere to the earlier requirements may provide some assurance of future success, but in light of the unresolved deficiencies, the Navy's continued adherence to its acquisition strategy is not reassuring. We have, therefore, modified our report and recommendation to address the congressional reporting requirements and restate our concern that the Navy continues to pursue a high-risk acquisition strategy by not completing both phases of operational testing before low-rate production and by planning to acquire additional systems not needed for testing. DOD's comments are presented in their entirety in appendix I along with our evaluation of them.

Scope and Methodology

We performed our work at the Naval Air Systems Command, Washington, D.C.; the Offices of the Director of Electronic Combat and Director of

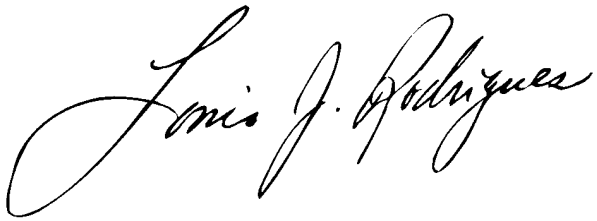
Operational Test and Evaluation (DOT&E) and the Office of the Secretary of Defense (OSD), Washington, D.C. In evaluating ALR-67(V)3 performance, we reviewed developmental test results, including System Anomaly Reports and operational assessment results. We also discussed the test results and potential performance issues with DOT&E, OSD, and Navy officials responsible for oversight of electronic warfare systems' acquisition.

Our review was performed from January 1995 through April 1996 in accordance with generally accepted government auditing standards.

We are sending copies of this report to other appropriate congressional committees; the Secretaries of Defense and the Navy; and the Director, Office of Management and Budget. We will make copies available to others upon request.

Please contact me at (202) 512-4841 if you or your staff have any questions concerning this report. Major contributors to this report were Jackie B. Guin, Charles A. Ward, and A. Delores Cohen.

Sincerely yours,



Louis J. Rodrigues
Director, Defense Acquisition Issues

Comments From the Department of Defense

Note: GAO comments supplementing those in the report text appear at the end of this appendix.

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ACQUISITION AND TECHNOLOGY

MAR 07 1996

Mr. Louis J. Rodrigues
Director, Defense Acquisition Issues
National Security and International
Affairs Division
General Accounting Office
Washington, D.C. 20548

Dear Mr. Rodrigues:

Enclosed is the Department of Defense (DoD) response to the General Accounting Office (GAO) draft report, "ELECTRONIC WARFARE: Navy's New Radar Warning Receiver Needs More Testing," dated February 5, 1996 (GAO Code 707104), OSD Case 1089.

See comment 1.

The DoD generally concurs with the report but disagrees with the GAO assertion that the Navy intends to commit to the ALR-67(V)3 production before completing operational testing. The ALR-67(V)3 will not go into low rate initial production (LRIP) until the Director, Operational Test and Evaluation reports to the Congress on the adequacy of operational testing and the Navy reports to the Congress on the objectives and results of the developmental flight testing.

See comment 2.

The DoD believes the recommendation that the Secretary of Defense require the ALR-67(V)3 undergo sufficient operational testing to demonstrate that the deficiencies identified during developmental testing have been resolved before committing to LRIP is superfluous. The Navy's strategy for operational testing of the ALR-67(V)3 prior to initiating LRIP is consistent with good acquisition planning, and it also accommodates the above congressional reporting requirements prior to the LRIP decision. The Department sees no need to place any additional requirements on the Navy regarding the ALR-67(V)3 prior to the LRIP decision.

Detailed comments regarding the report and the recommendation are enclosed. The Department appreciates the opportunity to comment on the draft report.

Sincerely,

George R. Schneiter
Director
Strategic and Tactical Systems

Enclosures

**GAO DRAFT REPORT - DATED February 5, 1996
(GAO CODE 707104) OSD CASE 1089**

"ELECTRONIC WARFARE: NAVY'S NEW RADAR WARNING RECEIVER NEEDS MORE TESTING"

DEPARTMENT OF DEFENSE COMMENTS

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RECOMMENDATION

RECOMMENDATION: The GAO recommended that the Secretary of Defense require that the ALR-67(V)3 undergo sufficient operational testing to demonstrate that the deficiencies identified during developmental testing have been resolved before committing to low rate initial production (LRIP). (p. 8/GAO Draft Report)

DOD RESPONSE: Nonconcur. The test program for the ALR-67(V)3 has been structured to provide the necessary information to support an LRIP decision. Furthermore, congressional language in House Report 4650, referenced by Senate Report 103-321 in the 1995 Department of Defense Appropriation Bill, requires both the Director, Operational Test and Evaluation (DOT&E) and the Navy to submit reports to the Congress prior to the ALR-67(V)3 entering LRIP. The Test and Evaluation Master Plan (TEMP) and test concept approved in December 1994 contain a well structured test program which was developed with participation/oversight from DOT&E through the Navy's Test Planning Working Group. The TEMP defines a test program calling for an early operational test (OT-IIA) made up of two phases. The first phase is a combined development and operational test using installed equipment testing conducted primarily in the chamber facility at Patuxent River, Maryland. The second phase is a flight test conducted primarily at the Electronic Combat Range at China Lake, California. The LRIP decision will be based on a total program review including the results of the OT-IIA and the subsequent submission of the required reports by DOT&E and the Navy to the Congress.

See comment 1.

See comment 3.

Specific language of House Report 4650, referenced by Senate Report 103-321 in the 1995 Department of Defense Appropriation Bill, requires that the congressional defense committees must be in receipt of three special reports at least 30 days prior to the Navy obligation of the FY 1995 funding for LRIP of the ALR-67(V)3. DOT&E is required to

See comment 4.

report the adequacy of operational testing and the potential operational effectiveness and suitability of ALR-67(V)3; the Commander of the Navy's Operational Test and Evaluation Force is required to report on the readiness of the ALR-67(V)3 for LRIP; and the Assistant Secretary of the Navy for Research, Development, and Acquisition is required to report on the objectives and results of developmental flight testing and the technical evaluation along with a certification of readiness to enter LRIP.

The following are GAO's comments on the Department of Defense's (DOD) letter dated March 7, 1996.

GAO Comments

1. According to the ALR-67(V)3 program schedule provided to us by the program office, the Navy plans to begin low-rate production of the system after the first of two phases of testing (OT-IIA). DOD considers OT-IIA to be joint developmental tests and operational flight testing. However, as discussed in DOD's letter, the first phase will be conducted primarily indoors in a chamber facility at Patuxent River, Maryland. Thus, most of OT-IIA will not be done in a realistic operational environment as required by DOD policy and should therefore not be considered to constitute realistic operational testing. The Navy's program schedule further indicates that the second phase of testing (OT-IIB), which is planned for a 4-month period at the Navy's open air range at China Lake, California, is to take place after low-rate production begins.

2. Requiring the Navy to comply with our recommendation would better ensure that the Navy does not commit to production of a deficient system, as it did with earlier versions of the ALR-67. DOD's compliance with the congressional reporting requirements, including mandatory certification from the Director of Operational Test and Evaluation that the ALR-67(V)3 is potentially operationally effective and potentially operationally suitable, may provide some assurance of future successful performance. However, DOD can only be certain that the ALR-67(V)3's problems have been solved by satisfactorily completing both phases of testing (OT-IIA and OT-IIB) and determining that it is both effective and suitable.

3. The majority of the flight testing, lasting 4 months according to the Navy's schedule, is to be conducted after the low-rate production decision.

4. We believe that the intent to comply with congressional reporting requirements will ensure that the ALR-67(V)3 is better tested prior to beginning production than its predecessor ALR-67 models. However, assurance of operational effectiveness and suitability can only be achieved through successful completion of both test phases (OT-IIA and B). Despite the various congressional reporting requirements, the Navy may still commit to the ALR-67(V)3's low-rate production before demonstrating in a realistic operational environment that the system's performance is satisfactory by completing both phases of testing. Compliance with our recommendation, in addition to the reporting requirements, could prevent premature commitment to production.