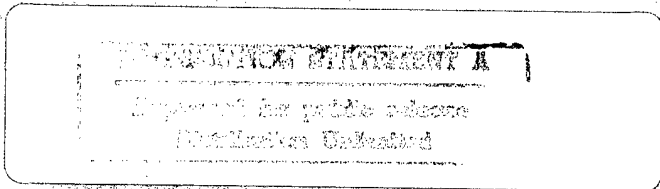
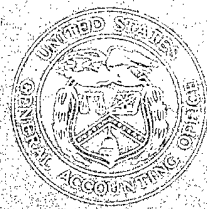


GAO

September 1996

# ELECTRONIC WARFARE

## Additional Buys of Sensor System Should Be Delayed Pending Satisfactory Testing

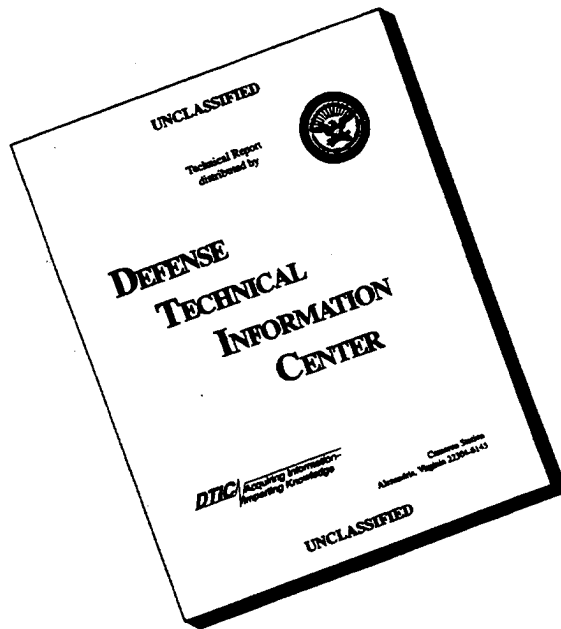


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National Security and  
International Affairs Division

B-272289

September 27, 1996

Congressional Committees

We reviewed the Army's \$1.55 billion program for acquiring the Intelligence Electronic Warfare Common Sensor (IEWCS) system. Our review focused on determining whether the Army was taking necessary measures to ensure that the system demonstrated acceptable performance before committing to its production. We conducted this review under our basic legislative responsibilities and are addressing this report to the committees of jurisdiction. The report identifies problems and calls for corrective action that the Department of Defense (DOD) has indicated an unwillingness to take. We are suggesting that Congress may wish to take the necessary action to ensure that the DOD addresses the problems we have identified.

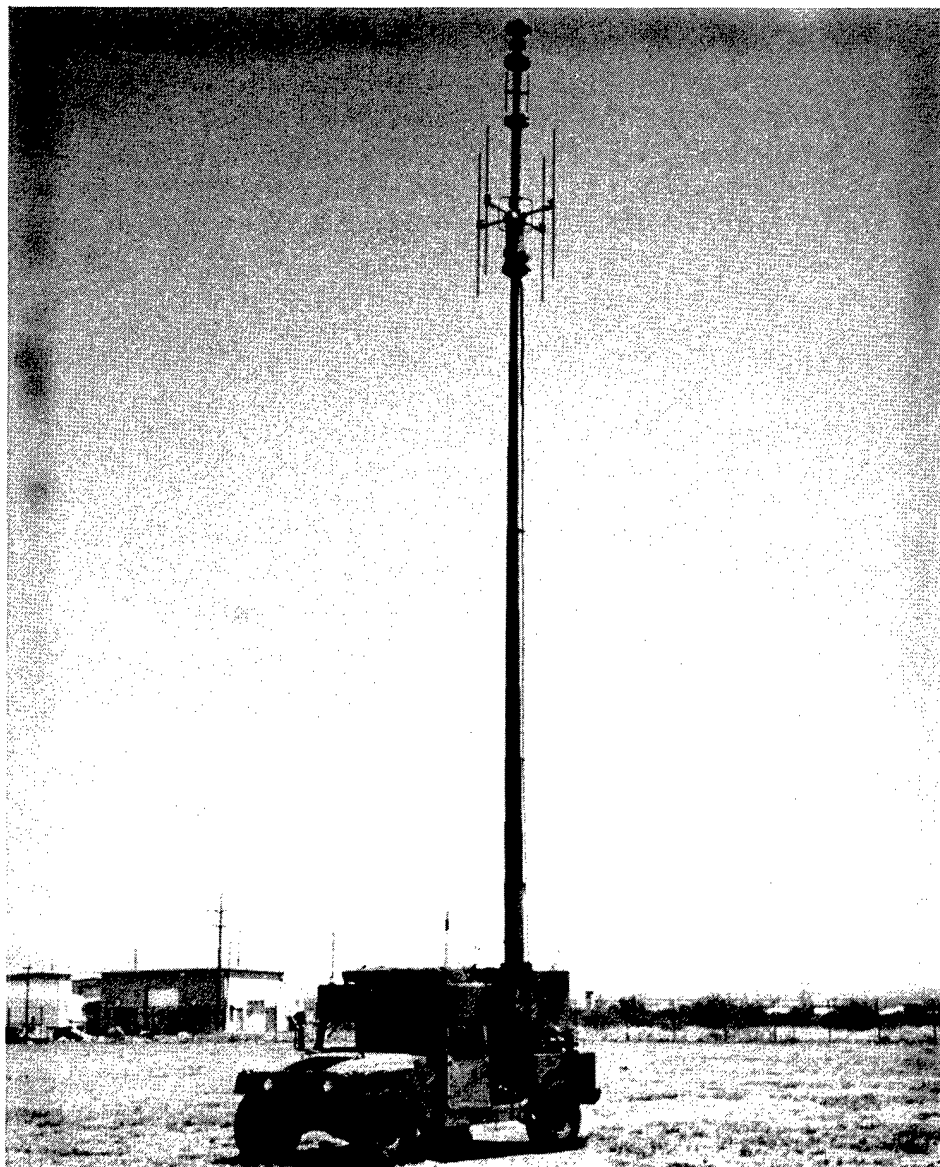
Electronic Warfare:  
Additional Buys of  
Sensor System  
Should be Delayed  
Pending Satisfactory  
Testing

## Background

The IEWCS system is intended to modernize the Army's signals intelligence equipment at the division level and includes a common suite of subsystems for use on three different platforms. The system for the Army's light divisions,<sup>1</sup> called Ground Based Common Sensor-Light (GBCS-L), is to be mounted on high mobility multipurpose wheeled vehicles. For heavy divisions, the system is called the Ground Based Common Sensor-Heavy (GBCS-H) and is to be mounted on a derivative of the Bradley Fighting Vehicle. The airborne version is mounted on the EH-60 Quickfix helicopter and is called the Advanced Quickfix (AQF). (See figs. 1 through 3.)

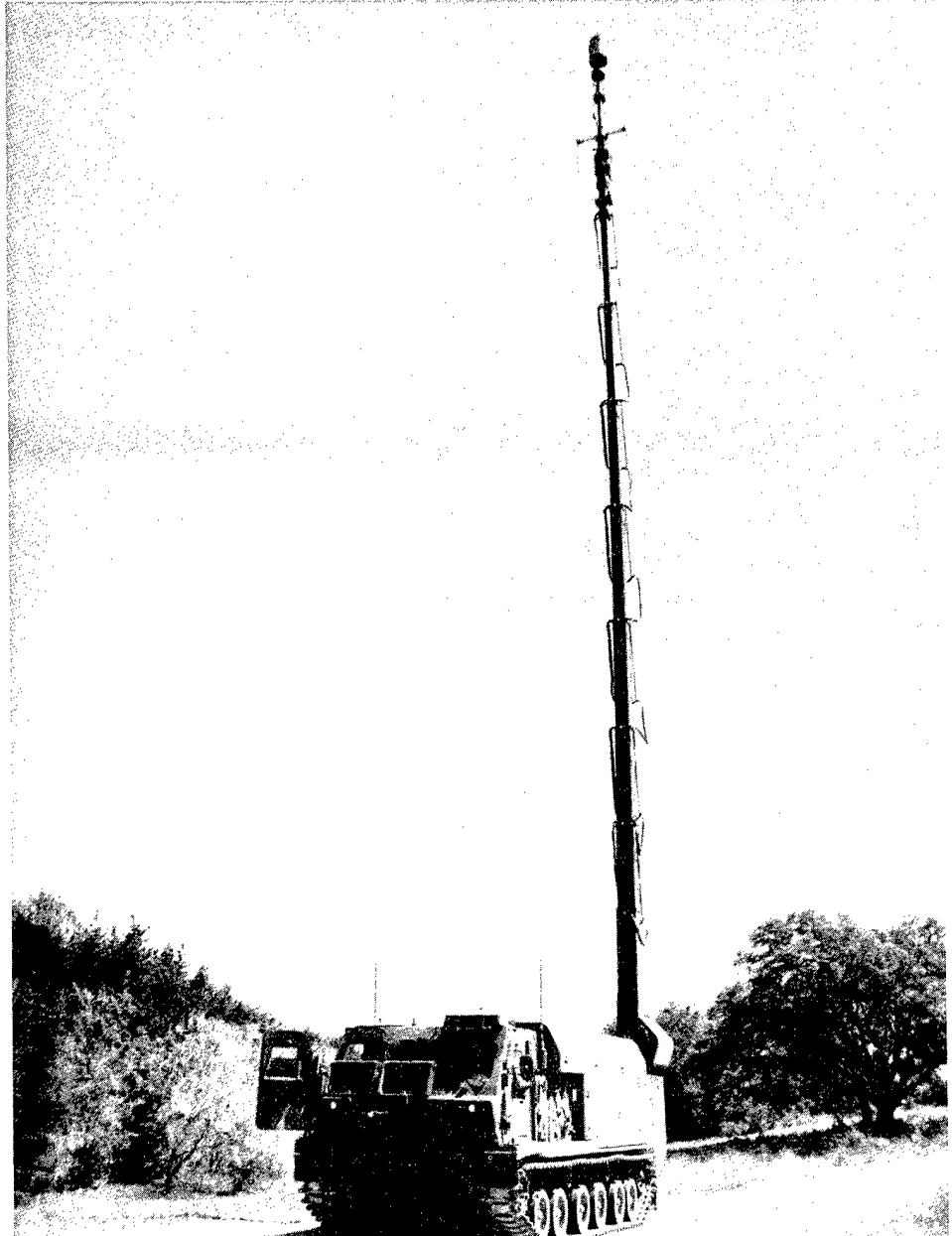
<sup>1</sup>The Army has light and heavy forces. Light forces include nonmechanized infantry, airborne, and air assault units. Heavy forces include armor, mechanized infantry, and cavalry units.

**Figure 1: Ground Based Common  
Sensor-Light**



Source: U. S. Army.

**Figure 2: Ground Based Common  
Sensor-Heavy**



Source: U. S. Army.

**Figure 3: Advanced Quickfix**

Source: U. S. Army.

IEWCS is expected to be capable of intercepting enemy communications signals, locating the source of those signals, and jamming them electronically. It is also expected to be capable of locating enemy radars. The Army started limited production of the GBCS-L in fiscal year 1995 on an urgent basis to field a system with a specific capability to counter a particular type of threat communications system. The Army had originally planned to upgrade seven EH-60 helicopters to the AQF configuration in 2 years of low-rate initial production (LRIP). It started LRIP of three AQF systems in fiscal year 1996 and had planned to procure the remaining four systems in fiscal year 1997.

In our September 1995 report, we indicated that the Army's fiscal year 1996 budget request to upgrade the EH-60 Quickfix to the AQF configuration could be reduced because operational testing of the AQF, needed to prove its effectiveness and suitability, was not scheduled until

fiscal year 1997.<sup>2</sup> Although the Army's fiscal year 1996 budget was approved, the DOD Comptroller considered our findings in evaluating the Army's fiscal year 1997 budget request and reduced the Army's planned second LRIP procurement of AQF systems from four to one. The Army justified the additional system as needed to raise the total LRIP quantity to four systems desired for the AQF's fiscal year 1997 initial operational test and evaluation (IOT&E).

## Results in Brief

The Army has prematurely committed to LRIP of the unproven IEWCS system and plans an additional LRIP that is not justified. In addition, the Army has plans to approve additional production of the system and enter full-rate production without demonstrating that it can meet minimum acceptable operational performance requirements. Unless the acquisition strategy is changed, the Army risks becoming committed to procuring an unsatisfactory system requiring redesign and retrofit to achieve acceptable system performance.

## Premature Low-Rate Production of IEWCS

The Army decided to enter low-rate production of AQF systems in November 1995 despite unfavorable user test results. The decision was linked to a test that was supposed to verify the operational characteristics of the IEWCS on all three platforms. The test results (details of which are classified) showed that the system would work occasionally under the right conditions, but failed to demonstrate that the system was sufficiently mature to justify production. For example, the system had problems locating targets. On one occasion, a GBCS-L platform erroneously displayed a location as being in northern Texas when the actual location was in southern Arizona. Further, the AQF version's performance was the poorest against frequency hopping (low-probability of intercept) signals, performing at a rate of only one-third that of the other two platforms.

Army program officials stated that the three AQF systems that were contracted for in January 1996 and the one system to be contracted for in fiscal year 1997 are necessary for the AQF's IOT&E. However, the first three systems are not scheduled to be delivered until June 1998 and the fourth is not scheduled to be delivered until even later, both long after the scheduled September 1997 AQF IOT&E.

<sup>2</sup>1996 Defense Budget: Potential Reductions, Rescissions, and Restrictions in RDT&E and Procurement (GAO/NSIAD-95-218BR, Sept. 15, 1995).

## Unnecessary Risk in Production Plans

Even though the Army plans to conduct IOT&E on the GBCS-L, AQF, and GBCS-H systems in stages over the next 3 years, the test results may not necessarily affect production decisions because the Army has taken the position that the performance criteria it has set in operational requirements documents (ORD) for the IEWCS are not absolute pass/fail measures. Instead, the Army has stated that "...[the criteria] represent estimates of performance for which a failure to achieve a given criterion would require a careful management reassessment of cost effectiveness and program options during the program milestone decision review." Consequently, the Army has given itself an option for proceeding into full-rate production of IEWCS systems that may not meet minimum acceptable performance requirements.

According to DOD Regulation 5002.R, at each milestone beginning with program initiation, thresholds and objectives expressed as measures of effectiveness or performance requirements should be documented in an ORD. The threshold value is the minimum acceptable performance requirement that, in the user's judgement, is necessary to satisfy a need. The objective value is what is desired by the user and what the user is attempting to obtain. The ORDs (which are classified) for the IEWCS platforms have objectives. However, the minimum acceptable performance requirements (thresholds) have not been specified for most of the objectives. For example, one AQF ORD objective is that the system must automatically process signal data at the sensor for threat detection and identification in near real-time. However, there is no specification for how often this must happen or how much data is to be processed to achieve minimum acceptable performance. Likewise, another ORD objective indicates that the system must locate threat emitters (communications) to within specified ranges, yet is silent regarding how often this needs to happen in order to meet the minimum acceptable performance requirement. Thus, conceivably a system that could intercept at least 1 out of 100 enemy messages could be considered to have met the requirements.

Decisions to enter and continue production without ensuring that systems meet minimum acceptable performance criteria have historically been made with adverse consequences. As we reported in 1994,<sup>3</sup> DOD has repeatedly committed electronic warfare and other systems to production without assurance that the systems would perform satisfactorily. Many of the weapon systems that started production prematurely later experienced

<sup>3</sup>Weapons Acquisition: Low-Rate Initial Production Used to Buy Weapon Systems Prematurely (GAO/NSIAD-95-18, Nov. 21, 1994).



significant operational effectiveness and/or suitability<sup>4</sup> problems. As a result, major design changes were often needed to correct the problems, costly retrofits were required for many delivered units, and substandard systems were sometimes deployed to field units.

For example, the Army began production of its AVR-2 and AVR-2A laser warning system<sup>5</sup> despite unfavorable test results and without verifying that design changes to correct performance problems were adequate. In total, the Army spent as much changing the system's design as it did on the system's original development and procured over half of its total program quantity without completing operational tests to ensure the system's satisfactory performance. On another electronic warfare system, the Army made design changes to correct a serious shortcoming detected during operational testing but failed to verify the adequacy of the changes in further operational testing. Subsequently, during Operation Desert Storm, the system proved so defective that Army pilots stopped using it.

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## Recommendation

We recommend that the Secretary of Defense:

- require the Army to cancel the planned fiscal year 1997 procurement of one AQF system and
- require both that specific, measurable, minimum acceptable performance requirements be established for the IEWCS system and that the system demonstrate the capability to meet these requirements before proceeding with additional procurements.

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## Agency Comments and Our Evaluation

In commenting on a draft of this report, DOD disagreed with our recommendation that the Army cancel its fiscal year 1997 procurement of one AQF system. DOD stated that while the one AQF system will not be available to support fiscal year 1997 AQF testing, it is needed to ensure that sufficient test articles are present to support a multi-year testing program. DOD also stated that the procurement supports the establishment of an initial production rate for the system sufficient to lead to full-rate production upon successful completion of operational testing. We found no evidence supporting a requirement for the fiscal year 1997 system to

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<sup>4</sup>Operational effectiveness refers to the ability of a system to accomplish its mission in the planned operational environment. Operational suitability is the degree to which a system can be placed satisfactorily in field use considering such factors as reliability and maintainability.

<sup>5</sup>The AVR-2 and AVR-2A laser warning system is installed in helicopters to alert pilots to the presence of laser energy and thereby provide protection against threat weapons that rely on lasers for their operation.

support future testing. The Test and Evaluation Master Plan (TEMP) for the GBCS-L states that only three platforms of each type (GBCS-L, AQF, and GBCS-H) are required for operational testing. The TEMP for the AQF does not address the number of test articles required for testing the AQF, and the Army has not prepared a TEMP for the GBCS-H. Furthermore, the Army could stretch the production of the three AQF systems ordered last year, thereby maintaining a stable production line until test results become available.

DOD partially agreed with our recommendation requiring both that specific measurable, minimum acceptable performance requirements be established for the IEWCS system and that the system demonstrate the capability to meet those requirements before the Army proceeds with additional procurements. DOD stated that it saw merit in this recommendation. It also agreed that the Army should establish key performance parameters for the IEWCS system before conducting final systems IOT&Es, but saw no need to require the successful demonstration of those parameters prior to further procurements. As we reported, decisions to enter and continue production without assuring that systems meet minimum performance criteria have historically been made with adverse consequences. Consequently, we continue to believe that there should be a requirement that the established key performance parameters be met prior to the procurement of additional systems.

DOD's comments are reprinted in their entirety in appendix I, along with our evaluation.

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## Matters for Congressional Consideration

In light of DOD's unwillingness to have the Army revise its IEWCS acquisition strategy, Congress may wish to take the actions necessary to limit AQF procurement until AQF systems successfully complete operational testing and to require IEWCS' demonstration of established key performance parameters prior to the procurement of additional systems.

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## Scope and Methodology

To address our objectives, we interviewed officials and obtained and reviewed briefing, budgetary, and planning documents from the office of the Project Manager, Signals Warfare, Vint Hill Farms Station, Va. We also visited officials, examined test sites, and obtained explanations of test procedures and results at the Intelligence Electronic Warfare Test Directorate, Fort Huachuca, Az. We also obtained, reviewed, and analyzed test reports prepared by the Intelligence Electronic Warfare Test Directorate and test plans prepared by IEWCS project office to determine

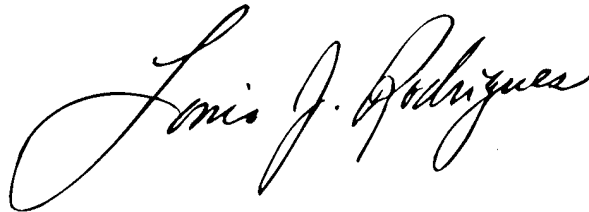
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whether the Army was taking necessary measures to ensure that the IEWCS system demonstrated acceptable performance prior to committing to production. We conducted our review between September 1995 and June 1996 in accordance with generally accepted government auditing standards.

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

Please contact me at (202) 512-4841 if you or your staff have any questions concerning this report. Major contributors to this assignment were Jackie B. Guin, Paul Latta, and Henry Arzadon.

A handwritten signature in cursive script that reads "Louis J. Rodrigues". The signature is written in black ink and is positioned above the printed name and title.

Louis J. Rodrigues  
Director, Defense Acquisitions Issues

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List of Congressional Committees

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House of Representatives

Chairman  
Ranking Minority Member  
Subcommittee on National Security  
Committee on Appropriations  
House of Representatives



# Comments From the Department of Defense

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



ACQUISITION AND TECHNOLOGY

## OFFICE OF THE UNDER SECRETARY OF DEFENSE

3000 DEFENSE PENTAGON  
WASHINGTON DC 20301-3000



12 AUG 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:

This is the Department of Defense (DoD) response to the General Accounting Office (GAO) draft report, "ELECTRONIC WARFARE: Additional IEWCS Buys Should Be Delayed Pending Satisfactory Testing," dated June 21, 1996 (GAO Code 707129), OSD Case 1176.

The draft GAO report deals with the Intelligence Electronic Warfare Common Sensor (IEWCS) program, which is made up of three separate and distinct ACAT-3 IEW systems: Advanced Quickfix (AQF), and Ground-Based Common Sensor -- Light and Heavy (GBCS-L and GBCS-H).

The DoD nonconcurs with the first recommendation and partially concurs with the second recommendation. In general, GAO's recommendations appear to be based on incorrect assumptions about the make-up of the Intelligence Electronic Warfare Common Sensor (IEWCS) program and an inadequate understanding of program plans and objectives.

The DoD believes the recommendation that the Secretary of Defense require the Army to cancel the planned fiscal year 1997 procurement of one Advanced Quickfix (AQF) system is unwarranted given overall test requirements for all the systems involved in the IEWCS development effort. The AQF system will round out the system requirements for one division, and thus provide for more robust operational testing in fiscal year 1998 and beyond. Although the AQF system being procured in 1997 will not be available for AQF testing in 1997, the system (platform and system components) is still needed in 1998 and beyond to support the multi-year testing program for the other systems contained in the IEWCS program. The Army's planned procurement of one AQF in fiscal year 1997 is consistent with both good acquisition planning and with the Department's objectives and intentions for Low-Rate Initial Production practices.



See comments 1 and 2.

See comment 1.

See comment 2.

Appendix I  
Comments From the Department of Defense

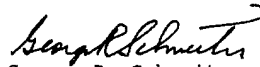
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See comment 3.

The DoD believes the recommendation that the Secretary of Defense require both that specific, measurable, minimum acceptable performance requirements be established for the IEWCS program, and that the systems demonstrate the capability to meet these requirements before proceeding with additional procurements has merit. The Department believes the Army should establish some Key Performance Parameters (KPPs) for each system before conducting final system IOT&Es. The Department is convinced the Army's strategy for testing all IEWCS-related systems and their integration, and for reviewing performance issues before making procurement decisions, is consistent with sound acquisition practices. Therefore, the Department sees no need to place any additional requirements on the Army regarding additional IEWCS procurement decisions, with the exception that the Army should establish KPPs to complement its existing system evaluation strategy.

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

Sincerely,



George R. Schneiter  
Director  
Strategic and Tactical Systems

Enclosure

GAO DRAFT REPORT - DATED June 21, 1996  
(GAO CODE 707129) OSD CASE 1176

"ELECTRONIC WARFARE: Additional IEWCS Buys Should Be Delayed  
Pending Satisfactory Testing"

DEPARTMENT OF DEFENSE COMMENTS

\* \* \* \* \*

RECOMMENDATIONS

**RECOMMENDATION 1:** The GAO recommended that the Secretary of Defense require the Army to cancel the planned fiscal year 1997 procurement of one Advanced Quickfix system. (p. 6/GAO Draft Report)

**DOD RESPONSE:** Nonconcur. The planned procurement of one Advanced Quickfix (AQF) system in fiscal year 1997 is in accordance with procedures required by DoD Instruction 5000.2R, and is consistent with good acquisition planning. Even though the system will not be available to support specific AQF testing in 1997, the procurement of one AQF system in 1997 is essential to ensure sufficient test articles are present to support the multi-year testing program, in 1998 and beyond, for all the systems associated with the IEWCS program. The Army's Operational Test and Evaluation Command has already assessed risk to system tests because of the lack of sufficient systems. Procurement of one AQF system in 1997 provides the Army one complete division set which will enable much more robust operational testing of an urgently needed signals intercept, jamming, and target location capability. AQF is an integrated electronic support and electronic attack system that uses IEWCS components, and operates both in a stand-alone mode and in a network with other IEW systems. In a network, AQF specifically interoperates with Ground-Based Common Sensor -- Light and Heavy (GBCS-L and GBCS-H) to obtain emitter locations with greater accuracy than if each system operated by itself. The Program Manager for Signals Warfare (PM SW), who manages AQF, GBCS-L, GBCS-H, and the IEWCS common component development program, must have sufficient flexibility to acquire the test articles needed for the testing of these separate, but operationally integrated, systems as circumstances dictate. The 1997 procurement of one AQF provides PM SW critically needed test articles and increases his flexibility to support rigorous test plans. The procurement also supports the establishment of an initial production base for AQF, and permits a more orderly increase in the production rate for the system sufficient to lead to full-rate production upon successful completion of operational testing.

See comment 1.

See comment 2.



Appendix I  
Comments From the Department of Defense

**RECOMMENDATION 2:** The GAO recommended that the Secretary of Defense require both that specific, measurable, minimum acceptable performance requirements be established for the Intelligence Electronic Warfare Common Sensor system and that the system demonstrate the capability to meet these requirements before proceeding with additional procurements. (p. 6/GAO Draft Report)

**DOD RESPONSE:** Partially concur. Each approved Acquisition Program Baseline and the system Test and Evaluation Master Plans already identify some specific and measurable performance requirements. These performance requirements are based on user requirements found in Required Operational Capability (ROC) documents along with known/tested capabilities of system subcomponents. While subcomponent capabilities are already known, when operating in a "stand-alone" environment, the capabilities of the new integrated systems remain to be identified. The Army uses "customer/user tests" to complement the required operational tests for verifying system capabilities, and determining overall operational effectiveness and suitability. However, the Department believes the Army should clearly spellout the "Key Performance Parameters (KPPs)" to represent the minimum acceptable performance levels of the IEWCS systems, which provides the Army a new capability when integrated together. Measuring test data against these KPPs will better serve the Milestone Decision Authority in making effective production decisions. Regarding the recommendation to require demonstration of desired capabilities, the Department believes the Army's test plans, which, again, include the use of customer tests, as well as the required operational tests, are adequate to effectively test each system and the common IEWCS subcomponents. Adequate reviews of test results are planned before full-rate production decisions are made. The Department sees no need to place additional requirements on the Army regarding its IEW systems and IEWCS common component procurement decisions, with the exception that the Army should establish KPPs before conducting final IOT&Es on the IEWCS related systems.

See comment 3.

The following are GAO's comments on the Department of Defense's (DOD) letter dated August 12, 1996.

## GAO Comments

1. While a set of four Advanced Quickfixes (AQF) for one division may give the Army flexibility in future tests, we found no evidence that supports a **requirement** for this many test platforms. According to the Test and Evaluation Master Plan (TEMP) for the Ground Based Common Sensor-Light (GBCS-L), only three platforms of each type (GBCS-L, AQF, and Ground Based Common Sensor-Heavy (GBCS-H)) are required for operational testing and the Army already has three AQFs under contract, plus two additional developmental platforms available. The TEMP for the AQF does not address the number of test articles required for testing the AQF and the Army has not prepared a TEMP for the GBCS-H. Consequently, we know of no requirement for four AQFs for testing either now or in the future.

2. With regard to DOD's position that the additional procurement of one AQF in 1997 "permits a more orderly increase in the production rate," we note that the DOD Comptroller reviewed the Army's request to produce four AQFs in 1997 and cut the request to a single system. Since a reduction in the production rate from three in fiscal year 1996 to one in fiscal year 1997 is not an "orderly increase in the production rate," DOD may find it to be useful to stretch production of the three AQFs ordered last year. In this way, a stable production line could be established and test results could be available before the Army commits to additional production.

3. As we noted in the body of our report, decisions to enter and continue production without ensuring that systems meet minimum performance criteria have historically had adverse consequences. Thus, we continue to believe that there should be a requirement that the established key performance parameters be met prior to the procurement of additional systems.