

November 2002

ELECTRONIC WARFARE

Comprehensive Strategy Still Needed for Suppressing Enemy Air Defenses





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Highlights of [GAO-03-51](#), a report to the Honorable Donald H. Rumsfeld, Secretary of Defense

Why GAO Did This Study

U.S. military aircraft are often at great risk from enemy air defenses, and the services use specialized aircraft to neutralize or destroy them. In January 2001, GAO reported that a gap existed between the services' suppression capabilities and their needs and recommended that a comprehensive strategy was needed to fix the situation. In response to GAO's report, DOD emphasized that a major study underway at the time would provide the basis for a Department-wide strategy and lead to a balanced set of acquisition programs between the services. This report updates our previous work and assesses actions that DOD has taken to improve its suppression capabilities.

What GAO Recommends

GAO continues to recommend that the Secretary of Defense develop a comprehensive, cross-service strategy to close the gap between DOD's suppression capabilities and needs. In addition, an effective coordinating entity is needed to develop and monitor implementation of the strategy.

In answer to a draft of GAO's report, DOD concurred with its recommendations. Staff changes are being made to address cross-cutting issues, and an integrated product team process established to form a comprehensive approach to the electronic warfare mission.

What GAO Found

The Department of Defense continues to face a gap between its need to suppress enemy air defenses and its capabilities to do so, despite some progress in upgrading its capabilities. There are not enough existing suppression aircraft to meet overall requirements, some aircraft are experiencing wing and engine problems, and improvements are needed to counter evolving threats. DOD's primary suppression aircraft, the EA-6B, is also reaching the end of its life cycle and a replacement is needed as early as 2009. Furthermore, some aircraft self-protection equipment, which provide additional suppression capabilities, have also been found to be unreliable.

DOD has not yet developed an integrated, comprehensive approach to the U.S. air defense suppression mission but has recently completed an Analysis of Alternatives that presented the services with 27 options for replacing the aging EA-6B. The services formed a coordinating group to assess the options, and in June 2002 presented service-specific proposals to the Office of the Secretary of Defense for analysis and consideration in the 2004 budget. However, the Analysis of Alternatives did not provide the basis for a comprehensive strategy to address the department's overall suppression needs. It only analyzed the airborne electronic attack portion of the mission and did not address needed improvements in aircraft self-protection systems or the technical and funding challenges of other service programs such as the Navy's and Air Force's air-launched decoy programs.



The EA-6B, DOD's primary suppression aircraft, is reaching the end of its life cycle. A replacement aircraft is needed as early as 2009.

Source: U.S. Navy.

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United States General Accounting Office
Washington, DC 20548

November 25, 2002

The Honorable Donald H. Rumsfeld
The Secretary of Defense

Dear Mr. Secretary:

In conducting military operations, U.S. aircraft are often at great risk from enemy air defenses, such as surface-to-air missiles. The services use specialized aircraft to neutralize, destroy, or temporarily degrade enemy air defense systems through either electronic warfare or physical attack. These aircraft use electronic warfare devices, called jammers, which transmit electronic signals that disrupt enemy radar and communications to temporarily suppress enemy air defenses. Other specialized aircraft use antiradiation missiles that home in on radars used by surface-to-air missiles or antiaircraft artillery systems to degrade or destroy them. Because specialized aircraft protect all service aircraft in hostile airspace, the suppression mission necessarily crosses individual service lines. In addition, military aircraft use on-board self-protection equipment to detect and suppress enemy air defenses, such as radar warning receivers and jammers.

In 1993 and 1996, we issued reports expressing concerns over Department of Defense (DOD) decisions to eliminate the F-4G and EF-111 suppression aircraft without first fielding comparable replacements.¹ These aircraft were retired because the cost of maintaining them was perceived to be too great, and because the Air Force planned to field stealthy aircraft² in the future. However, after stealth aircraft were revealed to be vulnerable in Kosovo, the services realized that the loss of suppression capability had actually increased U.S. aircraft vulnerability to enemy air defenses and that suppression assets were still needed. Because no replacements were yet available, the Navy's aging EA-6B became DOD's only standoff radar jammer aircraft, providing suppression support for all the services.

¹ U.S. General Accounting Office, *Suppression of Enemy Air Defenses: Air Force Plans*, [GAO/NSIAD-93-221](#) (Washington, D.C.: Sept. 30, 1993) and *Combat Air Power: Funding Priority for Suppression of Enemy Air Defenses May Be Too Low*, [GAO/NSIAD-96-128](#) (Washington, D.C.: Apr. 10, 1996).

² Aircraft are referred to as stealthy or stealth when they are constructed with features that make them harder to detect with radar and infrared systems.

In January 2001, we expressed concern about the acknowledged gap between the services' suppression capabilities and their needs, and DOD's fragmented approach to the suppression mission. The gap is a consequence of the increasing modernization of enemy air defenses that has outpaced DOD's effort to improve its suppression capabilities. We recommended that DOD designate an interservice coordinating entity to develop a comprehensive, cross-service strategy to close the gap.³ DOD agreed with our findings but disagreed with our recommendation. The Department stated that a study — the Airborne Electronic Attack Analysis of Alternatives — underway at the time, would provide a basis for its future strategy and lead to a balanced set of acquisition programs for the services. The objective of this report is to update our previous work and assess the actions DOD has taken to (1) improve its suppression capabilities and (2) develop an integrated, comprehensive approach for closing the gap between its capabilities and needs. Due to security classification, some details about the various suppression programs are not included in this report.

Results in Brief

DOD has been making some progress in upgrading its capabilities, but it continues to face a gap between its need to suppress enemy air defenses and the availability of equipment to allow it to do so. There are not enough existing suppression aircraft to meet overall requirements, some aircraft are experiencing wing and engine problems, and improvements are needed to counter evolving threats. In addition, DOD's primary suppression aircraft, the EA-6B, is reaching the end of its life cycle and a replacement aircraft is needed as early as 2009. Furthermore, some aircraft self-protection equipment, which is intended to provide additional suppression capabilities, has also been found to be unreliable. Individual service efforts to address problems by refurbishing aircraft, procuring and fielding more of the current suppression aircraft, and upgrading some electronic warfare equipment, while closing some of the gap, will not fill all current and future needs.

DOD has not yet developed an integrated, comprehensive approach to the U.S. air defense suppression mission. In December 2001, DOD completed an Airborne Electronic Attack Analysis of Alternatives that examined options for replacing the aging EA-6B. Although the analysis provided

³ U.S. General Accounting Office, *Electronic Warfare: Comprehensive Strategy Needed for Suppressing Enemy Air Defenses*, [GAO-01-28](#) (Washington, D.C.: Jan. 3, 2001).

detailed modeling of the estimated costs and capabilities of 27 options, it contained no recommendations on what system or systems should be acquired. The analysis did not provide the basis for a balanced, comprehensive strategy to address DOD's overall suppression needs. For example, it did not address improvements in aircraft self-protection systems or the technical and funding challenges of other service programs such as the Navy's and Air Force's air-launched decoy programs. The services formed a coordinating group to assess the options, and in June 2002 the Navy and the Air Force presented specific proposals to the Office of the Secretary of Defense for consideration in the fiscal year 2004 budget. These proposals emphasized only separate service-specific programs to replace EA-6B capabilities. DOD is currently analyzing the services' proposals to determine what mix of systems to approve.

We continue to recommend that you develop a comprehensive, integrated, cost-effective cross-service strategy to close the gap between DOD's suppression capabilities and needs. In addition, an effective coordinating entity is needed to develop and monitor implementation of the strategy.

In commenting on a draft of this report, DOD concurred with our findings and recommendations.

Background

The United States experienced heavy aircraft and aircrew losses to enemy air defenses during the Vietnam War. Since then, the services have recognized air defense suppression as a necessary component of air operations. Consequently, when a crisis arises, suppression aircraft are among the first to be called in and the last to leave. Radar is the primary means used by enemy forces to detect, track, and target U.S. aircraft with missiles and guns. Hence, U.S. suppression aircraft focus on trying to neutralize, degrade, or destroy the enemy's air defense radar equipment. U.S. suppression aircraft, using missiles and jammers, generally begin suppressing enemy air defenses after they begin emitting radio-frequency signals. Also, in some cases, aircraft launch antiradiation missiles that can search for and destroy enemy radars if they are turned on. At some risk to the aircraft and aircrews, suppression aircraft must be in the vicinity of the enemy air defenses to complete their mission.

Enemy radars in the past were usually fixed in position, operated independent of each other, and turned on for lengthy periods of time—all of which made them relatively easy to find and suppress through electronic warfare or physical attack. Such was the case in Operation Desert Storm, when suppression aircraft such as EA-6B and the

now-retired EF-111 and F-4G played a vital role in protecting other U.S. aircraft from radar-guided missile systems. In fact, strike aircraft were normally not permitted to conduct air operations unless protected by these suppression aircraft. The EA-6B and EF-111 were equipped with transmitters to disrupt or “jam” radar equipment used by enemy surface-to-air missiles or antiaircraft artillery systems. The F-4G, F/A-18, and EA-6B used antiradiation missiles that homed in on enemy radar systems to destroy them. The Air Force replaced the F-4G with a less capable aircraft, the F-16CG, but did not upgrade or replace the EF-111.⁴

According to DOD, countries have sought to make their air defenses more resistant to suppression. These efforts include increasing the mobility of their surface-to-air missiles and radar equipment, connecting radars together into integrated air defense systems, and adding sophisticated capabilities so that the radar can detect aircraft while turned on for a shorter period of time. These defenses use various means to track and target aircraft, including modern telecommunications equipment and computers to create networks of early warning radar, missile system radar, and passive detection systems that pick up aircraft communications or heat from aircraft engines. Integrated networks provide air defense operators with the ability to track and target aircraft even if individual radar elements of the network are jammed or destroyed.

Since the end of Desert Storm in 1991, U.S. suppression aircraft have been continuously deployed to protect fighter aircraft maintaining the no-fly zones over Iraq. More recently, these aircraft have been deployed to Yugoslavia and Afghanistan. In 1999, during Operation Allied Force in Yugoslavia and Kosovo, these aircraft were extremely important for protecting strike aircraft from enemy radar-guided missiles. However, according to the Defense Intelligence Agency, these aircraft were unable to destroy their integrated air defense system because Yugoslav forces often engaged in elaborate efforts to protect their air defense assets. These efforts reduced Yugoslav opportunities to engage U.S. and coalition aircraft because their air defense assets could not be used and protected simultaneously. Nevertheless, in two separate incidents, Yugoslav forces

⁴ The Air Force planned to replace the F-4G with an F-15 modified for the suppression mission with at least the same capability as the F-4G. The Air Force fielded the F-16CG as an interim capability while it planned the development of the F-15 suppression aircraft. Subsequently, the Air Force terminated the F-15 effort and the F-16CG and the newer F-16CJ became permanent replacements for the F-4G. The F-15 effort was terminated because of its expected high costs.

managed to shoot down an F-117 stealth fighter and an F-16CG. In addition to the two losses, the inability of the United States to counter Yugoslav air defenses that included radar and infrared guided missiles made it necessary for U.S. forces to (1) fly thousands of dedicated suppression missions, pushing suppression forces in Europe to their limits, and (2) raise their strike missions to higher altitudes or keep low-flying aircraft such as the Army's Apache attack helicopters out of combat to reduce risk from infrared missile threats.

DOD now primarily uses Navy and Marine Corps EA-6Bs for radar jamming and Air Force EC-130s for communications jamming. Recently, EA-6Bs and EC-130s saw combat in Operation Enduring Freedom in Afghanistan. Air defenses there were relatively weak compared to those faced by U.S. aircraft in Yugoslavia, placing fewer demands on suppression aircraft to jam air defense systems. This gave the EA-6B an opportunity to exploit new techniques to jam ground communications by working with the EC-130 and other electronic intelligence gathering aircraft.

Despite Some Increases in Capabilities, a Gap Remains

Since our January 2001 report,⁵ the services have had some success in improving their suppression capabilities, but they have not reached a level needed to counter future threats. When the Air Force retired the EF-111 without a replacement, the Navy's EA-6B became DOD's primary airborne radar jammer, providing suppression support for all the services. High demand for the aircraft has exacerbated current wing and engine problems, and the Navy has been unable to meet its overall requirements. Efforts are underway to address the EA-6B's problems and improve its suppression equipment, but the Navy projects that the declining EA-6B inventory will be insufficient to meet DOD's needs beyond 2009. The Air Force's F-16CJ fleet has grown and the aircraft's capabilities are being improved, but it still lacks some of the capabilities of the F-4G, the aircraft it replaced. Also, the Air Force and the Navy have improvements underway for other systems such as the EC-130 and antiradiation missiles but face funding challenges. Finally, to the extent there are gaps in suppression capabilities, U.S. fighter aircraft and helicopters must rely on self-protection equipment to suppress enemy air defenses, but some of this equipment has been proven to be unreliable. The services have some programs underway to improve this self-protection equipment, such as

⁵ See [GAO-01-28](#).

developing new towed decoys, but, as discussed below, these programs have been hampered by technical and funding issues.

Aging EA-6B Aircraft Are Unable to Meet Force Structure Objectives

The Navy does not have enough EA-6Bs to meet DOD's suppression needs due to wing fatigue and engine problems that have grounded aircraft; downtime required for routinely scheduled depot level maintenance; and, in the future, downtime to install major capability upgrades in the aircraft. Because of its limited numbers and high rate of use by the warfighting commanders, DOD designated the EA-6B as a "low density, high demand" asset to support worldwide joint military operations. EA-6Bs are included in all aircraft carrier deployments and support the Air Force's Aerospace Expeditionary Forces. To meet a requirement to field 104 aircraft out of a total inventory of 124 (with an average age of 19 years), the Navy refurbished 20 retired EA-6Bs. Subsequently, in 2001, 2 EA-6Bs crashed, reducing the total inventory to 122 aircraft. Also in that year, the Navy planned to raise the requirement to 108 aircraft and establish an additional EA-6B squadron, but that has been delayed until March 2004. In February 2002, the Navy had only 91 EA-6Bs available for operations instead of the 104 required. As a result, while the Navy has been able to meet operational commitments, it has been unable to meet some of its training and exercise requirements.

Figure 1: EA-6B with Jammer Pod and HARM Preparing for Launch from an Aircraft Carrier



Source: U.S. Navy.

The Navy is currently taking action to remedy EA-6B wing fatigue and engine failures, and flight restrictions have been put in place. However, because wing fatigue has continued to grow, the Navy may have to ground additional aircraft. The Navy plans to replace a total of 67 wing center sections to remedy the problem, and it will spend \$4.4 million each for such replacements for 17 aircraft in the fiscal year 2002 budget. In addition, DOD's 2002 supplemental funds covered 8 additional wing replacements, and the Navy is programming funds for 10 more wing replacements for each year in the Future Years Defense Plan.

In 2001, the Navy also began experiencing problems with the EA-6B's engines. Premature failure of certain engine bearings caused some engines to fail, and it may have caused the crash of two aircraft in 2001. The Navy grounded over 50 engines until they could be overhauled, but it expects to have them back in service by late this year.

The constant deployment of this "low density" EA-6B fleet for contingency operations has contributed to its deterioration and to other maintenance-related problems. For example, to maintain the readiness of squadrons

deployed to Kosovo and other ongoing commitments, the Navy took spare parts and personnel from nondeployed squadrons and subjected the EA-6B to above average cannibalization of parts.⁶ This impacted the ability of nondeployed units to train and maintain aircrew proficiency. The constant deployments also added to personnel problems in terms of quality of life. EA-6B crews, for example, are often away from home for extended periods of time creating hardships for their families.

Given the EA-6B's age and high rate of use, the Navy says that even if the EA-6B fleet's problems are remedied, it will be unable to meet force structure requirements in 2009, and all EA-6B aircraft will be out of the force by 2015. Therefore, the Navy says it needs a replacement aircraft to begin entering the force by 2009 if requirements are to be met.

Navy Is Improving EA-6B Jamming Capabilities

The Navy has been upgrading its EA-6B electronic warfare equipment over the years, and it is currently modifying its radar signal receiver and related equipment. The modification program, known as the Improved Capability Program (ICAP) III, provides improved radar locating and jamming capabilities to counter modern enemy air defense threats. As of January 2002, according to DOD, ICAP III engineering and manufacturing development was about 94 percent complete, and the modification began testing on the first aircraft in November 2001. The Navy expects ICAP III to reach initial operational capability in 2005 and to be installed on all EA-6Bs by 2010, about the time when the aircraft begins to reach the end of its service life. The Navy is considering using a modified version of the ICAP III equipment on whatever follow-on suppression aircraft are developed and fielded, and is also upgrading the EA-6B jammer pods to increase the number of frequencies that can be jammed.

Air Force Continues F-16CJ and EC-130 Upgrades but Has Not Fully Funded the Programs

The Air Force is procuring 30 additional F-16CJ suppression aircraft to meet force structure requirements for the Air Force's Aerospace Expeditionary Forces. In all, 219 F-16CJ aircraft will be available. To fully implement its concept of operations for the Expeditionary Forces, the Air Force also plans to increase the capability of the latest model F-16C/Ds (block 40) and the F-16CJs (block 50) to be used for both attack and

⁶ See U.S. General Accounting Office, *Military Aircraft: Services Need Strategies to Reduce Cannibalizations*, [GAO-02-86](#) (Washington, D.C.: Nov. 21, 2001). DOD defines cannibalization as removing serviceable parts for one piece of equipment and installing them in another.

suppression missions. To accomplish this, the F-16C/Ds will be modified to carry the HARM Targeting System, and the F-16CJs will be modified to carry the Advanced Target Pod. The HARM Targeting System will provide situational awareness to the F-16C/Ds and targeting information to the HARM missile to permit them to perform the suppression mission. The Advanced Target Pod will enable the F-16CJs to deliver precision-guided munitions.

Figure 2: F-16CJ Aircraft with the HARM Targeting Pod and HARM



Source: U.S. Air Force.

The Air Force recently upgraded the HARM Targeting System and is procuring additional systems. The upgrade (known as R-6) provides better and faster targeting information to the missile, but even with this pod the F-16CJ still lacks some of the capabilities of the retired F-4G. The Air Force completed the R-6 upgrade on fielded systems in December 2001 and systems subsequently produced will have it. Once 31 additional systems are delivered in 2002, the F-16CJs will have a total inventory of 202 systems, short of the Air Force's original goal of having 1.1 systems per aircraft, or about 240 systems. Also, the Air Force has partially funded additional upgrades (called R-7) for the HARM Targeting System in 2003, and plans to fully fund the upgrade in the 2004 budget cycle, according to Air Force operational requirements officials. These officials also stated

that they are considering funding for additional R-7 HARM Targeting Systems for F-16CJs and F-16C/Ds in the 2004 budget submission.

The Air Force is also upgrading the capabilities of the EC-130 Compass Call Aircraft, which perform primarily communications jamming missions. The upgrades are intended to improve the aircraft's jamming capabilities, reliability, and maintainability. The EC-130 is another "low density, high demand" asset with a total of only 13 operational aircraft, of which 11 are being funded for upgrade.

Aircraft Self-Protection Systems Are Also Experiencing Problems

Gaps in the services' air defense suppression aircraft make it essential that other aircraft have the ability to protect themselves from enemy defenses. The services have already identified serious reliability problems with current self-protection systems on U.S. combat aircraft, including jammers, radar warning receivers, and countermeasures dispensers. Most of the current systems use older technology and have logistics support problems due to obsolescence. Also, as we reported last year,⁷ the self-protection systems on strike aircraft may have more problems than the services estimate. In reviewing test results using the new Joint Service Electronic Combat System Tester, we found that aircraft the services believed to be mission capable were not because of faults in their electronic combat systems that were undetected by older test equipment. The faults ranged from the identification of parts needing to be replaced inside the electronic combat systems, to the wiring, antennas, and control units that connect the systems to the aircraft. For example, 41 of 44 F-15C aircraft and 10 of 10 F-18C aircraft previously believed to be fully mission capable were subsequently found to have one or more faults in their self-protection systems, and 1 F-18C had 12 such faults. Coupled with the problems in the suppression aircraft, these shortcomings could create survivability problems for the aircraft should they encounter significant enemy air defense capabilities in some future conflict.

The services have some programs underway to improve self-protection capabilities such as the joint Navy and Air Force Integrated Defensive Electronic Countermeasures (IDECM) system and the Precision Location and Identification (PLAID) system. The IDECM system will provide the

⁷ See U.S. General Accounting Office, *Electronic Combat: Services Should Consider Greater Use of New Test Equipment for Their Aircraft*, [GAO-01-843](#) (Washington, D.C.: Aug. 30, 2001).

F-15, F/A-18E/F, and B-1B aircraft with improved self-protection through jammers and towed decoys. The system has experienced some delays in engineering and development, and the estimated procurement cost has doubled. The PLAID system will provide aircrews with accurate location and identification of enemy air defense systems. The services expect to field both systems in 2004.

Other Development Efforts Are Underway with Some Facing Funding Constraints and Technology Challenges

The services have initiated additional research and development efforts to improve their ability to suppress enemy air defenses, but they face technology challenges and/or a lack of funding priority for many of these programs. The Miniature Air Launched Decoy (MALD), which an Air Force analysis has shown could make a significant contribution to aircraft survivability, illustrates this problem. MALD is supposed to mimic an aircraft and draw enemy air defenses away from the real aircraft. A recently completed Advanced Concept Technology Demonstration, it had been funded by the Air Force for an initial small procurement of 300 decoys, with potential for further procurement. According to the Air Force, after experiencing technical problems, MALD did not meet user needs, and its procurement cost estimates increased. Thus, the Air Force canceled the procurement and restructured MALD to address deficiencies highlighted in the demonstration.

The Navy has been developing its own decoy, the Improved Tactical Air Launched Decoy (ITALD), but it has procured only part of its inventory objective. Despite recurring congressional increases for the past several fiscal years, the Navy has not submitted budget requests for ITALDs or procured units to complete its inventory objective because of competing priorities.

Also, the Navy is upgrading the HARM missile used to attack shipborne and ground-based radars. The first phase of the upgrade improves missile accuracy by incorporating global positioning and inertial navigation systems into the missile. A second upgrade, the Advanced Anti-Radiation Guided Missile, will add millimeter wave capability to allow the missile to target radars that have stopped emitting. While the Air Force employs the HARM missile as well, it is not involved in the HARM upgrade program.

DOD Has Made Little Progress in Establishing a Coordinating Entity and Comprehensive Strategy for the Suppression Mission

DOD has acknowledged the gap in U.S. air defense suppression capabilities for some time and has conducted several studies to identify solutions, but it has had little success in closing the gap. Our past work and the work of others have cited the need for DOD to establish some coordinating entity to develop a comprehensive strategy that addresses this capability gap. In response to our previous report, DOD stated that its Airborne Electronic Attack Analysis of Alternatives would provide the basis for such a strategy. However, the analysis was limited to assessing options for replacing the EA-6B rather than assessing the needs of the overall suppression mission. Upon completion of the analysis, the Navy and the Air Force proposed options for replacing EA-6B capabilities, and DOD is currently evaluating these proposals for consideration in the 2004 budget submission.

The Analysis of Alternatives Did Not Provide the Basis for a Comprehensive Strategy for the Suppression Mission

In fiscal year 2000, Congress expressed concerns that DOD did not have a serious plan for a successor to the EA-6B aircraft and directed DOD to conduct the Airborne Electronic Attack Analysis of Alternatives for replacing the EA-6B.⁸ DOD indicated in its response to our January 2001 report that the analysis would lead to a DOD-wide strategy and balanced set of acquisition programs to address the overall gaps between suppression needs and capabilities. However, it was only intended to address the airborne electronic attack aspect of the suppression mission and therefore did not address the acknowledged problems with aircraft self-protection systems or the technical and funding challenges of other service programs such as the Navy's ITALD program, the Air Force's MALD program, and the Air Force's EC-130 modifications.

The Navy took the lead on the joint analysis with participation by all the services. The analysis, completed in December 2001, concluded that the services needed a standoff system or a combination of systems to operate at a distance from enemy targets and a stand-in system that would provide close-in suppression protection for attacking aircraft where the threat is too great for the standoff systems. The analysis established the capabilities of the EA-6B upgraded with ICAP III as the foundation for any future system. It presented the Navy and the Air Force with detailed models of estimated costs and capabilities of 27 mixes of new and/or upgraded aircraft to consider for follow-on electronic attack capabilities but did not

⁸ H.R. Conf. Rep. No. 106-301 at 625 (1999).

recommend any particular option. These options ranged in estimated 20-year life cycle costs from \$20 billion to \$80 billion.

In conjunction with the analysis, the services formed a Joint Requirements Coordination and Oversight Group to coordinate operational requirements for airborne electronic attack, review ongoing and planned production programs for the mission, and exchange information among the services to avoid unnecessary duplication. A key activity of the group is to coordinate Navy and Air Force proposals for replacing the EA-6B. According to group members, this mechanism will help address airborne electronic attack needs through the coordination of complementary systems agreed to by the services. In June 2002, the services presented their proposals for follow-on capabilities to the Office of the Secretary of Defense. According to the services, the Navy proposed to replace the EA-6B with an electronic attack version of its new F/A-18E/F fighter and attack aircraft. The Air Force proposed adapting the B-52H bomber for standoff suppression by adding jamming pods to it, plus a stand-in suppression capability provided by a MALD-type decoy with jamming capabilities or an unmanned aerial vehicle equipped with jammers. The services see these proposals as a coordinated, effective solution to the near- and far-term needs for airborne electronic attack. DOD is currently conducting an additional analysis of the proposals, and the Secretary will decide later this year what proposals to include in the fiscal year 2004 budget submission.

The development of systems to replace the EA-6B will help close the gap between DOD's suppression capabilities and needs. However, the service proposals that are currently being considered by DOD do not provide an integrated, comprehensive solution to the overall suppression needs. In addition, while the Joint Requirements Coordination and Oversight Group provides a mechanism to coordinate the services' efforts, it has not been directed to develop a comprehensive strategy and monitor its implementation.

Other assessments have also pointed to the lack of a coordinated approach to addressing the gap in air suppression capabilities. At DOD's request, the Institute for Defense Analyses studied problems in acquiring electronic warfare systems. The Institute found several causes for the problems, including uncertainties in characterizing rapidly changing threats and systems requirements, lack of adequate and stable funding, complexity of electronic warfare hardware and software, challenges in integrating the hardware and software on platforms, and difficulties in getting and keeping experienced electronic warfare personnel. Among other things, the Institute recommended that DOD establish central offices

for electronic warfare matters in the Joint Chiefs of Staff and in each service, create a senior oversight panel, and prepare an annual electronic warfare roadmap to help correct some of the problems DOD faces in electronic warfare acquisition programs.

While DOD has not established a coordinating entity to provide leadership for the suppression mission, it has recognized the need for such entities in other cross-service initiatives areas such as the development and fielding of unmanned aerial vehicles. In October 2001, the Under Secretary of Defense for Acquisition, Technology and Logistics established a joint unmanned aerial vehicles planning task force that will develop and coordinate road maps, recommend priorities for development and procurement efforts, and prepare implementing guidance to the services on common programs and functions.

Conclusions

The air defense suppression mission continues to be essential for maintaining air superiority. Over the past several years, however, the quantity and quality of the services' suppression equipment have declined while enemy air defense tactics and equipment have improved. DOD has recognized a gap exists in suppression capabilities but has made little progress in closing it. In our view, progress in improving capabilities has been hampered by the lack of a comprehensive strategy, cross-service coordination, and funding commitments that address the overall suppression needs. DOD relies on individual service programs to fill the void, but these programs have not historically received a high priority, resulting in the now existing capability gap. We continue to believe that a formal coordinating entity needs to be established to bring the services together to develop an integrated, cost-effective strategy for addressing overall joint air defense suppression needs. A strategy is needed to identify mission objectives and guide efforts to develop effective and integrated solutions for improving suppression capabilities.

Recommendations for Executive Action

To close the gap between enemy air defense suppression needs and capabilities, we recommend that the Secretary of Defense establish a coordinating entity and joint comprehensive strategy to address the gaps that need to be filled in the enemy air defense suppression mission. The strategy should provide the means to identify and prioritize promising technologies, determine the funding, time frames, and responsibilities needed to develop and acquire systems, and establish evaluation mechanisms to track progress in achieving objectives.

Agency Comments and Our Evaluation

In written comments to a draft of this report, DOD concurred with our recommendations and supported the need for a mechanism to coordinate electronic warfare strategy and systems acquisition. DOD stated that the Office of the Secretary of Defense (Acquisition, Technology and Logistics) is currently restructuring its staff to address cross-cutting issues, including the creation of an Assistant Director of Systems Integration for Electronic Warfare and an Integrated Product Team process to formulate a comprehensive approach to the electronic warfare mission area, including defense suppression. We believe this is a good step forward.

DOD also stated that we were overly critical in our characterization of individual defense suppression systems and failed to acknowledge its full range of capabilities to suppress air defenses. We recognize that the services have substantial capabilities but remain concerned because there are insufficient aircraft to meet overall requirements and improvements have not kept pace with evolving threats. Several service-specific attempts have been made to remedy the acknowledged gap in capabilities, but they have faltered in competition for funding. In some cases, Congress intervened with guidance and increases to services' budget requests for defense suppression to ensure that DOD addresses the capabilities gap. We believe that creation of a comprehensive strategy and effective coordinating entity would strengthen DOD's ability to compete for funding and address the gap.

DOD's comments are reprinted in appendix II. In addition, DOD provided technical comments that we incorporated into the report where appropriate.

Scope and Methodology

To assess the condition of DOD's suppression capabilities and DOD's progress in developing a strategy for closing the gap in suppression capabilities, we interviewed Office of the Secretary of Defense, Joint Chiefs of Staff, Defense Advanced Research Program Agency, Air Force, Army, Navy, and Marine Corps officials responsible for electronic warfare requirements and programs. We also interviewed service program managers for the EA-6B, EC-130, F-16CJ, HARM, aircraft self-protection systems, and programs under development. We also met with officials from selected EA-6B squadrons and an EA-6B maintenance depot. We interviewed Defense Intelligence Agency officials and reviewed related intelligence documents to ascertain the capabilities of current and future enemy air defense systems. We also discussed air defense suppression programs and issues with various DOD contractors, including RAND Corporation, Northrup-Grumman Corporation, General Atomics Aeronautical Systems, Incorporated, and Raytheon Systems Company. We

reviewed pertinent DOD, service, and contractor documents addressing the status of suppression capabilities, plans for maintaining them, and potential solutions for closing the gap in capabilities. Specific locations we visited are listed in appendix I.

We performed our review from October 2001 through August 2002 in accordance with generally accepted government auditing standards.

As you know, the head of a federal agency is required under 31 U.S.C. 720 to submit a written statement of actions taken on our recommendations to the Senate Committee on Governmental Affairs and the House Committee on Government Reform 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.

We are sending copies of this report to the Secretaries of the Army, Air Force, and Navy; the Commandant of the Marine Corps; and interested congressional committees. We will also make copies available to others on request. In addition, the report will be available at no charge on the GAO Web site at <http://www.gao.gov>.

If you or your staff have any questions, please contact me on (202)512-4841. Major contributors to this report were Michael Aiken, Gaines Hensley, John Oppenheim, Terry Parker, Robert Pelletier, and Robert Swierczek.

Sincerely yours,



R.E. Levin
Director, Acquisition
and Sourcing Management

Appendix I: Locations Visited during This Review

Office of the Secretary of Defense, Washington, D.C.

Joint Chiefs of Staff, Washington, D.C.

Headquarters Elements, Air Force, Army, Marine Corps, and Navy, Washington, D.C.

Defense Intelligence Agency, Washington, D.C.

Defense Advanced Research Projects Agency, Arlington, Virginia

U.S. Joint Forces Command, Norfolk, Virginia

RAND Corporation, Santa Monica, California

Air Combat Command, Langley Air Force Base, Virginia

Naval Air Systems Command, Patuxent River, Maryland

U.S. Air Force Aeronautical Systems Center, Wright Patterson Air Force Base, Ohio

U.S Air Force Air Warfare Center, Nellis Air Force Base, Nevada

11th and 15th Reconnaissance Squadrons, Indian Springs Air Force Base, Nevada

Headquarters, Pacific Fleet, North Island Naval Air Station, San Diego, California

Naval Aviation Depot, Naval Air Station Whidbey Island, Washington

Electronic Attack Wing, U.S. Pacific Fleet, Naval Air Station Whidbey, Island, Washington

Northrop Grumman Corporation, San Diego, California

General Atomics Aeronautical Systems, Incorporated, San Diego, California

Raytheon Systems Company, Goleta, California

Appendix II: Comments from the Department of Defense



ACQUISITION,
TECHNOLOGY
AND LOGISTICS

OFFICE OF THE UNDER SECRETARY OF DEFENSE

3000 DEFENSE PENTAGON
WASHINGTON, DC 20301-3000

15 NOV 2002

Mr. Robert Levin
Director, Acquisition and Sourcing Management
U.S. General Accounting Office
441 G Street, N.W.
Washington, D.C. 20548-0001

Dear Mr. Levin:

This is the Department of Defense (DoD) response to the GAO draft report, "ELECTRONIC WARFARE: Comprehensive Strategy Still Needed for Suppressing Enemy Air Defenses," dated October 7, 2002 (GAO Code 120169/GAO-03-51).

In reviewing this report, we have taken into account the complexity and variety of platforms and systems that the Department has developed over the years to address a dynamic and highly diverse threat base whose technologies and tactics are constantly evolving. Whereas this report focuses on system specific comparisons such as the individual capability of the F-16 CJ relative to the retired F-4G, or the limited numbers of remaining EA-6B aircraft, the Department has long recognized that the most successful strategy for suppressing and defeating adversary air defense systems is a full range of countermeasures aimed at forcing any adversary to overcome not just one but many simultaneous electronic and kinetic countermeasure attacks.

This variety of existing capabilities has been so successful that, as noted in the report, adversaries have been forced to adapt new tactics, frequent defensive maneuvers, and reduced periods of active radar operations. In view of this success, the department believes the report is overly critical in its characterization of individual system capabilities and fails to appropriately credit the substantial existing capability of the US to suppress air defenses.

In spite of this differing perspective, the Department supports the need for an enduring mechanism to coordinate strategy and systems acquisition. To ensure this level of coordination across vital segments of acquisition, we have recently implemented several organizational changes to address cross-cutting issues. Included among these is an Assistant Director of Systems Integration for Electronic Warfare who will oversee an Integrated Product Team process that will formulate comprehensive systems-of-systems architectures across all electronic warfare missions, including air defense suppression.

Sincerely,

for Glenn F. Lamartin
Director, Strategic and Tactical Systems

Attachment



GAO DRAFT REPORT – DATED OCTOBER 7, 2002
GAO CODE 120169/GAO-03-51

“ELECTRONIC WARFARE: Comprehensive Strategy Still Needed
for Suppressing Enemy Air Defenses”

DEPARTMENT OF DEFENSE COMMENTS
TO THE RECOMMENDATION

RECOMMENDATION: The GAO recommended that the Secretary of Defense establish a coordinating entity and joint comprehensive strategy to address the gaps that need to be filled in the enemy air defense suppression mission. The strategy should provide the means to identify and prioritize promising technologies, determine the funding, timeframes and responsibilities needed to develop and acquire systems, and establish evaluation mechanisms to track progress in achieving objectives. (p. 13/GAO Draft Report)

DOD RESPONSE: CONCUR.

The Department has long recognized that the most successful strategy for suppressing and defeating adversary air defense systems is a full range of countermeasures aimed at forcing any adversary to overcome not just one but many simultaneous electronic countermeasures and kinetic attacks. In spite of any differences in opinion with the report regarding individual program comparisons, the existing variety of US defense suppression capabilities has been so successful that, as noted in the report, adversaries have been forced to adapt new tactics that require frequent defensive movements and minimal periods of active radar operations to survive.

To ensure a continuing mechanism for coordinating systems acquisition with evolving strategies, the Under Secretary of Defense (Acquisition, Technology and Logistics) is restructuring elements of his staff which include an Assistant Director of Systems Integration for Electronic Warfare to oversee an Integrated Product Team process to formulate comprehensive systems-of-systems architectures across all electronic warfare mission areas, including the area of defense suppression. The Assistant Director will work closely with the Counter Air Defenses Joint Requirements Coordination Oversight Group, which the Services have already formed, to ensure effective harmonization of defense suppression strategies and requirements.

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Jeff Nelligan, managing director, NelliganJ@gao.gov (202) 512-4800
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