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THE F–35 JOINT STRIKE FIGHTER LIGHTNING II PROGRAM

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BEFORE THE

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AIR AND LAND FORCES

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HOUSE OF REPRESENTATIVES,
COMMITTEE ON ARMED SERVICES,
SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES,
Washington, DC, Wednesday, March 7, 2018.

The subcommittee met, pursuant to notice, at 2:05 p.m. in room 2212, Rayburn House Office Building, Hon. Michael R. Turner (chairman of the subcommittee) presiding.

OPENING STATEMENT OF HON. MICHAEL R. TURNER, A REPRESENTATIVE FROM OHIO, CHAIRMAN, SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES

Mr. TURNER. The committee will come to order. The subcommittee meets today to receive testimony on an update to the F–35 Joint Strike Fighter [JSF] program, and integrating fifth-generation tactical fighter capabilities into the services' fighter fleets.

I want to welcome our witnesses for today's panel. We have Vice Admiral Mat Winter, the Director of the F–35 Joint Program Office [JPO]; Lieutenant General Steven Rudder, Deputy Commandant of Aviation for the United States Marine Corps; Rear Admiral Scott Conn, Director of Air Warfare for the United States Navy; and Lieutenant General Jerry Harris, Deputy Chief of Staff of the Air Force for Plans, Programs, and Requirements.

Gentlemen, thank you for being here, and thank you for your service.

This year marks the beginning of an important transition for the F–35 program. After 17 years of development and engineering activities, the F–35 will complete its baseline development program by May of this year, and then enter into an operational test period this September to assess and validate if each variant of the F–35 provides the capabilities needed to meet operational requirements defined by each of the military services before us today.

F–35 acquisition is still increasing, but still not to the level the services require. Last year, the Department of Defense [DOD] requested 70 F–35s. This year the request is for 77, with plans for the services [to] budget for 99 aircraft per year by 2023.

Procurement costs for F–35s are steadily declining. Last year, negotiated costs for the three F–35 variants were over 6 percent lower than the previous year. Hopefully, projections for actual costs continue the recent trend of coming in below the program office's estimates.

Last year marked several notable accomplishments for the F–35 program. Among them, all developmental weapon testings was—were completed; the final version of the Block 3F software was pro-

vided to some of the fleet; and the 66 F–35s were delivered to the U.S. services. Additionally, F–35 deliveries were made to Italy, Norway, Israel, Australia, and Japan.

But the F–35 program continues to face challenges ahead. In addition to beginning operational testing, this year also marks a transition from initial development activities to follow-on development, which has become known as continuous capacity development and delivery, or C2D2.

While the goal of C2D2 methodology is designed to deliver continuous modernization to the warfighter in smaller increments and an expedited timeline, the recent Director of Operational Test and Evaluation's [DOT&E] report to Congress questioned whether or not the C2D2 program is properly resourced, and whether the testing community will be provided sufficient test aircraft built at a current production configuration to perform and validate future capabilities.

In terms of oversight, this subcommittee has always had affordability at the forefront of its F–35 oversight activities. To supplement our F–35 oversight activities, the subcommittee included a provision in the fiscal year [FY] 2017 National Defense Authorization Act [NDAA] that required the Government Accountability Office, or GAO, to review the F–35 sustainment support structure and provide Congress its findings in subsequent recommendations to address affordability issues. We look forward to those.

I am sorry, we actually—the GAO's report released in September of last year noted that the F–35 program is facing key sustainment challenges that include repair capacity at depots; spare part shortages compounded by insufficient reliability of various parts and components; unfunded intermediate-level maintenance capabilities; and delays in development of the computer and network-based Automatic Logistics Information System, known as ALIS. We look forward to GAO's continued review of those issues.

To address these issues, we understand that the F–35 program in the past year has executed $114 million of fast-track in standing up depots, made investments in reliability and maintainability improvement projects, and obligated $1.4 billion to increase spare parts purchases, and also built up repair capacity and improved the speed of repairs.

The F–35 program office has also developed a 5-year technical road map for ALIS to address future requirements. ALIS, in its current state, is not user-friendly, and has caused the services' maintenance personnel to create burdensome manual tracking processes and insufficient—and inefficient workloads. We have not only received testimony about that, I know a lot of our members have traveled to sites and spoken to them, the personnel, directly. And they continue to relate to us the difficulty with ALIS.

More troubling, each service continues to rely heavily upon contractor-provided information technology experts to manipulate ALIS's intricate software and complex databases, because the ALIS system still does not meet contractual capability requirements that would enable our personnel within each service to independently operate and input data into ALIS.

As much attention and effort that was being paid to getting F–35 development and procurement costs to a reasonable level, this

same level of effort and attention now needs to apply to ALIS and its functionality. Despite these efforts, the three services operating the F–35 are—still share a critical concern about rising F–35 operations and support [O&S] costs affecting affordability. We understand the F–35 program needs to reduce F–35 operations and support costs by about one-third to meet service budget goals for affordability. Otherwise, end-state quantity goals for each service could be dramatically impacted.

The higher-than-desired operations and support costs, compounded with the parts and depot issues I mentioned earlier, are already beginning to manifest with the services' hesitation to increase procurement rates beyond current levels until the F–35's glide path to affordability trends in the desired directions.

But increasing production is also how we lower production costs. For the Tactical Air and Land Forces Subcommittee, our actions will be to continue close oversight of the F–35 program, and to continue to provide the Department the tools and resources necessary to realize F–35 affordability.

The capabilities the F–35 brings to the battlefield against advanced threats are desperately needed to make the goals and objectives of our new defense strategy and that of our foreign partners invested in the program a reality. We, with our foreign partners, absolutely cannot risk the F–35 program meeting a similar fate of the F–22 program, where we were not able to procure and field sufficient capacity to meet combat commander warfighter requirements.

Gentlemen, I look forward to your testimony on how we can meet these and other future challenges in the F–35 program.

[The prepared statement of Mr. Turner can be found in the Appendix on page 35.]

Mr. TURNER. And I will now turn to my colleague, Niki Tsongas.

STATEMENT OF HON. NIKI TSONGAS, A REPRESENTATIVE FROM MASSACHUSETTS, RANKING MEMBER, SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES

Ms. TSONGAS. Thank you, Mr. Chairman, and good afternoon. I would like to thank our witnesses for being here today to discuss the F–35 Joint Strike Fighter.

The F–35 program has come a long way in the 10 years I have served on this committee, and important capabilities are finally being delivered to Air Force, Marine Corps, and Navy. And while the program has had dramatic cost growth and schedule delays since its inception in 2001, over the past 5 years its cost and schedule have been relatively stable.

When I look at the F–35 program, I see four major aspects to the program, each with its own achievements and challenges.

First, in the area of production and delivery of aircraft, the program is generally meeting delivery timelines and cost reduction goals. For each of the last four lots of aircraft, final negotiated costs have been lower than what was projected in the budget request for those years. Given the scale and complexity of the program, this is a significant achievement.

A second aspect of the program is completion of a 17-year system development and demonstration phase, which is expected to occur

in a few months. While completion of this almost two-decade-long effort is certainly welcome, according to the Joint Program Office, more than 200 software and other deficiencies will not be fixed by the time this phase officially ends. In addition, critical supporting infrastructure, including activities that produce vital threat information, logistic support software, and simulators for the F–35 remain immature and behind schedule.

It is important to note that the government already paid for these deficient and lagging capabilities once, and that the contractors failed to deliver. It is now important that the government be compensated for these shortfalls in the future.

A third aspect of the program is a cost to operate and maintain the F–35, often referred to as sustainment. Now that large number—now that large numbers of aircraft are actually entering service, all three military services operating the F–35 are expressing great concern about the cost to operate the aircraft. In public statements and discussions with the committee, senior DOD officials have expressed these same concerns. The F–35 was designed to be "affordable stealth." So I look forward to hearing about how we get there.

A fourth element of the program is the tremendous amount of work and cost ahead in the area of follow-on development. Previously called Block 4, and recently renamed continuous capability development and delivery, or C2D2. This follow-on effort to improve the capability of the F–35, mostly through software upgrades, is needed to keep up with the latest threats. However, the cost of this effort has been exceedingly difficult for Congress to nail down over the past several years.

Through the National Defense Authorization Act for Fiscal Year 2017, Congress required the Secretary of Defense, as a precondition for moving forward with this part of the F–35 program, to provide a detailed cost estimate for this effort. Unfortunately, the report provided to Congress this past January in response to this legislation did not provide the required information. And despite clearly not meeting Congress' demands for information, the C2D2 program is moving ahead as we speak.

However, we do have some idea of the potential cost of the effort. And subsequent information provided at the request of the committee by—and the information provided by the Joint Program Office to the committee, it appears the cost between fiscal year 2018 and fiscal year 2024 to achieve all the requirements for the C2D2 program may be as high as $11 billion in development and $5.4 billion in procurement. This potential cost of $16 billion is an astonishingly high amount and, as far as I am aware, greatly exceeds any cost figures previously provided to Congress.

Furthermore, the DOD's position remains that it wants to run this $16 billion development effort, which exceeds the cost of a *Ford*-class aircraft carrier, outside the normal program of record rules and regulations. It is also important to remember this is a software-intensive effort, and that the last 17 years of F–35 software development have seen dramatic cost increases and significant delays. How this new effort will somehow defy this unfortunate history remains an open question, to put it mildly.

If Congress agrees to support this effort at this cost, and under the proposed management regime, it should only do so fully aware of the significant risks involved. It is possible, of course, that the effort will proceed without any problems. It is also possible that a few years from now we will be told of massive cost overruns and dramatically reduced capabilities planned for delivery. While I support improving the F–35 in the future to provide the best capabilities possible, I would like to explore in detail how the DOD is proposing to manage the significant risks involved in this effort.

I look forward to hearing from our witnesses today, and I yield back.

Mr. TURNER. Thank you. Without objection, each of the witnesses' provided statements will be included in the hearing record.

And in addition, I ask unanimous consent that non-subcommittee members be allowed to participate in today's briefing after all subcommittee members have had an opportunity to ask questions.

Without objection, non-subcommittee members will be recognized at the appropriate time for 5 minutes.

Gentlemen, we will begin with Admiral Winter, and you will be followed by General Rudder, Admiral Conn, and then General Harris.

Admiral.

STATEMENT OF VADM MATHIAS W. WINTER, USN, PROGRAM EXECUTIVE OFFICER, F–35 JOINT PROGRAM OFFICE, OFFICE OF THE SECRETARY OF DEFENSE

Admiral WINTER. Thank you, Chairman Turner, Ranking Member Tsongas, and distinguished committee members. It is a distinct honor and pleasure to appear before you today with my three esteemed colleagues who represent our U.S. warfighters.

In addition to our eight international partners and three military sales teammates, these gentlemen are my customers, and they hold me accountable to deliver an affordable, lethal, and capable fifth-generation F–35.

Let me say upfront, over this past year the F–35 program execution has remained on track. We have delivered the Block 3F capability to our warfighters and are preparing to continue that capability development. Our production costs are coming down as our three production sites in Italy, in Japan, and in Fort Worth are beginning to ramp up for full rate. We are sustaining over 270 aircraft around the globe as we expand our global network to ensure that we can do that and handle the fleet growth. And our U.S. warfighters are prepared, trained, and ready to fight the fight today with F–35.

However, with these overwhelming and marked increases in accomplishments, we have a lot of challenges. And those challenges across development, production, and sustainment lines of effort have gone through a number of dialogue and quarterly engagements with the professional staffers and discussing these challenges and opportunities extensively. What I would like to do today is take a few minutes to highlight some of those directly with you and how our PB–19 [President's budget 2019] budget submission provides the critical investments to tackle those challenges, but also help enable some of the opportunities.

In development, our combined government and industry team has made significant progress in Block 3F test program, finishing all of our weapons testing, flight sciences, and mission system capabilities, executing over 5,000 test points just this year, and resolving a lot of the known deficiencies—and we still have deficiencies remaining that we will talk about.

We are on track to complete, though, the final SDD [system development and demonstration] flight certification and verification of the spec [specification] later this month. We have delivered the Block 3F aircraft software last month to the United States Air Force, and are preparing to provide to our United States Marine Corps and United States Navy later this month and next month.

All of that together brings enhanced sensors and targeting, improved data links, improved threat countermeasures, and enhanced weapons capability throughout the flight envelope. Though we have delivered the Block 3F, we must continue to mature the enabling capabilities. And those enabling capabilities—and specifically, the ones I am talking about are the ones that we have warfighter operational concerns with. Those are our mission data files, MDFs, and the Autonomic Logistics Information System, ALIS.

To that end, we are improving our reprogramming labs and putting actionable initiatives in to ensure that we can deliver MDFs in a more timely fashion. We are stabilizing the current fielded ALIS capability to give our warfighter higher system capability confidence. And we are assessing a new ALIS architecture road map to ensure it scales with production and remains viable for the long term.

Our PB–19 submission captures these and some of other—our critical near-term requests.

We completed all of our hardware qualifications this year, which allowed us to lock down the production specs, so that we can deliver spec-compliant hardware. We also made considerable readiness from last year, on track to start formal initial operational test and evaluation.

Additionally, we are supporting, hand in hand, the Director of DOT&E in his execution of select pre-IOT&E [initial operational test and evaluation] events that are taking advantage of unique operational weather conditions and availability of military capital assets.

For the development of F–35 warfare capability, we can't stop at Block 3F. Rather, Block 3F is our foundational element, which we will go forward for continuous enhancements and improvements, and must be delivered to ensure F–35 retains that battlefield dominance.

However, there should be no doubt that currently fielded Block 3 is and can engage and provide the much-needed capabilities to our warfighters to fight the fight and to engage those—today's threats. The problem is, is those today's threats are not stagnant. So we have leveraged the experience of our national intelligence agencies to provide an assessment of those future threats. And from those future threats, our warfighters have defined the next set of requirements.

The Department has approved and validated those Block 4 capability requirements to ensure that the F–35 remains relevant. With

the Block 4 requirements established and the Block 3 capability baseline understood, it became crystal clear to me that we could not pursue a development progress and plan similar to what we did over the last two decades, not in time, nor in cost.

The threat is simply moving too fast. We saw not only an opportunity, but a mandate to craft a new, innovative strategy that leverages commercial agile tenets to modernize, enhance, and improve the F–35. This strategy will develop, integrate, and test released incremental capabilities on a warfighter-defined and technically feasible cadence that accommodates those shifts and threats, but also can take advantage of new technologies that come on, and oscillating resource budgets.

This new capability delivery, C2D2, continuous capability development and delivery, reflects industry's best practices and will simultaneously support the currently fielded capability as we bring on new capabilities. With this opportunity, though, there is absolutely no doubt in my mind there are many challenges. We are still in the initial stages of this new strategy, one of the reasons why the FOM [follow-on modernization] report did not provide the detailed data that I know we need to bring to you.

This new strategy will start to decompose the requirements to a technically feasible work packages so that we can more accurately define the work; lay out an executable, realistic schedule; define the new skill sets that we need within the government and our industrial base; and more accurately estimate the associated costs.

I want to thank this committee's proactive engagement in the recently signed FY [fiscal year] 2018 NDAA, directing the Department to pursue more agile acquisition developments like this, and for Block 4, requesting the Congress' support as we bring on those new skill sets and develop those new cost estimating relationships, engineering and test methodologies, and set a course for a true cultural change across the Department.

You have my commitment that we will continue to communicate the evolution and the evaluation of this strategy in real time with you, with your staffs, and all the defense committees in my quarterly in-person updates, as well as our annual update of the C2D2 FOM report, as required by the fiscal year 2017 NDAA.

From a production perspective, our U.S. services' total procurement quantities remain steady at 2,456, with our international partners and FMS [Foreign Military Sales] teammates coming forward with their procurement of 741 aircraft over the life of the program.

Last year our program achieved the planned delivery of 66 aircraft, but also 74 propulsion systems, as planned, including the very first F–35A coming off of the Japan Nagoya FACO [final assembly and check-out] production line, and the very first F–35B from our production line in Cameri, Italy.

In 2018 we have already started delivering Lot 10 aircraft with the Block 3F capability. Our program's delivery goal of 91 aircraft this year combines both U.S. and international partners' aircraft. Our PB–19 request funds—requests the funding for 77 U.S. aircraft, so that we can maintain the capacity requirements of our U.S. warfighters.

I will tell you on price I am encouraged but not satisfied with the reductions. Six percent is good because we are coming down, but it is not good enough. The $94.5 million settlement price for an F–35A in Lot 10 was good, and we are delivering aircraft now under $100 million, but we need to get better. We need to further drive out the cost of production.

To that end we have set aggressive cost glidepaths, and we have new incentives with industry to truly lean out their production processes, increase their quality, hold them accountable, and effectively ramp production from the 66 of last year to 160 in 4 years, all while giving—ensuring fair and equitable profit, but not excessive profit, so that we can make this continued cost reduction fit our services' budgets.

I appreciate the subcommittee's critical support for providing the Department with the ability to use economic order quantity funding in FY 2019 and 2020. This approach is absolutely important step in making the F–35 continued cost reductions.

But it won't solve the problem wholly. My team remains keenly focused on aggressively reducing the cost to produce this F–35 by leading a multi-agency cost deep dive with our prime contractors and the top 100 suppliers to build a knowledge base that allows the government and the prime contractor to fully understand what it costs and what drives the cost of producing an F–35.

Additionally, as production line assessments are conducted across that supplier base, my team will highlight production line efficiencies that, when implemented, will further reduce and have the opportunity to reduce F–35 production costs. We are attempting to achieve an approach, a competitive cost at the fourth-generation alternatives [sic].

Finally, let me address sustainment. As of last month, the operational F–35 fleet consisted of over 270 fielded aircraft around the world, and we are on track to deliver 670 additional aircraft over the next 5 years. To support this growth, the F–35 global support solution is working full-time to provide cost-effective, safe, and timely maintenance, repair, overhaul, and upkeep capabilities that looks at the airframe, engine component, warehousing, and distribution.

We are expanding our global operational footprint from 13 bases to over 35 land and maritime bases over the next 5 years, with our United States Air Force F–35s today—forward deployed at Kadena Air Force Base, our United States Navy F–35s conducting carrier qualifications in support of their upcoming initial operational capability, and our United States Marine Corps conducting the first-ever F–35B maritime operations right now on the USS *Wasp* in the Pacific operational region.

With all that said, however, I am fully aware that, at current estimates, the F–35 sustainment costs are too high, given that planned fleet and our current future service budgets. We are tackling these cost challenges head on. We have established aggressive sustainment, performance, and affordability goals to improve performance and reduce overall sustainment costs by 30 percent across the life cycle.

Equally as important, we are actively pursuing actionable initiatives to realize these costs. I look forward to talking about those

in the questions and answers, but here is a quick look: accelerating the stand-up of repair capacity at our organic depots; increasing the acquired spare parts posture; investing in reliability projects to reduce aircraft subsystem failures; stabilizing and enhancing the ALIS to more accurately identify maintenance issues; flowing increased maintenance action authorities down to the flight line to reduce operational turnaround times; completing the modification of older aircrafts, our LRIP [low rate initial production] 2 through 5 aircrafts, and bringing them up to the more reliable and sustainable technical refresh 3 configurations; and, in the business, looking at shifting to true performance-based logistics business frameworks that will allow us to capture the true cost and hold industry accountable to deliver quality performance for a reduced cost.

Through these initiatives, our calculations show that we should increase availability by 20 percent, on average, and shift the sustainment cost ratio as we track to meet our 30 percent reduction goal. I have my entire sustainment enterprise as well as our senior Department of Defense leadership laser-focused on these actionable cost-reduction efforts to ensure we can meet the cost targets and our U.S. and partner warfighters can own and operate the F–35 well into the future.

In conclusion, we are on track for another productive and challenging year. It will be a year of growth and transition, a shift as we go from legacy SDD to C2D2, grow and align our production facilities to meet the coming ramp, while driving quality in and costs down, ensuring that we can effectively shift that cost ratio, and reinforcing a global supply chain and distribution network to hit our service and partner cost targets.

The F–35 is ready to fight the fight today, and your JPO—your JPO—is working daily to ensure F–35 remains affordable, lethal, effective, and a warfighting system in support of your National Defense Strategy. We will continue to focus on that affordability, accountability, and open transparent communication, and you have my commitment to do so.

Mr. Chairman and distinguished committee members, I thank you again for the opportunity to provide these opening remarks, and I look forward to your questions.

[The prepared statement of Admiral Winter can be found in the Appendix on page 38.]

Mr. TURNER. General Rudder.

STATEMENT OF LTGEN STEVEN R. RUDDER, USMC, DEPUTY COMMANDANT FOR AVIATION, HEADQUARTERS U.S. MARINE CORPS

General RUDDER. Chairman Turner, Ranking Member Tsongas, distinguished members of the House Armed Services Subcommittee of Tactical Air and Land Forces, and other distinguished members that are here, thank you for continued support, and I appreciate the opportunity to testify on the Marine Corps F–35B and C program.

In line with Secretary Mattis' guidance and CMC [Commandant of the Marine Corps] priorities, my top priority for aviation are framed around the National Defense Strategy or—of the principle

of lethality. Central to this are building readiness for combat and modernizing our aircraft.

Transitioning Marine aviation's legacy tactical aircraft to a fleet of fifth-generation F–35Bs and Cs is critical. They will perform the foundation of the next generation of air combat element by providing us tools to execute our required mission sets. The F–35 remains our top acquisition program.

The Marine Corps program of record is 420 F–35s: 353 F–35Bs and 67 Cs. 2018 marked the first year we are buying over 20 aircraft per year. This ramp is optimal for us, and will allow us to train fifth-generation aircrew maintainers, while simultaneously supporting global force requirements as we transition out of legacy platforms.

From the operator's perspective, the F–35's capability is unmatched. Marine F–35s have participated and continue to participate in exercises like Red Flag, Agile Lightning, and our weapons and tactics instructor course. The aircraft has proven its worth across all assigned mission sets, and achieves mission success not previously achieved by other platforms, certainly our legacy platforms.

To date, the Marine Corps has activated four 35B squadrons. VMFA–121 [Marine Fighter Attack Squadron 121] in Japan has assumed the 31st MEU [Marine Expeditionary Unit], as Admiral Winter just stated, flying on this week. And they have—still have 10 back in Iwakuni to assume as a 10-plane squadron to assume those mission sets. This week they flew six aircraft onto the USS *Wasp* to support the 31st MEU. Of note on that, they took two brand-new pilots with them in sea state number 3 and they felt comfortable landing that aircraft on a pretty dodgy flight deck, and it landed without incident. That is the extra stability of this particular aircraft.

A second F–35 MEU on the USS *Essex* will deploy this summer. So this fall we will have two F–35B decks on two different ships in the Pacific and/or other theaters.

So my message, I guess, is as we talk about sustainment, we are in it today.

Marine Corps will transition its first F–35C squadron, VMFA–314, in FY 2019. They are currently over in the CENTCOM [U.S. Central Command] AOR [area of responsibility] doing great work for our CENTCOM commander. They will be ready for expeditionary operations in 2021, but their primary mission will be to work up and deploy on the carrier by 2021, right after the first Navy deployment. Ultimately, we will have four F–35C squadrons that will rotate in deployments on the carrier with our naval brothers and sisters through a tactical air integration program.

We have an aggressive road map, but we expect to complete our transition to the F–35B and C to be out of legacy attack air by 2030, and F–18s being the last legacy attack air we will get out of.

Now our primary concern. The Marine Corps, in the partnership, need to see a reduction in cost to own and operate the F–35. This is by far our greatest programmatic challenge. We are working with JPO and industry to drive down cost. There is a learning curve associated with aviation logistics. As this process becomes more mature, we expect to see a decrease in operations and sus-

tainment costs. The key areas, such as parts reliability, repair turnaround times, are being addressed.

Very simply, I think, as you just heard Admiral Winter say, and as we have laid into our FY 2019 funding, we have laid in standing up our intermediate-level maintenance capability; being able to test and check and/or repair parts closer to the flight line; accelerating our stand-up of our organic depot repair capability; investing in our spares, fully investing in our spares capacity. And Chairman, your budget and everything that this committee has done and Congress has done to increase our spending limits have allowed us to not only buy airplanes, but also fully invest in our spares, so I thank you for that.

We are also investing in engineering to improve parts reliability. And, quite honestly, what helps with our reliability of this aircraft is upgrading our software, because many of our mission systems are the ones that give us those fault codes that provide [inaudible] discrepancies. New software will help us work through that.

I will re-emphasize that both variants F–35B and C are critical to Marine Corps aviation's modernization strategy, and our Nation's ability to deter and compete. The average age of the Marine Corps attack air aircraft is 22 years old. Our fleet of Harriers and Hornets continue to support deterrence combat missions forward. Whether they are on a ship—we have them on the carriers—land-based, or various parts of the world, they will continue to do that, and we will continue to update them to maintain tactical relevancy.

However, even in the most basic form, our F–35 today are already forward deployed and far more capable [than] any of our legacy tactical platforms.

Mr. Chairman, distinguished committee members, we appreciate your continued support of our aviation programs; look forward to answering your questions.

[The prepared statement of General Rudder can be found in the Appendix on page 67.]

Mr. TURNER. Admiral Conn.

STATEMENT OF RADM SCOTT D. CONN, USN, DIRECTOR, AIR WARFARE (OPNAV N98), OFFICE OF THE CHIEF OF NAVAL OPERATIONS

Admiral CONN. Chairman Turner, Ranking Member Tsongas, and distinguished members of the subcommittee, thank you for the opportunity to appear before you today and discuss the Navy's F–35C, a fifth-generation aircraft that, when fully integrated into the carrier wing, will make the carrier strike group more lethal.

In support of the National Defense Strategy, the procurement and modernization of the F–35C remains a priority to integrate into our carrier air wings. The F–35C will form a backbone of the Navy's air combat superiority fighter for decades to come, complementing the fourth-generation fleet from the carrier air wing.

The carrier air wing of the future must rely on the capacity and capability of both fourth- and fifth-generation aircraft. The F–35C provides unique capabilities that cannot be matched by modernizing our existing Super Hornets: low observable technology, modern weaponing, electronic warfare capability, and advanced inte-

grated systems that enable the F–35C to rapidly counter an ever-evolving air-to-air or air-to-surface threat.

The F–35C integrate an—interoperable with carrier wing and the carrier strike group of the future, will make us again more lethal, more survivable, and more able to accomplish the entire spectrum of missions that could be called upon from our global force.

The fiscal year 2019 President's budget maintains the PB–18 procurement profile, which will meet the transition timelines for our aircraft and squadrons to get to the fleet. The Navy is committed to procuring F–35Cs to achieve fifth-generation capability for what it takes to win in a near-peer competitor environment.

The Navy recognizes everyone on this stage, or on this dais. The Navy recognizes the operation and sustainment costs associated with a fifth-generation aircraft are going to exceed those of a fourth-generation aircraft. However, we have to drive down the cost to make it more operationally affordable. We are aggressively pursuing efforts among those that were mentioned previously to reduce those costs by over 30 percent in 10 years.

One of those areas where we see potential cost savings is to reduce the amount of contract logistics support. There are many things that are done by contractors that our sailors, once they get informed and trained, can do and should do to drive down costs. We have funded the initial effort to stand up the intermediate-level depot that will be first deployed on our carriers and amphibious ready groups, and then to our shore installations.

The Navy needs the capability of F–35C on our carrier decks, particularly in light of the geopolitical landscape that we are in, and the pacing threat. Affordability initiatives are underway and drive costs closer to the fourth-generation aircraft. Development and modernization efforts for the fifth-gen [generation] aircraft are like every other aircraft we own: we are modernizing our Super Hornets, we are modernizing our E–2, we are modernizing our E–18G with Next Generation Jammer. It is no different, particularly against the pacing threat.

Mr. Chairman, distinguished members, thank you for your continued support. I look forward to your questions.

[The prepared statement of Admiral Conn can be found in the Appendix on page 77.]

Mr. TURNER. General Harris.

STATEMENT OF LT GEN JERRY D. HARRIS, USAF, DEPUTY CHIEF OF STAFF FOR PLANS, PROGRAMS, AND REQUIREMENTS, HEADQUARTERS U.S. AIR FORCE

General HARRIS. Chairman Turner, Ranking Member Tsongas, and distinguished members of the subcommittee, thank you for the opportunity to testify again. Our engagements should continue to increase in both frequency and qualitative content as we continue to benefit from them.

As not yet mentioned, some of the questions you may ask may lead to classified answers to which we will be happy to respond after the meeting, rather than try and talk around the correct answer, to make sure that we get the information that you need.

The United States Air Force is now operating more than 130 F–35As, and will continue to grow the wealth of knowledge and

further develop both the aircraft and the tactics, techniques, and procedures for this weapon system.

Last year, when we all met on this topic, we were eagerly awaiting the results of getting this system out into the hands of our staff sergeants and our captains. I cherish the moments behind my Pentagon desk when I get to speak with these professional maintainers and aviators about the work that they are doing. And they are all smiles, talking to me.

As expected, the newer aircraft are—with updated software are flying better, they are flying more, and they are performing extremely well in our deployed and training environments. While we still need further modifications, the combat units employing this weapons system feel like the Block 3F version of the F–35A is the aircraft they were promised. In other words, to them, it rocks.

We appreciate the continued support of the Tactical Air and Land Forces Subcommittee, and we look forward to your questions. Thank you.

[The prepared statement of General Harris can be found in the Appendix on page 85.]

Mr. TURNER. I think you get the prize for the quickest presentation.

[Laughter.]

Mr. TURNER. Because we have so many members and so many questions that members want to ask, I am going to keep my questions somewhat short.

Admiral Winter, there is much discussion in DOD and in your written testimony about affordability. What defines affordability? I mean, percent reductions in unaffordability does not necessarily mean affordability. So what is our goal? What—how do we define affordability? And doesn't economics of scale play in the overall equation of trying to reduce costs to reach affordability?

And on the aspects of sustainability, one of the goals of designing this aircraft was that it was, in theory, supposed to be designed to be easier to sustain.

You were telling us some of the things that the JPO is doing in order to try to address those. The—could you please, you know, give us some context of why we are not where we had intended, and how we are going to get there. And where is there? What is affordability?

Admiral WINTER. Thank you, Mr. Chairman, for that opportunity to define affordability. Also, the tenets of our program that support our warfighters' ability to fight the fight with F–35.

Affordability comes in the context of—from a resource capability to—able to provide the people, the facilities, and the funding to be able to accomplish the F–35 development, production, and sustainment.

What we have seen over the past is certain decisions in the legacy acquisition strategy of 2001—total system performance responsibility, for example—that provided the opportunity for industry to chart the course of F–35. That allowed the technical and programmatic insight that is normal across the United States Government acquisition force in the program to not be at the same level and rigor that this acquisition professional would seem to be appropriate.

In that, to the 2004 to 2007 timeframe, technical issues such as the weight of the F–35B, such as the LO [low observable] characteristics of the airframe, and other technical issues drove technical pauses and stops, and requirements changes, as well as program restructuring that culminated in the Nunn-McCurdy in the late 2000s. At that timeframe the re-baseline and the step-out anew of 2011 established an opportunity to actually design, develop, and deliver the F–35 air system.

So, from an affordability perspective, there was an inflection point in 2011 to reset that clock. That clock was reset. And since that time, from a development perspective, the program has executed within the mandates and the guidance of the Department and the Congress to design and deliver F–35.

The extenuating attributes of F–35 goes in—that we capture the entire F–35 air system in our cost estimates, in our technical work to go. So it is not just the aircraft, it truly is the intelligence systems, it is the maintenance systems, it is the training systems, it is the planning systems. All of those elements that in traditional aircraft programs are captured in other budgets and reported through different mechanisms, F–35 and the Joint Program Office reports all of those costs together over the entire life cycle.

And with that gives us the opportunity to see what it truly costs to deliver fifth-generation strike fighter capability. In that the production costs will continue to come down, not just from a quantity perspective, which our industry partners would say, but as importantly, getting a true understanding of what the touch labor and the material costs are so that the U.S. taxpayer and our partners actually pay what they should pay for an F–35, F–35 ALIS system, an F–35 trainer and intelligence system.

Those are some of our initiatives in the deep dive in the production line of effort to ensure that we not only negotiate fairly with our industry partners, but we continue to look to the long term, all the way to 2044, which is the intended production run of the F–35.

From the sustainment perspective, this program office and previous administration had their eyes appropriately focused on F–35 development to get warfighting capability into the hands of our warfighter. We kept the emphasis on production and we made sure that sustainment was looked at, but we didn't give it the same scrutiny that it needed to be, and we are giving that scrutiny now.

And our operation and support, as I say, if you can afford to buy but not own and operate, then you are going to have to either not buy more, or you are going to have to reduce the overall execution. And in that case we have sat down with our service—U.S. service and international partners and the senior leadership, to the very senior leadership of the Department of Defense, and we have charted a sustainment cost ratio and a sustainment engagement strategy that focuses on the true levers, not just to reduce costs, but to understand those costs.

Previous engagement with the industrial base—as we were growing the production line, we identified a number of unreliable subsystems because of the immaturity of the aircraft and the immaturity of the subsystems. Those immaturities are starting to be matured, and we are bringing on in our newest lot of aircraft, in lot

9, lot 10, and lot 11, much higher reliable subsystems. So those aircraft availabilities are much higher. They are in the 65 to 75 percent range, where our oldest jets, the LRIP 2 to LRIP 5, are in the 40 percent availability because of failing subsystems, because we cannot repair those subsystems, and because we don't have new spare parts on the ramp to put those into the aircraft to—for them to go back and get—to operate.

So with that definition of the problem set, we have identified actionable efforts on, one, to transition and stand up the repair capacity for those over 3,000 items right now, the backlog of 3,000 subsystems that need to be repaired: tire and wheel, thermal management systems, avionics, and things of that nature. We have stood up 23 repair capacity organically within our United States, and we are starting to stand up the next 19 over the next 2 years. Our PB–19 requests the appropriate resources to do that next phase of organic depot stand-up for repair capacity.

In standing up that repair capacity, we take the repair demand signal off of the industry base, and allow them to focus on what they are good at, which is actually producing at rate the individual subsystems and spare parts that we need. Those industrial [inaudible] in the supply chain will be—then be able to go for spare parts and also new production parts. That will allow us to get to the spare parts posture that is absolutely necessary, coupled with the repair capacity to increase our availability.

The other initiatives to actually drive in reliability into those subsystems, we will realize that as we go forward into the lot 10 that we are delivering, all the way through our lot 15, when we bring on our technical refresh 3 new hardware and computing capacity that truly gives the government an open architecture, government-owned interface of the inner guts of the F–35 aircraft that will allow us then to drive, in our Block 4 cadence of software and hardware modernizations and enhancements and improvements, affordable at our pace cadence and best performer, and not beholding to a single individual industry partner.

The other elements that allow us to drive down that—the O&S costs are taking our ALIS system and stabilizing it and bringing it up to the usability and functionality necessary to truly—what we call prognostic health management, to be able to predict the maintenance efforts on our aircraft ahead of time. That is still a number of years away. But with the recent release of our Block 3F software in the aircraft, and our pending release of ALIS, we will be able to get ourselves back into a position where we don't take subsystems off of the airframe unless they are actually failed.

Those are our primary technical and programmatic efforts to get after the O&S costs as we go forward. Thank you, sir.

Mr. TURNER. Admiral, as you know, when Congress always—our work is prospective. We are working on next year. Right now we are doing the 2019 fiscal year National Defense Authorization Act.

I think everybody gets the sense that the F–35 is turning a corner, which is positive. But I would say that 2019 is the year of the F–35. Everyone is looking to—that the issues that are outstanding be solved, and that costs be—come down in a way that is predictable, and that—the implementation of what you just described occurring.

Going back 2 years backwards, you know, we are doing 2019. In 2017, when we did the National Defense Authorization Act, we put a section in the bill that required the Department to provide the congressional defense committees with a report that contains the basic elements of an acquisition baseline for Block 4 modernization.

In January of this year, the Department provided us a report that provides only initial insight, which, of course, reduces our overall confidence that the Department of Defense actually knows the answer to the question.

In 2019 being the year of the F–35, it is also the year of the F–35 for our oversight. Are you familiar with this request of the basic elements of an acquisition baseline for Block 4 modernization that the committee has requested? And, if so, can you tell us when we might be able to receive something besides just initial insight? And, if not, could you please take this back and address the issue?

Admiral WINTER. Mr. Chairman, I am familiar and aware of the direction from the NDAA, and I am aware of the pedigree of the report contents that did get delivered to your committee and the Congress.

The next elements of the continuous capability and development and delivery framework is being established today. We are late to need in establishing that activity. We have been pushed with the Block 3F, which is the departure point, but we have now got defined requirements from the warfighter. We understand the Block 4 requirements, and those requirements to address the advanced threats in the four mission sets that the U.S. services need to use the Block 4 system for.

With that, this year and next year, right now, we are devolving those warfighter requirements into technical work baselines. We did not have that information when the report was sent. We had the plan to do that technical work understanding and lay out the technical efforts to a PDR [preliminary design review] and CDR [critical design review].

We also saw the opportunity, with the Block 4 capabilities being 80 percent software-driven, to embrace an agile, rapid, iterative process that allows us to target capability enhancements and improvements on a warfighter cadence. If they need the EW [electronic warfare] system updated, we can do the EW system, instead of having what we—you would normally see in a program of record, which is out to—all the way to 2024 with every individual capability always going to be delivered at an exact same time.

We are embracing that flexibility and opportunity, but we are not being haphazard. The technical underpinnings of this is based upon our technical refresh [TR] architecture of the aircraft. The current TR–2, half of the Block 4 capabilities technically can operate on that. And then TR–3 in 2021, the balance of those capabilities can operate on TR–3, or needs to operate on TR–3.

So before the report was sent we were able to be able to map those timelines and to map those 3-year periods and then provide a cadence delivery. And so we are on our path to provide that technical underpinning and, with that, the cost estimate to do the verification, validation, and understanding of the new agile principles and system engineering and test.

We will have our Defense Acquisition Review Board [DAB] with Ms. Lord in June, and in June our acquisition strategy we are bringing forward for approval. And at that time we will have the entire acquisition plan all the way to 2024 laid out for the Department's review and approval. We plan to share that as it evolves before June, and I have authority to provide that as that is maturing to the Congress, as part of our quarterly updates. And then, as we come out of the June DAB, bring the Block 4 plan to you.

Right now, from a cost estimate perspective, we are using our traditional cost-estimating relationships, which are based on the Block 3 and traditional acquisition timelines. We are proposing true agile scrum, rapid, iterative activities to design and develop in code, and then have operational and developmental testers review and look at it, and then put it into the system. And when I say that, I mean put it into ALIS, put it into the aircraft, put it into the simulator, put it into the intelligence system. It is not just the aircraft. That allows us rapid delivery, as well as understanding and learning, and be able to flex to real-world threats as they become aware by our warfighters.

I realize that this is not traditional. And what I—what we need to do is provide you the sense of confidence for the goalposts that we can operate between, and bring that to you. Right now, our FY 2018 and FY 2019 resources provide those necessary critical near-term so that we can bring you that plan as we come forward in this summer. Thank you very much, sir.

Mr. TURNER. Niki Tsongas.

Ms. TSONGAS. Thank you, Mr. Chairman. And thank you Admiral Winter, for being here.

I mean I think we have these questions on C2D2 going forward, because it is important that if Congress is going to understand the costs and the risks and the timeline to be sure that it is executable, realistic, and—in its scheduling, and realistic in its goals, we need to understand all that before endorsing it.

So, in addition to what you just said, it is my understanding that you were unable to provide a definitive estimate in the January report, which was requested—again, because we need to be mindful of what Congress is committing itself to because the military services have yet to decide how much of that potential $16 billion upgrade, if you include the $11 billion in development, the $5.4 billion in procurement, how much of that they are willing to pay for. Is that correct?

Admiral WINTER. Ma'am, I appreciate the opportunity for those numbers. Right now the current cost estimate across all the way to 2024, which is 2 years more than a normal FYDP [Future Years Defense Program], is $10.8 billion. That is the current cost estimate.

Ms. TSONGAS. For development?

Admiral WINTER. For development of all eight elements—the aircraft, the MDFs, ALIS, the simulators, the threat databases, the mission planning, and the reprogramming laboratories—to be split between the international partnership and the U.S. services. The international partnership will be, right now, estimated $3.7 billion of that $10.9.

And so the U.S. services will be—their cost share is $7.2 billion over 7 years, which is just over $1 billion a year, for modernizing and enhancing the F–35 air system, which is on par for post-development ratios of the complete scope that I just articulated.

Thank you, ma'am.

Ms. TSONGAS. And then I would like to follow up, then, with our service representatives to just find out where each of your service stands on the issue of your piece of the C2D2 program, what decisions will need to be made in your service as to the way forward, who will make them, and when.

And we will start with you, General Rudder.

General RUDDER. Thank you. Thank you, Congresswoman. I think in some cases, when it comes down to the budget, the Commandant will have a fair bit of say about what we spend that on.

But as we look at C2D2, the one thing that I find that is important to understand in this committee is that—the agility and the requirement for the agility.

So we will—they—the JPO will scope out the program and we will stair-step this up, some of it in the initial processor that we have now, and then the follow-on processor that will get us to endgame.

But one thing, as a service, that we are actively looking at is the ability for the agility. Now, the agility of this is to be able to download the capabilities we need on a prioritized method that allows us to upgrade the aircraft to keep pace with the threats. And I think one thing about the C2D2 that sometimes gets clouded, I think, is how rapidly the threat and the pace of technological development that they are progressing at.

So there will be some budget decisions that have to be made. If the scope of the work comes in at the level that is proposed and is looking for within our TOA [task order agreement], we are going to be able to handle that. Obviously, O&S costs is another big part of that, which is another discussion item. But we, in the environment that I think all three of us are operating in, we have to build and download—and be agile and download the aircraft with updated capabilities to keep pace where we see the threat going, certainly out into the 2025 timeframe.

Ms. TSONGAS. So would you say at this point you are comfortable with what the Marine Corps is looking at? The cost.

General RUDDER. I am comfortable in the focus on the agile network—agile—the agile way ahead, and how Admiral Winter is approaching it. I think none of the service has a true comfort level until we get that sustainment—or no, not sustainment—the cost of how this is going to happen scoped out. We will be—but year by year we are going to put money into C2D2 at the levels that Admiral Winter is requesting currently.

Ms. TSONGAS. Admiral Conn.

Admiral CONN. I agree with Lieutenant General Rudder that we will fund to the requirement. There is obviously—as it works its way up through the POM [program objectives memorandum] process, up through this Chief of Naval Operations, Secretary of the Navy, but I think at the funding levels we are talking about we will fund to the requirement.

Now, whether OSD [Office of the Secretary of Defense] jumps in and provides us some guidance, I am not able to answer that at this time.

Ms. TSONGAS. And General Harris?

General HARRIS. Yes, ma'am. Thank you for that. Our Chief and Secretary likewise will have the final say, from an Air Force perspective, when it comes to that.

But we do want to highlight one of the strengths of this program is that each of our bills are only 40 percent, from an airman's perspective, of what that upgrade costs because it is a joint program that we do share across the services and the allies. So that is helpful.

We do have funds laid in our plan to cover most of these costs, and we do intend to execute these upgrades. But we are looking at the agile acquisition methods to reduce both the upgrade costs and also sustainment portion. So like my teammates, we are not certain of the costs that are coming our direction, that they will be covered as they are. We intend to make sure that we are driving those costs out and working with the JPO and the company to make that happen.

Ms. TSONGAS. I thank you all for your testimony. It is certainly—no matter—cost, and we just want to be sure that it is rooted in reality, and we are not facing, you know, as we have historically with this program, enhanced costs that could have been better thought through. Thank you.

Mr. TURNER. Mr. Kelly.

Mr. KELLY. Thank you, Mr. Chairman, and thank all you witnesses for being here today.

One of my biggest concerns is the operational and maintenance in keeping these birds flying. I mean they are critical, that—they not only—not only that we own them, but that we keep them flying in adequate hours to allow people to train, and also to operate, should we need them.

And I am going to start with you, Lieutenant General Rudder, and go down the line to Admiral Conn and then General Harris, but I want you guys to tell me how many F–15s—I mean, I am sorry, F–35s that you have. If you can, tell me what the average cost to maintain those birds through 2017 was, and then tell me what percentage of the time that they were eligible to be flying that they were flying. I think that is critical. We got to get to the crux of the matter. Does it work when we need it to work? And how much does it cost to maintain?

And Lieutenant General Rudder.

General RUDDER. We have got about 60 jets right now. Some are in operational tests and developmental tests. And then we have 16 operational aircraft at Iwakuni and about 12 aircrafts that are sitting in Yuma right now.

Each one of the aircraft costs, as was alluded to earlier, but just for the lot number aspects of availability, I think we are seeing those lot 6 and below aircraft, which we have the majority of those in our training squadron, we see those below the 50 percent level. If we begin to look at lot 7 and above—certainly as we get into lot 8 and 9—we start to border up into the mid-50s, getting close to 60.

If we look at the squadron that is forward in Iwakuni right now, long lines of supply, then we look at about the mid-50 percent. But if I look at the ones back in Yuma right now, they were running 9 out of 10 jets up, at a 90 percent. Now, that is not—that is a good day.

But the upper level of some of the late-lot jets are running about 60 percent.

Mr. KELLY. Just real quick, but the bottom line is where we are going to need these things are going to always be at long lines of supply. And we got to be able to fix our own stuff and fix it forward and have those stockage and parts and know what they are forward, because we are not going to be close, we are going to be far when we—if and when we do a fight.

Rear Admiral Conn.

Admiral CONN. Yes, sir. There are 28 F–35Cs, of which the Navy has 21 and the Marine Corps has 7. Primarily at Eglin, just standing up our FRS [Fleet Replacement Squadron] last year and our first squadron is transitioning—starting this month, actually—to be complete by October.

In terms of the maintenance availability rates, I believe it is 50 percent. But I will make sure that I get the accurate answer to you and to this committee. And in terms of the actual costs, I don't have those at hand right now, in terms of cost per hour. But I will get—also follow up with that information.

Mr. KELLY. I think that is really important to know those, you know, how often it flies, not—what—the war rate is one thing. But how often each bird—you know, we have pacing items in the Army. Each one of these things is a pacing item to me. And I knew what all my pacing items—I knew how often to buy a piece of equipment, how often they were available, and how often they were deadlined. And we need to do the same thing. And we also need to know what it costs to maintain, not just to buy.

General Harris, please.

General HARRIS. Congressman Kelly, sir, thank you for the question. And again, thank you for your prior service.

The Air Force has 130 F–35As, 100 of those are Block 2B and older airplanes. And the availability rate of those aircraft was in the low 40s. For our 3I and our 3F aircraft, the availability rate, the ability to fly those airplanes, is in the 60 to 70 range. And currently our deployed team right now is above 70, average, for the several months they have been deployed. So that part is working well.

Same on the costs. We think they are in about the $50,000-an-hour range, but that varies by block and how you are using them, whether it is a training or it is an inter-operational deployment, and as we continue to grow the ecosystem of the F–35. So the F–35 that you heard Admiral Winter speak about that rolled out of the FACO [final assembly and check-out] in Japan, being able to build these in Turkey from a final assembly, that will help us get these parts forward that we need and provide those distribution points. So that portion is also improving.

Mr. KELLY. And, Admiral—I mean, I am sorry, General Harris—I don't want to put you in the wrong service here—compare that to another gen five. You have both F–22s and F–35s. Compare the

cost and operational rates of those two aircraft, as far as maintaining and cost to maintain.

General HARRIS. Costs are about similar, and we expected the F–35 to be a little cheaper, because the F–22 is a—it is a different airplane, the way we use it. It is an older LO [low observable] capability, so it takes more maintenance to actually keep that upgraded on the capabilities. So that portion of the F–22 that we are living with—because we have been flying fifth-gen for a decade now in our Air Force—they are about the same, and we expect the F–35 to be lower, because obviously it is going to be a more available, a lot more in the procurement side than—of the aircraft.

Mr. KELLY. I yield back, Mr. Chairman.

Mr. TURNER. Thank you.

Mr. Carbajal.

Mr. CARBAJAL. Thank you, Mr. Chairman.

Lieutenant General Harris, in your testimony you express your continued concern over ALIS. What is most disturbing is that recent investigation showed that ALIS does not deliver the required warfighting capability that the Air Force needs, but this software is already being fielded.

I understand you have ordered a more in-depth study on this issue. Can you provide a timeframe of when this study will be completed?

Furthermore, the fiscal year 2017 DOT&E F–35 annual report indicated that the program relies too heavily on the results of laboratory testing of ALIS software, which does not resemble operational conditions. The recommended—and recommended the program develop a more adequate test venue.

Vice Admiral Winter, has the program taken steps to develop a better test venue for ALIS?

Admiral WINTER. Mr. Congressman, thanks for the question. We——

Mr. CARBAJAL. I went from one to the other. I apologize.

Admiral WINTER. I didn't know if there was——

Mr. CARBAJAL. Either one is fine.

Admiral WINTER. I will answer quickly. The operational environment lab that we have for our ALIS as it comes out of our Lockheed Martin RMS [rotary and mission systems] executive OMS [open mission systems] environment provides the operational reality and operational readiness for the fielded capabilities. The problem is that the—we are on that path to deliver the final functionality here next month, with ALIS 3.0.

The true issues are in the underlying COTS [commercial off-the-shelf] products, what they are—that are based upon a 1995 architecture that drives just unacceptable usability and interface concerns to our warfighters. And we are on track to assess the re-architecture plan to address all of those usability issues, stabilize the software, and then work with our U.S. warfighters to ensure that ALIS will be scalable and flexible for the long future. That process is in place today.

Mr. CARBAJAL. Thank you.

General Harris.

General HARRIS. Yes, sir. Thank you for the opportunity to speak about ALIS. That is one of our big concerns.

The team continues to provide regular updates and upgrades to ALIS. So the study that you alluded to will probably be ongoing. We hope to wrap it up within the year. But as the new upgrades come, we actually add that in to make sure that we are working with the current state of what ALIS is now, versus what it was when we started the study. And that is helpful.

As I talked to the maintainers as late as two nights ago, it is much better. We still have people that are permanently dedicated, their full-time job is to work on ALIS. And that wasn't what we had expected from our manpower, from our maintenance. We wanted our maintainers to be able to stay on the flight line, get the information they needed, and continue to work. And now the typical crew chief may have to actually secure her tools and her publications, walk in, do some work on ALIS to figure out the way ahead, and then go back out onto the flight line. So that is not optimal, that perspective, and we continue to work through that.

Mr. CARBAJAL. General Harris, I just don't understand how we are now just realizing that the methodology we used to develop the software system may not deliver the required warfighting capability. Can you elaborate a little bit more on that?

General HARRIS. The ALIS software system, is that what you are referring to?

Mr. CARBAJAL. Yes.

General HARRIS. Okay. It has been delivered in elements and pieces. It didn't come all together. We just now added the propulsion system to it. So ALIS does continue to grow, and it wasn't delivered where we need, and it is still not there yet. Things that used to take 5 and 6 hours to get the download, to know if the aircraft is going to be able to fly to make the next go, was substantially outside of the windows we needed. So we were able to turn that now, with the improvements and working with both the contractor and the JPO, to get that down to minutes. So the airplanes are able to make a normal turn time.

Sir, I think we recognized that it wasn't going to deliver perfect upfront, that the upgrades would be required. We just think it is taking longer and more manpower-intense than we had expected.

Mr. CARBAJAL. Thank you.

Mr. Chair, I yield back.

Mr. TURNER. Mr. Gaetz.

Mr. GAETZ. Thank you, Mr. Chairman. And my questions follow General Kelly's line of thinking.

And General Harris, first, thanks to you for all of the guidance and assistance you have provided me. I will say that, as my staff and I have spent time with folks at the 33rd Fighter Wing at Eglin, it has not been all smiles because we have gotten report after report that the parts are not available to ensure that we have got capable aircraft to meet the training syllabus.

And while we have not been late in graduating any pilots yet, I have been told that we are rapidly approaching the inability to accomplish the mission. And I have got JPO, you know, and Lockheed Martin both sort of doing this. And so I am hoping you can enlighten us as to how to get out of this system where there are not adequate parts.

And particularly, those who are training are frustrated when they send parts to JPO and those parts then end up in a combat squadron somewhere else. I can understand why one would do that under intense pressure. My hope is that this is actually neither Lockheed's fault nor JPO's fault, it is actually Congress's fault for keeping us under a continuing resolution for so long that we have been unable to adequately fund parts.

So when we get beyond the current continuing resolution into an appropriations process, will we solve this problem before we are unable to graduate pilots on time?

General HARRIS. So, Congressman Gaetz, thank you for that question. I would love to share the blame with Congress, so happy to do that. But it is partially us, sitting here. We are late in standing up our depots to actually turn and fix those parts. So we have been going back to the OEMs, the original equipment manufacturers, to get new parts for most of the time, rather than fix them. So those parts themselves are stacking up.

And you heard the admiral talk that we are getting there to stand those depots up and fixing those parts faster.

And, as you know, Eglin is special in all of our hearts. It is my birthplace, by the way. They have got our oldest jets. That is the first place we put them. So a lot of those parts that—they go, we are not even putting down to production airplanes, but they need those parts to keep them flying at the 2B level, which are the jets that are—the way they are configured.

So that is a concern of what we are looking at, from an Air Force, to make sure that our training pilots are getting the information and the quality of training they need before they go to those operational squadrons, and we are working through our plan to how do we either upgrade or swap those aircraft out and put them into a suitable role.

Mr. GAETZ. And it invariably begs the question, if we have got folks training on the older aircraft, does that in any way impair the quality of the training, particularly if we are unable to get those aircraft in the sky.

I have also heard troubling reports that Lockheed may be involved in changing the status of planes and their reports, going from non-mission-capable to potentially partially mission capable. To what extent is the contractor involved in that decision-making process, versus our uniformed military?

General HARRIS. Normally, sir, they are not. And when it comes to an operational squadron, even less so. Because these are training jets in your particular case, it has happened where we say it is not flyable because the LO or a combat system may not be ready, yet the company looks at it and says the airplane is actually flyable, so they change the status of that. We disagree with that practice. We are working through to make sure that it is——

Mr. GAETZ. Is that a current—do we currently have a situation where uniformed military says that the aircraft is not mission capable, the contractor says it is, and then the contractor's view is dispositive?

General HARRIS. I think we have made a change to say that will no longer occur. It has occurred in the past. I don't think it is occurring right now.

Mr. GAETZ. All right. It would be excellent if you could confirm that and maybe let the committee know, so that we could take comfort in the manifestation of that change.

[The information referred to can be found in the Appendix on page 99.]

Mr. GAETZ. Is there anything we can do and any guidance you would give us during the appropriations process so that we could work with our appropriators and authorize the right amount so that, on a going-forward basis, we don't risk sort of going over the edge of the waterfall on not graduating pilots, and then seeing an even more pronounced impact on combat squadrons than the missing of a part, because you would have the missing of a pilot, which is the most important part?

General HARRIS. Yes, sir. That is a fair question. We are doing less than half of our upgrade training now at Eglin, as we have got a little more than one squadron and more jets standing up at Luke. So we are balancing that with making sure that we have, as the operation squadrons build, the training squadrons build. So I think we have that solved at this time, to make sure that the build is commensurate with what we need.

As I said, the aircraft that are flying at Eglin are our oldest ones. They are our least available. But we are also able to measure and put fewer pilots per squadron into that until we can get those airplanes upgraded, as we talked about, to a 3I or 3F configuration, if that is the way we are able to go.

Mr. GAETZ. So what I think I hear you saying is that it is truly not the contractor's fault. There is a bureaucratic issue at JPO that we are working through to fix, and that with the new appropriation—you know, with our new cap [budget caps] deal, that this is a solvable problem, that we won't be here, you know, 12 months from now, wondering why we are approaching the time where we can't graduate pilots.

General HARRIS. Sir, the problem is solvable. I am not sure it is a bureaucratic JPO issue. It was probably more of a misunderstanding for the company doing contract maintenance to think they had the ability to go in and make changes from what an airman or a supervisor put out.

Mr. GAETZ. Thank you, Mr. Chairman. I yield back.

Mr. TURNER. Mr. Bacon.

Mr. BACON. Well, I thank you gentlemen for being here. It is a very important topic, is going to make a big impact on our country for decades to come. I have a couple questions for Admiral Winter and then one for General Harris.

When I retired out of the Air Force I was working in the mission data files, and it was a hard problem. Of course, that was in 2014, so we have hopefully progressed 3 years and made a lot of progress.

I understand that the U.S. Reprogramming Lab has the lead, they are making some great strides.

One of the concerning things is those mission data files that sort of run the whole—you know, it is like the brains of the F–35. The earlier mission data files are not compatible with what we are using in the F–35. Have we created a standard that we are going to be using for the future F–35s and future, you know, fifth-genera-

tion and sixth-generation aircraft? Hopefully, we don't have to re-create the wheel again like we have done here.

Admiral WINTER. Mr. Congressman, thanks for that question because the mission data file is that intelligence brain that, when in the aircraft and the aircraft is operating and the advance sensors start to sense and bring that information in, the mission data file presents and provides that cross-check, presents that information to the pilot on the panoramic cockpit display.

My first introduction to the mission data file is a—it is a series of hundreds—in some cases, thousands of files. It is not a single file. The tool suite that the 513th, as well as our government software engineers use are an engineering developmental tool suite that was used in the early 2000s. That is another causal factor. And we were doing unique mission data file architectures for each type of aircraft configuration.

We have learned all of those lessons. And so today we have put a standard framework for the mission data file. However, we still need to generate a new data file when a configuration changes. And those configurations are like going from 3I to 3F, adding additional sensors. We have to get over that, as well.

And so, we have brought in the defense digital science team, we have brought in the Air Force digital science folks to provide us insights on better ways to re-architect the mission data file format going into the future. Thank you, sir.

Mr. BACON. Thank you very much. Now, I am a RC–135 guy from—you know, going way back, three tours at Offut [Air Force Base], four times in the 55th Wing. So the F–35 has a great sensor package on there. In fact, I remember always using the words "exquisite sensor package."

What concerns me, though, is we are—I think we are still trying to figure out how do we get that data off the airplane.

So, two things. When we land, we should be able to have that storage capability so we can go back and debrief and figure out where all the threats are at, so that the follow-on packages can get that data and be better prepared, or, you know, to get the mission done. But even more optimally is a real-time intelligence feed off the airplane. Where are we at with both when we land to get the data off, or also, follow-on, getting that data off real-time while we are airborne?

Admiral WINTER. Again, sir, excellent question. After landing and bringing out the PMD [portable memory device], which is the data cartridge, we had initially an older generation of data recorder transfer that was just completely unacceptable. It was 1 to 15, 1 to 20. We are now on the third generation and have designed the fourth generation. That is now near real-time.

And so that is good. But even in downloading that, our debrief mission planning systems are not up to snuff, and so we need to work on that, along with that integration to ALIS, so that all of that data can then provide the health and status and prognostic look-ahead for that individual aircraft.

As far as real-time airborne engagement and data collection, sensor collection, and then being able to process that, we now—right now we can share that amongst other F–35s that are on the same configuration. So that real-time communication and sharing does

occur. And from other Link 16 communication data links, we can share it with other fourth-generation—certain data with certain fourth-generation aircraft——

Mr. BACON. So we can get it back to the AOC [air operations center], is what you are saying, eventually?

Admiral WINTER. Eventually, yes, sir. So the thing is it is not at the level of flexibility that we need to get to, that we are planning to have it to, as we get into the Block 4 capabilities, which are part of those modernization and enhancements to the system.

Mr. BACON. I won't be able to get my other question in, I am running out of time, but I just think that that offers a real decisive advantage, getting this data off real-time, back to the AOC, see where the SA–20s [Russian-made surface-to-air missile systems] are at, or the airborne threats are at, and be able to respond and plan while those F–35s are still airborne. I just see a huge advantage there. And so, hopefully, we can exploit that.

And with that I yield back.

Mr. TURNER. Chairman Bishop.

Mr. BISHOP. Thank you, Mr. Chairman. And thank you for your communication with my staff, as well.

Gentlemen, I appreciate all of you being here today.

And Admiral Winter, I also appreciate you, in your recent tour of Hill Air Force Base with the Air Force basing team. Obviously, I think I am justifiably proud of that base, and what the 388th is doing, and what they have done over in Europe, and what the 34th Squadron is doing in the Pacific right now, as well as the depot work that is taking place there to maintain that aircraft.

As you go forward with—you know, with the HPSI [Hybrid Product Support Integrator]—for whatever that acronym means; I can't keep up with them, anyway—I was just wondering. As you come up with your assessment criteria, will like real-time collocation of operational and maintenance expertise be one of the factors that will be considered?

Admiral WINTER. Congressman Bishop, thank you for that question. And also, I was very impressed with my first visit to Hill, and not only from the operational perspective and the depot, but the software sustainment footprint that is there.

On your question about the Hybrid Product Support Integrator——

Mr. BISHOP. You got it, good for you.

Admiral WINTER [continuing]. HPSI—if we can't pronounce your acronym, it is not a good acronym.

[Laughter.]

Admiral WINTER. The current HPSI team is located here at—in Crystal City, and operating and doing the work of the HPSI. We are using the United States Air Force strategic basing process through the Secretary of the Air Force. The criterion that was laid out was to maximize and leverage off of intellectual capital of government acquisition professionals and operational professionals in the geo-located area.

Will there be additional credit or discriminators between having sustainment and acquisition and operational? They are both two separate on the criterion list, as well as other areas in the criterion.

I know that Hill is one of our candidates, and that process for final selection is working its way to—in the April timeframe to Secretary Wilson.

Mr. BISHOP. I appreciate that. If I could just follow with one other, too.

You know there was a recent GAO report that talked about repair time. And I was wondering if you are—have implemented any new initiatives or what—and/or what can Congress do to assist in making sure that those repairs are being done in a timely fashion to keep us at least on pace with the Chinese and the Russian fifth-generation aircrafts?

Admiral WINTER. Again, Congressman Bishop, great question. And this committee has already leaned forward in supporting spare parts, as well as ensuring the funding for our organic depot stand-up, which is our number one effort in standing up from 23 repair lines to 68 repair lines to more rapidly—well, increase the repair capacity, but rapidly deliver the repaired part back to our warfighter. And that is underway right now. And the ramp-up of that is being funded. That is our first and foremost effort. So that action is underway right now.

We are also engaging with the industry partners that have that repair capacity, to ensure that their throughput goes, so that our warfighters have repaired spare parts on the flight line.

Mr. BISHOP. Thank you.

Mr. Chairman, I will yield back.

Mr. TURNER. Mr. Wittman.

Mr. WITTMAN. Thank you, Mr. Chairman. Gentlemen, thanks much for joining us today.

Lieutenant General Rudder, I wanted to begin with you and ask you, as the Marine Corps deals with having two versions of F–35, both the F–35 Bravo and the F–35C, is the mix of aircraft for the Marine Corps optimal in order for you to achieve the goals in the National Defense Strategy?

General RUDDER. Thank you, Congressman. It is. The—currently, with the F–35B, those aircraft will serve in two roles. They will be deployable on the amphibious big decks, but we will also use them for our shore-based commitments right now.

If you look at where we are today, we have got an F–18 squadron shore-based in CENTCOM, we have got an F–18 squadron shore-based in PACOM [U.S. Pacific Command]. We have got a carrier deployment, and then we have got all our new deployments that are roaming about. This aircraft will do all of those, to include the F–35Cs, which will integrate in with the carrier deployments.

So currently, those aircraft, as we look to distribute them around the world and fulfill our distributed operations, our expeditionary air base operations concepts, on being able to use smaller airfields and different distributed—in a distributed STOVL [short take-off/vertical landing] manner, I think it fits perfectly in the lethality part of the National Defense Strategy.

Mr. WITTMAN. Very good. I want to ask you a little bit about software upgrades. We know that the Marine Corps declared for F–35B IOC [initial operational capability] with Block 2B. And the Air Force declared IOC for F–35C with Block 3I. We know the dif-

ference between them is integrated core processor, so there is some hardware differences there.

As we look at where Block 3I is today, we know that 85 percent of the code necessary for full combat capability today is flying. We know that Block 3F is soon going to be before us. We know it is going to be soon, but we know that it is not going to be operationalized on a number of aircraft for a significant period of time.

Give me your perspective on the importance of a software element of the hardware of these aircraft, not only what it brings in capability, but what about the timeliness of having that for your aircraft, and the missions that you are needing to perform as part of the Marine Corps direction.

General RUDDER. We have—we are going to prioritize, obviously, our forward deployers to get the 3F drops. And we will also prioritize those that are in the continental United States that are next deployed for those 3I drops. We are still receiving. As a matter of fact, we just received our first lot 10, which is a production 3F aircraft, just the other day. Now it is at Pax River doing some testing. So it is very important.

One, this 3F drop, first and foremost, will give us better reliability, just—it is a more stable software, less fault codes.

Two, it gives us the full G and full air speed right off the bat. And also, for the Marine Corps, what it does is it allows us—and for all the services—a lot less to do external stores and our gun pod.

So at some point within whatever scenario you may want to dictate, we will have been able to strip down, mostly under the great command of the great Air Force, to be able to integrate part of that, to strip down any air defense systems, and then we are going to put the F–35B into a [inaudible] formation and do close air support with us or aerial interdiction.

Back to—so that is the goodness of it, and there is some other things that go along with that, as far as some tactical pieces of that, as far as being able to push data links a little better and quicker.

For upgrading our other aircraft, we are funding and advocating and working with the JPO to make sure that our TR–1 jets are upgraded to TR–2. And we hope to have our fleet jets that are out there upgraded by next summer. So we should hopefully, by next summer, have all 3F configured out in the fleet. And then we will begin to work on our training squadron.

Mr. WITTMAN. Got you. Very good.

General Harris, give me your perspective, too. As we talked about, the Air Force went to IOC with the 3I, with Block 3I, 3F becoming available. Give me your perspective on the importance of 3F, the importance of the capability that the aircraft has with that software upgrade, and where you see it being needed by the Air Force to achieve their missions.

General HARRIS. Thank you, Congressman Wittman. The benefit is the Air Force is now flying with 3F inter-operational squadron.

Mr. WITTMAN. Good, good.

General HARRIS. We did the upgrade for the aircraft currently deployed. They left as 3I and are now 3F at deployed location, and we are working through the rest of them at Hill.

It is not night and day, it is an awesome improvement in many ways to provide aircraft stability. The fault rates are down and the software itself is making better use of the sensors that are onboard the airplane. Because you know it is just a software upgrade——

Mr. WITTMAN. Yes.

General HARRIS [continuing]. But it is all working better now. So 3F is the airplane the aircrew and the maintainers really were looking for.

Mr. WITTMAN. Very good.

Thank you, Mr. Chairman. I yield back.

Mr. TURNER. Thank you. We are going to go for a couple of additional questions.

Admiral Winter, I work with our NATO [North Atlantic Treaty Organization] partners and dual-capable aircraft [DCA] for—are incredibly important for our ability to continue the NATO nuclear mission. Your budget request currently includes $770.4 million for the development of dual-capable aircraft and $984 million for Block 4 C2D2. In your prepared remarks you mentioned that the program will leverage a minimum essential infrastructure for the development, integration, certification, and testing of the DCA capability.

Would reductions to the $984 million request for Block 4 affect the infrastructure necessary for developing dual-capable aircraft capabilities?

Admiral WINTER. Mr. Chairman, the—your direction in the NDAA—previous NDAA that gave us programmatic direction to ensure that the DCA development and delivery was not impeded by or tied to the Block 4 software development, and so we are following that direction. And the infrastructure and specifics are the development test flight aircraft and the laboratories that we need to bring the F–35 software in, along with the munition software to do that integration.

The $984 million request in FY 2019 funds predominantly the Block 4 software for the F–35, the TR–3 continued development and integration efforts, and then the rightsizing of our developmental test aircraft and test fleet.

If there is a mark to that $984, there is a graduating impact to that element. But the DCA and the $77 million that we have budgeted for DCA will continue to do the design work post-PDR [preliminary design review] to CDR [critical design review] for DCA. And the infrastructure will be there to allow us to do that.

Mr. TURNER. Niki Tsongas.

Ms. TSONGAS. Thank you, Mr. Chairman.

Admiral Winter, in a recent Inside the Navy story you were reported to have said that the Block 3F deficiency database contains roughly 200 deficiencies related to mission planning, ALIS, and the aircraft.

You also reported said that you would not "pay twice" for fixing these issues during the follow-on C2D2 upgrade effort.

So, first of all, can you provide more deals—more details about those 200 deficiencies?

Admiral WINTER. Yes, ma'am. And those deficiencies captured the entire—or the timeframe from 2001 to now. Most of them have been resolved. But those are remaining deficiencies against the

fielded capability. And in that, the performance level of that capability, it is not the capability is not there, but the performance of that capability.

We have little "pippers" in the display. They may be slightly jittery or a refresh rate of a display, which we will go fix. But to go fix that would delay delivery of the capability. We take those types of decisions to what we call a configuration steering board, and they are chaired by me, and they are populated by the U.S. Marine Corps, U.S. Navy, and the U.S. Air Force warfighter, and they give me direction to say, "You have to fix that right now" or "That can be fixed later."

And so those are things in the simulator, in ALIS, in the MDF, and in the aircraft. Those 200 DRs, deficiency reports, that are remaining right now have gone through that process, and they are still being tracked, and they will be resolved as we go forward.

But our industry partner was on contract to deliver Block 3F capability with no deficiencies. So what we are doing is we are holding what we call a consideration summit, where we bring not just those DRs, ma'am, but there are other contractual, non-deliverable items that our industry partners have not provided. And so we will sit down and we will have a discussion on the like-kind feedback and like-kind resourcing, because, as I go forward with Block 4 and I am doing the modification and enhancement, I am going to be fixing some of those display—it is just the right thing to do. But I don't want to pay that, because it was—should have been fixed before we delivered. So that is the idea of how we will get that consideration adjudication, and not pay twice.

Ms. TSONGAS. So when you say consideration summit, you are talking about who pays for it.

Admiral WINTER. Correct. Yes, ma'am.

Ms. TSONGAS. Great, thank you. I yield back.

Mr. TURNER. Gentlemen, any closing remarks? Anything you would like to add that we have not gotten to? I think you have had a pretty good breadth of the committee's concerns. Any questions?

General RUDDER. Just an overall thanks for what you have done with the budget last year, and certainly the budget this year. I mean it—back to the original point was we are now able to fully fund these readiness accounts to get this airplane where it needs to be, plus ramp up production. So I thank you for the committee and to the——

Mr. TURNER. I appreciate that. Hopefully in the next several years we won't have the battle over top line that we have had over the past, and we can talk about how we reach new capabilities, as opposed to just the degrading of our readiness. So I appreciate that comment.

With that, we will be adjourned.

[Whereupon, at 3:37 p.m., the subcommittee was adjourned.]

A P P E N D I X

MARCH 7, 2018

PREPARED STATEMENTS SUBMITTED FOR THE RECORD

MARCH 7, 2018

Statement of the Honorable Michael Turner
Hearing on Military Services 5th Generation Tactical Aircraft Challenges and F-35 Joint Strike Fighter Program Update

March 7, 2018

The hearing will come to order.

The subcommittee meets today to receive testimony on an update to the F-35 Joint Strike Fighter program, and integrating fifth-generation tactical fighter capabilities into the services' fighter fleets.

I want to welcome our witnesses for today's panel:

- Vice Admiral Mat Winter, the Director of the F-35 Joint Program Office;
- Lieutenant General Stephen Rudder, Deputy Commandant of Aviation for the United States Marine Corps;
- Rear Admiral Scott Conn, Director of Air Warfare for the United States Navy; and,
- Lieutenant General Jerry Harris, Deputy Chief of Staff of the Air Force for Plans, Program and Requirements.

Gentlemen, we thank you for your distinguished service and look forward to your testimony today.

This year marks the beginning of an important transition for the F-35 program.

After 17 years of developmental and engineering activities, the F-35 will complete its baseline development program by May of this year, and then enter an operational test period this September to assess and validate if each variant of the F-35 provides the capabilities needed to meet operational requirements defined by each of the military services before us today.

F-35 acquisition is still increasing, but still not to the level the services require. Last year, the Department of Defense requested 70 F-35s. This year, the request is for 77, with plans for the Services to budget for 99 aircraft per year by 2023. Procurement costs for F-35s are steadily declining. Last year, negotiated costs for the three F-35 variants were over six percent lower than the previous year. Hopefully, projections for actual costs continue the recent trend of coming in below the program office's estimates.

Last year marked several notable accomplishments for the F-35 program. Among them: all developmental weapons testing was completed, the final version of block 3F software was provided to some of the fleet, and 66 F-35s were delivered to the U.S. Services. Additionally, F-35 deliveries were made to Italy, Norway and Israel.

But the F-35 program continues to face challenges ahead.

In addition to beginning operational testing, this year also marks a transition from initial development activities to follow-on development, which has become

known as "continuous capability development and delivery" or "C2D2". While the goal of C2D2 methodology is designed to deliver continuous modernization to the warfighter in smaller increments and an expedited timeline, the recent Director of Operational Test and Evaluation report to Congress questioned whether the C2D2 program is properly resourced, and whether the testing community will be provided sufficient test aircraft built in a current production configuration to perform and validate future capabilities.

In terms of oversight, the subcommittee has always had affordability at the forefront of its F-35 oversight activities. To supplement our F-35 oversight activities, the subcommittee included a provision in the fiscal year 2017 National Defense Authorization Act that required the Government Accountability Office, or GAO, to review the F-35's sustainment support structure and provide Congress its findings and subsequent recommendations to address affordability issues.

The GAO's report, released in September of last year, noted that the F-35 program is facing key sustainment challenges that include: repair capacity at depots, spare parts shortages compounded by insufficient reliability of various parts and components, unfunded intermediate-level maintenance capabilities, and delays in development of the computer and network-based Autonomic Logistics Information system, known as "ALIS".

To address these issues, we understand that the F-35 program office in the past year has executed $114 million dollars to fast track the standup of depots, made investments in reliability and maintainability improvement projects, and obligated $1.4 billion dollars to increase spare parts purchases, build up repair capacity and improve the speed of repairs.

The F-35 program office has also developed a five-year technical roadmap for ALIS to address future requirements. ALIS in its current state is not user-friendly and has caused the services' maintenance personnel to create burdensome manual-tracking processes and inefficient workarounds. More troubling, each service continues to rely heavily upon contractor-provided information-technology experts to manipulate ALIS's intricate software and complex databases because the ALIS system still does not meet contractual capability requirements that would enable our personnel within each service to independently operate and input data into ALIS.

As much attention and effort that was paid to getting F-35 development and procurement costs to a reasonable level, that same level of effort and attention now needs to be applied to ALIS and its functionality.

Despite these efforts, the three Services operating the F-35 all still share a critical concern about rising F-35 operations and support costs affecting affordability. We understand that the F-35 program needs to reduce F-35 operations and supports costs by about one-third to meet Service budget goals for affordability; otherwise, end-state procurement quantity goals for each service could be dramatically impacted.

The higher-than-desired operations and support costs, compounded with the parts and depot issues I mentioned earlier, are already beginning to manifest with

the Service's hesitation to increase procurement rates beyond current levels until the F-35's glide path to affordability trends in the desired direction.

For the Tactical Air and Land Forces Subcommittee, our actions will be to continue close oversight of the F-35 program and continue to provide the Department the tools and resources necessary to realize F-35 affordability. The capabilities the F-35 brings to the battlefield against advanced threats are desperately needed to meet the goals and objectives of our new Defense Strategy and that of our foreign partners invested in the program. We, with our foreign partners, absolutely cannot risk the F-35 program meeting a similar fate the F-22 program did in not being able to procure and field sufficient capacity to meet combatant commander warfighting requirements.

Gentleman, I look forward to your testimony on how we can meet these and other future challenges in the F-35 program.

Without objection, each of the witnesses prepared statements will be included in the hearing record.

Admiral Winter, please begin with your opening remarks, and you will be followed by General Rudder, Admiral Conn, and then General Harris.

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THE HOUSE ARMED SERVICES COMMITTEE
SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES

STATEMENT OF

VICE ADMIRAL MATHIAS WINTER
PROGRAM EXECUTIVE OFFICER
F-35 LIGHTNING II PROGRAM

BEFORE THE

TACTICAL AIR AND LAND FORCES SUBCOMMITTEE

OF THE

HOUSE ARMED SERVICES COMMITTEE

ON

F-35 PROGRAM REVIEW

MARCH 7, 2018

NOT FOR PUBLICATION UNTIL RELEASED BY
THE HOUSE ARMED SERVICES COMMITTEE
SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES

I Introduction

Chairman Turner, Ranking Member Tsongas, and distinguished Members of the Subcommittee, thank you for the opportunity to discuss with you today how the President's FY 2019 Budget request supports the fact-of-life, program wholeness and near term critical investments necessary for our F-35 Lightning II Program. As adversaries across the globe continue to develop advance capabilities of their own, this conversation serves as an opportunity to align programmatic expectations and goals while discussing the operational accomplishments that are redefining the battlespace through the acquisition of the world's most advanced fifth-generation strike fighter. In January 2018, the Secretary of Defense outlined his agenda for "Sharpening the American Military's Competitive Edge" in the 2018 National Defense Strategy. As the subsequent discussion will demonstrate, the F-35 plays a central role in the three crucial pillars of this framework:

Building a More Lethal Joint Force

- The F-35 Air System is the premier multi-mission, fifth generation strike fighter that provides our warfighters unmatched, game-changing capabilities.
- The F-35's interoperability allows seamless information exchanges making every participant in the battlespace smarter, more lethal, and more survivable.

Strengthening Alliances and Attracting New Partnerships

- The unique F-35 Partnership brings together our three U.S. Services with our eight Partner nations and three Foreign Military Sales customers that strengthen our acquisition, government and warfighter alliances.
- The F-35 program modernizes the defense capabilities of participating nations and enables coalition-based fighting, international interoperability, enhanced global reach and a strong global industrial base coalition.

Reforming Business Practices for Greater Performance and Affordability

- The F-35 will be the world's most advanced fighter for the next fifty years, and to ensure the aircraft remains ahead of adversaries, the enterprise will continually deliver enhanced capability to the warfighter with a focus on affordability and speed.
- The F-35's number one priority is the continued aggressive reduction and avoidance of costs through new uses of agile development, streamlined production and global support sustainment practices, allowing us to work smarter and cost-effectively to make the air system more affordable for all Customers.

On this strategic foundation, the F-35 Joint Program Office enters a critical transition period as we prepare to deliver the full Block 3F warfighting capability, transform the Enterprise to embrace true agile acquisition processes for future modernization, ramp up to full rate production and continue to expand the global sustainment framework in support of our US Services and Partners' warfighters. With over 270 fielded aircraft operating from twelve (12) sites within the United States and abroad, F-35 warfighters are beginning to experience the true game changing capabilities the F-35 brings to bear as well as identifying challenges that need to be addressed. Through these efforts, along with the aggressive implementation of cost-saving initiatives, the F-35 will be more survivable, supportable, lethal, and affordable than ever before and will ensure our expectation for decades of continued U.S. air superiority is reaffirmed

While the Program's leadership has undergone change since last appearing before your subcommittee, its attention to these tenets remains constant. With a renewed focus on affordability, transparency, communications and stakeholder engagement, the Program's future, its three lines of effort (production, sustainment, and development), the United States, its International Partners, and the Program's FMS customers are well-prepared to meet the challenges and threats of the future.

II Program Successes and Accomplishments

We are pleased to report many accomplishments during the past year, both programmatically and operationally. The F-35 Joint Program Office made major strides in finishing Block 3 testing, completing all weapons test points and the majority of the remaining flight science and mission systems test points, a total of 5,266 developmental flight test points. The F-35 Enterprise made significant progress towards the completion of test readiness criteria required to begin formal Initial Operational Test and Evaluation (IOT&E), providing weapons and flight envelope clearances to allow for Pre-IOT&E activities. The Program delivered 66 aircraft to its customers, completing LRIP Lot 9 deliveries. Finally, the F-35 Sustainment Team managed the flight operations and maintenance of 270 F-35 aircraft at thirteen training and operational sites, and increasing the number of trained F-35 maintainers to over 5,000 personnel worldwide.

Operationally, eight United States Air Force F-35As from the 34th Fight Squadron at Hill Air Force Base in Utah deployed to Royal Air Force (RAF) Lakenheath in the United Kingdom in June. The 34th Fight Squadron flew seventy-six sorties and tallied more than 154 flying hours alongside F-15s from the 48th Fighter Wing based at RAF Lakenheath. The aircraft then forward deployed to Estonia and Bulgaria to maximize training opportunities and build partnerships with allied air forces. RAF Lakenheath is scheduled to receive its first permanent F-35A Lightning IIs in 2021.

In August, to demonstrate solidarity with our allies in northeast Asia, four F-35Bs from Marine Corps Air Station Iwakuni in Japan, two B-1Bs from Andersen Air Force Base in Guam, two Japan Air Self-Defense Force F-15Js, and four Republic of Korea Air Force (ROKAF) F-

15Ks flew together over the waters near Kyushu, Japan, and the U.S. and ROKAF aircraft continued on and flew across the Korean Peninsula.

In October, the U.S. Marine Corps participated in Exercise Dawn Blitz where U.S. Marine Corps F-35B Lightning II, assigned to Marine Fighter Attack Squadron 211 conducted operations aboard the USS ESSEX (LHD-2) to test the ability to conduct amphibious operations and completing thirteen (13) carrier qualifications.

As the Program continues toward the U.S. Navy's Initial Operating Capability milestone later in 2018, the F-35 Enterprise is razor focused on seeing that everything is in place to support the Navy. Last year, Naval Air Station Lemoore in California stood up as the Navy's F-35 Fleet Replacement Squadron and its Strike Fighter Squadron (VFA-125) conducted day and nighttime flight operations aboard the USS CARL VINSON (CVN 70). Also last year, the Navy conducted F-35 pilot carrier qualifications aboard the USS ABRAHAM LINCOLN (CVN 72).

Our International Partners and FMS customers recently achieved several noteworthy milestones as well. Of exceptional note, in November the Royal Norwegian Air Force became the second International Partner to receive an F-35 on its home soil. The Royal Norwegian Air Force acknowledged this accomplishment during its 73rd birthday celebration.

The F-35 Program continues to execute across the entire acquisition spectrum, including development and design, flight test, production, fielding and base stand-up, sustainment of fielded aircraft, and the building of a global sustainment enterprise and is in a full sprint across all three lines of effort.

III Development

While each line of effort is vital to the long-term success of our warfighter, our work to

deliver the F-35 weapon system begins with Development. By transforming the way we view the Program through an "eight element" model while delivering Block 3F capability, and preparing to meet DCA requirements, the F-35 continues to establish itself as a vital part of our nation's defense. To that end, the Program is preparing for Initial Operational Test and Evaluation (IOT&E) start and embracing an agile framework for the Continuous Capability Development and Delivery of Block 4 capabilities.

F-35 Eight Element Model: In order to demonstrate the F-35's capabilities on and off the battlefield, the Joint Program Office has transformed the way it conceptualizes the F-35 weapon system. This renewed approach serves as a reminder that the F-35 platform is more than just an aircraft. While the air vehicle's capabilities are transformed through the information provided by its operational flight program, similar relationships exist between JSF Reprogramming Labs and Mission Data Files, Autonomic Logistics Information System (ALIS) and Off-Board Mission Support, and Full Mission Simulators and their Threat Database; by establishing this eight element framework, the Program has better technical and programmatic control on how each component of the F-35 system arms the aircraft with revolutionary capabilities, lethality, and supportability that differentiate it from legacy platforms.

Block 3F: The F-35 is prepared to enter combat if required. The delivery of Block 3F improves warfighting capability with enhanced sensors and targeting, improved data links, improved threat countermeasures, and enhanced weapons capability to include air-to-air missiles, air-to-ground munitions, and weapons employment throughout the full aircraft flight envelope. Initial Block 3F software was delivered with later LRIP Lot 9 F-35A aircraft starting in August 2017 and included Block 3F Mission Systems capabilities required to conduct all critical mission

threads including: Strategic Attack, Close Air Support, Suppression/Destruction of Enemy Air Defenses, and Air Superiority.

Block 3F capabilities are in the fleet today and will continue to be delivered with LRIP Lot 10 F-35 aircraft. Since the initial Fleet Release of Block 3F software in August 2017 the F-35 JPO, in close coordination with U.S. Services and International Partners, has addressed critical Deficiency Reports (DRs) in order to deliver mission systems improvements and maximize F-35 mission effectiveness for LRIP Lot 10 Block 3F aircraft. The latest Block 3F software has demonstrated the capability maturity and stability to complete all required Missions Systems test points and address critical DRs as directed by the Services via the F-35 Configuration Steering Board. In addition, the Program is taking the necessary Airworthiness and Weapons Certification steps to enable full combat capability with Block 3F hardware, software, and weapons carriage with LRIP Lot 10 F-35 aircraft delivered during 2018.

The Program continues to deliver Block 3F capability for the F-35A and is on track to deliver Block 3F capabilities to the F-35B and F-35C later this year in May (BF-63) and July (CF-34), respectively. This capability delivery will support fleet operational needs, deployments, and entry into formal Initial Operational Test and Evaluation (IOT&E) in fall 2018.

Dual Capable Aircraft (DCA): While full warfighting capability was achieved with the delivery of Block 3F, the F-35 weapons system's nuclear capabilities are critical to building a more lethal joint force. As the Program transitions from SDD to the C2D2 framework for the delivery of Block 4, infrastructure will be required to support the development, integration, testing and fielding of approved Block 4 capabilities. The Program will leverage a minimum essential infrastructure for the development, integration, certification and testing of the DCA

capability. The F-35 Program's minimum essential infrastructure is a foundational capability that consists of the resources required to maintain development and integration labs, required test sites and facilities, Developmental Test (DT) aircraft, and industry and government manpower to support and maintain the labs and DT aircraft fleet. The United States is committed to upgrading DCA and is incorporating nuclear capability onto the forward-deployable F-35 as a replacement for the current aging DCA.

In accordance with the 2018 National Defense Strategy, nuclear capabilities are essential to our nation's long-term defense. F-35 DCA remains aligned with the initial increment of the Block 4 effort. Detailed Risk Reduction activities have been completed, ensuring the F-35A is fully compatible with the B61-12 weapon and initial planning for Block 4 Nuclear Certification efforts have begun in anticipation of initial B61-12 integration on the F-35A this year. The F-35 JPO remains fully engaged with the USAF, Department of Energy, and strategic partners, and is confident that this capability will be fielded and certified in time to meet specified need dates

Initial Operational Test and Evaluation: With warfighting capability delivered, it is essential to prove the effectiveness of the F-35 through thorough test and evaluation. There are forty-seven Initial Operational Test and Evaluation (IOT&E) test readiness criteria that must be met before formally beginning IOT&E. Examples of readiness criteria include: aircraft and weapons envelope certification, verified and validated Block 3F mission data file production, and the number of aircraft in a Block 3F configuration. Formal IOT&E is currently expected to begin during the late third quarter of 2018. To help mitigate delays in Program development, the Director of Operational Test and Evaluation (DOT&E), in coordination with the operational test agencies, agreed to permit the execution of select "Pre-IOT&E" activities prior to satisfying all

forty-seven readiness criteria. Pre-IOT&E activities are occurring in two increments in early 2018.

In January and February of this year, six F-35s (two of each variant) deployed to Eielson Air Force Base in Alaska for the first increment of Pre-IOT&E activities. The six F-35s conducted cold weather testing in sub-zero degree (Fahrenheit) temperatures and assessed the F-35 air vehicle system's effectiveness, suitability, and mission capability during alert launches. Pre-IOT&E Increment Two is expected to begin mid-2018 and will evaluate the F-35 in tactical missions such as Close Air Support (CAS), Strike Coordination and Reconnaissance (SCAR), Aerial Reconnaissance (Recce), and Forward Air Controller (Airborne) (FAC-A). These tests will include weapons delivery effectiveness evaluations. They will also include assessments of F-35B and F-35C variants in shipboard operations. Formal IOT&E includes Defensive Counter-Air missions and combined mission scenarios executed by two 4-ships of F-35s to achieve realistic complexity, threat densities, and schedule-range-cost efficiencies.

Continuous Capability Development and Delivery - Block 4: With recent progress and goals in mind, the development of F-35 warfighting capability does not end with the delivery of Block 3F software. Rather, it is the foundation upon which continuous enhancements and improvements will be made to increase capabilities that make the F-35 more lethal and survivable. To ensure the F-35 remains a relevant, capable warfighting platform, the Block 4 capability set was approved by the U.S. Services and Partner nations, and formally endorsed by the Joint Requirements Oversight Committee during spring 2017. With Block 4 requirements defined, the JPO determined that legacy linear development and delivery approaches could not deliver the required capability on the necessary timeline at available funding levels.

The F-35 program is taking a new approach to deliver post-SDD capabilities in order to provide the warfighters F-35 weapon system modernizations, enhancements, and improvements faster and more frequently. Under this new capability delivery paradigm, software sustainment and modernization will no longer be two separate efforts. C2D2 is a strategy that allows support and enhancements to fielded capabilities while also delivering advanced capabilities. This effort reflects a shift to a more agile process that enables the F-35 enterprise to incrementally develop, integrate, test, and deliver the Block 4 capability set on an operationally-relevant timeline.

Objectives of C2D2 include a six-month enhancement and improvement software delivery cycle and a twelve-month interval for modernization. The approach includes a sequence of two capability drops aligned with a cycle of Technology Insertions. Technology Insertions leverage rapid commercial off-the-shelf computer upgrades to keep pace with technology and minimize obsolescence while solving diminishing manufacturing source issues. Maintaining hardware currency provides the flexibility to quickly develop and implement changes to meet the evolving threat. On a longer range cycle, as industry moves to a next generation of computing architecture, F-35 C2D2 will plan a Technology Refresh (TR) to capture the next higher level of computing capacity. While such a change is involved and complex, these upgrades are essential to the viability of the F-35 throughout its full lifecycle. Based on experience from the F-22, an eight-to-ten year span between Technology Refresh events will maintain viable warfighting capability throughout each cycle. TR-3 is planned for implementation as soon as possible, but not later than LRIP Lot 15, with an objective of accelerating into LRIP Lot 14. The Technology Refresh, Technology Insertion, and C2D2 Capability Drop Agile Acquisition Cycles are represented in Figure 1 below.

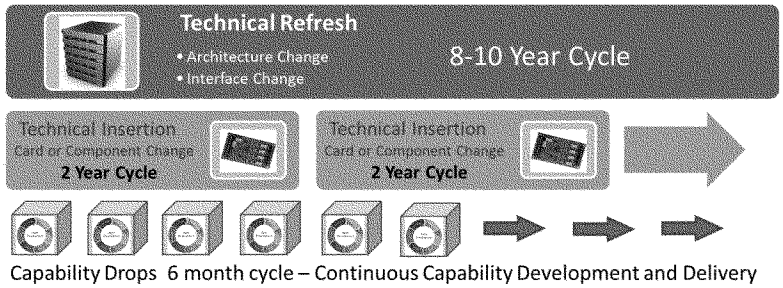

Figure 1 C2D2 Agile Acquisition Cycles

The program is developing a strategy for System Engineering Transformation (SET) that will leverage Model Based Systems Engineering (MBSE) to rapidly develop and deliver F-35 capabilities and is establishing a Government/Industry team to develop the strategy for this initiative. The team will assess previous modeling & simulation efforts on F-35 and other programs to identify lessons learned; evaluate and map current F-35 Systems Engineering processes and tools to MBSE approaches and tools; identify investment for tools, training, and other infrastructure requirements; and create an implementation plan.

In December the Program completed Requirements Decomposition and a System Functional Review. Additionally, the TR-3 hardware strategy (including new F-35 main computers and displays) was implemented, a suitable specification was developed, and the TR-3 system design phase contract was awarded to Lockheed Martin in the first half of 2017. The coming year will be filled with many new development challenges and achievements as well. 2018 will include further Requirements Decomposition and Preliminary Design of select Block 4 capabilities as well as completion of the Preliminary Design Review this fall. A Planning and

Systems Engineering Phase II contract award is planned for spring 2018, which will support a Preliminary Design Review for select Block 4 capabilities and a System Requirements Review for Block 4 capabilities that will be developed later in the Program.

IV Production

Aircraft production continues to accelerate while aggressively driving costs out of the production line. Efforts such as Blueprint for Affordability and War on Cost initiatives, economic order quantity (EOQ) purchases, and Government-direct purchasing continue to ensure the F-35 is not only lethal, survivable, and supportable, but affordable as well. With suppliers in forty-five states and eleven countries (Figure 2), these are truly global production efforts. Together, with each of our Partners and FMS Customers, the F-35 Program continues to realize progress and achieve results in terms of delivery performance, pricing, and contracting.

Figure 2: F-35 International Global Supply Base

Delivery Performance: In order to meet increasing schedule demands, the Program will continue to ramp up production while focused on improving quality to support cost and delivery targets. During 2017, seventy-four propulsion systems and sixty-six aircraft were delivered as planned. Over 280 aircraft have been delivered to date and all LRIP Lot 9 deliveries are now

complete.

In 2017, the Program delivered sixty-six aircraft and achieved the planned delivery goal for the year. This total includes nine LRIP Lot 8 aircraft that were delayed due to non-conforming insulation on polyalphaolefin (PAO) cooling tubes found in some F-35A wing fuel tanks in August 2016. Aircraft delivered in 2017 include sixty-one from the Fort Worth, Texas Final Assembly and Check-Out (FACO) facility, three aircraft from the Italian FACO in Cameri, Italy and two aircraft from the Japanese FACO in Nagoya, Japan. The Italian FACO produced their first "B" model and the two "A" model aircraft assembled at the facility in Nagoya, Japan were the first produced at that location. Of the sixty-six aircraft produced, thirty-four were delivered on time in accordance with the contracted delivery schedule.

Goals for 2018 include the delivery of ninety-one aircraft. Of those ninety-one aircraft, eighty-five aircraft will be delivered from the Fort Worth FACO, two aircraft from the Italian FACO and four aircraft deliveries from the Japanese FACO.

F-35 LRIP Pricing: The price of F-35 aircraft continues to decline. For example, the price (including airframe, engine, and contractor fee) of a LRIP Lot 10 F-35A aircraft ($94.3 million) is approximately 7.5 percent less than a LRIP Lot 9 aircraft. LRIP Lot 10 F-35B ($122.4 million) and F-35C ($121.2 million) aircraft are approximately 6.2 percent less than LRIP Lot 9 aircraft. The price of the F-35A fell below $100 million for the first time in LRIP Lot 10 and prices are expected to continue to decline as we negotiate LRIP Lot 11.

Over the course of the LRIP contracts, timeliness of aircraft deliveries has historically been a challenge. However, over the past few years, while production quantities have increased, the

Program has seen improvement in the timeliness of aircraft deliveries (Figure 3). Though getting better, the program is not satisfied with any delays.

LRIP	Average Days Late to Contract Deliveries
1	23
2	96
3	131
4	139
5	87
6	68
7	20
8	30
9	18

Figure 3: F-35 LRIP Aircraft Delivery Timeliness

Challenges/Quality Escapes/Scrap Rework and Repair: The F-35 weapon system has taken production of stealth fighter aircraft at high volume with an integrated support and training infrastructure to levels never seen before. Technologies required to create its unique characteristics continue to push the boundaries of manufacturing capability. As with all aircraft production, non-conformance to requirements and standards still occurs. These non-conformances or "defects" are identified and corrected before the government accepts an aircraft. Remediation of defects falls into three categories: Scrap (replace the part completely); Rework (correct the part); and Repair (render a full life part by authorized fix). Defect quantity and Scrap, Rework, and Repair (SRR) hours are measured throughout the production process.

Defects have been reduced by 45 percent since tracking began in LRIP Lot 6. Further, aircraft SRR hours per aircraft have been reduced by 78 percent since production began. While these achievements have aided in the production of superior products at reduced cost, the Program is not satisfied. The Joint Program Office, in partnership with the Defense Contract Management Agency (DCMA), continually strives to improve defect and SRR measures while

seeking out new measures through aggressive quality management. Such efforts include the identification and elimination of the root causes of defects, preventing future occurrences. Additionally, process controls and other proven practices are used to reach desired levels of defect prevention.

The efforts to prevent defects take place throughout the entire supply chain and across the weapon system. Ongoing corrective actions and initiatives improve producibility and foster the steady maturation and expansion of the F-35's global production footprint as quantities increase. Production quality metrics of SRR, Defect Reduction, and Out-Going Product Quality Level continue to improve lot over lot; however, they still represent medium risk to full-rate production objectives.

Due to recent quality escapes impacting production and field sites, JPO has chartered a Quality Review team that draws on senior quality experts within the Department of Defense (DoD) to evaluate enterprise Quality practices and improve Quality Management System processes. Program managers continue to work with contractors to implement aggressive program goals to meet affordability objectives by driving cost out of the program, increasing quality, and increasing availability to the warfighter.

Air Vehicle Production Contracting: While the U.S. Services continue to contract annually for LRIP Lots 12, 13, and 14, some F-35 Partners and FMS customers have initiated a Block Buy contracting strategy for LRIP Lots 12, 13 and 14. This strategy gives F-35 Partners and FMS customers flexibility to purchase all aircraft in a single procurement for LRIP Lot 12 (FY 2018) or to procure aircraft and engines in a multiple lot format for LRIP Lot 12 (FY 2018), LRIP Lot 13 (FY 2019), and LRIP Lot 14 (FY 2020). The U.S. Services will procure LRIP Lots 12, 13,

and 14 as single-year procurements and have requested congressional approval to award a single contract to procure two year advanced material and equipment for FY 2019 and FY 2020. There is no multi-year commitment for U.S. Services' aircraft and engines, which will continue to be bought on an annual basis for LRIP Lots 12 through 14 (FY 2018 - 2020) and preserves congressional annual discretion.

The risk of the Partners' and FMS customers' Block Buy for Lots 12, 13, and 14 is considered low because the design of the weapon system will be stable during this period of time. All F-35 variants have completed second life (8,000 hours full life) durability testing. Additionally, 99.9 percent of all hardware and subsystems qualifications are completed, and Block 3F capability will begin delivery this year, well before Lots 12, 13, and 14 are delivered. For the U.S. Services and Congress, the risk is even lower since the commitment is limited to the purchase of two years' worth of parts in a single EOQ procurement (FY 2019 and FY 2020).

Engine Production: In 2016, the Program completed contractual actions with Pratt & Whitney on LRIP Lot 9 and 10 for the F135 propulsion system. The F-35A/F-35C propulsion system reduced 3.4 percent from the previously negotiated LRIP Lot 8 price to the negotiated LRIP Lot 10 price. The F-35B propulsion system (including lift systems) reduced 6.4 percent from the previously negotiated LRIP Lot 8 price to the LRIP Lot 10 price. Pratt & Whitney has completed delivery of the sixty-seven production propulsion systems for LRIP Lot 9 delivering 33 percent ahead of contract delivery requirements. Pratt & Whitney has delivered approximately 50 percent of the 104 production propulsion systems for LRIP Lot 10 achieving a 71 percent delivery of the fifty-one production propulsion systems ahead of contract delivery requirements. Pratt & Whitney continues efforts to improve quality surveillance within its

manufacturing processes resulting in a 29 percent reduction in quality escapes during 2017; however, improvements at the vendor level are needed to identify and eliminate quality non-conformances which have interrupted engine deliveries. For 2018, Pratt & Whitney remains focused on increasing capacity at existing suppliers and qualifying second and third sources as needed to meet production ramp requirements.

V Sustainment

While development and production efforts of the F-35 Program are central to the creation of the aircraft, they must be matched with equally robust capacity for aircraft sustainment. The past year brought measured enhancements in both sustainment capability and affordability. The F-35's Global Enterprise is in a full sprint to execute and grow sustainment to provide cost-effective, safe, and timely Maintenance, Repair, Overhaul, and Upgrade (MRO&U) capability within a three-region framework (Europe, Pacific, and North America) for airframe, engine, component, warehousing, and distribution. There are over 270 aircraft fielded throughout the F-35 Enterprise; during the next five years, more than 670 aircraft are expected to be delivered and fielded. The global sustainability of this growing fleet relies on a common pool of spares and support equipment, common pilot and maintainer training, and common engineering support.

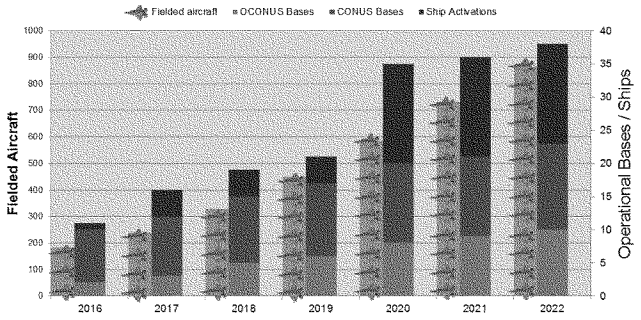

Figure 4: F-35 Fleet Growth through 2022

With over 5,000 maintainers worldwide, the F-35's sustainment capacity is growing immensely. In 2017, the JPO invested $3.4 million in Reliability and Maintainability (R&M) improvement projects and executed $1.4 billion to increase spare part purchases, build up repair capacity, and improve the speed of repairs. A five-year ALIS technical roadmap was developed to ensure cyber security, maintain current technology, and minimize Lifecycle Cost. Finally, to ensure Warfighter performance capabilities will be delivered within an affordable Operation and Sustainment (O&S) cost, the JPO established a 30 percent cost reduction mandate for life-cycle O&S costs over ten years based on the 2012 Sustainment Annual Cost Estimate (ACE) baseline.

There are over 270 F-35s operating at thirteen sites, five of which are overseas. Luke Air Force Base in Arizona is the main training base for the A Variant for the USAF, many Partners, and our FMS customers. Marine Corps Air Station (MCAS) Beaufort in South Carolina is the main F-35B training base for the USMC and United Kingdom. Additionally, Italy will utilize MCAS Beaufort from 2019 as additional F-35Bs are delivered from the Italian FACO. Eglin Air Force Base in Florida is the main training base for the USN's F-35C and Naval Air Station (NAS) Lemoore in California became the first USN operational unit with nine aircraft in VFA-

125 in January 2017. All F-35 maintainers also get their initial maintenance training at Eglin Air Force Base. In the next 4 years, we will add another 17 operating bases to the F 35 enterprise across all 3 regions of North America, the Pacific, and Europe. Cumulative aircraft availability rates remained steady from 2016 to 2017 at 51 percent: 53 percent for the A-model, 47 percent for the B-model, and 48 percent for the C-model which experienced higher rates of non-possessed time for depot modifications.

This continues to be a focus area for the Program and various Program initiatives are being executed to improve overall weapon system availability. A disciplined Reliability and Maintainability (R&M) Program, improved maintenance procedures and manuals, continued improvement in the ALIS, better forecasting of spares requirements, more agile spares contracting, improved repair turnaround times from suppliers and incorporation of aircraft design improvements are having a positive effect, but at a slower rate than desired. However, newer aircraft in later LRIP Lots are showing significantly better R&M Availability Rates when compared to older lot aircraft as design improvements are incorporated. Figure 5 shows combined (F-35 A, B, and C-model) Air Vehicle Availability (AVA) rates for each production lot.

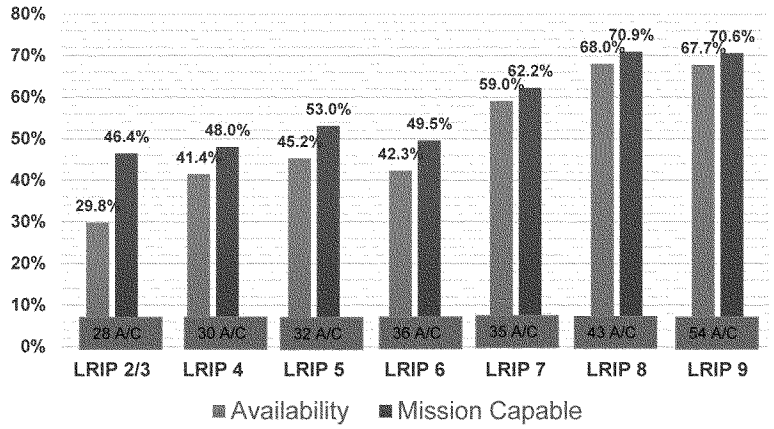

Figure 5: Aircraft Availability Rates by Production Lot

The Program continues to mature the Global Sustainment posture across Europe, Asia-Pacific, and North America. In December 2016, DoD made OCONUS regional MRO&U source of repair selections for sixty-five of the 456 components released for OCONUS repair. These initial component repair capabilities, when combined with F-35 airframe and engine heavy-level maintenance, begin establishing the foundation to provide all customers, including the U.S. Services, the capability to sustain their aircraft globally. This year, the F-35 JPO will make OCONUS source of repair recommendations to OUSD(A&S) for the next batch of 391 released air vehicle and propulsion components.

In August 2017, the DoD assigned regional warehousing capabilities for both Europe and Asia-Pacific Regions. Following analysis of support equipment maintenance requirements, it was determined there was no current business case for an OCONUS regional MRO&U capability, thus the Program is building an integrated network of Product Support Providers

consisting of commercial and organic sources of repair and calibration in all F-35 user countries on or near the operating sites. DoD has assigned to the F-35 Partners and FMS customers regional MRO&U including technology groups spanning wheels and brakes, electrical and hydraulic systems, power and thermal management, Lockheed Martin (LM-STAR) tested components, as well as warehousing for the global supply chain. These same capabilities either currently exist or are being stood up at U.S. Service depots in accordance with U.S. law.

Hybrid Product Support Integrator: The past year marked many milestones for the Program's HPSI, a partnership of government and industry organizations, which manages product support and other sustainment efforts. The HPSI declared initial operational capability (IOC) in 2016 and through effective collaboration, now works to ensure enterprise success across delivery streams including maintenance, supply chain, sustainment engineering, training, and logistics information systems. Within the HPSI, product support providers work to identify "best value" sustainment solutions and adhere to transparent decision making and source selection processes.

In May 2017, the HPSI continued to mature as the HPSI Operations Center transitioned to a new facility located in Fort Worth, Texas. The Operations Center is maturing in capability with personnel from all five major contractor teams manning the facility and contributing to availability improvements.

This year is shaping up to be equally promising for the HPSI. The organization will soon make a strategic basing decision and will begin executing its full operational capability (FOC) plan. Further, the HPSI will select OCONUS HPSI regional support sites and identify a Deputy HPSI Manager from among the Partners. By 2019, the HPSI will include approximately 440 individuals including Services, Partners, and Industry personnel.

Global Support Solution: As a truly global Partnership, the F-35 enterprise requires an effective Global Support Solution (GSS). Established upon core principles of transparency, continuous competition, and best-value analysis, the Product Support Manager, HPSI Manager, and Product Support Managers seek to offer effective sustaining engineering, training, and maintenance as the F-35 Program continues to embrace "contracting for outcomes" rather than simply "contracting for things."

With an emphasis upon fleet performance and increased readiness, affordability, and sustainability, the F-35 Program continues to implement and improve its Global Spares Pool, allowing the U.S. Services, International Partners, and FMS customers the opportunity to increase parts availability while leveraging economies of scale. The JPO is aware of and addressing each of the findings in last year's Government Accountability Office report and is confident that the appropriate steps are being taken to maximize aircraft availability for the warfighter.

The F-35 Lightning II Program will continue its organizational transition in a manner that achieves Program goals and complies with the JSF Production, Sustainment, and Follow-On Development (PSFD) Memorandum of Understanding (MOU). All participants continue to support the Product Support Manager (PSM) in fulfillment of the statutory mandate and in implementing the sustainment strategy through the GSS organization, which is tailored to meet participant and FMS customer requirements. The HPSI organization has achieved IOC (2016) and FOC (2019) maturity planning is underway and working daily sustainment of the F-35 fleet. The first service-led HPSI manager is on board and fully engaged in the transition. Delegation

of duties will increase during the transition period as the HPSI organization matures and business systems evolve.

All participants continue to work toward the maturation of an HPSI organization that integrates Government and industry capabilities and skillsets to achieve Program objectives and warfighter requirements as the Air System matures and expands, in accordance with GSS design criteria. Further, the participants will support the evolution of Product Support Provider analysis and execution.

In FY 2018, U.S., Partner, and FMS Customers will co-exist at various stages of operating capability with growing fleets as the Program continues to develop and negotiate value-based, long-term Logistics and Sustainment arrangements with Industry and organic providers. Deploying Global Support Solutions to leverage all stakeholder capabilities, human capital and best practices remains a priority. Finally, life cycle integration with an emphasis toward cost reduction, affordability, and R&M improvements to support the warfighter continue to drive F-35 sustainment efforts.

As the F-35 Air Vehicle matures, there is an increasing need to move maintenance tasks planeside to provide field units with maintenance capability to execute repairs at the Organizational Level (O-Level). For FY 2017, the Maintenance (Mx) Value Stream Team (VST), in conjunction with Lockheed Martin, initiated thirty-four Mx Plan "changes" costing $48 million, with a positive impact to Air Vehicle Availability (AVA) of 10 percent and $400 million in cost avoidance over the Program life-cycle.

The Mx VST Level of Repair Analysis (LORA) went beyond just economic-LORA, by conducting preliminary Maintenance Task Analysis (MTA) on Tire & Wheel initiatives.

Analysis showed that a cost avoidance of $491 million over a 20-year period could be realized by using a Condition Based Maintenance (CBM) concept for the wheel. The LORA team conducted MTA on twenty-nine specific components to support Department of the Navy (DoN) Intermediate Level (I-Level) effort with projected cost avoidance of $450 million over a 20-year life-cycle. The DoN programmed $42 million in FY 2019 funds to initiate this capability.

Further, Air Force A4 Headquarters requested an individual synopsis of Air Force I-Level maintenance using a Centralized Intermediate Repair Facility (CIRF), separate from the Regional Repair Network (RRN) approach recommended by the JPO. The analysis showed a return on investment (ROI) of $881 million using the full bed-down of 1,311 aircraft. Modeling excursions showed ROIs with reliability improvement of 10-20 percent above predicted; with the extreme of 50 percent aircraft with a 20 percent increase in reliability still showed a $296 million return on investment.

RRN models (Navy and Air Force combined) were updated, with the current RRN concept showing the largest impact for the F-35 Program with $1.8 billion in cost avoidance.
For FY 2018, eleven more Maintenance Plan changes are scheduled for completion during FY 2018, including an F-35 Wheel Overhaul Demonstration of Capability with I-Level maintainers at Beaufort MCAS using F-18 technical data (with projected cost avoidance of $491 million over a 20-year period). The Mx VST LORA will continue depot throughput analysis to build models to aid in analyzing depot throughput bottlenecks, material lay-in, resource requirements, cost, capacity, and other elements to improve turnaround times, while optimizing resources and reducing cost.

In FY 2018, the United States, International Partners, and FMS customers continue to increase in fleet size and capability. As we develop and negotiate value-based, long-term arrangements with industry and leverage all stakeholder capabilities, and as we drive Lifecycle Integration with an emphasis upon cost reduction and affordability, it is clear that the F-35 will be the sustainable and affordable weapon system necessary to face both today's threats and those of the future.

VI International Partners and FMS Customers

With eight International Partners and three FMS customers, international participation within the Program remains strong. Over the past year, aircraft deliveries continued to our United Kingdom, Italy, and Norway International Partners and to our FMS customers, Israel and Japan. Of note, Italy received its first F-35B aircraft in December which was assembled at the Italian Final Assembly and Check-Out (FACO) facility in Cameri, Italy. In January 2018, this aircraft completed a transatlantic flight and arrived at NAS Patuxent River in Maryland. The first Japanese aircraft from the Japanese FACO in Nagoya, Japan was completed in October and in February, Japan held a First Aircraft Arrival celebration at their Main Operating Base in Misawa, Japan.

Pooled F-35A pilot and maintainer training continues at Luke Air Force Base in Arizona for Italy, Norway, Australia, and Japan. Maintainer training for both F-35As and F-35Bs continues at Eglin Air Force Base in Florida. Pooled F-35B pilot and maintainer training between the United States Marine Corps and the British Royal Air Force continues at Marine Corps Air Station Beaufort in South Carolina. Italy is in initial discussions with the USMC for pooled F-35B training at Beaufort, South Carolina which is expected to start in 2019.

On 12 December 2017, the Government of Canada launched a Future Fighter competition to replace their CF18 aircraft with eighty-eight advanced fighter aircraft. The JPO has worked closely with the U.S. Defense Security Cooperation Agency to promptly and thoroughly answer all questions provided by the Canadian government in support of its fighter replacement analysis.

In February 2017, Turkey held a 95 percent Design Review for its first Major Operating Base in Malatya, Turkey. This review is a major milestone on the way to ensuring Turkey's infrastructure is ready for aircraft arrival in 2019. In August 2017, DoD assigned F-35 regional warehousing capability in the European and Pacific regions to the Netherlands and Australia, respectively. These overseas warehouse and distribution centers will enable the F-35 Program to optimize and manage aviation inventory inside the Global Support Solution construct.

In November 2017, the first three Norwegian aircraft arrived in-country at Ørland, Norway's F-35 Main Operating Base. Norway continues testing of the Drag Chute System (DCS) and is also working on the pre-integration of their Joint Strike Missile (JSM). The Dutch also intend to use the DCS, while the Australian government is considering JSM for their Air Force's maritime strike requirements. In December, the Israeli Air Force became the first F-35 OCONUS user to declare Initial Operating Capability (IOC). In August, the Israeli Ministry of Defense signed an amendment to their Letter of Offer and Acceptance (LOA) bringing the Israeli Air Force (IAF) projected total to fifty F-35A aircraft by 2024.

The JPO continues to work with potential FMS customers including Belgium, Finland, Germany, Switzerland, Greece, Romania and Spain, responding to all requests for information and other official inquiries. These and many other new and promising developments continue to foster opportunities and optimism among the U.S. Services, International Partners, and each

FMS customer. 2018 promises to be another year of progress across the global F-35 enterprise.

VII Conclusion

The F-35 Program is on track to have an energy-filled 2018. Operationally, F-35s will continue to support our Combatant Commanders with land-based and afloat units. The warfighters will continue to accept the F-35 weapon system and take delivery of aircraft while establishing new bed down sites.

Our Program will complete Block 3F capability delivery and the Operational Testers will measure its suitability and effectiveness for the warfighters. The Program is pivoting to an Agile development approach, which the Department will leverage to deliver Block 4 capabilities that will keep the F-35 viable against emerging threats in the years ahead. As the production line climbs its aggressive ramp to almost 100 aircraft per year, we are aggressively driving cost out of the production line and global supply chain. In Sustainment, the Program is driving cost-effective performance through affordability initiatives while it builds and reinforces a global supply chain and distribution network to hit Service and Partner cost and performance targets.

With this aggressive focus upon cost-reduction and with keen attention to production, sustainment, and development, the F-35 Joint Program Office remains proud of the Program's consistent progress and optimistic for its success. Alongside each of our International Partners and FMS Customers, the Program remains resolved to meet threats wherever they may arise, and is committed to provide fifth-generation air-superiority to the warfighter for many years to come. The JPO is working daily to ensure the F-35 remains an affordable, lethal and effective war-winning platform in support of our National Defense Strategy. I thank you again for the

opportunity to appear before this subcommittee, and look forward to continued dialogue with you and your staff throughout the coming years.

Vice Admiral Mathias W. Winter
Director, Joint Strike Fighter Program, Office of the Secretary of Defense

Vice Adm. Mat Winter, a 1984 graduate of the University of Notre Dame with a Bachelor of Science in Mechanical Engineering, received his commission through the Naval Reserve Officers Training Corps and was designated a naval flight officer in 1985. Winter holds a master's degree in computer science from the Naval Postgraduate School and another in national resource strategy from National Defense University's Industrial College of the Armed Forces; and a Level III certification in Program Management and Test & Evaluation from the Defense System Management College.

Winter served operational tours as an A-6E Intruder Bombardier/Navigator with Attack Squadrons 42, 85 and 34 making multiple deployments aboard aircraft carriers USS Saratoga (CV 60), USS America (CV 66), USS Dwight D. Eisenhower (CVN 69) and USS George Washington (CVN 73).

Winter's acquisition tours include assistant deputy program manager for the Joint Standoff Weapon System; chief engineer for Joint Strike Fighter Integrated Flight and Propulsion Control; deputy program manager for the Tactical Tomahawk All-Up-Round development program; chief of staff to the program executive officer (PEO) for Tactical Aircraft Programs; and his major acquisition command tour as the Precision Strike Weapons (PMA-201) program manager.

Winter has served flag tours as the commander, Naval Air Warfare Center Weapons Division, China Lake/Point Mugu, California; assistant commander for Test and Evaluation, Naval Air Systems Command, PEO for Unmanned Aviation and Strike Weapons; director, Innovation Technology Requirements and Test & Evaluation; chief of Naval Research and most recently, deputy program executive officer for the F-35 Lighting II Joint Program Office. In May 2017, he became the program executive officer for the F-35 Lightning II Joint Program Office, the Department of Defense's agency responsible for developing and acquiring the F-35A/B/C, the next-generation strike aircraft weapon system for the Navy, Air Force, Marines and many allied nations.

His personal awards include the Navy Distinguished Service Medal, Legion of Merit (three awards), Defense Meritorious Service Medal (two awards), Navy Meritorious Service Medal (two awards), Navy and Marine Corps Commendation Medal (four awards), Joint Service Achievement Medal (two awards), Navy and Marine Corps Achievement Medal, Air Force Acquisition Excellence Award, Southwest Asia Service Medal, Kuwait Liberation Medal and various unit and sea service awards.

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TACTICAL AIR AND LAND FORCES SUBCOMMITTEE

STATEMENT

OF

LIEUTENANT GENERAL STEVEN RUDDER

UNITED STATES MARINE CORPS
DEPUTY COMMANDANT FOR AVIATION

BEFORE THE

HOUSE ARMED SERVICES SUBCOMMITTEE ON
TACTICAL AIR AND LAND FORCES

ON

THE USMC F-35 PROGRAM

7 MARCH 2018

RAYBURN HOUSE OFFICE BUILDING

NOT FOR PUBLICATION UNTIL RELEASED BY THE
HOUSE ARMED SERVICES COMMITTEE
TACTICAL AIR AND LAND FORCES SUBCOMMITTEE

Chairman Turner, Ranking Member Tsongas, distinguished members of the House Armed Services Subcommittee on Tactical Air and Land Forces, and other distinguished members, thank you for your continued support. We appreciate the opportunity to testify on the F-35 Lightning II Program.

Marine aviation was created to support the Rifleman – the Marine on the ground – as we fight our Nation's battles. Aviation provides speed, agility and reach to the Marine Air Ground Task Force (MAGTF) battlespace. In line with Secretary Mattis' guidance, my top priorities for Marine aviation are framed around lethality and include building readiness for combat and modernizing the fleet. Transitioning Marine aviation from its fleet of legacy tactical aircraft to a combination of fifth generation F-35B and F-35C aircraft is critical to building readiness and meeting the demands of the strategic environment. The F-35B and F-35C remain a top acquisition priority for the Marine Corps. The F-35 provides transformational warfighting capabilities for the future naval and Joint Force. Whether the mission requires the execution of strike, close air support, counter air, escort, or electronic warfare, the F-35 Lightning II will form the backbone of U.S. air combat superiority for decades to come.

Operational Update

In the past two years, the Marine Corps conducted trans-oceanic flights across both the Atlantic and Pacific, and exercised the expeditionary capability of the aircraft both aboard ship and in austere environments. To date, the Marine Corps has activated four F-35B squadrons and amassed over 34,000 flight hours in the aircraft. VMFA-121 is permanently stationed in Japan and has assumed the 31st MEU and F/A-18 UDP commitments. The squadron deploys six aircraft with the 31st Marine Expeditionary Unit (MEU) this week – the first operational F-35 shipboard deployment. Our second F-35B squadron, VMFA-211, deploys six aircraft to the 13th MEU this July; *we will have two MEUs deployed with the F-35B this summer.* A combined arms element such as today's MEU afloat is completely revolutionized by having F-35B Short Takeoff and Vertical Landing (STOVL) aircraft aboard. The F-35B can fill the basic role

of providing fixed wing strike and surveillance support to the MAGTF commander and, in the moment, turn and penetrate a high-threat Integrated Air Defense System (IADS). This is a concept completely impossible prior to putting the F-35B on a MEU. The F-35s deployed aboard a MEU can execute all of our current missions to support the Battalion Landing Team (BLT) while simultaneously providing a high-end deterrent to any potential near-peer threat that may emerge. The capabilities of the F-35 make our MEUs, Amphibious Ready Groups, and Carrier Strike Groups more lethal and more survivable – and this is happening *now*.

The Marine Corps has begun procurement of the F-35C variant and will transition its first F-35C squadron, VMFA-314, in FY19. That squadron will be ready for expeditionary operations in 2021 and deploy aboard an aircraft carrier in 2022. Ultimately, we will have four F-35C squadrons that will rotate into deployments on the carrier through Tactical Air Integration (TAI). The F-35C provides the Marine Corps with the exact same systems capabilities and allows us to employ the aircraft from forward deployed airfields or from US Navy aircraft carriers in support of Joint or MAGTF operations. We expect to be out of legacy TACAIR and complete the transition to the F-35B and F-35C by 2030.

Partnership

The Marine Corps will continue to support integrated training operations with our U.K. partners. U.K. aircraft continue to deliver to VMFAT-501 to support the standup of the first U.K. squadron. The UK training pipeline will transition to the RAF Marham, U.K., in June 2019 but the UK pilots will continue to train with Marines at MCAS Beaufort until then. The U.K. is also supporting the F-35B Joint Operational Test Team at Edwards AFB. Between its pilots, maintainers, and support personnel, the U.K. has over 200 people in the U.S. involved in the F-35 program. The U.S. – U.K. carrier integration is also ongoing, and the U.S. will officially support the U.K inaugural deployment on HMS Queen Elizabeth in 2021 with USMC F-35Bs.

Operator's Perspective

From the operator's perspective the F-35's performance is unmatched. F-35 gun squadrons have participated in exercises such as Red Flag, Agile Lightning, and our Weapons and Tactics Instructor (WTI) course at Marine Aviation Weapons and Tactics Squadron One. The Marine Corps has now produced eight F-35B WTIs, and both pilots, and instructors continue to praise the F-35's situational awareness and lethality. During these multiple exercises and WTI classes, we have witnessed first-hand how the F-35 enhances the effectiveness of the Marine Air Ground Task Force, most notably through increased lethality and battlespace awareness. Within the Air Combat Element (ACE), the 5th generation capabilities of this airplane increases the synergy, awareness, lethality and survivability of the entire force. The aircraft has proven its worth across all assigned mission sets, and achieves mission success previously unrealized in legacy platforms.

Operations and Sustainment (O&S) Challenges

It is true and well known that this airplane has been accompanied by an increase in operating costs over our aging F-18s and AV-8Bs; this is by far our greatest programmatic challenge. Much of that increased cost is associated with laying in the appropriate infrastructure to support flight operations, but also the initial procurement of everything that supports the F-35. As an example, right now we are in the midst of procuring initial spares packages for bases and ships; however, once those spares packages are procured, the cost associated with refreshing those packages are significantly lower than the initial buy.

There is also a learning curve associated with an updated model to our aviation logistics. The Joint Program Office re-designed their structure for this in late 2016 and we are just now getting the Hybrid Product Support Integrator (HPSI) in gear to manage the Global Support Solution for all Services

and Partner nations. As this process becomes more mature, we expect to see a decrease in the operations and sustainment costs.

O&S Cost Initiatives

The Marine Corps needs to see a reduction in the cost-to-own and operate the F-35 and we are working with the Joint Program Office and industry to drive down those costs. Key areas such as parts reliability and repair-turn-around times are being addressed. In PB-19, the Navy and Marine Corps programmed money to begin standing up our own Intermediate Level maintenance capability. This capability will assist in not only reducing stress on the supply chain, but also is more in line with our expeditionary operating concept. The Marine Corps' Intermediate Level (I Level) maintenance capability will enable the organic repair of both support equipment and aircraft components to include Alternate Mission Equipment (AME) and F-35 gun pod repairs, engine component repair, low observable material repair procedures, limited hydraulic component repair, and limited airframe structures repair. The I-level effort, which is essential to our core expeditionary and maritime operating concept, will also serve as a point of departure for an effort to bring test, check and repair closer to the squadron. Cost is driven down through more efficient troubleshooting, a decrease in the cost of moving parts to and from OEM manufacturers, and better maintenance and sparing efficiency. In all, this initiative has the potential to save the Marine Corps $451M in lifetime ownership costs while improving aircraft availability. As a specific example, roughly 14 months ago, a joint JPO / USMC Team was established to investigate increases in expected F-35B sustainment costs seen between POM-17 and POM-19. The team determined that costs were underrunning expectations by about 10-15%, a closer look at the data revealed that the underruns were at least partially due to under-execution. With that information, the team built a multi-year Affordability Campaign Plan with the established goal of reducing per-tail F-35B

sustainment costs closer to 4th generation aircraft levels. This first stage focused on specific cost areas, and developed targeted initiatives.

The Department is currently reviewing a re-structuring of the Program Office. This initiative is in response to an OSD AT&L review of established management structure. The review specifically focuses on how we can make efficiencies within the existing structure of the organization through a re-design of the current management structure. We are still a long way from implementation, but all of the Services are actively reviewing this with the intent to drive down the cost of the program.

Procurement

The Marine Corps' procurement schedule for the F-35 is on track to support the warfighter and our ability to be deployed around the world. Beginning in 2018 the Marine Corps procurement rate will exceed 20 aircraft per year, which marks the start of the full rate of transition operations. We have an aggressive roadmap over the next seven years, transitioning five F/A-18 Hornet and four A/V-8B Harrier units to F-35 units from 2020-2025. The transition plan accounts for money programmed into procurement and sustainment of aircraft, infrastructure, development and test, and manpower. Our current procurement across the future years defense program is right-sized for the Marine Corps based on our ability to train aircrew and maintainers to support 5th generation flight operations while simultaneously supporting Global Force requirements with our fourth generation platforms.

System Development Demonstration (SDD)

The F-35 program continues to meet Marine Corps requirements in SDD. We are still on track to receive the full F-35B weapons inventory (external & internal) and envelope around April – May 2018 with the release of 3F software. SDD deficiencies continue to be identified and addressed in accordance

with the Deficiency Report (DR) process. The Marine Corps doesn't anticipate any "show stoppers" that will prevent SDD exit.

The program anticipates the production release of 3F in late spring 2018. This software upgrade will realize a major increase in the F-35's combat capability, making it the premier multi-role (to include electronic warfare) fighter in the world. Operational test communities are actively identifying and correcting deficiencies discovered in the 3F test software. There are no anticipated deficiencies that will delay the release of 3F to fleet aircraft.

Currently, there are no known overt risks to SDD exit or 3F; however, concern remains in the rate of production of 3F Mission Data Files (MDFs). The U.S. Reprograming Laboratory (USRL) produces the MDFs, but the process is very data intensive and complex and the lab has a limited a production capacity. These issues have the full attention of the Joint Program Office and Lockheed Martin, and the Marine Corps feels comfortable with the recent positive trajectory. As the program matures, the Reprogramming Labs will gain the capacity to produce multiple MDFs, as well as respond to urgent requests for MDF updates.

Continuous Capability Development and Delivery (C2D2)

The F-35 partnership, through the leadership at the Joint Program Office, recently re-structured the original Block 4 Follow-on Modernization (FOM) strategy into a more agile Continuous Capability Development and Delivery (C2D2) program. This approach leverages existing commercial practices and develops capabilities in smaller, more managed increments which will accelerate the delivery of warfighting capability.

While this strategy delivers the capabilities required to fight and win against emerging threats, it is expensive. Several studies have validated the current C2D2 plan and identified areas in which costs

can be reduced. These studies also indicate that C2D2 has accurately captured the requirements needed to keep the F-35 on the tactical and operational edge; however, accurate capability requirements are not always aligned with budget realities. There are ongoing efforts that are attempting to find efficiencies across the C2D2 enterprise to reduce overall costs.

ALIS (Aviation Logistics Information System)

During deployed operations, both expeditionary and at sea on amphibious ships, ALIS' performance improved over the last year. In 2018 ALIS will support the F-35B MEU deployments. While there are significant challenges with the efficiency of ALIS, the Marine Corps has demonstrated that the system supports operations both at sea and in austere environments.

The Marine Corps is working with the Program Offices and the other services to evaluate work on two intermediate phases of ALIS which will help stabilize the ALIS system and strengthen future cyber compliance requirements.

Other improvements have been incorporated to assist ALIS and the warfighter. We have implemented a cyber security evaluation of new F-35 squadrons that searches for ALIS interface vulnerabilities within the squadron or squadron spaces. We have also developed a cross domain solution (CDS) that enables F-35 post flight data (downloaded on a special access program (SAP) system)to be sanitized and converted to the secret level. Our vision for ALIS is a holistic IT backbone that enables our Marines and aircraft to operate in any clime or place.

Conclusion

I will conclude by reemphasizing that both variants of the F-35 – the B and the C – are critical to Marine aviation's modernization strategy. The average age of Marine Corps TACAIR aircraft is 22 years.

Our fleet of Harriers, Hornets and Prowlers – while proven – is exhausted. Even in its most basic form, this 5th generation aircraft is more capable than any of our legacy tactical aircraft.

Mr. Chairman, distinguished committee members, we appreciate your continued support of our Aviation programs and we look forward to answering all of your questions.

Lieutenant General Steven R. Rudder
Deputy Commandant for Aviation

Lieutenant General Steven R. Rudder assumed his current position as the Deputy Commandant for Aviation, Headquarters Marine Corps in July 2017. LtGen Rudder is a native of Canton, CT, and was commissioned as a Second Lieutenant in June 1984. LtGen Rudder previously served as the Director of Strategic Planning and Policy (J5), U.S. Pacific Command.

LtGen Rudder's previous assignments include: Serving in Co B, 3rd Amphibious Assault Battalion; Student, NAS Pensacola, FL, designated a Naval Aviator; HMT-303, AH-1J helicopter training; HMLA-367, Maintenance Quality Assurance

Officer and Weapons and Tactics Instructor; unit deployments to Futenma, Okinawa, and Operations DESERT SHIELD/STORM; HMM-161 (REIN), Weapons and Tactics Officer deploying with the 11th MEU(SOC) back to North Arabian Gulf; AH-1 Division Head, Marine Aviation Weapons and Tactics Squadron One; Operations Officer, HML/A-167; Future Operations Officer, deploying with the 22nd MEU(SOC) to EUCOM and CENTOCM AOR, HMM-261(REIN); Office of Net Assessment, the Office of the Secretary of Defense serving as Mr. Andrew Marshall's Military Assistant; Squadron Commander, HML/A-167 deploying to EUCOM AOR in support of Dynamic Mix; Senior Watch Officer, OIF, 3rd Marine Air Wing Tactical Command Center; J5 Lead planner for Afghanistan and Pakistan, CENTCOM, Tampa, FL; deployed to Afghanistan, Pakistan and Qatar in support of Operation ENDURING FREEDOM; Commander, Marine Air Group 26, deploying to Al Asad, Iraq, in support of Operation IRAQI FREEDOM 9.1; Branch Head of Aviation Expeditionary Enablers (APX), Headquarters Marine Corps Aviation; Legislative Assistant to the Commandant, Headquarters Marine Corps, Office of Legislative Affairs; Commanding General, 1st Marine Air Wing, Okinawa, Japan; deployed Wing to Thailand and South Korea.

LtGen Rudder holds a Bachelor of Science Degree in Business Administration from Boston University, a Masters of Military Studies Degree from the Marine Corps Command and Staff College, and a Masters of Strategic Studies from the United States Army War College.

Personal decorations include the Defense Superior Service Medal, Legion of Merit with Gold Star, Distinguished Flying Cross with Combat 'V', Defense Meritorious Service Medal with Gold Star, Meritorious Service Medal with Gold Start, Air Medal Strike Flight 4, Navy Commendation Medal with Gold Star and Combat 'V', Joint Achievement Medal and Navy Achievement Medal.

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SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES

STATEMENT OF

REAR ADMIRAL S. D. CONN
DIRECTOR, AIR WARFARE
CHIEF OF NAVAL OPERATIONS

BEFORE THE

TACTICAL AIR AND LAND FORCES SUBCOMMITTEE

OF THE

HOUSE ARMED SERVICES COMMITTEE

ON

THE NAVY'S F-35C PROGRAM

March 7, 2018

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SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES

Introduction

Chairman Turner, Ranking Member Tsongas and distinguished Members of the Subcommittee, it is a distinct pleasure to be here with you today. Thank you for the opportunity to appear and discuss the Navy's progress with integrating the F-35C into our Carrier Air Wings, providing fifth generation capabilities to the warfighter and challenges associated with this new technology. The F-35C will form the backbone of Navy air combat superiority for decades to come complementing the tactical fighter fleet with a dominant, multirole, fifth-generation aircraft capable of projecting U.S. power and deterring potential adversaries.

The Carrier Air Wing of the future must rely on the capacity and capabilities of both fourth and fifth-generation aircraft. The F-35C provides unique capabilities that cannot be matched by modernizing fourth-generation aircraft. Stealth technology and advanced integrated systems enable the F-35C to counter rapidly evolving air-to-air and surface-to-air threats. Whether the mission requires the execution of strike, Close Air Support (CAS), counter air, escort, or electronic warfare (EW), the F-35C is vital to our future as they become a lethal cornerstone of our naval air forces. Delivering this transformational capability to front-line forces as soon as possible remains a top priority.

The Fiscal Year (FY) 2019 President's Budget (PB-19) supports the F-35C procurement to complete System Development and Demonstration (SDD), enter formal Initial Operations Test and Evaluation (IOT&E), Initial Operational Capability (IOC) and to transition the first Navy squadron on a timeline that supports the first operational deployment on USS CARL VINSON (CVN 70) in 2021. The Navy also has a robust sustainment plan that supports operating this new aircraft and properly training maintenance crews and Carrier Air Wing aviators.

The maritime expression of the National Defense Strategy - "The Navy the Nation Needs" - requires the continuous maintenance and modernization of both fourth and fifth-generation aircraft to pace the modern, ever evolving threat. Investing in new aircraft and capabilities while ensuring adequate levels of readiness are both necessary to support current and enduring Naval Aviation requirements. Continuous Capability Development and Delivery (C2D2) of Block 4 capability and weapons integration for the F-35C are critical to the success of the Future Carrier Air Wing.

Two challenges that the program is aggressively addressing are lethality and affordability. The JPO continues to trace Block 4 requirements decomposition to meet the threat environment, while affordability remains a high priority among all the Service Chiefs. Over the past year, the DoD initiated an F-35 Cost Deep Dive to identify, develop and implement cost saving opportunities within the F-35 supply chain. Furthermore, the Navy has chartered an ongoing independent Senior Review Team to assess, make recommendations to improve, and inform the C2D2 acquisition strategy. The Navy is driven to make F-35 costs closer to those of fourth generation fighter aircraft.

Ultimately, with F-35C integrated and interoperable in the Carrier Air Wing, the Carrier Strike Group of the future will be more lethal, survivable and able to accomplish the entire spectrum of mission sets to include immediate response to high-end threats. The Navy remains dedicated to delivering capabilities to outpace the threat as we evolve the Carrier Air Wing and the Carrier Strike Group of the future.

Operator's Perspective

The past calendar year has seen significant steps taken in the F-35C program. The Navy has reestablished VFA-125 at Naval Air Station Lemoore in California. VFA-125 will serve as

the Fleet Replacement Squadron at our west coast master jet base and is responsible for not only the training of initial naval aviators new to the aircraft, but will also transition fleet squadrons to the F-35C. The first of those squadrons, VFA-147, began their transition in February 2018. VFA-147 is on schedule to complete their transition by October 2018 and will support the first F-35C deployment in 2021.

Progress has been made in the tactical integration of fourth and fifth-generation fighters. Last August, aircraft from VFA-101, VFA-125 and VX-9 detached to Naval Air Station Fallon to support Tactics, Techniques, Training and Procedures events at the Naval Aviation Warfighting Development Center. TOPGUN instructors and squadron pilots conducted mixed division missions with F-35C and F/A-18E/F aircraft to establish a baseline on how the Navy will conduct integrated Strike Fighter operations. Further, development of fourth and fifth-generation integrated tactics continues with every TOPGUN class to ensure there will be improved survivability and lethality across all Carrier Air Wing assets against modern threats.

System Development and Demonstration (SDD)

After eleven years and over 16,000 flight hours, the full Block 3F SDD developmental test phase is quickly approaching an end. We estimate completion to be March/April 2018. The program can now proceed into IOT&E. IOT&E is critical to the Navy because we have linked the successful demonstration of 3F capabilities in IOT&E to our IOC declaration for the F-35C. Our IOC criteria states that the aircraft will be in a 3F configuration with the ability to conduct assigned operational missions utilizing SDD program of record weapons, mission systems, sensors and performance envelopes as outlined in the Operational Requirements Document V3 19 Aug 2008. IOC is capability and event driven, not calendar driven. The Navy understands that the threshold and objective dates, August 2018 and February 2019, are at risk due to a delay

in the IOT&E schedule. Once full 3F capability has been demonstrated in IOT&E, and all other IOC criteria have been met, the Navy will declare that the F-35C has achieved Initial Operational Capability. We are on track to send the F-35C on deployment aboard USS CARL VINSON in 2021.

A key component of the F-35 system is the Autonomic Logistics Information System (ALIS). The ALIS development effort has three priorities, the correction of deficiencies, cyber vulnerability and system resiliency. ALIS 3.5 will help correct on going software deficiencies and ALIS 3.6 will focus on cyber security compliance and stabilize end-of-life software.

Through cooperation with our industry partners, three deficiencies mentioned in the 2017 testimony have positive corrective actions in place as we look to close out SDD and transition to IOT&E. We are currently modifying our fleet to correct the outboard weapons station overloading condition discovered with the external carriage of AIM-9X. The F-35 Joint Program Office (JPO) in coordination with Lockheed Martin has resolved the Nz oscillation issue during catapult ride. Plus, we have identified an engineering solution for the Helmet Mounted Display system problems that had posed issues for night shipboard operations that had adversely affected pilot safety in the carrier environment. The Navy is actively engaged with the JPO and other Services to close out SDD and proceed into IOT&E.

Procurement

The PB-19 procurement ramp optimizes the transition timeline for Navy F-35C squadrons based on current force structure and future deployment schedules. The Navy is committed to procuring F-35Cs to achieve essential fifth-generation capability for "what it takes to win" across all deployed Carrier Air Wings. As additional aircraft arrive to the Fleet, a

commensurate expansion of training throughput for both maintainers and pilots is necessary, as well as the appropriate military construction to support operations and training.

Operations and Sustainment

The Navy recognizes that the Operations and Sustainment costs associated with a 5th generation aircraft are going to exceed those of our current 4th generation strike fighters. However, we are dedicated to making the F-35C operationally affordable. By partnering with the JPO, we are aggressively pursuing efforts to reduce O&S Costs by 30% over the next 10 years. One of the areas that we see potential cost savings is to reduce the amount of Contractor Logistics Support (CLS). As our knowledge of the aircraft and support systems like ALIS increases, we are diligently educating Navy personnel to assume responsibilities we have relied on industry support for up to this point. Leveraging our experience within the Naval Aviation Enterprise and partnering with the USAF we are constructing lab facilities to take on a greater role in the sustainment of the software required to operate the F-35. In FY19 we have funded the initial effort to break from the Operational to Depot level maintenance construct the program has operated under to this point and stand up an organic Intermediate Level (I-Level) maintenance capability to be first deployed aboard our carriers and amphibious assault ships to support deployed operations. Additionally, we will expand this capability to our fleet concentration areas ashore. This I-Level repair capability of 29 critical components projects to a cost avoidance of $450 million over a 20 year life cycle while to reducing reliance on contractor support and time to repair.

C2D2

The Department is restructuring the original Block 4 Follow-on Modernization acquisition strategy into the C2D2 model. The C2D2 approach leverages commercial practices, develops capability in smaller, more easily managed increments, and accelerates delivery of warfighting capability. The approach also advances Departmental goals of reducing C2D2 risk and lowering cost. For the Carrier Air Wing of the future to pace a rapidly evolving threat, C2D2 must deliver Block 4 capabilities and weapons on schedule. It is not enough to just evolve the significant capabilities of the F-35C, but equally important to ensure those capabilities are integrated and interoperable with existing ships and Carrier Air Wing aircraft within the Carrier Strike Group. The Navy has aggressively pulled F-35C Link 16 (CMN-4) capability to the left to ensure that information is disseminated across ships and aircraft throughout the strike group. Several critical enablers to Naval Integrated Fire Control advanced kill chains exist in Block 4 technologies, and the Navy's ability to conduct integrated fires in the future is instrumental to how the future Carrier Strike Group will fight. Weapons integration, radar improvements, electronic warfare capabilities, interoperability, and real-time information dissemination must also continue to progress in order to guarantee mission success in the future high-end threat environment.

Closing

The future of the Carrier Air Wing relies on the F-35C. More than just the next fighter, the Lightning II brings unprecedented low observable technology, modern weaponry, and electronic warfare capability to the Carrier Strike Group. The ability of the Carrier Strike Group to maneuver and the F-35C's stealth will be a lethal force capable of projecting power in an ever increasing anti access area denial environment.

Rear Admiral Scott D. Conn
Director, Air Warfare, Office of the Chief of Naval Operations (OPNAV N98)

Rear Adm. Scott Conn is a native of Lancaster, Pennsylvania, and a 1985 graduate of Millersville University of Pennsylvania. He was designated a naval aviator in May 1987. Conn is also a graduate of the Naval War College.

Conn's command tours include Carrier Strike Group 4; Naval Aviation Warfighting Development Center; Carrier Air Wing 11; the FA-18 series Fleet Replacement Squadron (FRS) Strike Fighter Squadron (VFA) 106; and VFA-136.

Conn's sea tours involved seven deployments on five different aircraft carriers in support of Operations Deliberate Force, Southern Watch, Deny Flight, Enduring and Iraqi Freedom. He has flown in excess of 100 combat missions, has accumulated over 4,700 flight hours and 1,000 arrested landings.

Ashore, Conn had multiple flying tours involving flight in the A-4, F-5, F-16 and FA-18 series aircraft. His staff tours include serving as the staff general secretary and U.S. Pacific Command (PACOM) event planner at the Joint Warfighting Center; as the executive assistant to Commander, U.S. Fleet Forces Command; and as the strike branch director for Director Air Warfare (N98) on the staff of the Office of the Chief of Naval Operations.

Conn was the recipient of the 2004 Vice Adm. James Bond Stockdale Inspirational Leadership award and is authorized to wear the Legion of Merit (six awards), Defense Meritorious Service Medal, Meritorious Service Medal, Air Medal (five Strike Flight), Navy and Marine Corps Commendation Medal (five awards, one with Combat "V") and the Navy and Marine Corps Achievement Medal, as well as various service and campaign awards.

Updated: 7 December 2017

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HOUSE ARMED SERVICES COMMITTEE
UNITED STATES HOUSE OF REPRESENTATIVES

PRESENTATION TO THE
HOUSE ARMED SERVICES COMMITTEE
TACTICAL AIR AND LAND FORCES SUBCOMMITTEE
UNITED STATES HOUSE OF REPRESENTATIVES

SUBJECT: How the F-35 is Meeting Current and Future Fifth Generation Fighter Capability

STATEMENT OF: Lieutenant General Jerry D. Harris Jr., USAF
Deputy Chief of Staff for Strategic Plans and Requirements
Headquarters U.S. Air Force

March 7, 2018

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HOUSE ARMED SERVICES COMMITTEE
UNITED STATES HOUSE OF REPRESENTATIVES

INTRODUCTION

Chairman Turner, Ranking Member Tsongas, and distinguished Members of the Subcommittee, it is my distinct pleasure to be here with you this morning. Thank you for the opportunity to discuss how the F-35A Joint Strike Fighter is meeting current and future fifth generation fighter capability needs.

The Air Force is accepting Lot 10 aircraft in the System Development and Demonstration (SDD) final Block 3F configuration. With this configuration, the F-35A is fully capable of striking and destroying a broad range of targets, day or night, in adverse weather conditions. The F-35A missions include Air Interdiction, Offensive and Defensive Counter Air, Close Air Support, Strategic Attack, and Suppression and Destruction of Enemy Air Defenses. The F-35A complements other low-observable assets including the F-22, B-2, and B-21 as well as our legacy fourth generation fleet. It is a lethal, survivable, and adaptive weapon system emerging as the mainstay of our future Combat Air Force.

The F-35 is the fighter of the future. Not just for the Air Force but also for our sister Services and eight partner nations. Designing and developing an aircraft capable of the missions I've mentioned for three different services and eight partner air forces is probably the most complex and challenging undertaking in Department of Defense history. The systems on board the aircraft are among the most advanced systems in the world. Fusing all of these systems into a coherent, integrated solution that presents enormous amounts of information to the pilot is no easy task. Although issues existed regarding cost, schedule and performance of the System Development and Demonstration (SDD) effort, most of these issues are now behind us. I'll discuss some of these issues as I address how the F-35A is meeting the Air Force's current and future fifth generation fighter capability needs.

KEY CHALLENGES AFFECTING AF OPERATIONS AND SUSTAINMENT COSTS

Overall F-35 system affordability is our number 1 concern. If we can't reduce the projected overall costs for this very capable platform, we simply won't be able to afford the current planned buy. This issue is a key focus of both OSD and the AF and we're working closely with the JPO on the way ahead to affordability

AF PLANS TO ADDRESS INCREASING F-35 OPERATIONS AND SUSTAINMENT COSTS

As the program matures, we will continue to evaluate the operations and sustainment cost of the F-35. Although, the program is still in development, opportunities exist in reducing the overall operations and sustainment cost, lowering production cost, and building better sustainment strategies. We will continue to work closely with the Joint Program Office and Industry to evaluate and analyize actual data. Adjusting program quantities and flying hours may be required if the projected higher than expected operations and sustainment cost come to reality.

OPERATOR'S PERSPECTIVE ON PROGRESS IN MEETING REQUIREMENTS

The Air Force declared Initial Operational Capability in August, 2016 with twelve Block 3i configured aircraft assigned to the 388th Fighter Wing, Hill AFB, Utah. Today, we have thirty-four F-35s as we build the 388th Fighter Wing fleet to 72 F-35s by December 2019.

Last year, we deployed the F-35s from Hill AFB to Red Flag 17-1 to train with our sister services and coalition partners. Other participants included the Royal Air Force, Royal

Australian Air Force, United States Navy and United States Marine Corps. Missions included integration with F-16s, F-15s, F-18s, F-22s and a variety of command and control assets. Aircraft and crews integrated seamlessly with all other participants, delivered a dramatic increase in Air Force capability, and significantly enhanced the capabilities of the entire force of 80 aircraft taking part in the exercise.

Today, F-35s assigned to Hill AFB are deployed to Pacific Command to support a Theater Security Package. Following a flawless deployment of 12 aircraft to Kadena AB, Japan, we established flying operations in less than three days after landing; much like we would expect with our legacy fighter aircraft. We learned valuable lessons on F-35A spare parts supply chain availability in theater as we maintain our deployed fleet far from home over a six month duration. The aircraft were involved in several exercises in theater and have integrated with United States Air Force, United States Marine Corps, Republic of Korea and Japanese Air Defense assets. These 12 aircraft recently completed an aircraft configuration upgrade from Block 3i to our more advanced Block 3F configuration.

Block 3i provided an interim aircraft configuration sufficient for Initial Operational Capability, yet lacked some desired capabilities for full spectrum combat operations. The upgrade to Block 3F expands the number and type of weapons that can be carried, provides improved targeting and identification functionality, and enhances datalinks for improved communication and interoperability. Block 3F F-35As provide a lethal and survivable 5th Generation capability to our Combatant Commands that can detect, track and engage targets in contested environments, and meet the full spectrum of Joint warfighter requirements in future years. Block 3F F-35A performance has exceeded our expectations and the sentiment from both

our pilots and maintainers is the Block 3F F-35A represents a massive leap forward in combat capability and maintainability.

Since the first F-35A (AF-1) rolled off the assembly line at the Lockheed Martin plant in Ft Worth, Texas on 25 Nov 2008, the United States Air Force fleet of F-35s has grown to 137 total aircraft stationed at five different Air Force Bases in the continental United States. We've trained approximately 360 pilots from several nations, with a mix of Active Duty (258), AF Reserve (31), Air National Guard (4), USMC (3), international (50) and contractors (4). During these past 6 years, Air Force pilots have flown over 60,000 flight hours in this fighter jet and have full confidence in the F-35A's ability to take the fight to our enemies at the time and location of our choosing.

PERSPECTIVE ON COMPLETING SYSTEM DEVELOPOMENT AND DEMONSTRATION

Concerning the completion of the System Development and Demonstration phase, we have just started fielding F-35A aircraft in the final SDD Block 3F configuration and are very pleased with the performance of the new software so far; however, approximately 108 aircraft are in either a Block 2B or 3i configuration that eventually requires retrofit with software and/or hardware upgrades to the Block 3F configuration. The Air Force is working with the Joint Program Office on a detailed retrofit plan to efficiently and smartly upgrade the existing fleet to the Block 3F configuration.

As mentioned, we're very pleased with the performance of the new 3F software but, like any system of this complexity, there are corrections that need to be addressed in the future. We're focused on prioritizing known deficiencies so the Joint Program Office can focus their efforts and

understand which problem areas must be fixed, as well as those that may be resolved with a short-term fix until a more permanent solution can be found.

F-35A PROCUREMENT IN THE FUTURE

The F-35A acquisition schedule makes the F-35 a critical component of the Air Force long-term fighter force. Currently, the Air Force plans to procure forty-eight F-35As annually and increase our procurement to fifty-four over the Future Years Defense Program or FYDP for fiscal years 2019-2023. Accelerating the procurement rate prior to the development of Block 4 adds overall cost to the program. If we were to procure at higher than planned rates inside the FYDP, the Air Force would have to retrofit aircraft already delivered to the fleet with Block 4 hardware and software modifications. Once Block 4 delivers near the end of the FYDP, we will examine the option of accelerating the F-35A program above the current procurement rate to meet the 5th Generation requirements necessary to balance the Air Force ability to fulfill national security objectives.

MEETING REQUIREMENTS UNDER C2D2

The F-35 Joint Program Office is in the process of coordinating and transitioning to a new acquisition strategy for follow-on modernization. This new approach provides a continuous, incremental, plan called Continuous Capability Development and Delivery (C2D2). F-35 C2D2 will build upon the warfighting capability provided in Block 3F during the SDD phase. The C2D2 approach is more responsive to the changing threat priorities and maintains the viability of the F-

35 fleet over its 50+ year lifecycle. The C2D2 strategy is geared toward acquisition of the requirements to counter the estimated threat in 2025 and beyond. Capability improvements include integration of additional weapons and upgrades to the electronic warfare system, datalink systems, and radar. The Air Force is placing great importance on the hardware upgrade planned as Technical Refresh 3. Technical Refresh 3 adds an improved integrated core processor, an improved panoramic cockpit display, and a more capable aircraft memory system.

The Air Force is concerned over funding for Block 4 modernization. Congress reduced the F-35 follow-on modernization in fiscal year 2017 by approximately sixty percent. For fiscal year 2018, Congress is recommending a twenty-five percent reduction in follow-on modernization funding. Both of these budgets were marked as "Early to Need" based on the lack of a Capability Development Document. The Capability Development Document was approved by the Joint Requirements Oversight Council in April 2017. I can't emphasize enough how important it is that we fully fund Block 4. We are at a crucial stage where we must commit to the developmental work to ensure we have these capabilities available to meet a 2025 need.

READINESS OF AUTONOMIC LOGISITICS INFORMATION SYSTEM

In February of last year, I expressed frustration and hope regarding the Autonomic Logistics Information System, or ALIS. Schedule and capability delays continue and ALIS capability has marginally improved.

The Air Force demonstrated an initial capability to deploy with ALIS with our recent Theater Security Package deployment in the Pacific; however, ALIS is currently labor-intensive for our maintainers and support personnel. In some of our Aircraft Maintenance Units,

maintenance Airman are assigned to work ALIS issues as a primary job. This has a significant impact to our already stretched maintenance workforce, negatively affecting flight line operations and workforce development. I remain concerned about the future of ALIS and the impact it has on our growing fleet.

In August of 2017, the Air Force Digital Services conducted a two-day study of ALIS and the processes used to develop ALIS. In that investigation, their opinion was that methodology and resources used to develop ALIS does not deliver the required warfighting capability that the Air Force needs.

We are working with the F-35 Joint Program Office in order to request Air Force Digital Services to conduct a more in-depth study so we can fully understand the issues. This more in-depth study is imperative to better inform requirements for future ALIS development. Now is the right time to address the shortcomings of ALIS and future development. The JSF enterprise needs a new methodology and plan with measurable, attainable milestones going forward.

CONCLUSION

In conclusion, the United States Air Force remains confident the F-35A provides the survivability, lethality, and maintainability the Combat Air Force needs to meet current and emerging world-wide threats. We look forward to seeing the fleet employ full warfighting capability now that it's been delivered in 2018. The Air Force will continue to work closely with our sister services and the Joint Program Office to ensure the right capabilities are delivered and any challenges are prioritized. Our initial experiences with our Block 3i aircraft give us confidence we are on the right path. As our Chief of Staff of the Air Force, General Goldfein, recently stated

"Air and Space superiority are not American birthrights. They must be fought for and won." Finishing the F-35A System Development and Demonstration program of record and transitioning to Block 4 follow-on modernization are critical to ensuring the Air Force is ready to fly, fight, and win when called upon. I thank the committee for their support of the Armed Forces and our nation. Thank you for the invitation and for allowing me to speak with you today.

Lieutenant General Jerry D. Harris Jr.

Lt. Gen. Jerry Harris is Deputy Chief of Staff for Strategic Plans and Requirements, Headquarters U.S. Air Force, Washington, D.C. In support of the Chief of Staff and Secretary of the Air Force, General Harris leads the development and integration of the Air Force strategy, long-range plans and operational capabilities-based requirements. He directs and coordinates activities ensuring the Air Force builds and employs effective air, space and cyber forces to achieve national defense objectives.

General Harris entered the Air Force in 1985 as a graduate of the ROTC program at Washington State University. He has served as a flight commander, operations officer, weapons officer and inspector general. The general served on the staffs of two numbered Air Forces and one major command, all in operations. He has also served as the Combined Air and Space Operations Center Battle Director for operations Iraqi Freedom and Enduring Freedom. General Harris has commanded at squadron, group and wing levels. Prior to his current assignment, General Harris was the Vice Commander, Air Combat Command, Langley Air Force Base, Virginia, responsible for organizing, training, equipping and maintaining combat-ready forces for rapid deployment and employment while ensuring strategic air defense forces are ready to meet the challenges of peace time air sovereignty and wartime defense. General Harris is a command pilot with more than 3,100 flying hours in the F-16.

EDUCATION

1985 Bachelor of Science in Mechanical Engineering, Washington State University
1992 Squadron Officer School, Maxwell AFB, Ala
1997 Air Command and Staff College, Maxwell AFB, Ala.
1997 Master of Science in Aeronautical Science Technology, Embry-Riddle Aeronautical University, Daytona Beach, Fla.
1998 School of Advanced Airpower Studies, Maxwell AFB, Ala.
1998 Master of Science in Airpower Art and Science, School of Advanced Airpower Studies, Maxwell AFB, Ala.
1998 Armed Forces Staff College, Norfolk, Va.
2001 Air War College, by correspondence
2006 National Defense College, New Delhi, India
2011 Capstone General and Flag Officer Course, National Defense University, Washington, D.C.

ASSIGNMENTS

1. February 1986 - January 1987, Student, undergraduate pilot training, Williams AFB, Ariz.
2. January 1987 - April 1987, Student, AT-38B lead-in fighter training, Holloman AFB, N.M.
3. April 1987 - December 1987, Student, F-16 B-Course, MacDill AFB, Fla.
4. December 1987 - July 1989, Chief, Current Operations Division; Squadron Assistant Programmer; Training Officer; and Mobility Officer, Nellis AFB, Nev.
5. August 1989 - January 1992, Chief of Weapons and Tactics and Air-To-Surface Weapons Officer, Moody AFB, Ga.
6. January 1992 - February 1992, Student, Squadron Officer School, Maxwell AFB, Ala.
7. February 1992 - March 1994, Chief of Mid-range Programming and Student, Fighter Weapons School, Luke AFB, Ariz.
8. March 1994 - June 1996, Weapons and Tactics Flight Commander; Chief of Wing Weapons; and Chief of Squadron Weapons, Eielson AFB, Alaska
9. July 1996 - July 1998, Student, School of Advanced Airpower Studies and Air Command and Staff College, Maxwell AFB, Ala.
10. July 1998 - September 1998, Student, Armed Forces Staff College, Norfolk, Va.
11. September 1998 - March 1999, NATO Joint Staff Officer, Long-range Plans, Plans and Policy, Headquarters, Southern Region Air Command, Naples, Italy
12. March 1999 - August 2000, Chief of Strategy, Crisis Action Group, Headquarters Southern Region

Air Command, Naples, Italy
13. September 2000 - January 2001, Student, F-16 requalification, Luke AFB, Ariz.
14. January 2001 - February 2003, Operations Officer and Chief of Standardization and Evaluation, 20th Operations Group; and assistant Director of Operations, 79th Fighter Squadron, Shaw AFB, S.C.
15. March 2003 - February 2005, Commander, 79th Fighter Squadron, Shaw AFB S.C.
16. March 2005 - July 2005, Staff Director and Inspector General, 20th Fighter Wing, Shaw AFB S.C.
17. July 2005 - December 2005, Deputy Commander, 20th Operations Group, Shaw AFB S.C.
18. January 2006 - January 2007, Student, National Defense College, New Delhi, India
19. January 2007 - July 2008, Commander, 505th Training Group, Hurlburt Field, Fla.
20. July 2008 - November 2008, Director of Air, Space and Information Operations, 13th Air Force, Hickam AFB, Hawaii
21. November 2008 - September 2009, Commander, 8th Fighter Wing, Kunsan Air Base, South Korea
22. September 2009 - September 2010, Assistant Director of Operations, Plans, Requirements and Programs, Headquarters Pacific Air Forces, Hickam AFB, Hawaii
23. September 2010 - September 2012, Commander, 56th Fighter Wing, Luke AFB, Ariz.
24. September 2012 - March 2014, Vice Commander, 5th Air Force, Yokota Air Base, Japan
25. March 2014 - April 2015, Director of Programs, Office of the Deputy Chief of Staff for Strategic Plans and Programs, Headquarters U.S. Air Force, Washington, D.C.
26. April 2015 - February 2017, Vice Commander, Air Combat Command, Joint Base Langley-Eustis, Va.
27. February 2017 - Present, Deputy Chief of Staff for Strategic Plans, Programs, and Requirements, Headquarters U.S. Air Force, Washington, D.C.

SUMMARY OF JOINT ASSIGNMENTS
September 1998 - August 2000, NATO Joint Staff Officer, Long-range Plans, Plans and Policy; and Chief of Strategy, Crisis Action Group, Headquarters Southern Region Air Command, Naples Italy, as a major

FLIGHT INFORMATION
Rating: command pilot
Flight hours: more than 3,300
Aircraft flown: F-16, T-37, T-38, Mig-29 and Mig-21

AWARDS AND DECORATIONS
Distinguished Service Medal
Legion of Merit with two oak leaf clusters
Defense Meritorious Service Medal
Meritorious Service Medal with two oak leaf clusters
Air Medal with three oak leaf clusters
Aerial Achievement Medal
Air Force Commendation Medal with two oak leaf clusters
Joint Service Achievement Medal
National Defense Service Medal with bronze star
Southwest Asia Service Medal with three bronze stars
Kuwait Liberation Medal (Kingdom of Saudi Arabia)
Kuwait Liberation Medal (government of Kuwait)

EFFECTIVE DATES OF PROMOTION
Second Lieutenant May 11, 1985
First Lieutenant Sept. 1, 1987
Captain Sept. 1, 1989
Major Sept. 1, 1995
Lieutenant Colonel April 1, 2000
Colonel Jan. 1, 2006
Brigadier General Nov. 3, 2010
Major General June 27, 2014
Lieutenant General Feb. 22, 2017

(Current as of February 2017)

WITNESS RESPONSES TO QUESTIONS ASKED DURING THE HEARING

MARCH 7, 2018

RESPONSE TO QUESTION SUBMITTED BY MR. GAETZ

General HARRIS. We have made progress on this issue but some work remains. As of Dec 2017, contractor site leads ended the practice of adjusting aircraft status reporting at the base level. While status is no longer being changed, for contractual purposes, there is a reconciliation process that still happens monthly behind the scenes. The status reported by the uniformed personnel at the base level is the status reflected at the F–35 Operations Center and is also the status used to report our force readiness. However, there is a monthly contractual reconciliation process towards the award of Performance Incentive Fees. The F–35 Joint Program Office (JPO) Performance Management Team, in concert with the contractor, Services and Partners, review performance metrics for reconciliation. The JPO has final say of the reconciled metrics. The process provides credit to the prime contractor and commonly results in an 8–10% increase in Air Vehicle Availability for the reporting period. The primary difference in aircraft reporting status between the USAF and the contract is the distinction between airworthiness (Air Vehicle Availability) and mission capability. The contract is tied to Air Vehicle Availability, so the reporting is focused on airworthiness of the aircraft to fly (safely). The USAF uses a Minimum Essential Function List (MEFL) to determine the appropriate aircraft condition status to ensure mission capability and readiness of aircraft. In some cases, an aircraft will remain airworthy, but not capable of performing all assigned missions; for example, due to the lack of an electronic warfare component. The USAF is working closely with the Joint Program Office to resolve the mission capability vs. airworthiness differences for contractor performance. To that end, starting with the FY18 sustainment contract baseline, the program is pursuing a Performance Based Logistics (PBL) approach for future sustainment contracts. [See page 24.]

QUESTIONS SUBMITTED BY MEMBERS POST HEARING

MARCH 7, 2018

QUESTIONS SUBMITTED BY MR. TURNER

Mr. TURNER. When do you believe the program will be ready to begin IOT&E, what are the risks to this start date, and are there any mitigations you are considering?

Admiral WINTER. Initial Operational Test and Evaluation (IOT &E) will begin when the Defense Acquisition Executive certifies that the F–35 Air System meets the readiness criteria for IOT&E and the Director, Operational Test and Evaluation (DOT&E) approves the test plan as adequate, all in consultation with the F–35 Joint Program Office (JPO) and the Joint Strike Fighter Operational Test Team (JOTT). The JPO will provide the appropriate resources to enable the JOTT to execute Operational Test. The formal IOT&E start date will be criteria-driven, but is anticipated in the fall of 2018. Risk reduction for IOT&E includes execution of pre-IOT&E activities, to move testing that is ready forward while awaiting for full readiness criteria to be met. The first of these activities, cold weather testing, took place at Eielson AFB, Alaska in January of this year.

Mr. TURNER. Last year you gave us some information regarding progress on software stability, but you had not yet delivered a software build with full warfighting capability. Can you update us on the latest software capability as well as provide any updates on the previous stability issue?

Admiral WINTER. In August 2017, the F–35 Joint Program Office (JPO) delivered software known as 3FP6.2, which provided Block 3F capability to the Warfighter. Regarding stability, whereas last year the JPO reported that we were experiencing a stability event approximately once every 25 flight hours, we are now observing a stability event only once every 90 hours on that build. Your subcommittee may have heard reports that there are a number of outstanding deficiencies against the 3F capability. The JPO wants to be clear that the currently delivered 3F software contains all Block 3F warfighting capability, but it can continue to be improved. The JPO continues to correct deficiencies against the 3F capability while simultaneously moving forward into modernization under a construct of Continuous Capability Development and Delivery. The currently planned software cadence delivers a production candidate software build to the Integrated Test Force every six months. These builds contain modernizations, enhancements, and improvements to the currently fielded software. Early builds of the next production ready software release are already in flight test, and the production candidate itself will be delivered to the Integrated Test Force in April. In light of the recent National Defense Authorization Act language promoting Agile software development, it is worth noting that we are working with our industry partners to transition to an agile acquisition model, to include Agile software development. We kicked off our first Agile pilot program with Lockheed Martin in February, and we will begin to prototype agile capability development methodologies (as they apply to our integrated hardware/software system) throughout the summer. In parallel, we are updating our Systems Engineering processes and Governance processes to be more responsive to Warfighter needs. This supports our National Defense Strategy imperative to "deliver performance at the speed of relevance."

Mr. TURNER. We understand that Block 3F capability in the Training System is slated for delivery this year. Is that delivery on schedule?

Admiral WINTER. In order to mitigate the risk of late delivery of Block 3F capability to the Training System, we have worked with our industry partner to deliver Block 3F training capability in two incremental releases. This strategy will enable us to deliver the majority of 3F capability sooner than waiting to deliver full capability in a single release. Development of the initial increment was completed in February and will be retrofit across the enterprise between March and June. Development of the full 3F capability release is scheduled for completion in August, and will be delivered across the enterprise between September 2018 and August 2019.

Mr. TURNER. This committee understands that the F–35 program is dealing with a level of concurrency no other acquisition program has dealt with in the past. This means a large number of Low Rate Initial Production Aircraft require retrofits to maintain pace with production baselines. What steps has the JPO taken to control and mitigate the complexity of retrofits?

Admiral WINTER. Retrofitting the fleet and keeping pace with the production baseline of capabilities and also correcting deficiencies, is, indeed, a challenge. We have a team of acquisition and sustainment professionals who focus on managing the concurrency retrofits within the program. Both the contractor and our JPO team work proactively to identify, mitigate, and execute retrofits to the fleets. We continuously work directly with each Service, Partner, and Foreign Military Sales customer ensuring that retrofits for their fleets are planned, budgeted, scheduled, and executed in order to meet each customer's critical milestones. We continue to streamline our contracts and business processes to reduce administrative lead time and costs. Our team works closely with the Service Depots regarding current and future workloads, dock space, and personnel. We are forecasting our modification and retrofits schedule five years into the future which equates to known workloads for more robust and fiscally responsible planning. With the close of System Development and Demonstration and completion of Initial Operational Test and Evaluation, discoveries will decrease allowing the Low Rate Initial Production fleets to be retrofitted to the full suite of 3F capabilities.

Mr. TURNER. The F–35B brings new capabilities and operational possibilities to the Marine Expeditionary Unit and you have discussed the vision of linking Marine Expeditionary Units (MEUs) more closely into the joint force. However, those new capabilities and operating concepts require investment in shipboard infrastructure to include upgraded data links. Please discuss your vision for L-class ship connectivity and current plans to achieve that vision.

General RUDDER. Our L-Class ships are behind where we would like to be, but the Navy is in full support and we are improving those ships as fast as possible. Three of our L-Class big decks now have the new Capstone Ship Self Defense System (SSDS) which brings the Cooperative Engagement Capability and Link 16 to the platform. There are 5 LHD's which are scheduled to be upgraded over the next 5 years. This system provides a critical combat capability which will integrated with F–35 over Link 16. The Navy just installed a system called Radiant Mercury on the USS WASP, which enables post flight data from the F–35 to be sanitized and convert data to a generic secret level. This will lead to a much smoother dissemination of information to battle field commanders and leadership for expeditious debrief, validation, or follow on operations. We also plan on operating the Marine Corps Common Aviation Command and Control System (CAC2S) on the Essex. This is a new capability being used by USMC tactical air defense controllers and air control electronics operators. It integrates information from various aerial and ground-based radar systems and sensors to enable a common, real-time tactical picture. This system will bring a Marine Corps Command and Control capability to the ship that can seamlessly integrate with the F–35, allowing the F–35 to transfer real time data from onboard systems and data links back to the ship. Effectively the aircraft now becomes a forward sensor for the command elements embarked on MEU/ARGs bringing greater situational awareness and faster decision making. With the embarkation of F–35s on L-Class ships, one major change to the ships were the designation of special access program facilities (SAP-Fs). These rooms of elevated classification allow for F–35 operational planning on classified F–35 systems. The SAP–F spaces modernize facilities on the ship, elevate the classification and capability of rooms for F–35 planning or other Special Access Program enablers, and introduce new connectivity in spaces where that ATO did not exist before, overall enabling warfighter operations overall.

Mr. TURNER. The F–35 program has seen its share of delays over the last two decades. After reading your written statement, we understand the threshold and objective dates for F–35C IOC are at risk due to delays in the IOT&E schedule. The committee understands from previous testimony that IOC is not driven by schedule; rather, IOC for the Navy is an "event-driven" milestone. Can you please clarify for this committee the Navy's roadmap to IOC, when it might be declared, and the path to the first operational deployment for the F–35C?

Admiral CONN. For the Navy, IOC continues to be a capability and event-driven milestone—the capability being demonstration of 3F in IOT&E. The threshold and objective dates are at risk due to delay in the IOT&E schedule. Once 3F capability is demonstrated in IOT&E, and all other IOC criteria have been met, the Navy will declare the F–35C has achieved Initial Operational Capability.

In the meantime, VFA–147 is already training in the F–35C and is expected to be designated "safe for flight" with their compliment of aircraft in October 2018. Ship and shore infrastructure to support F–35C qualifications, training and operations are on track to support the IOC objective date. And security measures, both ashore and embarked, will be complete before the end of the year. The Navy is working closely with the JSF Operational Test Team, the USAF and VX–9 to determine when the aircraft will satisfy the mission requirements defined in the Block

3F Operational Requirements Document. Despite the IOC threshold and objective date risk, the F–35C remains on path and on schedule to support its first operational deployment in 2021.

Mr. TURNER. What is the service's plan and expected costs to retrofit early Low-Rate Initial Procurement (LRIP) aircraft to Block 3F?

General HARRIS. The services requested a plan from the Joint Program Office in Fall 2017 to upgrade early Low-Rate Initial Procurement (LRIP) aircraft to the 3F configuration. This upgrade is a priority for the Air Force and will begin at the end of this calendar year. These upgrades will ensure that the early LRIP aircraft are fully modified to a more sustainable configuration. The cost of the upgrade will vary depending on the LRIP Lot. This upgrade will allow all F–35s access to a deeper parts pool and provide greater reliability.

Mr. TURNER. There have been press reports concerning the Fifth Generation Fighters (F–22, F–35) challenges in regards to communicating and passing targeting data between each other in a denied environment. What steps has the USAF taken to fix this shortfall?

General HARRIS. The USAF fielded the Battlefield Airborne Communications Node (BACN) gateway in 2009 and has included BACN program sustainment funding in the FY19–23 POM. BACN effectively and securely translates communications between 5th generation (F–22, F–35) and 4th generation aircraft and other airborne and ground-based stations.

The USAF has plans to equip F–22 aircraft with Link-16 transmit capability in the near future. Since F–35 already integrates Link-16, this F–22 upgrade will provide these aircraft the ability to share targeting data and support each other in a denied environment. By FY23, all fifth gen aircraft will have the ability to fully participate (transmit and receive) in the Link-16 network.

Mr. TURNER. Does the Air Force have the ability to pass threat and targeting data between Fifth Generation Fighters (F–22, F–35) and Fourth Generation Fighters (F–15, F–16, F/A–18) in an A2AD environment without being detected?

General HARRIS. Yes—the USAF fielded the Battlefield Airborne Communications Node (BACN) gateway in 2009 and has included BACN program sustainment funding in the FY19–23 POM. BACN effectively and securely translates communications between 5th generation (F–22, F–35) and 4th generation aircraft and other airborne and ground-based stations.

The USAF has plans to equip F–22 aircraft with Link-16 transmit capability in the near future. Since F–35 already integrates Link-16, this F–22 upgrade will provide these aircraft the ability to share targeting data and support each other in a denied environment. By FY23, all fifth gen aircraft will have the ability to fully participate (transmit and receive) in the Link-16 network.

Mr. TURNER. The committee understands the USAF has a roadmap to develop and field an advanced tactical data link in the 2030 timeframe. However, the need for a common solution for interoperability between Fifth to Fifth and Fourth to Fifth Generation fighters is a clear demand signal from the Combatant Commands now. In addition, the USAF is pursuing constructs to achieve a multi domain command and control capability and has noted that "agile communications" is the foundational piece to achieve this goal. Over the past five years, several live-fly and Joint demonstrations in operationally relevant environments have shown that technologies exist that are mature, effective and programmatically feasible against current and future threats.

How is the Air Force pursuing and satisfying this urgent communications need?

General HARRIS. Currently, that need is met primarily by the Battlefield Airborne Communications Node (BACN) gateway that was fielded in 2009. BACN effectively and securely translates communications between 5th and 4th generation aircraft and other airborne and ground-based stations. On 21 November 2017.

Long-term, the USAF continues moving towards a Combat Cloud Operating Concept; an overarching meshed network for multi-domain data distribution and info sharing that is transparent to platform/user. The 5th-to-4th generation gateway performs an incremental approach for Combat Cloud concepts (National Technical Means, Common Tactical Picture, Resiliency, Coalition sharing). 5th-to-4th generation gateway program requirements refinement are on-going and aligned with a "4 Pillar" approach:

1. Near-term 5th-to-4th (BACN; F–22 Link 16 transmit)
2. Robust Link 16 Comms; Link 16 is the backbone of on-going and future networking solutions
3. Open Radio Architecture
4. Experimentation and Limited fielding

QUESTIONS SUBMITTED BY MS. TSONGAS

Ms. TSONGAS. In the annual DOTE report, it pointed out significant problems with the 25mm cannon on the F–35A. Specifically it cited "uncharacterized bias toward long and right of the target" and that the "gunsight display . . . was cluttered and slow to stabilize." For the F–35B and F–35C, the report said that testing with the gun pod was going better than on the F–35A, but that there were issues of concern. What is the status of the F–35A's cannon as of today? When will we know the 3F version of the aircraft has an effective gun? What is the status of the F–35B and F–35C gun pod?

Admiral WINTER. Testing indicated bias in the F–35A gun at the time the Director, Operational Test and Evaluation report was drafted (2017). Since that time, corrections were made to the F–35 gun aiming software. These corrections were tested and found to correct much of the observed bias. Ongoing operational testing continues to fully evaluate gun characteristics. The F–35 B and C gun pods are performing with the predicted levels of accuracy and lethality. The performance is currently being reviewed by the Department of the Navy for fleet usage beginning in May 2018.

QUESTIONS SUBMITTED BY MS. ROSEN

Ms. ROSEN. In the March 7th hearing held by the full House Armed Services Committee on defense acquisition reform, there was discussion of being "outgunned" in program negotiations—making note of the F–35's expensive program history—by experienced industry lawyers with vast amounts of resources and time spent negotiating long-term government contracts. How do we augment the expertise of DOD's negotiators when changes in duty station take them to and from the negotiating table every few years, so that they can better compete for the Department and the American taxpayer?

Admiral WINTER. The best approach to address negotiation skills in Department of Defense (DOD) is to reduce attrition in the civilian contracting career field by retooling current retention policies. The current policies regarding retention incentives require employees to have an offer of employment from an organization outside the Government before the DOD offers a retention incentive; however, once a Government employee has gone through the entire employment process with a company outside the Government and has an employment offer in hand, there is little chance of having them remain in the Government. Furthermore, current retention agreements are structured for the employee to stay in the Government, not necessarily on the program where their skills are most needed. To improve the situation, the retention incentives must be structured to have the employee remain on the major systems program where their experience is required, not anywhere in the Government. Retention incentives should be based on the experience and contributions of the employee, not on their ability to get a job offer outside of the Government. In addition to the required training for the contracting career field, the most useful training is obtaining a Master in Business Administration (MBA) and Professional Military Education (PME). Many employees in the contracting career field pursue an MBA on a part time, evening basis. Retention incentives that would allow contracting personnel to pursue a full time MBA or PME program, in exchange for a commitment to return to the major systems they came from in a three year commitment for one year of full time study, would also help with retention. Finally, funding has to be made available for these incentives and earmarked so they cannot be siphoned off into other initiatives. Given the cost of effective retention incentives for 100 employees, and the current cost of a full time MBA program, $1 million annually would be required for the F–35 program to implement a successful retention program. Retention incentives to reduce attrition on the F–35 program in summary: 1) A policy that allows annual retention incentives to be paid, as part of performance reviews, specifically for retention on the F–35 program, with no requirement for a job offer outside the Government. 2) Paid full time MBA and PME programs with a three for one time commitment specifically on the F–35 program. 3) An earmarked budget of $1 million annually to implement a contracting personnel retention program on the F–35 program

Ms. ROSEN. We must assume that the baseline is always moving. How do we stay on the forefront of the F–35's real time hardware/firmware/software to be as dynamic and nimble as possible, while maintaining its physical and cyber security status?

Admiral WINTER. The F–35 Joint Program Office (JPO) has reassessed the planned approach for executing Follow on Modernization, Block 4, and determined that it cannot continue as it had during the System Development and Demonstra-

tion (SDD) phase for the Block 3F capability delivery which was a slow, rigid "big bang" methodology. The F–35 JPO will apply a more rapid and iterative process to field software solutions, aligned with enabling hardware upgrades, to keep pace with the dynamic threat environment and maintain the viability of the Joint and International F–35 fleet. The JPO is establishing an updated acquisition strategy based on agile practices called Continuous Capability Development and Delivery (C2D2). The C2D2 methodology is designed to deliver continuous modernization, enhancements, and improvements to the entire F–35 Air System, and deliver Block 4 in smaller capability drops to the Warfighter on an expedited timeline. This new agile approach to capability development is characterized by capability based engineering, agile/automated test, parallel development and operational test, flexible contract strategies and new cost estimating relationships.

QUESTIONS SUBMITTED BY MR. BACON

Mr. BACON. The U.S. Reprogramming Lab (USRL) plays a critical role in programming the brain of the F–35. The USRL has made great strides but I understand that the process of creating new mission data files (MDFs) is still very lengthy and manpower intensive. I also understand that previous MDFs are not compatible with block software updates for the aircraft system baseline, often requiring these MDFs to be regenerated.

Questions: 1) What steps are you taking to provide software tools to USRL technicians to speed the MDF analysis and validation process? 2) What is the objective timeline standard for new MDF creation, when do you expect to meet it, and what do you require to get there? 3) What steps are you taking to bring the USRF into the F–35 system development process earlier to keep us from having to recreate our MDF library every time the F–35 aircraft software baseline changes?

Admiral WINTER. The F–35 Joint Program Office (JPO) has collaborated with the United States Reprogramming Lab (USRL) operational community to document its requirements for next generation mission data software tools. The JPO is investigating new technologies and techniques from leading commercial software companies in order to bring machine-to-machine learning, artificial intelligence, and software automation to fulfill the USRL's software tool requirements. The USRL with being receiving updates to ist software tools in 2018. In 2020 it will receive additional software tools in preparation for F–35 Block 4. The maturation of the tools and processes during this timeframe will continue to improve both quality and timeliness of delivery. By the end of 2021, the USRL's capabilities will have it well positioned to respond to ever-changing threats.

Mission Data File (MDF) development currently takes 12 to 18 months to complete due to significant capability differences between 4th and 5th generation aircraft and a lack of robust reprogramming software tools to facilitate these 5th generation capabilities. The JPO is actively addressing these issues and developing new software tools to support the reprogramming labs. These new tools will be able to complet an MDF in 6 months versus the current 18 months and will be released

Mr. BACON. The F–35's on-board sensors provide an asymmetric advantage to other F–35s in flight, but I am concerned about the ability of the F–35 to share the information it is capable of collecting with other users.

Questions: 1) What capability/capacity does the F–35 Block 3F have to store and record information from each of the F–35's active and passive sensors?

2) Does the F–35 Block 3F have a post-mission data recovery architecture to allow sensor and mission data to be sanitized and passed on to other joint users, U.S. national intelligence agencies and international partners?

3) What are the specific Block 4/C2D2 requirements to record and share F–35 sensor data, both inflight and post-mission, and when does the program anticipate fielding this capability?

4) When will the F–35 have to ability to pass targeting information to support the following joint force missions: Inflight target cueing for Army long-range fires? Inflight target cuing for Navy TLAM strikes? Inflight imagery transfers to deployed joint special operations forces? Inflight and post mission electronic order of battle (EOB) updates to the appropriate national intelligence agencies and integrated broadcast services?

Admiral WINTER. F–35 Block 3F has the capability to store and record five Synthetic Aperture Radar images from its Radar. In addition, fused data (i.e., not raw sensor data) displayed on the pilot's left/right panoramic cockpit displays and helmet video is recorded.

Information collected by the F–35's sensors can be shared outside the F–35 Air System's architecture; however, this is accomplished by the users and is not inher-

ent in the F–35 Air System. The Navy developed a unique Radiant Mercury (RM) solution to make limited recorded classified information releasable (e.g., weapons shot data). This capability is currently unique to the Navy onboard the USS WASP for the USMC and was completed outside the F–35 program.

Block 3F allows imagery to be sent out via variable message format and Link-16 in an Eagle Eye format as well as the electronic warfare data via Link 16. Block 4 adds a full motion video capability as well as the ability to support imagery with associated metadata. Block 4 will also allow sensor data to be recorded for post-mission analysis. Our current plans have this capability completing testing in fall 2021 and fielding in spring 2022.

The F–35 is capable of inflight image transfer to other units via Link-16 to support target cueing. The F–35 can also utilize variable message format combat net radio capability to create mission assignments for close air support that include targeting information. The F–35 does not have a requirement to transmit a digital Call-For-Fire (CFF) nor a requirement to be interoperable to the Advanced Field Artillery Tactical Data System (AF ATDS), which are needed for seamless fully digital capability. The interoperability with the AF ATDS and digital CFF are both needed for the Army long-range fire. Additionally, the F–35 does not have a requirement to be interoperable directly with the Tomahawk Land Attack Missile (TLAM) systems nor does the TLAM have onboard capability to accept the Link-16 target cueing message set.

Mr. BACON. The 33 FW at Eglin AFB is flying some of the earliest model F–35s and is struggling with its AA, MC and S-rates. As we work to produce enough trained pilots for the 388 FW at Hill today, and soon the 354 FW at Eielson and 48 FW Lakenheath, how does the Air Force and JPO propose to improve the F–35 maintenance situation at Eglin?

Admiral WINTER. The F–35 Joint Program Office (JPO) is working in concert with U.S. Air Force (USAF) logistics leaders to apply a full spectrum of improvements for the Eglin Air Force Base (AFB) maintenance team. Maintenance challenges at Eglin AFB are driven by three factors: (1) Global Spares Pool maturity is causing delays in repairable assets; (2) under-developed technical data available for diagnosing and repairing; and (3) aircraft availability is pressured by Eglin's early Low Rate Initial Production (LRIP) fleet which require both Technical Refresh (TR) 2 hardware and Block 3F software upgrades to improve parts and performance to provide relevant pilot training. Each one of these areas has specific on-going initiatives to improve aircraft availability. To address factor one, our critical spares issues, we are accelerating organic depot standups, improving Original Equipment Manufacturing capability, and have established a Reliability & Maintenance Improvement Program (RMIP) to actively address parts availability and reliability. In the interim, we have remodeled Eglin's spare part kits and are making inventory adjustments to better match its usage requirements. To address factor two, technical data, we will expand maintenance group authorities to improve base level maintenance capabilities and expand on-site technical assistance. In addition, we are conducting a series of "deep dives" on the top drivers (supply and maintenance) to review technical data, assistance requests, repair capacity, and parts backlogs to improve aircraft availability. To address factor three, TR 2 hardware and Block 3F upgrade needs, the JPO and the USAF have worked to spread out the Eglin Fleet modification timeline to provide greater aircraft availability to keep pace with pilot training demands. These modifications are critical to bringing the aircraft to full envelope capabilities and improve aircraft reliability. The upgrades drastically improve Eglin's fleet with more reliable parts through established repair lines.

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General HARRIS. Key to long-term sustainability at Eglin AFB will be to upgrade the Air Force's 2B aircraft to the new 3F configuration. The funded upgrade kits will be available at the end of this year. The upgraded aircraft will have access to a deeper repair network and access to a deeper 3F spares pool. New integrated processors are required for the 3F upgrade and their availability drives the upgrade timeline.

In addition to these planned upgrades for Eglin AFB, they will also benefit from the larger enterprise efforts underway. Depot standup is behind schedule and the Air Force is working with the F–35 Joint Program Office (JPO) to remedy the repair cycle deficiencies. In Fiscal Year 18 we increased funding for our initial spares purchase and invested in our repair network. These investments will result in a deeper parts pool and more robust repair capability. The combined efforts to build a robust

spares pool will take time. We will continue to work with the JPO Hybrid Product Support Integrator (HPSI) to prioritize parts support to units conducting or preparing for deployed combat operations, and identify options to expedite procurement of mission critical components.

In addition to the items above that address the supply side of the equation, we're also encouraged by reductions in the demand signal for spare parts as well. The enhanced performance and reliability of the recent aircraft 3F software update improves internal diagnostics. The better fault isolation results in fewer serviceable parts that are erroneously introduced into the repair pipeline. Also, reliability and maintainability efforts continue to decrease Mean Time Between Failure (MTBF) rates resulting in fewer parts needing repair.

The combination of supply side increases and demand signal reductions will result in improved aircraft availability across the enterprise, including the 33FW at Eglin AFB.