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NAVY, MARINE CORPS AND AIR FORCE TACTICAL AVIATION PROGRAMS

HEARING

BEFORE THE

SUBCOMMITTEE ON TACTICAL
AIR AND LAND FORCES

OF THE

COMMITTEE ON ARMED SERVICES
HOUSE OF REPRESENTATIVES

ONE HUNDRED TWELFTH CONGRESS

FIRST SESSION

HEARING HELD
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NAVY, MARINE CORPS AND AIR FORCE TACTICAL AVIATION PROGRAMS

HOUSE OF REPRESENTATIVES,
COMMITTEE ON ARMED SERVICES,
SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES,
Washington, DC, Tuesday, March 15, 2011.

The subcommittee met, pursuant to call, at 11:32 a.m. in room 2118, Rayburn House Office Building, Hon. Roscoe G. Bartlett (chairman of the subcommittee) presiding.

OPENING STATEMENT OF HON. ROSCOE G. BARTLETT, A REPRESENTATIVE FROM MARYLAND, CHAIRMAN, SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES

Mr. BARTLETT. The hearing will come to order.

The subcommittee meets today to receive testimony on the Navy, Marine Corps and Air Force budget request for combat aircraft programs for fiscal year 2012.

We welcome our visitors for today.

The first panel is Mr. David Van Buren, Acting Assistant Secretary of the Air Force for Acquisition, also representing the Office of the Secretary of Defense; Vice Admiral David Venlet, Program Executive Officer for the F–35 aircraft program; and Mr. Michael Sullivan, Director of Acquisition and Sourcing.

The subcommittee invited Dr. Ashton Carter, Under Secretary of Defense for Acquisition, Technology and Logistics to provide testimony today, but he was unable to appear.

The second panel will be Vice Admiral Mark Skinner, Principal Military Deputy to the Assistant Secretary of the Navy for Research, Development and Acquisition; Lieutenant General Robling, Deputy Commandant of the Marine Corps for Aviation; Rear Admiral Kenneth Floyd, Director of the Air Warfare Division, the U.S. Navy; and Lieutenant General Mark Shackelford, Military Deputy, Office of the Assistant Secretary of the Air Force for Acquisition; Lieutenant General Carlisle, Deputy Chief of Staff for Operations, Plans and Requirements, U.S. Air Force.

Thank you all very much for accommodating us today and coming to this hearing.

We have a number of issues to cover today, but my opening remarks will focus primarily on the F–35 program.

The F–35 is a complex program. There is no question, significant technology and manufacturing capabilities have been demonstrated. The thousands of people working at the major contractors, as well as the many suppliers and vendors, deserve a great deal of credit for their achievements.

But with tens-of-billions of dollars having been invested in F–35 development to date, the program has encountered a series of major cost increases and schedule delays. Last year, the F–35 program experienced a Nunn-McCurdy cost breach that required a restructured program.

The new program executive officer conducted a Technical Baseline Review this past year, which again has resulted in a restructured program and additional projected cost increases and program delays.

Concerns about the F–35 program expressed annually for several years by the GAO [Government Accountability Office], having gone unheeded by the Pentagon, have largely been right on the mark.

Our first panel today includes Mr. Mike Sullivan from the Government Accountability Office, who has provided the committee independent reports on the F–35 program for many years. In 2001, when the Department began the F–35 program, the GAO noted that the critical technologies for key aircraft performance elements were not mature, and recommended that DOD [the Department of Defense] delay the start of system development until critical technologies matured to acceptable levels.

The DOD did not delay start of development and procurement costs, and procurement costs have climbed from $233 billion to over $382 billion since that time.

In 2006, the GAO noted that the DOD planned to enter production with less than 1 percent of testing completed, and recommended a delay in production until flight testing demonstrated that the F–35 would perform as expected.

DOD did not delay the start of production, believing the risk level was appropriate. Since that time, estimates for average F–35 procurement costs have increased over 30 percent.

In 2008, the DOD implemented a Mid-Course Risk Reduction Plan to replenish management reserves by reducing test resources. The GAO testified that this plan would likely actually increase risk, and recommended that DOD revise the plan to address concerns about testing, use of management reserves and manufacturing.

Since then, development costs have increased 22 percent, and recent restructurings in the past year have added test aircraft back into the program.

I might also add that in 2007, the GAO testified that experience with the first alternate engine program suggests that F135 and F136 engine competition could generate savings and benefits of up to 20 percent, if contractors are incentivized to invest their own money to remain competitive and produce more reliable engines, resulting in lower maintenance costs.

Unfortunately, the Pentagon has also rejected the GAO's conclusions on the F–35 alternative engine program, and has submitted a budget each year since fiscal year 2007 that would eliminate competition for the $110 billion F–35 engine program.

This year we are told that an additional $4.6 billion and 2 years have been added to the development schedule. Another 124 aircraft have been removed from the planned buy for the next 5 years. We have yet to be provided an estimate of the current total F–35 program procurement costs.

The fiscal year 2010-to-completion of development cost estimate for the F–35 primary engine contract has increased from $385 million to $2.1 billion—445 percent since February 2008. However, a portion of this increase is due solely to cost increases associated with F–35B lift fan components and schedule increases in the aircraft program, and not the F135 engine itself.

For those who might ask the question regarding F–35 program costs, at what point does this program become unaffordable, I would respond that, if you believe our Nation needs a fifth-generation stealth fighter, you have no choice. There is no viable competition for this aircraft.

And I would also point out that, if the Pentagon has its way, that is exactly the position we will be in for the engine for this aircraft by giving a decades-long, $110 billion, sole source contract to the primary engine manufacturer for the F–35.

Having no choice but to continue to pay for F–35 development and procurement cost increases is exactly why many of us do not believe that it is wise to create the same monopoly situation with the F–35 engine as we have done for the F–35 aircraft, that could comprise ultimately up to 95 percent of the U.S. fighter fleet.

Given the $2.6 billion investment already made in a competitive engine program, the Pentagon's analysis indicates that, over the life cycle of the F–35 aircraft program, that it would cost no more for a two-engine program than a one-engine F–35 program.

The Pentagon is concerned with the near-term investment costs to maintain a competitive program—initial costs DOD incurs to initiate any competitive military acquisition program.

This year, the costs to maintain the competitive engine program represent eight one-hundredths of one percent of the Pentagon's budget request. The option is whether we believe that it is wise for eight one-hundredths of one percent of the defense budget to foreclose the option for competition on the only element—an estimated $110 billion element—of the F–35 program that Congress agrees is required for our forces.

Discussion of the competitive engine issue has been made more difficult by misstatements regarding the F–35 engine program by former and current members of the Administration. The former deputy secretary of defense for Secretary Gates when he first became secretary of defense wrote an op-ed indicating "The F–35 second engine was not included in the Defense Department plan during or before my tenure as deputy secretary."

This statement is a total misrepresentation of fact. The F–35 development program began in 2001. The July 2000 Joint Strike Fighter program propulsion system acquisition strategy includes the design, development and qualification and production of a primary and an alternate propulsion system to support the JSF [Joint Strike Fighter].

In November 2006, the same former deputy secretary signed a memorandum of understanding with the eight partner nations for the F–35 program agreeing "the production work will include, but will not be limited to, the following: production of the JSF air vehicle, including propulsion systems, both 135 and 136."

This from the same Administration official, very close to the previous quote, which said that it had never been anticipated.

It is a total mystery how the former number one adviser to Secretary Gates could write that the F–35 engine was not included in the Pentagon's plan during or before his tenure, when the alternate engine was in the original F–35 acquisition strategy, and he signed an agreement with eight other nations to produce the alternate engine.

Some opponents of the competitive engine point out that the competitive engine is 3–5 years behind the primary engine—without also stating that is the case, because there is the acquisition strategy for the F–35 engine.

The 136 engine development was started four years after the 135. The 135 engine is about 24 months behind schedule. The 136 is about 2 to 3 months behind schedule, which means, if the engines had been started at the same time, the second engine would be now nearly 2 years ahead of the first engine in development.

Some opponents of the competitive engine say there already was a competition for the F–35 engine program when, as prescribed by the F–35 acquisition strategy, a sole source engine development contract was signed with the primary engine manufacturer in 2001, and a sole source contract was signed with a competitive engine contract in 2005.

Some say that the primary engine has 20,000 flight test hours when the primary engine has, in fact, accumulated less than 1,000—only 950—flight test hours, and continues to have modifications being made to achieve required capabilities. It takes 200,000 flight hours to mature a fighter engine.

We have had tens-of-billions of dollars in overruns on the F–35 development and procurement program, years of delay and many misjudgments of risk remaining in the F135 program.

Secretary Gates, speaking in Fort Worth, Texas, in August of 2009 said, "My impression is that most of the high-risk elements associated with this development program are already behind us, and I felt a good deal of confidence on the part of the leadership here that the manufacturing process, that the supply chain, that the issues associated with all of these have been addressed, or are being addressed."

Since Secretary Gates made this statement, the F–35 program cost has increased $50 billion, has had two major schedule delays, and procurement of 246 F–35 aircraft has been deferred to after 2016.

F–35 development competition has slipped from 2014 to 2018, and increased by nearly $10 billion to $56.4 billion, approximately 20 percent. The development test program has added 3 years to its schedule, one-third more flights, and Secretary Gates has put the Marine Corps short take-off and vertical landing F–35B on a 2-year probation to evaluate and engineer solutions to the F–35B.

Major misjudgments of risk in the F–35 program have been made at the highest levels of the Pentagon over a number of years. Is it possible that wrong judgments are being made on the need for competition for the F–35 engine? What gives us confidence that the engine decision is anything other than a short-term decision?

Just like many of us have had to watch the cost of the F–35 program spiral upward, many of you could have to live with a sole source F–35 engine decision for decades to come.

Before we begin, let me call on the ranking member of this subcommittee, my good friend, Mr. Reyes, for his opening remarks.

STATEMENT OF HON. SILVESTRE REYES, A REPRESENTATIVE FROM TEXAS, RANKING MEMBER, SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES

Mr. REYES. Thank you, Mr. Chairman.

And I also want to welcome our panelists here this morning. As today's hearing on combat aviation programs is a critical part of this subcommittee's work for the year, we are very much interested in listening to their testimony.

Other than large Navy ships, the DOD spends more procuring aircraft of all types than any other kind of weapon system. In fiscal year 2012, the total request for Air Force, Navy and Marine Corps aircraft procurement is $33.9 billion. By comparison, the Army's total procurement request for fiscal year 2012 is only $24 billion.

That does not mean that the aircraft are not worth the price, but it does mean that we must carefully review the DOD's request and ensure that the funds are, as always, spent wisely.

Of the many topics today's hearing will cover, the F–35 Joint Strike Fighter is probably the most critical issue. When the program's schedule was developed, the DOD intentionally took some risk in ramping up large-scale production before a significant amount of test flights had been completed. The DOD is now living with both the benefits and the downsides of this plan.

The good news is that we are building a lot of aircraft, thus learning a lot about how to ramp up production while at the same time gaining production efficiencies. The downside, on the other hand, is that we are finding a lot of things in test flights that will now have to be fixed during later production, or through later modifications that could prove much more expensive.

With regard to the alternate engine, while I do not support continuing with the F136 alternate engine, I do—and I want to emphasize this—share the Chairman's concerns about Congress being given accurate information from DOD. Regardless of the outcome, we have to deal with the facts at hand and not the spin.

A final issue I hope to hear about in today's hearing is the apparent disconnect in aircraft procurement strategies between the Air Force and the Navy. The Air Force has been adamant that it only wants to buy fifth-generation fighter aircraft in the future, and thus has refused to consider procuring F–16s or F–15s while the F–35 is under development.

On the other hand, the Navy is planning to continue to procure fourth-generation F/A–18 Super Hornets for many years while waiting on next versions of the F–35.

One benefit of the Navy's approach is that as the F–35 is further delayed, they can more easily adjust fighter production to ensure that there are enough planes to meet future requirements, as they did this year by adding another 40 F/A–18s to their budget request. The Air Force, on the other hand, is essentially betting its entire future and force structure on the F–35.

While we all hope that the F–35 proceeds as planned from here on out, to me, this does seem like somewhat of a risky approach. As a result, I look forward to hearing from our Air Force witnesses

what the back-up plan might be for additional delays in the F–35 Strike Fighter program.

So, with that, Mr. Chairman, I yield back to you.

Mr. BARTLETT. Thank you.

Without objection, all witnesses' prepared statements will be included in the hearing record.

Mr. Van Buren, please proceed with your opening remarks. Then you will be followed by Admiral Venlet and Mr. Sullivan. Thank you for coming.

STATEMENT OF DAVID M. VAN BUREN, ACTING ASSISTANT SECRETARY OF THE AIR FORCE FOR ACQUISITION, U.S. AIR FORCE

Mr. VAN BUREN. Thank you, Chairman Bartlett, Ranking Member Reyes and distinguished members of the committee. Thank you for the opportunity to address this committee regarding the Joint Strike Fighter.

The Joint Strike Fighter is the Department of Defense's largest acquisition program, and its importance to our national security is immense. The JSF will form the backbone of U.S. air combat superiority for generations to come.

For our international partners who are participating in the program, the JSF will become a linchpin for future coalition operations that will enhance the strength of our security alliances.

Following the JSF Nunn-McCurdy criteria certification in June 2010 by Dr. Carter, the F–35 program office under Admiral Venlet conducted the most comprehensive review of the JSF program ever accomplished. A Technical Baseline Review assessed the cost, schedule and technical risk of the work required to complete the F–35 system development and demonstration program.

The TBR [Technical Baseline Review] involved 120 technical experts reviewing every detail of the program over a period of months, supported by the full strength of the Air Force and Navy's tactical aircraft experts.

As a result of the TBR, Secretary Gates directed several changes to the program. He directed the program decouple testing of the short take-off and vertical landing model from the carrier, and conventional take-off and landing variants to ensure that any problems with this STOVL [short take-off and vertical landing] would not delay the other variants.

Additionally, the Secretary added resources to the system design and development program through its completion in 2016. Extra development funding will allow us to complete additional testing found necessary by the TBR, and properly fund testing cost estimates that were previously estimated at too low a level.

The Department further decided to hold production levels to 32 aircraft in fiscal year 2012. This allows the final assembly process at Fort Worth to mature, and reduces concurrency in the program.

Beginning in fiscal year 2013, the Department will increase the production by a factor of 1.5 per year, as recommended by the manufacturing review team.

Finally, the Secretary placed the STOVL on probation for 2 years, as was noted, pending further successful development. The

probation period limits the procurement of 6 F–35B aircraft in both fiscal year 2012 and fiscal year 2013.

This 2-year period will provide additional time to resolve engineering and technical challenges. And at the end of the 2-year probation, Department leadership will make an informed decision on how or whether to proceed with STOVL.

The Department recognizes the concerns of Congress and the taxpayers regarding the cost overruns of this program. The Department estimates that the independent production unit cost estimate to the JSF have nearly doubled since the program began. This cost growth is simply unacceptable and must be reversed.

The Department will be performing a rigorous LRIP [Low Rate Initial Production] 5 "should-cost" effort. This process has already shown some success, with cost reductions in LRIP 4, a fixed-price incentive fee contract, with the target costs substantially lower than the independent cost estimate.

The program's management over the past year has put in place the right fundamentals and realistic plans using sound systems engineering processes. And we are monitoring and tracking performance on a continuous basis using detailed metrics.

Overall, there is much work still ahead of us. But through the multiple reviews and adjustments in the past year, Dr. Carter and I believe we have put the program on sound footing for the future. In our opinion, the TBR has given the Department the best basis it has had to plan and manage the JSF program.

Admiral Venlet and I have submitted this detailed written statement for the committee. Admiral Venlet also has an opening statement, but I do wish to thank you again for the opportunity to discuss the program.

Admiral Venlet.

[The joint prepared statement of Mr. Van Buren and Admiral Venlet can be found in the Appendix on page 45.]

STATEMENT OF VADM DAVID J. VENLET, PROGRAM EXECUTIVE OFFICER FOR THE F–35 LIGHTNING II PROGRAM, U.S. DEPARTMENT OF DEFENSE

Admiral VENLET. Chairman Bartlett, Ranking Member Reyes and distinguished members of the committee, thank you for this opportunity to appear before you today.

By any measure of progress or performance, the F–35 program has not delivered acceptable results. Previous reports and investigations cite a history of program plans and re-plans to which program performance does not measure up.

You may fairly ask why any new plan presented can be depended upon to deliver to expectations or be bounded and under control. The changes and decisions reflected in the President's 2012 budget are a result of 120 technical experts from the F–35 program office and the Services' systems commands reviewing the remaining work from the bottom up.

This plan derives its higher confidence by embracing fundamentals in every technical and business discipline. There is grounding in realism about cost, schedule and performance.

Such a grasp on fundamentals and realism is the distinguishing characteristic that makes this plan different from all before it. This

plan has resilience and prudent reserve to absorb expected further learning and discovery.

This is a plan resourced with realism that will begin building a record of dependable results.

I am honored to respond to your further questions.

Mr. BARTLETT. Thank you.

Mr. Sullivan.

STATEMENT OF MICHAEL J. SULLIVAN, DIRECTOR OF ACQUISITION AND SOURCING, U.S. GOVERNMENT ACCOUNTABILITY OFFICE

Mr. SULLIVAN. Good morning, Chairman Bartlett, Ranking Member Reyes and members of the subcommittee.

It is my pleasure to be here again to talk about the Joint Strike Fighter program, DOD's largest acquisition ever and so important to plans for recapitalizing our Air Force, Navy and Marine Corps tactical aircraft. I will make some brief comments, and then be happy to take your questions.

Mr. Chairman, over the last 13 months, Defense leadership has taken positive action to restructure the Joint Strike Fighter program, and we strongly support these actions, many of which are overdue, that we and some other organizations have previously recommended.

We have been concerned since program start about the risks posed by the high degree of concurrency between testing and production activities, and have consistently recommended reducing annual procurement quantities until sufficient testing is completed.

The Secretary's substantial reduction of 246 aircraft through 2016 certainly helps lessen concurrency risk. Even with that reduction, however, total development cost is now estimated at $56.4 billion dollars, and will not be completed until 2018—a 26 percent cost increase and a 5-year schedule slip from the 2007 baseline.

We also note that, over the next 5 years, the annual funding requirements for procurement more than double, and annual quantities more than triple.

Looking forward, a focus is on affordability, which is critical. With future budgets likely to be austere, the program is planning an unprecedented amount of funding for a sustained period, averaging more than $11 billion per year through 2034.

And this does not reflect all of the effects of the Secretary's recent restructuring actions. We understand the Department has not yet calculated the net effects financially from differing aircraft quantities from the near term to future budgets, and we expect future procurement funding requirements to increase once this is done.

The program had mixed results during the year of 2010, achieving 6 of 12 major goals that it set for itself, and progressing in varying degrees on the rest.

There are some encouraging signs. The pace of flight testing, for example, accelerated in 2010, accomplishing three times as many flights as in the 3 years prior combined.

Also, there is much more work in process on the factory floor. And we have taken annual tours of the factory floor, and found it much busier this year than in the past.

These signs of improvements are counterbalanced with continuing setbacks, however. For example, while the Air Force's conventional variant and the Navy's carrier variant performed well in limited flight tests, the short takeoff and landing variant essential to the Marines' future aviation plans had numerous technical problems. And as has been stated earlier, DOD has directed a 2-year period to slow down procurement to engineer solutions.

The final delivery of test and production aircraft is still lagging. That is a big concern for us. And a majority of improvements that the expert review teams did recommend have not yet been implemented.

Improving factory through-put and the global supply chain are now urgent priorities for the program.

Also, design changes continue at higher rates than expected, and may increase further as flight testing continues. This indicates the design is not fully stable, several years after critical design review.

Finally, integration and testing of software essential for achieving 80 percent of the JSF's functionality is significantly behind schedule as it enters its most challenging phase.

Mr. Chairman, let me conclude by saying that the program's time to perform to cost and schedule targets has come.

The GAO pointed out several years ago that official estimates were unrealistic, that they were based on optimistic assumptions rather than robust systems engineering knowledge, and that plans to cut test assets and reduce flight testing during the Mid-Course Risk Reduction Plan were ill-advised. And we have consistently pointed out risks to the program that the Department has largely ignored until now.

We now support recent restructuring efforts and believe that the added funding, extended time to complete systems development and a more robust flight test program provide a much more achievable program.

However, let me say loud and clear again that this program still lags behind expectations and is not out of the woods yet. Continued strong oversight will be critical.

Now is the time for much more disciplined decisionmaking concerning critical aspects of the program such as: The STOVL variants' inefficient schedule; overall cost controls on the program; annual funding actions that the Department and the Congress will have to make; and management of critical software development efforts.

The program has been supported through many turbulent years, and it does represent the fifth-generation fighter, and it is a very important piece of our tactical air portfolio.

There have been a lot of smaller, perhaps lower-priority programs that have taken on some of the cost-sharing for the Joint Strike Fighter as it goes along.

After 10 years of product development and 4 years of production, it is time for the program to make good on its estimates and deliver aircraft in a predictable manner.

Mr. Chairman, that concludes my statement. I await your questions.

[The prepared statement of Mr. Sullivan can be found in the Appendix on page 65.]

Mr. BARTLETT. Thank you very much.

Thank all of you for your testimony.

As is usually my practice, I will delay my questions until the end, hoping that my colleagues will have asked them all.

Mr. Reyes.

Mr. REYES. Thank you, Mr. Chairman.

And thank you all for your testimony.

I have two questions, one for Admiral Venlet dealing with the testing results and production plans, and the other one for Mr. Sullivan regarding the issue of the software and its development.

For the Admiral, your testimony states that, due to a series of problems discovered during testing, Secretary Gates placed the F–35B short takeoff and landing variant JSF on probation for 2 years.

He also directed major changes to the program that will add hundreds of additional test flights. While test data to date shows the other two F–35 variants somewhat ahead of schedule in this testing, but the 35B continues to fall behind.

So my questions are, when exactly will the program, in your opinion, have enough flight test data to allow us to get off this probation designation?

And secondly, in the meantime, does it make sense to put the 19 additional F–35B aircraft on contract for production, which are being paid by fiscal year 2010 and fiscal year 2011 funds?

[The information referred to can be found in the Appendix on page 149.]

Mr. REYES. And then, finally, why not build more of the other variants that are not on probation instead of the 35B?

Admiral VENLET. Thank you, sir. Your reference to the STOVL falling further behind, I would lead with the recent months' progress has been quite remarkable for the STOVL aircraft.

It has flown quite a bit more. It has accomplished a lot more vertical landings, really, since the turn of the year. We have four of them return to flight test.

If I might just start with a current event issue, sir, you mentioned discovery in flight test. Last week we had a dual generator failure on an Air Force test aircraft at Edwards Air Force Base. To take the time to understand what caused that, what its impacts were, we grounded the entire test fleet and their first two production aircraft.

Over the weekend, they were able to do an investigation and tear the hardware apart. They understand what caused that failure and the failure of the other generator.

And yesterday, they determined that there was a difference in configuration of generators in the first test aircraft built. This was a new configuration generator that was cut in.

And the differences gave confidence that we could return the original, the older generator aircraft to flight. So yesterday, AF1 flew at Edwards, and today, the four STOVL test aircraft are on the schedule to fly today at Pax River.

So, I mentioned resilience in the schedule. This generator is actually an early opportunity to test that resilience in our schedule to see if we can absorb this and learn from it.

So, when will we have enough data to basically come off of probation for the STOVL, sir?

The effect of probation was the suppression of the procurement quantities. The test program has been planned and is having detailed adjustments made to it this year, so it is going full-speed ahead. And it was planned to do that even before probation was pondered.

So, the actual focus in this probation period—and I am meeting with the commandant every month. In fact, this week, Friday, I meet with my shipmate behind me here and several others to keep the commandant informed.

We are going to focus on several characteristics. The first of all will be weight. We will watch how the weight is affected by what we learn in flight test. We will watch how it performs in its first sea trials, scheduled this fall.

Our progress in testing has improved our confidence of our ability to meet what is our now-plan date of late October or early November for its first sea trials. I know that was originally planned to be late last year, slipped into the spring. Our current planning and progress is giving us good confidence that we will make this fall.

So, the weight, the ship operability, the discovery of flight test that illuminates what we expect as key performance parameters to be, and then, its progress towards achieving an airworthiness determination by the technical assistance command, and its ability to fly unmonitored in the fleet's hands without test instrumentation and engineers following it.

Those are the characteristics that we will inform and we will evaluate. And it will be a combination of those things, not any one particular thing that will lead to the determination of the confidence to go forward near the end of 2012.

You asked about the wisdom of continuing to buy. These are certainly challenging decisions.

The complexity of the program and concurrency, the path that we have set about to test and build and deliver to the fleet, and operate at the same—this is our first year of experiencing that. We are delivering our first production aircraft this year, and we will be standing up testing for the Air Force in Eglin Air Force Base.

Now, a comment. I have to wait and see what this generator issue is going to do to that. There is nothing known on that. We are evaluating that as we sit here.

But to break production would add additional cost. I think the Secretary in this budget has moderated its spread production out to reduce the impacts of concurrency and the possibilities of modification due to learning and test.

I will stop there.

Mr. REYES. Thank you. I will have some follow-up, but I will wait until the next round.

Let me go to Mr. Sullivan on software. In your testimony, you discuss the potential additional delays that could result from the software development effort within the F–35 program. And specifically, you note that each software block is likely to be at least 2 years late, which obviously delays the overall program.

The two questions I have: Are these delays primarily the result of overoptimistic initial estimates, or are they performance shortfalls by the contractors? That is number one.

And number two, given the size and the complexity involved, is the program doing well compared to the private sector, in your opinion?

Mr. SULLIVAN. To answer your first question, I think your point about underestimating the time and resources that would be needed at the beginning of the program is probably the right answer.

I think the program has found, number one, that the lines of code that are needed to make up all of the performance and functionality that software has to bring to this weapons system has grown by about 40 percent since that time. And it is already probably the most software-laden aircraft ever developed. I know it is more than the F–22 or F/A–18E/F.

So, I think they underestimated the enormity of the challenge for software development. They did not plan for enough time.

And I think that they did not plan to keep software engineering experts around long enough. That has been one, I think, one of the cost drivers on the program, as well.

So, I think that, from our point of view, is the answer to the first one. They were optimistic in their original estimates.

With regard to your second question, I do not have a whole lot of experience comparing defense programs with commercial, but we have done some work in the commercial world to find best practices in software, development in software engineering.

And I would say that the commercial world takes the idea of spiral development a lot more seriously than what we see typically on a weapon system acquisition.

What you have on the Joint Strike Fighter is that they want to go all the way to—the program will not be complete, and development is not complete, until they have all of the software delivered Block 3 and beyond, which tends to go beyond what you might think of as a 95-percent solution.

Whereas in the commercial world, I think they are much more flexible with incrementally releasing software, getting better software to the field, if you will, more quickly, although it is not the ultimate. You know, they spin out. I think they are much more flexible.

They reuse software a lot more. They do not rely as much on unique software writing and proprietary software, and things like that.

You know, that would be my observations on that.

Mr. REYES. And I think it is interesting, because in last week's hearing, we talked about just that issue, that sometimes it does not make sense to—and unrealistic to expect—a 90, 95 percent level, when 75, 80 percent, and then evolving through that process.

Mr. SULLIVAN. Yes.

Mr. REYES. So, that is something that I think the committee certainly understands, and maybe we can influence.

Thank you, Mr. Chairman. I yield back.

Mr. BARTLETT. Thank you.

Mr. LoBiondo.

Mr. LOBIONDO. Mr. Chairman, I would like to yield my time to Mr. Shuster.

Mr. BARTLETT. Oh, Mr. Shuster.

Mr. SHUSTER. Thank you, Mr. Chairman. And I thank the gentleman from New Jersey for yielding me his time.

Mr. Van Buren, on the F–35, I have a couple of concerns, first and foremost on the alternative engine.

We have seen a GAO report that has come out and says the alternative engine is, over the long run, cost-neutral, one engine or two engines. So, first, I wonder if you could address that, along with—I read a report that General Heinz, the former Joint Strike Fighter program manager, stated that he believes that the Pentagon has not considered, under his opinion, operational risk involved with doing away with the alternative engine.

And looking at having an alternative engine, some of the other benefits, the technological innovation, enhanced contractor responsiveness and, I might add, keeping the costs down, which was what I think we have seen over and over again when you have competition and a more robust industrial base.

So, I wonder if you might address those concerns that I have.

Mr. VAN BUREN. Well, the issue of the alternate engine is clearly a case of constrained resources. And currently, in our defense budget, we feel that we do not have the resources to fund the alternate engine. The monies need to be put on higher priority programs.

Secondarily, the issues of stability in the current engine, the F135, it is performing very well. It is very mature. There have been no major problems in the flight test program to-date.

And I would say that the JPO [Joint Program Office] has concluded a fixed-price type contract with Pratt and Whitney on that engine, and that they appear to be working well to get the cost price down.

Mr. SHUSTER. Then you would agree that, in the short term, it is a $430 million—or a $430 billion savings is what we are going after. But the long term, you do agree that there would be—the cost would be bear out, it would be neutral, or it would be the same cost by having the two engines, and reduce, according to General Heinz, operational risks?

Mr. VAN BUREN. I do not agree with General Heinz on the operational risk. What I will say in the near term is that it is an expenditure of well over $2 billion, approaching $3 billion, funds that we currently do not have.

Mr. SHUSTER. And again, we are going to have—in 25 years it appears we will have 95 percent of our fighter fleet will be the F–35. That is correct?

Mr. VAN BUREN. A considerable portion of our fighter fleet for the Air Force. I would let the Navy speak to the force structure. But for the Air Force, certainly, the F–35 will become the largest element of our force structure.

And I would say that the challenge that we have is to get to the "should-cost" numbers, aggressively working at the reduction in the per-unit costs, not only for the engine, but also for the airframe.

Mr. SHUSTER. So, one engine you are willing to make the bet—95 percent of the Air Force's fleet. Having that one engine, you are confident that that is not going to cause an increase in operational risk when you have that kind of—we are going to rely on that single engine.

Mr. VAN BUREN. I am confident with this engine.

Mr. SHUSTER. And you talked about unit cost. Economies of scale dictate that the more you produce, generally, it drives cost down. But yet, we continue to decrease the numbers that we are purchasing.

And you are certain, or you feel certain that that is not going to drive up the cost per unit, if we reduce the quantity, and we continue to reduce the quantity that we contract to produce?

Mr. VAN BUREN. Well, I will say that that particular factory in Middletown, Connecticut, is also responsible for producing F119 and F117 engines for F–22 and C–17 fleet, and also will be producing the engines for our KC–46A tanker.

So, we are confident with the situation up in Connecticut.

Mr. SHUSTER. But when you are switching over assembly lines, they are not the same engine. Correct?

Mr. VAN BUREN. No. They go in parallel lines——

Mr. SHUSTER. Right.

Mr. VAN BUREN [continuing]. Coming through the factory.

Mr. SHUSTER. Well, again, most economics I have studied, that when you reduce the units, you are going to drive up—or when you reduce the number you order, you are going to drive up the unit costs. And even if a plant is producing an engine, it is a different engine. Every time you switch over, it seems to me, there is going to be an increase in costs.

So, I have a great concern that we are going with one engine. I know the House just recently voted to go with one engine.

But again, with the reliance on the F–35 that we are going to be placing on it with 95 percent of the Air Force fleet, with our allies moving in that direction, again, I just think it is—in the short term, I think we are making a mistake by going with one engine. And I hope that as we move down the road, we can change that policy, because again, I think there are so many benefits to having a competitive program.

And this Administration has said about going out and being competitive and transparent, yet we have seen time after time they want to go to sole sourcing on many different items, not just in the Defense Department, but across the government, which I think is the wrong direction to take.

I see my time has expired. I thank the chairman and thank the gentleman for yielding from New Jersey.

Mr. BARTLETT. Thank you.

Mr. McIntyre.

Mr. MCINTYRE. Thank you, Mr. Chairman.

Mr. Van Buren, flight testing for the F–35 began in 2006. Is that correct?

Mr. VAN BUREN. Yes, I think so.

Mr. MCINTYRE. All right. So, that means you have been testing for over 4 years now, going on 5. Is that correct?

Mr. VAN BUREN. Very limited testing early on. I think this past year was the preponderance of the testing, and we are roughly doubling, as I remember, the number of flight test sorties this year from last year.

Mr. MCINTYRE. Can the current aircraft fly throughout this specified envelope?

Mr. VAN BUREN. Admiral.

Mr. MCINTYRE. Admiral Venlet, you are welcome to help answer, if you need.

Admiral VENLET. Yes, sir. The envelopes are being expanded as we speak.

Just for scale, we have roughly 550 flights under our belt now, and we are approaching 900 total flight hours. The Technical Baseline Review assessed that it would take up to 7,700 flights to complete developmental tests on all three variants, including the mission systems, which we will take out into 2016.

So, as a matter of scale of how much flight test is behind us and how much is ahead of us, roughly 900 hours behind us, reaching for—excuse me. I mixed hours and flights.

So, 550 flights behind us, 7,700 flights to attain.

Mr. MCINTYRE. What are the specific reasons that after 4 years of flight testing, that the F–35 is still not cleared to fly throughout the specified envelope? Can you tell us—one, two, three, four—what those specific reasons are?

Admiral VENLET. Developmental flight test incrementally opens an envelope. It does not begin with a full envelope at the beginning, sir. So, we know what envelope is required for the commencement of training by fleet ops. And so, our testing is focused on progressing to that size of envelope for all three models—Air Force, Navy and Marine Corps.

You are casting a view of the length of time we have been in flight tests, sir, the first—there was only one test that we called it AA–1, that was flying for the first couple of years. So, it was one struggling airplane not accumulating very much flight time, nor was it prepared or instrumented to expand the envelope.

So, we really have only begun to expand the envelope in this near the end of 2010. We will do so rapidly in 2011 and 2012.

I don't make excuses for that. I just say what it was.

Mr. MCINTYRE. Hasn't the F135 engine contributed to the delays in the flight testing and the restrictions in the flight envelope?

Admiral VENLET. Specifically, we had a characteristic called screech in the afterburner that caused us to have to avoid certain portions of the flight envelope, but that did not slow us down from going to other points in the envelope to make progress, sir. We are fixing—we are putting kits in so that the aircraft can go back and catch that up, sir.

Mr. MCINTYRE. If you can tell me also, Mr. Van Buren, the Air Force variant, you have said, has been performing very well.

So, then, the question becomes, why slow down by cutting production by 57 aircraft over the FYDP [Future Years Defense Program], and potentially dramatically increasing the cost per unit?

Mr. VAN BUREN. Well, the reduction in the recurring number of jets to be built was caused by the need to more robustly fund the development program. And so, resources on the order of $4.5 billion were put into the budget between the 2011 budget and the 2012 budget to fully fund that testing that needed to be done, software development that the Admiral mentioned, and to finish the program off in 2016.

Mr. MCINTYRE. How much per unit is it going to increase the cost over the FYDP?

Mr. VAN BUREN. Our plan is to continuously reduce the per-unit cost from LRIP 4 and beyond on a fixed-price type basis.

Mr. MCINTYRE. Right. But during the FYDP, how much will it increase the cost per unit?

Mr. VAN BUREN. Well, we do not know that. I think that will be a product of our "should-cost" activity. And we have not received our proposal yet on LRIP 5. And that is our task, is to robustly reduce the price for all of these variants.

Mr. MCINTYRE. I hope that can be achieved. I share with Mr. Shuster the same concern, and with Mr. Bartlett, that government studies have shown that the alternative engine would bring down the cost over the life of the program for the F–35. And I am very concerned that we be responsible with taxpayer money, and that we also have an opportunity to increase job opportunity, which the alternative engine will do.

Thank you, Mr. Chairman.

Mr. BARTLETT. Thank you.

Dr. Fleming.

Dr. FLEMING. Thank you, Mr. Chairman.

And I want to follow up a bit on the one-versus-two engine issue, as well.

I have no dog in the hunt, so it has nothing to do with my district whatsoever. I am just interested in getting the best results for the taxpayer.

And it is interesting. This is the only issue that I have dealt with in the over 2 years I have been on the Hill in which both sides claim the same ground, and that is savings.

The people who are for one engine say that we are going to save money. The people who say we are for two engines say we are going to save money. So, both sides are using the same rationale.

The best I can understand about this is that we are really looking at different budget windows, that one-engine proponents say we are going to save money early on, because we are not investing in that research and development. But then, proponents of two engines say, in out-years, that is where the savings are going to be, because we will have two sources and, therefore, we will have competition.

So, is this really, by going with one engine, are we really in essence saving money in the short term in order to actually end up spending more money in the long term?

And I will open to anyone in the panel who would like to answer that question.

Mr. VAN BUREN. Again, we are constrained on resources here. In the near term we know that that would be some cost, and we do not feel that that is in our taxpayers' interest.

Dr. FLEMING. Okay. Anyone else like to tackle that question?

Mr. SULLIVAN. I guess, from our point of view as an uninterested observer, if you will. You know, when we looked at this issue—it has been a few years ago—we made a number of assumptions. So, we did really a rather theoretical look at the impact of competition. And I think it does, more or less, boil down to near term and long term, which, you know, can be interpreted many different ways.

But I believe where the Department stands now, is that they feel that they are in a short-term affordability crunch, and they are not

willing to invest what is now probably somewhere between $2.5 and $3 billion in order to see if they can recoup that and more down the road.

When we did our study, we found it reasonable to assume that over the long haul, over a 40-year buy of engines, if you competed them annually, you would achieve a return on investment that would exceed the investment.

Dr. FLEMING. And I appreciate your honesty in that response.

Do you have—and I know this is an off-the-top-of-your-head estimate—what the savings might be in the long term as compared to the $2 billion or $3 billion in the short term?

Mr. SULLIVAN. We do not have a number for that. But what we did was we looked at—we used as a model the Great Engine War. I do not know if you are familiar with that, but it was the result of the competition that was infused into the F–15, F–16 engine programs.

And it was done as a result of the—the prime engine maker was not being responsive. Reliability was lacking. Cost was going up on the engines. And it was a sole source buy.

So, the Air Force at that time brought in competition and saw cost reductions—initially, a great deal of cost reductions as the competition kicked in. And then, through the program, was very happy, not only with the financial results of that, but also with the—they got much more responsiveness from both contractors, and reliability went up.

Dr. FLEMING. Okay. I appreciate that answer.

Then, would it make sense that down the road another year or two, we get our budgets in order, we are winding down our conflicts, perhaps we are able to invest that money. Would it make sense to open up a second-source engine at a later date?

Mr. VAN BUREN. It does not make any sense to us. And we are comfortable with the efficiencies of having a single source. We find the contractor responsive. We find the costs coming down in a fixed-price environment. And there are no major technical issues.

Dr. FLEMING. Okay. Okay, well, that being said, I thank you, gentlemen, and I yield back.

Mr. BARTLETT. Thank you.

Mr. Kissell.

Mr. KISSELL. Thank you, Mr. Chairman.

And as the chairman said earlier on, thank you, gentlemen, for the work you do, that obviously, this program is very important to our Nation. And obviously, we have had some issues with this program.

And I am going to go through some numbers that have been repeated. I know the chairman said these, and others have referred to them. But I think it is important we not forget this as we assess where we are in the development of the F–35.

In the 10th year of development, that we started out with projected cost of $233 billion, is now up to $382 billion. By rough math, that is a 65 percent increase. We have cut the number of planes we are going to purchase by 400.

In 2007, Congress appropriated and authorized 90, I believe, airplanes, none of which have been delivered. We were looking for 32 this year.

We had less than 10 percent of the flight training completed that we wanted to. Referencing back to what Secretary Gates said in August 2009, that the rough spots are behind us, that we are moving forward. But yet, it seems like we have moved from 2014 to 2018, in terms of when we expect the production to be completed.

From the authorization of 2007, we are now 15 months behind schedule. And once again, we are talking about the first production plane to be delivered next month.

And, Mr. Van Buren, I do find a lot of concern in my mind with your saying, short term, this is the best option for us with the single engine, when this program is anything but short term in nature. We are talking about 95 percent of our fighter fleet. We are talking about years of development leading to years that this will be an operational plane.

There is nothing short-term about this.

Mr. Sullivan, we have heard the words, and we have talked about that the F135 engine, I believe, that the manufacturers reached that point to declare an ISR [Initial Services Release]. They are ready to go into production.

But my understanding is that they also asked for $1 billion more for development, changes, whatever. It sounds like we are anywhere but ready to go into production when you ask for $1 billion more.

We have made words aplenty as to where we are. Where do words stop and we can be able to say specifically, this is what we have got to look for to be able to say we are on a production schedule that is meaningful, and that the projections we are making in terms of cost and delivery and expectations are being met? What are the key things we should be looking for other than just projections and words?

Mr. SULLIVAN. From our perspective, we believe the restructure that they just went through was very comprehensive. So, I think you are getting somewhere close to a point where you are ready—you know, you are beginning to feel like you could go to production.

However, until the flight test program, and for that matter, until the models and simulation that they have are accredited, and most of the development issues in testing are further along, we believe that right now, that the aircraft is too immature—and the engines are too immature—to go to production. I do not know. Maybe the program has more insight on that.

Mr. KISSELL. Well, and Admiral—or Mr. Van Buren, you know, we talk about going to production. But yet, we are not there. And so, where are we in terms of going to production and actually being able to have, you know, these airplanes rolling out and meeting the needs that we have?

Mr. VAN BUREN. Congressman, I think one of the biggest issues that affected the program was a high-level, a change traffic that occurred, notably in the first part of 2009. And it took the program some bit of time, delaying deliveries, to absorb that change traffic.

If you look at the metrics on the production line with regard to travel, work and span times, and the other, the new changes that are occurring, it has come down significantly. So, I can say that the production maturity is far better than it was 2 years ago.

That is not to say, though, that there is a lot of work, there is a lot of flight test ahead of us and discovery. And that is why I think the changes that were made in the restructure were very prudent to reduce that concurrency, and produce the aircraft at a lower rate of production, which would allow the Admiral and the team to make sure that we had a much more mature product coming down that production line.

Mr. KISSELL. Okay. Thank you, sir. Thank you, gentlemen, once again.

Thank you, Mr. Chairman.

Mr. BARTLETT. Mr. Critz.

Mr. CRITZ. Thank you, Mr. Chairman.

Thank you, gentlemen, for testifying.

I did hear about the issue with the testing. What was that, the end of last week, where you had to ground the fleet? You say you are going to be up in the air today? Is that correct?

Admiral VENLET. We flew yesterday, sir, with AF1 at Edwards.

Mr. CRITZ. And no recurring problem with——

Admiral VENLET. No, sir. The generator configuration is different in the jets that are released for flight. And so, that is why they are flying.

Mr. CRITZ. Okay, good.

Now, there have been advertisements in local newspapers, and I have heard different figures. The Pratt Whitney engine is how many billion dollars over budget right now?

There is an advertisement that says it has $3.9 billion cost overruns. Can you put a number on what is the real number? What is the real number of the cost overrun on the engine?

Admiral VENLET. The contract for the F135 has a scope that includes the integration into the aircraft that is not on the F136. So, the size of the scope of work for the two contracts is so different.

There was a reference to adding more money to that contract. We have talked about the Technical Baseline Review, that looked at the work to go, sir, and the additional flights from 5,500 in the old plan, the 7,700 in the new plan—5,800 to—it is an 1,800-flight increase.

There was a need to buy more spares to support that extension. So, it was not related to a deficiency in the F135 as much a preponderance of that money is to support the extension in the flight test. We were going to fly 12 aircraft in test. We are now going to fly 18.

There was $470 or $480 million that the Technical Baseline Review assessed that was needed to address the integration of the STOVL issues that are not unique to the F135, sir. There is the lift-fan, drive shaft, clutch, roll-post heating. Addressing those technical issues, there are material solutions in hand.

So, the original F135 contract—I would go through my notes here, but I—it is currently projected with these cost additions to be about 8.2.

So, I haven't got the beginning portion in my head to give you a good delta in that growth, sir.

Mr. CRITZ. So, cost additions are $8.2 billion?

Admiral VENLET. No, that is the total of the entire contract——

Mr. CRITZ. The entire, right, right.

Admiral VENLET [continuing]. From the beginning of 2002 to the——

Mr. CRITZ. And to separate out if the engine—now, you said you went from 5,500—5,800 to 7,700. What drove that additional flight?

Admiral VENLET. It was not engine-related, uniquely, sir. It was the entire scope of the program.

There were four characteristics of the growth in the test. The planned work was judged to be underestimated in cost and schedule. There was work that was not in the test program that was necessary to address risks that we saw.

There was the schedule extension that needed to just pay for the more time of flight test and the people involved. And then, there was no reserve.

So, those are the four characteristics that go in. And that is across the entire scope of work, aircraft and engine, sir.

Mr. CRITZ. Mr. Sullivan, you wanted to say something?

Mr. SULLIVAN. Yes, sir. I think the original contract, the development contract, began at $4.8 billion. And it is now $8.2 billion, so it is a $3.4 billion increase.

Mr. CRITZ. But that is systemwide. That is not just the engine.

Mr. SULLIVAN. That is the engine.

Mr. CRITZ. That is the engine.

Mr. SULLIVAN. Yes.

Mr. CRITZ. Oh, so there is a $3.4 billion—oh.

Well, the reason I bring it up is that, you know, we had a presidential helicopter that got cancelled, because it was around $3 billion spent, and nothing to show for it. Then we just had an EFV program that was cancelled, that was around $3 billion.

And, you know, we are at this magic number here, $3.4 billion creep. You know, obviously, that seems to be a magic number on your side of the equation as to when we have got problems.

Of course, we have issues with it, too, when it grows exponentially like that, especially when we are told there is not enough money in the budget to fund an alternate engine, but we have got a $3.4 billion increase in the engine that we are buying.

One other question, and I do not have much time left. But I saw where there was about $1 billion cost increase in development, and $600 million was for extra flight test engines. I am trying to figure this out.

There were 15 test planes. And then I imagine you buy a couple extra engines, just in case. And I am curious why you have to buy more.

Admiral VENLET. The test program did not have spare engines in it. It did not have enough spare components and support to carry it through. That was one of the areas that was judged underestimated and underresourced. So, it was putting the realism back in the work to go, sir.

Mr. CRITZ. All right. Thank you, and I yield back.

Thank you, Mr. Chairman.

Mr. BARTLETT. Thank you.

Mr. Shuster was previously yielded Mr. LoBiondo's time. And now he is in the queue for his own time. After that, we move to those who arrived at the committee after gavel fall.

Mr. Shuster.

Mr. SHUSTER. Thank you very much, Mr. Chairman.

I just, for the record, want to know, as Dr. Fleming stated, I have no manufacturing facilities for this aircraft in my district. What I care about is that we are doing what is right for this Nation.

And the other thing Dr. Fleming said is, the argument is not one engine versus two engines saves money. It is two engines we believe is going to be neutral.

But it is going to give us, I think as Mr. Sullivan said, as we learned from the F–16 and F–15, financially, it will improve the response—the response of the supplier to the Department of Defense is increased, and the reliability, the quality got better.

So, that is what I care about, making sure we are doing—making the right choice. Because, Mr. Van Buren, you and I, 25 years from now, are probably going to be long gone from public service. And the Nation is going to have to live with what we do with this F–35, being that it is 95 percent of our—it will be 95 percent of the fighter fleet.

So, I hope we get it right. And I hope, if I am up here today talking about this, I hope I am wrong, and I hope you are right if we go with one engine, because the Nation will be at risk.

But just as we go through this, we talk about cost overruns and the schedule slipping. As Mr. Critz pointed out, $3 billion, and it seems to be the magic number. It is in baseball, too. Three strikes and you are out.

So, you know, this is too important. And I know that when we develop new systems, that that often happens, unfortunately. But we need to make sure we do what is right for this Nation.

And Mr. Sullivan, a question to you is, has the program been receptive to your advice in the past? When you have come to them and laid it out to them what you think, have they been receptive to it? Have they stiff-armed you? What has been their reaction?

Mr. SULLIVAN. Well, we, you know, we maintain an auditor, or a program relationship, which I think is good. But we make recommendations. We typically make recommendations, make them available to the program and the Department. And they weigh those and either concur with our recommendations or non-concur.

And I would say, on this program, it has mostly been non-concur.

Mr. SHUSTER. Right. That is unfortunate to hear.

And again, if you would, just so I make sure I am completely straight on the record, the F–15 and the F–16, your testimony today was that it was—that it was financially positive, that the supplier was much more responsive to the military?

Mr. SULLIVAN. The studies that we looked at—and they were mostly Air Force and industry studies—showed that there was much more—responsiveness went way up. Reliability went up. Quality went up.

And the financial aspects of that, we looked at the first 4 years of competition to get the percentage savings that we saw. So, we did not have the entire lifecycle of the engines. But it was dramatic.

Mr. SHUSTER. And your general experience in these situations, when you have competition, do you typically see financially the cost has not necessarily stayed down, but it does not grow as quickly, you get the responsiveness and you get the reliability? Is that typi-

cally your response when—or typically what you have seen when——

Mr. SULLIVAN. I think that is what competition is all about. And in fact, the Department recently has tried to make it more of a policy to infuse more competition into these programs.

Mr. SHUSTER. Right. And what would you say going forward? What would you recommend to the Department of Defense on the Joint Strike Fighter program to see that past mistakes have not been made? What recommendations would you put forward to them?

Mr. SULLIVAN. Well, right now, what we believe needs to be done is that we think the restructure was a really good, comprehensive restructure. But they need to continue to maintain very close oversight. We think that software management is something that they need to pay very close attention.

We think that they should consider, with the problems that the STOVL aircraft is having, I think the Department would be good to try to manage that. You know, we have thought about perhaps separating that out from the program, so that the other two variants can get busy and get testing done.

Mr. SHUSTER. Right.

Mr. SULLIVAN. And, you know, the funding on this program is going to be critical for the Department and for the Congress; $11 billion on average over the next 20 years. We believe that that should be very closely monitored and limited.

Mr. SHUSTER. Right. All right.

Well, thank you all. Thank you all for your testimony.

And again, I just would say in closing that I hope we are making the right decision. I think it is a short-term decision for a long-term system, that we desperately need to make sure it is right.

So, again, thank you very much.

Mr. BARTLETT. Thank you very much.

Mr. Garamendi.

Mr. GARAMENDI. I thank you, Mr. Chairman.

I noticed that a lot of the discussion on the new strike fighter, but also a lot of testimony on the existing equipment that we are using. And the structural integrity of the A–10, F–15, F–16 and F–22 has been in question and, apparently, to be dealt with.

As I was reading that, I was reminded of an incident several decades ago in which a piece of equipment on my family's ranch needed to be repaired. And an old blacksmith was working on it, and he was beating the heck out of that piece of steel with a ball-peen hammer.

About a few decades, several decades later, I ran into a laser peening operation in coming out of Lawrence Livermore Laboratories and now out in the public, which is apparently beating the heck out of a piece of F–22 equipment, and strengthening it.

That is what the blacksmith said. He said, why are you doing that? And he said, because it makes it stronger.

And apparently, laser peening does the same thing, and has been proven to be successful on the F–22. And the aircraft structural integrity program has found it so.

So, my question to all of the generals behind you, as well as those of you at the table is: Are you considering using the laser

peening process when you go about the repair or the maintenance or the strengthening of certain structural materials on the various jets that you are operating? For example, Admiral, tailhooks, where I understand it is able to increase the viability of a tailhook by two-and-a-half times.

General.

Or Admiral, and Mr. Van Buren.

Mr. VAN BUREN. Congressman, I would like to take that for the record. I am unfamiliar with that. Perhaps some of the generals in the second panel might be, but we will take that for the record on the first panel.

[The information referred to can be found in the Appendix on page 149.]

Mr. GARAMENDI. Well, now you know why I asked you, because I figured you did not know about it.

Admiral.

Admiral VENLET. I would say that I do have confidence, though, that the most modern methods of repair and improvement are certainly going to be taken advantage of. But I am also not familiar with laser peening specifically.

Mr. GARAMENDI. And I suspect most of the men and women behind you are also not familiar.

Admiral VENLET. But that does not mean—the industry team that we have and the technical experts in our government systems commands might very well know about it, sir. I just might not, so I could get back to you.

Mr. GARAMENDI. Now you know why I raised the question.

My next question goes to Mr. Sullivan. Could you tell me the three most important things that can be done to hold down the cost of the equipment that is being purchased by the military? One, two, three.

Mr. SULLIVAN. Define requirements a lot better at the beginning of the program. Take enough time early in the program to ensure that you have a stable design for the full-up weapon system through prototyping and good systems engineering knowledge.

And limit the development time to a reasonable kind of a horizon that people can actually think about where you are getting added value capability to the field, but you are not putting yourself in a position where you are trying to invent and do trial-and-error on the fly—incremental, knowledge-based acquisition.

Mr. GARAMENDI. Are we doing those three things?

Mr. SULLIVAN. You know, the Department and, in fact, the Congress a couple of years ago passed a bunch of acquisition reform. The Department has embraced it in its policies. I think there are people within the government—I think this program is beginning to think along those lines, but there is a long way to go.

I do not know that I could name more than two or three programs that I have seen that seem to be doing things in that reasonable fashion. It really does all begin with setting requirements properly.

Mr. GARAMENDI. What does it take to force the Department of Defense to do those three things? Another law? Apparently, that did not work.

Mr. SULLIVAN. That is a very good question, sir. You know, I have been doing this for 25 years, and there are an awful lot of stakeholders involved in the building of weapon systems. And it can be a very complex proposition.

But I do not know that laws necessarily—we pass laws, we pass legislation. I think at some point, it is a matter of getting serious with the taxpayers' dollars.

Mr. GARAMENDI. Which is our responsibility.

Mr. SULLIVAN. That is all of our responsibilities—mine, the rest of the people on the panel——

Mr. GARAMENDI. I was specifically referring to this committee.

Mr. SULLIVAN. Yes.

Mr. GARAMENDI. When we say that it is not, I suppose we should pull the plug.

Mr. SULLIVAN. It does not happen very often, and it might—and decisions, tough decisions like that might make a difference in changing the culture, yes.

Mr. GARAMENDI. Thank you.

Mr. BARTLETT. Thank you.

Mr. Wilson, and then Mr. Turner.

Mr. WILSON. Thank you, Mr. Chairman. And thank all of you for being here today.

And I am particularly interested in the F–35s, the F–35Bs. I am very grateful that I know how important they are and to our national security. And I represent communities that are very supportive of their being placed; for example, the Beaufort Marine Corps Air Station, and also, McEntire Joint Air Base near Columbia.

And in fact, I just met with the mayor of Columbia, a new mayor, Steve Benjamin, and long-time city councilwoman, Tameika Isaac Devine. And we were talking about that we have got the right climate.

It is a meteorological climate, so that people can train almost 365 days of the year. And then, it is a climate where there are warm, supportive people. So, keep that in mind as you think of Beaufort and Columbia.

I am concerned, Mr. Van Buren. On January the 6th, the Secretary of Defense stated he was placing the F–35Bs on a 2-year probation. It is my understanding that, over this entire year, the last 70 days, that the training, the test flights have been really very, very positive.

The Commandant has stated, if this continues, he would like to see the probation status lifted and the normal procurement numbers restored as soon as possible.

And so, my first question is: What criteria was established to measure its progress, and what is expected during the probation period?

Mr. VAN BUREN. Well, I will let the Admiral get into a little bit more detail. But at a top level, Congressman, I would say that it is stability of the design that is not impacted by further discovery, and flight test sortie generations, flight test rates, is usually reliability, both in the vehicle overall, as well as the propulsion system.

Mr. WILSON. And Admiral? Yes.

Admiral VENLET. Yes, the test program is structured to go at full pace either with or without probation. It did not affect the test program; it affected the procurement profiles. But to inform the Department, the focus on STOVL unique characteristics, sir.

So, we are sharing with the Commandant and Department leadership that each of the technical issues in view right now, which are preponderantly integration-related to the STOVL characteristics of the airplane to land vertically and short take-off. We believe we have engineering solutions to everything in view today.

We are focusing on its weight, its key performance parameter of its vertical lift bring-back. Every pound of weight is, you know, needs to be offset by thrust. They all line up in the same axis, so weight is very critical, and we are focusing on weight.

We are focusing how it will perform around the ship—we expect to get there this fall—both how it operates around the ship and how it appears it will be able to be supported around the ship, as well.

And then, its ability to work through these issues, and then be judged by the systems command to be worthy of an airworthiness flight clearance, to be flown by the fleet in an unmonitored sense.

Those will be the characteristics in progress we will be closely helping the Commandant keep track of.

Mr. WILSON. And I cannot wait for the American people to see the STOVL capability and what that means in projecting our military's ability to save lives and make a difference.

Mr. Van Buren, who will make the decision to remove the F–35Bs from the probation, or take other actions?

Mr. VAN BUREN. I think it will be recommendations coming from Admiral Venlet, through me to Dr. Carter, the Under Secretary, and ultimately the Secretary of Defense.

Mr. WILSON. And again, I just want to thank all of you for your service.

But we are really looking forward. And the communities I represent, they love the sound of freedom. And I cannot imagine anything more meaningful to the people I represent than F–35Bs.

Thank you, Mr. Chairman.

Mr. BARTLETT. Thank you.

Mr. Turner.

Mr. TURNER. Thank you, Mr. Chairman.

Gentlemen, I want to return to the issue of the alternate engine. I know there has been some discussion. I know many times people raise the issue of having an alternate engine as being one of budgetary concerns.

I fall on the side of being concerned of not having an alternate engine, that if we go to a single source, we could have both problems with price escalation. If there are problems that develop with the engine, you could have, certainly, devastating consequences to a fleet that has a single source.

And when you look at the analyses that have occurred that indicate that, you know, the Joint Strike Fighter will ultimately comprise 95 percent of our fighter attack force structure, I think you can become concerned about our vulnerability.

But one of the concerns that I have is the manner in which we discuss this issue. Since it is a financial issue, we talk about it in

terms of comparison. And when we talk about the 135 engine, the Pratt Whitney engine, people cast that discussion in terms of cost efficiencies in production.

Admiral Mullen said you get savings by production levels. He says, I think with the kind of production levels we will talk about, that we are talking about, that they will come down—meaning the cost amounts will come down.

Mr. Van Buren, I understand that you had stated in this hearing that you are confident that the prices would not be increased.

One of the concerns that I have when we have this discussion is the difference between what is opinion, what is judgment and what is fact upon which we can rely. When we talk about the people who come before us, and even the people who sit in our seats, these are decisions that will long last us as we look to what the effects are.

So, I raise my inquiry to the issues of, to what extent is it legally binding that these cost reductions will occur? Are they projections that people are saying of savings and production levels?

When we go to one and we talk about confidence levels that prices will not be raised, is there currently—currently—any legally binding way in which it can be enforced that we get those cost savings? Or is this something that we are figuring and projecting? Because I think it does figure into our overall discussion.

Mr. Van Buren, would you like to start?

Mr. VAN BUREN. Surely. What we know in the way of fact is a fixed-price contract that we have with Pratt for LRIP 4. What we know is that there is substantial cost that will be required to continue the F136 development.

So, our plan is to continue that cost reduction on the F135 on a fixed-price type basis——

Mr. TURNER. But excuse me. You said—but your fixed-price contract, does it currently have a price reduction provision?

I mean, does it say, if you do not have 136, that your costs are a different amount?

Mr. VAN BUREN. No. It is simply a contract with the manufacturer on a fixed-price incentive fee type basis for the quantity that we are procuring in LRIP 4.

Mr. TURNER. And so, it already figures in what Admiral Mullen is saying that he believes they are going to be production savings and what you say are going to be confident of no cost increases, and that these cost reductions will be delivered.

Mr. VAN BUREN. There is a ceiling or a cap on the price that the government would pay for those engines.

Mr. TURNER. Does that contract currently require the cost savings that we have heard as a result of the increased production that is expected? Or will it have to be continually—will it have to be renegotiated?

I mean, my understanding, my expectation is that there is going to have to be additional negotiation and documents that occur, that your current primary, underlying document does not take into consideration the full timeline of production or the increases in production, and deliver the cost savings that are projected, or that you are expecting.

Is that correct? Or does your current document deliver those cost savings?

Mr. VAN BUREN. This contract is simply for the production quantity for the fiscal year 2010 procurement of engines.

Mr. TURNER. That is what I thought. So, when we talk about what the cost comparison is going to be, and the budget effects for future years, we are talking about projections and expectations, not things that are absolute as we go forward with these cost comparisons. Am I accurate in characterizing it that way?

Mr. VAN BUREN. Well, what is absolute would be the nonrecurring investment to fund a second engine. That is a known fact.

Mr. TURNER. The cost per engine, though, is not known. Correct? I mean, you cannot tell me for every year what it is going to be. It is an expectation.

Mr. VAN BUREN. Well, as I mentioned in my——

Mr. TURNER. The cost, it is a projection. Is that correct?

Mr. VAN BUREN. As I mentioned in my opening statement, the challenge for us, our responsibility, our commitment to the taxpayer and to all of you, is to have to work very diligently on the cost reduction for this program—not just with the engine, but also with the airframe.

Mr. TURNER. But which is yet to be done. My other portion of the point on this is for the issue of the cost for the 136. There are, of course, a significant number who have an opinion that, in the long run, those will actually be cost savings.

But I appreciate your distinctions here and your explanation.

Thank you, Mr. Chairman.

Mr. BARTLETT. Thank you.

In the interest of full disclosure, I would like to note that, to the best of my knowledge, the only interest in my district relative to the engine is the 135, the prime engine. I think that they will do a better job if there is a 136.

Some of my questions have been asked, not all of them. But I will submit most of them for the record. I would just like to ask two questions now.

Mr. Van Buren, wearing your OSD [Office of the Secretary of Defense] hat, Secretary Carter indicated last September that dual-source procurement for the littoral combat ship would not be "real competition."

By December of 2010, Secretary Carter reversed his position, because of the lower-than-expected ship price—this is what competition does, gentlemen—bid and endorsed dual-source procurement for the LCS [littoral combat ship].

In justifying this reversal and stating dual-source procurement of LCS is different than dual-source procurement of the F–35 engines, the Pentagon has indicated LCS is different, because all of the development costs of the LCS have been expended.

But this year's budget request for development costs for LCS is $1.9 billion—$785 million higher than last year.

Can you explain this contradiction to the Pentagon's statement and explain why the LCS acquisition model does not apply to F–35 engines?

Mr. VAN BUREN. Mr. Chairman, I am not equipped to discuss the LCS. That is not in an area of the Air Force's portfolio. So, I would

like to take that for the record and have the Department get back to you on that issue.

[The information referred to can be found in the Appendix on page 149.]

Mr. BARTLETT. Admiral.

Admiral VENLET. Sir, LCS strategy is beyond the vein of my awareness or ability to speak to. I am sorry.

Mr. BARTLETT. Mr. Sullivan.

Mr. SULLIVAN. I think I am in the same boat, your honor. I would not be able to speak intelligently to compare those two different acquisitions.

Mr. BARTLETT. To whom should we address this question, so that we can get an answer? If we ask this question for the record, will somebody answer the question for us?

Mr. VAN BUREN. Well, Secretary Stackley, the acquisition executive of the Navy, reporting up through Dr. Carter, are the most knowledgeable of this topic.

Mr. BARTLETT. Are any of you in that chain of command?

Mr. VAN BUREN. No.

Mr. BARTLETT. No? Is anybody in the second panel in that chain of command?

Mr. VAN BUREN. I will have to——

Mr. BARTLETT. I see a hand raised behind you. Okay, we will ask that question again in the second panel. And if you cannot answer it, sir, we hope you will go up the chain of command and get us an answer for the record.

Okay, my second question. In your statement—this is Admiral Venlet—in your statement, you indicated a fixed-price contract has been signed with the contractor for $3.9 billion for 32 aircraft for fiscal year 2010. The amount appropriated for this—2010 was over $11 billion.

Given the yet-to-be-determined contract amount for the F–35 engine, because the fiscal year 2010 contract has yet to be signed, how much of the total fiscal year 2010 appropriation is still subject to cost-plus determination?

Admiral VENLET. Yes, sir. We contract on each year's procurement fixed-price incentive for the aircraft, and we contract for the sustainment portion where we buy simulators, support equipment and sustainment activity at cost-plus, since we are still early in.

So, the math—the difference between—you cited a budget number and an aircraft fixed-price engine contract number in the different—in the space between those two, there is a portion for cost-plus sustainment activity on the contract. But there are other costs in there, as well. So, I do not have that split out, sir.

But there is a sustainment that is cost-plus, and it will be on the next couple of years' contract.

Mr. BARTLETT. We have eight or so foreign countries that are interested in buying this plane. I know that some of them—I do not know how many of them—are distressed that there may be only one engine.

To your knowledge, are any of these sales at risk, if we do not have a second engine?

Because if they are, then that simply drives up the cost of our planes, because we have got to spread the development costs across

the universe of planes that are sold. If fewer are sold, ours cost more.

Wouldn't just some minimal drop in foreign sales way offset any potential savings that you hope to achieve by this short-term not supporting the second engine?

Mr. VAN BUREN. Mr. Chairman, I talk to many of the partner nations regularly. I know of no risk based on the engine issue.

Mr. BARTLETT. I talked to one of them, and they were considerably concerned—I don't know if concerned to the point that they are not going to buy. And as the price goes up, we risk that some of them will not buy.

And if they are concerned about a second engine, it would not take very many planes not sold to increase our cost, to wipe out any miniscule savings that you could achieve by not funding the second engine currently.

I have one other question. We have a vote on, so we will recess very shortly, and then we will come back and seat the second panel.

Ultimately, 95 percent of all of our fighter aircraft in all of our Services, we hope to be this airplane.

What percent of the fighter aircraft of our allies will be this plane? Do you have any knowledge of that?

I do not know whether it will be big or small. But whatever number it is, I think it indicates a real risk.

Should there be problems with the engine—there are occasionally problems with engines, and we have to ground the fleet that uses that engine. So far, that has not been a problem, because we have not had 95 percent of our fleet the same airplane. So, if one plane is down because of engine troubles, we have several other airplanes. That will not be the case in the future.

Not only will a second engine provide competition and drive the cost down and the quality up, but shouldn't we also have the second engine in some of our planes, so that we will not be at risk of having only 5 percent of our planes available in an emergency, should there be an engine problem?

Mr. VAN BUREN. Mr. Chairman, you asked about the partner nations. I would like to take that for the record.

I think it widely varies from country to country. For some countries, JSF is a very high percentage of their future force structure; for others, not as much.

So, I would like to take that for the record.

[The information referred to can be found in the Appendix on page 149.]

Mr. BARTLETT. So, it is not only us who would have 95 percent of our planes grounded, but a significant percentage of the fighter aircraft, and our allies would also be grounded. Correct?

That does not give you some pause that we might be in a situation where we desperately need fighter aircraft, and neither we nor our allies have very many?

Mr. VAN BUREN. Mr. Chairman, I think it is an issue of risk. And I think the opinion of the Department right now is that the engine is performing very well. It is in a very mature state, and the risk is very low.

Mr. BARTLETT. Those are very qualitative terms, sir. The slippage in the increased cost would indicate that some would not concur with those terms.

Well, I am just having trouble understanding how it is in our long-term best interest to save a few dollars now, and put ourselves at risk for the future of having increased cost and a lesser quality of engine.

Competition always makes things better and cheaper. And having only one engine, so that if that is grounded, essentially our whole fleet is grounded for all of our Services—and a major part of the fleet for all of our allies.

I would hope that would give you considerable pause as we look to the future. And I think that this short-term expediency of saving a few billion dollars now, that we will pay dearly for that in the future.

Thank you all very much for your testimony. We will recess now for votes, and we will return so quickly as we can.

Thank you.

[Recess.]

Mr. BARTLETT. Admiral Skinner, please proceed with your opening remarks, followed by General Robling, Admiral Floyd, General Shackelford and General Carlisle.

STATEMENT OF VADM W. MARK SKINNER, USN, PRINCIPAL MILITARY DEPUTY TO THE ASSISTANT SECRETARY OF THE NAVY (RESEARCH, DEVELOPMENT, AND ACQUISITION), U.S. NAVY; LT. GEN. TERRY G. ROBLING, USMC, DEPUTY COMMANDANT OF THE MARINE CORPS FOR AVIATION, U.S. MARINE CORPS; AND RADM KENNETH E. FLOYD, USN, DIRECTOR OF THE AIR WARFARE DIVISION, U.S. NAVY

Admiral SKINNER. Chairman Bartlett and Ranking Member Reyes, distinguished members of the subcommittee, it is our honor to appear before you today to discuss the Department of the Navy's aviation procurement programs.

Testifying alongside me today are Lieutenant General Terry Robling, Deputy Commandant for Marine Corps Aviation; and Rear Admiral Kenneth Floyd, the Navy's Director of Air Warfare.

We note the absence of Representative Gabby Giffords, and send her and our shipmate, Mark, our best.

With the permission of the committee, I propose to keep our oral remarks brief and submit our combined statement for the record. That includes the specific questions requested by the subcommittee.

Mr. BARTLETT. Without objection.

Admiral SKINNER. The Department of the Navy's fiscal year 2012 aviation budget request provides Navy and Marine Corps aviation forces capable of meeting the wide spectrum of threats to our Nation, both today and in the future.

This year, the Department of the Navy will procure 137 fixed wing aircraft, 66 rotary wing aircraft and 20 unmanned air vehicles, for a total of 223 aircraft.

In the past year, we deployed the EA–18G in an expeditionary role to Iraq; the E–2D successfully completed an operational assessment; our MV–22 fleet reached 100,000 flight hours; the AH–

1 Zulu successfully completed operational test and entered full-rate production; and the CH–53K completed its critical design review.

And with the leadership of Congress, we signed a multiyear procurement contract for the F/A–18 and EA–18G, which saved the taxpayers $605 million, and we are moving forward on the next MH–60 multiyear procurement.

The Department of the Navy has emerged more confident that the essential F–35 Joint Strike Fighter program has been positioned for success.

Taking into account the restructuring of the program approved by Secretary Gates last December, we reviewed our tactical aircraft inventory projections and initiated strong steps to mitigate the strike fighter shortfall to the operational commanders by increasing F/A–18E/F procurement quantity by 41 aircraft, and including funds to extend the life of 150 legacy Hornets.

By doing this, we anticipate a manageable shortfall of approximately 65 aircraft that peaks in fiscal year 2018.

We are integrating Dr. Carter's Better Buying Power initiatives, and are implementing "should cost" parameters into our programs early, where it can make the most difference, such as with the E–2D.

We are changing our approach to contract types and structures, to ensure that we get the most product for the warfighter. We are targeting affordability, both in procurement and sustainment.

It is our privilege to testify before you today, and we look forward to answering your questions.

[The joint prepared statement of Admiral Skinner, General Robling, and Admiral Floyd can be found in the Appendix on page 91.]

Mr. BARTLETT. Do I understand that you have made a combined statement for all of the group?

Admiral SKINNER. Yes, sir.

Mr. BARTLETT. Thank you very much.

Mr. Reyes.

Oh, is there another to testify? It was not clear to me for how many you were speaking, sir.

Who wishes to testify?

Admiral SKINNER. General Robling and——

Mr. BARTLETT. Oh, thank you. Okay, go ahead, sir.

STATEMENT OF LT. GEN. MARK D. SHACKELFORD, USAF, MILITARY DEPUTY, OFFICE OF THE ASSISTANT SECRETARY OF THE AIR FORCE FOR ACQUISITION, U.S. AIR FORCE; AND LT. GEN. HERBERT J. CARLISLE, USAF, DEPUTY CHIEF OF STAFF FOR OPERATIONS, PLANS AND REQUIREMENTS, U.S. AIR FORCE

General SHACKELFORD. Chairman Bartlett, Ranking Member Reyes, distinguished members of the subcommittee, thank you for calling this hearing and for the opportunity to provide you with an update on the Air Force's tactical aviation programs.

I am joined this afternoon by Lieutenant General "Hawk" Carlisle, the Deputy Chief of Staff for Operations, Plans and Requirements.

We acknowledge Congresswoman Giffords' absence this afternoon, and wish her a speedy recovery.

Today, the Air Force is fully engaged in operations across the globe, engaged in overseas contingency operations and providing support to the combatant commanders to enable them to successfully execute their missions.

In the coming year, we will assess how the fiscal year 2012 budget aligns with our standing operational requirements, along with the upcoming needs of the entire Air Force.

We understand your focus today is on the Air Force investment plans to ensure that conventional strike, air superiority and rotary wing capabilities are adequate for executing the national military strategy with an acceptable level of risk.

Our rapidly aging aircraft fleet drives our urgent need to balance between acquiring new inventory with sustaining our current fleet.

We look forward to discussing how we can match the requirements with available resources in order to execute the national military strategy.

Lieutenant General Carlisle and I thank the subcommittee for allowing us to appear before you today, and for your continued support of the Air Force. I will request our combined written statement be submitted for the record. We look forward to your questions.

[The joint prepared statement of General Shackelford and General Carlisle can be found in the Appendix on page 123.]

Mr. BARTLETT. Thank you.

Without objection, all of the written statements will be in the record in full.

Thank you very much for your testimony.

Now, Mr. Reyes.

Mr. REYES. Thank you, Mr. Chairman.

And, gentlemen, thank you for being here with us and for your service, and most of all for your gracious comments about Congresswoman Giffords. We really appreciate that. And I know it really makes a difference to her staff and family members, as well. So, thank you. Thank you very much for that.

I have a question for General Carlisle, General Robling and Admiral Floyd. The committee has been told many times that the F–35 is a must-have weapon system for the future.

I guess the most basic question is: Why is that the case? What about the F—what about the F–35, I guess, do we have in order to succeed in the future? What is it about the F–35?

What specific threats are we most concerned about? And how does the F–35 counter those threats?

And the third one is: How does the F–35, which is a relatively short-range fighter, fit into DOD's overall need for the longer range systems to operate in regions such as the Pacific?

In whatever order you wish to take that.

General CARLISLE. Thank you, Congressman Reyes. I will start, if that is okay.

Clearly, the Air Force believes that the move to a fifth-generation capability is paramount as we move into the future. And that is to be able to operate aircraft and have freedom of action across the

range of operations, military operations that would be required of us.

We know that our adversaries, or potential adversaries out there, are continuing to develop and field anti-access/area denial capability, and that fifth-generation ability to penetrate those areas and still maintain freedom of maneuver and, if required, to hold targets at risk in an anti—or an area denial type environment. So, that is really the reason that we see it.

And we see that those systems are proliferating throughout the world, and they are continuing—as very recently, the J–20 rollouts.

You look at the short-range and medium-range ballistic missiles, surface-to-air capability and an integrated air and missile defense capability from our adversaries, we have to have that fifth generation to be able to maintain freedom of action in those environments.

With respect to the legs, obviously, very much refueling aircraft and the ability to get it close and then refuel in and out. Also, certainly in the case of the Air Force.

The announcement by the Secretary of Defense of the new long-range strike family of systems, which is a family of systems which includes communications, electronic attack, long-range weapons, as well as a long-range penetrating bomber—all aid our ability to penetrate airspace and to go deep, if required, sir.

Mr. REYES. And the specific threats and how the F–35 is unique in that respect to counter them?

General CARLISLE. Sir, I think that unique—would probably be the adversary's advanced integrated air defense systems, SA–20s and SAN–20s, HQ–9s, in particular, as well as the denial capabilities, with respect to anti-satellite capabilities to deny access, as well as trying to keep surface combatants away from using anti-ship missiles, would be the three that would be the most prominent, sir.

Mr. REYES. Anybody else?

General ROBLING. Sir, I will just add, one of the things you asked in addition was, what makes the F–35 a must-have?

I would say, over legacy aircraft right now, even at Block 2B and eventually Block 3, but even starting at Block B, what you get out of the F–35 that you do not get out of legacy aircraft is this very powerful, integrated sensor suite that is really designed to—you know, centered around the digital aperture system.

You get fused information displays. You get better joint operability for data transmission and communications. You get increased capability with your precision weapons, particularly JDAM [Joint Direct Attack Munition] and AMRAAM [advanced medium range air-to-air missile]-type missiles.

And all of that combined gives you an aircraft, really, that is much more survivable, much more lethal and less dependent on support aircraft, tanker aircraft and electronic attack aircraft.

Mr. REYES. I will yield back.

I do have some additional questions, Mr. Chairman, but I will submit those for the record.

Thank you, gentlemen.

Mr. BARTLETT. Thank you.

Mr. LoBiondo.

Mr. LOBIONDO. Thank you, Mr. Chairman.

And thank you to our panelists for being here today and for your service to our Nation.

I have got two questions I would like to ask. First, we have read a lot about the future of the Air Force's fighter fleet. But I want to focus on a very specific portion of it right now.

Due to the current Air Force recapitalization crisis, the fiscal year 2012 budget request adds only about $15 million to the design and development of structural and capability modifications for the F–16 Block 40, 42, 50 and 52 fleet.

However, I believe a majority of the F–16s in the Air Guard fleet are flying Block 30s, which also includes the 177th Fighter Wing, which I represent. These aircraft are not in your current plan for service life extension program.

My question is: How do you plan to maintain the air sovereignty alert mission if these planes cannot fly, if you do not provide the same modifications to the aircraft at our National Guard wings? I think this is confusing and sends a very bad message.

And the second question I have is that I have been surprised by the reports that the Air Force is considering a sole-source approach to buying helicopters to replace its fleet of Hueys for the Common Vertical Lift Support Platform program.

I anticipate a competition would be a fair one; it would not favor any one particular company or solution. And it is puzzling to me why a decision has not been made to have this competitively bid.

Given that the mission is U.S.-only, non-combat, non-deployable, can we be assured that the Air Force is going to give consideration to affordable solutions in this time of budget crisis that are commercial, off-the-shelf, not in the current inventory?

I think it would be a shame to waste what could be up to billions-of-dollars buying something that is overkill, just for the convenience that it is already in the Pentagon inventory.

Whoever would choose to——

General CARLISLE. Thank you, Congressman. I will answer your first question, and my friend, Shack, will answer your second question, sir.

Mr. LOBIONDO. Okay.

General CARLISLE. The first one referenced the F–16s and the ASA [air sovereignty alert] alert. The Air Force fully funded the program for ASA alert, and clearly, that is our primary mission is homeland defense, and we are committed to that mission.

With respect to the service life extension and how we are going to maintain that fleet, the Block 30, the pre-blocks as we call them, Block 25, 30 and 32s, using structural sustainment using O&M [Operations and Maintenance] funding, those airplanes, our intent would be to fly those to the 8,000-hour limit of those airplanes, which brings those airplanes out into late in this decade and early in the 2020s.

We are going to do a service life extension program to include structure and capability modifications for Block 40s and 50s, the newest, most capable F–16s. And as F–35s start coming off the line, we will move those Block 40s and 50s, backfill in Block 25, 30 and 32 units.

So, the cascade of iron will be, as F–35s come in to both the Guard and the Active Duty, then we will take the newest F–16s that do have the SLEP [service life extension program] modernization and both the end capability improvements, and move those into the units that have the older aircraft, the Block 25s, 30s and 32s, sir.

Mr. LOBIONDO. Just a brief comment, if I could, that it just seems that without the modifications, if the F–35 continues to slip, these F–16 Block 30s are made more irrelevant and incapable of doing the mission. I would hope somebody would consider that.

And for the second part of the question, General?

General SHACKELFORD. Yes, sir. If I might just elaborate on that for a second. The SLEP for the Block 40s or 52s leads to a production kit buyout in the—just beyond this current FYDP.

That is prior to the time when the Block 30s—25, 30 and 32—are expected to time-out with their service life, which is between 2018 and 2021.

So, we still have time in the future, if we need to go back to those pre-blocks, to further modify them to pick that up. It is too early to be putting that into the budget right now.

Mr. LOBIONDO. Okay.

General SHACKELFORD. Now, regarding your question about Common Vertical Lift Support Platform, clearly, there are a number of vendors. We believe three or four different companies are able to produce the type of helicopter that we are looking for there. So, we have a wide range of options to choose from as we finalize the acquisition strategy.

I expect that to be a competitive acquisition strategy, so that we can take advantage of competition, and so that we can get the best arrangement that we can for the Air Force and the taxpayer.

Mr. LOBIONDO. Okay.

Thank you, General.

Thank you, Mr. Chairman.

Mr. BARTLETT. Mr. Shuster.

Mr. SHUSTER. Thank you very much, Mr. Chairman.

Thank you, gentlemen, for being here today.

My question, General Shackelford, on the Common Vertical Lift Support Platform, the CVLSP, my understanding is that the Air Force is considering—well, I guess in March, you are going to come out with requirements on acquisition, the strategy. And my understanding is that you are going to put out there a sole source for the Huey helicopter replacement.

Can you confirm or deny it, that that is going to happen, the sole-source contract?

General SHACKELFORD. If you mean by a sole-source contract selecting an existing helicopter in a sole-source situation, that is not correct as a strategy.

Mr. SHUSTER. Okay.

General SHACKELFORD. Per my just previous comment, there are three or four different vendors that are able to produce a helicopter to our requirement for Common Vertical Lift Support Platform. We have a range of options.

At one extreme end is going to a sole-source vendor for an existing capability, such as the H–60. That is not the direction we are

leaning towards. I expect we will go towards a competitive strategy, which will give all of those vendors an opportunity to compete.

Mr. SHUSTER. I am sorry. You said, for one of the platforms you will go to an existing——

General SHACKELFORD. No, sir.

Mr. SHUSTER. Okay.

General SHACKELFORD. No, sir——

Mr. SHUSTER. There's going to be competition?

General SHACKELFORD. It will be a competitive strategy, as I understand it.

Mr. SHUSTER. And you view there are at least four vendors out there that can meet the requirements.

General SHACKELFORD. There are three to four that can meet the requirement for CVLSP.

Mr. SHUSTER. Okay. That was my only question, so I yield back. Thank you very much.

Mr. BARTLETT. Thank you very much.

Admiral Skinner, let me ask the question of you that I asked of the previous panel. Can you explain the contradiction to the Pentagon statement and explain why the LCS acquisition model does not apply to the F–35 engine? If competition and two LCS ships—those are pretty small classes, sir, compared to the number of engines that we would be buying for these planes.

Can you explain why that is not a good model for F–35 engine procurement?

Admiral SKINNER. Thank you, Mr. Chairman, for the question. Secretary Mabus has stated that the littoral combat ship procurement, we funded the research and development for both variants of the littoral combat ship. And we also obtained the data packages for both of those variants.

We have funded the research and development for one variant of the F–35 engine, the F135. And the vast majority of the research and development for the other variant of the F–35 engine, the F136, is in front of us.

I have seen the business case analysis. And it seems to be compelling in that regard.

But those are the major differences between the procurement of the littoral combat ship and the current procurement of the F–35 fighter engine.

Mr. BARTLETT. Yes, but there is still a meaningful amount of development money to be expended yet in LCS, is there not?

Admiral SKINNER. Well, we have both LCS–1 and LCS–2 are currently afloat. LCS–1 has already made one appointment to Southern Command.

So, to my knowledge, we have committed to fully funding the research and development for both of those variants. And that was all part of our acquisition strategy, and the purchase of the design packages for both of those variants.

Mr. BARTLETT. Why do we still have more money in this year's budget for a development of the LCS than there was in last year's budget? Is this for the ship itself? Or is it for the mission packages?

Admiral SKINNER. We have money in the budget for procurement of the vessels themselves, and we are still developing the mission packages.

But Mr. Chairman, I can get you more information on that question, and take that question for the record and get back to you.

[The information referred to can be found in the Appendix on page 149.]

Mr. BARTLETT. Your budget request RDT&E [Research, Development, Test & Evaluation] continues through 2011, 2012, 2013 and 2014 in decreasing amounts, from $226 million, $183 million, $110 million, $82 million, and up a little to $87 million in fiscal year 2015.

I was very supportive of buying both of the LCS ships.

The competition did what they were supposed to do. Each of them believed that they had to be the low bidder, or they were not going to be in the game anymore. So, they really sharpened their pencils, and we got bids that were like $100 million less than we expected, unexpectedly low numbers.

I did not think we had enough sea trials with these ships to know which of those would be better for the multiple missions that we are buying these ships for. And so, I was very supportive of this dual buy.

And I am still wondering why this is not a good model for procurement of the F–35 engine.

Admiral Skinner, the Department has increased its emphasis on acquiring longer-range strike capabilities to address ever-increasing anti-access/area denial threat environments. These are obviously threat environments for the ships.

This was evident by the Navy's desire to field an Unmanned Carrier-Launched Airborne Surveillance and Strike system by 2018, and the Air Force's plans to acquire a new long-range penetrating bomber by mid-2020s.

I have a couple of questions and concerns relative to this. First of all, this recent emphasis on the need for longer-range strike systems changed the Department's thinking about its requirements—that is, the quantity, the mix, the fielding timeframes—for shorter-range fighter attack aircraft, such as the Joint Strike Fighter.

Admiral SKINNER. Mr. Chairman, the systems that you refer to as the unmanned are the UCLASS [Unmanned Carrier-Launched Airborne Surveillance and Strike] system, a surveillance and strike system that we are going to put on our aircraft carriers in the 2018 timeframe.

We have a two-part process in order to do that. We have a current demonstration, the Navy Unmanned Combat Aerial System demonstration, that we are performing to-date.

That system will operate off an aircraft carrier in the 2013 timeframe. What is unique about that is we will stop our carrier operations to get that unmanned air vehicle on and off our ships, and we will learn how to operate it from an arrested landing and a catapult launch and airspace means.

All the knowledge that we gain from operating that unmanned combat air system will be put into the UCLASS system, the surveillance and strike system that you mentioned. And that system will fly in an integrated fashion with our carrier air wings in the 2018 timeframe.

With regards to the requirements part of your question, I defer that part of the answer to Admiral Floyd.

Admiral FLOYD. Thank you, Mr. Chairman.

Regarding the requirements and whether there is anything specific ongoing right now in the manned aircraft realm, outside of our normal requirements review process every year, the answer to that would be no.

We are focused on the carrier air wing and the mix of Joint Strike Fighter and F/A–18 out into the future for our strike requirements.

Mr. BARTLETT. I understand that we are relooking at the mix of short-range and long-range attack platforms, because of some anti-access platforms that potential enemies have, such as the Chinese anti-ship missile, which means that we need to stand off a considerable distance that that weapon is available to them.

I have a question relative to the future. You are projecting the use of unmanned. That means you have not put a man at risk, if you are going into a hostile environment. And I think we need to move more in that direction.

But there are three capabilities that one needs to consider. One is our ability to be stealthy—and we are pretty good. But radars are getting better, and the air—or the ground-to-air defenses are getting better.

With whom do you counsel to determine which of these technologies will run faster? Will we be able to remain invisible to them with our stealth? Or will their radars run faster than stealth improvements, so that they can see us?

And what about these ground-to-air capabilities?

With whom do you counsel to determine which of these capabilities will run the faster? And, therefore, what kind of assets should we be developing for the future?

General CARLISLE. Well, Mr. Chairman, I will start with an answer on that.

I think that we look to all the agencies—obviously, DARPA [the Defense Advanced Research Projects Agency], NASIC [the National Air and Space Intelligence Center] with respect to adversary capabilities and how well they are—how fast they are developing their new systems—AFRL [the Air Force Research Laboratory], the research laboratory.

We look at the T.R. [Technology Readiness] level of different technologies, technology readiness levels of different technologies. And we look at where we are at, and what it has taken to get us to the position we are at with respect to our capabilities and our potential adversaries and where they are at, and what we assess to be their timeframe to get there.

But I think, at the core of this, Mr. Chairman, is our ability to integrate and operate jointly in a cross-domain capability. Whether it is space, cyber or subsurface, surface combatant, air combatants, it is our ability to operate in an integrated—beyond joint—an integrated fashion and use capabilities to exploit the adversary's weakness wherever that is, to deny him use of those systems that he has developed and put forth, so that we can achieve freedom of maneuver and gain access to hold targets at risk when we want to and when we need to.

Mr. BARTLETT. I asked that question of the new director of DARPA—you mentioned DARPA—Regina Dugan. I asked if they

had the capability to advise us on the projected improvement in technology, so that we would know whether we were developing an airplane that was just going to be cannon fodder for the future, or would we be able to penetrate their defenses.

She said, yes, they did that kind of thing. And as an example, she had with her an analysis they did of cyber, and the malware and the defense-ware that we are developing.

It was a startling picture. The lines of code for malware have not increased significantly over the years. But there has been an exponential increase in the lines of code that we find necessary to protect our computer systems.

If we cannot bend that curve, by-and-by, our computers will be consumed with protecting themselves, and they will not be able to do anything for us. And it is that kind of an analysis that I hope we are able to make for these technologies.

Clearly, radar will get better. Clearly, we will be able to do better with stealth. And clearly, there will be improvements in ground-to-air defensive capabilities.

And again, I want to make sure that we are getting the best counsel we have. And these are very long-range programs, you know. It is going to be a decade or more before anything is in the field when you start a program.

And when we get it in the field, is it already going to be obsolete, because the defenses against it have run faster than those developments? And you indicated that you counsel with DARPA for this kind of thing?

General CARLISLE. Yes, sir, we do. We take advantage of what they are looking at. And again, NASIC and the entire I.C., intelligence community, as well as the research labs—Livermore, Lawrence Livermore, AFRL—all the labs.

Mr. BARTLETT. Thank you very much. We have a number of questions that we need answers to for the record.

Let me turn to my colleague and ask him if he has additional questions?

Mr. REYES. Just for the record.

Mr. BARTLETT. Just for the record. He has questions for the record.

I have a number of questions. But rather than take your time here, we will just submit those questions for the record.

I want to thank you very much for your testimony.

I want to note that I have been to the floor 50 times, I think, exactly, to speak for an hour on energy. And if you watch C–SPAN, you will notice that they pan the floor. There is nobody out there.

But I need to know when I am at that microphone that there are somewhere between a million-and-a-half and two-and-a-half million people out there that are watching that. So, you are talking kind of to an invisible audience.

We are doing quite the same thing today. There are a lot of people out there watching. And this becomes a part of the permanent record, and a lot of people will be poring over it in the future.

So, thank you very much for your testimony. Thank you for the service to your country.

And we will adjourn this hearing.

[Whereupon, at 2:04 p.m., the subcommittee was adjourned.]

A P P E N D I X

MARCH 15, 2011

PREPARED STATEMENTS SUBMITTED FOR THE RECORD

MARCH 15, 2011

NOT FOR PUBLICATION UNTIL RELEASED BY
HOUSE ARMED SERVICES COMMITTEE
SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES
U.S. HOUSE OF REPRESENTATIVES

DEPARTMENT OF THE AIR FORCE
AND
DEPARTMENT OF THE NAVY

PRESENTATION TO THE
HOUSE ARMED SERVICES COMMITTEE
SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES
U.S. HOUSE OF REPRESENTATIVES

SUBJECT: Air Force Tactical Aviation Programs

COMBINED STATEMENT OF: Mr. David M. Van Buren
Air Force Service Acquisition Executive
Office of the Assistant Secretary of the Air Force
(Acquisition)

Vice Admiral David J. Venlet
Program Executive Officer for the F-35 Program

March 15, 2011

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HOUSE ARMED SERVICES COMMITTEE
SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES
U.S. HOUSE OF REPRESENTATIVES

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

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

The multi-role F-35 is the centerpiece of the Department of Defense's future precision attack capability. The JSF is designed to penetrate air defenses and deliver a wide range of precision munitions. This modern, fifth-generation aircraft brings the added benefit of increased allied interoperability and cost-sharing across Services and partner nations. It will also serve to fulfill our commitment to NATO's dual-capable aircraft mission. The FY12 budget includes $9.7 billion for continued system development, test and procurement of 32 F-35 aircraft. In January, the Secretary of Defense announced that the short take-off and vertical landing (STOVL) model has been placed on probation for two years, pending further successful development. The probation period limits the procurement to 6 F-35B aircraft in FY12 and FY13. This two

year period will provide additional time to resolve the engineering and technical challenges. At the end of the two year probation, Department leadership will make an informed decision on how to, and whether to proceed with STOVL.

International Partnership

The F-35 program continues to be the Department of Defense's largest cooperative program, with eight Partner countries participating under Memorandums of Understanding for System Development and Demonstration (SDD) and for Production, Sustainment and Follow-on Development. The eight partner countries include the United Kingdom, Italy, The Netherlands, Turkey, Canada, Australia, Denmark, and Norway. In October 2010, Israel signed a letter of agreement to purchase 19 F-35A variants for $2.75B, with deliveries scheduled to begin in 2015. Through FY 2010, the nine International Partners will have provided approximately $4.45 billion of their $4.9 billion commitment to the SDD phase of the program. The United States has commitments from our allies to purchase in excess of 500 F-35 aircraft. Additionally, studies are in progress to determine Foreign Military Sales possibilities for nations outside the partnership.

Program Status

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

35A static structural testing was completed five months ahead of schedule with no failures. The program rolled out the first Low Rate Initial Production (LRIP) F-35A and completed 410 total F-35 test flights in 2010. In addition, 2010 saw the successful negotiation of the first fixed price production contract which resulted in significant Department of Defense efficiencies (LRIP Lot 4). Finally, the first two F-35A production aircraft (AF-6 and AF-7) took their inaugural flights in the last few weeks at the Lockheed Martin Facility in Texas, and we anticipate delivery of this aircraft in the near term.

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

Program restructure

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

We believe the cost estimates for production and sustainment developed during the Nunn-McCurdy process are credible, but simply unacceptable in this fiscal environment. We continue to scrutinize the Joint Strike Fighter Program, in addition to all programs, in order to target affordability and control cost growth. The Department has already seen progress in controlling the cost through Should Cost methods, one of Dr. Carter's recent Better Buying Power initiatives. Should Cost estimates are allowing the Department to build the correct strategy and form the basis for contract negotiations and contract incentives.

Technical Baseline Review

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

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

development program.

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

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

The TBR drove several program changes to lower schedule risk associated with testing. The program has adjusted the flight test program to make temporary use of 6 LRIP aircraft in addition to the original 12 planned SDD airplanes, do now total18 aircraft for use in flight test. The flight science portion of flight test has decoupled the three variants so that they may all proceed at their best pace and not impact any of the others. However, the mission system avionics (radar, electro optical/infrared sensor, data links, Communication and Navigation) is common for all three variants and is not being decoupled. Development testing of the common mission system and flight sciences for CTOL and CV is now scheduled to complete in the first quarter of 2016. The flight science testing for STOVL extends into the last quarter of 2016.

Manufacturing Review Team

In 2010 the same team of experts that conducted the 2009 Independent Manufacturing Review Team (IMRT) assessment, now under the direction of the F-35 Program Executive Officer (PEO) and referred to as the Manufacturing Review Team (MRT), evaluated the contractor's plans and readiness to manufacture aircraft at the production rates outlined in the Department's program of record. The MRT concluded that the contractors could produce the programmed rates if certain process and planning improvements, identified previously in their 2009 IMRT report, continued as planned.

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

STOVL Durability Testing and Aircraft Changes

Concurrency is a major element of the strategic framework of the program. Calendar year 2011is an important year for progress. The program will be performing flight test, delivering its first production aircraft, and performing sustainment of those aircraft. To manage the effects of concurrency, and any schedule and cost impacts, there

is close attention and tracking of sources of change, and change integration to identify and close on overall program performance goals.

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

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

Software Development and Testing

The development of F-35 Mission Systems software, a component of the Air System Software, is proceeding according to a schedule adjusted as an outcome of the TBR. As a matter of fundamental process discipline, no new software blocks were created, no functionality was pushed to later blocks, and no capabilities were removed as a result of the TBR. The Mission Systems Block 1 software has demonstrated stable performance in flight test, and will be delivered with LRIP 1, 2 and 3 aircraft. We have demonstrated, in the initial Block 1 release to flight test, expected functionality of the primary sensors, including radar, electronic warfare, Electro-Optical Targeting System, Distributed Aperture Sensor, and Integrated Communications, Navigation, and Identification. Block 1 maturation will continue through 2011, with an update this fall to include Multi-Level Security capability. Block 2 software, planned for delivery in LRIP 4 and 5 aircraft, introduces multi-ship network functionality, with the first release to flight test planned at the end of 2011. Block 3 software, having just completed requirements review, will complete the SDD development stream and provide full Operational Requirements Document (ORD) compliant capabilities. Final Block 3 software is planned to deliver to flight test in 2015, to allow completion of the mission system development in the first quarter of calendar 2016.

Engine Development Programs

Pratt and Whitney F135 engines have completed a total of 12,168 hours of testing on ground-test engines, 4,473 hours on flight-test engines, and a total of 941 hours of flight testing on all three variants of F-35 aircraft. Pratt and Whitney is currently

supporting flight test on all three variants at three locations and has delivered eight production F135 CTOL engines and four production STOVL propulsion systems to date. Based on the TBR, the Pratt and Whitney contract will be adjusted to support the extended testing required to complete SDD and to resource the resolution of integration issues in development up to this point.

The General Electric/Rolls Royce F136 engine program has completed 1,669 total hours of ground testing to-date.

The Department of Defense continues to believe that the Joint Strike Fighter F136 alternate engine program is unnecessary, and risks diverting much needed resources from other higher priority programs. The FY12 President's Budget does not request funding for the development and procurement of the F136 alternate engine. However, the Air Force and Navy continue to execute the funding appropriated by Congress in previous budgets and the FY 11 Continuing Resolution to continue the F136 program.

Continued funding for the F136 engine carries cost penalties to both the F135 and F136 engines in the form of significant upfront investment cost, reduced production line learning curves, and less efficient economic order quantities. The Department has concluded that maintaining a single engine supplier provides the best balance of cost and risk. We believe the financial risks associated with a single source engine supplier are manageable, and are less than the investment required to fund a competitive alternate engine.

F-35 Aircraft Production and Deliveries

The F-35 aircraft manufacturing plan, as adjusted in September 2010, remains as the current baseline, and is currently on track as measured by earned hours and station

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

The JSF Program Office provides a large number of metrics to the Congress on a monthly basis. We have increased attention to manufacturing quality metrics including supplier quality, assembly and test. Additionally, we have incorporated oversight into the contractor's supplier risk management process to ensure timely awareness of problems in the supply chain.

F135 Engine Production and Deliveries

While timely delivery of the F135 has presented schedule challenges in the past, Pratt and Whitney is expected to meet the projected schedule delivery in the near future. The first three 2011 F135 engine deliveries were each three weeks late. The next three to deliver through April are each projected to be about two weeks late. Current projections

indicate the remaining year's engines to make schedule targets. Slightly late engine deliveries are not predicted to delay 2011 aircraft deliveries.

FY 2010 fixed price airframe contract

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

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

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

Any overrun to the Target Cost will result in an equal sharing of overrun costs between the Contractor and the Government. Should the Contractor under run the Target Cost, the Government and Contractor will share equally in the under run costs.

FY 2010 fixed price engine contract

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

A preliminary settlement agreement was reached between the Government and Pratt & Whitney in February 2011 for the above effort, including the procurement of 5 spares (3 CTOL and 2 STOVL). Contract award is expected by early April 2011. The per-variant price is $14.99 million for CTOL/CV and $32.07 million for STOVL.

Any overrun to the Target Cost (FPIF effort) will result in an equal sharing of overrun costs between the Contractor and the Government. Should the Contractor under run the Target Cost, the Government and Contractor will share equally in the under run costs.

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

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

The LRIP Lot 4 F-35 Logistics/Sustainment effort (Recurring Sustainment Support, Training, Support Equipment, and Spares) was initiated 16 September 2010 by means of a UCA with a NTE value of $511M. This action is pursuant to an ADM issued by OUSD (AT&L) on 5 March 2010 that approved the use of UCAs to protect the F-35 LRIP Lot 4 delivery schedule and minimize delays to the JSF Operational Test schedule. Negotiations for the Recurring Sustainment Support effort are anticipated to conclude in early April 2011, and negotiations for Training, Support Equipment, and Spares are expected to conclude in late April 2011.

F-35 PNR Tooling for lead-time-away procurement to support F-35 production ramp rate was initiated via a UCA awarded to LM Aero on 19 July 2010 with a NTE value of $820M. Negotiations for the PNR Tooling are anticipated to conclude in early May 2011.

FY 2011 contracts

The lack of FY11 Appropriations Act is impacting the planning, negotiation and eventual award of F-35 and F135 LRIP Lot 5 procurements. An Appropriations bill or relief from the CR constraints is necessary to procure the requested F-35 LRIP Lot 5

quantities. Without an Appropriations bill, the F-35 program will be limited to procuring FY10 aircraft quantities (10 CTOLs, 4 CVs, and 16 STOVLs) – well below the level requested in the FY11 PB (22 CTOLs, 1 OCO CTOL, 7 CVs, and 13 STOVLs). The uncertainty associated with aircraft procurement quantity extends throughout the rest of the FY11 LRIP Lot 5 procurements, including spare parts, support equipment, and sustainment support.

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

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

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

While still early in the year, the pace of testing is increasing flight test hours and test point accomplishment at higher rates from January 2011. Concurrency of testing and delivering production aircraft for fleet training operations in 2011 demands assessment of the system maturity to enable each service's systems command granting air worthiness clearances for unmonitored fleet operations. The test points are planned with realistic refly margins to progress in a deliberate way to support this maturity assessment. Progress to initial sea trials for STOVL is tracking solidly to support operations at sea in October 2011. For each technical issue unique to the STOVL model apparent today,

there are engineering solutions leading to sound mission performance. Weight will be under closest scrutiny and management attention. The four highest development risks on the program risk management board are software development concurrency (TBR replan has assessed and extended the schedule, and early code writing and lab integration testing performance measures are being closely monitored), pilot vehicle interface, STOVL Vertical Lift Bringback (VLBB) and Helmet Mounted Display. We have put in place a detailed risk management process to address these and all program risks.

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

Conclusion

The enhanced capability of the JSF will provide the backbone of the US combat air superiority for generations to come. The technological capabilities of the aircraft are sound. The program's management over the past year has put in place the right

fundamentals and realistic plans using sound systems engineering processes, and we are monitoring and tracking performance using detailed metrics. Overall, there is much work still ahead of us, but through the multiple reviews and adjustments in the past year we believe we have put the program on sound footing for the future.

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

BIOGRAPHY

UNITED STATES AIR FORCE

DAVID M. VAN BUREN

Mr. David M. Van Buren is the Principal Deputy Assistant Secretary for Acquisition (performing the duties of the Assistant Secretary of the Air Force for Acquisition), Washington, D.C. He is responsible for all Air Force research, development and acquisition activities. He provides direction, guidance and supervision of all matters pertaining to the formulation, review, approval, and execution of acquisition plans, policies and programs. Mr. Van Buren directs $67 billion annual investments that include space and major programs like the KC-X, F-35, Advanced Extremely High Frequency, Evolved Expendable Launch Vehicle, Global Positioning System, Unmanned Aircraft System and munitions, as well as capability areas such as information technology and command and control, intelligence, surveillance and reconnaissance systems. He formulates and executes the $300 billion Air Force investment strategy to acquire systems and support services to provide combat capability to joint warfighting commanders.

Mr. Van Buren has more than 30 years of acquisition experience in the Air Force, large defense corporations, and private equity owned small and medium aerospace and commercial high-technology firms. These technology areas include hyperspectral imaging; laser communications; alternative power sources; avionics; high-speed processing; compound semi-conductors; and satellite power systems. In 2005, he was also a member of the Defense Acquisition Performance Assessment Study Senior Review Team as its only small business representative.

Prior to entering public service, and for the past 15 years, Mr. Van Buren primarily worked as an executive for numerous private equity-owned high technology firms. He directed Raytheon's compound semi-conductor activity, and successfully transitioned TECSTAR, a small business, to being named one of the top 50 space manufacturers in the world by Space News. Mr. Van Buren was Vice President and Deputy Program Manager for the B-2 bomber at Northrop Corporation. He was involved in the transition to production, flight test, first flight and day-to-day program management activities. At Lockheed, he was a project manager on several classified airborne platforms, including the F-117A, and satellite platforms. Prior to his tenure at Lockheed, he served on active duty in the Air Force for nine years, including two tours in Southeast Asia, ending his career as a captain. His last Air Force assignment was as Program Manager in the AIM-9 Sidewinder Program Office.

EDUCATION

1971 Bachelor's degree in physical science, University of Illinois

1975 Master's degree in industrial management, Central Michigan University
1977 Education with Industry, Air Force Institute of Technology
1987 Executive Program, Stanford University

CAREER CHRONOLOGY

1. 1971 - 1981, Air Force officer
2. 1981 - 1983, Project Manager, Classified Programs, Lockheed Missiles and Space Company, Sunnyvale, Calif.
3. 1983 - 1987, Engineering Manager and Deputy Program Manager, B-2 Bomber, Northrop Corporation, Pico Rivera, Calif.
4. 1987 - 1992, Vice President and Deputy Program Manager, B-2 Bomber, Northrop Corporation, Pico Rivera, Calif.
5. 1992 - 2000, President and Chief Executive Officer, TECSTAR Corporation, City of Industry, Calif.
6. 2000 - 2001, President, Raytheon Microelectronics, Commercial Electronics Group, Andover, Mass.
7. 2001 - 2004, consultant and Chief Executive Officer for several private equity firms, Sudbury, Mass., and Blackhawk, Calif.
8. 2004 - 2007, Chairman, Chief Executive Officer and President, Novasol Inc., Honolulu, Hawaii
9. March 2008 - April 2009, Principal Deputy Assistant Secretary of the Air Force for Acquisition and Management, Washington, D.C.
10. April 2009 - November 2010, acting Assistant Secretary of the Air Force for Acquisition, Washington, D.C.
11. November 2010 - present, Principal Deputy Assistant Secretary for Acquisition (performing the duties of the Assistant Secretary of the Air Force for Acquisition), Washington, D.C.

(Current as of December 2010)

United States Navy
Biography

Vice Admiral David J. Venlet
Program Executive Officer - F-35 Lightning II Program

Vice Admiral Venlet is the program executive officer for the F-35 Lightning II Program. He previously served as commander Naval Air Systems Command, headquartered in Patuxent River, Md. Other flag tours include program executive officer, Tactical Air Programs and commander Naval Air Warfare Center, Weapons Division, with responsibility for Navy weapons and systems RDT&E and fleet support capabilities at China Lake and Point Mugu, Calif. He served as NAVAIR assistant commander for Test and Evaluation, and for Shore Installation Management.

Fleet tours include VF-41 as an F-14 Tomcat radar intercept officer embarked in USS *Nimitz*. He wears the distinguished Flying Cross for action in VF-41. After redesignation as a naval aviator he flew with VF-143 as an F-14 pilot embarked in USS *Dwight D. Eisenhower* and with VF-101 at NAS Oceana as a Tomcat instructor pilot and A-4 adversary pilot.

Tours in Naval Air Systems Command include Strike test pilot at Naval Air Test Center, Patuxent River, the F/A-18 program in various capacities including class desk officer and deputy program manager. He was executive assistant to the commander, Naval Air Systems Command and served as program manager for Air-to-Air Missiles involving AIM-9X development.

Venlet is from Pottstown, Penn., and graduated from the U.S. Naval Academy. He is a graduate of the Naval Postgraduate School and US Naval Test Pilot School and is a member of the Society of Experimental Test Pilots. He has a BS in Systems Engineering and MS in Aerospace Engineering.

Updated: 27 May 2010

United States Government Accountability Office

GAO

Testimony

Before the Subcommittee on Tactical Air and Land Forces, Committee on Armed Services, House of Representatives

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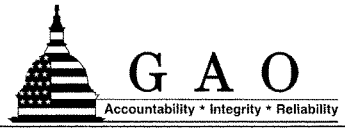
JOINT STRIKE FIGHTER

Restructuring Should Improve Outcomes, but Progress Is Still Lagging Overall

Statement of Michael Sullivan, Director
Acquisition and Sourcing Management



GAO-11-450T

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Highlights

Highlights of GAO-11-450T, a report to congressional committees

March 2011

JOINT STRIKE FIGHTER

Program Restructuring Should Improve Outcomes, but Progress Is Still Lagging Overall

Why GAO Did This Study

The F-35 Lightning II, also known as the Joint Strike Fighter (JSF), is the Department of Defense's (DOD) most costly and ambitious aircraft acquisition, seeking to simultaneously develop and field three aircraft variants for the Air Force, Navy, Marine Corps, and eight international partners. The JSF is critical for recapitalizing tactical air forces and will require a long-term commitment to very large annual funding outlays. The estimated total investment cost is currently about $385 billion to develop and procure 2,457 aircraft. Because of a history of relatively poor cost and schedule outcomes, defense leadership over the past year has directed a comprehensive restructuring of the JSF program that is continuing.

This testimony draws substantially from our extensive body of work on the JSF, including the current annual review mandated in the National Defense Authorization Act for Fiscal Year 2010, Pub. L. No. 111-84 § 244 (2009). Our draft report is being reviewed by the Department and we expect to issue it early next month. That report and this testimony discusses (1) program cost and schedule changes and their implications on affordability; (2) progress made during 2010; (3) design and manufacturing maturity; and (4) test plans and progress. GAO's work included analyses of a wide range of program documents and interviews with defense and contractor officials.

View GAO-11-450T or key components. For more information, contact Michael J. Sullivan at (202) 512-4841 or sullivanm@gao.gov

What GAO Found

DOD continues to restructure the JSF program, taking positive, substantial actions that should lead to more achievable and predictable outcomes. Restructuring has consequences—higher up-front development costs, fewer aircraft bought in the near term, training delays, and extended times for testing and delivering capabilities to warfighters. Total development funding is now estimated at $56.4 billion to complete in 2018, a 26 percent cost increase and a 5-year schedule slip from the current baseline. DOD also reduced procurement quantities by 246 aircraft through 2016, but has not calculated the net effects of restructuring on total procurement costs nor approved a new baseline. Affordability for the U.S. and partners is challenged by a near doubling in average unit prices since program start and higher estimated life-cycle costs. Going forward, the JSF requires unprecedented funding levels in a period of more austere defense budgets.

The program had mixed success in 2010, achieving 6 of 12 major goals and progressing in varying degrees on the rest. Successes included the first flight of the carrier variant, award of a fixed-price aircraft procurement contract, and an accelerated pace in development flight tests that accomplished three times as many flights in 2010 as the previous 3 years combined. However, the program did not deliver as many aircraft to test and training sites as planned and made only a partial release of software capabilities. The short takeoff and landing (STOVL) variant had significant technical problems and deficient flight test performance. DOD directed a 2-year period to evaluate and engineer STOVL solutions.

After more than 9 years in development and 4 in production, the JSF program has not fully demonstrated that the aircraft design is stable, manufacturing processes are mature, and the system is reliable. Engineering drawings are still being released to the manufacturing floor and design changes continue at higher rates than desired. More changes are expected as testing accelerates. Test and production aircraft cost more and are taking longer to deliver than expected. Manufacturers are improving operations and implemented 8 of 20 recommendations from an expert panel, but have not yet demonstrated a capacity to efficiently produce at higher production rates. Substantial improvements in factory throughput and the global supply chain are needed.

Development testing is still early in demonstrating that aircraft will work as intended and meet warfighter requirements. About 4 percent of JSF capabilities have been completely verified by flight tests, lab results, or both. Only 3 of the extensive network of 32 ground test labs and simulation models are fully accredited to ensure the fidelity of results. Software development—essential for achieving about 80 percent of the JSF functionality—is significantly behind schedule as it enters its most challenging phase.

Chairman Bartlett, Ranking Member Reyes, and members of the Tactical Air and Land Forces Subcommittee:

Thank you for the opportunity to discuss our work on the F-35 Lightning II, also known as the Joint Strike Fighter (JSF). The JSF is the Department of Defense's (DOD) most costly and ambitious aircraft acquisition, seeking to simultaneously develop and field three aircraft variants for the Air Force, Navy, Marine Corps, and eight international partners. The JSF is the core of DOD's long-term tactical aircraft recapitalization plans as it is intended to replace hundreds of legacy aircraft. Total planned U.S. investment in JSF is now about $385 billion to develop and acquire 2,457 aircraft through 2035. With such a substantial funding commitment amidst pressing warfighter requirements for this next generation capability, DOD has lately recognized numerous technical, financial, and management shortcomings and continues to significantly restructure the program, adding more time and money and making other changes that we support.

GAO has reported on the JSF acquisition program for a number of years. Our March 2010 report[1] discussed additional cost and schedule pressures, unsatisfactory performance in manufacturing and delivering aircraft, and concerns about not meeting warfighter requirements on time and in quantity. We concluded that DOD's plans to restructure the JSF program, just announced before our report was issued, were well-founded, if overdue. Also in March 2010, the Department declared that the program experienced a breach of the critical cost growth statutory threshold and subsequently certified to Congress in June 2010 that the JSF program should continue.[2] Appendix I summarizes the evolution of JSF cost and

[1] GAO, *Joint Strike Fighter: Additional Costs and Delays Risk Not Meeting Warfighter Requirements on Time*, GAO-10-382 (Washington, D.C.: Mar. 19, 2010). Refer to the related products section for a list of prior GAO reports and testimonies.

[2] Commonly referred to as Nunn-McCurdy, 10 U.S.C. § 2433 establishes the requirement for DOD to submit unit cost reports on major defense acquisition programs or designated major subprograms. Two measures are tracked against the current and original baseline estimates for a program: procurement unit cost (total procurement funds divided by the quantity of systems procured) and program acquisition unit cost (total funds for development, procurement, and system-specific military construction divided by the quantity of systems procured). If a program's procurement unit cost or acquisition unit cost increases by at least 25 percent over the current baseline estimate or at least 50 percent over the original baseline estimate, it constitutes a breach of the critical cost growth threshold. When a program experiences a Nunn-McCurdy breach of the critical cost growth threshold, DOD is required to take a number of steps, including reassessing the program and submitting a certification to Congress in order to continue the program, in accordance with 10 U.S.C. § 2433a.

schedule estimates at key junctures in its acquisition history through the Nunn-McCurdy certification. Since then, in January 2011, the Secretary of Defense announced additional development cost increases and further changes consequent to the ongoing restructure, but has not yet established a new approved acquisition program baseline.

My comments today are focused largely on our latest review. Our draft report is with DOD for comment and we expect to issue it early next month. This will be the second annual JSF report under our current mandate in the National Defense Authorization Act for Fiscal Year 2010.[3] For our latest report, we (1) evaluated program cost and schedule changes and their implications on affordability; (2) identified progress made in 2010 against established goals; (3) assessed elements of design stability and manufacturing maturity and reviewed production results; and (4) reported the status of development testing and technical challenges facing the program. To conduct this work, we evaluated DOD's restructuring actions and impacts on the program, tracked cost and schedule changes, and determined factors driving the changes. We reviewed program status reports, manufacturing data, test plans, and internal DOD analyses. We discussed results to date and future plans to complete JSF development and move further into procurement with officials from DOD, the JSF program office, contractor officials, and members of the independent review teams. We toured aircraft and engine manufacturing plants, obtained production and supply performance indicators, and discussed improvements underway with contractors. We conducted this performance audit from May 2010 to March 2011 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

[3] Pub. L. No. 111-84 § 244 (2009).

JSF Restructuring Improves Program, but Affordability Is Challenged by Rising Costs and Delays

Over the past year, DOD has substantially restructured the JSF program, taking positive actions that should lead to more achievable and predictable outcomes. Restructuring has consequences—higher development costs, fewer aircraft in the near term, training delays, and extended times for testing and delivering capabilities to warfighters. Key restructuring changes include the following:

- The total system development cost estimate rose to $56.4 billion and its schedule was extended to 2018. This represents a 26 percent increase in cost and a 5-year slip in schedule compared to the current approved program baseline established in 2007.
- Resources and time were added to development testing. Testing plans were made more robust by adding another development test aircraft and the use of several production aircraft; increasing the number of test flights by one-third; extending development testing to 2016; and reducing its overlap with initial operational testing.
- Near-term procurement quantities were reduced by 246 aircraft through 2016; the annual rate of increase in production was lowered; and the full-rate production decision moved to 2018, a 5-year slip from the current baseline.
- The military services were directed to reexamine their initial operational capability (IOC) requirements, the critical need dates when the warfighter must have in place the first increment of operational forces available for combat. We expect the Marine Corps' IOC will slip significantly from its current 2012 date and that the Air Force's and Navy's IOC dates will also slip from the current dates in 2016.
- To address technical problems and test deficiencies for the short takeoff and landing (STOVL) variant, the Department significantly scaled back its procurement quantities and directed a 2-year period for evaluating and engineering technical solutions to inform future decisions on this variant. DOD also "decoupled" STOVL testing from the other two variants so as not to delay them and to allow all three to proceed at their own speeds.

The fiscal year 2012 Defense Budget reflects the financial effects from restructuring actions through fiscal year 2016. The net effect was increased development funding and decreased procurement funding in the near term. For example, compared to last year's estimate for the same year, DOD for fiscal year 2012 requested an increase of $520 million for JSF development and a decrease of $2.6 billion for procurement, reflecting

the reduction of 13 aircraft and associated spares. Table 1 summarizes the revised procurement funding requirements and annual quantities during this 5-year period following the Secretary's reductions. Even after decreasing annual quantities and lowering the production rate of increase, JSF procurement still escalates significantly. Annual procurement funding levels more than double and quantities more than triple during this period. These numbers do not include the additional orders expected from the international partners.

Table 1: JSF Procurement Funding and Quantities Requested in the Fiscal Year 2012 Defense Budget

(Dollars in billions)						
	2012	**2013**	**2014**	**2015**	**2016**	**Total**
Air Force	$3.8	$4.1	$5.6	$6.5	$8.5	$28.5
Navy	1.8	2.5	2.8	3.3	2.9	13.2
Marine Corps	1.3	1.3	1.4	2.0	2.9	9.0
U.S. total	**$6.9**	**$7.9**	**$9.8**	**$11.8**	**$14.3**	**$50.7**
Procurement Quantities						
	2012	2013	2014	2015	2016	Total
Air Force	19	24	40	50	70	203
Navy	7	12	14	19	20	72
Marine Corps	6	6	8	12	18	50
U.S. total	**32**	**42**	**62**	**81**	**108**	**325**

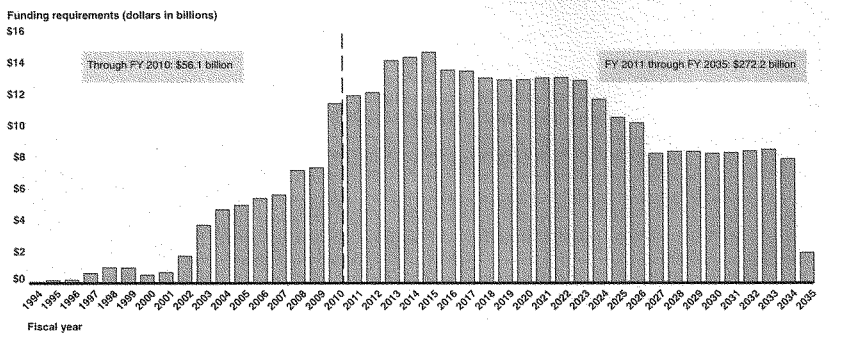
Source: GAO analysis of fiscal year 2012 President's Budget.

DOD does not yet know the full impact from restructuring actions on future procurement funding requirements beyond this 5-year period. Cost analysts are still calculating the net effects from deferring the near-term procurement of 246 aircraft to future years and from lowering the annual rate of increased procurement. After a Nunn-McCurdy breach of the critical cost growth threshold and DOD certification, the most recent milestone must be rescinded, the program restructured to address the cause of the breach, and a new acquisition program baseline must be approved that reflects the certification approved by the milestone decision authority. The Secretary has not yet granted new milestone B approval for the JSF nor approved a new acquisition program baseline. Future funding requirements could be higher than projected and the quantities, which are considered affordable by the U.S. and allies, could be reduced, further driving up unit costs.

Affordability—in terms of the investment costs to acquire the JSF, the continuing costs to operate and maintain it over the life-cycle, and its impact on other defense programs—is a challenging issue. Including the funding added by the restructuring actions, system development cost estimates have increased 64 percent since program start. (App. II summarizes the increases in target prices on development contracts, and major cost drivers contributing to increased system development funding requirements.) Also, the estimated average unit procurement price for the JSF has about doubled since program start and current forecasts indicate that life-cycle costs will be substantially higher than the legacy aircraft it replaces. Rising JSF costs erode buying power and may make it difficult for the U.S. and its allies to buy and sustain as many aircraft as planned.

Going forward, the JSF will require unprecedented demands for funding in a period of more austere defense budgets where it will have to annually compete with other defense and nondefense priorities for the discretionary federal dollar. Figure 1 illustrates the substantive annual development and procurement funding requirements—almost $11 billion on average through program completion in 2035. This reflects the program's estimate at the time of the fiscal year 2011 budget submission. These funding levels do not include additional funding increases pursuant to the June 2010 Nunn-McCurdy certification nor funding changes in the fiscal year 2012 budget request. As discussed earlier, defense cost analysts are still computing the long-term procurement funding requirements reflecting the deferral of aircraft to future years.

Figure 1: JSF Annual Development and Procurement Funding Requirements (April 2010 Estimate)



Source: GAO analysis of DOD data.

Progress In Achieving the JSF Program's 2010 Goals Was Mixed

The JSF program established 12 clearly stated goals in testing, contracting, and manufacturing for completion in calendar year 2010. It had mixed success, achieving 6 goals and making varying degrees of progress on the other 6. For example, the program exceeded its goal for the number of development flight tests but did not deliver as many test and production aircraft as planned. Also, the program awarded its first fixed-price contract on its fourth lot of production aircraft, but did not award the fixed-price engine contract in 2010 as planned. Table 2 summarizes JSF goals and accomplishments for 2010.

Table 2: JSF Progress on Stated Goals for 2010

Key event	Achieved in 2010	Status
Complete 400 development flight tests	Yes	Completed 410 test flights
First vertical landing of STOVL variant	Yes	Achieved March 2010
Carrier variant first flight	Yes	Achieved June 2010
Autonomic logistic information system is operational	Yes	Began limited operations July 2010
Training for 125 maintenance personnel completed	Yes	Trained 138 maintenance personnel
Award contract for fourth aircraft production lot	Yes	Awarded contract November 2010
Eleven test aircraft delivered to test sites	No	Delivered eight aircraft
Flight test rate of 12 flights per aircraft per month demonstrated	No	Achieved flight test rate of 2 to 8 per month
At least 3 aircraft delivered to Eglin Air Force Base	No	None delivered, expected mid-2011
Begin flight training operations at Eglin Air Force Base	No	Expected September 2011
Block 1.0 software delivered to flight test	No	Delivered limited capability November 2010 with full capability expected November 2011
Award contract for fourth engine production lot	No	Expected April 2011

Source: GAO analysis of DOD data.

Although still hampered by the late delivery of test aircraft to testing sites, the development flight test program significantly ramped up operations in 2010, accomplishing 3 times as many test flights as the previous 3 years combined. The Air Force conventional takeoff and landing variant significantly exceeded the annual plan while initial limited testing of the Navy's carrier variant was judged satisfactory, below plans for the number and hours of flight but ahead on flight test points[4] flown. The Marine Corps STOVL, however, substantially underperformed in flight tests, experienced significant down times for maintenance, and was challenged by several technical issues unique to this variant that could add to its weight and cost. The STOVL's problems were a major factor in the Secretary's decision to give the STOVL a 2-year period to solve engineering issues, assess impacts, and inform a future decision as to whether and how to proceed with this variant. Table 3 summarizes 2010 flight test results for each variant.

[4] Flight test points are specific, quantifiable objectives in flight plans that are needed to verify aircraft design and performance.

Table 3: Flight Test Performance in 2010

	Conventional takeoff and landing variant	Short takeoff and vertical landing variant	Carrier variant	Total
Flight tests				
Actual	171	212	27	410
Planned	112	251	31	394
Difference	59	(39)	(4)	16
Flight test hours				
Actual	290	286	41	617
Planned	202	409	56	667
Difference	88	(123)	(15)	(50)
Flight test points flown				
Actual	1373	1924	496	3793
Planned	1064	2438	270	3772
Difference	309	(514)	226	21

Source: GAO analysis of DOD data.

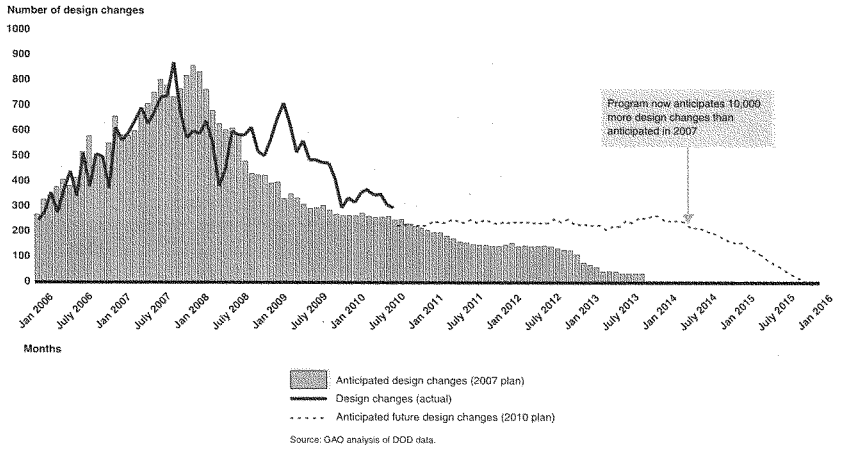
Program Has Still Not Fully Demonstrated a Stable Design and Mature Manufacturing Processes as It Enters Its Fifth Year of Production

After completing 9 years of system development and 4 years of overlapping production activities, the JSF program has been slow to gain adequate knowledge to ensure its design is stable and the manufacturing process ready for greater levels of annual production. The JSF program still lags in achieving critical indicators of success expected from well-performing acquisition programs. Specifically, the program has not yet stabilized aircraft designs—engineering changes continue at higher than expected rates long after critical design reviews and well into procurement, and more changes are expected as testing accelerates. Also, manufacturing cost increases and delays in delivering test and production aircraft indicate need for substantial improvements in factory throughput and performance of the global supply chain.

Engineering drawings released since design review and the number and rate of design changes exceed those planned at program outset and are not in line with best practices. Critical design reviews were completed on the three aircraft variants in 2006 and 2007 and the designs declared mature, but the program continues to experience numerous changes. Since 2007, the program has produced 20,000 additional engineering drawings, a 50-percent increase in total drawings and about five times more than best practices suggest. In addition, changes to drawings have

not yet decreased and leveled off as planned. Figure 2 tracks and compares monthly design changes and future forecasts against contractor plans in 2007.

Figure 2: Monthly Design Changes for JSF Aircraft

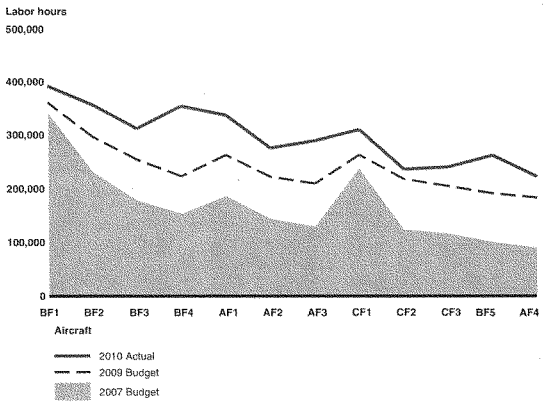


Source: GAO analysis of DOD data.

The monthly rate in 2009 and 2010 was higher than expected and the program now anticipates more changes over a longer period of time—about 10,000 more changes through January 2016. With most of development testing still ahead for the JSF, the risk and impact from required design changes are significant. In addition, emerging concerns about the STOVL lift fan and drive shaft, fatigue cracks in a ground test article, and stealth-related issues may drive additional and substantive design changes.

As in prior years, lingering management inefficiencies, including substantial out-of-station work[5] and part shortages, continued to increase the labor needed to manufacture test aircraft. Although there have been improvements in these factors, final acceptance and delivery of test jets were still delayed. Total labor hours required to produce the test aircraft increased over time. The cumulative actual labor hours through 2010 to complete the 12 test aircraft exceeded the budgeted hours estimated in 2007 by more than 1.5 million hours, a 75 percent increase. Figure 3 depicts forecasted and actual labor hours for building test jets.

Figure 3: JSF Labor Hours for Manufacturing Test Aircraft



Source: GAO analysis of DOD data.

DOD began procuring production jets in 2007 and has now ordered 58 aircraft on the first four low-rate initial production lots. The JSF program anticipated the delivery of 14 production aircraft through 2010, but none

[5] Out of station work occurs when manufacturing steps are not completed at its designated work station and must be finished elsewhere later in production. This is highly inefficient, increasing labor hours, causing delays, and sometimes quality problems.

have been delivered. Delivery of the first two production jets has been delayed several times since the contract was signed and is now expected in April 2011. The prices on the first three cost-reimbursable production contracts have increased from amounts negotiated at contract award and the completion dates for delivering aircraft have been extended over 9 months on average. We are encouraged by DOD's award of a fixed-price incentive fee contract for lot 4 production and the prospects for the cost study to inform lot 5 negotiations, but we have not examined contract specifications. Accumulating a large backlog of jets on order but undelivered is not an efficient use of federal funds, tying up millions of dollars in obligations ahead of the ability of the manufacturing process to produce.

The aircraft and engine manufacturers now have significantly more items in production flow compared to prior years and are making efforts to implement restructuring actions and recommendations from expert defense teams assembled to evaluate and improve production and supply operations. Eight of 20 key recommendations from the independent manufacturing review team have been implemented as of September 2010. Until improvements are fully implemented and demonstrated, the restructuring actions to reduce near term procurement quantities and establish a more achievable ramp rate are appropriate and will provide more time to fully mature manufacturing and supply processes and catch up with aircraft backlogs. Improving factory throughput and controlling costs—driving down labor and material costs and delivering on time— are essential for efficient manufacturing and timely delivery to the warfighter at the increased production rates planned for the future.

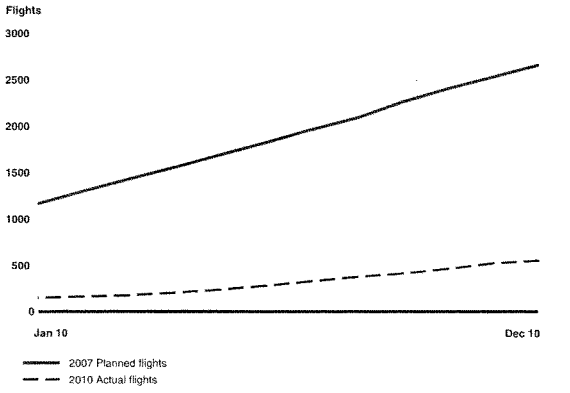
Testing Has Been Slow and Has Not Demonstrated That the Aircraft Will Work in Its Intended Environment

Since the first flight in December 2006, only about 4 percent of JSF capabilities have been completely verified by flight tests, lab results, or both. The pace of flight testing accelerated significantly in 2010, but overall progress is still much below plans forecast several years ago. Furthermore, only a small portion of the extensive network of ground test labs and simulation models are fully accredited to ensure the fidelity of results. Software development—essential for achieving about 80 percent of the JSF functionality—is significantly behind schedule as it enters its most challenging phase.

Development flight testing was much more active in 2010 than prior years and had some notable successes, but cumulatively still lagged behind previous expectations. The continuing effects from late delivery of test aircraft and an inability to achieve the planned flying rates per aircraft

substantially reduced the amount and pace of testing planned previously. Consequently, even though the flight test program accelerated its pace last year, the total number of flights accomplished during the first 4 years of the test program significantly lagged expectations when the program's 2007 baseline was established. Figure 4 shows that the cumulative number of flights accomplished by the end of 2010 was only about one-fifth the number forecast by this time in the 2007 test plan.

Figure 4: Actual JSF Flight Tests Completed through 2010 Compared to the 2007 Plan



Source: GAO analysis of DOD data.

By the end of 2010, about 10 percent of more than 50,000 planned flight test points had been completed.[8] The majority of the points were earned on airworthiness tests (basic airframe handling characteristics) and in ferrying the planes to test sites. Remaining test points include more

[8] According to program officials completion of a test point means that the test point has been flown and that flight engineers ruled that the point has met the need. Further analysis may be necessary for the test point to be closed out.

complex and stringent requirements, such as mission systems, ship suitability, and weapons integration that have yet to be demonstrated.

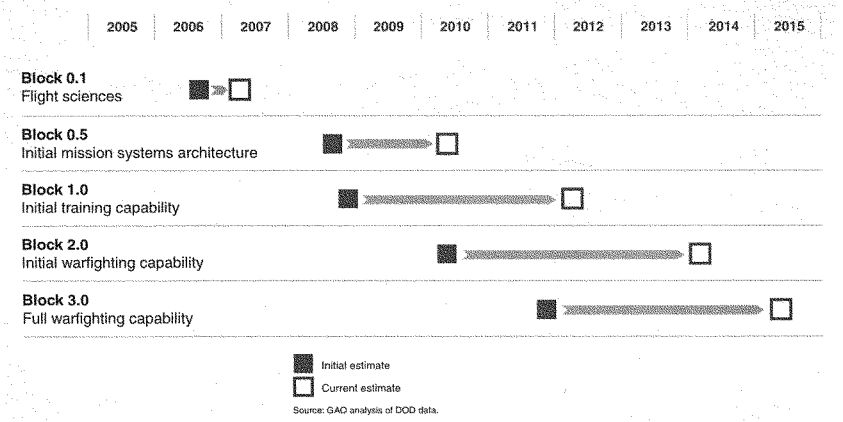
The JSF test program relies much more heavily than previous weapon systems on its modeling and simulation labs to test and verify aircraft design and subsystem performance. However, only 3 of 32 labs and models have been fully accredited to date. The program had planned to accredit 11 labs and models by now. Accreditation is essential to validate that the models accurately reflect aircraft performance and it largely depends upon flight test data to verify lab results. Moreover, the ability to substitute ground testing for some flight testing is unproven. Contracting officials told us that early results are providing good correlation between ground and flight tests.

Software providing essential JSF capability is not mature and releases to the test program are behind schedule. Officials underestimated the time and effort needed to develop and integrate the software, substantially contributing to the program's overall cost and schedule problems and testing delays, and requiring the retention of engineers for longer periods. Significant learning and development work remains before the program can demonstrate the mature software capabilities needed to meet warfighter requirements. The JSF software development effort is one of the largest and most complex in DOD history, providing functionality essential to capabilities such as sensor fusion, weapons and fire control, maintenance diagnostics, and propulsion. JSF depends on millions more lines of software code than the F-22A Raptor and F/A-18E/F Super Hornet. While good progress has been reported on the writing of code, total lines of code have grown by 40 percent since preliminary design review and 13 percent since the critical design review. The amount of code needed will likely increase as integration and testing efforts intensify. A second software integration line added as part of the restructuring will improve capacity and output.

Delays in developing, integrating, and releasing software to the test program have cascading effects hampering flight tests, training, and lab accreditation. While progress is being made, a substantial amount of software work remains before the program can demonstrate full warfighting capability. The program released its second block, or increment, to flight test nearly 2 years later than the plan set in 2006, largely due to integration problems. Each of the remaining three blocks—providing full mission systems and warfighting capabilities—are now projected to slip more than 3 years compared to the 2006 plan. Figure 5

illustrates the actual and projected slips for each of the 5 software blocks in delivering software to the test program.

Figure 5: Software Delivery to Flight Test Slips



Schedule delays require retention of engineering staff for longer periods of time. Also, some capabilities have been moved to future blocks in attempts to meet schedule and mitigate risks. Uncertainties pertaining to critical technologies, including the helmet-mounted display and advanced data links, pose risks for more delays.

Concluding Remarks

The JSF program is at a critical juncture—9 years in development and 4 years in limited production–but still early in flight testing to verify aircraft design and performance. If effectively implemented and sustained, the restructuring DOD is conducting should place the JSF program on a firmer footing and lead to more achievable and predictable outcomes. However, restructuring comes with a price—higher development costs, fewer aircraft received in the near term, training delays, prolonged times for testing and delivering the capabilities required by the warfighter, and impacts on other defense programs and priorities. Reducing near-term

procurement quantities lessens, but does not eliminate the still substantial and risky concurrency of development and production. Development and testing activities will now overlap 11 years of procurement. Flight testing and production activities are increasing and contractors are improving supply and manufacturing processes, but deliveries are still lagging. Slowed deliveries have led to a growing backlog of jets on order but not delivered. This is not a good use of federal funds, obligating millions of dollars well before the manufacturing process can deliver aircraft.

We agree with defense leadership that a renewed and sustained focus on affordability by contractors and the government is critical to moving this important program forward and enabling our military services and our allies to acquire and sustain JSF forces in needed quantities. Maintaining senior leadership's increased focus on program results, holding government and contractors accountable for improving performance, and bringing a more responsible management approach to the JSF to "live within its means" may help limit future cost growth and the consequences for other programs in the portfolio. The JSF acquisition demands an unprecedented share of the Department's future investment funding. The program's size and priority are such that its cost overruns and extended schedules must either be borne by funding cuts to other programs or else drive increases in the top line of defense spending; the latter may not be an option in a period of more austere budgets. Given the other priorities that DOD must address in a finite budget, JSF affordability is critical and DOD must plan ahead to address and manage JSF challenges and risks in the future.

Chairman Bartlett, Ranking Member Reyes, and members of the Tactical Air and Land Forces Subcommittee, this completes my prepared statement. I would be pleased to respond to any questions you may have.

GAO Contacts and Acknowledgments

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

Appendix I: Changes in Reported JSF Program Cost, Quantities, and Deliveries

	October 2001 (system development start)	December 2003 (2004 replan)	March 2007 (approved baseline)	April 2010 (initial program restructure)	June 2010 (Nunn-McCurdy)
Expected quantities					
Development quantities	14	14	15	14	14
Procurement quantities (U.S. only)	2,852	2,443	2,443	2,443	2,443
Total quantities	**2,866**	**2,457**	**2,458**	**2,457**	**2,457**
Cost estimates (then-year dollars in billions)					
Development	$34.4	$44.8	$44.8	$50.2	$51.8
Procurement	196.6	199.8	231.7	277.5	325.1
Military construction	2.0	0.2	2.0	0.6	5.6
Total program acquisition	**$233.0**	**$244.8**	**$278.5**	**$328.3**	**$382.5**
Unit cost estimates (then-year dollars in millions)					
Program acquisition	$81	$100	$113	$134	$156
Average procurement	69	82	95	114	133
Estimated delivery and production dates					
First operational aircraft delivery	2008	2009	2010	2010	2010
Initial operational capability	2010-2012	2012-2013	2012-2015	2012-2016	TBD
Full-rate production	2012	2013	2013	2016	2016

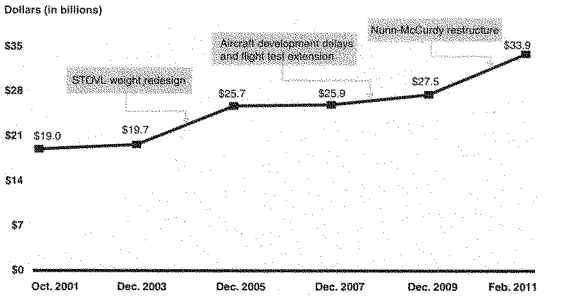
Source: GAO analysis and DOD data.

Note: Does not reflect cost and schedule effects from additional restructuring actions announced after June 2010.

Appendix II: Systems Development Contracts Target Price History and Engine Schedules

Projected costs for three contracts comprise about 80 percent of total system development funding requirements. The airframe and primary engine development contracts have experienced significant price increases since contract awards—79 percent and 69 percent respectively. The alternate, or second, engine contract price has increased about 12 percent. By design, it began about 4 years after the primary engine contract and has a more limited scope. The primary engine contract includes development of both the common engine and the STOVL lift system while the alternate engine contract develops its version of the conventional common engine. Figures 6, 7, and 8 depict the price histories for these three contracts and the reasons behind major price increases.

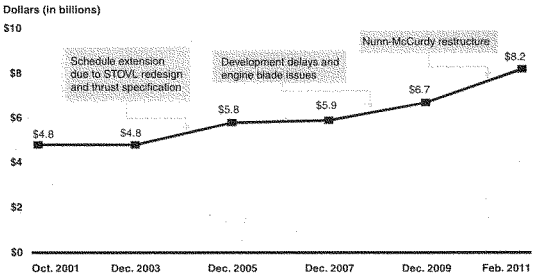
Figure 6: JSF Airframe Development Contract Target Price Increases



Source: GAO analysis of DOD data.

Note: The Feb. 2011 cost is not the contract target price, but the latest government estimate from the fiscal year 2012 defense budget request.

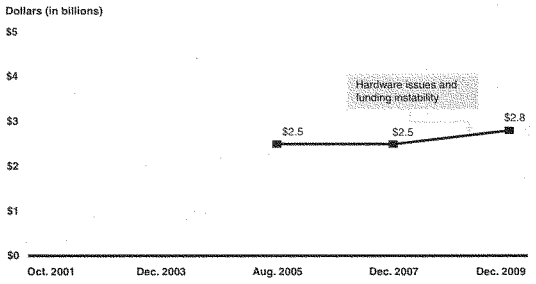
Figure 7: Primary Engine Development Contract Target Price Increases



Source: GAO analysis of DOD data.

Note: The Feb. 2011 cost is not the contract target price, but the latest government estimate from the fiscal year 2012 defense budget request.

Figure 8: Alternate Engine Development Contract Target Price Increases



Source: GAO analysis of DOD data.

Note: The Dec. 2009 cost is the contractor's estimate from the 2009 Selected Acquisition Report. The fiscal year 2012 budget includes a DOD estimate of $2.1 billion for this contract, but it assumes no funding beyond fiscal year 2010.

Table 4 shows changes in engine development schedules. The initial service release milestone usually coincides with low rate initial production. The engine should have completed required verification activities and meet specification requirements. The operational capability release milestone is generally associated with the start of full-rate production when the engine is acceptable for full production release.

Table 4: Engine Development Contracts Milestones

	Initial estimate	Current estimate or actual
F135 primary engine		
Initial service release	November 2007	CTOL/CV March 2010 STOVL December 2010
Operational capability release	November 2008	July 2016
F136 alternate engine		
Initial service release	May 2012	CTOL/CV December 2012 STOVL December 2013
Operational capability release	July 2013	February 2014

Source: GAO analysis of DOD data.

Note: JSF program officials stated that the Department has not requested funding for the F136 engine in FY11 or 12, and progress towards achieving milestone dates is dependent on whether final appropriations for FY11 and 12 include funding for the F136.

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Mr. Sullivan currently serves as Director, Acquisition and Sourcing Management, at the U.S. Government Accountability Office. This group has responsibility for examining the effectiveness of DOD's acquisition and procurement practices in meeting its mission performance objectives and requirements. In addition to directing reviews of major weapon system acquisitions such as the Joint Strike Fighter, F-22, Global Hawk, and various other major weapon acquisition programs, Mr. Sullivan has developed and directs a body of work examining how the Department of Defense can apply best practices to the nation's largest and most technically advanced weapon systems acquisition system. This work has spanned a broad range of issues critical to the successful delivery of systems, including technology development; product development; transition to production; software development; program management; requirement-setting; cost estimating; and strategic portfolio management. The findings and recommendations from this work have played a major role in the department's recent acquisition policy revisions. Most recently, he has directed the GAO's annual assessment of major weapon systems programs for the Congress and GAO's work with Congress in establishing acquisition policy reforms. His team also provides the Congress with early warning on technical and management challenges facing these investments.

Mr. Sullivan has been with GAO for 24 years. He received a bachelor's degree in Political Science from Indiana University and a Masters Degree in Public Administration from the School of Public and Environmental Affairs, Indiana University.

STATEMENT OF

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AND

LIEUTENANT GENERAL TERRY G. ROBLING, USMC
DEPUTY COMMANDANT FOR AVIATION

AND

REAR ADMIRAL KENNETH E. FLOYD, USN
DIRECTOR, AIR WARFARE

BEFORE THE

TACTICAL AIR AND LAND FORCES
SUBCOMMITTEE

OF THE

HOUSE ARMED SERVICES COMMITTEE

ON

DEPARTMENT OF THE NAVY'S AVIATION PROCUREMENT PROGRAM

MARCH 15, 2011

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

NAVAL AVIATION

Mr. Chairman, Representative Reyes, and distinguished members of the Subcommittee, we thank you for the opportunity to appear before you today to discuss the Department of the Navy's (DoN) Aviation programs. Our testimony today will provide background and rationale for the Department's Fiscal Year (FY) 2012 budget request for aviation programs. This statement also includes responses to the questions in your March 2, 2011, letter to Secretary Mabus.

The United States is a maritime nation with global responsibilities. For 235 years, our Navy and Marine Corps' persistent presence and multi-mission capability have been the representation of U.S. power across the global commons. Our naval tradition informs our decisions today, as we remain today firmly in a forward posture for engagement and action. We continue to build on our ability to come from the sea to conduct our missions rapidly across the range of military operations. We are an agile and amphibious power projection force in readiness, and such agility requires that the tactical aviation arm of our naval expeditionary forces remain strong.

The Fiscal Year 2012 President's Budget requests funding for 223 aircraft including 13 F-35 Joint Strike Fighters for both the Navy and the Marine Corps, 11 P-8As to replace the aging current Anti-Submarine Warfare and maritime patrol squadrons, 24 MH-60R and 18 MH-60S helicopters, 1 KC-130J, 24 H-1 variant helicopters, 30 MV-22 tilt-rotor aircraft, 28 F/A-18E/F fighter attack planes, 12 EA-18G to continue replacing the EA-6B, 6 E-2D Advanced Hawkeyes, 36 Joint Primary Aircraft Trainers (JPAT) and 20 Unmanned Aerial Vehicles (UAV). The Department has also requested funds for the continued development of the Broad Area Maritime Surveillance (BAMS) unmanned system and for the demonstration of the Navy Unmanned Combat Aerial System (N-UCAS). The DoN Fiscal Year 2012 aircraft program budget is funded for planned program execution throughout the Future Years Defense Program (FYDP).

TACTICAL AVIATION (TACAIR)

TACAIR Inventory Management

The Fiscal Year 2012 President's Budget request includes a DoN reduction of 67 F-35B/C aircraft, the addition of 41 F/A-18E/F aircraft and the service life extension of 150 F/A-18A-D aircraft. In 2010, we estimated the DoN Strike Fighter Shortfall (SFS) to be about 100 aircraft, but the President's Budget for 2012 reduces the DoN's projected shortfall to a manageable level of 65 aircraft, with a peak in 2018. The Navy will transition three additional squadrons from FA-18Cs to F/A-18Es and then redistribute the F/A-18C aircraft to requirements across the DoN. With the procurement of the additional 41 Super Hornets, redistribution of existing aircraft and management of aircraft service life, the DoN will have the operational tactical aviation strength required to meet our Service commitments.

The DoN continues to meticulously manage the flight hours and fatigue life of our tactical aircraft. Since 2004, we have provided fleet users guidance and actions to optimize aircraft utilization rates while maximizing training and operational opportunities. The Inventory Forecasting Tool (IFT) is used to project the combined effects of TACAIR transition plans, attrition and pipeline requirements on the total strike fighter aircraft inventory. The IFT has been updated with the most recent data to provide a current forecast of the strike fighter inventory

compared to the existing requirements. Critical variables used in the tool include F-35 deliveries, force structure, usage rates, life limits, depot turnaround time, Fatigue Life Expenditure (FLE), arrested and field landings and catapult launches. Our latest shortfall prediction of 65 aircraft is manageable and is based on Fiscal Year 2012 President's Budget.

We continue to perform High Flight Hour (HFH) inspections to extend the service life limits of the F/A-18A-D aircraft from 8,000 to 8,600 flight hours. Engineering analysis completed in 2009 revealed that extensive areas of the legacy F/A-18 airframe would require Service Life Extension Program (SLEP) inspections and modifications in order to reach the service life goals of 10,000 hours. The F/A-18A-D SLEP engineering development phase completes in 2012, and the program then commences with the induction of aircraft. The Fiscal Year 2012 President's Budget includes a request to SLEP 150 aircraft throughout and beyond the FYDP. The HFH and SLEP efforts can effectively extend the F/A-18 A-D service life to 10,000 hours, thereby mitigating the impacts of the SFS. Continued investment in Program Related Engineering and Program Related Logistics funds within the Operations and Maintenance, Navy (O&M,N) accounts is critical for sustaining the combat relevancy of the DoN's legacy platforms through the TACAIR transition.

F-35/Joint Strike Fighter (JSF):

The DoN remains strongly committed to both the F-35B Short Take-Off and Vertical Landing (STOVL) and F-35C Carrier Variant (CV) of the Joint Strike Fighter, as they are essential to our long-term Naval and Marine Corps Aviation strategy and the nation's security. Despite the recent program challenges, we believe there is no program, or combination of programs, that can more affordably provide the Combatant Commanders the warfighting capabilities they will need to protect the Nation's global interests. F-35 is planned to supersede the Department's aging TACAIR fleet by replacing the Navy and Marine Corps' legacy F/A-18A-D Hornets, Marine Corps AV-8B Harrier and EA-6B Prowler aircraft. The integration of F-35B and F-35C aircraft will provide the dominant, multi-role, fifth-generation capabilities needed across the full spectrum of combat operations to deter potential adversaries and enable future Naval and Marine Aviation power projection.

The Department of Defense (DoD) has recently completed the most in-depth, bottoms-up technical review of the program to date. The F-35 Technical Baseline Review (TBR) involved more than 120 technical experts investigating all aspects of the program. Based on this review, the Secretary of Defense (SECDEF) determined the F-35 Systems Development and Demonstration (SDD) phase should be re-structured; variants of the F-35 aircraft de-coupled; and the production ramp reduced to mitigate concurrency risk in design and production. The Fiscal Year 2012 President's Budget requests $1.3 billion in Research, Development, Test & Evaluation (RDT&E) and $3.1 billion in Aircraft Procurement, Navy (APN) for 13 F-35 aircraft (6 F-35B and 7 F-35C) with associated aircraft hardware and spares. These resource requirements align to the SECDEF's F-35 program restructure.

The TBR identified program challenges affecting all variants of the F-35, to include software development, flight test progress and production delays. The Navy's F-35C is progressing satisfactorily while select F-35B unique systems, such as the auxilary air-inlet doors and the engine driveshaft interface require additional engineering. SECDEF is providing two-years of

additional government and industry scrutiny to overcome these challenges to ensure the Marine Corps is delivered the warfighting capabilities needed to defend the Nation. The Commandant of the Marine Corps is personally engaged in the oversight of the STOVL variant. After the allotted two-year time span, the Department's leadership will reassess the overall technical progress and then make informed decisions regarding the F-35B development and production.

With the restructure and technical challenges before us, the DoN is assessing the implications to F-35B and F-35C Initial Operational Capability (IOC). The Navy and Marine Corps require that the aircraft attain service-specific mission oriented capabilities as defined in the F-35 Operational Requirements Document (ORD) prior to considering declaration of IOC. The Marine Corps requires a Block 2B weapon system capability and the Navy requires a fully ORD-compliant Block 3C capability. Implementation of the TBR findings and development of detailed test schedules are still in progress. Once the findings have been assessed, test schedules further matured, and all information incorporated into a new Integrated Master Schedule, the services will then assess and establish IOC dates for each F-35 variant.

F-35 technical reviews identified two critical technologies that were rated below the threshold for MS-B. One, the lift fan anti-icing system has now been adequately matured to the necessary technical readiness level (TRL-6). The other, the Helmet Mounted Display, continues to experience technical difficulties. The program is investigating alternative, more mature technologies that can provide an interim warfighting capability while the ORD-compliant solution is matured. An ORD-compliant helmet will continue development and will be integrated into the air system when the technology has been proven.

Developmental aircraft of all three variants are now in flight testing. The program now has nine test aircraft operating at three test sites, with three more Navy/Marine Corps developmental test aircraft planned to be delivered this year (BF-5, CF-2, CF-3). The Marine Corps' BF-1 returned to flight following an extended modification period. The aircraft has now flown effectively in the conventional take-off and short take-off and vertical take-off modes. BF-2 has accomplished six vertical landings (VLs) to-date and is now executing other unique VL test points. BF-3 returned to flight in January after weapons bay door calibration and other modifications. BF-4 completed a 3.6 hour flight in early February, the longest flight test mission (other than a ferry flight) on the overall F-35 program. Another F-35B completed tests in February to expand its speed envelope to 1.2 Mach (550 knots). The Navy's CF-1 test aircraft ferried to Naval Air Station (NAS) Patuxent River in November 2010 and has been completing early flying qualities envelope expansion. CF-2 and CF-3 are undergoing final preparations and ground testing. Both CF-2 and CF-3 are expected to ferry to NAS Patuxent River, Maryland, this spring. Drop testing of Navy's CG-1 aircraft, to simulate carrier landings of up to 26.4 feet per second, has been completed and has enabled detailed analysis and model validation. This same test article, reconfigured for static testing, has completed testing in support of aircraft catapult and arrestment. These ground tests support our early efforts for ship integration and lay the foundation for jet blast deflector and other ship suitability testing this summer at Naval Air Engineering Station Lakehurst. To date, all known air/ship integration issues are resolvable.

As of early February 2011, the F135 engine program had completed a total of 12,122 hours of testing on ground-test engines, 4,229 hours on flight-test engines, and a total of 838 hours of flight testing on all three variants of F-35 aircraft. In 2010, the F135 propulsion contractor delivered the final flight test engine and the first 12 production engines, which includes all the

Low Rate Initial Production (LRIP) 1 engines and the start of LRIP 2. Notwithstanding this significant progress, there have been technical and cost challenges. In 2010, the program began implementing plans to modify test aircraft to rectify an F135 afterburner "screech" problem, which prevents the engine from sustaining full thrust. These issues are now understood and modifications are in-work for the flight test aircraft to complete flight envelope expansion on planned schedules. Contributing to the F-35B two-year probation decision were STOVL-unique propulsion system challenges, including those associated with roll-post thermal capabilities, driveshaft spacers, and clutch temperatures. Plans are now maturing to correct each of these propulsion system issues. With regard to engine affordability, the SECDEF chartered a 2010 F-35 Engine Joint Assessment Team (JAT) to investigate F135 propulsion costs and provide a 'should-cost' objective. The propulsion team is implementing the recommendations with a focus in the coming year to ensure the engine manufacturer and the Government continue to make the necessary investments to achieve F135 cost reduction goals. The current LRIP 4 engine negotiations show that the engine manufacturer has begun to reduce cost in alignment with the JAT assessments and recommendations.

With regard to the F136 alternate engine program, the DoN supports the SECDEF's position that the interests of the taxpayer, the military, our partner nations, and the resource integrity of the overall F-35 program are best served by not pursuing a second engine. Our assessment is that the benefits that might theoretically accrue with a second engine are more than offset by excess cost, complexity and associated risks, and will divert precious modernization funds from other more pressing priorities.

While F-35 has been challenged this past year, and additional developmental challenges may arise, we strongly support the F-35 program. It is essential to our long-term National Security as the future backbone of our air-superiority and the core of Navy and Marine Aviation.

F/A-18 Overview

There are 20 Navy Super Hornet squadrons totaling 416 F/A-18E/Fs. One more F/A-18E/F squadron completes transition in March 2011. There are 17 Navy and 13 Marine F/A-18 A-D squadrons totaling 628 legacy A-D Hornets. Super Hornets and legacy Hornets have conducted over 148,000 combat missions in support of Operations IRAQI FREEDOM (OIF) and ENDURING FREEDOM (OEF) since September 11, 2001. While deployed both ashore and at sea aboard our aircraft carriers, F/A-18s have brought significant numbers of precision ordnance and laser-guided munitions to the fight, and have employed thousands of rounds of 20 millimeter ammunition supporting forces during strafing runs. These aircraft continue to provide vital overwatch and direct support to our troops on the ground in Iraq and Afghanistan. The F/A-18 fleet continues to meet operational needs in the current conflicts. DoN Hornets have consistently met readiness and operational commitments. Naval Air Systems Command (NAVAIR) uses a Health of Naval Aviation (HONA) database to store and track the actual utilization data of all the F/A-18s. Both the Legacy and the Super Hornet were procured with an objective of 20 years time in service. The average Legacy Hornet has just now reached that goal, while the Super Hornet is at almost 30 percent of its expected 20 year life. It is reasonable to conclude that most aircraft will substantially exceed 20 years in service, based on current trends.

F/A-18 A/B/C/D (Legacy) Hornet

The Fiscal Year 2012 President's Budget request is $364.6 million in APN for the continuation of the SLEP, systems upgrades and obsolescence programs for the F/A-18 platform. As the F/A-18 program transitions to the F/A-18E/F and F-35, today's inventory of 628 F/A-18A/B/C/Ds will continue to comprise more than half of the DoN's strike fighter inventory until 2013. The funds requested will procure and install center-barrel modifications and SLEP kits, which will be a major contributor to extending the service life of select candidate aircraft from the F/A-18 C/D fleet to 10,000 flight hours. The Service Life Management Program (SLMP) continues to monitor and improve the health of the legacy F/A-18A-D fleet through analyses of TACAIR inventories and the management of usage rates at the squadron level. The F/A-18A-Ds have flown approximately 75 percent of the total flight hours available at the 8,600 hour limit and approximately 69 percent of the fleet is over 6,000 flight hours with 15 aircraft over 8,000 flight hours. SLEP of approximately 150 of these aircraft, to extend their service life to 10,000 flight hours, will be required to meet operational commitments out to 2023.

In order to maintain a tactical advantage, we will continue to procure and install advanced systems ((Joint Helmet-Mounted Cueing Systems (JHMCS), Multi-Function Information Distribution System (MIDS) and LITENING for USMC)) on selected F/A-18A/B/C/D aircraft. The Marine Corps is upgrading 56 Lot 7-9 F/A-18As and 30 Lot 10/11 F/A-18Cs to a Lot 21 avionics capability with digital communications, a tactical data link, JHMCS, MIDS and LITENING. The Marine Corps will also upgrade 38 F/A-18A-D model APG-73 radars with the Expand 4/5 upgrade, providing an enhanced Synthetic Aperture Radar (SAR) capability, further improving its all-weather capabilities. The Marine Corps anticipates these upgrades will enhance the current capabilities of these aircraft with the digital communications, tactical data link and situational awareness required for them to remain viable and relevant. The Marine Corps expects the F/A-18(A++/C/D) to remain in the active inventory until Fiscal Year 2022 and in the reserve inventory until Fiscal Year 2023. The Marine F/A-18s are also employing the LITENING targeting pod in expeditionary operations including OEF. When combined with data link hardware, the LITENING pod provides real-time video to ground forces through Remotely Operated Video Enhanced Receiver (ROVER) and Video Scout ground workstations.

The F/A-18 A-D Service Life Assessment Program (SLAP) is now complete and has identified that extensions of the airframe are possible with inspections and modifications. Based upon those results, SLEP, a three-phased program, has begun. SLEP Phase A is complete; it identified the critical safety of flight locations that needed immediate inspection and identified notional repair concepts to enable Rough Order of Magnitude (ROM) cost estimates. SLEP Phase B is currently in work with NAVAIR and the Original Equipment Manufacturer (OEM); this phase categorizes parts by criticality, developing tracking algorithms to define recurring inspection intervals, conducts vertical tail failsafe solutions and upgrades analytical tools necessary for the NAVAIR and OEM engineers to design repairs. Phase B is currently 90 percent complete and should conclude in August 2011. SLEP Phase C is in planning, it will finalize all remaining Phase B work and develop modifications and inspections as required. The estimated contract award date is summer 2011. The life extension of the F/A-18 A-D's major subsystems and avionics is independent of the airframe, but progressing as well.

The Fiscal Year 2012 President's Budget request includes SLEP requirements for 150 airframes; modifications begin in 2012. The technical risk in developing modification kits to achieve the

goal of 10,000 flight hours is assessed as low. Current assessments have determined that the Fleet Readiness Centers (FRC) have the capacity to execute the required number of HFH inspections and SLEP modifications. Material availability and engineering disposition turn-around times influence depot efficiencies.

F/A-18 E/F Super Hornet

The Fiscal Year 2012 President's Budget requests $2.4 billion in APN-1 for 28 F/A-18 E/F Block II (Lot 26-38) aircraft. The F/A-18E/F continues to transition into the fleet, improving the survivability and strike capability of the carrier air wing. The Super Hornet provides a 40 percent increase in combat radius, 50 percent increase in endurance and 25 percent increase in weapons payload over the legacy Hornets. The program will complete procurement of the 556 programmed aircraft in 2014. Production line shutdown will begin in Fiscal Year 2014 with the final shutdown occurring in Fiscal Year 2016. The Super Hornet uses an incremental development approach to incorporate new technologies and capabilities – the JHMCS, Advanced Targeting Forward Looking Infra Red(ATFLIR) with shared real-time video, Shared Reconnaissance Pod System (ShARP) and MIDS data-link. The F/A-18E/F Fiscal Year 2012 Budget request includes $172.6 million in APN to implement commonality, maintain capabilities and improve reliability and structural safety.

The APG-79 Active Electronically Scanned Array (AESA) radar system was installed in all production F/A-18E/Fs and EA-18Gs beginning with Lot 30 in Fiscal Year 2006, and a retrofit program exists to modify 133 Lot 26-29 Block II aircraft with APG-79 radars. The Navy plans to equip all 419 Block II Super Hornets with AESA radars, providing the Super Hornet a significant increase in detection range, lethality and survivability over the legacy Hornets. AESA squadrons have been successfully deploying since 2007 and are highly valued by Fleet Commanders. The AESA Squadrons are considered force multipliers because of their ability to share battlespace management data with other non-AESA tactical aircraft in the carrier battle group.

The F/A-18 E/Fs have flown approximately 30 percent of the total flight hours available at the 6,000 hour limit and this will not be adequate to meet operational commitments out to 2035. As a result, the F/A-18E/F Service Life Assessment Program commenced in 2008 and will last through 2015. Its goal is to analyze actual usage versus structural test data to identify the feasibility of extending F/A-18E/F service life from 6,000 flight hours to 9,000 flight hours via a follow on SLEP. Extending the airframe to 9,000 hours through both inspections and modifications is currently assessed as a low risk effort. The F/A-18E/F SLAP is a three phased program which commenced in 2008 and will last through 2015. The Fiscal Year 2012 President's Budget includes a request for $100.4 million RDT&E (Fiscal Years 2012-2016) to support the F/A-18E/F SLAP study requirement. One of the F/A-18E/F SLAP goals is to define the necessary inspections and modifications required to achieve 9,000 flight hours. Other goals relate to increasing total landings, arrested landings and catapults beyond currently defined life limits. Phase A is currently underway and is developing methodologies to be used and assessing airframe, flight controls and subsystems. Phases B and C will continue those assessments along with landing gear and multiple fleet teardowns. The F/A-18E/F SLAP is incorporating lessons learned from the F/A-18A-D analysis. E/F SLAP was started sooner in its life cycle than the F/A-18A-D SLAP and encompasses the entire weapon system vice just the airframe. The F/A-18E/F SLAP also has the advantage of having a 3rd lifetime of test cycles completed on multiple

test articles providing detailed information on high fatigue areas early in the program. The SLMP philosophy has also been applied to the F/A-18E/F fleet much sooner in its lifecycle than the F/A-18A-D, which will optimize FLE, flight hours and total landings so that they all converge at approximately the same time, which should align aircraft service life with fleet requirements.

A multi-year procurement (MYP) contract for 124 F/A-18E/F Super Hornets and EA-18G Growlers was signed on September 24, 2010 for Fiscal Years 2010 through 2013. In December 2010, SECDEF added 41 E/F aircraft to the Fiscal Year 2012 President's Budget request in Fiscal Years 2012 through 2014. The total planned procurement is now 556 Super Hornets and 114 Growlers.

Airborne Electronic Attack (AEA) / EA-18G Growler

The Fiscal Year 2012 President's Budget request is $1.1 billion in APN for 12 Full Rate Production (FRP) EA-18G aircraft and $17.1 million in RDT&E, N for correction of deficiencies. The program completed Operational Test and Evaluation (OT&E) in May 2009 and was deemed Operationally Effective and Operationally Suitable. IOC was achieved in September 2009 and a favorable FRP decision was obtained in November 2009. The first EA-18G squadron deployed in an expeditionary role in November 2010 to Iraq. EA-18Gs in-service have flown approximately five percent of the 7,500 total flight hours per aircraft and are meeting all operational commitments.

The EA-18G began replacing expeditionary and carrier-based Navy EA-6Bs in 2009. These transitions will continue through 2015. A total of 78 EA-18Gs have been procured to date. As directed by the Quadrennial Defense Review in 2009, SECDEF added 26 EA-18G aircraft to the program of record across the FYDP to increase joint force capacity to conduct expeditionary electronic attack. The additional aircraft will fill the Navy's four expeditionary electronic attack squadrons currently using the legacy EA-6B Prowler. As reflected in the Fiscal Year 2011 President's Budget, the program of record is now 114 aircraft.

The Navy has completed an Analysis of Alternatives (AoA) to determine the best path forward for the Next Generation Jammer (NGJ). The NGJ system will replace the ALQ-99 electronic warfare pods currently flown on the EA-18G and EA-6Bs and will provide DoD with the advanced comprehensive electronic attack capability to outpace the threat.

Airborne Electronic Attack (AEA) / EA-6B Prowler

The Fiscal Year 2012 President's Budget request includes $20.2 million in RDT&E,N for electronic warfare counter response, $34.1 million in APN for common AEA systems and $27.7 million in APN for all EA-6B series aircraft. Currently there are 85 EA-6Bs in the Navy and Marine Corps to support 62 operational aircraft in 14 active component squadrons and one reserve component squadron. This includes 39 Navy and Marine Corps Improved Capability (ICAP) II aircraft and 23 ICAP III aircraft. The replacement of Navy EA-6B aircraft with EA-18G was expected to be completed in 2012; however, the Navy now plans to complete the transition of the aircraft in 2015. This extension allows for full transition of carrier-based and expeditionary mission aircraft while supporting OIF and OEF combat efforts.

The Marine Corps currently has 11 operational EA-6B ICAP II aircraft and nine operational EA-6B ICAP III aircraft in four VMAQ squadrons. The transition to the ICAP III aircraft began in March 2010 and will complete in 2012. As the Navy transitions ICAP III squadrons to EA-18G, the Navy Prowlers will be transferred to the Marine Corps. Once the transition is complete, the Marine Corps will have 32 ICAP III aircraft to support its EA-6B program of record through 2019. Aircrew training for the DoN will be conducted at VAQ-129 through 2014. Once the Navy has completed its transition from the EA-6B, the Marine Corps may be required to establish a Fleet Replacement Squadron to support its program of record.

Marine Aviation is on a path towards a distributed AEA system of systems that is a critical element in achieving the Marine Air Ground Task Force Electronic Warfare (MAGTF EW) vision: a composite of manned and unmanned surface, air, and space-based assets, fully networked and collaborating to provide the MAGTF commander the ability to control the electro-magnetic spectrum at the time and place of his choosing. Current aviation programs supporting this vision are the EA-6B and the Intrepid Tiger II ALQ-231 pod, scheduled to deploy with an AV-8B squadron in fall 2011. In development are Unmanned Aircraft System (UAS) EW payloads to include a Software Reprogrammable Payload. Critical to the development of all these potential sensors is the development of an EW services architecture which will facilitate cooperative and collaborative networked Electronic Warfare Battle Management.

E-2D Advanced Hawkeye (AHE)

The E-2D Advanced Hawkeye is the Navy's carrier-based Airborne Early Warning and Battle Management Command and Control system. The E-2D provides Theater Air and Missile Defense and is capable of synthesizing information from multiple onboard and off-board sensors, making complex tactical decisions and then disseminating actionable information to Joint Forces in a distributed, open-architecture environment.

Utilizing the newly developed AN/APY-9 Mechanical Electronic Scan Array (MESA) radar and the Cooperative Engagement Capability (CEC) system, the E-2D works in concert with surface combatants equipped with the Aegis combat system to detect, track and defeat air and cruise missile threats at extended range and provide Battle Group Commanders required reaction time. This system-of-systems architecture, known as Naval Integrated Fire Control-Counter Air (NIFC-CA), provides vital force protection and allows the Navy to safely project forces into the littorals and overland to ensure access in contested areas.

The E-2D Advanced Hawkeye program is in the Production and Deployment phase after the Defense Acquisition Board (DAB) approved MS-C in June 2009. The SDD flight test program is 96 percent complete. Three pilot production aircraft were delivered in 2010, and the program successfully completed its second Operational Assessment (OA). From a cost standpoint, the Estimate at Complete (EAC) has been stable for over 42 months and the program is on track to finalize carrier suitability testing by third quarter Fiscal Year 2011. OT&E is scheduled to begin first quarter Fiscal Year 2012. LRIP 1 and 2 contracts have been awarded with two LRIP 1 aircraft scheduled for delivery in 2011. A DAB, which will authorize LRIP 3 and 4 procurements, is scheduled for March 2011. All major acquisition milestones have been achieved on or ahead of schedule since program inception in 2003.

The E-2D AN/APY-9 radar system continues to perform well, displaying satisfactory design maturation. All hardware and software is being delivered to the aircraft on schedule. During the

2009 Office of Naval Research's live fire demonstrations, the E-2D successfully demonstrated its integral role in the NIFC-CA architecture.

The Fiscal Year 2012 President's Budget requests $110.9 million in RDT&E, N for continuation of SDD and $1,236.3 million in APN for six LRIP 4 aircraft and advanced procurement (AP) for Fiscal Year 2013 FRP 1 aircraft.

AV-8B Harrier

The Fiscal Year 2012 President's Budget requests $30.7 million in APN funds to continue development of the AV-8B Readiness Management Program (RMP), Operational Flight Program and Avionics Weapons Systems Development and Integration, and Engine Life Management Program (ELMP). Avionics development includes completion of the Airborne Variable Message Format Terminal which will provide digital communication interoperability with other Variable Message Format capable platforms, including F-35.

Today's Harrier, equipped with precision weapons, LITENING targeting pods with a video downlink to ROVER ground stations and the digitally-aided Close Air Support (CAS) Marine Tactical System protocol, is a proven, invaluable asset for the MAGTF and Joint Commander across the spectrum of operations. The AV-8B program focuses on sustainment efforts to mitigate significant legacy inventory shortfalls, maintain airframe sustainment and address reliability and obsolescence issues of avionics and subsystems. The AV-8B continues to be deployed heavily in support of emerging operational contingencies. Each Marine Expeditionary Unit (MEU) that deploys does so with embarked AV-8Bs. The aircraft supports ground forces in Afghanistan with its precision weapons, 25-millimeter cannon, and sophisticated sensor suite. The Harrier has a proven combat record, and its weaponry and basing flexibility from the decks of L-class ships to the austere Afghanistan environment have been invaluable. Planned capability upgrades, obsolescence mitigation and readiness initiatives will ensure the AV-8B remains relevant, healthy and sustained through 2022.

The Fiscal Year 2012 President's Budget requests $51.5 million in Overseas Contingency Operations (OCO) procurement funding for USMC expeditionary LITENING targeting pod upgrades, which include enhanced Forward Looking Infrared (FLIR) and charge-coupled device optics, a Laser Target Imaging Processor, a more powerful video downlink transmitter and improved ground moving target and air-to-air target tracking systems. Building on its extensive and proven combat record, the United States Air Force and Marine Corps are upgrading the LITENING pod to the Gen 4 (fourth generation) standard to support engaged Marine Corps, joint and coalition warfighters. Finally, the Fiscal Year 2012 Budget requests $2.0 million in OCO procurement funding to install OCO-procured ALE-47 kits. ALE-47 provides AV-8B an improved countermeasure capability over the legacy and obsolete ALE-39 system.

The AV-8B Fleet continues to meet operational commitments with simultaneous support to three MEUs and OCO. The Harrier monitors structural FLE vice flight hours. As of January 2011, the highest FLE aircraft is 49.0 percent of available expenditure. The single-seat, deployable aircraft FLE average is 26.8 percent. Continued investment in engine sustainment, avionics and in managing airframe component obsolescence is critical to ensuring these aircraft remain viable contributors to the TACAIR inventory.

P-8A Poseidon

The future of the Navy's maritime patrol force includes plans for sustainment, modernization, and re-capitalization of the P-3C force. The P-8A Poseidon is the replacement aircraft for the P-3C Orion. The Fiscal Year 2012 President's Budget requests $622.7 million in RDT&E, N for development and $2.275 billion in APN for procurement of 11 P-8A Poseidon aircraft. Fiscal Year 2012 research and development funding will support the continued development of the P-8A and associated testing. Fiscal Year 2012 funds support the procurement of the 11 LRIP P-8A aircraft which are scheduled to begin delivery in May 2014 and advanced procurement for the subsequent LRIP. The program is on track for IOC in 2013 when the first squadron will have transitioned and be ready to deploy forward in support of the combatant commander. The P-8A program is meeting all cost, schedule and performance parameters in accordance with the Acquisition Program Baseline (APB).

The program completed the MS C Review in August 2010 which authorized the Navy to proceed with LRIP Lots 1, 2, and 3 for six aircraft in Fiscal Year 2010, seven aircraft in Fiscal Year 2011 and eleven aircraft in Fiscal Year 2012. The Navy awarded the LRIP Lot 1 contract in January 2011. The first three flight test aircraft are being flown at NAS Patuxent River, MD in support of the Integrated Test and Evaluation (IT&E) plan. The last three of six flight test articles are on schedule for delivery from the OEM.

P-3C Orion

The aging P-3C fleet continues to provide critical anti-submarine warfare, anti surface warfare, and intelligence, surveillance, and reconnaissance support for Joint and Naval operations worldwide. In Fiscal Year 2012, $171.5 million is requested to sustain the P-3C until transition to the P-8A Poseidon. A subset of $100.4 million of this request is for wing modifications, which will allow airframe sustainment to support the Chief of Naval Operation's P-3 Fleet Response Plan, as well as supporting EP-3E requirements, which are executed within the P-3 Airframe Sustainment Program. The P-3C is being sustained to keep the aircraft a viable warfighter until it is replaced by P-8A beginning in 2013.

The aircraft is well beyond planned fatigue life of 7,500 hours for critical components, with an average airframe usage of over 16,000 hours. Since February 2005, 12 aircraft grounding bulletins have impacted 101 P-3 aircraft. In December 2007, NAVAIR's RDT&E funded P-3C Fatigue Life Management Program determined that in addition to existing structural fatigue issues associated with the forward lower wing section (Zones 2-4), the lower aft wing surface (Zone 5) of the P-3 aircraft had showed fatigue damage beyond standards for acceptable risk, resulting in the grounding of 39 P-3 aircraft. As of January 2011, a total of 59 aircraft have been grounded for Zone 5 fatigue. P-3 groundings, due to known material fatigue, will continue for the remainder of the P-3 program. Heretofore unknown fatigue issues will continue to present persistent risk until the P-8A transition is complete.

A return to aircraft availability numbers representative of pre-December 2007 grounding levels was recently achieved in December 2010; 85 P-3C mission aircraft are available today. Preserving funding for Zone 5 and outer wing kits and installations is critical to sustaining the minimum number of P-3Cs until replaced by the P-8A. As of February 25, there have been 38 Zone-5 modifications completed; 30 Zone-5 aircraft are in work and five outer wing assemblies

have been delivered for ongoing installations. Key elements of the sustainment approach are: strict management of requirements and flight hour use, special structural inspections to keep the aircraft safely flying, semi-annual fatigue updates per individual P-3C/EP-3 aircraft and increased use of simulators to satisfy training requirements. In the Fiscal Year 2012 President's Budget request, $71.1 million is requested for sustainment and modernization. These funds will continue addressing a multitude of mission essential efforts to replace obsolete components, integrate open architecture technology and leverage commonality.

The Navy will continue to closely manage the service life of the P-3C as the Maritime Patrol Reconnaissance Aviation forces transition to the P-8A Poseidon. Until P-8A Full Operational Capability is achieved, allocations of aircraft must be balanced to meet mission and minimum training while preserving remaining P-3 service life. Maintaining P-3C sustainment and modernization programs and the P-8A procurement schedule is critical to avoid any increases in aircraft non-availability.

EP-3 Aries Replacement/Sustainment

The EP-3E ARIES is the Navy's premier manned Airborne Intelligence, Surveillance, Reconnaissance, and Targeting (AISR&T) platform. The Joint Airborne Signals Intelligence (SIGINT) Common Configuration includes spiral upgrades which, in conjunction with SECDEF and ISR Task Force surge efforts, are fielding a robust Multi-Intelligence (INT) capability inside the FYDP. Multi-INT sensors, robust communication, voice internet protocol and data links employed by the flexible and dependable P-3 air vehicle help ensure effective AISR&T support to conventional and non-conventional warfare across the current Range of Military Operations. Operating around the globe, the EP-3E continues to satisfy critical Joint, Combatant Commander, and Service airborne ISR priorities and requirements.

In Fiscal Year 2012, the President's Budget request is $104.0 million in APN, including $20.8 million for OCO to address EP-3E SIGINT and communications capability upgrades and obsolescence. The APN request supports the LRIP installations and FRP buy for communications intelligence modifications necessary to keep pace with the evolving threat. The EP-3E program continues to modify aircraft with multi-intelligence capability to meet emergent classified requirements. Modifications are necessary to keep the platform viable until the EP-3 capabilities are recapitalized.

The Navy cancelled the EP-3E replacement (EP-X) in the Fiscal Year 2011 President's Budget and currently the Navy is in the process of developing a "Family of Systems" concept to recapitalize airborne ISR capabilities. In the interim, the Navy will continue to replace obsolete equipment with mission-critical sensor improvements on board the EP-3 to support US and coalition forces currently engaged in OCO.

MH-60R and MH-60S

The Fiscal Year 2012 President's Budget requests $1.0 billion for 24 MH-60R aircraft including AP for 24 Fiscal Year 2013 aircraft and $17.7 million RDT&E, N for continued replacement of the Light Airborne Multi-Purpose System (LAMPS) MK III SH-60B and carrier-based SH-60F helicopters with the MH-60R. The $17.7 million will continue development of the Ku-band data link, a fleet driven capability upgrade to the APS-147 Radar known as the Automatic Radar

Periscope Detection and Discrimination program, a Mode V interrogation capability into the identification friend-or-foe system and the aluminum gearbox. An aluminum gearbox design is replacing the current magnesium gearbox to reduce corrosion and improve total ownership cost. The MH-60R is used in both anti-submarine warfare (ASW) with its dipping sonar, sonobuoys and torpedoes and in the surface warfare (SUW) role with its electronics surveillance measures system, multimode radar with inverse synthetic aperture radar, FLIR system and Hellfire missiles. It has demonstrated three to seven times the capability in the ASW role and significant increases in its SUW capability over legacy systems. The MH-60R program achieved FRP in 2006. The second MH-60R operational deployment is currently underway with HSM-77 aboard the carrier USS ABRAHAM LINCOLN (CVN 72). There are three operational Carrier Air Wing squadrons and two fleet replacement squadrons operating the MH-60R. Two additional operational squadrons will transition to the MH-60R by the end of Fiscal Year 2011.

The Fiscal Year 2012 President's Budget requests $483.0 million in APN for 18 MH-60S aircraft including advanced procurement for 18 Fiscal Year 2013 aircraft and $30.6 million in RDT&E, N funds for the MH-60S to continue development of the Organic Airborne Mine Countermeasures (OAMCM) (Block II) and the Armed Helicopter (Block III) missions. The MH-60S is the Navy's primary combat support helicopter designed to support carrier and expeditionary strike groups. The MH-60S has replaced three legacy Navy helicopter platforms. The basic MH-60S reached IOC and FRP in 2002. The Armed Helicopter configuration reached IOC in June 2007 and OAMCM is scheduled to reach IOC in 2011. The second MH-60S operational deployment is currently underway with HSC-12 aboard the USS ABRAHAM LINCOLN (CVN 72). MH-60S helicopters currently operate with self defense equipment, crew-served weapons and Hellfire missiles. MH-60S configuration enhancements include Fixed Forward Firing Weapons that will begin fielding in 2012.

The SECDEF certified a MYP for the Army and Navy to pursuing a joint platform procurement of the MH-60R and MH-60S airframes along with the Army's UH-60M. At the same time, the SECDEF certified the Navy MYP strategy for the MH-60R and MH-60S common cockpit procurement.

T-6B Joint Primary Aircraft Training System (JPATS) and other Training Systems

The T-6 is the primary flight training aircraft for Navy and Marine Corps pilots and Naval Flight Officers (NFO), replacing the aging and increasingly difficult to support T-34. The recent grounding of 186 T-34 aircraft, almost three-fourths of the Chief Naval Aviation Training (CNATRA) T-34 inventory, due to rudder pedal cracks demonstrates the urgency of this procurement. The current requirement for T-6's has been revised to 295 aircraft following an internal Navy requirements review. To date, 197 T-6's have been procured and 107 have been delivered. Of those 107 aircraft, 65 are the newer T-6B aircraft with an upgraded avionics variant of the T-6A. The Fiscal Year 2012 President's Budget request includes $266.9 million to procure 36 T-6Bs under a United States Air Force contract. The JPATS program first delivered the T-6B aircraft to the Navy in August 2009 and IOC occurred in April 2010. Funding requested in the President's Budget will also support the critical sustainment of the TH-57, the training helicopter for Navy and Marine Corps helicopter pilots, and of the T-45, the Navy's training jet for future jet pilots and NFOs.

ASSAULT SUPPORT AIRCRAFT

KC-130J Hercules

The KC-130J continues to replace the aging KC-130F/R/T fleet in order to fulfill the Marine Corps' requirement for 79 KC-130 aircraft, which provide fixed wing, rotary wing and tiltrotor air-to-air refueling (AAR); assault support; airborne multi-sensor imagery reconnaissance (MIR); and CAS to the MAGTF. The Fiscal Year 2012 President's Budget requests $94.4 million in APN for the procurement, support and sparing of one aircraft. Keeping this transition program on track allows the Marine Corps to fully exploit the agility of this unique multi-mission assault support platform while mitigating ever increasing legacy KC-130T operating and sustainment costs.

As of February 8, 2011, 42 USMC KC-130J aircraft of a total program of 104 (79 Marine Corps, 25 Navy) have been delivered, and an additional five aircraft are on contract, expected to deliver between Fiscal Year 2011 and 2014.

LIGHT ATTACK AND UTILITY AIRCRAFT

UH-1Y / AH-1Z

The H-1 Upgrades Program is replacing the Marine Corps' UH-1N and AH-1W helicopters with state-of-the-art UH-1Y and AH-1Z aircraft. These legacy aircraft have proven enormously effective over decades of heavy use, and as they reach the end of their service lives we look forward to expanding utility and attack helicopter capabilities. The new Yankee and Zulu aircraft are fielded with integrated glass cockpits, world-class sensors and advanced helmet-mounted sight and display systems. The future growth plan includes a digitally-aided close air support (CAS) system designed to tie these airframes, their sensors and their weapons systems together with ground combat forces and capable DoD aircraft. Low-cost weapons such as the Advanced Precision Kill Weapon System II (APKWS II) will increase lethality while reducing collateral damage.

The Fiscal Year 2012 President's Budget requests $72.6 million in RDT&E, N for continued product improvements and $798.6 million in APN for 26 H-1 Upgrade aircraft: 15 UH-1Y, 10 AH-1Z and one AH-1Z OCO aircraft. The program is a key modernization effort designed to resolve existing safety deficiencies, to enhance operational effectiveness, and to extend the service life of both aircraft. Additionally, the 84 percent commonality between the UH-1Y and AH-1Z will reduce lifecycle costs and logistical footprint significantly, while increasing the maintainability and deployability of both aircraft. The program will provide the Marine Corps 349 H-1 aircraft through a combination of remanufacturing and new production.

The UH-1Y "Yankee" aircraft achieved IOC in August 2008 and FRP in September 2008. The "Yankee Forward" procurement strategy prioritized UH-1Y production in order to replace the under-powered UH-1N fleet as quickly as possible. The AH-1Z completed its operational evaluation (OT-II3C) in June 2010 and received approval for FRP in November 2010. As of 1 March 2011, 52 aircraft (38 UH-1Ys and 14 AH-1Zs) have been delivered to the Fleet Marine Force; an additional 48 aircraft are on contract and in production. Lots 1-5 aircraft deliveries are

complete and Lot 6 deliveries are progressing on schedule. The AH-1Z achieved IOC in February 2011 and in November 2011 a MEU will deploy with both UH-1Y and AH-1Z aircraft – the first such all-upgrades deployment. To date, all Fiscal Year 2009 - 2011 aircraft deliveries have been completed ahead of the contracted schedule date.

The UH-1Y completed its first overseas deployment with the 13th MEU in July 2009 and has supported sustained combat operations in OEF since November 2009. The UH-1Y has continued to demonstrate high rates of deployed readiness, achieving an average mission capability rate of 85 percent for the last squadron deployment which completed in November 2010. Deployed utilization is also high, with the nine OEF UH-1Ys averaging 3134 flight hours every six months (54.7 hours/month/aircraft), tripling normal continental United States (CONUS)-based operating levels.

Due to increased utility helicopter demand from the ground combat element, the Marine Corps approved a restructure of the H-1 squadron configuration from 18 AH-1Zs and nine UH-1Ys to 15 AH-1Zs and 12 UH-1Ys. As a result, the aircraft procurement mix changed to 189 AH-1Zs and 160 UH-1Ys, with 58 AH-1Z aircraft built new since insufficient numbers of AH-1Ws are available for remanufacture. The total aircraft procurement remains the same at 349.

V-22B Osprey

The Fiscal Year 2012 President's Budget request includes $2.4 billion in APN for procurement of 30 MV-22Bs and for continued development of follow-on block upgrades. Fiscal Year 2012 is the fifth year of the V-22 MYP contract. The V-22 MYP strategy supports a continued cost reduction and affordability trend, provides a stable basis for industry and best supports the needs of the warfighter. The funds requested in the Fiscal Year 2012 President's Budget will fully fund Lot 16 under the V-22 MYP contract, and procure long-lead items for Lot 17. The Marine Corps continues to field and transition aircraft on time.

The effectiveness and survivability of this revolutionary, first-of-type MV-22B Osprey tiltrotor has been repeatedly demonstrated in combat, from land-based operations in Iraq and Afghanistan to sea-based operations in Haiti and the Horn of Africa. As the premier medium-lift assault support platform, the Osprey brings unprecedented range, speed and survivability to the warfighter in a platform that far exceeds the capabilities of the CH-46E, giving combatant commanders unprecedented agility and operational reach.

The MV-22B has been continuously supporting the Marines since October 2007, in extreme environment conditions during nine combined deployments to Iraq, Afghanistan, and aboard amphibious shipping. It has the lowest Class A flight mishap rate of any USMC fielded tactical rotorcraft over the past ten years, and in 2010, the MV-22 had the lowest cost per seat mile of any DoN rotorcraft. Those figures will only improve as our cost per flight hour continues to decrease and our readiness rates continue to rise.

In February 2011, the V-22 fleet exceeded 100,000 total flight hours. With the pace of new aircraft introduction, flight hours have doubled since November 2008. The introduction of this new tiltrotor capability into combat has provided valuable lessons with respect to readiness and operating costs. Improvements continue to be made and are having a clear effect on increasing aircraft availability and decreasing flight hour costs. The MV-22 squadrons in Afghanistan and

on the MEU are seeing mission capable rates in the 70 percent range. This compares with the 71.6 percent availability over eighteen months of operations in Iraq. To keep these improvements on track, much in the same manner as with other successful programs like the F/A-18 and H-53 during early fleet introduction, we have introduced a Readiness Operations and Safety Improvement Program (OSIP) into the Fiscal Year 2012 President's Budget. This OSIP will provide the stable source of APN-5 so crucial to all programs in the early stages of their fleet introduction.

The MV-22 capability is being increased and fielded over time via a block upgrade acquisition strategy. The great benefit of a fly-by-wire rotorcraft is becoming clearer as we increase airspeed and lift by simply rewriting the flight control software. These advancements, along with any corrections of deficiency, require thorough testing. To support this, we have added RDT&E to the V-22 line in FY 2012 and FY 2013 to fund a replacement fully-instrumented aircraft. We have only one such aircraft now, and it is five iterations of V-22 behind what we fly today and requires hundreds of maintenance man hours per flight hour.

CH-53K Heavy Lift Replacement Program

In Fiscal Year 2012 the President's Budget requests $629 million RDT&E, N to continue SDD of the CH-53K. In the past year, the CH-53K program successfully completed its Critical Design Review (CDR), and began system capability and manufacturing process demonstration. During the balance of Fiscal Year 2011 and continuing through Fiscal Year 2012, the program will work on manufacturing the various test articles needed to support developmental test activities. The funding requested for Fiscal Year 2012 will support activities required to achieve first flight of the CH-53K in Fiscal Year 2013.

The new build CH-53K will replace the legacy fleet of CH-53E helicopters with an aircraft that provides the performance necessary to support our future warfighting requirements. The CH-53E Super Stallion provides unparalleled combat assault support to the MAGTF and is one of the Marine Corps most-stressed aviation communities. CH-53s, providing vital lift of heavy equipment, supplies and troops, are currently deployed in Afghanistan, the Horn of Africa, and with Marine Expeditionary Units. Since May 2010, these aircraft have flown over 11,500 hours, carried more than 79,000 passengers, and moved over 16 million pounds of cargo in support of coalition forces in Afghanistan and the Horn of Africa, while flying well above their programmed rates in austere, expeditionary conditions. The need for heavy lift support has increased substantially when compared to last year's numbers over the same reporting period. The only true heavy lift helicopters deployed to Afghanistan, CH-53Es have performed combat external recoveries of three coalition helicopters during this period. Forward-deployed aircraft typically operate at over three times the peacetime utilization rates.

To keep these platforms viable until the CH-53K enters service, the Fiscal Year 2012 President's Budget requests $133.6 million for both near and mid-term enhancements, including the Force XXI Battle Command Brigade and Below, Integrated Mechanical Diagnostic System, T-64 Engine Reliability Improvement Program kits, Directed Infrared Countermeasures, Critical Systems Armor and sustainment efforts such as Kapton wiring replacement. While these aircraft are achieving unprecedented operational milestones, they are nearing the end of their service life; the CH-53E is approaching 30 years of service and the CH-53D, operational for almost 40 years is scheduled to retire from active service in First Quarter Fiscal Year 2013.

The new-build CH-53K will fulfill land and sea based heavy-lift requirements not resident in any of today's platforms, and contribute directly to the increased agility, lethality, and presence of joint task forces and MAGTFs. The CH-53K will transport 27,000 pounds of external cargo out to a range of 110 nautical miles, nearly tripling the CH-53E's lift capability under similar environmental conditions, while fitting into the same shipboard footprint. The CH-53K will also provide unparalleled lift capability under the high altitude, hot weather conditions similar to those found in Afghanistan, greatly expanding the commander's operational reach.

Maintainability and reliability enhancements of the CH-53K will improve aircraft capability and operational effectiveness over the current CH-53E with improved cost effectiveness. Additionally, survivability and force protection enhancements will increase protection dramatically, for both aircrew and passengers, thereby broadening the depth and breadth of heavy lift operational support to the Joint Task Force and MAGTF commander. Expeditionary heavy-lift capabilities will continue to be critical to successful land- and sea-based operations in future anti-access, area-denial environments, enabling seabasing and the joint operating concepts of force application and focused logistics.

The CH-53K program continues to meet all of its performance goals, but is expected to achieve IOC approximately 40 months later than the original goal of September 2015. The current projected Program Acquisition Unit Cost is approximately 5.7 percent higher than the original goal and projected Average Procurement Unit Cost is approximately 4.3 percent higher. These schedule and cost projections have changed little over the past 18 months, varying only as program budget assumptions changed, providing a good indication that program execution is stable.

EXECUTIVE SUPPORT AIRCRAFT

VH-71 / VXX Presidential Helicopter Replacement Aircraft

The Fiscal Year 2012 President's Budget includes $180.1 million for continuing efforts on VXX, the follow-on program for presidential helicopters. Fiscal Year 2012 reflects a funding adjustment to address the revised MS A date. The original funding profile assumed MS A early in Fiscal Year 2011 and commensurate contract start.

The VH-71 termination proposal was received on May 21, 2010, with negotiations and the anticipated settlement expected late in Fiscal Year 2011. The Navy is currently working closely with Defense Contract Management Agency and Defense Contract Audit Agency in a complex effort to disposition all assets acquired during the VH-71 Program. The majority of VH-71 specific tooling has been sold back to the OEM in Europe. The process of disposition of non-aviation related assets is well underway in the United States and is beginning in Europe. The Navy continues to dialogue with various operators of the EH-101 and other Federal entities concerning disposition of VH-71 aircraft and parts.

VXX activity will include continuing effort that began in Fiscal Year 2010, with current activity in Fiscal Year 2011 focused on completing the AoA, capability based assessments, concept of operations development, trade study analysis, specification development, system concept

development and threat analysis leading to a successful MS A decision in the latter part of Fiscal Year 2011. Following the decision to enter into the Technology Development Phase at MS A, Fiscal Year 2012 activities will focus on the proposed material solutions. Specifically, the program will begin reducing technology risk by determining and maturing the appropriate set of technologies through select prototype demonstrations.

The VXX AoA addresses all feasible options with a holistic assessment of requirements, capabilities, cost drivers, schedule implications, and risks. The requirement for a replacement Presidential helicopter was validated by the Joint Requirements Oversight Council; the details and specifications on how the requirement will be met safely and affordably have not been finalized. As a first step in the process to determine how best to satisfy the need to transport the President, data will be analyzed and matured by the government study team into executable alternatives. This AoA process is near completion and will support the development of an acquisition strategy that will balance capability and affordability; the emphasis will be on affordability.

VH-3D/VH-60N Executive Helicopters Series

The Fiscal Year 2012 President's Budget requests an investment of $58 million to continue programs that will ensure the legacy Presidential fleet remains viable until its replacement is fully fielded. Ongoing efforts include the Cockpit Upgrade Program for the VH-60N, Communications Suite Upgrade, Structural Enhancement Program and the Obsolescence Management Program. The VH-3D and VH-60N Trainers Conversion Program will begin in Fiscal Year 2011 and continue into Fiscal Year 2012. Service life assessment results are currently being evaluated for both VH-3D and VH-60N, with non-recurring engineering beginning for the Service Life Extension Program beginning in Fiscal Year 2012. The VH-3D Cockpit Upgrade Program, providing a common cockpit with the VH-60N, will start in Fiscal Year 2012. Continued investments in the legacy fleet will ensure continued safe and reliable Executive transportation until the replacement aircraft is fielded.

UNMANNED AVIATION

MQ-4C Broad Area Maritime Surveillance (BAMS) UAS

The Fiscal Year 2012 President's Budget requests $548.5 million RDT&E to continue SDD of the BAMS UAS and $4.5 million MILCON to construct a training facility at NAS Jacksonville. The MS B decision for the BAMS UAS program was achieved on April 18, 2008. The program is on schedule. The Systems Requirement Review (SRR) was conducted in January 2009, System Functional Review in June 2009, Integrated Baseline Review in July 2009, Preliminary Design Review (PDR) in February 2010 and the CDR in February 2011. The BAMS UAS program will meet the Navy requirement for a persistent ISR capability. The BAMS UAS is a larger Group-5 system that will be a force multiplier for the Fleet Commander, enhancing situational awareness of the battle-space and shortening the sensor-to-shooter kill chain. BAMS UAS will work as an adjunct to the new P-8A Poseidon to provide a more affordable, effective and supportable maritime ISR option than current ISR aircraft. The Navy also procured two USAF Global Hawk (Block 10) UASs in Fiscal Year 2004, for demonstration purposes and to perform risk reduction activities for the BAMS UAS Program, known as the BAMS-

Demonstrator (BAMS-D) program. BAMS-D UAS has been deployed to the Central Command (CENTCOM) theater of operations for over two years.

MQ-8B Vertical Takeoff and landing Unmanned Aerial Vehicle (VTUAV)

The MQ-8B Fire Scout is an autonomous vertical takeoff and landing tactical UAV (VTUAV) designed to operate from all air-capable ships, carry modular mission payloads, and operate using the Tactical Control System and Line-Of-Sight Tactical Common Data Link. The Fiscal Year 2012 President's Budget requests $108.2 million RDT&E to develop an endurance upgrade and integrate weapons on the MQ-8B, and $198.9 million APN for the production of 12 Fire Scout MQ-8B aircraft, Ship Control Stations and initial spares. The RDT&E budget includes funding to increase endurance and integrate specialty payloads to support the Special Operation Forces (SOF) mission and satisfy urgent needs and a CNO-directed 18-month Rapid Deployment Capability for the Weaponization of the MQ-8B. The MQ-8B aircraft quantity supports Littoral Combat Ship (LCS) missions, SOF missions and other expeditionary demands. Procurement of ship based control stations is aligned with both the LCS mission and outfitting Fast Frigate (FFG) ships to support the SOF missions. Production to incorporate the endurance changes is included in the APN budget. The MQ-8B system is continuing a Military Utility Assessment (MUA) on the USS HALYBURTON to evolve fleet concepts for operation of the system. The MQ-8B system will deploy to Afghanistan in April 2011 to support the ISR Task Force from expeditionary facilities. The Fire Scout program will also continue to support integration and testing in all mission modules on LCS. The Navy continues to cooperate with the Coast Guard for their ship-based UAS planning.

Unmanned Combat Air System Carrier Demonstration (UCAS-D)

The Fiscal Year 2012 President's Budget requests $198.3 million RDT&E to continue the Navy Unmanned Combat Aircraft System Carrier Demonstration (UCAS-D) efforts to research a tactical jet-sized, carrier-suitable, low observable relevant, unmanned aircraft system. The UCAS-D program will demonstrate UCAS carrier operations and Autonomous Aerial Refueling (AAR), and mature required technologies to Technology Readiness Level (TRL)-6. The Aviation/Ship Integration portion of the program is meeting all technical objectives, with surrogate aircraft flights in vicinity of aircraft carriers (CV) completed in 2009 and 2010, and the next carrier-related operations scheduled for Spring 2011. The UCAS-D contract was competitively awarded in August 2007. The program was re-baselined in 2010 due to delays in the original contract schedule which was focused on early completion of UCAS-D objectives. The re-baselined schedule is executable within existing resources; completion of the carrier demonstration is planned for Fiscal Year 2013. AV-1 first flight was completed on February 4, 2011. Shipboard X-47B deck handling operations and flight operations in the vicinity of an aircraft carrier are scheduled to begin in 2012. Actual catapult launches, arrested landings and additional flight operations in the vicinity of a CV are scheduled to be completed in 2013. UCAS-D is an essential first step toward full-scale development of a carrier-suitable unmanned ISR/strike platform. Successful UCAS-D sea trials will set the stage for potential follow-on acquisition programs.

Cargo Unmanned Aerial System (CUAS)

The Fiscal Year 2012 President's Budget requests $53.9 million in support of Cargo UAS (CUAS) deployment through Fiscal Year 2012. This effort supports the USMC operational requirements captured in a Cargo UAS Joint Urgent Operational Needs (JUONS). The Marine Corps is assigned the lead service. Currently, two vendors have been awarded contracts in support of Cargo UAS development. The CUAS initiative is a MUA which will inform a follow-on program of record.

The purpose of the Cargo UAS capability is to "get trucks off the roads" in combat zones, minimizing the improvised explosive device (IED) threat to logistics convoys. The CUAS will provide a low risk, persistent, 24-hour capability for dispersed forces on the battlefield. This capability will mitigate the requirement for manned ground vehicles to resupply forces in remote locations. The CUAS will also augment manned aviation assault support assets and airdrop methods when the weather, terrain, and enemy pose an unsuitable level of risk. Aerial delivery of cargo by the CUAS, between main logistical hubs and remote "spokes", will be executed under the control of a ground control station at a main operating base and a remote terminal at the drop-off zone.

RQ-21A Small Tactical Unmanned Aircraft System (STUAS)

The Fiscal Year 2012 President's Budget requests $49 million in RDT&E ($22.7 million Navy, $26.3 million Marine Corps) and $12.8 million in APN for the RQ-21A Integrator STUAS program that will address Marine Corps and Navy ISR capability shortfalls currently supported by service contracts. This Group 3 UAS will provide persistent, ship and land-based ISR support for tactical level maneuver decisions and unit level force defense/force protection missions. MS B and contract award occurred in July 2010. MS C and LRIP decisions are scheduled for the 4th quarter of Fiscal Year 2012. Fiscal Year 2012 USMC RDT&E will procure two LRIP systems in order to support Initial Operation Test and Evaluation as well as complete the EMD. Fiscal Year 2012 APN will procure one LRIP system.

RQ-7B Marine Corps Tactical UAS (MCTUAS)

The Fiscal Year 2012 President's Budget requests $0.9 million RDT&E to continue development efforts and government engineering support, and $11.4 million in APN to support the continuation of congressionally mandated Tactical Common Data Link retrofits for RQ-7B Shadow units. MCTUAS is the same system as the Army's RQ-7B Shadow UAS, and is a Group 3 system procured as an interim replacement for the RQ-2B Pioneer UAS until a suitable Group 4 UAS can be fielded. The transition to the RQ-7B Shadow began in Fiscal Year 2007 and the Marine Corps procured its thirteenth and final system in Fiscal Year 2010. The Shadow UAS provides rapid fielding of a capability that meets Marine Corps urgent operational requirements and brings immediate interoperability and commonality between Army and Marine Corps unmanned aircraft units operating side-by-side in Afghanistan.

Unmanned Carrier Launched Airborne Surveillance and Strike (UCLASS) System

The Fiscal Year 2012 President's Budget requests $121.1 million RDT&E for the Unmanned Carrier Launched Airborne Surveillance and Strike (UCLASS) System efforts. The UCLASS system will provide a persistent, aircraft carrier based ISR and strike capability supporting carrier air wing operations no later than 2018. In order to achieve the UCLASS operational objectives, the system will maximize use of existing technology to launch and control the air vehicle, transfer data in support of precision strike, and conduct persistent surveillance operations. The UCLASS system will consist of a carrier-suitable air vehicle, a remote vehicle control segment, a system support segment, and connectivity to carrier unmanned components and systems, and to existing DoD Tasking, Processing, Exploitation and Dissemination systems. The system will be integrated into Carrier Controlled Airspace operations and will be maintained in accordance with standard fleet processes, wherever possible, as tailored for UAS application. The system will contain appropriately balanced survivability attributes to be effective in specified tactical situations. The Initial Capability Document has been entered into the Joint Capability Integration and Development System process. Formal acquisition and contracting strategies are in development.

WEAPONS

Tactical Tomahawk BLK IV Cruise Missile

The Fiscal Year 2012 President's Budget requests $303.3 million of Weapons Procurement, Navy (WPN) for procurement of an additional 196 BLK IV weapons and associated support and $36.1 million of OPN for the Tactical Tomahawk Weapon Control System (TTWCS). $6.3 million in RDT&E, N is requested for updates of the weapon system. WPN resources will be for the continued procurement of this versatile, combat-proven, deep-strike weapon system in order to meet surface and subsurface ship-fill load-outs and combat requirements. OPN resources will address the resolution of TTWCS obsolescence and interoperability mandates.

Theater Mission Planning Center (TMPC)

TMPC is the mission planning segment of the Tomahawk Weapon System. Under the umbrella of TMPC, Tomahawk Command and Control System (TC2S) develops and distributes strike missions for the Tomahawk Missile; provides precision strike planning, execution, coordination, control and reporting; and enables Maritime Component Commanders the capability to plan and/or modify conventional Tomahawk Land-Attack Missile missions. The Fiscal Year 2012 President's Budget requests $2.5 million RDT&E and $36.7 million OPN for continued TMPC development and support. These resources will complete testing of TC2S Version 4.3 and continue the development and testing of TC2S Versions 5.0 to improve joint interoperability, mission planning time and system usability. These resources are critical towards supporting 125 planning sites, to include Cruise Missile Support Activities; Tomahawk Strike and Mission Planning Cells; Carrier Strike Groups, Command and Control Nodes and Labs/Training Classrooms.

Joint Air-to-Ground Missile (JAGM)

The Fiscal Year 2012 President's Budget requests $118.4 million of RDT&E to support the continued development of this next-generation air-ground precision-guided weapons program. The DoN, in conjunction with the United States Army, received formal approval to proceed with the development of the JAGM in January 2008. During a 27-month technology development phase, two competing contractors completed system-level preliminary design reviews and successfully fired three ground-launch test missiles. These launches demonstrated the Key Performance Parameters for range and the maturity of JAGM missile seeker technologies in the semi-active laser, millimeter-wave, and imaging infrared modes. In Fiscal Year 2011, the JAGM program will complete MS B, conduct a competitive down-select, and award an Engineering and Manufacturing Development (EMD) contract to the winning JAGM competitor. JAGM will be launched from Navy and Marine Corps fixed-wing, rotary-wing, and unmanned platforms.

Hellfire Weapon System

The Fiscal Year 2012 President's Budget requests $36.7 million, including $14.0 million of OCO funding, for 421 Hellfire all-up-round weapons. Hellfire procurements are a mix of thermobaric, blast/fragmentation, and anti-armor warheads, to provide maximum operational flexibility to our warfighters. This procurement quantity will bring the inventory total to approximately fifty-percent of the requirement and will increase our training assets. While the DoN develops the JAGM, continued support for legacy Hellfire weapons is required. Hellfire continues to be a priority weapon for current military operations as it enables our warfighters to attack targets in the caves of Afghanistan, as well as to prosecute military operations in urban environments.

Small Diameter Bomb II (SDB II)

The Fiscal Year 2012 President's Budget requests $47.6 million of RDT&E for the continued development of this joint DoN and Department of the Air Force weapon and bomb-rack program. SDB II provides an adverse weather, day or night standoff capability against mobile, moving, and fixed targets, and enables target prosecution while minimizing collateral damage. SDB II will be integrated into the internal carriage of both the Navy (F-35C) and Marine Corps (F-35B) variants of the F-35 and will be compatible with the BRU-61/A miniature-munitions carriage. SDB II entered MS B in August 2010 and successfully completed CDR in January 2011.

Joint Standoff Weapon (JSOW)

The Fiscal Year 2012 President's Budget requests $7.5 million of RDT&E for continued JSOW-C-1 test activity and $137.9 million of WPN for production of 266 All-Up Rounds. The JSOW-C-1 variant fills a critical capability gap by adding maritime moving-target capability to the highly successful baseline JSOW-C program. JSOW-C-1 targeting is achieved via a data-link and guidance software improvements. Initial LRIP deliveries began in October 2010.

Direct Attack Moving Target Capability (DAMTC)

The Fiscal Year 2012 President's Budget requests $41.3 million for the completion of OT and the first FRP order of 3,500 weapons. DAMTC was initiated as a Fiscal Year 2007 Rapid

Deployment Capability (RDC) in response to an urgent requirement identified by the combatant commander overseeing operations in Iraq and Afghanistan. The RDC has now transitioned to a formal program of record entering the Department's formal acquisition system at MS C. DAMTC provides a flexible, dual-mode weapon capable of precision guidance and attack on stationary targets through the weather, as well as reactive targeting and attack of moving and maneuvering targets in clear weather. The material solution for the DAMTC program is the Laser Joint Direct Attack Munition (LJDAM). The Laser JDAM leverages proven baseline JDAM technology and the existing JDAM logistics infrastructure mitigating life-cycle support costs.

Advanced Anti-Radiation Guided Missile (AARGM)

The Fiscal Year 2012 President's Budget requests $6.7 million of RDT&E for the follow-on development and test program and $73.1 million for production of 72 All-Up-Rounds and Captive Training Missiles. The AARGM development program transforms the legacy High-speed Anti-Radiation Missile (HARM) into an affordable, lethal, and flexible time-sensitive strike weapon system. AARGM adds multi-spectral targeting capability with supersonic fly-out to destroy sophisticated enemy air defenses and expand upon the traditional anti-radiation missile target set. The program was approved for its first of three LRIPs in Fiscal Year 2008. IT&E began in February 2011 and Initial OT&E (IOT&E) is scheduled to begin in the third quarter of Fiscal Year 2011, with IOC on the F/A-18C/D in 2011.

Advanced Precision Kill Weapon System II (APKWS II)

The Fiscal Year 2012 President's Budget requests $29.0 million of PAN&MC, including $11.5 million of OCO funding, for procurement of 1656 APKWS II Precision Guidance Kits and $3.1 million of RDT&E to support an APKWS Fixed-Wing Joint Capabilities Technology Demonstration. After the DoN assumed program authority from the Army on September 30, 2008, Congress appropriated funding and approved a DoN above-threshold reprogramming (ATR) request in Fiscal Year 2008 to complete APKWS II development. Integrated testing was completed in January 2010, MS C followed in April 2010 and the LRIP contract was awarded in July 2010. IOC is planned for the fourth quarter of Fiscal Year 2011. APKWS II will provide an unprecedented precision guidance capability to our current unguided (and thus less accurate) rockets, improving accuracy and minimizing collateral damage. The program is on schedule and on budget to meet the needs of our warfighters in today's theaters of operations.

Sidewinder Air-Intercept Missile (AIM-9X)

The Fiscal Year 2012 President's Budget requests $8.8 million of RDT&E and $47.1 million of WPN for this joint DoN and Department of the Air Force program. RDT&E will be applied toward AIM-9X developmental/operational tests and requirements definition for Joint Staff directed Insensitive Munitions requirements. WPN will be for production of a combined 132 all-up-rounds and Captive Air Training Missiles and missile-related hardware. The AIM-9X Sidewinder missile is the newest in the Sidewinder family and is the only short-range infrared air-to-air missile integrated on USN/USMC/USAF strike-fighter aircraft. This fifth-generation weapon incorporates high off-boresight acquisition capability and increased seeker sensitivity through an imaging infrared focal plane array seeker with advanced guidance processing for

improved target acquisition; and advanced thrust vectoring capability to achieve superior maneuverability and increase the probability of intercept of adversary aircraft.

Advanced Medium-Range Air-to-Air Missile (AMRAAM/AIM-120)

The Fiscal Year 2012 President's Budget requests $2.9 million for continuing RDT&E efforts and $188.5 million for production of 161 all-up-rounds and captive air training missiles and missile-related hardware. AMRAAM is a joint Navy and Air Force missile that counters existing aircraft and cruise-missile threats. It uses advanced electronic attack capabilities at both high and low altitudes, and can engage from beyond visual range as well as within visual range. AMRAAM provides an air-to-air first look, first shot, first kill capability, while working within a networked environment in support of the Navy's Theater Air and Missile Defense Mission Area.

The following are the responses to Hearing Questions requested in the Sub-Committee's Letter of Invitation to Secretary Mabus, dated March 2, 2011.

A-12 Litigation

The dispute over the 1991 termination for default of the A-12 program has been in litigation since June 1991. On appeal for the third time, on June 2, 2009 the Court of Appeals for the Federal Circuit affirmed the May 2007 judgment of the Court of Federal Claims that the Navy had properly terminated the contract for default. Plaintiffs/appellants sought a rehearing before the full Court of Appeals, but their requests were denied on November 24, 2009. The contractors sought and obtained Supreme Court review. On January 18, 2011, the contractors presented their argument that the impact of a state secrets privilege assertion upon default termination of the A-12 contract precluded the proper presentation of the contractors' superior knowledge affirmative defense. A decision is expected before the current term of the Supreme Court expires in late June 2011.

DoN aircraft strike-fighter force structure inventory requirement

The 1,240 aircraft strike-fighter force is the projected DoN inventory needed to support the anticipated operational demand through the 2024 timeframe. The Navy inventory requirement of 820 aircraft supports - 40 active duty Strike Fighter Squadrons composed of 440 aircraft, and two reserve squadrons with 20 aircraft. In order to maintain the operational aircraft, support aircraft are required for aviator training, flight test, attrition reserve and the depot pipeline. This inventory projection is estimated based on historical averages and assumes 100 percent squadron entitlement (no productive ratio reductions) and does not account for potential future efficiencies gained from TACAIR Integration (TAI). Both services remain committed to TAI.

The Marine Corps TACAIR requirement to meet operational demands and commitments is 420 F-35 JSFs in 21 active and three reserve squadrons. Since 2001, this requirement has been consistently stated, documented and periodically verified for relevancy. A total of 282 aircraft will be assigned to operational squadrons, 64 aircraft for training use, six aircraft for test and evaluation, and the reminder for pipeline maintenance and attrition replacement. The inventory projection is based on detailed projected and historical operational analysis, optimization of the

JSF multi-mission capabilities, complete legacy TACAIR replacement by the F-35, and expected improvements in reliability, maintainability and survivability.

During the Fiscal Year 2011 President's Budget submit, the DoN inventory shortfall projection was 177 aircraft toward the end of the decade, without the implementation of mitigation levers. With implemented levers, including the planned SLEP of Legacy Hornets, it was estimated that the shortfall could be reduced to approximately 100 aircraft. Combined with the planned accelerated transition of three additional Super Hornet squadrons (10 total) using the 41 additional aircraft in PB12, and the modification of the Marine Corps' transition plan to account for the delayed delivery of 67 F-35B/C to outside the FYDP, the Fiscal Year 2012 President's Budget DoN strike-fighter inventory shortfall projection is a manageable 65 aircraft. The shortfall is estimated to peak in 2018. As analysis is updated projections will continue to evolve and further mitigations will be explored.

Discussion of current and future capabilities inherent in the F/A-18E/F that do not meet future Combatant Commander operational requirements for strike-fighter aircraft.

The F/A-18E/F is a highly capable aircraft designed to meet and defeat today's threats with growth potential for the future. The aircraft provides a 40 percent increase in combat radius, 50 percent increase in endurance, 25 percent greater weapons payload, three times more ordnance bring-back, and is five times more survivable than legacy F/A-18A/C models. The Super Hornet will be a complementary platform on the nation's carrier decks with the F-35C into the 2030s and will meet current and projected requirements, with planned investments in the Fiscal Years 2012-2016 FYDP and beyond. These investments in F/A-18E/F spirals, to include upgraded avionics and sensors, will ensure relevancy against emerging and future threats.

JSF and F/A-18E/F capabilities will be complementary, with an ideal balance of versatility, lethality, survivability, and capacity that will pace the threat through 2030. A mix of the two aircraft in future carrier air wings represents an affordable, timely solution to the strike-fighter shortfall and provides conventional conflict analysis validated, combat capability and capacity to support foreseen carrier strike group mission requirements through 2030.

A discussion of 1) how many aircraft engine types and models the DON currently operates, maintains and sustains and the logistical strategy employed by the DON to support all aircraft operations, 2) a representative comparison of how many aircraft engine types and models were aboard aircraft carriers during Operation Desert Storm, and 3) how many aircraft engine types and models are projected to be aboard aircraft carriers in 2035, assuming only the F135 engine F-35 aircraft.

The DoN supports the Secretary of the Defense's position that the interest of the taxpayer, the military, our partner nations, and the resource integrity of the overall F-35 program as best served by not pursuing a second engine. Our assessment is that the benefits that might theoretically accrue with a second engine are more than offset by excess cost, complexity and associated risks, and will divert precious modernization funds from other more pressing priorities. The implementation of two F-35 engines onboard aircraft carriers is suboptimal due to increased Operational Logistics Footprint (LFP) aboard carriers. While the engine is interchangeable, several engine components are not. For example, the engine front fans and gearboxes are different and not interchangeable.

In the 1990 timeframe of Operation Desert Storm, the following tactical carrier based aircraft engines were onboard: TF30 or F110 for F-14 (noting that only a single engine type was supported afloat); F404 for F/A-18A-D (during one deployment in 1996, both the F404/400 and F404/402 were supported on one carrier due to unique operational requirements; however, unlike the F-35 engines, much of the support equipment, components and training were common); T56 for E-2; J52-P8B for A-6; TF41 for A-7; TF34 for S-3; and J52-P408 for EA-6B. Of these, future carrier based aircraft engines include F414 for FA/-18E/F and EA-18G, T56 for E-2D and F135 for F-35.

There are currently 24 active type/model/series engines in the DoN inventory. Of the total quantity of 11,040 engines, only 9,402 are considered active engines. The population of Naval Aviation engine type/model/series from Desert Storm timeframe in the 1990's to 2035 totaled 22. The number of different type/model/series engines will be below 10 in 2035 due mostly to a decrease in the type/model/series of aircraft.

A discussion regarding all issues, associated risks, feasibility, costs and schedule of integrating the F-35B and F-35C aircraft onto L-class and CVN-class ships for forward deployed operations, and what date changes to L-class ships will be made to support the forward deployability of the Marine Corps' planned Fiscal Year 2012 IOC date for F-35B.

Several separate ship alterations have been identified as requirements to integrate F-35C into CVN aircraft carriers. These modifications provide electrical power supply, expanded weapons handling, construction of secure access facilities, Autonomic Logistics Information Systems, mission rehearsal training, and Joint Precision Approach and Landing System. F-35C thermal impacts on CVN are currently being modeled with promising preliminary results. Land based testing of the F-35C exhaust plume on the jet blast deflector are scheduled to be tested this summer, will validate the analysis, and will determine the scope of the JBD modifications. Ship modification will continue to be incorporated into CVN68-class aircraft carriers during planned maintenance availabilities in advance of F-35C arrival. Required modifications that are not part of the CVN78-class design will be incorporated into the ship prior to F-35C deployment.

A discussion regarding the analysis and probability of when the F-35B and F-35C are scheduled to declare Initial Operation Capability as it relates to the restructured System Design and Demonstration (SDD) program delay resulting from the recent technical baseline review.

The DoN is assessing the implications of the restructured program to F-35B and F-35C IOC. The Navy and Marine Corps require that the aircraft attain service-specific mission oriented capabilities as defined in the F-35 Operational Requirements Document (ORD) prior to considering declaration of IOC. The Marine Corps requires a Block 2B weapons system capability and the Navy requires a fully-ORD compliant Block 3C capability. Implementation of the TBR findings and development of detailed test schedule is still in progress. Once the findings have been assessed, test schedules further matured, and all information incorporated into a new Integrated Master Schedule, the services will be able to assess and establish IOC dates for each F-35 variant.

Discussion of the known risks and issues specifically related to the DON regarding the development, fielding and deployment of the Autonomic Logistics Information Systems (ALIS) for sustaining the F-35 as it relates to maintenance and logistics operations.

F-35 Autonomic Logistics Global Sustainment is built concurrently with the aircraft and the ALIS is being used to support flight test operations today. As with any new system, there has been a learning curve associated with the new logistics support system and the new users; however, as maintainers continue to tax and use the system, improvements and efficiencies can be identified. The early operational use of ALIS with the developmental test program at NAS Patuxent River, will function as risk mitigation for OT&E and for operational fielding. Currently there are no known risks that do not have mitigation plans in-place. We will continue to address any issues that may arise as development continues, as is done for any complex developmental effort, and as plans for test and deployment mature.

Aviation Safety

Naval Aviation Summary - The table below provides a summary of all Class A, B & C Flight mishaps from Oct 2009 through March 02, 2011. The rates are based on total Flight Hours of 1,624,743.

YEAR	Flight Hours	Class A	Class A Rate	Class B	Class B Rate	Class C	Class C Rate
FY 10	1,172,460	11	0.94	16	1.36	77	6.57
FY 11	452,283	2	0.44	4	0.88	35	7.74

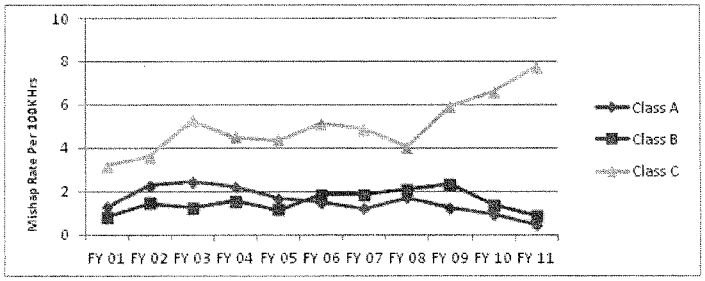
The most recent DON Flight Class A Mishaps include:

- Dec 02, 2010: (El Centro, CA) F/A-18C departed runway after landing. Pilot ejected safely.
- Dec 29, 2010: (near Tallahassee, FL) T-45 crashed during training flight. Both crew ejected safely.

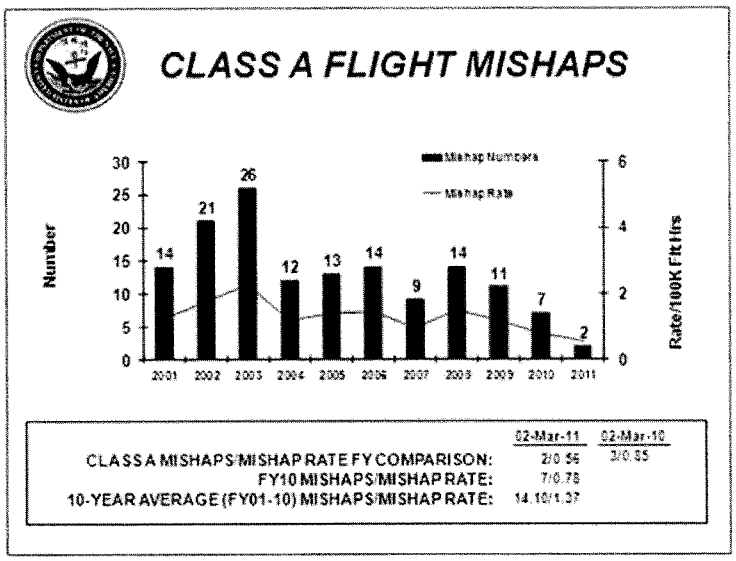
Recent DON Flight Related Mishaps (FRM) or Aviation Ground Mishaps (AGM) not included in above table or below Navy and Marine Corps charts:

- Dec 05, 2010: (Afghanistan) Fratricide during an F/A-18C day air-to-ground strafe delivery.
- Dec 03, 2010: (PAX River, MD) Airborne Low Frequency Sonar (ALFS) transducer assembly departed MH-60R. Transducer recovered. Expect mishap downgrade after repair cost calculation

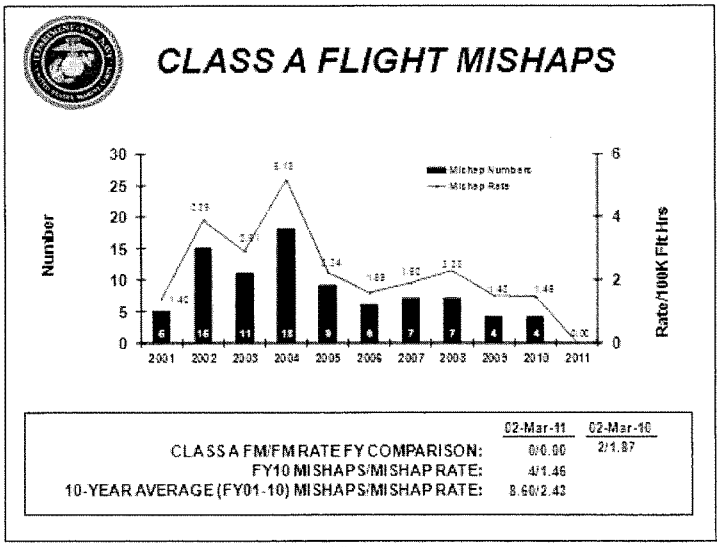
DON Historical Mishap Rate Trend per 100K Flight Hours (as of March 2, 2011) per Mishap Class is shown below.



Class A Flight Mishap historical data for U.S. Navy



Class A Flight Mishap historical data for U.S. Marine Corps



Vice Admiral W. Mark Skinner
Principal Military Deputy

Vice Admiral Skinner is currently serving as the principal military deputy to the assistant secretary of the Navy (Research, Development, and Acquisition). He assumed his duties Aug. 9, 2010.

Skinner was born in Houston, Texas and graduated from the United States Naval Academy in June 1977.

As a flag officer, he was the program executive officer for Tactical Aircraft Programs and commanded Naval Air Warfare Center, Weapons Division and served as assistant commander, Test and Evaluation, Naval Air Systems Command.

Skinner held both operational and shore commands to include commanding officer Patrol Squadron 47, chief test pilot and commanding officer of Naval Force Aircraft Test Squadron, and program manager for a chief of naval operations special project.

He is a graduate of the Navy Test Pilot School and served in Force Warfare Aircraft Test Directorate, where he was recognized as Directorate Test Pilot of the Year in 1986. Additionally, he received a degree in Financial Management from the Naval Post Graduate School, where he graduated as a Conrad Scholar and was awarded the Department of Navy award for excellence in financial management and the Rear Admiral Thomas R. McClellan award for excellence in administrative sciences.

His awards include Legion of Merit (3 awards), Meritorious Service Medal (4 awards), Navy Commendation Medal (2 awards), Navy Achievement Medal, and other unit deployment citations and ribbons.

Lieutenant General Terry G. Robling
Deputy Commandant for Aviation

Lieutenant General Robling entered the Marine Corps in 1976 after graduating from Central Washington University with a degree in Business Administration. Following graduation from the Basic School in April 1977, he began flight training and earned his wings in November 1978.

Upon completion of F-4 Phantom transition training at MCAS Yuma, Arizona, he reported to MCAS Kaneohe Bay, Hawaii, and joined the "Lancers" of VMFA-212. As a "Lancer," he attended TOPGUN and participated in two WestPac deployments to Iwakuni, Japan. During his three-year tour with VMFA-212, he held various billets including Maintenance Control Officer, Assistant Maintenance Officer, and Aircraft Maintenance Officer.

In June 1983, Lieutenant General Robling reported to Amphibious Warfare School in Quantico, Virginia and upon graduation returned to MCAS Kaneohe Bay for duty with VMFA-235. As a "Death Angel," he held assignments as the Assistant Operations Officer and Aircraft Maintenance Officer, completed two more WestPac deployments and attended the Weapons and Tactics Instructor Course.

In June 1987, Lieutenant General Robling reported to Headquarters Marine Corps where he served as Aviation Programs Officer for the Deputy Chief of Staff for Aviation. During this tour, he was one of 24 officers selected for F/A-18D transition on the first "Delta" transition board. In August 1989, he reported to VMFAT-101 at MCAS El Toro for F/A-18 Hornet transition training, after which he remained with the "Sharpshooters" as the Aircraft Maintenance Officer as well as a pilot and weapon systems officer instructor.

In December 1990, Lieutenant General Robling reported to the newly redesignated VMFA(AW)-242 and assumed the duties as Executive Officer. In June 1992, he was reassigned as the Commanding Officer of VMFA(AW)-242 and completed another WestPac deployment to Iwakuni, Japan. As the Commanding Officer, Lieutenant General Robling was selected as the Marine Corps Naval Flight Officer of the Year in 1993.

In August 1994, Lieutenant General Robling reported to the National War College where he obtained a Master of Science Degree in National Security Strategy. Following graduation, he reported to the Chairman, Joint Chiefs of Staff, Washington, DC for duty as the Current Operations Officer, Central Command Division of the Joint Operations Department.

In August 1998, Lieutenant General Robling was selected for a Foreign Affairs Fellowship and attended Johns Hopkins University at the School of Advanced International Studies in Washington, DC. Upon completion of the Fellowship, he was reassigned to the Director of

Expeditionary Warfare, Office of the Chief of Naval Operations, as the Resource and Requirements Officer for Unmanned Aerial Vehicles.

In January 2000, Lieutenant General Robling assumed command of Marine Aircraft Group 11. In August 2001, he assumed the duties of Chief of Staff for the 3d Marine Aircraft Wing in Miramar, California. In June 2002, Lieutenant General Robling assumed the duties of Assistant Wing Commander for the 3d Marine Aircraft Wing.

In January 2003, Lieutenant General Robling deployed for Operation Iraqi Freedom. He was designated Commanding General, 3d MAW Forward in June 2003 and returned to Miramar in September 2003. In July 2004, Lieutenant General Robling assumed duty as Chief of Staff, Striking and Support Forces NATO, in Naples, Italy. In July 2006, he was assigned to serve as the Director, Strategy and Plans Division in Plans, Policy and Operations, Headquarters, U.S. Marine Corps.

In July 2007, Lieutenant General Robling assumed command of the 3d Marine Aircraft Wing, where he served until August of 2009. In September 2009, Lieutenant General Robling assumed command of the III Marine Expeditionary Force and Marine Corps Bases Japan.

Rear Admiral Kenneth E. Floyd
Director, Air Warfare Division (OPNAV N88)

Rear Admiral Floyd hails from Lewisburg, W.Va., and was commissioned through the University of North Carolina at Chapel Hill NROTC program in May 1980. He was designated a naval flight officer in August 1981 and completed training in the F-14A at Fighter Squadron (VF) 101 in May 1982.

Floyd served in several F-14 Tomcat squadrons including tours with the Jolly Rogers of VF-84, the Grim Reapers of VF-101 as an instructor, and the Red Rippers of VF-11. He participated in Operation *Desert Storm* while serving as a department head with the Starfighters of VF-33. He served as the executive officer and subsequently the commanding officer of the VF-32 Swordsmen from November 1994 to September 1997.Subsequent sea tours include a tour as the executive officer of USS *Constellation* and deputy commander of Carrier Air Wing 7 where he participated in Operation *Enduring Freedom*. He commanded Carrier Air Wing 7 from February 2003 to July 2004.

Ashore Floyd served on the staff of the Naval Space Command in Dahlgren, Va. as aide to the commander and subsequently as flag lieutenant, commander Carrier Group 8. He also attended the Naval War College graduating with a Master of Arts degree in International Studies and served as the chief staff officer on the Fighter Wing, U.S. Atlantic Fleet staff. He completed a tour on the staff of the United States military representative to the NATO Military Committee in Brussels, Belgium, served as the deputy operations officer on the staff of Joint Task Force Southwest Asia in Riyadh, Saudi Arabia, and served as chief of staff to commander, Naval Air Forces. He has served flag tours as director, Aviation and Aircraft Carrier Plans and Requirements (OPNAV N880) and deputy director, Air Warfare Division (OPNAV N88B) prior to assuming command of Strike Force Training Pacific in February 2009. He returned to the OPNAV staff in June 2010 and is currently serving as director, Air Warfare Division (OPNAV N88).

His awards include the Legion of Merit, Bronze Star, Defense Meritorious Service Medal, Meritorious Service Medals, Air Medal, Navy Commendation Medal, Navy Achievement Medal and various campaign, unit, and service medals.

DEPARTMENT OF THE AIR FORCE

PRESENTATION TO THE
HOUSE ARMED SERVICES COMMITTEE
SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES
U.S. HOUSE OF REPRESENTATIVES

SUBJECT: Air Force Tactical Aviation Programs

COMBINED STATEMENT OF: Lt Gen Mark D. Shackleford, Military Deputy
Office of the Assistant Secretary of the Air Force
(Acquisitions)

Lt Gen Herbert J. (Hawk) Carlisle
Deputy Chief of Staff
Operations, Plans and Requirements

March 15, 2011

NOT FOR PUBLICATION UNTIL RELEASED BY
HOUSE ARMED SERVICES COMMITTEE
SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES
U.S. HOUSE OF REPRESENTATIVES

Lt. Gen. Mark D. Shackelford, Accompanied by: Lt. Gen. Herbert J. (Hawk) Carlisle

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Committee: House Armed Services Committee — Subcommittee on Tactical Air and Land Forces

Subject: Air Force Tactical Aviation Programs

Testimony:

Statement of Mark D. Shackelford, Military Deputy, Office of the Assistant Secretary Department of the Air Force

Accompanied by:

Lieutenant General Herbert J. (Hawk) Carlisle, Deputy Chief of Staff, Operations, Plans and Requirements (AF/A3/5), Department of The Air Force

House Armed Services Subcommittee on Tactical Air and Land Forces

March 15, 2011

I. Introduction

Chairman Bartlett, Ranking Member Reyes, and distinguished members of the subcommittee, thank you for calling this hearing, and for the opportunity to provide you with an update on Air Force modernization efforts and other matters important to our Air Force and to the Nation. The Air Force is fully engaged in operations across the globe, including overseas contingency operations (OCO) and supporting the Combatant Commanders (COCOM) and enabling them to successfully execute their missions. In the coming year, we will assess how the Fiscal Year (FY) 2012 budget request aligns with standing operational requirements and future needs of the entire Air Force. The Secretary of Defense, in the recent 2010 Quadrennial Defense Review (QDR), set four objectives to guide our current actions and future planning: prevail in today's wars, prevent and deter conflict, prepare to defeat adversaries and succeed in a wide range of contingencies, and preserve and enhance the all-volunteer force. The Air Force is vectoring to meet these objectives, balancing risk appropriately, and preparing to prevent, prevail, and preserve well into our Nation's future.

We frame our decisions and recommendations using the 2010 QDR and the Air Force's top five priorities, established by the Secretary and Chief of Staff of the Air Force. We understand your focus today is on the Air Force investment plans to ensure that conventional strike, air superiority, and rotary-wing capabilities are adequate for executing the National Military Strategy with an acceptable level of risk. Our rapidly aging aircraft fleet drives our urgent need to balance between acquiring new inventory with sustaining our current fleet. We look forward to discussing how we can match the requirements with available resources in order to execute the National Military Strategy.

II. Contributions of our Air Force

Today, the Air Force flies and fights in air, space, and cyberspace--globally and reliably--as a valued member of our Joint and coalition teams. Nearly 37,000 Airmen are deployed to 135 locations across the globe, with over 29,000 in and around Afghanistan and Iraq, as we unwaveringly do whatever it takes to prevail in today's wars. Airmen, Soldiers, Sailors, and Marines who cross outside the wire do so with the asymmetric advantage of armed overwatch, globally integrated intelligence, surveillance, and reconnaissance, combat search and rescue, and aero-medical evacuation. Last year the Air Force conducted more than 45,000 sorties supporting Operation IRAQI FREEDOM/NEW DAWN and almost 101,000 sorties supporting Operation ENDURING FREEDOM, delivered over 1.78 million passengers and 712,000 tons of cargo, and employed almost 2,580 short tons of munitions. Additionally, we have transported nearly 86,000 patients from the United States Central Command (CENTCOM) area of responsibility (AOR). An additional 57,000 total force Airmen are forward stationed overseas providing capabilities in direct support of our combatant commander requirements. And from home stations here in the United States, approximately 218,000 Airmen provide daily support to combatant commanders' worldwide operations, including standing nuclear alert, commanding and controlling our satellites, controlling remotely piloted aircraft (RPA), analyzing intelligence, surveillance and reconnaissance data and much more. On the home front, since September 11th, 2001, the Air Force has flown over 60,200 total sorties under Operation NOBLE EAGLE, including 42,800 fighter sorties, 11,700 tanker sorties, and 1,870 early warning sorties. As a testament to the total force, the Air National Guard has flown more than 65 percent of these sorties and currently operates 18 Air Sovereignty Alert sites. As we continue to accomplish our current mission sets and plan for future threats, we must remain mindful of the increasing age and costs of operating our air fleet. Our Air Force leadership is scrutinizing programs and budgets to find acceptable solutions to meet growing demands that are competing for limited funds.

III. Fighter Aircraft Shortfalls

During the FY12 program review, the Air Force delivered to the Office of the Secretary of Defense, Cost Analysis and Program Evaluation (OSD CAPE) the Service's moderate risk

fighter force structure requirement of 1,200 primary mission aircraft and 2,000 total aircraft. A comprehensive review of the current and projected force structure revealed a total aircraft shortfall of approximately 3-5% through the Future Years Defense Program. This shortfall will be mitigated through aggressive management of F-35 production, legacy fleet review and sustainment, along with selected service life extension (SLEP) and modernization programs. F-35 program status remains the key variable in the fighter force structure forecast as the Air Force transitions to a 5th Generation fighter force. However, current Air Force mitigation options preserve decision space as we carefully monitor program status and impending decision points.

The Air Force performs regular, comprehensive fighter force structure reviews that incorporate information from fleet viability boards, ongoing and scheduled full-scale durability tests and the latest real-world aircraft engineering data. A review is currently underway and will provide modified fighter shortfall numbers within the next several months. Shortfall mitigation will include executing funded sustainment and fleet management actions for older F-16 Block 25, 30 & 32 aircraft, newer F-16 Block 40/50 service life extension and targeted modernization, and examination of the overall force structure to ensure viable warfighting capabilities are maintained.

IV. Status of Combat Aircraft Acquisition

Fighter Force

The average age of all Combat Air Force aircraft is 21.3 years. The assessment of our aircraft's longevity is complicated by the fact that we are currently flying the oldest Air Force fleet in our history and using them longer and more frequently than was envisioned during their design as a result of over 20 years of continuous combat operations. This presents considerable challenges in a difficult fiscal environment.

As we fulfill, and in some cases extend, the service lives of our aircraft it is important to ensure not only the structural integrity of the airframe, but also the aircraft's viability to perform mission tasks. Modernization will be a key piece of any force structure forecast due to the proliferation of technology and ever changing mission environment. Actions to extend and modernize the legacy fleet are a bridge to 5th generation capabilities and are not considered replacement actions.

A-10

The A-10 provides our Joint Force Commanders lethal, precise, persistent, and responsive firepower for close air support and combat search and rescue. It has performed superbly in Operations DESERT STORM, ALLIED FORCE (OAF), ENDURING FREEDOM (OEF) and

IRAQI FREEDOM (OIF). However, the A-10's age and high operations tempo have taken a toll on the fleet. The A-10 fleet's aircraft availability for FY10 was 52 percent.

The Air Force plans to retain the venerable A-10 fleet beyond 2030 based on implementation of the proper care, investment, and fleet management recommendations specified by a 2006 Fleet Viability Board. The FY12 President's Budget (PB) invests approximately $500M across the Future Years Defense Program (FYDP) for funding modernization, sustainment, and life extension programs for the A-10. In FY07 the A-10 fleet began a robust depot-level modification. This year we begin installing "thick- skin" wings on 230 A-10s--nearly two-thirds of the fleet, and begin improving the fuselage structure. The Air Force is also modernizing 347 A-10s to the 'C' configuration anticipating completion by April of 2011. This upgrade includes precision engagement modifications to integrate targeting pods and digital data links into the aircraft avionics, enabling use of global positioning system-aided munitions such as the Joint Direct Attack Munition (JDAM) and Wind Corrected Munitions Dispenser. We also integrated a digital data link and advanced targeting pods with video downlink and replaced monochrome cockpit displays with color multi-function displays, installed new pilot throttle and stick controls, a moving map capability and a mass-memory upgrade. Finally, we integrated beyond line of sight radios for faster communication with ground units, forward controllers, and command and control centers. Together, these modifications will allow the A-10 to excel at close air support for the next two decades.

F-15 C/D

The F-15 C/D air superiority fighter averages over 25 years of age. The FY12 President's Budget (PB) invests approximately $1.1B for the modernization and sustainment of the F-15C/D fleet. We project the F-15C/D fleet will remain viable until 2025-2030 with potential for an airframe service life extension following full-scale fatigue testing. This test is underway and will conclude in FY14. The Air Force manages the fleet through scheduled field and depot inspections under an individual aircraft tracking program. For FY10, the F-15C/D's aircraft availability was 64 percent.

We continue to modernize our F-15 fleet with Active Electronically Scanned Array (AESA) radars, and a more capable aircraft mission computer. We expect these efforts to enable the 176 F-15C/D "long-term fleet" to operate safely and effectively through at least 2025 as determined by the full-scale fatigue test. We may extend "long-term" status to the entire 250 aircraft inventory based on requirements of the future force structure.

F-15E

The F-15E fleet, with an average age of over 16 years, continues to provide support for on-going operations in Afghanistan and Iraq. Like the A-10, the F-15E performed superbly in Operations DESERT STORM, OAF, OEF and OIF. In 2009, F-15Es delivered 54% of the 2000lb JDAMs and 29% of the 500lb JDAMs employed in that area of operations. Aircraft availability for the F-15E in FY10 was 62 percent.

The Air Force will maintain and improve the F-15E's ability to rapidly engage and destroy time-sensitive targets. The FY12 President's Budget investment across the FYDP is approximately $1.3B for F-15E modernization and sustainment. This includes adding secure radios for faster communications with ground units and forward controllers, integrating the latest precision weapons to hit targets accurately and reduce collateral damage, and adding a helmet mounted cueing system that will reduce the F-15E's time to engage a target by up to 80 percent. Finally, we are adding the state-of-the-art AESA radar system that advances capabilities to identify and engage targets as well as share information with other aircraft. The Air Force expects the F-15E to be an integral part of the Nation's force through at least 2035. A full-scale fatigue test, due to be complete in 2015, will provide useful data regarding the feasibility of a service life extension.

F-16

Our multi-role F-16 comprises the majority of the fighter fleet. The FY12 President's Budget invests approximately $858 million across the FYDP for F-16 modernization, sustainment, and life extension. F-16 fleet aircraft availability has dropped 5.5 percent since FY05. Drivers include the Falcon STAR (all blocks) structural integrity program, engine inlet ram (all blocks), lower wing skin cracking (blocks 25/30/32), and aft cockpit corrosion for two seat aircraft. We expect these drivers to continue to impact aircraft availability through FY15. F-16 FY11 aircraft availability to date is 66.6 percent. Extensive flight hours and stressing mission profiles resulted in the need for the FalconStar structural modification to the F-16. This upgrade program scheduled to complete in FY14, replaces known life-limited structural components and maintains the original design airframe life of 8,000 actual flight hours. Structural upgrades in the F-16 SLEP include rework and replacement to extend airframe structural service life by 25% (6-8 years).

In other inspections, maintainers have found bulkhead cracks in approximately 63 percent (403 of 642) of our Block 40/52 F-16 aircraft. 263 aircraft have been repaired and 80 aircraft had the bulkheads replaced with 3 more in progress. An additional 58 aircraft continue to fly with increased inspections to measure crack growth. Similar to the F-15, the Air Force will start conducting a full-scale durability test for the F-16 in FY11 to enable F-16 Block 40-52 airworthiness certification to be extended from the current 8,000 actual flight hours to 9,000 plus actual flight hours. The FY12 budget request adds $15M in FY12 to begin design and development of structural and avionics capability modifications for the Block 40-52 fleet to be

responsive to the Air Force's total fighter requirement. This funding is in addition to the $10.6M requested to continue the full scale durability test.

Fifth Generation Fighters

Fifth generation fighters like the F-22A and the F-35 are key elements of our Nation's defense and ability for deterrent capability. Hostile nations recognize that U.S. airpower can strike their vital centers with impunity which enhances all other U.S. Government instruments of power. This is the timeless paradox of deterrence; the best way to avoid war is to demonstrate to your adversaries that you have the capability and will to defeat them. The F-22A and F-35 represent our latest generation of fighter aircraft. Both aircraft are necessary to maintain a margin of superiority that permits our air and ground forces freedom of maneuver and attack. The F-22A and F-35 each possess unique, complementary, and essential capabilities that provide the synergistic effects across the spectrum of conflict. The Office of the Secretary of Defense (OSD)-led 2006 QDR Joint Air Dominance study underscored that our Nation has a critical requirement to recapitalize TACAIR forces. Legacy 4th generation aircraft simply cannot survive to operate and achieve the effects necessary to win in an integrated, anti-access environment.

F-22A Future Capabilities & Modifications

The F-22A Raptor is the Air Force's primary air superiority fighter providing unmatched capabilities for air supremacy and homeland defense for the Joint team. The multirole F-22A's combination of speed, stealth, maneuverability and integrated avionics ensures this remarkable aircraft accesses and survives high-threat environments. Its ability to find, fix, track, and target enemy air- and surface-based threats ensures air dominance and freedom of maneuver for all Joint forces.

Similar to every other aircraft in the U.S. inventory, there is a plan to regularly incorporate upgrades into the F-22A to ensure it remains the world's most dominant fighter in the decades to come. The F-22A modernization program consists of two major efforts that will ensure every Raptor maintains its maximum combat capability: the Common Configuration Program and a pre-planned product improvement program which includes Increments 2, 3.1, and 3.2A, 3.2B, and 3.2C.

As of 9 Mar 2011, the Air Force had accepted 167 F-22A aircraft out of a programmed delivery of 187. We will continue to upgrade the F-22A fleet under the Joint Requirements Oversight Council-approved Increment 3 upgrade designed to enhance both air-to-air and precision ground attack capability. Raptors from the production line today are wired to accept Increment 3.1. This

upgrades the APG-77 AESA radar for synthetic aperture radar ground mapping capability, provides the ability to self-target JDAMs using on-board sensors and allows F-22As to carry and employ eight Small Diameter Bombs (SDBs). The Air Force is fielding Increment 3.1 this year.

Responding to current threat assessments, the next upgrade will be Increment 3.2 "Accelerated" with complete development in FY14. Increment 3.2 "Accelerated" is a software-only upgrade and provides significant additional Electronic Protection, Link 16 improvements, and a better Combat Identification capability. In the future, F-22As will receive the Increment 3.2B and Increment 3.2C upgrades which feature improved SDB employment capability, improved targeting using multi-ship geo-location, additional Electronic protection and Combat ID, Automatic Ground Collision Avoidance System (Auto GCAS) and the capability to employ our enhanced air-to-air weapons (AIM-120D and AIM-9X). Increment 3.2B should begin to field in FY17. The current F-22A modernization plan will result in 34 Block 20 aircraft used for test and training, 63 Block 30s, 86 Block 35s, and two Edwards AFB-test coded aircraft. Both Block 30 and Block 35 aircraft will accept Increment 3.2B, 3.2C, and all contemplated future capabilities.

F-22A Procurement Plans

The F-22A production program is currently delivering Lot 9 aircraft ahead of scheduled contract delivery dates at a rate of about two per month. When the plant delivers the last Lot 10 aircraft in 2012, we will have completed the program of 187 Raptors. The average unit cost for the 60 aircraft in the multiyear procurement was $142.6 million. The Lot 10 unit flyaway cost is estimated at $153.2 million. This is $10.6 million higher than under the multiyear procurement due to higher materiel costs for a much smaller lot buy, loss of the multiyear procurement savings in parts and labor and inflation.

F-35

The multi-role F-35A is the centerpiece of the Air Force's future precision attack capability. In addition to complementing the F-22's world class air superiority capabilities, the F-35A is designed to penetrate air defenses and deliver a wide range of precision munitions. This modern, fifth-generation aircraft brings the added benefit of increased allied interoperability and cost-sharing across Services and partner nations. It will also serve to fulfill our commitment to NATO's dual-capable aircraft mission. The FY12 budget includes $5.3 billion for continued development and procurement of 19 F-35A Conventional Take-Off and Landing (CTOL) production aircraft.

The F-35A program team achieved a number of accomplishments over the past year, including the first flight of the first mission systems aircraft, arrival of the first four F-35A test aircraft at Edwards Air Force Base, California, completion of F-35A static structural testing five months ahead of schedule with no failures, roll out of the first Low Rate Initial Production (LRIP)

F-35A, completion of 410 total F-35 test flights in 2010 of which 171 were F-35A flights, negotiation of the first fixed price type production contract (LRIP Lot 4 – 10 CTOL aircraft), and the signing of a Letter of Offer and Acceptance to procure the F-35A by Israel.

The Air Force also announced the preferred alternatives for F-35A operational and training bases. Those bases are Hill Air Force Base, Utah, and Burlington Air Guard Station, Vermont for operational squadrons and Luke Air Force Base, Arizona for training. The program continues to experience challenges as it transitions from development to production despite the significant accomplishments. The Secretary of Defense announced a program restructure in February 2010. The restructure resulted in increased funding for development and production in accordance with Joint Estimate Team II estimates, reduced procurement by 122 aircraft over the FYDP in the FY11 PB, upgraded the Program Executive Officer position from a 2-star to 3-star flag rank, extended development by 13 months, added an additional LRIP lot prior to entering full rate production, and reduced the ramp rate to less than 150 percent of the previous year's production. Program cost growth, including growth from the restructure, resulted in a critical Nunn-McCurdy breach in March 2010. The Under Secretary of Defense for Acquisition, Technology, and Logistics subsequently certified the program in accordance with the Nunn-McCurdy statute, allowing the F-35 program to continue. The DoD tasked the program office to perform a bottom-up review of the remaining development effort after the program Nunn-McCurdy certification. This Technical Baseline Review (TBR), completed in November 2010, became the basis for additional program restructuring within the FY12 PB. The TBR called for an additional $4.6 billion to complete the Joint development effort. To fund this new development effort, and recognizing a continued lagging performance in production, the DoD reduced procurement by 124 aircraft over the FYDP in the FY12 PB, 57 of which were F-35As.

The Commander, Air Combat Command (COMACC) remains the Air Force's decision authority for declaring the F-35A's IOC. His decision will be based on achieving sufficient levels of readiness in both capability and capacity, and will not be driven by a specific date. Last June, COMACC detailed the specific capability and capacity criteria required for F-35A IOC. These included validation and acceptance of the F-35 Operational Requirements Document-compliant Block 3 mission system software through the Initial Operational Test and Evaluation (IOT&E) process. This will demonstrate the Air Force's ability to employ the F-35A in Offensive Counter Air and Suppression / Destruction of Enemy Air Defense missions in Anti-Access / Area Denied environments. In addition, Air Force pilots and maintainers must be validated as trained and ready to conduct operations, with all operations and logistical support elements ready and in place. Last June, based on this criteria, COMACC estimated the Air Force would be able to declare the F-35A IOC in 2016.

The Air Force's position on IOC remains unchanged. We will declare IOC for our F-35As based on achieving the required ORD-compliant capability and capacity criteria, and not on a specific date. We are currently analyzing the impacts to program delivery timelines due to the most recent program restructure, and the results of this analysis will be available later this year. When

this analysis is complete, the Air Force will reevaluate our IOC estimate, but we currently expect up to a two year delay.

Joint Strike Fighter (JSF) Alternate Engine Program

The Air Force's position regarding the JSF alternate engine program is that a second engine is unnecessary, too costly, and risks diverting resources from production. The FY12 President's Budget does not request funding for the development and procurement of the F136 alternate engine. The Air Force and Navy continue to execute the funding appropriated by Congress in the previous budgets to continue the F136 program.

The Office of the Secretary of Defense for Cost Assessment and Program Evaluation estimated that the Department of Defense will require approximately $2.9 billion to take the F136 engine to competition in FY17, including development, directed buys, and the necessary logistics support. Continued funding for the F136 engine carries cost penalties to both the F135 and F136 engines in the form of reduced production line learning curves and inefficient economic order quantities. The department concludes that maintaining a single engine supplier provides the best balance of cost and risk. We believe the risks associated with a single source engine supplier are manageable due to improvements in engine technology and do not outweigh the investment required to fund a competitive alternate engine.

Joint Air-to-Surface Stand-off Missile (JASSM)

The JASSM is the nation's only stealthy, conventional, precision, launch-and-leave, stand-off missile capable of being launched from fighter and bomber aircraft. The JASSM achieved an operational capability on B-52, B-1, F-16 and B-2 and puts an adversary's center-of-gravity targets at risk even if protected by next-generation air defense systems.

The Air Force completed JASSM–ER (Extended Range) DT/OT testing with 10 successes out of 11 shots. The Air Force also successfully completed the Milestone C DAB to approve the start of JASSM-ER Low Rate Initial Production (LRIP) in FY11 and is now preparing to award the FY11 production contract for 90 JASSM baseline missiles and the first production lot of 30 JASSM-ER missiles. The FY12 President's Budget requests funds for the procurement of 142 missiles – 30 JASSM-ER and 112 JASSM baseline missiles.

Legacy Bomber Fleet

The B-1, B-2 and B-52 remain engaged in today's fight while retaining an ability to meet future challenges. Air Force bombers have been on rotating deployments to Southwest Asia since September 11th. The bomber aircraft inventory consists of 156 aircraft averaging 33.7 years old. The Air Force continues its commitment to future long-range strike capabilities as part of a comprehensive, phased plan, valued at $5.5 billion over the FYDP, to modernize and sustain our bomber force.

B-1

The B-1 is fighting in Afghanistan by providing long-range persistent airpower in direct support of NATO, US and Afghan troops. The B-1 provides real-time intelligence, surveillance and reconnaissance with full-motion video, enhanced situational awareness, and a demonstrable over watch presence. B-1s added SNIPER Advanced Targeting Pod capability in summer 2009 to provide aircrews with positive identification capability and the ability to share video with ground forces. The AF developed this capability on an accelerated 18-month timeline in response to a CENTCOM tasking. Other B-1 modernization programs include the Fully Integrated Data Link (FIDL), Radar Reliability and Maintainability Improvement Program and the Inertial Navigation System and Vertical Situational Display Upgrade.

The AF is retiring six B-1s, all Primary Aircraft Authorization (PAA), to fund the four grounding modifications plus Fully Integrated Data Link (FIDL) through the remainder of the B-1 fleet. The four grounding modifications are: Vertical Situational Display Upgrade (VSDU), Central Integrated Test System (CITS), Radar Maintainability and Improvement Program (RMIP), and the Inertial Navigation System (INS). This is strictly a programming action, taking acceptable (moderate) risk to the overall bomber capability requirement.

B-1 aircraft availability rates remained relatively level for FY02-07 with a drop in FY08 and FY09 primarily driven by modernization efforts. To mitigate manpower shortages and reduced maintenance experience levels, B-1 bases have been augmented by contract field teams which will continue through April 2011. Manning authorizations have been approved but B-1 aircraft availability will be affected into the distant future while personnel are trained and gain experience.

The B-1 has maintained a deployed presence since September 11, 2001 in support of OEF and OIF. During that time, the B-1 fleet and its crews have flown more than 8,000 missions and amassed more than 90,000 combat hours. In OEF alone, the B-1 has employed nearly 40 percent of all munitions while flying only 5 percent of all sorties.

Given the B-1's critical contributions to today's fight and its corresponding high operations tempo, the Air Force places great emphasis on sustaining the B-1 fleet. B-1 sustainment efforts address several issues which, if left unchecked, could critically limit aircraft availability and leave a gap in our power projection capability. Although these modifications represent a

significant investment, they are critical to supporting our deployed combat forces by ensuring continued B-1 availability.

The Air Force's primary B-1 modernization effort is the Fully Integrated Data Link (FIDL). FIDL gives aircrew enhanced situational awareness and combat effectiveness by incorporating Link-16 data link and Joint Range Extension Beyond Line-of-Sight capabilities. FIDL also provides the backbone infrastructure for a substantial upgrade to the existing cockpit including modern multi-function color displays that provide aircrew with a new level of fused data.

B-2

The B-2 is significant to Pacific Command's (USPACOM) Continuous Bomber Presence to assure allies and support US interests in the Pacific. The B-2 Spirit provides a lethal combination of range, payload, and stealth. It remains the world's sole long-range, low observable bomber. It is the only platform capable of delivering 80 independently targeted 500-lb Joint Direct Attack Munitions (GBU-38). While B-2 availability has steadily increased over the past five years, in part due to enhancements in low observable maintenance such as the highly successful Alternate High Frequency Material program, it faces increasing need for upgrades to avionics originally designed over twenty years ago.

The Extremely High Frequency Satellite Communications and Computer Upgrade Program (EHF SATCOM and Computer Upgrade) has three increments. Increment 1 upgrades the Spirit's flight management computers as an enabler for future avionics efforts. Increment 2 integrates the Family of Beyond-line-of-sight Terminals (FAB-T) along with a low observable antenna to provide secure, survivable strategic communication, and Increment 3 connects the B-2 into the Global Information Grid. Increment 1 of EHF SATCOM and Computer Upgrade is beginning procurement this year for fleet installations beginning at the end of FY-2013.

We will finish replacing the B-2's original radar antenna, upgrade selected radar avionics and change the radar operating frequency as part of the Radar Modernization Program (RMP). Thanks in large part to Congressional support, the RMP acquisition strategy was modified to include life-of-type component buys to avoid diminishing manufacturing source issues during the production run.

The Department is also investing in B-2 Defensive Management System (DMS) modernization to ensure continued survivability. This will allow the B-2 to continue operations in more advanced threat environments while decreasing the maintenance required to operate the system. The DMS faces obsolescence in light of threat system advances and diminishing manufacturing sources for critical components. $41M is being invested in FY12 with $560M across the FYDP to maintain B-2 penetration capability. We just completed an Analysis of Alternatives and are preparing to move towards the technology development phase.

B-52

The B-52 Stratofortress is our nation's oldest frontline long- range strategic bomber with the last airframe entering service in 1962. It amplifies the consistent message of long-range US airpower in a theater like USPACOM where distances drive decisions. Equipped with an advanced targeting pod, the B-52 can also provide real-time intelligence, surveillance and reconnaissance with full-motion video, enhanced situational awareness, a demonstrable overwatch presence and precision joint fires in support of USPACOM's objectives. In addition to supporting the Continuous Bomber Presence at Anderson AFB on Guam, the B-52 continues to maintain a high-state of readiness for the nuclear deterrence mission.

The Air Force has invested in modernization programs to keep the B-52 platform viable and operationally relevant. Major B-52 modernizations include the Combat Network Communications Technology (CONECT), EHF SATCOM, Strategic Radar Replacement (SR2), and the 1760 Internal Weapons Bay Upgrade programs. CONECT provides an integrated communication and mission management system with machine to machine data link interfaces for weapons delivery. The digital infrastructure provided in CONECT is the backbone for EHF SATCOM. The EHF SATCOM program integrates the FAB-T providing assured, survivable two-way strategic command and control communications. The SR2 program, starting in FY10, integrates a modern non-developmental radar to address systemic sustainment issues, replacing the legacy APN-166 radar. Finally, the 1760 Internal Weapons Bay Upgrade provides internal J-series weapons capability through modification of Common Strategic Rotary Launcher and an upgrade of stores management and offensive avionics software. Updated with modern technology the B-52 will be capable of delivering the full complement of jointly developed weapons and will continue into the 21st century as an important element of our nation's defenses.

Long Range Strike (LRS)

The FY12 President's Budget provides funding for the long range penetrating bomber program, following an extensive 18 month, OSD-led review of long range strike requirements. This program will deliver a nuclear capable, optionally manned, penetrating bomber beginning in the mid 2020s.

The President's Budget requests $197 million in FY12 and $3.7 billion over the FYDP for LRS.

Rotary Wing Aircraft

Combat Search and Rescue

The HH-60G Pave Hawk is a Low-Density/High-Demand asset that is currently conducting 45% of CENTCOM personnel recoveries with only 2% of in-theater rotary wing assets. The CSAR

fleet has 99 of 112 aircraft and over 50% of the fleet has major structural cracks. Additionally, 28 aircraft sustained battle damage in FY10.

Aircraft availability remains a top concern for Air Force CSAR. Ongoing modification programs attempt to keep the HH-60G a viable CSAR asset until the Air Force's replacement programs are complete. The modifications address avionics upgrades, safety features, and defensive systems that allow the HH-60G to continue operations in a joint/multi-national environment under austere combat conditions.

The Air Force is procuring replacement rotary wing aircraft based upon currently fielded CSAR capabilities. Two programs address the immediate and long-term needs of Air Force CSAR: HH-60 Operational Loss Replacement (OLR) and HH-60 Recapitalization.

The HH-60 OLR program is designed to bring the fleet back to the program of record of 112 aircraft. The OLR program is purchasing UH-60M aircraft and will modify the aircraft with CSAR equipment to create an airframe comparable to the existing HH-60G. The OLR program uses an incremental acquisition strategy to deliver aircraft to the warfighter as rapidly as possible. The initial three aircraft procured in FY10 will receive minimal modifications and be delivered to a non-combat coded unit, freeing up three combat capable HH-60Gs that will be made available for deployments. The first two aircraft have been delivered and are currently being modified with scheduled delivery to the unit in summer 2011. The next increment will use existing design drawing packages for an integrated cockpit and associated hardware to create a CSAR baseline aircraft.

The HH-60 Recapitalization program is designed to recapitalize the entire CSAR fleet. The Air Force is currently examining acquisition strategies to determine how to ensure the warfighter receives the best product, on schedule, and within budget.

CV-22

The CV-22 is providing transformational mission capabilities to SOF warfighters. The current CV-22 fleet stands at 17 aircraft. The last of 50 aircraft will deliver in FY16. AFSOC has deployed the CV-22 globally, including OIF and OEF. Currently, the 27th Special Operations Wing, based at Cannon AFB, NM, is preparing to for an OCONUS deployment in FY11.

The Navy-led V-22 Joint Program Office at Naval Air Systems Command, Patuxent Naval Air Station, MD, is developing improved operational suitability, reliability, and effectiveness capabilities for the CV-22 in block increments. Block 10 modifications, currently being retrofitted on fielded aircraft, will complete in FY13 and include an aft rescue hoist, defensive weapon system, retractable fuel probe, anti-icing system, more accessible nacelles, avionics/communications/navigation upgrades, situational awareness improvements, and reliability/maintainability modifications. Block 20 modification development efforts will

include rehosting of MV-22 basic aircraft improvements, communications systems upgrades, fuel jettison system improvements, situational awareness upgrades, and over-the-horizon communications improvements.

Sustainment of the basic V-22 aircraft is managed under Joint Performance Based Logistics (JPBL) multiyear contracts that cover both the Air Force CV-22 and Marine Corps MV-22. These contracts are designed to incentivize the contractor to improve readiness and availability by improving component reliabilities, reducing logistics delay times, and reducing maintenance man-hours and repair turnaround times.

The V-22 Joint Program Office has a disciplined process to identify and evaluate those modifications and improvements likely to provide the greatest impact to overall system reliability, readiness, and cost-per-flying-hour. These efforts are paying off: mission capable rates are increasing and cost-per-flying-hour is decreasing.

Common Vertical Lift Support Platform

The Common Vertical Lift Support Platform (CVLSP) will provide vertical lift support for Intercontinental Ballistic Missile (ICBM) convoy escort, nuclear emergency security response, and Continuation of Government (COG) and Continuation of Operations (COOP) missions in the National Capital Region (NCR). Other CVLSP missions include training, range support, Pacific Air Forces (PACAF) senior leader airlift, combat aviation advisory training, and Survival, Evasion, Resistance, and Escape (SERE) training support. An Off-The-Shelf/Non-Developmental acquisition of up to 93 aircraft is desired.

The CVLSP addresses capability gaps in helicopter nuclear security operations and COG/COOP missions. It provides needed carrying capacity, speed, range, and endurance currently not provided by the UH-1N fleet. Additionally, the CVLSP will resolve nuclear security waivers to DoD nuclear weapon security regulations. A SECDEF Blue Ribbon Report in February 2008 and a SECDEF Nuclear Task Force in September 2008 identified the need to replace nuclear security support helicopters. The Air Force is analyzing all options to ensure that warfighter requirements are met at best cost to the Government.

Light Attack / Armed Reconnaissance Aircraft

The Air Force is committed to building successful partnerships with militaries around the world in order to ensure interoperability, integration and interdependence between Coalition forces, while providing our Partner Nations the capability to resolve their own national security challenges. We have requested $159 million in the FY12 budget for 15 LAAR aircraft as part of this effort.

The requirement for a LAAR capability is derived from multiple sources. The Air Force's May 2009 Irregular Warfare (IW) Tiger Team defined IW and Building Partnership Capacity (BPC) capability gaps. Specifically, the team found that the "USAF lacks the capability to develop aviation resources in less-developed partner nations that do not benefit from the US's high-tech-focused security assistance efforts." An Air Force Capability Based Assessment (CBA) conducted in August 2009 validated BPC and LAAR mission/capability gaps. The CBA found that "USAF aircraft, assets, technology, and Tactics, Techniques and Procedures (TTPs) are not ideal for most partner nations because of expense and complexity ... US personnel may lack experience and/or currency to train partner nations on aircraft that were never or are no longer in the USAF inventory ... and both the Combat Air Forces and the Mobility Air Forces need to include one or more BPC-friendly aircraft types and specialized units designed to provide support to countries fighting insurgencies directly or indirectly."

The 2010 Quadrennial Defense Review directed the Air Force to field light attack aircraft in the general purpose forces to increase their ability to work effectively with a wider range of partner air forces. The QDR directs that the Air Force increase "contributions to security force assistance operations by fielding within our broader inventory aircraft that are well-suited to training and advising partner air forces" and that we "strengthen and expand capabilities for training partner nation aviation forces."

Secretary of Defense guidance directed the USAF to institutionalize fixed-wing aviation security force assistance capabilities in the general purpose forces and to strengthen aviation capabilities for training and advising foreign security forces. The capability provided by LAAR is also consistent with multiple Combatant Commands' building partnership capacity priorities.

The Initial Capabilities Document (ICD) for the Light Attack Armed Reconnaissance (LAAR) aircraft was approved by the Joint Capabilities Board (JCB) on 27 May 2010. The Capability Production Document (CPD), which will codify the aircraft requirements, is scheduled for the Air Force Requirements Oversight Council validation on 17 March 2011, with JCB review expected no later than June 2011.

The LAAR acquisition strategy will not be finalized until after JCB approval of the CPD (Jun 11).

Aviation Safety

The Air Force continues to pursue safety excellence in order to preserve the assets required to execute our mission. The Secretary of Defense goal for 2012 is to reduce by 75 percent the 2002 statistics for Class A mishaps and fatalities, and the number of aircraft destroyed. Last year, the Air Force incurred 14 Class A mishaps, the fewest in the last decade, and as of March 3, 2011 has incurred 5 Class A mishaps. In 2010, the Air Force incurred 8 aircraft losses, and one to date in FY11. Both of these metrics represent an improving trend. The Air Force will continue to place a heavy emphasis on safety in order to meet or exceed the established goals.

V. Closing

The Air Force stands ready to win today's Joint fight and plan for tomorrow's challenges. We are committed to working together to determine the right procurement, sustainment and retirement strategy to remain prepared for the current fight as well as posturing for future demands. Dominance of air, space, and cyberspace continues to be requisite to the defense of the United States. USD/AT&L, Ash Carter testified that: "I support, as does the Secretary, the initiatives the Congress directed when it unanimously passed the Weapon Systems Acquisition Reform Act (WSARA) of 2009. Acquisition reform is one of the DoD's High Priority Performance Goals presented in the Analytic Perspectives volume of the President's FY 2011 Budget. The Department is moving out to implement these initiatives." The Air Force TACAIR Program actions described above are consistent with WSARA implementation and DoD's Acquisition Reform goal. We appreciate your continued support and look forward to working in concert to ensure our decisions enable us to strengthen our Air Force to meet future requirements.

BIOGRAPHY

UNITED STATES AIR FORCE

LIEUTENANT GENERAL MARK D. "SHACK" SHACKELFORD

Lt. Gen. Mark D. "Shack" Shackelford is the Military Deputy, Office of the Assistant Secretary of the Air Force for Acquisition, the Pentagon, Washington, D.C. He is responsible for research and development, test, production, and modernization of Air Force programs worth $40 billion annually.

General Shackelford entered the Air Force in 1977 as a distinguished graduate of the U.S. Air Force Academy. He has more than 2,700 flight hours in 40 aircraft types with operational experience in the F-4 and F-16. The general was an experimental test pilot in the F-16 and the first Air Force pilot to fly the YF-22 Advanced Tactical Fighter prototype. He managed the F-22 Cockpit Development Program and directed the T-38, F-5, F-16 and F-22 programs. The general commanded a test squadron at Ogden Air Logistics Center, Hill Air Force Base, Utah, and the test wing at the Air Armament Center, Eglin AFB, Fla. He also served as Deputy, Test and Assessment, for the Missile Defense Agency, and then Director of Plans and Requirements, Headquarters Air Force Space Command, Peterson AFB, Colo. Prior to his current assignment, he was the Director, Global Power Programs, Office of the Assistant Secretary of the Air Force for Acquisition, Headquarters U.S. Air Force, Washington, D.C

General Shackelford holds Department of Defense Acquisition Corps Level III certifications in Test and Evaluation; Program Management; and Systems Planning, Research, Development and Engineering. He holds master level certification in the Space Professional Development Program. The general is a distinguished graduate of undergraduate pilot training, F-16 Fighter Weapons School and the U.S. Air Force Test Pilot School.

EDUCATION

1977 Bachelor of Science degree in astronautical engineering, U.S. Air Force Academy, Colorado Springs, Colo.
1977 Squadron Officer School, by correspondence
1984 F-16 Fighter Weapons School, Nellis AFB, Nev.
1985 Air Command and Staff College, by correspondence
1987 U.S. Air Force Test Pilot School, Edwards AFB, Calif.
1990 Master of Science degree in mechanical engineering, California State University, Fresno
1991 Program Management Course, Defense Systems Management College, Fort Belvoir, Va.
1995 Air War College, Maxwell AFB, Ala.
2000 Defense Systems Management College, Fort Belvoir, Va.
2000 Advanced Management Program, Carnegie-Mellon University, Pittsburgh, Pa.
2008 Program for Executives in Logistics and Technology, University of North Carolina at Chapel Hill

2008 Enterprise Leadership Seminar, University of North Carolina at Chapel Hill

ASSIGNMENTS

1. November 1977 - October 1978, student, undergraduate pilot training, Columbus AFB, Miss.
2. November 1978 - February 1979, student, fighter lead-in training, 436th Tactical Fighter Training Squadron, Holloman AFB, N.M.
3. February 1979 - September 1979, student, F-4 training, 306th Tactical Fighter Training Squadron, Homestead AFB, Fla.
4. September 1979 - November 1980, F-4E aircraft commander, 68th Tactical Fighter Squadron, Moody AFB, Ga.
5. December 1980 - August 1981, F-4D aircraft commander, 80th Tactical Fighter Squadron, Kunsan Air Base, South Korea
6. January 1982 - July 1982, F-16 fighter pilot, 35th Tactical Fighter Squadron, Kunsan AB, South Korea
7. August 1982 - June 1986, F-16 instructor pilot, and weapons and tactics officer, 72nd Tactical Fighter Training Squadron, MacDill AFB, Fla.
8. July 1986 - June 1987, student, U.S. Air Force Test Pilot School, Edwards AFB, Calif.
9. July 1987 - September 1987, experimental test pilot, 6512th Test Squadron, Edwards AFB, Calif.
10. September 1987 - March 1989, experimental test pilot, F-16 Combined Test Force, Edwards AFB, Calif.
11. March 1989 - January 1991, YF-22A project test pilot, Advanced Tactical Fighter Combined Test Force, 6511th Flight Test Squadron, Edwards AFB, Calif.
12. January 1991 - June 1991, student, Defense Systems Management College, Fort Belvoir, Va.
13. August 1991 - August 1993, Chief, Cockpit Integrated Product Team, F-22 System Program Office, Wright-Patterson AFB, Ohio
14. August 1993 - June 1994, Commander, 514th Flight Test Squadron, Hill AFB, Utah
15. July 1994 - June 1995, student, Air War College, Maxwell AFB, Ala.
16. July 1995 - August 1997, Director, Fighter and Trainer Directorate, San Antonio ALC, Kelly AFB, Texas
17. August 1997 - August 1999, Commander, 46th Test Wing, Eglin AFB, Fla.
18. August 1999 - June 2000, Deputy Director, Directorate of Plans and Programs, Headquarters Air Force Materiel Command, Wright-Patterson AFB, Ohio
19. June 2000 - May 2002, Director, F-16 System Program Office, Aeronautical Systems Center, Wright-Patterson AFB, Ohio
20. May 2002 - November 2002, Director, F-22 SPO, ASC, Wright-Patterson AFB, Ohio
21. November 2002 - January 2003, special assistant to the Commander, ASC, Wright-Patterson AFB, Ohio
22. February 2003 - May 2005, Deputy, Test and Assessment, Missile Defense Agency, Office of the Secretary of Defense, Washington, D.C.
23. May 2005 - April 2007, Director of Plans and Requirements, Headquarters Air Force Space Command, Peterson AFB, Colo.
24. April 2007 - October 2008, Director, Global Power Programs, Office of the Assistant Secretary of the Air Force for Acquisition, Headquarters U.S. Air Force, Washington, D.C.
25. October 2008 - present, Military Deputy, Office of the Assistant Secretary of the Air Force for Acquisition, the Pentagon, Washington, D.C.

SUMMARY OF JOINT ASSIGNMENTS

1. February 2003 - May 2005, Deputy, Test and Assessment, Missile Defense Agency, Office of the Secretary of Defense, Washington, D.C., as a brigadier general

FLIGHT INFORMATION

Rating: Command pilot
Flight hours: More than 2,700
Aircraft flown: F-4, F-16 and 40 aircraft types

MAJOR AWARDS AND DECORATIONS

Distinguished Service Medal
Defense Superior Service Medal
Legion of Merit with oak leaf cluster
Meritorious Service Medal with three oak leaf clusters
Air Medal with two oak leaf clusters

Joint Service Commendation Medal
Air Force Commendation Medal with two oak leaf clusters

OTHER ACHIEVEMENTS
1977 Outstanding Cadet in Astronautical Engineering, U.S. Air Force Academy
1978 Air Training Command Commander's Trophy, Undergraduate Pilot Training
1978 Orville Wright Achievement Award, Order of Daedalians
1987 Liethen-Tittle Award, U.S. Air Force Test Pilot School
1988 Lieutenant General Bobby Bond Memorial Aviators Award

EFFECTIVE DATES OF PROMOTION
Second Lieutenant June 1, 1977
First Lieutenant June 1, 1979
Captain June 1, 1981
Major March 1, 1988
Lieutenant Colonel July 1, 1991
Colonel Feb. 1, 1995
Brigadier General April 1, 2002
Major General Nov. 1, 2005
Lieutenant General Oct. 6, 2008

(Current as of March 2011)

BIOGRAPHY

UNITED STATES AIR FORCE

LIEUTENANT GENERAL HERBERT J. "HAWK" CARLISLE

Lt. Gen. Herbert J. "Hawk" Carlisle is the Deputy Chief of Staff for Operations, Plans and Requirements, Headquarters U.S. Air Force, Washington, D.C. He is responsible to the Secretary of the Air Force and the Chief of Staff for formulating policy supporting air, space, irregular warfare, counterproliferation, homeland security, weather and cyber operations. As the Air Force Operations Deputy to the Joint Chiefs of Staff, General Carlisle determines operational requirements, capabilities and training necessary to support national security objectives and military strategy.

General Carlisle graduated from the U.S. Air Force Academy in 1978. He has served in various operational and staff assignments throughout the Air Force and commanded a fighter squadron, an operations group, two wings and a numbered air force. The general is a joint service officer and served as the Chief of Air Operations, U.S. Central Command Forward in Riyadh, Saudi Arabia. During that time he participated in Operation Restore Hope in Somalia. He also participated in Operation Provide Comfort in Turkey as Commander of the 54th Fighter Squadron, and Operation Noble Eagle as the 33rd Fighter Wing Commander. General Carlisle served on the Air Staff as Director, Operational Planning, Policy and Strategy, Deputy Chief of Staff for Air, Space and Information Operations, Plans and Requirements, and twice in the Plans and Programs Directorate. He also served as the Deputy Director, and later, Director of Legislative Liaison at the Office of the Secretary of the Air Force. Prior to his current assignment, General Carlisle was the Commander, 13th Air Force, Joint Base Pearl Harbor-Hickam, Hawaii.

The general is a command pilot with more than 3,600 flying hours in the AT-38, YF-110, YF-113, T-38, F-15A/B/C/D, and C-17A.

EDUCATION

1978 Bachelor of Science degree in math, U.S. Air Force Academy, Colorado Springs, Colo.
1982 Squadron Officer School, Maxwell AFB, Ala.
1984 F-15 Fighter Weapons Instructor Course, Nellis AFB, Nev.
1988 Master's degree in business administration, Golden Gate University, San Francisco, Calif.
1991 Air Command and Staff College, Maxwell AFB, Ala.
1993 Armed Forces Staff College, Norfolk, Va.
1997 Army War College, Carlisle Barracks, Pa.
2002 National Security Management Course, Syracuse University, N.Y.

2005 Seminar XXI - International Relations, Massachusetts Institute of Technology, Cambridge
2007 Executive Course on National and International Security, George Washington University, Washington, D.C.

ASSIGNMENTS
1. May 1978 - November 1979, student, undergraduate pilot training, Williams AFB, Ariz.
2. November 1979 - January 1984, instructor pilot and flight examiner, 525th Tactical Fighter Squadron, Bitburg Air Base, West Germany
3. January 1984 - January 1986, Chief of Weapons and Tactics, 9th Tactical Fighter Squadron, Holloman AFB, N.M.
4. January 1986 - April 1988, Chief of Weapons and Tactics and flight commander, 4477th Test and Evaluation Squadron, Nellis AFB, Nev.
5. April 1988 - July 1990, Director, F-15 Multistage Improvement Program, Tactical Fighter Weapons Center, Nellis AFB, Nev.
6. July 1990 - June 1991, student, Air Command and Staff College, Maxwell AFB, Ala.
7. June 1991 - July 1993, Chief of Air Operations-Forward Element, Joint Operations Directorate, U.S. Central Command, Riyadh, Saudi Arabia
8. July 1993 - June 1995, operations officer, 19th Fighter Squadron, Elmendorf AFB, Alaska
9. June 1995 - July 1996, Commander, 54th Fighter Squadron, Elmendorf AFB, Alaska
10. July 1996 - June 1997, student, Army War College, Carlisle Barracks, Pa.
11. June 1997 - June 1998, Deputy Commander, 18th Operations Group, Kadena AB, Japan
12. June 1998 - March 2000, Commander, 1st Operations Group, Langley AFB, Va.
13. March 2000 - February 2001, Chief, Combat Forces Division, Directorate of Programs, Headquarters U.S. Air Force, Washington, D.C.
14. March 2001 - February 2003, Commander, 33rd Fighter Wing, Eglin AFB, Fla.
15. March 2003 - August 2004, Chief, Program Integration Division, Directorate of Programs, Headquarters U.S. Air Force, Washington, D.C.
16. September 2004 - April 2005, Deputy Director, Legislative Liaison, Office of the Secretary of the Air Force, Washington, D.C.
17. May 2005 - June 2007, Commander, 3rd Wing, Elmendorf AFB, Alaska
18. June 2007 - November 2007, Director, Operational Planning, Policy and Strategy, Deputy Chief of Staff for Air, Space and Information Operations, Plans and Requirements, Headquarters U.S. Air Force, Washington, D.C.
19. November 2007 - August 2009, Director, Legislative Liaison, Office of the Secretary of the Air Force, Headquarters U.S. Air Force, Washington, D.C.
20. September 2009 - December 2010, Commander, 13th Air Force, Hickam AFB, Hawaii
21. January 2011 - present, Deputy Chief of Staff for Operations, Plans and Requirements, Headquarters U.S. Air Force, Washington, D.C.

SUMMARY OF JOINT ASSIGNMENTS
June 1991 - June 1993, Chief of Air Operations-Forward Element, Joint Operations Directorate, U.S. Central Command, Riyadh, Saudi Arabia, as a major and lieutenant colonel

FLIGHT INFORMATION
Rating: Command pilot
Flight hours: More than 3,600
Aircraft flown: AT-38, YF-110, YF-113, T-38, F-15A/B/C/D, and C-17A

MAJOR AWARDS AND DECORATIONS
Distinguished Service Medal
Legion of Merit with three oak leaf clusters
Defense Meritorious Service Medal
Meritorious Service Medal with three oak leaf clusters
Air Force Commendation Medal with oak leaf cluster
Joint Meritorious Unit Award with oak leaf cluster

EFFECTIVE DATES OF PROMOTION
Second Lieutenant May 31, 1978
First Lieutenant May 31, 1980
Captain May 31, 1982
Major March 1, 1989
Lieutenant Colonel June 1, 1993
Colonel Sept. 1, 1998
Brigadier General Aug. 1, 2005
Major General Dec. 10, 2007
Lieutenant General Sept. 2, 2009

(Current as of January 2011)

WITNESS RESPONSES TO QUESTIONS ASKED DURING THE HEARING

MARCH 15, 2011

RESPONSES TO QUESTIONS SUBMITTED BY MR. BARTLETT

Mr. VAN BUREN. [The information was not available at the time of printing.] [See page 28.]

Mr. VAN BUREN. [The information was not available at the time of printing.] [See page 29.]

Mr. VAN BUREN. [The information was not available at the time of printing.] [See page 37.]

RESPONSE TO QUESTION SUBMITTED BY MR. REYES

Admiral VENLET. [The information was not available at the time of printing.] [See page 10.]

RESPONSE TO QUESTION SUBMITTED BY MR. GARAMENDI

Mr. VAN BUREN, Admiral VENLET, and Mr. SULLIVAN. [The information was not available at the time of printing.] [See page 23.]

QUESTIONS SUBMITTED BY MEMBERS POST HEARING

MARCH 15, 2011

QUESTIONS SUBMITTED BY MR. BARTLETT

Mr. BARTLETT. Air Force witnesses before the subcommittee indicated the Air Force intends to conduct a fair and open competition for CVLSP. Can I assume that the Air Force will establish CVLSP requirements that do not exceed the requirements, to avoid having to pay for more capability than required for the CVLSP mission?

Mr. VAN BUREN. [The information was not available at the time of printing.]

Mr. BARTLETT. I understand the Air Force has two helicopter modernization requirements, CSAR and CVLSP. The CSAR mission is a demanding combat operation for which the Air Force originally intended to buy the HH–47 heavy-lift Chinook helicopter. The CVLSP mission is a non-deployable, non-combat mission performed today by UH–1 aircraft. Is it correct to assume that these are two very different missions that require a high-low mix of aircraft to ensure that the warfighter gets what is truly required, as affordably as possible?

Mr. VAN BUREN. [The information was not available at the time of printing.]

Mr. BARTLETT. Can the Air Force assure the subcommittee that it will run separate fair and open competitions for its Huey and its Pavehawk replacement programs, given that they are such different requirements?

Mr. VAN BUREN. [The information was not available at the time of printing.]

Mr. BARTLETT. On several occasions during your testimony on the F135 engine you characterized the F135 engine as a "mature" engine. Previously, the Department of Defense has informed the committee that 200,000 flight hours are required to achieve engine maturity. The F135 has accumulated approximately 1,000 flight hours. How can you characterize the F135 as a "mature" engine?

Mr. VAN BUREN. [The information was not available at the time of printing.]

Mr. BARTLETT. In your March 15, testimony before the subcommittee you indicated that the "JPO has concluded a fixed price type contract for the F135 engine."

When was the contract signed?

What type of contract was signed?

What was the total value of the contract?

What percentage of the contract value was subject to cost plus reimbursement?

What is the target value of the contract?

What is the ceiling price of the contract?

What is the cost share?

Mr. VAN BUREN. [The information was not available at the time of printing.]

Mr. BARTLETT. 1a. Mr. Sullivan, as you know, the JSF program has had a host of problems over the past years resulting in significant cost growth, schedule slips, and, most importantly, delays in fielding capabilities to the warfighter.

From your observations, what have been the primary causes to the JSF's development problems and challenges to date?

Mr. SULLIVAN. JSF development problems and challenges can largely be traced to its extremely risky acquisition strategy, poor decisions at key junctures, and a management environment that was slow to acknowledge and address problems. At development start, JSF officials adopted a "single step" acquisition strategy to develop and acquire full combat capabilities on a very aggressive, risky schedule with substantial concurrency among development, testing, and production activities. Little systems engineering analysis was done to understand what resources would be needed to achieve the required capabilities. In implementation, the program started development before requisite technologies were ready, started manufacturing test aircraft before designs were stable, and moved to production before flight testing adequately demonstrated that the aircraft design meets performance and operational suitability requirements. None of the 8 critical technologies were mature at system start and now, almost 10 years later, only five are mature and three are approaching maturity.[1] Also, all three variants fell significantly short of meeting best practice standards regarding release of drawings at the critical design reviews. The

[1] Applying best commercial practices, we define maturity as achieving technology readiness level 7–system prototype demonstration in a realistic operational environment.

late release of drawings—and continuing high rate of changes—resulted in a cascading of problems in establishing suppliers and manufacturing processes, which led to late parts deliveries, delayed the program schedule, and forced inefficient manufacturing processes to workaround problems. These issues are lessening now but the impacts are still felt in higher costs, late deliveries of test and production aircraft, and a much-delayed development test schedule.

As part of its June 2010 Nunn-McCurdy certification to the Congress, DOD provided a root cause analysis for cost and schedule growth that identifies similar factors. Specifically, the analysis cites a very aggressive and concurrent development schedule, unrealistic cost and schedule estimates, flawed and overoptimistic assumptions, and management's reluctance to accept unfavorable information, slowing down the ability of the contractor and government to recognize and respond to problems.

Mr. BARTLETT. 1b. Has the program been receptive to your past advice and recommendations for establishing a knowledge-based acquisition process?

Mr. SULLIVAN. Until recently, the Department has not been very receptive to our findings and recommendations. Since 2001, defense officials have often non-concurred with our recommendations and, even when somewhat agreeable, did not usually fully implement them. For example, while officials generally acknowledged the merits of knowledge-based acquisitions and agreed that the JSF strategy was very risky, they chose to continue moving forward with the intent to manage the risks. They did not delay development start even though technologies were not ready and did not delay or reduce procurement when designs were not stable nor manufacturing processes mature. Appendix II of our recently issued report [2] summarizes our reports since 2001 and DOD's general recalcitrance in adopting our recommendations. (Included in this document as appendix 1.)

In the past year and a half, defense management appears to be somewhat more responsive to our findings and recommendations. Defense officials lately recognized numerous technical, financial, and management shortcomings and continue to significantly restructure the program, making changes we support and, in quite a few cases, had earlier recommended. Our work with DOD officials and the JSF program is now somewhat more collaborative than in the past and is open to, at minimum, an "agree to disagree" relationship.

Mr. BARTLETT. 1c. What future steps can the Department take to ensure the JSF program does not repeat its mistakes from the past to achieve a more predictable and successful outcome?

Mr. SULLIVAN. A new and sustained focus on affordability, effective implementation of restructuring actions, successful mitigation of cost and manufacturing risks identified by independent panels, and more active and involved oversight by OSD and military service headquarters should lead to more predictable and achievable outcomes. Regaining and aggressively pursuing affordability—both in terms of the investment costs to acquire the JSF and the continuing costs to operate and maintain it over the life-cycle—will be very challenging, but is paramount to future success. Restructuring actions include the adoption of more realistic cost and schedule estimates, a more robust flight test program, and directed implementation of critical improvements needed in the aircraft and engine manufacturing and supplier management processes. Still needed (and in the works) is a new, knowledge-based procurement cost estimate through completion of the program. Marine Corps leadership is directly involved in efforts to resolve technical deficiencies in the short take off and landing variant.

Mr. BARTLETT. 1d. What steps can be taken to place bounds on the program and to help improve management and oversight of the program?

Mr. SULLIVAN. Our April 7 report [3] recommends the Secretary of Defense take the following actions to reinforce and strengthen program cost controls and oversight:

(1) The JSF program should maintain total annual funding levels for development and procurement at the current budgeted amounts in the fiscal year 2012–2016 future years defense plan (modified, if warranted, by the new acquisition program baseline expected this year). It should facilitate trades among cost, schedule, requirements, and quantities to control cost growth. Having gone through the Technical Baseline Review and budget approval process, it is reasonable to expect the program to execute against the future years defense plan going forward. Only in instances of major and unforeseen circumstances, should the Department consider spending more money on the program. Even then, we would expect changes to be few and adopted only after close scrutiny by defense leadership. Approved changes

[2] GAO, *Joint Strike Fighter: Restructuring Places Program on Firmer Footing, but Progress Still Lags.* GAO–11–325 (Washington, D.C.: April 7, 2011).

[3] GAO–11–325.

should be well supported, adequately documented, and reported to the congressional defense committees.

(2) Establish criteria for the STOVL probation period and take additional steps to sustain individual attention on STOVL-specific issues, including independent F–35B/STOVL Progress Reviews with Senior Leadership to ensure cost and schedule milestones are achieved to deliver required warfighter capabilities. The intent is to allow each JSF variant to proceed and demonstrate success at its own pace and could result in separate full-rate production decisions.

(3) Conduct an independent review of the contractor's software development, integration, and test processes—similar to its review of manufacturing operations—and look for opportunities to streamline software efforts. This review should include an evaluation of the ground lab and simulation model accreditation process to ensure it is properly structured and robustly resourced to support software test and verification requirements.

Mr. BARTLETT. 2a. DOD has been engaged in a comprehensive restructuring of the program since last year. In testimony last year before this Subcommittee, you said that GAO supports these actions.

Do you still support the restructuring efforts, including the most recent ones added by the Secretary in January 2011? Have you seen concrete examples of improvements from these actions?

Mr. SULLIVAN. We do still support JSF restructuring actions and note some tangible improvements already:

- The technical baseline review was very comprehensive and applied solid systems engineering methods to thoroughly scrub the program and highlight key problem areas.
- While cost analysts are still working toward a new program baseline that recalculates procurement costs to completion, the current cost and schedule estimates provided to the Congress in the Nunn-McCurdy certification package and the FY 2012 budget are more realistic and achievable.
- The new development flight test schedule is also more realistic and better resourced, using more conservative assumptions about fly rates and test point achievements and providing for more flights and more test assets.
- The "probation period" and high level of oversight ordered for the STOVL is appropriately focused on evaluating and resolving its problems to better inform future decisions on this variant, so critically important to the Marine Corps' future aviation plans.
- The substantial reduction in near-term procurement lessens, but does not eliminate, risks from concurrency.
- Finally, the aircraft and engine manufacturers are making good faith efforts to implement the findings and recommendations of the Independent Manufacturing Review Team and Joint Assessment Team and some production and supply performance measures are improving.

Mr. BARTLETT. 2b. Several actions seem the same or similar to GAO's recommendations from years ago. What are some of these and why did the Department not previously implement your recommendations?

Mr. SULLIVAN. Several actions are quite similar.

- Our March 2008 report criticized DOD's so-called Mid-course Risk Reduction Plan, particularly the cuts made in flight test assets and the number of flight tests. We recommended that DOD revisit and, if necessary, revise the plan to address concerns about testing, use of management reserves, and manufacturing deficiencies. Instead, DOD wanted to replenish management reserves from within the program baseline and did not revise its plan, nor fix the problems. In short order, management reserves were again depleted. Recent restructuring actions added more test resources, increased the number of flight tests, and extended the schedule, effectively reversing the mid-course plan. In addition, the IMRT team recommended improvements in manufacturing and supply chain management.
- Also in 2008, we determined that the program cost estimate was not reliable and that a new comprehensive independent cost estimate and schedule risk assessment are needed. We reiterated these concerns in subsequent reports, including the need to make a better projection of life-cycle operating and support costs. DOD's joint estimating team did provide better cost estimates in the interim, but it was not until the recent restructuring (and after a Nunn-McCurdy cost breach) that comprehensive independent cost estimates for the program to completion were directed. DOD is also preparing a more informed forecast of life cycle costs. Restructuring also directed the program to finally do the schedule risk assessment, more than two after our recommendation.

- Since 2006, we have consistently warned against procuring quantities of aircraft much ahead of testing and the ability of the manufacturing process to produce at high rates. In 2009, for example, we reported on the risks posed by DOD plans to further accelerate procurement and to do so on cost reimbursement contracts. DOD responded to us that planned procurement rates were efficient and feasible. We were gratified when Defense leadership substantially reduced near term procurement and decreased the annual ramp rate (the percentage increase in production from one year to the next) and awarded the first fixed price production contract.

We are not sure why the Department did not implement these recommendations earlier. We can only surmise that it did not because it did not have to. Funding for the JSF was plentiful and it was a top priority, meaning the Department could borrow from lower priorities to pay for its cost growth. While acknowledging the risks, program and contractor officials typically kept driving forward rather than admit and resolve problems.

Mr. BARTLETT. 2c. Going forward, what critical challenges remain for the program from a cost and schedule standpoint?

Mr. SULLIVAN. Although encouraged by DOD's ongoing restructuring actions, we remain concerned about the JSF program's ability to successfully execute to testing and manufacturing schedules. The JSF program is still very early in demonstrating aircraft design and testing to verify it works as intended. Development testing continues to be hampered by late delivery of test aircraft, slips in delivering software to testing, and delays in accrediting and verifying ground test labs and simulation models. These issues must be addressed in order to implement the more rigorous test schedule going forward. Furthermore, development and operational testing will inevitably identify design and employment changes as a result of discovery and rework. Future changes may require alterations to the manufacturing process, changes to the supply base, and costly retrofitting of aircraft already produced and fielded.

The program has still not adequately demonstrated stable designs and mature manufacturing processes as it enters the fifth year of production. We remain concerned about constraints in factory throughput and the increasing backlog of production jets on order but not delivered. Even after the Secretary reduced near-term procurement quantities, the program still plans to steeply ramp up annual production rates and make substantial investments, planning to purchase more than 300 aircraft for about $50 billion before development flight testing is completed in 2016. We will monitor contractors' responsiveness in implementing the IMRT and JAT recommendations, especially efforts to improve global supply chain management.

Additional program cost increases and schedule delays are likely as restructuring continues. The Secretary of Defense has not yet granted new milestone B approval nor approved a new acquisition program baseline. Originally planned for November 2010, program officials now expect the new acquisition program baseline in summer 2011. Cost analysts are still revising procurement funding requirements for the period fiscal year 2017 through completion of procurement in 2035. Accordingly, the net effect of reducing near-term procurement quantities and deferring these aircraft to future years is uncertain and depends upon the assumptions made about future unit prices, annual quantities, and inflation. We expect total procurement costs will be somewhat higher than the estimate submitted in the Nunn-McCurdy certification. A major unknown factor that could have major consequences is the potential costs and schedule changes resulting from the evaluation of STOVL deficiencies.

Maintaining affordability—both in terms of the investment costs to acquire the JSF and the continuing costs to operate and maintain it over the life-cycle—will be very challenging. A key tenet of the JSF program from its inception has been to deliver an affordable, highly common fifth-generation aircraft that could be acquired by the warfighters in large numbers. Rising aircraft prices erode buying power and may make it difficult for the U.S. and its allies to buy as many aircraft as planned. The international partners are being counted on to buy about 730 aircraft; DOD's unit cost estimates assume this level of participation. Quantity reductions could drive additional price increases for future aircraft. Further, while the Department is still refining cost projections for operating and supporting future JSF fleets, cost forecasts have increased as the program matures and more data becomes available. Current JSF life-cycle cost estimates are considerably higher than the legacy aircraft it will replace; this has major implications for future demands on military operating support budgets and plans for recapitalizing fighter forces.

Mr. BARTLETT. 2d. In your current draft report at DOD for comment, what are some specific actions you would like them to take?

Mr. SULLIVAN. We issued the report on April 7. DOD concurred with all three recommendations. These are discussed above in the answer to the fourth question under part 1.

Mr. BARTLETT. 3a. Mr. Sullivan, you issued a recent report on the Air Force's tactical fighter shortfalls and inventory plans. One key point was the JSF's sheer size and priority within the Department and how that impacts other programs in the acquisition portfolio.

How has the JSF size and priority affected other programs in the portfolio? Considering the JSF's central role in DOD's future tactical aircraft recapitalization plans, what are the potential consequences to the program and other programs if the JSF cannot deliver on time with the numbers needed to replace legacy fighters and at a price the Department can afford?

Mr. SULLIVAN. Our July 2010 report on DOD's tactical aircraft requirements[4] stated that the JSF is the linchpin in DOD's tactical aircraft recapitalization plans because of its magnitude and the hundreds of legacy aircraft it is slated to replace. As a result, JSF program setbacks in costs, deliveries, and performance directly affect modernization plans and retirement schedules of the legacy aircraft. Uncertainty about JSF's costs and deliveries makes it challenging for the Services to plan and implement modernization efforts and retire older aircraft that are becoming more expensive to operate. As a result, Service officials have been forced to react to changing JSF schedules and to put forward unfunded contingency plans to modernize and extend the life of some legacy aircraft. In addition to JSF's problems, DOD's investments in legacy systems have generally been assigned lower priority in the budgeting process, and many critical upgrade and modernization efforts face funding shortfalls.

Going forward, the JSF is a top priority for the Department and will require large annual funding commitments from the Air Force, Navy, and Marine Corps. As such, continued program cost increases have significant affordability implications for the Services, other programs in the acquisition portfolio, and the Nation as a whole. In this period of more austere budget conditions, continued cost increases may result in reduced quantity purchases by the Department or international partners. If this were to occur, we would expect unit prices to increase, further straining program affordability. At minimum, other lower priority programs will have to compete with the JSF for a shrinking discretionary pool of money. Looking forward, long-term JSF operating and sustainment costs will significantly affect future budgets; while the costs to develop and produce a weapon system are significant, these usually represent less than a third of total ownership costs. Current forecasts of JSF operating and sustainment costs project them to exceed those of legacy aircraft.

Mr. BARTLETT. 3b. What are the Air Force and Navy doing with legacy fighter programs to help mitigate cost increases and schedule delays for the JSF?

Mr. SULLIVAN. The Air Force plans to extend the service life and enhance capabilities on 300 newer legacy F–16s. Initial funding for this is in the Air Force's 2012 budget request, but the full cost is not yet known. Along with some structural work on older legacy F–16s, and assuming JSF at peak procurement of 80 aircraft per year, officials believe this will mitigate a projected shortfall in the tactical fighter force through 2030. Our February 2011 report on Air Force fighter force structure reports[5] noted the-Air Force is not expecting any major changes to its fighter recapitalization plan. However, better information on the JSF restructured program and on the F–16 fleet is expected to become available in 2011. This could enable a more informed analysis, comparing and contrasting various alternatives for mitigating the projected aircraft shortfalls.

Similarly, the Navy is evaluating a service life extension program for approximately 280 F/A–18 aircraft in order to address its projected tactical aircraft shortfall in the near term. The new budget also directs the Navy to purchase an additional 41 F/A–18E/F Super Hornets in the near-term to help cover the gap caused by JSF delays.

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[4] GAO, *Tactical Aircraft: DOD's Ability to Meet Future Requirements Is Uncertain, with Key Analyses Needed to Inform Upcoming Investment Decisions.* GAO–10–789 (Washington, D.C.: July 29, 2010).

[5] GAO, *Tactical Aircraft: Air Force Fighter Reports Generally Addressed Congressional Mandates, but Reflected Dated Plans and Guidance, and Limited Analyses.* GAO–11–323R (Washington, D.C.: Feb. 24, 2011).

Appendix 1: GAO Reports and DOD Responses

GAO report	Est. dev. costs dev. length APUC(a)	Key program event	Primary GAO message	DOD response and actions
2001 GAO–02–39	$34.4 Billion 10 years $69 Million	Start of system development and demonstration approved.	Critical technologies needed for key aircraft performance elements are not mature. Program should delay start of system development until critical technologies are mature to acceptable levels.	DOD did not delay start of system development and demonstration stating technologies were at acceptable maturity levels and will manage risks in development.
2005 GAO–05–271	$44.8 Billion 12 years $82 Million	The program undergoes replan to address higher than expected design weight, which added $7 billion and 18 months to development schedule.	We recommend that the program reduce risks and establish executable business case that is knowledge-based with an evolutionary acquisition strategy.	DOD partially concurred but does not adjust strategy, believing that their approach is balanced between cost, schedule and technical risk.
2006 GAO–06–356	$45.7 Billion 12 years $86 Million	Program sets in motion plan to enter production in 2007 shortly after first flight of the non-production representative aircraft.	The program plans to enter production with less than 1 percent of testing complete. We recommend program delay investing in production until flight testing shows that JSF performs as expected.	DOD partially concurred but did not delay start of production because they believe the risk level was appropriate.
2007 GAO–07–360	$44.5 Billion 12 years $104 Million	Congress reduced funding for first two low-rate production buys thereby slowing the ramp up of production.	Progress is being made but concerns remain about undue overlap in testing and production. We recommend limits to annual production quantities to 24 a year until flying quantities are demonstrated.	DOD non-concurred and felt that the program had an acceptable level of concurrency and an appropriate acquisition strategy.

GAO report	Est. dev. costs dev. length APUC(a)	Key program event	Primary GAO message	DOD response and actions
2008 GAO–08–388	$44.2 Billion 12 years $104 Million	DOD implemented a Mid-Course Risk Reduction Plan to replenish management reserves from about $400 million to about $1 billion by reducing test resources.	We believe new plan actually increases risks and that DOD should revise the plan to address concerns about testing, use of management reserves, and manufacturing. We determine that the cost estimate is not reliable and that a new cost estimate and schedule risk assessment is needed.	DOD did not revise risk plan nor restore testing resources, stating that they will monitor the new plan and adjust it if necessary. Consistent with a report recommendation, a new cost estimate was eventually prepared, but DOD refused to do a risk and uncertainty analysis that we felt was important to provide a range estimate of potential outcomes.
2009 GAO–09–303	$44.4 Billion 13 years $104 Million	The program increased the cost estimate and adds a year to development but accelerated the production ramp up. Independent DOD cost estimate (JET I) projects even higher costs and further delays.	Because of development problems, we stated that moving forward with an accelerated procurement plan and use of cost reimbursement contracts is very risky. We recommended the program report on the risks and mitigation strategy for this approach.	DOD agreed to report its contracting strategy and plans to Congress. In response to our report recommendation, DOD subsequently agreed to do a schedule risk analysis, but still had not done so as of February 2011. In February 2010, the Department announced a major restructuring of the JSF program, including reduced procurement and a planned move to fixed-price contracts.

GAO report	Est. dev. costs dev. length APUC(a)	Key program event	Primary GAO message	DOD response and actions
2010 GAO–10–382	$49.3 Billion 15 years $112 Million	The program was restructured to reflect findings of recent independent cost team (JET II) and independent manufacturing review team. As a result, development funds increased, test aircraft were added, the schedule was extended, and the early production rate decreased.	Because of additional costs and schedule delays, the program's ability to meet warfighter requirements on time is at risk. We recommend the program complete a full comprehensive cost estimate and assess warfighter and IOC requirements. We suggest that Congress require DOD to prepare a "system maturity matrix"–a tool for tying annual procurement requests to demonstrated progress.	DOD continued restructuring actions and announced plans to increase test resources and lower the production rate. Independent review teams evaluated aircraft and engine manufacturing processes. As we projected in this report, cost increases later resulted in a Nunn-McCurdy breach. Military Services are currently reviewing capability requirements as we recommended. The Department and Congress are working on a "system maturity matrix" tool, which we suggested to Congress for consideration, to improve oversight and inform budget deliberations.

Source: DOD data and GAO analysis.
(a) Average procurement unit cost.

QUESTIONS SUBMITTED BY MRS. ROBY

Mrs. ROBY. Gen Carlisle, what is the process you plan to use to ensure procurement of an affordable, right-sized helicopter for the mission? What assurances will there be that the American taxpayer is not paying too much for an aircraft that is overkill for this domestic, non-combat requirement?

General CARLISLE. [The information was not available at the time of printing.]

Mrs. ROBY. I am sure you are familiar with all of the fighter wings in the Air National Guard, and there is one I would like to highlight, in light of F–35 fielding. This is the 187th Fighter Wing which flies F–16s. Early on, Air Combat Command leadership led our Commanding General of the Alabama National Guard to believe that this unit would be on the first list of units to be fielded the F–35. Well, the list came out and the 187th FW was not on the list. My question is not if the 187th FW will be fielded the F–35, but when?

General CARLISLE. [The information was not available at the time of printing.]

QUESTION SUBMITTED BY MR. OWENS

Mr. OWENS. Given our experience in Iraq and Afghanistan, and even previous air campaigns like Operations Desert Storm and Operation Allied Force how much of an operational and logistical advantage will it be in future conflicts, if three of our Services and our allies are all flying the F–35?

General CARLISLE. [The information was not available at the time of printing.]

QUESTIONS SUBMITTED BY MR. GARAMENDI

Mr. GARAMENDI. On-going deployment of laser peening for life extension of the F–22 structure is going very well and represents an excellent example of addressing issues before they become serious and costly problems. It is also another example of US development of world leading aerospace technology that spins out creating US jobs in the commercial sector. We applaud this F–22 effort and the forward looking steps the Air Force and its OEMs took in this deployment. Do you see this and other new technologies being deployed to solve problems for new systems such as the F–35? What is the mechanism to ensure these advances move forward?

Mr. VAN BUREN and Admiral VENLET. [The information was not available at the time of printing.]

Mr. GARAMENDI. Laboratory test results funded by the Office of Naval Research and overseen by NAVAIR have indicated that up to 250% lifetime improvements can be obtained on arrestment hook shanks for carrier based aircraft with a simple advanced process adding processing cost of only about 1%. We applaud this work and highly recommend that it be followed through to deployment. We understand that if implemented cost savings will be in the many millions of dollars for the fleet as well as adding enhanced safety. Are efforts underway to field and identify other applications? Are programs such as the Navy's BOSS III the appropriate vehicle to enable implementation and thus begin to realize cost savings?

Admiral SKINNER. [The information was not available at the time of printing.]