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THE HOUSE ARMED SERVICES COMMITTEE

STATEMENT OF
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F-35 LIGHTNING II PROGRAM

BEFORE THE
TACTICAL AIR AND LAND FORCES SUBCOMMITTEE OF THE
HOUSE ARMED SERVICES COMMITTEE

ON
FISCAL YEAR 2025 BUDGET REQUEST OF THE DEPARTMENT OF DEFENSE FOR
FIXED-WING TACTICAL AND TRAINING AIRCRAFT PROGRAMS

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INTRODUCTION

Chairman Wittman, Ranking Member Norcross, and distinguished Members of the subcommittee, thank you for the opportunity to provide an F-35 Program update. In December 2023, I testified before this subcommittee on topics spanning F-35 development, production, and sustainment. The subcommittee highlighted priorities including engine power and cooling modernization, test infrastructure enhancements, digital engineering initiatives, supply chain maturity, the program's future sustainment strategy, Technology Refresh 3 (TR-3), and Block 4 delivery. As you know, development and production concurrency is Block 4's most critical challenge, and we are dealing with its consequences today. Since my last testimony, the F-35 Joint Program Office has maintained unequivocal focus on these efforts as we work to make congressional and warfighter expectations a reality. I look forward to offering updates regarding progress across these fronts, and to sharing details on the work that remains.

Amid these efforts, the Department of Defense's official declaration of Milestone C and formal Full Rate Production decision in March 2024 gives credence to the acquisition maturity taking place within the F-35 Enterprise. For over twenty years, F-35 stakeholders have laid the groundwork for a 5th Generation Air System that is operating around the world today—and planned for employment by U.S. and international users for decades to come. With this milestone behind us, we enter a new chapter as we make an unrelenting push to modernize this platform for the future and drive sustainment excellence throughout the fleet. TR-3, a Reimagined Block 4, propulsion modernization, and the upgrades that will follow, depend on the work we must execute today. The F-35 Program represents professional acquisition at its highest level – and I'm tremendously proud of the team working to bring these objectives to life. As this subcommittee knows, the efforts that got us here will not be sufficient to get us where we are going. Success will

continue to require the best personnel, software practices, facilities, supply chains, and industry partnerships our U.S. and international teammates can offer. I have no doubt we will continue to face and overcome complex challenges, and I assure you the F-35 Joint Program Office team remains up for the challenge.

Program Progress

In the brief time since I last testified before this subcommittee, F-35 U.S. and international stakeholders made significant progress. In December, South Korea announced the purchase of twenty F-35As, in addition to forty jets the nation already received. In the same month, Australia signed stage two of a facility services deed enabling construction of seven additional maintenance bay facilities in the country's Hunter Valley. Meanwhile, the F-35 JPO and Naval Information Warfare Center Atlantic delivered the first Government Furnished Equipment Operational Data Integrated Network (ODIN) Country Kit to Lockheed Martin for software integration and testing. This innovation addresses Autonomic Logistics Information System (ALIS) hardware obsolescence and accelerates technology insertion to improve readiness.

In January, The Netherlands declared initial depot capability for a sovereign F-35 Maintenance, Repair, Overhaul, and Upgrade (MRO&U) facility at Woensdrecht Air Force Base. In Japan, the Mizuho Regional Engine MRO&U facility declared initial depot capability for F135 power modules. From an operational perspective, the Royal Norwegian Air Force successfully deployed F-35s to Iceland as part of NATO air surveillance missions in the region. Meanwhile, U.S., United Kingdom, and Australian team members participated in Red Flag exercises at Nellis Air Force Base, where users experienced realistic, high-end combat scenarios. In late January, personnel from the Vermont Air National Guard's 158th Fighter Wing traveled to Savannah Air

National Guard Base for an Agile Combat Employment exercise known as *Maple Thunder*. On 29 January, the Czech Republic finalized an agreement to procure twenty-four F-35A aircraft, making the nation the F-35 Program's tenth Foreign Military Sales customer. That same month, the Department of Defense concluded its F-35 Technical Baseline Review by providing findings associated with Block 4 schedule, hardware maturity, software, and workforce considerations. Joint Program Office personnel are implementing many associated findings as we work to drive cost, schedule, and performance rigor throughout Block 4 development and delivery.

In February, F-35 stakeholders gathered for a Corrosion Summit where team members identified new corrosion prevention initiatives to maximize mission capability across the fleet. During the same month, F-35 suppliers delivered the 3,000th Gen III Helmet Mounted Display System. Meanwhile, U.S. Marine Fighter Attack Squadron 121 deployed aboard USS America, and the U.S. Air Force's 48th Fighter Wing unveiled a new training facility at Royal Air Force Lakenheath, United Kingdom. As operational activities continue, fleet availability remains a top enterprise priority. Since our War on Readiness began, mission capable rates have increased, but not enough. For several days in February, the fleet's mission capable rate clocked in at 64.2%. While surges in readiness offer a glimpse of what's possible in the months ahead, our focus remains on elevating readiness rates for years, not just months and days. Later in February, U.S. Air Force 4th Fighter Squadron F-35As assigned to Hill Air Force Base participated in combined training with the U.S. 7th Air Force and Republic of Korea Air Force fighter aircraft during a temporary deployment to Osan Air Base, Korea.

March 2024 was one of the most significant months in F-35 acquisition history. The Director, Operational Test and Evaluation (DOT&E) released the formal F-35 Initial Operational Test and Evaluation (IOT&E) report, which evaluated F-35 combat effectiveness against current

and future threats and assessed the fleet's sustainment posture. Meanwhile, the F-35 demonstrated its capability throughout the month at *Nordic Response*, a large-scale field exercise in Finland, Norway, and Sweden. 20,000 warfighters from 13 countries including Norway, Finland, Germany, Sweden, the UK, and the U.S. engaged in training activities. The U.S. Marine Corps, Royal Air Force, Royal Navy, and Royal Norwegian Air Force deployed F-35s during the exercise. Also in March, the F-35 JPO awarded a contract modification extending the existing FY23 recurring sustainment contract period of performance through 30 June. Several weeks later, U.S. and international leaders gathered in Washington, D.C. for a semiannual JSF Executive Steering Board (JESB) meeting. The same week, Air Combat Command completed its first ever F-35A Nuclear Weapon System Evaluation Program by successfully dropping two Joint Test Assemblies. As the month came to an end, we reached an out-of-court settlement with Lockheed Martin in ongoing litigation concerning an intellectual property dispute centered on "F-35 In a Box" software. After nearly five years of litigation, the agreement enables future F-35 In a Box deliveries and opens the door to Government software development opportunities in key program areas. This also enables the Joint Simulation Environment (JSE) to support operational test and advanced tactics development and training as Block 4 is delivered.

As noted above, on 12 March, the Department of Defense declared Milestone C and formally announced a Full Rate Production decision. The Department made this determination after considering F-35 Combined IOT&E and Live Fire Test and Evaluation Report results, System Development and Demonstration exit criteria, statutory and regulatory documentation compliance, future production strategy, and draft acquisition program baseline details. Proceeding to Milestone C and Full Rate Production required manufacturing process control, acceptable performance and reliability, adequate sustainment infrastructure, and support system establishment. Reaching this

milestone represents a whole-team effort and I am tremendously proud of the Government and industry workforce that made it possible.

CONGRESSIONAL FOCUS AREAS

While recent months have borne significant progress across the enterprise, the F-35 Program has faced its share of challenges. At a December 2023 Tactical Air and Land Forces hearing, the subcommittee noted its patience with F-35 development delays is wearing thin. The committee referenced four areas of concern including TR-3 development and fielding, propulsion and power thermal management modernization and requirements, sustainment strategy planning, and potential software capability development and testing strategies. As your Program Executive Officer, I remain committed to owning and addressing these matters head on. I understand the subcommittee also remains interested in the F-35 IOT&E report's recommendations, Block 4 delivery, future production plans, and other key topics. While these are difficult and complex challenges, their resolution is fundamental to delivering the capable, available, and affordable F-35 our warfighter expects. The following testimony provides updates on these *Congressional Focus Areas*, followed by additional program updates.

TR-3 Development and Fielding

TR-3 has taken far too long to deliver. To get a full understanding of development issues, we initiated a Software Architecture Independent Review Team early this year. While the Independent Review Team's work continues, their initial findings highlight hardware design maturity as a significant complicating factor in software integration. Today, this hardware maturity manifests in low manufacturing yields of parts necessary for aircraft production. We also find

ourselves using software to overcome hardware design maturity challenges. The Software Independent Review Team's initial conclusion is that we have a solid software architecture, but until the underlying hardware is fully mature, the F-35 Program will continue to struggle with software integration efficiency.

The Software Architecture Independent Review Team also made significant observations about system performance, labs, effect of diminishing manufacturing sources on Technology Refresh programs, and the industry and Government technical workforce. We are planning to act on all Independent Review Team findings, as we mitigate risk in the remaining schedule to field combat capable TR-3 configured F-35 aircraft.

The first realistic opportunity for TR-3 aircraft acceptance is July 2024, and even that date bears risk. The Software Architecture Independent Review Team predicts that delivery in August or September 2024 is more likely. TR-3 aircraft acceptance depends upon completing a stable, capable, and maintainable software build for release to flight test. Achieving this depends upon fixing specific issues in TR-3 software. The F-35 JPO and industry are working intensely to resolve the deficiencies to improve software stability on the ground and in the air. Future risks hinge upon whether TR-3 will require additional incremental software releases to test and implement critical fixes. If risk manifests in labs or flight test, TR-3 may require additional software releases (taking between two and six weeks per release).

The F-35 JPO is working with warfighters across the U.S. Services, F-35 Partners, and Foreign Military Sales customers on a plan to deliver TR-3 software in two releases. The first release (40P01) is a truncation of the TR-3 software at a point when the code is stable, capable, and maintainable to deliver TR-3 configured aircraft for use in combat training, but it is not until

the second software release (40P02) that full combat capability is realized. F-35 JESB stakeholders have approved TR-3 truncation acceptance criteria.

While these circumstances are not ideal, the decision to truncate TR-3 software has significant benefits – including delivering F-35 aircraft to support training squadrons, stand-up of new squadrons, exercising TR-3 maintenance, and decreasing the time that F-35s are parked in long term storage. Truncation also allows the F-35 Enterprise to fully transition personnel, labs, and flight test capacity onto the next Block 4 software release (40P02) which provides significantly more combat capability. We are working closely with our industry counterparts to ensure accountability and collaboration throughout this effort and will continue to eliminate risk wherever possible. The F-35 Program’s primary development objective remains delivery of safe, stable, capable, and maintainable TR-3 aircraft to the fleet.

Engine and Power Thermal Management Modernization

The Engine and Power Thermal Management Modernization (EPM) pre-acquisition program is an engine and air vehicle modernization program that supports future Mission Systems capabilities while restoring engine life. It consists of engine modernization and Power Thermal Management Upgrade (PTMU) and is progressing with support from the U.S. Services, Congress, and our International Partners. The JPO is working with the Services, Department of Defense, and Congressional Defense Committees to align EPM within the F-35 portfolio to ensure proper oversight.

The F-35 Program remains committed to executing EPM as we provide increased cooling and electrical power generation required to support capabilities beyond Block 4 for all variants while reducing lifecycle costs through engine life restoration. Engine Core Upgrade (ECU) risk

reduction design efforts have progressed nominally, with propulsion leaders from the Departments of the Air Force and Navy reviewing the process regularly. The JPO is continuing to develop and refine subsequent phases of the EPM acquisition strategy, including market research.

The F-35 Program is working aggressively to meet EPM requirements, including congressional report requirements associated with this topic. More than a dozen studies supporting the cost-benefit and technical risk analysis are complete or ongoing. This analysis will continue for various vehicle systems into 2025. The JPO remains in discussions with the Office of the Secretary of Defense, Cost Assessment and Program Evaluation (OSD CAPE) on when to begin an EPM independent cost estimate and will continue to engage with OSD stakeholders as we move toward establishing EPM as a major subprogram to the F-35.

Sustainment Strategy Planning

When I last testified before this subcommittee, I emphasized the F-35 JPO's commitment to ensuring contracts fairly and effectively motivate industry behavior to meet fleet readiness requirements. At that time, in close coordination with DoD and U.S. Service senior leadership, the F-35 JPO paused its path to a system-level Supply Chain Performance Based Logistics (PBL) construct with Lockheed Martin. Today, the F-35 JPO is committed to ensuring the F-35 fleet has the required Air Vehicle Sustainment contract coverage. With the pause of system-level Supply Chain PBL efforts, the JPO implemented a contract strategy to provide air vehicle sustainment coverage through calendar year 2028. The JPO awarded extensions to the FY21-23 contract to cover the fleet through June 2024. In parallel, the JPO is negotiating a follow-on Air Vehicle Sustainment Contract (AVSC) in two phases. The first phase will award by 1 July 2024 and provide fleet coverage through Calendar Year 2024. The second phase will award by 1 January

2025 and provide options for coverage through Calendar Year 2028. This four-and-a-half-year contract provides sufficient time to develop a new sustainment strategy around the Fiscal Year 2022 NDAA Section 142 requirement to transition sustainment responsibilities to the U.S. Services. Maximizing readiness is the annualized contract's primary objective. The F-35 Program established an Air Vehicle Sustainment Performance Working Group with U.S. Service and Partner representation to improve upon the performance incentive construct that exists in current air vehicle annualized contracts. This incentive construct will be part of the award on 1 January 2025, and will be built to drive the right industry behaviors as we work together to improve readiness.

Software Development Strategies

As noted previously, the F-35 JPO chartered a Software Architecture Independent Review Team of U.S. Air Force, U.S. Navy, academic, and industry software experts to evaluate TR-3's architecture for any flaws that prevent execution. The team determined the F-35 Program has inadequate digital infrastructure for modern software development across industry labs, resulting in extensive regression testing and late discovery of defects. Software Architecture Independent Review Team recommendations include leveraging 'Iterative Integration' to minimize significant hardware concurrency, embracing a 'Model-Sharing' construct among Lockheed Martin and suppliers to facilitate collaborative integration and test, and significantly improving digital infrastructure for industry-to-industry and Government-to-industry connections for collaboration in a digital virtual environment. The F-35 JPO is exploring which commercial software development processes are most appropriate to modernize software architecture, and we are

partnering with industry to identify the digital infrastructure needed to discover defects early in the software development process.

The F-35 Program is working to establish and implement digital engineering, modeling, and simulation initiatives to reduce operations and sustainment costs while increasing aircraft availability and mission capability rates. The Government and industry team began efforts to transform engineering and capability development activities toward a model-based approach in 2019. The program has developed seventeen “born digital” Block 4 capabilities and twenty-eight Program of Record capabilities using digital models. F-35 Air System Model (ASM) development continues to mature and will generate source data for technical reviews and certification events.

The F-35 Enterprise remains focused on upgrading modeling and simulation fidelity to discover defects earlier in development. High-fidelity digital modeling and simulation in the Multi-ship Virtual Development Lab (MVDL), Hardware in the Loop (HITL) lab, and DoD anechoic chambers all have the potential to drive test optimization, alleviate flight test capacity demand, and reduce cost by identifying defects earlier. As noted above, the agreement reached on F-35 In a Box in March has significant implications for organic software development and paves the way for users to begin integrating current F-35 operational software into the JSE, and to prepare for follow-on test and evaluation of Block 4 capabilities. Meanwhile, the F-35 JPO is working closely with the OUSD Research and Engineering Test Resource Management Center to establish a common data management system for data analysis of development and operational test data, while enabling data sharing and collaboration with applicable Government and industry test sites, other platforms, and their domains. This data management system will support modeling and simulation accreditation, capability-level verification, and mission-level test and evaluation of F-35 effectiveness, suitability, and survivability.

These and other F-35 digital engineering efforts are beginning to yield results. F-35 In a Box completed ‘for score’ events in September 2023. Joint Operational Test Team (JOTT) members ran and validated sixty-four scenarios during a two-week event in the JSE facility at Naval Air Station Patuxent River, paving the way for F-35 IOT&E closure. I’m grateful to the collective Air Force Operational Test & Evaluation Center, Naval Air Systems Command (NAVAIR), DOT&E, JOTT, JPO, and Lockheed Martin Team that brought JSE to life and made this success possible. During the same month, the F-35 Program closed the first two Multi-Ship Infrared Search and Track (IRST) Increment One Verification Result and Reports using MVDL evidence. Increasing test facility capabilities remains fundamental to alleviating flight test capacity constraints and reducing flight test costs. As we look to the future, additional opportunities include engine predictive capabilities, enhanced determinate assembly capabilities, and creation of a microelectronics hardware accurate digital twin.

Despite this progress, significant time and investment are required to improve the F-35's development infrastructure for faster software development timelines and necessary capacity given the F-35's scale and complexity. We must go faster.

F-35 Initial Operational Test and Evaluation

In March 2024, DOT&E released its F-35 IOT&E report. The classified report includes evaluations of F-35 combat effectiveness against current and future threats and assesses the fleet’s sustainment posture. The F-35 performs very well against the threat for which it was designed. However, the threat continues to evolve. The report emphasizes the importance of Block 4 capabilities. The F-35 JPO agrees with the majority of the report’s recommendations and has either already addressed, or is addressing, these recommendations through current and planned efforts.

As the F-35 Program addresses the IOT&E report's recommendations, the enterprise remains focused on reimagining and delivering Block 4 capabilities while maximizing fleet readiness. To ensure the F-35 retains its competitive edge, we must deliver Block 4 capabilities as soon as possible, and must continue to make sustainment and reliability improvements. We are committed to working with the operational test community as we move forward across these focus areas. The F-35 JPO appreciates this subcommittee's continued interest in the report's findings and looks forward to addressing any questions as required in the months ahead.

PROGRAM INITIATIVES

Since I last testified in December 2023, the F-35 Program established capability at one new base and on one new ship, bringing F-35 totals to 32 bases and 12 ships (59 squadrons in total), respectively. To date, F-35 users have logged over 815,000 flight hours across the globe. Within ten years, there will be over 600 F-35s operating in the European theater alone, and fewer than 60 will be U.S. owned. The F-35 Partnership's shared commitment and mission bring game-changing value for coalition combat and our taxpayers. I'm tremendously proud of our multinational F-35 JPO team members who work tirelessly to maximize readiness, minimize cost, and enhance survivability throughout the enterprise. The following updates address progress across corresponding Program Initiatives.

War on Readiness

In March 2023, I set a target to increase the U.S. fleetwide F-35 mission capable rate by 10% (to 64%) by the end of March 2024. To accomplish this, we initiated the 'War on Readiness' and assembled a Fleet Readiness Team dedicated to understanding and addressing complex

challenges that negatively affect fleet mission capability. With a focus on top degraders, supply and maintenance challenges, and issues affecting long-term-down and out-of-reporting aircraft, the team implemented multiple initiatives to drive improvements to the F-35 Enterprise. Two major War on Readiness initiatives include stand-up of the F-35 Readiness Control Board (RCB) to identify degraders, conduct root cause analysis, and implement corrective actions and the initiation of Readiness Health Assist (RHA) site visits to help F-35 user sites create individualized plans to mitigate unique challenges. The F-35 Executive Leadership Team is engaging directly with suppliers to ensure necessary focus is placed on top degraders affecting the fleet. War on Readiness stakeholders meet bi-weekly with F-35 users, industry, and JPO personnel to “get tactical” in addressing specific sustainment challenges. I’m extremely proud of this team’s progress over the past year.

As of March 2024, our U.S. F-35 fleet mission capable rate averaged 55.7%, up 2.6% since last year’s spring hearing. Over the past year, mission capable rates have risen above the 64% target for short periods; however, we have not yet sustained the levels of readiness our users expect. While these figures indicate only a slight improvement over the past year, and these rates remain unacceptable, the importance of establishing the War on Readiness to focus on top degraders, overcome supplier disruptions, maximize industrial capacity, remove barriers, and support the user community cannot be overstated. Due to the War on Readiness, the sustainment and supply chain data at our disposal today is greater than at any point in our program’s history. Our progress is not all aspirational – and this effort is also yielding real-time results. Since March 2023, F-35 stakeholders have resolved 21 of the top 40 readiness degraders. A small number of top degraders continue to disproportionality hinder fleet availability. If we resolved the impact of our remaining

top two degraders, U.S. Fleet mission capable rates would increase to over 70%. The program remains committed to aggressively curtailing the harmful effects of these two degraders.

The F-35 Program notes the committee's continued interest in F135 power module availability. I'm pleased to report the engine sustainment enterprise remains on track to produce power modules at a rate sufficient to meet anticipated demand. As of April 2024, the engine non-mission capable, supply (NMC-S) rate is just 1.1% against a requirement of 5%. Engine sustainment success remains critical as we expand our global propulsion maintenance nodes to meet current and future demands.

War on Cost

The F-35 Program recently marked the first anniversary of the 'War on Cost' – an initiative designed to drive affordability throughout the enterprise. The F-35 Affordability Directorate leads this initiative and is my primary conduit for holding the enterprise to account. In the 2023 Annual Cost Estimate (ACE), the F-35 JPO captured an additional \$13.6B (CY12\$) in sustainment cost reductions over the program's lifecycle, bringing the total captured savings to date to \$33.7B (CY12\$). I look forward to providing updated captured savings when the 2024 ACE is finalized.

Our efforts are yielding results across development, production, and sustainment. In terms of development, the program is working with industry partners to identify and drive out inefficiencies in capability development roadmaps. In production, the team is conducting business case analyses to support future production contracting strategy discussion, process efficiency, and automation opportunities. Sustainment efforts have yielded impressive results and are continuing to mature cost reduction initiatives as we seek out organic maintenance opportunities, increase life limits to reduce supply chain pressures, and update engine induction schedules. The F-35 JPO has

driven F-35A Cost Per Tail Per Year (CPTPY) down from \$8.7M in 2014 to \$6.4M in 2022 (CY12\$) and the Cost Per Flight Hour from \$87.3k to \$36.1k (CY12\$) over the same period. Air system affordability remains a top priority for the F-35 Program and I look forward to keeping you apprised of our progress.

War on Cyber

Recognizing the influence of the global cyber environment, the F-35 Program maintains an elevated emphasis on cyber survivability through a War on Cyber. This initiative ensures that acquisition planning and execution is infused with relevant cyber policy and guidance from development through sustainment. Since kicking off in June 2023, F-35 cyber stakeholders have achieved heightened focus on software management, enhanced cyber integration with systems engineering and test, and stronger relationships with our DoD operational cyber partners within the U.S. Services and U.S. Cyber Command.

ADDITIONAL PROGRAM UPDATES

Reimagining Block 4

Development and production concurrency remains Block 4's most critical challenge, and we are dealing with its consequences today. In Calendar Year 2023, the Defense Acquisition Executive directed an F-35 Independent Technical Baseline Review Team to assess Block 4 capabilities and requirements, delivery timelines, test infrastructure and capacity, and other resource constraints. The Technical Baseline Review assessed that numerous Block 4 capabilities will not deliver until the 2030s due to technical complexity, software efficiency, human and financial resourcing, flight test capacity, lab quality and capacity, and lack of defined requirements.

Over the past 12 months, the JPO focused on improving the systems engineering required to properly characterize the concurrency between development and production. In May 2023, we established a new Block 4 contract which established Capability Decision Points (CDPs) to rigorously assess the technical maturity of hardware and software and the readiness for introduction into F-35 aircraft production lots. The JPO is confident in Block 4 delivery dates associated with the rigorous CDP process. We continue to apply this process to additional capabilities to bolster schedule realism. As previously mentioned, in February 2024, the Department of Defense established a Software Architecture Independent Review Team to assess the underlying TR-3 hardware and software architecture, provide recommendations for establishing a more agile software development framework, and make recommendations in support of the next F-35 operating system technology refresh.

In alignment with the Software Independent Review Team and Technical Baseline Review initiatives, the F-35 Program seeks to define a *Reimagined Block 4* as “must-have” content to maintain competitive advantages against our adversaries. We anticipate Reimagined Block 4 will include a subset of the original 88 JESB-approved capabilities. Reimagined Block 4 will likely include common capabilities for Electronic Warfare; Communication, Navigation, and Identification; Sustainment, and new weapons for the Partnership, plus U.S. Service-unique capabilities and Partner-unique capabilities. Reimagined Block 4 must consist of “what industry can actually deliver” across the Future Years Defense Program (FYDP) and be consistent with the JESB-directed development funding cost cap. This approach is subject to buy-in from the Defense Acquisition Executive, Service Acquisition Executives, Joint Staff, U.S. Services, and F-35 JESB. To succeed in this effort, the F-35 Enterprise must continue applying more robust systems engineering in the Block 4 program to establish realistic cost, schedule, and performance targets

for the Block 4 major subprogram that the Department plans to formally establish within the next year.

Weapons

The F-35 Enterprise continues to seek paths to accelerate weapons integration. The team is aggressively pursuing a two-year sprint to integrate certain new weapons. In support of these efforts, the program completed ground vibration testing, structural coupling testing, and a heavy external stores risk reduction flight test program. We intend to deliver these capabilities two years ahead of our standard weapon integration timeline.

Lot 18-19 Status and Plans

The F-35 production contract for Lot 18 and Lot 19 aircraft will deliver F-35s to U.S. Services, Partners, and FMS customers, increasing F-35 operational capacity worldwide. International demand for F-35 aircraft is growing, as evidenced by additional aircraft procurement by Korea, the addition of the Czech Republic as a Foreign Military Sales customer, and other allies soon to follow. Nations across the globe continue to competitively select F-35 to meet their national defense requirements.

In October 2023, Lockheed Martin submitted a proposal for Lot 18 and Lot 19 production. In recent F-35 production lots, suppliers have experienced significant financial pressures driven by labor wage inflation, material inflation, and increased European energy prices. We continue to work to drive down the cost of the air vehicle; however, these realities may drive an increase to prices in the Lot 18-19 production contract. Resolving these challenges requires partnership between Government and industry stakeholders as the team works towards awarding the Lot 18-

19 production contract in Fiscal Year 2024. Beyond the Lot 18 and Lot 19 contract, we must consider longer-term contract arrangements to stabilize the F-35 industrial base and utilize industry standard indices.

The F-35 Program intends to shift to a larger block-buy strategy for Lots 20-24 to establish greater stability within the F-35 supply base and reduce cost. The program plans to pursue Economic Order Quantity (EOQ) funding, subject to the availability of funds, to enable prime and subcontractors to make longer-term supply chain investments that reduce overall cost. EOQ has the potential to save up to \$1.1B across the Lot 20-24 air vehicle production contract, encourage F-35 suppliers to make capital investments to further reduce cost, and avoid costly supply chain disruptions that occur under current shorter-term agreements. EOQ funding is critical to maintain stable production cost. A stable supply base must be a high priority for all F-35 stakeholders.

ALIS-to-ODIN Transition

The F-35 JPO continues to evolve its legacy maintenance system, ALIS, into a modern system called ODIN. The transition program, known as ALIS-to-ODIN (A2O), is maturing software, hardware, data, and infrastructure activities with a focus on progressively delivering value to users while being responsive to warfighter priorities.

In 2023, the program encountered technical complexities that delayed ALIS software releases. The latest ALIS software release is progressing through flight test, ensuring that all critical findings are resolved and that a robust technical solution is available to the global fleet. This ALIS software update addresses significant software obsolescence issues and continues to improve the system's cyber survivability posture. It further adds initial data centralization functionality. Data centralization marks a significant step towards enabling data-driven decision

making at the country level. Progress continues with improvements in data quality, and we are maintaining supply ready for issue around ninety percent – significantly improved from approximately forty percent three years ago. Increased data integrity contributes to ongoing efforts to improve efficiency and reduce cost. The F-35 JPO has begun initial planning for the evaluation, development, and procurement of a F-35 Fleet Management capability to provide insight into fleet utilization, availability, and global resource allocations.

In parallel, the JPO continues to develop the foundational architectural elements of ODIN to simplify future application modernization and enable faster and more frequent ODIN updates to support user needs. The program continues making progress in developing “infrastructure as code,” which allows for the fielding of software independent of underlying hardware and enables the seamless transition of code into developmental and production environments, including Government-owned clouds.

In 2023, the program successfully fielded unclassified ODIN hardware for new maritime and land-based site activations, and established contracts to continue the replacement of fielded ALIS hardware with the new, more capable and supportable ODIN hardware. The JPO is currently testing classified ODIN hardware elements to enable future fielding of complete hardware kits. As part of this modernization effort, the JPO streamlined the supply chain for ODIN hardware by purchasing hardware directly from the Original Equipment Manufacturer and providing it as Government Furnished Equipment to improve acquisition agility and affordability.

Combat Data Systems

F-35 mission data translates the complex operational electromagnetic environment collected by the aircraft’s sensors into an actionable situational view for the pilot. When combined

with the aircraft's low observability characteristics, this information enables F-35 pilots to act and engage first. The operational environment is constantly changing, and mission data must change with it. F-35 Combat Data Systems (CDS) generate data and planning needed to perform a successful mission and enable data collection, distribution, and analysis for each mission.

The F-35 Program continues to invest and modernize the software and hardware 'tools' in reprogramming laboratories and at operational mission planning sites that deliver Block 4 capability compliant and operationally viable Mission Data Files (MDF) required for every flight mission. The F-35 CDS Program is executing agile Common Reprogramming Tool (CRT) development, which will enable the program to build advanced MDFs to support TR-3 and Block 4 advanced sensors. Meanwhile, we are continuing work to build the next generation of electromagnetic stimulators for mission data reprogramming laboratories to better simulate more agile and dense threat environments as well as the new spectrum visible to Block 4 sensors.

We will continue development and soon begin fielding Next Generation Mission Planning modernization hardware to replace Diminishing Manufacturing Sources and meet security requirements for improved cyber survivability. The Mission Planning Enterprise is successfully developing the next generation of mission planning software called Next Generation Open Mission System (NOMS) completely in the Government "JPO" Cloud environment, which will bring together U.S. Air Force and U.S. Navy Government software depots across the country. The JPO Cloud environment will also bring together multiple industry partners to include Lockheed Martin, Boeing, Northrop Grumman, and small businesses in a 500-person software factory. NOMS will begin replacing elements of the Joint Mission Planning Software (JMPS) in late 2025 and will fully replace JMPS in 2026.

The F-35 CDS Program is working closely with the 350th Spectrum Warfare Wing to better utilize F-35 sensor data to support rapid reprogramming requirements. We continue to make progress posturing our mission data enterprise to respond quickly to new and emerging threats we anticipate in a near peer conflict. In addition to these priorities, the program received final disclosure and policy approvals enabling all F-35 operators to receive Coalition Mission Data Files (CMDx). A CMDx provides coalition air component commanders the assurance that all assets are seeing the same thing at the same time. The multiplying force of our F-35 Partners and Foreign Military Sales customers is undeniable and data interoperability is the cornerstone of integrated deterrence and coalition warfare. We will continue to improve tools like CMDx and common mission planning environments to improve interoperability in response to warfighter demand.

Training Systems and Simulations

The Training Systems and Simulation (TSS) PMO is responsible for development, delivery, operation, and maintenance of F-35 training systems including Pilot Training Devices, Maintenance Training Devices, Technical Infrastructure Systems, and the JSE. F-35 Training Systems are critical enablers to produce mission qualified pilots and maintainers. Training systems are comprised of hardware, software, subsystems, equipment, and reference data required to design, develop, deliver, evaluate, and refine training with capacity and fidelity to enable aircrews to train for the high-end fight. TSS is changing the way we think about Training and Simulation – and high-fidelity simulation is the best way to fully test evolving capabilities.

F-35 TSS efforts have yielded significant results in recent months. The JSE program recently completed development, verification, validation, and accreditation of the F-35 JSE, enabling completion of IOT&E mission tests in a simulated environment. JSE runs the F-35's

mission systems software along with other software models (such as other weapons and modern threat systems) to provide complex mission scenarios for testing that the program cannot replicate in a real-world environment. In September 2023, JSE received accreditation as an operationally representative environment, and was deemed adequate to complete IOT&E mission tests. As noted above, F-35 stakeholders conducted the final 64 mission tests the same month. As we look to the future, JSE efforts will engage closely with Mission Systems efforts to integrate new Block 4 capabilities. In 2023, as part of these advanced training and simulation efforts, the F-35 JPO also supported fielding of a Government-owned, JPO-managed, and Naval Air Warfare Center Aircraft Division-developed F-35 Effects Based Simulator (EBS).

The F-35 Program will continue to modernize training systems by significantly increasing their computing power. We recognize the need to support multiple synthetic environments, and our new software architectures provide more efficient reuse of components between the various environments (such as JSE, Pilot Training Devices, and MVDL development stations), reducing the time between fielding software updates on the Air Vehicle and in synthetic environments. With an eye towards affordability, the TSS PMO continues to improve pilot training device fidelity and capability. We will continue to deliver world class training capability to an expanding F-35 fleet that is operationally relevant, affordable, and sustainable.

Addressing Government Audit Recommendations

The F-35 JPO remains an open and committed partner to the GAO's oversight mission, and we are currently supporting six unique audits across two different GAO mission teams – as well as three audits from the Department of Defense Office of Inspector General (DoD IG) – which encompass the entirety of the F-35 acquisition lifecycle.

The JPO works actively to implement and close GAO recommendations, as well as recommendations received from other audit agencies. In addition to these active audits, there are sixty-four issued recommendations (fourteen pending closure) from GAO, DoD IG, and the Air Force Audit Agency that are being implemented across the F-35 Enterprise. While independent program oversight is beneficial, these reports drive significant manpower requirements within the F-35 Program. Here in the JPO, implementation activities have already begun. My team is working diligently to implement these recommendations and will continue to maintain transparency and communication with our GAO colleagues.

Business Operations & Human Capital

People are our number one resource. We must continue investing in appropriately staffing the F-35 Program (Government and industry) with talent necessary to continuously develop, produce, deliver, and sustain the F-35 Air System. We are strategically implementing initiatives to incentivize, recruit, retain, and professionally grow our people to meet the challenges in front of us. Last year, the Air Force Life Cycle Management Center (AFLCMC) and NAVAIR analyzed the F-35 JPO's workforce demands and size. As I testified last year, this analysis highlighted several staffing concerns, and AFLCMC and NAVAIR remain committed to providing their support in attracting and retaining a skilled workforce that meets F-35 Program priorities and customer demands. In support of this effort, we are improving and investing in our workspace to create an environment to incentivize commitment by our most valuable resource as they drive the F-35 Program to realize success as we develop, produce, deliver, and sustain three aircraft variants. I'm appreciative of the U.S. Services' engagement in co-developing solutions to meet near and long-term F-35 Program priorities.

CONCLUSION

Since I last testified before this committee in December 2023, the F-35 has continued to demonstrate its real-world capability in training and operational activities across the globe. We are making headway in addressing key development and sustainment challenges, though progress is not happening quickly enough. The team we have in place understands these challenges today better than ever before, and we will deliver on our commitments. I remain tremendously proud of the men and women throughout this F-35 Enterprise who are working tirelessly to bring the next generation of capabilities to bear on the F-35 platform.

The work we're achieving here enables capabilities unlike any the world has seen before. Meanwhile, our adversaries are honing capability of their own, and we will not become complacent. Our enterprise is being tested in new ways through real-world conflicts and is proving capable, ready, reliable, and resilient. We are continuing to prioritize depot stand-up, organic warehousing and transportation, engine modernization, and logistics information system modernization. Digital engineering and enhanced modeling and simulation methodologies will continue to accelerate capability delivery. The March 2024 Full Rate Production decision will drive supplier confidence for years to come and allow us to focus on the future rather than reporting on the past.

This is professional acquisition at its finest, and I couldn't be more proud to lead this organization. Thank you once again for the opportunity to discuss our progress, challenges, and opportunities. This subcommittee's support and oversight are essential to our success.