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United States Government Accountability Office
Washington, DC 20548

September 14, 2011

The Honorable Carl Levin
Chairman
Committee on Armed Services
United States Senate

Subject: Joint Strike Fighter: Implications of Program Restructuring and Other Recent Developments on Key Aspects of DOD's Prior Alternate Engine Analyses

Dear Mr. Chairman:

After supporting a Joint Strike Fighter (JSF) acquisition strategy that called for a competitive engine development of the F135 and F136 engines, the Department of Defense (DOD) stopped requesting funding for the F136 alternate engine in its fiscal year 2007 budget request, but the Congress continued to fund it through the 2010 budget.¹ In February 2010, DOD projected that it would cost an additional \$2.9 billion through 2016 to support an alternate engine program. DOD decided that an engine competition would not likely generate enough long-term savings to justify this up-front investment and subsequently terminated the alternate engine program. In 2010, at your request, we reviewed the basis for DOD's \$2.9 billion funding projection and reported that the projection did not include the same level of fidelity and precision normally associated with a detailed, comprehensive cost estimate and that the amount of up-front investment needed could be lower if two key assumptions in DOD's analysis were changed.² Moreover, since DOD's projection and our last review, several fundamental changes in the JSF aircraft and engine programs have taken place. At your request, we examined the potential implications of these changes to the \$2.9 billion funding projection. We also examined the potential implications for DOD's broader cost-benefit analysis that captures the long-term costs and benefits of the competitive engine program.

In performing our review, we obtained data and met with officials in the Office of the Secretary of Defense, Cost Assessment and Program Evaluation, regarding their \$2.9 billion

¹ The JSF program began in 1996 with an acquisition strategy that called for a competitive engine acquisition program. The program planned to first develop and procure the F135 primary engine and, with a few years lag time, develop the F136 alternate engine to compete for future procurements and for life-cycle support activities.

² GAO, *Joint Strike Fighter: Assessment of DOD's Funding Projection for the F136 Alternate Engine*, [GAO-10-1020R](#) (Washington, D.C.: Sept. 15, 2010).

Report Documentation Page

*Form Approved
OMB No. 0704-0188*

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1. REPORT DATE 14 SEP 2011		2. REPORT TYPE		3. DATES COVERED 00-00-2011 to 00-00-2011	
4. TITLE AND SUBTITLE Joint Strike Fighter: Implications of Program Restructuring and Other Recent Developments on Key Aspects of DOD's Prior Alternate Engine Analyses				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Government Accountability Office, 441 G Street NW, Washington, DC, 20548				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

funding projection and also discussed any analyses or efforts to estimate changes to their funding projection resulting from recent events. We also met with representatives from the Office of the Under Secretary of Defense for Acquisition, Technology and Logistics and the JSF joint program office. We reviewed DOD's 2007 cost-benefit analysis of the JSF alternate engine program and its 2009 limited update. Also, in performing our review, we used data and information collected over the past several years from our body of work reviewing the overall JSF and alternate engine programs (see the list of related GAO products at the end of this report).

We conducted this performance audit from June 2011 to September 2011 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives. We are not making recommendations in this report.

Summary

In early 2010, DOD determined that it would need an additional \$2.9 billion to support an alternate engine program up to the point where it believed it could begin competition in 2017. Since then, there have been major changes to the JSF aircraft and engine program costs, schedules, and procurement plans. Specifically, (1) defense officials substantially restructured the JSF program, adding cost and time to development and changing the procurement profile to buy fewer aircraft and engines over the next 5 years; (2) more engine production cost data are available; and (3) the F136 alternate engine contractor offered to fund development costs for 2011 and 2012 with its own corporate funds. These and other changes could affect portions of the department's \$2.9 billion projection and would have to be addressed and quantified in order to make a more up-to-date and complete funding projection. While there have been significant changes made to the JSF aircraft and engine programs, DOD has not updated its funding projection and has no plans to do so.

DOD has not done a complete analysis of the potential life-cycle costs and benefits of the competitive engine strategy in over 4 years. A cost-benefit analysis is an important tool for making investment decisions. DOD's \$2.9 billion funding projection through 2016 comprises only a portion of the information that would be needed for such an analysis. DOD maintains that while there have been significant changes made to the JSF aircraft and engine programs, there is still not a compelling business case to continue supporting both engines, and DOD does not plan to update its cost-benefit analysis. Thus, whether a more current, comprehensive analysis that includes all life-cycle costs, benefits, and risks would result in a more definitive business case—one way or another—remains an unanswered question. In commenting on a draft of this report, DOD reiterated its position that the up-front costs to support the alternate engine were not affordable and that a new analysis reflecting recent changes would not likely alter its position. We continue to believe that acquisition decisions

should weigh both near-term and long-term costs and benefits and that an updated analysis would provide important information for making these decisions.

Background

DOD leaders often reference three different analyses when explaining their decision not to proceed with a competitive engine program. In early 2007, DOD completed a detailed comparison of the expected life-cycle costs and benefits from sole source and competitive engine options. Officials followed this analysis in late 2009 with a limited update reflecting more current development cost estimates but did not update procurement or operations and support costs. From each analysis, officials concluded that there was not a compelling business case either for or against competition. In February 2010, DOD submitted the results of a third analysis, this one a projection of the amount of additional funding that it believed would be needed through fiscal year 2016 to finish system development and demonstration, allow sufficient time for the contractor to gain production experience before DOD begins the competition, and create a logistics support system for the alternate engine. This analysis produced the \$2.9 billion funding projection that DOD officials cite as unaffordable and a primary reason for terminating the alternate engine program. Table 1 compares key aspects of DOD’s three alternate engine-related analyses.

Table 1: Comparison of DOD’s Three Key Competitive Engine Analyses

	Detailed life-cycle cost-benefit analysis	Limited update to cost-benefit analysis	Funding projection to support fiscal year 2011 budget request
Date completed	Early 2007	Late 2009	Early 2010
Primary focus	Cost-benefit analysis comparing development, procurement, operating, and support costs of competitive and single source approaches.	Limited update to 2007 cost-benefit analysis to reflect more recent actual development cost data; no change to procurement, operating, or support cost projections.	Budget excursion to estimate amount of additional near-term (FY11-FY16) funding needed to prepare the alternate engine for competition. This was a funding projection and not a cost-benefit analysis.
JSF program structure	Reflected program structure as of 2007.	Reflected program structure as of 2007.	Reflected program quantity and procurement cost changes as of 2010, but major program restructuring was still ongoing.
Summary finding	Analysis slightly favored a single source approach, but it also identified other considerations that could favor competition.	Analysis indicated that a competitive engine strategy was slightly more attractive than a single source strategy.	Projection that \$2.9 billion would be needed from fiscal years 2011 through 2016 to prepare the F136 for competition.
Type of analysis and data sources	Largely based on historical analogy; little JSF actual engine data available.	Largely based on historical analogy; limited JSF engine procurement data available. Relied heavily on 2007 analysis.	Largely based on historical analogy; limited JSF engine procurement data available. Relied heavily on 2007 analysis.

Sources: DOD (data); GAO (presentation).

DOD’s \$2.9 Billion Funding Projection Has Not Been Updated to Reflect Recent, Significant Changes in the JSF Program

DOD has not updated its projection of the amount of additional funding needed to support the F136 alternate engine program to a point where DOD believes it could begin a competition. As we reported last year, DOD’s projection of \$2.9 billion was not based on, nor intended to be, a detailed comprehensive cost estimate but more of a general level projection of the funding needed to put the F136 alternate engine on a competitive level with the F135 primary engine. We also reported that if two key assumptions were changed—a reduction to the number of years of noncompetitive procurements and the need for government-funded component improvement programs—the estimate could be lower. Since the estimate was prepared, the JSF aircraft and engine programs have experienced substantial changes that could materially affect funding requirements. The Secretary of Defense stated in April 2011 that nothing had occurred in the past year that would appreciably change the projection or the decision to end the alternate engine program. However, a number of significant changes have, in fact, been made to the program, but the department has not developed a new funding projection. Table 2 summarizes the key elements of DOD’s 2010 funding projection.

Table 2: DOD’s Projection of the Additional Funding Needed to Support the Alternate Engine Program, Which Was Completed in Early 2010

Then-year dollars in millions

	Additional funding projected by DOD (FY 2011-FY 2016)
Development total	\$1,533
• System development and demonstration	1,188
• Engine component improvement program	345
Procurement total	\$1,381
• Noncompetitive procurement of engines (including spares)	747
• Production tooling	133
• Support	500
Total	\$2,914

Sources: DOD (data); GAO (presentation).
 Note: Some numbers may not add to totals because of rounding.

Prior GAO Assessment of DOD's \$2.9 Billion Funding Projection

In 2010, at your request, we reviewed the basis for DOD's \$2.9 billion funding projection and its key assumptions. We reported that the projection—referred to as a budget excursion by DOD cost analysts—was intended to provide a general sense of the funding needed to support the F136 alternate engine program to the point where DOD believed it could begin a competition, but it did not include the same level of fidelity and precision normally associated with a detailed, comprehensive cost estimate. We also reported that the projection should be viewed as one point within a range of possible costs depending on the factors and assumptions used, and not as an absolute amount. We noted that if two key assumptions in DOD's analysis were to change, the projected amount of up-front investment needed could be lower. These assumptions were that (1) 4 years of noncompetitive procurements of both engines would be needed to allow the alternate engine contractor sufficient time to gain production experience and complete developmental qualification of the engine and (2) the government would need to fund quality and reliability improvements for engine components. We pointed out that past studies and historical data indicated that it could take less than 4 years of noncompetitive procurements and that competition could obviate the need for government-funded component improvement programs. We stated that providing decision makers with a range of costs around a point estimate would be more useful than providing only the point estimate, particularly when information on cost, schedule, and technical risks is limited.

Program Changes and Potential Implications to DOD's Funding Projection

At the time DOD prepared its funding projection in early 2010, the JSF acquisition program was in the midst of a complex and comprehensive restructuring. As a result, according to DOD, it was unable to invest the time and resources that normally would be part of a more comprehensive cost estimate and instead relied heavily on data, assumptions, and methodologies from its 2007 cost-benefit analysis. Since the funding projection was prepared, most of the JSF restructuring has been completed, making substantive changes in aircraft and engine costs and schedules. Specifically, near-term aircraft and engine purchases were significantly reduced, development and test times were extended, and estimated costs for development, procurement, and sustainment were increased. The department also terminated the F136 engine contract in April 2011, and is no longer funding F136 design and development activities. Following the contract termination, the F136 contractor announced a proposal to continue development of the engine through fiscal year 2012 using its own funds—although the scope of this proposed development work and funding is not clear.

These JSF aircraft and engine program changes would likely affect the amount of near-term funding needed to support the F136 alternate engine program. Three specific examples and their potential implications on DOD's \$2.9 billion projection are discussed below:

- DOD’s projection included more than \$700 million in government funding for F136 system development and demonstration during fiscal years 2011 and 2012. DOD officials state that if the F136 contractor fully funds its own development efforts through 2012, and does not pass the cost back to the government through increased overhead rates or procurement prices, then the near-term funding projection could be reduced by approximately \$700 million. However, the actual scope of the work and level of funding that the F136 contractor is actually considering is unclear. It is also not clear how the contractor would continue to ensure that its efforts were adequately integrated with the overall JSF development program. At the time of our review, neither DOD cost analysts nor JSF program office representatives had met with the F136 contractor to discuss its concept. In addition, DOD cost analysts have not conducted a detailed assessment of the status of F136 development in about 2 years. DOD cost analysts emphasize that F136 design, development, and testing progress is a key unknown that would need to be updated if a new projection was to be made. An accurate understanding of the F136 contractor’s proposal and an updated assessment of F136 development progress would be needed to accurately determine when the alternate engine could be ready for competition and how much additional near-term funding might be needed.
- DOD’s projection assumed that 743 engines (including U.S., international partner, and spare engines) would be noncompetitively procured from fiscal year 2013 through fiscal year 2016. This accounted for an estimated \$747 million in additional procurement costs. According to DOD cost officials, noncompetitive procurements reduce the number of engines any one contractor would produce, affecting manufacturing efficiencies and increasing prices for both competitors during the noncompetitive period. In addition, the greater number of noncompetitive procurements means that fewer engines would be available for future competition. DOD’s recent JSF restructuring and changes in the international partners’ procurement plans have reduced the number of JSF aircraft and engines to be purchased through 2016. Based on the procurement plans contained in DOD’s fiscal year 2012 budget submission, the JSF program now expects to procure approximately 610 engines (U.S., international, and spares) from fiscal year 2013 through fiscal year 2016.³ If competition begins in 2017—as previously assumed by DOD—there would be 133 fewer engines (743 minus 610) procured in a noncompetitive environment. This would likely reduce the amount of up-front investment needed because of noncompetitive effects and result in additional engines being available for competition in the future. However, it is not known how it would affect the F136 contractor’s ability to mature its engine design and production processes before beginning competition.
- DOD’s projection relied largely on the same historical data that had been used to support the 2007 cost-benefit analysis because limited actual production cost data for the F135 primary engine and F136 alternate engine were available. DOD’s projection also assumed that the initial F136 engine procurement unit prices would be the same as the F135’s unit prices at the same stage of the program, and that both engines would follow the same

³ Consistent with DOD’s methodology, we applied a 15 percent spare engine factor to the number of engines expected to be procured during the period.

price curves. DOD now has actual F135 production data from the first three engine procurement lots that could be used to inform its funding projection. According to DOD cost analysts, in preparing the latest JSF program cost estimate they did a detailed, comprehensive analysis of the projected procurement unit costs for the F135 based largely on actual cost data. DOD analysts recognize that the F136 engine is a different design and that the contractor will use different manufacturing processes that could result in different unit prices and price curves. However, the analysts emphasize that they have not done a detailed fact-finding effort on the F136 program for about 2 years, and they are not sure if any new data are available that would allow them to assume different unit prices or price curves at this time. Thus, the effect of actual engine production costs on DOD's projection is not known.

More detailed and updated information that reflects recent program restructuring and other developments would likely change DOD's \$2.9 billion funding projection. DOD analysts responsible for developing the funding projection acknowledge that many of their original assumptions would likely be affected by recent program changes. As noted above, some of the changes could reduce the amount of up-front investment needed, such as the F136 contractor's proposal to fund its own development efforts, but other changes, such as slower-than-planned JSF development progress and recent schedule extensions, could increase the amount. Regardless, DOD has not updated its funding projection and does not have a plan to do so at this time.

DOD's Detailed Cost-Benefit Analysis Is Dated

Although there have been many changes to the JSF program, DOD has not conducted a detailed, comprehensive analysis of the total life-cycle costs and benefits of a competitive engine program since early 2007. In late 2009, DOD did update the 2007 analysis to reflect changes in estimated development costs but did not update estimated operational support and procurement costs. This update also did not reflect schedule changes made in the JSF program since 2007. An up-to-date, comprehensive analysis that takes into consideration both the total costs and benefits during the entire life-cycle of both engines would be an important tool for making investment decisions. Such an analysis would compare the total expected costs of competitive and noncompetitive options against the total expected benefits to determine whether the benefits from competition outweigh the costs and by how much. DOD's \$2.9 billion projection represents additional costs over a 6-year period, which is only a portion of the information needed to complete a comprehensive life-cycle cost-benefit analysis. Over the past 4 years, JSF flight test information, design and production data, as well as updated acquisition and sustainment cost information have become available. As noted, the program has also gone through many significant schedule and procurement profile changes since 2007. For example, the program's development completion has slipped by over 5 years and procurement quantities through 2016 have decreased by roughly one-third. DOD analysts acknowledge that much of the 2007 study was based largely on historical data of prior engine programs with little actual data from the F135 or F136 engine programs. DOD cost officials also agree that there has been more design, development, and production

work done by both engine contractors that could provide better quality and more precise data to use to update a cost-benefit analysis. Specifically, DOD cost analysts stated that several areas would need to be updated, including (1) F136 design progress; (2) procurement profiles, unit costs, and price curves; and (3) operations and support cost estimates.

Agency Comments and Our Evaluation

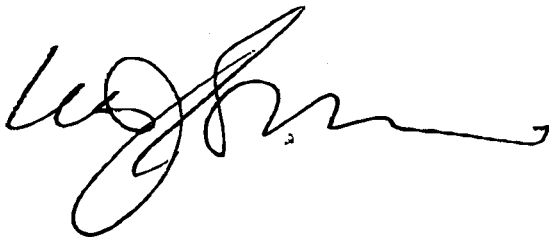
In commenting on a draft of this report, DOD reiterated its position that there is no compelling business case for the alternate engine. It noted that the up-front costs are less affordable in the current fiscal environment, the baseline F135 engine has performed well so far, and the department has not received a formal contractor proposal for a self-funded alternate engine. The department noted that the federal government, including DOD, is entering a new era of resource austerity. While that is clearly the case, we note that such austerity is not limited to the near-term—it is a long-term problem. Acquisition decisions should weigh both near-term and long-term costs and benefits. If near term costs are always the primary factor in decisions, it would be difficult to justify competitive strategies in the future. DOD’s complete comments are enclosed.

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As agreed with your office, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies of this report to appropriate congressional committees, the Secretary of Defense, the Secretary of the Air Force, the Secretary of the Navy, and the Director of the Office of Management and Budget. The report will also be available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at (202) 512-4841 or sullivanm@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. Staff members making key contributions to this report were Bruce Fairbairn, Assistant Director; Matthew Lea; and Travis Masters.

Sincerely yours,



Michael J. Sullivan, Director
Acquisition and Sourcing Management

Enclosure

Enclosure

Comments from the Department of Defense



COST ASSESSMENT AND
PROGRAM EVALUATION

OFFICE OF THE SECRETARY OF DEFENSE
1800 DEFENSE PENTAGON
WASHINGTON, D.C. 20301-1800

AUG 30 2011

Mr Michael J. Sullivan
Director, Acquisition and Sourcing Management
U.S. Government Accountability Office
441 G. Street, N.W.
Washington, DC 20548

Dear Mr. Sullivan:

This is the Department of Defense (DoD) response to the GAO Draft Report, GAO-11-903R, Joint Strike Fighter: Implications of Restructuring and Other Recent Developments on Key Aspects of DOD's Prior Alternate Engine Analyses, dated August 15, 2011 (GAO Code 121003). Thank you for the opportunity to review this draft report. We understand that your report contains no recommendations and, therefore, comments are optional. We would like to take this opportunity to provide clarifying comments on the report.

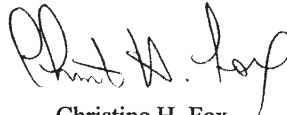
The basis for DoD opposition to the alternate engine program remains unchanged: the costs to pursue a second engine are significant and immediate, while the benefits are speculative and would not be realized until many years later. During the past year, the fiscal situation facing the Department has amplified our concerns with the second engine program. The Federal Government, including DoD, is now entering an era of resource austerity. We anticipate that many difficult decisions will have to be made on major weapon systems, including the Joint Strike Fighter (JSF) program at large. We simply cannot afford to continue the second engine development activities with the many higher military priorities and the stringent budgets we face.

Your report identifies recent programmatic changes that could affect our \$2.9 billion estimate of upfront costs for an alternative engine. The changes identified in the report could move this figure in either direction—either higher or lower—but, ultimately, the changes identified in the report would be inconsequential. Revisiting the previous analyses will not change the fundamental conclusion that upfront costs to prepare a second engine are significant, at a time when the resources available to the Department are projected to decline in real terms.

The Pratt & Whitney F135 JSF baseline engine has accumulated more than 18,000 test hours, including about 1,700 flight test hours on three F-35 variants. Each variant of the propulsion system achieved initial service release status within the past 18 months, a key milestone and indication of the ability to meet performance and safety requirements. Also, qualification issues that have risen during flight testing with respect to baseline engine performance have been minimal, and have been handled within the qualification schedule for the program. Moreover, the JSF program is currently in the midst of qualification activities for complex mission systems and software designed to provide critical fifth generation capabilities. These are the essential focus areas for the program, and continued development of a second engine would divert resources and attention from these higher program priorities.

The draft report mentions a “proposal” from General Electric (GE) to self-fund the second engine development activities for some limited period. Unfortunately, the details of this “proposal” are sketchy at best. As you know, on April 25, 2011, the Department initiated the contract termination process and all qualification activities for the second engine have ceased. Also, the Department has not received any formal proposal from the contractor to self-fund engine development activities. We can reasonably project, however, that any self-funded engine effort performed in isolation from the government is likely to require extensive integration and validation efforts at a later point in time. These activities would require both time and resources which would ultimately be paid by the government. This scenario would also result in additional cost and schedule implications for the JSF aircraft development program.

In conclusion, we find that there is no compelling business case for the second engine. The upfront costs are less affordable in the current fiscal environment, the baseline F135 engine has performed well so far, and we have no formal proposal for a self-funded second engine program. Also, the operational users have indicated that they have no requirement for the second engine. Recent changes in the fiscal environment make the upfront costs of a second engine program even more unattractive. Finally, I believe that revisiting, once again, each of the analytic assumptions in the business case for the second engine would prove unproductive, since it is not likely to lead to a change in the Department’s position on this program.



Christine H. Fox
Director

Related GAO Products

Joint Strike Fighter: Restructuring Places Program on Firmer Footing, but Progress Is Still Lagging. [GAO-11-677T](#). Washington, D.C.: May 19, 2011.

Joint Strike Fighter: Restructuring Places Program on Firmer Footing, but Progress Still Lags. [GAO-11-325](#). Washington, D.C.: April 7, 2011.

Joint Strike Fighter: Restructuring Should Improve Outcomes, but Progress Is Still Lagging Overall. [GAO-11-450T](#). Washington, D.C.: March 15, 2011.

Tactical Aircraft: Air Force Fighter Reports Generally Addressed Congressional Mandates, but Reflected Dated Plans and Guidance, and Limited Analyses. [GAO-11-323R](#). Washington, D.C.: February 24, 2011.

Defense Management: DOD Needs to Monitor and Assess Corrective Actions Resulting from Its Corrosion Study of the F-35 Joint Strike Fighter. [GAO-11-171R](#). Washington, D.C.: December 16, 2010.

Joint Strike Fighter: Assessment of DOD's Funding Projection for the F136 Alternate Engine. [GAO-10-1020R](#). Washington, D.C.: September 15, 2010.

Tactical Aircraft: DOD's Ability to Meet Future Requirements Is Uncertain, with Key Analyses Needed to Inform Upcoming Investment Decisions. [GAO-10-789](#). Washington, D.C.: July 29, 2010.

Defense Acquisitions: Assessments of Selected Weapon Programs. [GAO-10-388SP](#). Washington, D.C.: March 30, 2010.

Joint Strike Fighter: Significant Challenges and Decisions Ahead. [GAO-10-478T](#). Washington, D.C.: March 24, 2010.

Joint Strike Fighter: Additional Costs and Delays Risk Not Meeting Warfighter Requirements on Time. [GAO-10-382](#). Washington, D.C.: March 19, 2010.

Joint Strike Fighter: Significant Challenges Remain as DOD Restructures Program. [GAO-10-520T](#). Washington, D.C.: March 11, 2010.

Joint Strike Fighter: Strong Risk Management Essential as Program Enters Most Challenging Phase. [GAO-09-711T](#). Washington, D.C.: May 20, 2009.

Defense Acquisitions: Assessments of Selected Weapon Programs. [GAO-09-326SP](#). Washington, D.C.: March 30, 2009.

Joint Strike Fighter: Accelerating Procurement before Completing Development Increases the Government's Financial Risk. [GAO-09-303](#). Washington, D.C.: March 12, 2009.

Defense Acquisitions: Better Weapon Program Outcomes Require Discipline, Accountability, and Fundamental Changes in the Acquisition Environment. [GAO-08-782T](#). Washington, D.C.: June 3, 2008.

Defense Acquisitions: Assessments of Selected Weapon Programs. [GAO-08-467SP](#). Washington, D.C.: March 31, 2008.

Joint Strike Fighter: Impact of Recent Decisions on Program Risks. [GAO-08-569T](#). Washington, D.C.: March 11, 2008.

Joint Strike Fighter: Recent Decisions by DOD Add to Program Risks. [GAO-08-388](#). Washington, D.C.: March 11, 2008.

Tactical Aircraft: DOD Needs a Joint and Integrated Investment Strategy. [GAO-07-415](#). Washington, D.C.: April 2, 2007.

Defense Acquisitions: Assessments of Selected Weapon Programs. [GAO-07-406SP](#). Washington, D.C.: March 30, 2007.

Defense Acquisitions: Analysis of Costs for the Joint Strike Fighter Engine Program. [GAO-07-656T](#). Washington, D.C.: March 22, 2007.

Joint Strike Fighter: Progress Made and Challenges Remain. [GAO-07-360](#). Washington, D.C.: March 15, 2007.

Tactical Aircraft: DOD's Cancellation of the Joint Strike Fighter Alternate Engine Program Was Not Based on a Comprehensive Analysis. [GAO-06-717R](#). Washington, D.C.: May 22, 2006.

Defense Acquisitions: Major Weapon Systems Continue to Experience Cost and Schedule Problems under DOD's Revised Policy. [GAO-06-368](#). Washington, D.C.: April 13, 2006.

Defense Acquisitions: Actions Needed to Get Better Results on Weapons Systems Investments. [GAO-06-585T](#). Washington, D.C.: April 5, 2006.

Tactical Aircraft: Recapitalization Goals Are Not Supported by Knowledge-Based F-22A and JSF Business Cases. [GAO-06-487T](#). Washington, D.C.: March 16, 2006.

Joint Strike Fighter: DOD Plans to Enter Production before Testing Demonstrates Acceptable Performance. [GAO-06-356](#). Washington, D.C.: March 15, 2006.

Joint Strike Fighter: Management of the Technology Transfer Process. [GAO-06-364](#). Washington, D.C.: March 14, 2006.

Tactical Aircraft: F/A-22 and JSF Acquisition Plans and Implications for Tactical Aircraft Modernization. [GAO-05-519T](#). Washington, D.C.: April 6, 2005.

Tactical Aircraft: Opportunity to Reduce Risks in the Joint Strike Fighter Program with Different Acquisition Strategy. [GAO-05-271](#). Washington, D.C.: March 15, 2005.

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