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SENATE ARMED SERVICES COMMITTEE
UNITED STATES SENATE

DEPARTMENT OF DEFENSE

PRESENTATION TO THE
SENATE ARMED SERVICES COMMITTEE
UNITED STATES SENATE

SUBJECT: Joint Strike Fighter

COMBINED STATEMENT OF: Dr. Ashton Carter
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Chairman Levin, Ranking Member McCain, and distinguished Members of the Committee. Thank you for the opportunity to address this committee regarding the Joint Strike Fighter.

The F-35 is the Department of Defense`s largest acquisition program, and its importance to our national security is immense. The F-35 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, multi- role, fifth-generation aircraft, capable of projecting U.S. power and deterring potential adversaries. Furthermore, the F-35 will effectively perform missions across the full spectrum of combat operations. For our international partners who are participating in the program, the F-35 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 multi-role F-35 is the centerpiece of the Department of Defense's future precision attack capability. The F-35 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. It will also serve to fulfill our commitment to NATO's dual-capable aircraft mission. The FY12 budget includes $9.7 billion for continued system development, test and procurement of 32 F-35 aircraft. In January, the Secretary of Defense announced that the Short Take-Off and Vertical Landing (STOVL) model has been placed on probation for two years, pending further successful development. The probation period limits the procurement to 6 F-35B aircraft in FY12 and FY13. This two year period will provide additional time to resolve the engineering and technical

challenges. At the end of the two year probation, Department leadership will make an informed decision on how to, and whether to proceed with STOVL.

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. In October 2010, Israel signed a letter of agreement to purchase 19 F-35A variants for $2.75B, with deliveries scheduled to begin in 2015. Through FY 2010, the nine International Partners will have provided approximately $4.45 billion of their $4.9 billion commitment to the SDD phase of the program. The United States has commitments from our allies to purchase in excess of 500 F-35 aircraft. Our first FMS case; Israel, is underway, and additionally, studies are in progress to determine other Foreign Military Sales possibilities for nations outside the partnership.

Program Status

The F-35 program team achieved a number of accomplishments over the past year, including the first flight of the first mission systems aircraft. It also saw the arrival of the first four F-35A (CTOL) test aircraft at Edwards Air Force Base (AFB), California, delivery of two additional F-35B (STOVLs) and the first F-35C Carrier Variant (CV) test aircraft to Naval Air Station Patuxent River, Maryland, and the completion of the F-35A static structural testing five months ahead of schedule with no failures. The program rolled out the first Low Rate Initial Production (LRIP) F-35A and completed 410 total F-

35 test flights in 2010. In addition, 2010 saw the successful negotiation of the first fixed price production contract which resulted in significant Department of Defense efficiencies (LRIP Lot 4). Finally, the first two F-35A production aircraft (AF-6 and AF-7) have been delivered to Edwards AFB to support SDD and an Operational Utility Evaluation prior to initial operational training at Eglin AFB this fall.

Reviews conducted in 2010 and their impact on the F-35 program

Program restructure

The program continues to experience challenges as it transitions from development to production despite the significant accomplishments. The Secretary of Defense announced a program restructure in February 2010. The restructure resulted in increased funding for development and production in accordance with Joint Estimate Team II estimates, reduced procurement by 122 aircraft over the FYDP in the FY11 PB and extended development by 13 months. It further added an additional LRIP lot prior to entering full rate production, reduced the ramp rate to less than 150 percent of the previous year's production, and upgraded the Program Executive Office position from a 2-star to 3-star flag rank. Program cost growth, including growth from the restructure, resulted in a critical Nunn-McCurdy breach in March 2010. The Under Secretary of Defense for Acquisition, Technology, and Logistics subsequently certified the program in accordance with the Nunn-McCurdy statute, allowing the F-35 program to continue.

We believe the cost estimates for production and sustainment developed during the Nunn-McCurdy process are credible, but simply unacceptable in this fiscal environment. We continue to scrutinize the F-35 Program, in addition to all programs, in order to target affordability and control cost growth. The Department has already seen

progress in controlling the cost through Should Cost methods, one of Dr. Carter's recent Better Buying Power initiatives. Should Cost estimates are allowing the Department to build the correct strategy and form the basis for contract negotiations and contract incentives.

Technical Baseline Review

Following the F-35 Nunn-McCurdy criteria certification in June 2010, the F-35 Program Office conducted the most comprehensive review of the F-35 program ever accomplished. A Technical Baseline Review (TBR) assessed the cost, schedule and technical risk of the work required to complete the F-35 System Development and Demonstration (SDD) program. The TBR was heavily dependent upon the technical strengths of Naval Air Systems Command, Air Force Aeronautical Systems Center and the Office of the Secretary of Defense.

The TBR involved more than 120 technical experts and differed from previous Joint Estimating Team (JET) assessments conducted by the Department's Cost Assessment and Program Evaluation (CAPE) office in 2008 and 2009. While the JET reviews were top-down technical program cost and schedule assessments, the TBR was a bottoms-up technical review of detailed plans at the lowest levels. It also drew on knowledge from the aircraft and engine contractors as well as the government test bases, to gain a thorough understanding of the content of the work required to complete the development program.

TBR subject matter experts formed sub teams across the various technical disciplines of test and engineering. They completed assessments of approximately 80 percent of the remaining SDD costs via interviews and detailed analyses of program data

and performance artifacts.

The TBR became the basis for additional program restructuring in the FY12 PB. The FY12 PB called for an additional $4.6 billion to complete the development effort, held F-35 procurement in FY12 at 32 aircraft, and reduced procurement by 124 aircraft over the FYDP in the FY12 PB. This restructure puts the program on solid ground, with realistic development and production goals and significant reduction in concurrency. As a result of the FY12-16 restructuring, the Air Force F-35A variant has been reduced by 57 aircraft, and the Department of the Navy F-35B and C variants have been reduced by 67.

The TBR drove several program changes to lower schedule risk associated with testing. The program has adjusted the flight test program to make temporary use of 5 LRIP aircraft, in addition to the original 12 planned SDD aircraft. The flight science portion of flight test has decoupled the three variants so that they may all proceed at their best pace and not impact any of the others. However, the mission system avionics (radar, electro optical/infrared sensor, data links, Communication and Navigation) is common for all three variants and is not being decoupled. Development testing of the common mission system and flight sciences for CTOL and CV is now scheduled to complete in the first quarter of 2016. The flight science testing for STOVL extends into the last quarter of 2016.

Manufacturing Review Team

In 2010 the same team of experts that conducted the 2009 Independent Manufacturing Review Team (IMRT) assessment, now under the direction of the F-35 Program Executive Officer (PEO) and referred to as the Manufacturing Review Team

(MRT), evaluated the contractor's plans and readiness to manufacture aircraft at the production rates outlined in the Department's program of record. The MRT concluded that the contractors could produce the programmed rates if certain process and planning improvements, identified previously in their 2009 IMRT report, continued as planned.

The 2010 TBR and the MRT were conducted with full awareness and benefit of information contained in the 2008 and 2009 JET reviews, the 2009 Joint Assessment Team (JAT) review of the Pratt & Whitney engine program, and the 2009 IMRT. The 2010 TBR and MRT reviews are the updated assessments of all the previous years' reviews and constitute the combined body of information that contributed to program adjustment recommendations to Department of Defense leadership. We believe these changes were critical to placing the program on solid ground, and are confident that these adjustments will ultimately result in program success.

STOVL Durability Testing and Aircraft Changes

Concurrency is a major element of the strategic framework of the program. Calendar year 2011 is an important year for progress. The program is performing flight test, delivering its first production aircraft, and performing sustainment of those aircraft. To manage the effects of concurrency, and any schedule and cost impacts, there is close attention and tracking of sources of change, and change integration to identify and close on overall program performance goals.

At this point in the development program, the costlier changes are primarily driven by discovery, in flight test, in static tests, in durability tests, and in line replace-able component qualifications. The TBR took into account the historical rate of change, the cost of each change, and the projected rate of change given the extension of the test

program. TBR findings have been incorporated into the program's plan for the remainder of the development effort. An example of change driven by discovery in the structural test program is the STOVL durability fuselage station 496 stress cracks. In November 2010, durability testing on the STOVL fatigue test article, BH-1, found stress cracks on the Station 496 bulkhead. In LRIP lots 1 through 4, there are 29 US STOVL aircraft in production flow. Different modifications (a blend, strap modification or new design dimensions) based upon access to the target location are required for STOVL aircraft depending on the state of manufacturing of each aircraft. Durability testing will re-commence in October 2011 after the fatigue test article is repaired. The delay in durability testing will not impact the flight test schedule, and the changes for production are anticipated to be incorporated in the current manufacturing plan and delivery schedule.

As the test program progresses, the risk of change driven by discovery is reduced. It is difficult to predict what discovery will occur in 2011. However, the TBR and development test plan contain realistic assumptions of discovery, which have fed into realistic assumptions of change and change integration, and their associated cost and schedule impacts to the program.

Software Development and Testing

The development of F-35 Mission Systems software, a component of the Air System Software, is proceeding according to a schedule adjusted as an outcome of the TBR. As a matter of fundamental process discipline, no new software blocks were created, no functionality was pushed to later blocks, and no capabilities were removed as a result of the TBR. The Mission Systems Block 1 software has demonstrated stable

performance in flight test, and will be delivered with LRIP 1, 2 and 3 aircraft. We have demonstrated, in the initial Block 1 release to flight test, expected functionality of the primary sensors, including radar, electronic warfare, Electro-Optical Targeting System, Distributed Aperture Sensor, and Integrated Communications, Navigation, and Identification. Block 1 maturation will continue through 2011, with an update this fall to include Multi-Level Security capability. Block 2 software, planned for delivery in LRIP 4 and 5 aircraft, introduces multi-ship network functionality, with the first release to flight test planned at the end of 2011. Block 3 software, having just completed requirements review, will complete the SDD development stream and provide full Operational Requirements Document (ORD) compliant capabilities. Final Block 3 software is planned to deliver to flight test in 2015, to allow completion of the mission system development in August 2016.

Engine Development Programs

Pratt & Whitney F135 engines have completed in excess of 17,237 hours of testing (ground and flight), and more than 965 hours of flight testing on all three variants of F-35 aircraft. In addition, the F-35B variants have completed more than 87 vertical landings to-date. Pratt & Whitney is currently supporting flight test on all three variants at three locations and has delivered thirteen production F135 CTOL engines and eight production STOVL propulsion systems to date. Based on the TBR, the Pratt and Whitney contract will be adjusted to support the extended testing required to complete SDD and to resource the resolution of integration issues in development up to this point.

The Department of Defense has initiated termination for convenience of the F136

engine. We believe the financial risks associated with a single source engine supplier are manageable, and are less than the investment required to fund a competitive alternate engine.

F-35 Aircraft Production and Deliveries

The F-35 aircraft manufacturing plan, as adjusted in September 2010, remains as the current baseline, and is currently on track as measured by earned hours and station flow. The final Air Force CTOL development test aircraft was delivered to Edwards Air Force Base in January 2011. There are six CTOL aircraft now at Edwards AFB in flight test. Three SDD test aircraft remain to be delivered, one STOVL and two CVs. After the delivery of those three aircraft, there will be a total of 8 aircraft, (5 STOVL and 3 CV) in flight test at Patuxent River by the summer of 2011. The original contract delivery dates for the first three years of production are all late to their original schedules. New delivery dates based upon the September 2010 adjusted manufacturing plan have 16 production aircraft projected for delivery in 2011. All 16 of these aircraft have their weight on their landing gear in the factory in Fort Worth and are tracking on schedule to the current manufacturing plan. The first two production aircraft (both CTOLs) were delivered to Edwards AFB and will contribute to flight test as planned.

The JSF Program Office provides a large number of metrics to the Congress on a monthly basis. 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.

F135 Engine Production and Deliveries

While timely delivery of the F135 has presented schedule challenges in the past, Pratt and Whitney is expected to meet the projected schedule delivery in the near future. The first seven 2011 F135 engine deliveries were each three weeks late to LM desired need dates. One more will deliver late; however, current projections indicate the remaining year's engines to make schedule targets. Slightly late engine deliveries are not predicted to delay 2011 aircraft deliveries based upon the delivery schedule in the September 2010 adjusted manufacturing plan.

FY 2010 fixed price airframe contract

The Government awarded a fixed-price contract on 19 November 2010 to Lockheed Martin Corporation; Lockheed-Martin Aeronautics Company (LM Aero) valued at $3,887,418,000 (Target Price) for the purchase of 30 JSF aircraft for the U.S., plus one for the U.K. and an option for one more for the Netherlands. This is the fourth low-rate initial production (LRIP Lot 4) contract, which brings the total aircraft procured to 63.

More specifically, this airframe contract provides for the procurement of 10 CTOL for the U.S. Air Force, one CTOL aircraft (Option) for the Netherlands, 16 STOVL aircraft for the U.S. Marine Corps, one STOVL aircraft for the U.K. Royal Navy, and four CV aircraft for the U.S. Navy. The per-variant price is $111.6M for CTOL, $109.4M for STOVL, and $142.9M for CV. In addition, this contract provides for the procurement of associated ancillary mission equipment, flight test instrumentation, and manufacturing support equipment.

During negotiations, this effort to manufacture and deliver F-35 JSF LRIP Lot 4 aircraft was converted from a cost-plus-incentive-fee to a fixed-price-incentive-fee (firm target) (FPIF) contract. This contract-type conversion occurred two years earlier than envisioned in the acquisition strategy.

Any overrun to the Target Cost will result in an equal sharing of overrun costs between the Contractor and the Government up to the ceiling price of the contract. Above the ceiling price of the contract, Lockheed Martin bears the burden of all costs. Should the Contractor under run the Target Cost, the Government and Contractor will share equally in the under run savings.

FY 2010 fixed price engine contract

The FY 10 engine contract was initially awarded via an Undefinitized Contract Action (UCA) in July 2010 with Pratt & Whitney at a Not-to-Exceed value of $949M. The UCA incorporated FPIF terms for the procurement of 32 engines (11 CTOL, 17 STOVL, and 4 CV, including 1 UK STOVL and 1 NL CTOL as Options) and retained Cost Plus Incentive Fee (CPIF) terms for Production Non-Recurring (PNR) Tooling and Logistics/Sustainment efforts. The procurement of PNR Tooling and Logistics/Sustainment efforts continued on a CPIF basis since the Government does not currently have sufficient cost data to adequately price and allocate risk for a FPIF-type contract. This UCA did not provide coverage for Spares since delivery timelines were not sufficiently urgent at the time the UCA was executed.

A preliminary settlement agreement was reached between the Government and Pratt & Whitney in February 2011 for the above effort, including the procurement of 5

spares (3 CTOL and 2 STOVL). Contract award occurred on 13 May 2011. The per-variant price is $14.99 million for CTOL/CV and $32.07 million for STOVL.

Any overrun to the Target Cost (FPIF effort) will result in an equal sharing of overrun costs between the Contractor and the Government up to the ceiling price of the contract. Above the ceiling price of the contract, Pratt & Whitney bears the burden of all costs. Should the Contractor under run the Target Cost, the Government and Contractor will share equally in the under run savings.

Cost plus contracts for the FY 2010 F-35 procurement appropriation

In addition to the above-referenced LM Aero Airframe and Pratt & Whitney Engine acquisitions, the F-35 Program Office is currently in negotiations with LM Aero for the procurement of Logistics/Sustainment efforts and PNR Tooling. At present, the Government does not have sufficient cost data on Logistics/Sustainment or PNR Tooling efforts to adequately price and identify risk for a FPIF-type contract. As a result, the Government determined that these efforts will continue to be procured under cost reimbursement type contract(s).

The LRIP Lot 4 F-35 Logistics/Sustainment effort (Recurring Sustainment Support, Training, Support Equipment, and Spares) was initiated 16 September 2010 by means of a UCA with a NTE value of $511M. Negotiations for the Recurring Sustainment Support, Training, Support Equipment, and Spares are anticipated to conclude in late May 2011.

F-35 PNR Tooling for lead-time-away procurement to support F-35 production ramp rate was initiated via a UCA awarded to LM Aero on 19 July 2010 with a NTE

value of $820M. Negotiations for the PNR Tooling are anticipated to conclude in late summer 2011.

FY 2011 Contracts

The F-35 Program Office has received the LRIP 5 proposal for the FY11 procurement. This proposal was delayed due to uncertainty in the aircraft quantity being procured in the absence of an FY11 Appropriation Act. Proposal analysis is underway with negotiations expected to conclude by the end of the calendar year.

Similar to FY10, the F-35 Program Office will apply the majority of FY11 procurement dollars to FPIF-type contracts for F-35 aircraft and F135 engines. For the reasons cited above, PNR Tooling and Logistics/Sustainment efforts will be procured using a cost-reimbursement-type contract.

Sustainment focus

One of the key issues facing the department is driving down the overall unit cost of the airplane and getting our collective (joint) arms around the sustainment of this weapon system. We know that 70% of overall life cycle cost is in sustainment and the department is examining the major drivers of sustainment cost and aims to capitalize on opportunities to reduce cost. The Department is working to provide knowledgeable estimates of the 10 largest cost drivers of sustainment: 1) maintenance man-hours per flight hour and meantime between repair; 2) establishing a joint sustainment system; 3) balancing modern sustainment capabilities with legacy capabilities; 4) striking the right balance of government and contractor capabilities; 5) getting the right division of labor in international sustainment capabilities 6) aircraft bed down plans; 7) spares costs;

8) support equipment costs; 9) manpower; and 10) training. We are analyzing each of these cost drivers to place a laser focus on ultimately fielding an affordable system.

PEO Evaluation of Cost, Schedule and Performance Risk to the F-35 Program

The schedule and resource adjustments to the remaining development program create a plan with realism to deliver the required capability. We have confidence in the resilience of the plan to absorb further learning and discovery and expect the program to stay on track, so long as it remains resourced as recommended by the TBR.

While still early in the year, the pace of testing is increasing flight test hours and test point accomplishment at higher rates from January 2011. Concurrency of testing and delivering production aircraft for fleet training operations in 2011 demands assessment of the system maturity to enable each service's systems command granting air worthiness clearances for unmonitored fleet operations. The test points are planned with realistic refly margins to progress in a deliberate way to support this maturity assessment. Progress to initial sea trials for STOVL is tracking solidly to support operations at sea in October 2011. For each technical issue unique to the STOVL model apparent today, there are engineering solutions leading to sound mission performance. Weight will be under closest scrutiny and management attention. The four highest development risks on the program risk management board are software development concurrency (TBR replan has assessed and extended the schedule, and early code writing and lab integration testing performance measures are being closely monitored), pilot vehicle interface, STOVL Vertical Lift Bringback (VLBB) and Helmet Mounted Display. We have put in place a detailed risk management process to address these and all program risks.

Production emphasis continues on dependable delivery schedule, quality and lower cost. The manufacturing plans will be managed to optimize delivery rates as they change due to US and foreign partner procurement adjustments. While not a long record, the program has shown the ability to keep a tight manufacturing flow for eight straight months since the last adjustment. Previous manufacturing plans were sliding aircraft deliveries by approximately two weeks every month. We believe the details are being managed, and span time improvements and margins in place are all bringing realism and resilience to improving schedule performance in manufacturing. In-process manufacturing quality metrics are being tracked and illuminating the need to improve on a continual improvement basis. The external result of product quality in the fleet's hands will come into view as production aircraft begin to support training later in fall 2011.

Conclusion

The enhanced capability of the F-35 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 we are 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 we believe we have put the program on sound footing for the future.

Thank you again for this opportunity to discuss the F-35 Lightning II program. We look forward to answering any questions you have.