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JOINT STRIKE FIGHTER

Significant Challenges Remain as DOD Restructures Program

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Mr. Chairman and Members of the Committee:

Thank you for the opportunity to discuss our work on the F-35 Lightning II, also known as the Joint Strike Fighter (JSF). The JSF is the Department of Defense's (DOD) most costly and ambitious aircraft acquisition. DOD is seeking to simultaneously develop and field three aircraft variants for the Air Force, Navy, Marine Corps, and eight international partners. The JSF program is to provide critical replacement aircraft that will serve as the heart of future tactical air forces. It will require a long-term commitment to very large annual funding outlays. The current estimated investment is $323 billion to develop and procure 2,457 aircraft.

Through March of 2009, GAO has issued five annual reviews of the JSF program under congressional mandate.[1] We have consistently reported on the elevated risk of poor program outcomes from the substantial overlap of development, test, and production activities and our concerns about the Government investing in large numbers of production aircraft before variant designs are proven and performance verified in testing. In our March 2009 report,[2] we again noted development cost increases, additional delays in manufacturing and testing schedules, and the government's increased financial risk from plans to increase procurement in advance of testing. DOD concurred with, but has not yet implemented, our two recommendations to report on plans for transitioning from cost-reimbursement to fixed-price contracts for aircraft procurement and to ensure that the prime contractor performs detailed schedule risk analyses to provide important insight into use of management reserve funds and manufacturing progress.

This testimony is based on our sixth annual review, which will be released later this month. GAO's work for this report began under a request from the Chairman and Ranking Member of the House Armed Services Air and Land Subcommittee. Subsequently, we received a new mandate in the National Defense Authorization Act for Fiscal Year 2010 to annually review the JSF program through 2015.[3] We examined (1) program cost, schedule, and performance; (2) manufacturing plans and results; and (3) test plans

[1] Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005, Pub. L. No. 108-375, § 213 (2004).

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

[3] National Defense Authorization Act for Fiscal Year 2010, Pub. L. No. 111-84 § 244 (2009).

and progress. To conduct this work, we tracked and compared current cost and schedule estimates with those of prior years, identified changes, and determined causes. We obtained program status reports, manufacturing data, and test planning documents. We conducted our own analyses of the information. We discussed results to date and future plans to complete JSF development and move further into procurement with DOD, JSF, and contractor officials. We conducted this performance audit from May 2009 to March 2010. Our work was performed 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.

In brief, Mr. Chairman, our work has found that, although the department has recently directed a number of strong actions that should improve JSF program outcomes in the future, development costs have continued to increase and key events were missed. Although improving, manufacturing inefficiencies and parts problems persist, slowing delivery of test aircraft and, in turn, delaying development flight tests. DOD's restructuring actions should help, but there is still substantial overlap of development, test, and production activities while DOD continues to push ahead and invest in large quantities of production aircraft far ahead of completing testing. In light of these circumstances, we are recommending in our forthcoming JSF report that DOD (1) make a new, comprehensive and independent assessment of the costs and schedule to complete the program, including military construction, JSF-related expenses in other budgets, and life cycle costs; and (2) reassess warfighter requirements and, if necessary, defer some capabilities to future increments. GAO will also suggest that Congress consider requiring that DOD establish a management tool for tying annual procurement requests to demonstrated progress in testing and manufacturing. The report is currently at DOD for comment which we expect to receive soon.

Cost Increases and Schedule Delays Increase Risk of Not Meeting Warfighter Requirements on Time

The JSF program continues to struggle with increased costs and slowed progress—negative outcomes that were foreseeable as events have unfolded over several years. Total estimated acquisition costs have increased $46 billion and development extended 2 ½ years, compared to the program baseline approved in 2007. DOD is now taking some positive steps that, if effectively implemented, should improve outcomes and provide more realistic cost and schedule estimates. Officials increased time and funding for system development, added 4 aircraft to the flight test program, and reduced near-term procurement quantities by 122 aircraft. Restructuring is not done and further cost growth and schedule extensions are likely. There is a substantial risk that the program will not deliver the expected number of aircraft and required capabilities on time. Dates for achieving initial operational capabilities may have to be extended or some requirements deferred to future upgrades. Also, aircraft unit costs will likely exceed the thresholds established by the statutory provision commonly referred to as Nunn-McCurdy[4] and require the Department to certify the need for the JSF to Congress. Program setbacks in costs, deliveries, and performance directly impact modernization plans and retirement schedules of the legacy aircraft the JSF is slated to replace.

Table 1 summarizes changes in program cost, quantities, and schedules at key stages of acquisition. The 2004 replan estimates reflect a quantity reduction and a major restructuring of the program after integration efforts and design review identified significant weight problems. The 2007 data is the current approved acquisition baseline and the 2011 budget request reflects cost increases stemming from a major reassessment of the program by a joint team comprised of OSD, Air Force, and Navy representatives.

[4] 10 U.S.C. § 2433 establishes the requirement for DOD to perform unit cost reports on major defense acquisition programs or designated major defense subprograms. If a program exceeds cost growth thresholds specified in the law, this is known as a Nunn-McCurdy breach. DOD is required to report breaches to Congress and, in certain circumstances, DOD must reassess the need for the program and submit a certification to Congress in order to continue with acquisition.

Table 1: Changes in Reported JSF Program Costs, Quantities, and Deliveries

	October 2001 (system development start)	December 2003 (2004 Replan)	March 2007 (Approved Baseline)	Fiscal Year 2011 Budget Request
Expected quantities				
Development quantities	14	14	15	14
Procurement quantities (U.S. only)	2,852	2,443	2,443	2,443
Total quantities	2,866	2,457	2,458	2,457
Cost Estimates (then-year dollars in billions)				
Development	$34.4	$44.8	$44.8	$49.3
Procurement	196.6	199.8	231.7	273.3
Total program acquisition (see note)	$231.0	$244.6	$276.5	$322.6
Unit Cost Estimates (then-year dollars in millions)				
Program acquisition	$81	$100	$113	$131
Average procurement	69	82	95	112
Estimated delivery dates				
First operational aircraft delivery	2008	2009	2010	2010
Initial operational capability	2010-2012	2012-2013	2012-2015	2012-2015

Source: GAO analysis of DOD data.

Note: Military construction costs, typically part of total program acquisition costs, are not included in this table. Construction costs associated with the JSF program are incomplete and have been inconsistently portrayed at various stages.

Table 2 shows the extension of major milestone dates for completing key acquisition activities. The February 2010 restructure reflects the direction ordered by the Secretary in an acquisition decision memorandum issued on February 24 and revised on March 3. Completing system development and approving full-rate production is now expected in April 2016, about 2 ½ years later than planned in the acquisition program baseline approved in 2007.

Table 2: Changes in Major Milestones

Major Milestones	Program of record December 2007	Program of record December 2008	Restructure February 2010
Development Testing Complete	October 2012	October 2013	November 2014
Initial Operational Test and Evaluation Complete	October 2013	October 2013	January 2016
System Development and Demonstration Phase Complete	October 2013	October 2014	April 2016
Full-Rate Production Decision	October 2013	October 2014	April 2016

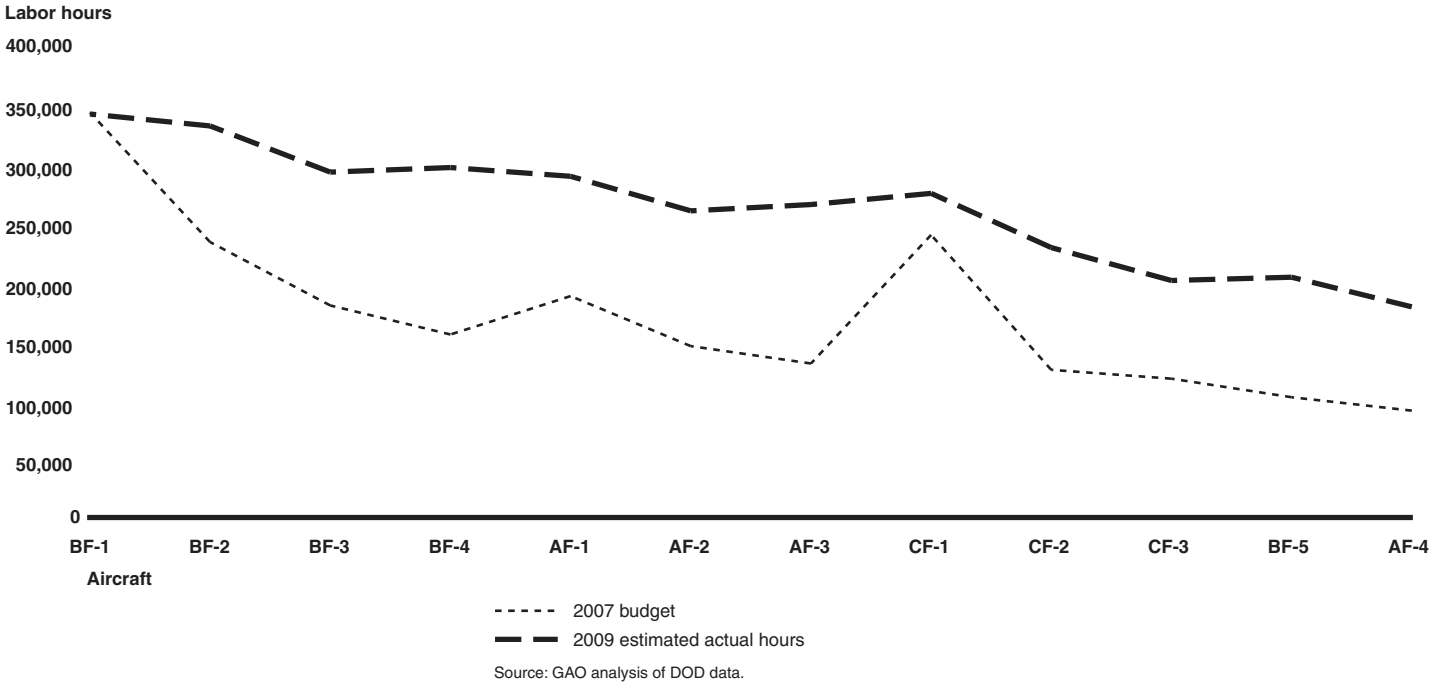
Source: GAO analysis of DOD data

Manufacturing and Engineering Challenges Continue To Slow Aircraft Deliveries And Hold The Production Schedule At Risk

Manufacturing JSF test aircraft continues to take more time, money, and effort than budgeted. By December 2009, only 4 of 13 test aircraft had been delivered and total labor hours to build the aircraft had increased more than 50 percent above earlier estimates. Late deliveries hamper the development flight test program and affect work on production aircraft, even as plans proceed to significantly ramp-up annual procurement rates. Some improvement is noted, but continuing manufacturing inefficiencies, parts problems, and engineering technical changes indicate that design and production processes may lack the maturity needed to efficiently produce aircraft at planned rates. An independent manufacturing review team determined that the planned production ramp rate was unachievable absent significant improvements. While the restructuring has reduced near-term procurement, annual aircraft quantities are still substantial. In addition, the program is procuring a substantial number of low rate production (LRIP) aircraft using cost-reimbursement contracts, a contract type that places most of the cost risk on the government.[5] Continued use of cost reimbursement contracts beyond initial LRIP quantities indicate that uncertainties in contract performance exist that do not permit costs to be estimated with sufficient accuracy for the contractor to assume the risk under a fixed price contract. Figure 1 compares labor hour estimates for test aircraft in 2007 and the revised manufacturing plan in 2009.

[5] According to the Federal Acquisition Regulation, this contract type is suitable for use only when uncertainties in contract performance do not permit costs to be estimated with sufficient accuracy to use a fixed price contract. Federal Acquisition Regulation § 16.301-2.

Figure 1: JSF Labor Hours for Manufacturing Test Aircraft



Source: GAO analysis of DOD data.

BF= Short take-off and vertical landing aircraft for the Marine Corps
AF= Conventional take-off and landing aircraft for the Air Force
CF= Carrier variant for the Navy

Little Progress in Development Testing While Program Continues To Face Technical Challenges

Although DOD's restructuring actions should help, there is still substantial overlap of development, test, and production activities while DOD continues to push ahead and invest in large quantities of production aircraft before variant designs are proven and system performance verified. Given the extended development time and reduced near term procurement, DOD still intends to procure up to 307 aircraft at an estimated cost of $58.2 billion before completing development flight testing by the beginning of fiscal year 2015 (see figure 2). At the same time, progress on flight testing is behind schedule—slowed by late aircraft deliveries and low productivity, the flight test program completed only 10 percent of the sorties planned during 2009. Other technical challenges include (1) relying on an extensive but largely unproven and unaccredited network of ground test laboratories and simulation models to evaluate system performance; (2) developing and integrating very large and complex software requirements; and (3) maturing several critical technologies essential to meet operational performance and logistical

support requirements. Collectively, testing and technical challenges will likely add more costs and time to development, slowing delivery of capabilities to warfighters and hampering start up of pilot and maintainer training and initial operational testing.

Figure 2: JSF Procurement Investments and Progress of Flight Testing

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Cumulative procurement (billions of dollars)	$0.9	$3.6	$7.1	$14.4	$23.6	$33.2	$45.2	$58.2	$72.4
Cumulative aircraft procured	2	14	28	58	101	146	217	307	420
Development flight testing schedule	→	→	→	→	→	→	→	→	

Source: GAO analysis of DOD data.

Note: U.S. Investments Only.

Concluding Remarks

The JSF is DOD's largest and most complex acquisition program and a linchpin of the United States and its allies' long-term plans to modernize tactical air forces. It will require exceptional levels of funding for a sustained period through 2034, competing against other defense and non-defense priorities for the federal discretionary dollar. DOD leadership has taken some recent positive steps that, if effectively implemented, should improve outcomes and provide for a more realistic, executable program. However, we believe additional steps are needed to ensure the JSF program is able to meet warfighter expectations. To date, the Department does not have a full, comprehensive cost estimate for completing the program. Credible cost and schedule estimates are critical because they allow DOD management to make sound trade-off decisions against competing demands and allow Congress to perform oversight and to hold DOD accountable. Because of the significance that the JSF is expected to have on the future of the tactical aircraft fleet, the services should have a high degree of confidence in their ability to meet their initial operational capability requirements and to acquire JSFs in quantity so that DOD can plan its overall tactical aircraft force structure strategy. However, the Department has not defined what are reasonable expectations for achieving initial operational capabilities for each of the services given the substantial changes to the program already experienced and future changes directed by the recent restructuring.

Finally, while the Department has reduced near term procurement quantities, there is still substantial overlap of development, test, and production activities now stretching into 2016. Constant program changes and turbulence have made it difficult to accurately and confidently

measure progress and maturity of the aircraft system. The program has often fallen short of expectations in regards to its annual plans. Tying annual investments more directly to demonstrated progress in developing, testing, and manufacturing aircraft may be a prudent fiscal measure for ensuring government funds are invested wisely.

In light of these circumstances, we are recommending in our forthcoming JSF report that DOD (1) make a new, comprehensive and independent assessment of the costs and schedule to complete the program, including military construction, JSF-related expenses in other budgets, and life cycle costs; and (2) reassess warfighter requirements and, if necessary, defer some capabilities to future increments. GAO may also have a matter for congressional consideration to address some of the issues raised in this testimony.

Mr. Chairman, this completes my prepared statement. I would be pleased to respond to any questions you or other Members of the Committee may have.

For further information on this statement, please contact Michael Sullivan at (202) 512-4841 or sullivanm@gao.gov. Contact points for our Office of Congressional Relations and Public Affairs may be found on the last page of this statement. Individuals making key contributions to this statement are Bruce Fairbairn, Ridge Bowman, Charlie Shivers, David Adams, Lindsay Taylor, W. Kendal Roberts, Matt Lea, and Greg Campbell.

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