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SENATE ARMED SERVICES COMMITTEE
SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES
UNITED STATES SENATE

DEPARTMENT OF DEFENSE

WRITTEN TESTIMONY FOR THE
SENATE ARMED SERVICES COMMITTEE
SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES
UNITED STATES SENATE

SUBJECT: F-35 Joint Strike Fighter Program

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May 8, 2012

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Chairman Lieberman, Ranking Member Brown, and distinguished Members of the Committee. Thank you for the opportunity to address this committee regarding the Joint Strike Fighter.

The Joint Strike Fighter is the Department of Defense`s largest acquisition program, and its importance to our national security is immense. The JSF will form the backbone of U.S. air combat superiority for generations to come. It will replace the legacy tactical fighter fleets of the Air Force, Navy, and Marine Corps with a dominant, multirole, fifth-generation aircraft, capable of projecting U.S. power and deterring potential adversaries. Furthermore, the JSF will effectively perform missions across the full spectrum of combat operations. For our international partners and foreign military sales customers who are participating in the program, the JSF will become a linchpin for future coalition operations and will help to close a crucial capability gap that will enhance the strength of our security alliances.

The multirole F-35 is the centerpiece of the Department of Defense's future precision attack capability. The JSF is designed to penetrate air defenses and deliver a wide range of precision munitions. This modern, fifth-generation aircraft brings the added benefit of increased allied interoperability and cost-sharing across Services and partner nations. The FY13 budget includes $9.3 billion for continued system development, test and procurement of 29 F-35 aircraft.

It is our duty to produce the next generation fighter jet for the United States and

our and allies, understanding that we live in a resource constrained world. Holding fast to the three pillars I embraced when I joined the Joint Strike Fighter team – a commitment to fundamentals, a firm grasp on reality, and transparency in all we do - remains key to the successful completion of development, and delivery of critical capability.

Program Accomplishments in the Last Year

The F-35 program team achieved a number of accomplishments over the past year, including the delivery of 13 aircraft, 4 test aircraft to test bases and the first 9 production jets to Eglin Air Force Base. The F-35B Sea Trials conducted on the USS WASP marked a high point in the year. The F-35B conducted seventy-two vertical landings and short take-offs while exhibiting aircraft handling performance that met all expected standards. The program completed F-35C static structural testing and improved the schedule and cost performance of assembled wings and forward fuselage deliveries to the production line mate station. The F-35C conducted ship suitability events at Lakehurst, conducting 65 catapult launches, including one on the new Navy Electromagnetic Aircraft Launch System (EMALS). The production F-35A has started Local Area Flights at Eglin AFB.

In January 2011, Secretary Gates placed the F-35B on "probation" because of the existence of several unique STOVL aircraft design issues. All F-35B test issues in view now are comparable to those being encountered with the other F-35 variants and there is no reason at this point to single out the F-35B. Secretary Panetta made the decision to remove STOVL from probation on January 20, 2012.

An Operational Assessment released in the fall of 2011 expressed concern about the risk associated with several design issues that had surfaced during the F-35 Joint Strike Fighter test program. After the F-35 Operational Assessment was released in October 2011, the Acting Under Secretary of Defense for Acquisition, Technology and Logistics (AUSD AT&L) commissioned a Quick Look Review (QLR) of the F-35 program. The review found that, while the overall F-35 design is sound, there is significant risk remaining in the program. Resolving key technical issues is important to address concerns about the F-35's operational capabilities and to having confidence in the design so that production rates can be increased. The Department used the result of the QLR to inform the FY 2013 Future Years Defense Program, which holds US production at 29 per year through 2014 to reduce concurrency and permit additional progress on the test program before increasing production. The technical issues are all being addressed in the restructured System Development and Demonstration (SDD) phase of the F 35 program.

The original MS B, approved in October 2001, was rescinded following a critical Nunn-McCurdy breach in March 2010. The Defense Acquisition Board (DAB) reviewed the F-35 development, production, and sustainment technical status and cost estimates in February 2012 and on March 28, 2012, OUSD (AT&L) signed an Acquisition Decision Memorandum that officially recertified the program and granted MS B approval.

International Partnership

The F-35 program continues to be the Department of Defense's largest cooperative program, with eight Partner countries participating under Memorandums of Understanding for System Development and Demonstration (SDD) and for Production,

Sustainment and Follow-on Development (PSFD). The eight partner countries include the United Kingdom, Italy, The Netherlands, Turkey, Canada, Australia, Denmark, and Norway. The partners recently met and all expressed their continued commitment and support for the program.

In October 2010, Israel signed a letter of agreement to purchase 19 F-35A aircraft for $2.75 billion, with deliveries scheduled to begin in 2016. In December 2011, Japan selected F-35 using a competitive process. Japan signed a $6 million agreement to conduct F-35 studies on February 1, 2012. Japan is expected to sign an agreement to purchase the first 4 of a planned acquisition of 42 CTOL aircraft in the summer of 2012. Deliveries will begin in 2016. On January 20, 2012, the Republic of Korea released a competitive Request for Proposal for acquisition of its future fighter. The F-35 team is developing a proposal that will be delivered in June 2012.

Development Program restructure

The F-35 development program has been re-planned and is now resourced with realistic planning factors to complete the required Block 3 capability testing by the end of 2016. Key activities that created the re-plan include the development of an Integrated Master Schedule (IMS), execution of a Schedule Risk Assessment (SRA), and completion of the Integrated Baseline Review (IBR). These efforts incorporated the 2010 Technical Baseline Review's recommendations including revised flight test rates, longer software development spans, new systems engineering processes, and reestablished technical performance measurement. This plan provides the time and resources realistically required for the development program to deliver Block 3 capabilities.

F-35 SDD Flight Test program exceeded overall test point and flight goals in

2011. The overall test point progress was 7% above the 2011 plan. The Integrated Test Force (ITF) achieved 972 test flights, a 137% increase from the total flights in 2010. The ITF also executed 7,823 unique test points, a 93% increase from that achieved in 2010. Key 2011 achievements included the completion of F-35A and F-35B Flight Science testing to support the Block 1 Training envelope; the accomplishment in 2011 of 268 F-35B Vertical Landings, 395 Short Take Offs and 156 Slow Landings; the completion of the first F-35B ship trials aboard USS WASP; initial land based F-35C ship suitability testing, consisting of Jet Blast Deflector testing and Catapult Structural Survey and Steam Ingestion testing; the first test of the F-35C launched by the Electromagnetic Aircraft Launch System (EMALS); completion of Radar Cross Section Baseline testing on 3 aircraft and the completion of Block 1A Mission Systems Maturity Testing. The 2012 F-35 flight test plan calls for the execution of 1,001 flights and 7,873 test points and we are currently ahead of plan on all fronts. We expect to see this high level of performance continue through 2012.

Pratt & Whitney F135 engines have completed a total of 21,857 operating hours, 9,106 hours on flight-test and production engines, and a total of 2,908 hours of flying time on all three variants of F-35 aircraft."

Pratt and Whitney is currently supporting flight test on all three variants at three locations. Based on the total F-35 program restructure, the Pratt and Whitney contract is being adjusted to support the extended ground and flight testing required to complete SDD and to resource the resolution of integration issues currently in view.

In 2011, Pratt and Whitney F135 engines helped flight test exceed all goals. Various engine "firsts" were also achieved including a maximum speed demonstration

(1.6 Mach).

Production Program Restructuring

The F-35 aircraft manufacturing plan, as adjusted in September 2010, continues to exhibit dependable aircraft assembly up to the point of aircraft rollout to the flight line. Current production performance to the September 2010 baseline is about 14 days behind schedule to aircraft roll-out from the factory, and about 4 months behind for aircraft roll-out to government acceptance. In 2011, the production program finished deliveries of the remaining SDD test aircraft (one CTOL, one STOVL, and two CV). One more Navy test aircraft, CF-5, is scheduled to deliver in 2012 as part of the Low Rate Initial Production (LRIP) 4. Included in the 2011 deliveries were nine LRIP aircraft (LRIP 1 and part of LRIP 2), for a total of 13 aircraft delivered out of 20 planned.

During the last year we have increased attention to manufacturing quality metrics, including supplier quality, assembly and test. Additionally, we have incorporated oversight into the contractor's supplier risk management process to ensure timely awareness of problems in the supply chain.

Pratt & Whitney has delivered 41 F135 Production propulsion systems. From early 2011 to the beginning of 2012, Pratt & Whitney has improved their delivery rate, increasing from 1 per month to now 2 per month consistently, staying ahead of aircraft deliveries. Spare engines have also been delivering to Eglin to support current flight and sustainment efforts.

The Department of Defense established the F-35 program in 2001 with a planned

measure of concurrent development and production that attempted to balance cost, risk, and the need for tactical aircraft modernization. That plan had unfounded optimism in time and resources, driven by assumptions about design stability through the test program. The development program is taking longer and costing more to overcome technical issues that have been discovered. Concurrency generated impacts. Changes that must be made to the production aircraft due to problems found in testing are very real and affect schedule and cost in hardware, software, test and production. However, concurrency is a transient issue in which risks progressively decline through the end of SDD and the test program. Concurrency changes have also been taking an unacceptable time, two to three production lots, to incorporate into the build baseline. These issues are being addressed with the incorporation of strong contract incentives to the prime contractor and by slowing the rate of production in 2013 and 2014. Concurrency risk will progressively recede between now and 2015, when second-life fatigue testing should complete for all variants and flight test will be through 80% of the loads envelope.

Development Risk Mitigation and Control

The three F-35 variants are encountering the types of development problems historically encountered on highly sophisticated state-of-the-art high performance aircraft development programs at this stage of maturity. While risk does remain in the balance of the development and flight test program, there is no known design issue that cannot be overcome by effective engineering. There is also margin in the SDD plan to account for discovery during the balance of the test program. This section summarizes the major risks and the steps that are being taken to address them.

Software development and flight test of mission systems are the primary drivers

to completion of the System Development and Demonstration (SDD) program. These program drivers were highlighted in the 2010 Technical Baseline Review and were a major focus of efforts to restructure the SDD program. Some of the solutions in the restructured program include additional planning for software rework and integration, as well as increasing lab capacity, which comes on-line in October 2012. The program plan includes three basic capability steps in this concurrent development. Block 1 is for initial training, Block 2 is for initial warfighting capability and Block 3 is the required full warfighting capability for the Services. Each year of production delivers a version of one of these software blocks at government acceptance. Technical difficulties encountered in Block 1 and initial Block 2 development resulted in schedule delays. The performance in software development is under intense scrutiny by the program, and industry performance must improve to deliver within the boundaries of time and funding in the replanned program.

The pilot's helmet for the F-35 is a major technological advance and a design challenge. Three helmet technical risks affecting the original helmet design are night vision acuity, stability of the symbology or frame "jitter", and the latency of the displayed information. The second generation of the original helmet is the desired solution for its capability to display all information on the visor, day and night, without goggles. As a result of testing, the program now understands the measured latency that is acceptable for pilot tasks and this understanding is leading to cost effective system adjustments. Improved night vision acuity will be evaluated with new camera technology and visor symbology jitter will be evaluated with small inertial measurement units embedded in the helmet itself. As risk reduction, the program has funded development of a night vision

goggle-based alternative helmet solution. The goggle-based helmet development will continue until we see demonstrated improvement in the three risk areas. A system-level design review will occur in the Fall of 2012 where the program will evaluate the development performance of both helmet designs.

During land based ship suitability testing, the F-35C tailhook did not catch the arresting wire. Comprehensive system improvement is ongoing and involves damping of hook bounce and hook point shape adjustment. Testing will be conducted in 2012 to evaluate the new design.

Early Fuel Dump testing revealed that fuel was migrating within the wing during fuel dumping and the fuel was impinging on the underside of the wing. Improved seals within the wing will mitigate the migration issue and the program is pursuing improvements in the fuel dump system to resolve the fuel impingement issue.

The flight test program continues to address known aero performance issues like Transonic Roll-Off (TRO); TRO is an issue every swept wing fighter has to deal with. We continue to refine our flight control laws to minimize the impact of TRO. At this point in testing, we're confident we have reduced TRO to an acceptable level for the F-35A and F-35B. The F-35C TRO testing is underway at this time.

Durability testing for the F-35B was restarted in January 2012. The test was halted to correct the bulkhead design in November 2010 and was one of the reasons cited for the F-35B "probation". This delay in the testing does not directly impact the flight test program or production schedules.

Aircraft are experiencing higher than predicted buffet during flight test and have not yet reached areas of highest predicted buffet loads. Flight testing in 2012 will assess

the operational impacts to aircraft tracking and other requirements affected by buffet at low angles of attack. Future flight test will include higher buffet loads where the program will evaluate structural and systems fatigue impacts.

Cost Risk Mitigation and Control

The December 2011 Selected Acquisition Report (SAR) reflects the new approved Acquisition Program Baseline (APB) which sets the program cost, schedule and performance baseline. SAR 2011 has been updated from Base Year (BY) 2002 dollars to BY 2012 dollars. SAR 2011 and the APB reflect two sub-programs: F-35 Aircraft and F-35 Engine.

There are two facets of inflation that impact the SAR. First, the F-35 baseline costs have increased approximately 22% as the program transitioned from SAR 2010 (BY02) to SAR 2011 (BY12). Secondly, inflationary assumptions have a significant impact to the Operating and Support (O&S) cost estimate as it is applied over the next 50+ years.

The SAR 2011 total program cost estimate in Then-Year (TY) dollars includes both the Acquisition and the Operating and Support cost; these include the Research, Development, Test and Evaluation estimate - $55.2B, the Procurement estimate - $335.7B, the Military Construction estimate - $4.8B and the O&S estimate - $1,113.0B. The total cost estimate for the program is $1,508.7 (TY$B) over the life of the program which began in 1994 (70+ years).

Control of production costs is being achieved in part by movement from cost plus to fixed price contract types. The F-35 LRIP Lot 4 aircraft and F135 engine contracts purchased 30 Air Systems for the United States, plus one for the United Kingdom and another for the Netherlands. The Lot 4 contracts were negotiated as fixed-price-incentive-fee (firm target) (FPIF) type contracts. The prime contractor, Lockheed Martin Aeronautics Company (LM Aero), is projected to overrun LRIP 4 costs by approximately 7%. This overrun percentage is approximately half the overrun experienced on the F-35 LRIP Lots 1 to 3 cost-reimbursement-type contracts. On the LRIP Lot 4 contracts, overrun costs on the aircraft and engines are shared equally between the government and the contractor until the overrun exceeds 20% of the target cost, at which point the contractor is responsible for all additional overrun costs.

FY 2011 Lot 5 fixed-price airframe and propulsion system production contracts

The FY 2011 airframe and engine contracts for Lot 5 were initiated via Undefinitized Contract Actions (UCAs) in the month of December 2011. The UCAs incorporate FPIF terms for the procurement of 30 aircraft and engines (21 F-35A, 3 F-35B, and 6 F-35C) but are being modified to procure one additional F-35A for the U.S. Air Force and one additional F-35C for the U.S. Navy, for a total FY 2011 purchase of 32 Air Systems. This brings the total number of Air Systems procured on the program to 95.

In Lot 5 the government's cost risk is being mitigated by transferring some responsibility for concurrency cost risk to the prime contractor for the first time. The terms of the UCA include a "cost-sharing/no fee" contract arrangement for known concurrency changes identified at the time of UCA award. The Government and LM

Aero will share equally (50/50) in these costs (estimated at $150 million) with no fee for the known concurrency changes specified in the UCA. Newly discovered concurrency changes will be added to the contract as Engineering Change Proposals (ECPs) and will cause a renegotiation of the target cost of the aircraft, but with no profit.

The Office of the Secretary of Defense's (OSD) Director of Defense Pricing led an F-35 LRIP 5 "Should Cost" effort from the contractor proposal submittal in late April 2011 through early October 2011. Following an OSD Peer Review, LRIP Lot 5 negotiations commenced on December 9, 2010 and are heavily informed by the F-35 LRIP Lot 5 "Should Cost" conclusions which are based on actual experienced costs. Negotiations on the definitized contracts for Lot 5 are anticipated to conclude in late Spring.

An effective Earned Value Management System (EVMS) is critical to monitoring performance and controlling costs. In 2007, a Defense Contract Management Agency (DCMA) review found the LM EVMS to be noncompliant with EVM guidelines. Although both parties engaged in a focused effort to bring the LM Aero EVMS into compliance, appropriate corrections were not completed and DCMA decertified the LM Aero EVMS in 2010. LM Aero has been working to complete its EVMS corrective action plan (CAP). LM CAP actions include development of new tools and processes as well as modifications to core management processes. A DCMA EVMS compliance validation review is underway and is scheduled to finish in the next few months. DCMA continues to work with LM to bring the LM EVMS to full and sustainable compliance.

In accordance with DoD Federal Acquisition Regulations, the DCMA imposed a 2% withhold against F-35 LRIP 5 Progress Payments as part of last year's Undefinitized

Contract Action (UCA). This 2% withhold is a result of the disapproved status of LM Aero's EVMS. The withhold will remain in place until LM Aero's EVMS deficiencies are corrected and the system regains approval status.

FY 2012 and FY2013 contracts

The JSF Program Office will obligate the majority of FY 2012 and FY 2013 procurement dollars to fixed-price-type contracts for F-35 aircraft and F135 engines. The JSF Program Office will ensure that future U.S. aircraft and engine procurements comply with Section 143 of the National Defense Authorization Act (NDAA) for FY 2012, which provides: "…[t]he Secretary of Defense shall ensure each of the following: (1) That the contract is a fixed-price contract. (2) That the contract requires the contractor to assume full responsibility for costs under the contract above the target cost specified in the contract."

The F-35 Lightning II Joint Strike Fighter Program is implementing an event based contracting strategy for Low Rate Initial Production (LRIP) Lots 6 and 7 that buys aircraft production quantities based upon development and test progress. This strategy provides a means to have control (a "dial") on production that is informed by demonstrated development performance against the 2012 plan and concurrency cost risk reduction.

The Department will request Lockheed Martin provide a consolidated proposal for LRIP Lots 6 and 7 based on the following structure:

- Award 25 FY12 Lot 6 aircraft (31 are authorized/appropriated)
- Provide flexibility to procure 0 to 6 remaining FY12 funded Lot 6 aircraft concurrent with the Lot 7 contract award in 2013
- Link total aircraft quantity ultimately procured in Lot 6 to development performance and concurrency cost risk reduction

The Department will decide to award the additional aircraft based on progress expected in 2012, as planned and resourced in the development program Integrated Master Schedule. This schedule is executable, appropriately resourced, includes sufficient margin for issues that are normal in a development program, and has been agreed to by both Lockheed Martin and the F-35 program office.

Specific decision criteria include, but are not limited to, the following:

1. Planned 2012 System Engineering Technical Reviews for Block 3 software
2. Lockheed Martin progress improving concurrency change incorporation, both forward into production and back fit post delivery modification engineering.
3. Planned 2012 progress in F-35A, F-35B, and F-35C durability testing
4. Planned 2012 progress in flight test
5. Planned 2012 Line Replaceable Units (LRU) qualification

These criteria will enable the Department to determine that the additional quantity of six Lot 6 aircraft can be in optimum configuration. Each successive contract will include sharing of known concurrency changes, until concurrency change generation recedes, as we have on contract now with LRIP 5.

Currently appropriated FY12 funding is necessary to implement this contracting strategy. The variable quantity of up to 6 Lot 6 aircraft will be paid for with the FY12 funds originally authorized and appropriated for their purchase; however, these funds will not be obligated on contract until FY13.

The Department intends to award Lot 7 aircraft and the Lot 6 variable quantity aircraft through fully definitized contract actions in FY13. The initial Lot 6 contract award for 25 aircraft will require an Undefinitized Contract Action (UCA) to ensure production flow is not disrupted. However, the Department does not intend to award a UCA for the 25 aircraft in Lot 6 until essential agreement is reached for Lot 5.

The strategy outlined in this testimony continues the Department's rigorous management control of the F-35 Lightning II Joint Strike Fighter. Ensuring sufficient discipline and progress in development will deliver aircraft that last their required service life, come with the required mission capability, and reduce the need to modify delivered aircraft.

Operations and Sustainment Costs

F-35 Sustainment costs are a concern across the Department. While the F-35 Joint Program Office and the Services made progress in 2011 toward reducing its estimate, there is more work to do in this area, and this is an area of increasing focus. The Services and the Department will continue to support the F-35 JPO in its disciplined approach to analyzing and reducing sustainment costs. Over the next 12 months the JPO will complete the F-35 Business Case Analysis (BCA). The results from the BCA will assist the PEO in refining the current F-35 support strategy by identifying the best mix of existing Service/Partner organic capabilities with that of the industry team to develop the optimum long term best value F-35 support solution.

This year the Services and OSD, working in concert with the JPO, will analyze options outside of the PEO's span of control to reduce operating cost. These include reviewing basing options and the sequencing of those actions, unit level manpower/squadron size and discrete sustainment requirements. Through these efforts, the Department believes the PEO and the Department can converge on a more affordable F-35 sustainment strategy. The past year was largely about making progress in testing, moving toward a stable design, and controlling the cost and risk in the production program with an initial review of sustainment costs. The next year will continue those

efforts, but the focus will shift more to identifying and implementing opportunities to reduce sustainment costs.

Conclusion

My observations and assessments over the past year give me reason to believe the basic aircraft designs are sound and will deliver. The remaining development is focused on testing and integration. Schedule and resource adjustments that have been made to the remaining development program underpin a realistic plan to deliver the required capability. While there is still risk in the program, I have confidence in the resilience of the plan to absorb expected further learning and discovery and stay on track, so long as it remains properly resourced.

Software development, coupled with flight test execution, will remain the major focus of program execution in the coming year and through the completion of SDD. I have observed past and current performance by industry on software that gives me concern about the ability to deliver full capability within the current schedule without improvement in performance. I will continue to closely examine progress and seek the changes needed to gain required performance. I have developed a solid program baseline, ensuring the program has resources, tools, and processes in place to make proactive, disciplined decisions regarding the development and delivery of incremental capabilities to the F-35 fleet. However, industry must understand that this new schedule with all of the margin and realism will not execute itself. A rededication to the characteristics of systems engineering fundamentals is crucial and I continue to speak

bluntly to industry on this issue.

Concurrency is a transient issue that the program is dealing with right now, but which will lessen over time. I recognize that while the Department of Defense would prefer to not be in this concurrent program situation, it is now my responsibility to navigate through this and deliver the most capable aircraft at the best price.

I believe the plan for negotiations for LRIP 6 and 7 will allow the Department of Defense to control production quantity based on the performance of the development program. It is important that Lockheed Martin dependably perform and establish confidence that the F-35 is a stable and capable platform.

As in any complex development program there are challenges, but I believe the enhanced capability of the JSF will provide the backbone of the US combat air superiority for generations to come. The technological capabilities of the aircraft are sound. The program's management over the past year has put in place the right fundamentals and realistic plans using sound systems engineering processes, and I am monitoring and tracking performance using detailed metrics. Overall, there is much work still ahead of us, but through the multiple reviews and adjustments in the past year I believe the Department has put the program on sound footing for the future.

Thank you again for this opportunity to discuss the F-35 Joint Strike Fighter Program. I look forward to answering any questions you have.