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NAVAL STRIKE FIGHTERS—ISSUES AND CONCERNS

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SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES

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NAVAL STRIKE FIGHTERS—ISSUES AND CONCERNS

HOUSE OF REPRESENTATIVES,
COMMITTEE ON ARMED SERVICES,
SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES,
Washington, DC, Tuesday, March 28, 2017.

The subcommittee met, pursuant to call, at 3:54 p.m., in room 2212, Rayburn House Office Building, Hon. Michael R. Turner (chairman of the subcommittee) presiding.

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

Mr. TURNER. The hearing will come to order. The subcommittee meets today to receive testimony on the current readiness challenges facing strike fighter fleets for the Department of the Navy.

I would like to welcome our distinguished panel of witnesses: Lieutenant General Jon M. Davis, Deputy Commandant of the Marine Corps for Aviation; Rear Admiral DeWolfe "Chip" Miller, Director of the Air Warfare Division for the U.S. Navy; and Rear Admiral Michael T. Moran, Program Executive Officer for Tactical Aircraft.

I would like to thank you all for your service and appreciate your testimony today.

We have several important issues to cover today. Before I begin, I want to briefly highlight three areas of committee concern: One, overall strike fighter readiness; two, the Navy's current strike fighter shortfall; and, three, the issue of increased physiological episodes [PEs] in the F–18 fleet.

Last year, this subcommittee held a hearing similar to this one to conduct oversight on the capability and capacity challenges in the Navy's strike fighter fleets. During that hearing, the witnesses noted that, quote, "aviation readiness is in a precarious position that extends well beyond the strike fighter force structure. It is particularly acute in the United States Marine Corps. Marines are flying on average 58 percent of the required flight time necessary to be ready for the Nation's call."

The witnesses went on to explain that this situation resulted from reduced capacity, increased operational demand and usage, under-resourcing sustainment and spare parts, and F–18 depot production falling short of the required output.

Last summer, I led a congressional delegation to Marine Corps Air Station Miramar, where I met with pilots and maintainers. And I heard firsthand their concerns regarding a lack of spare parts availability and not getting enough flight training time due to insufficient aircraft being available.

Just last month, this full committee held a hearing on the state of the military at which Admiral Moran, the Vice Chief of Naval Operations, verified that well more than half of the Navy and Marine Corps F/A–18 aircraft were out of service. We learned that 62 percent of F/A–18s cannot fly today. The current crisis in military aviation readiness appears to be only getting worse.

So we expect our witnesses today to help us better understand what can be done to reverse this damaging trend in Navy and Marine Corps aviation readiness. In hearings 2 years ago, for the fiscal year 2016 [FY16] budget request, Admiral Greenert, then Chief of Naval Operations, described a requirement to procure an additional 3 squadrons of F/A–18 Es and Fs, or about 36 aircraft, to improve capacity and address a growing shortfall in naval strike fighter inventory.

However, as a result of increasing demand and operational use, combined with continuing resolutions [CRs] and budget constraints imposed by Congress, we understand that shortfall has now grown to over 100 aircraft.

For fiscal year 2017, to help address both the readiness and the strike fighter shortfalls the committee added 12 F/A–18E/F aircraft, 4 F–35C and 2 F–35B aircraft. The House-passed Defense Appropriations Act for fiscal year 2017 reflects those increases.

The Department of Defense amended budget request for fiscal year 2017 also includes an additional 24 F/A–18 E and Fs, and this subcommittee plans to work to ensure that request is fully funded. We expect our witnesses today to provide us with additional information as to what mitigating actions and investment we need to now make in order to reverse this harmful trend of a shrinking strike fighter fleet.

Since 2009, the Department of the Navy has noticed a steady year-over-year rise in hazard reports, known as HAZREPs, regarding physiological episodes in the Navy's F/A–18 and EA–18G fleets. In fiscal year 2011, the Navy reported 15 physiological episodes in the fleet of F/A–18 A–D aircraft. In fiscal year 2016, 38 episodes were reported. In the first quarter of this fiscal year, there have already been 13 episodes.

I am concerned about this growing trend, one that has significant effect on readiness and one that needs to be fixed. According to the Navy, physiological episodes occur when a pilot experiences a loss in performance related to insufficient oxygen, depressurization, or other factors present during flight.

Last year, we were informed that the Navy had organized a physiological episode team to investigate and determine the causes of these physiological episodes. And we are very aware of how that affects the confidence of our pilots and their ability to perform, because it is not just these events occurring, it is also the anxiety of these events occurring in succession.

In response and as a result of the subcommittee hearing, the National Defense Authorization Act [NDAA] required the Navy to establish an independent review team to evaluate the Navy's plan to solve this problem. We look forward to receiving an update on these efforts from our witnesses today and request your professional opinion on what do we, as Members of Congress, need to do to help with this process.

In closing, as I have said at previous hearings, there is a military readiness crisis. Continuing down this path of budget-driven defense strategies rather than capacity-driven defense strategies, places too great a burden on our men and women in uniform.

We need to close out fiscal year 2017. We need to address the additional funding requirements we were unable to cover in the National Defense Authorization Act for 2017. And finally, we need to work with the administration to develop a top-line budget request for fiscal year 2018 that is as close as possible to the $640 billion top-line figure identified by Chairman Thornberry in his views and estimates letter to the House Budget Committee.

Before we begin, I would like to turn to my good friend and colleague, and thank my ranking member, Massachusetts Member Ms. Niki Tsongas, and ask her for her comments. Thank you.

[The prepared statement of Mr. Turner can be found in the Appendix on page 39.]

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

Ms. TSONGAS. Thank you, Mr. Chairman, and good afternoon to all. And thank you to our witnesses here today.

As you are well aware, today's hearing on issues and concerns facing the Navy and Marine Corps strike fighter community comes at a time when the entire naval aviation enterprise is under tremendous strain from several directions.

The first challenge is funding, as the chairman stated so well. I agree that sequester-level funding has constrained our ability to make the thoughtful investments in these types of important capabilities. A second challenge centers on continuing problems with the life support systems for F–18 Hornet and Super Hornet aircraft, the aircraft that make up almost all of the Navy and Marine Corps fighter fleets; specifically, problems with decompression incidents in older F–18s, and possible oxygen system contamination in newer F–18s continue to plague the fleet.

As Chairman Turner mentioned, this subcommittee had a hearing just over a year ago where these same issues were discussed in some detail. And I thank Lieutenant General Davis and Rear Admiral Moran for appearing before us again today to provide an update.

Since that time, the Navy has continued to aggressively pursue equipment fixes, improved diagnostic equipment, provide additional aircrew training, and focus significant leadership attention to this issue. Importantly, I think the Navy has developed a clearer understanding of which aircraft are beset by each of these physiological events.

However, while some progress has been made, the overall rate of incidents for 2016 were worse than they were in 2015. For the first few months of 2017, some parts of the fleet have seen improvement, while other parts have plateaued or gotten worse. So the situation is mixed.

While it has not garnered as much recent attention as the overall state of F–18 readiness in the fleet, I believe we must address this issue because it directly affects the lives of the brave men and

women operating these aircraft. With this in mind, before we proceed, I would like to read a portion of a letter sent to our committee by a family member of an F–18 pilot. While it only provides one person's perspective on the problem, I think it tells a story in a way all of us can appreciate.

Quote, and I will continue to read until we come to the end of it, and then unquote: "My brother is a pilot and department head in an F–18 squadron. In the last year, they have had at least 20 incidents of the aircraft's environmental control system malfunctioning, leading to pilots developing decompression sickness and resulting in several incidents of hospitalizations and trips to a decompression chamber, or dive chamber."

"My brother alone has had three decompression incidents in the last 3 months. After his most recent incident, his decompression sickness was left undiagnosed for 4 days. Before finally receiving treatment, he was so mentally impaired that he could not perform basic arithmetic and spent 6 hours in a decompression chamber."

"In another instance, a squadron pilot has persistently failed neurological exams, despite three rounds of treatment in the decompression chamber and multiple MRIs [magnetic resonance imagings]. Hornet pilots I have spoken with confidentially predict that a fatality will result soon if the situation is not addressed."

"Naval aviators volunteer for a high-risk profession. However, the dangers inherent in flying military missions are vastly different than the risk of harm that accrues from piloting an aircraft with systems that are operating well beyond their life expectancy and frequently failing in unpredictable ways."

"The key here is that these airplanes are failing in ways engineers didn't predict, and thus eliminate the aircrews' ability to safely troubleshoot a system failure in flight. Funding and attention needs to be diverted to immediately solve this issue, as was done when problems with the oxygen system developed with the U.S. Air Force's F–22," unquote.

I think that letter lays out the problem as well as any facts and figures I could cite. The incidents taking place and the possible causes are admittedly complex, but the lack of overall progress, despite the best efforts of all involved, is of great concern. I look forward today to getting into the details of developments in this area, what is being done, and options for the future.

And with that, I yield back and look forward to hearing from today's witnesses.

Mr. TURNER. Thank you, Ms. Tsongas. Before we proceed, I would like to ask unanimous consent that non-subcommittee members be allowed to participate in today's hearing after all subcommittee members have had an opportunity to ask. And before I ask the committee, I should disclose to them that it is actually Mr. Larsen, so they can take that into consideration. Is there any objection? I hear no objection——

Mr. COOK. Reserving the right to object.

[Laughter.]

Mr. TURNER. Excellent.

Mr. COOK. No, it is okay.

Mr. TURNER. So there is no objection, even though it is Mr. Larsen. Without objection, Mr. Larsen will be recognized at the appropriate time.

With that, we will turn to General Davis.

STATEMENT OF LTGEN JON M. DAVIS, USMC, DEPUTY COMMANDANT FOR AVIATION, U.S. MARINE CORPS

General DAVIS. For time today, you have got my statement for the record. Bottom line, the United States Marine Corps remains the Nation's force in readiness. We are challenged with our TACAIR [tactical aviation] readiness. I will tell you that we are right now deployed in a 1:2 deployment-to-dwell ratio, which is a very high state of deployment-to-dwell. And we are doing it with a very small structure.

You know, the United States Marine Corps is designed to [be] small in size, high in readiness, and about 20 squadrons of TACAIR. Right now, we have got 19; one of our Reserve squadrons is cadre'd [non-operational]. So in those 19 squadrons, we are very, very busy, very forward deployed.

I will tell you that we are flying some of the oldest aircraft in the Nation's inventory. Average age our F–18s and Harriers are in the 22- to 24-year range, and those Harriers were remanufactured from day attack to radar in the early 1990s. So they are even older than that on the inside; trusty, tried, and true airplane.

So old airplanes doing their level best. On the F–18 inventory, today I can muster F–18s, Harriers, and F–35s. Of the about 326 aircraft I should have on my flight line, I could get airborne in about 146. Alright? And that is—we are missing some parts. Every type/model/series is a little bit different.

I will tell you, most of that risk right now is in legacy F–18. The legacy F–18, I have got 11 squadrons of those airplanes. And they are struggling in their readiness. The Harrier, we had a readiness review; that airplane is doing well. Our F–35s are doing exceedingly well. They are in Korea right now, VMFA–121, the first forward-deployed fifth-generation strike fighter out and basically flying missions out there for General Brooks in Korea, and every day—I track those guys every day, 7 to 8 airplanes up out of the 10 that they own out there. So that is what we are looking for. We don't realize that with our F–18. We are doing better in our Harrier.

So as a small force, small in size, high in readiness, we need a higher state of readiness out there. Number one for us is to recapitalize. That old fleet, we are only 13 percent through our TACAIR recapitalization in the Marine Corps. We have just started TACAIR recapitalization. So that is the F–35 program for us. And bottom line, we need to continue on with that.

The second thing we need to do to basically help our readiness—I think that Admiral Moran and team would say the same thing—is the sustainment accounts. Readiness recovery, which this committee and this—our Congress has been very supportive of the United States Marine Corps readiness recovery effort, we are making progress. But it is—I would say it is fragile progress. It is steady, one day at a time readiness recovery. And a big part of that is the spare parts accounts.

The number one impact for lack of readiness for legacy platforms they fly, across the spectrum of the Marine Corps, is lack of spare parts, whether that is F–18s, Harriers, or our helicopters or tiltrotors.

The United States Marine Corps will be ready. We will be ready to go with what we can offer up. But I would say that as the Nation's force in readiness, we could do a better job for our young Marines that are out there, giving them the proper training, the proper amount of flight time, and in order to make them ready to go do what our Nation requires them to do.

They will go forward. They will do the best they can. They will do a good job. But I think we owe it to them to give them more resources, more flight time, more training, more parts in order to make that go. And I think the recapitalization, it is time for the Marine Corps to do that, and I think that is the number one thing I could ask from this committee is to keep that recapitalization on track to get us in those fifth-generation strike fighters as soon as we can.

[The joint prepared statement of General Davis, Admiral Miller, and Admiral Moran can be found in the Appendix on page 42.]

Mr. TURNER. Admiral Miller.

STATEMENT OF RADM DEWOLFE "CHIP" MILLER III, USN, DIRECTOR, AIR WARFARE, U.S. NAVY

Admiral MILLER. Chairman Turner, Ranking Member Tsongas, distinguished members of the subcommittee, thanks for the opportunity to come here and talk about Navy strike fighter issues. I will also cut my opening remarks short.

As General Davis said, over the past 16 years our Navy strike fighters of F–18 Super Hornets have been flying combat missions in the Mediterranean, Arabian Sea, as well as providing much-needed presence in strategic locations such as the South China Sea. To state that the operational demand for carrier-based strike fighters has been high would be an understatement. And this demand is expected to remain high, especially given the aggressive growth from expanding naval competitors like Russia and China.

So our current force, as you mentioned in your opening remarks, sir, is that we are facing a readiness challenge. And there are three main drivers from my perspective on what those causes are: One is that persistent high operational demand for naval forces; second is funding reductions; and the third is the consistent uncertainty about when those reduced budgets will be approved.

As the Vice Chief of Naval Operations testified recently, we continue to put our first team on the field, but we lack serious depth on the bench. And that impact to our bench will be further exacerbated if we don't receive resolution on the FY17 request for appropriations and the recently provided request for additional appropriations. If we do not receive both, the aircraft shortages in our air wings that are preparing to deploy will grow, and we will have to continue to prioritize our readiness funding to ensure that the next group in the rotation is ready.

Although the bench issue has been more severe in our strike fighter fleet replacement squadrons and weapons schools, without adequate funding in FY17, this, too, will become worse. So the

Navy does require your support on the department's readiness recovery efforts. We have the opportunity to correct this, but it must start in FY17.

Recovery begins by improving wholeness in our existing strike fighter force, by ensuring we have the parts on the shelf, and ensuring we fully fund readiness enabler, depot, and flying hour accounts. We also need to procure new strike fighters to address the current shortfall in modernization of our fleet. This includes the procurement of both F–18s and F–35Cs.

As I testified before this committee earlier a month or so ago, the carrier air wing of the future needs both fourth- and fifth-gen [generation] capability and capacity. By strengthening the bedrock of our strike fighter force, filling the gaps which currently exist, and working towards a balanced fourth- and fifth-generation capability mix, we will field an unbeatable team, while ensuring our bench has the depth required to join the forward-deployed team.

Our readiness issues did not happen overnight. And we aren't going to get out of them overnight. It is going to take time and solid funding throughout the FYDP [Future Years Defense Program] to start making that recovery a reality.

Thank you very much for the opportunity to be here. And I look forward to your questions.

Mr. TURNER. Admiral Moran.

STATEMENT OF RADM MICHAEL T. MORAN, USN, PROGRAM EXECUTIVE OFFICER, TACTICAL AIRCRAFT, U.S. NAVY

Admiral MORAN. Good afternoon. Mr. Chairman, Ranking Member Tsongas, thanks for the opportunity this afternoon to testify. As a Program Executive Officer for aircraft—Tactical Aircraft programs, I am currently focused on three priorities to improve the capacity and capability of carrier aviation to meet our Nation's requirements.

One is to effectively execute the programs of record prioritized by Navy leadership and resourced by Congress. Number two is to improve flight line readiness of our carrier wing platforms, sensors, and weapons. And third is to improve speed to the fleet, which our programs deliver—require solutions required to mitigate Navy and joint force capability gaps.

Just a brief moment on the third part. I do want to thank Congress for the language in both the fiscal year 2016 and 2017 NDAA, which provides new prototype and experimentation pathways to enable us to go faster. I look forward to the opportunity to work with you to accelerate the fielding of advanced technology to enable us to maintain our competitive advantage over any adversary. I think that is a very helpful opportunity for us.

But executing the programs of record will always be my first priority. It is my obligation to not only ensure the timely delivery of critical capability to the fleet, but to do so as cost-effectively as possible on behalf of the taxpayer.

Therefore, I spend the majority of my time supporting these efforts, working with our resource sponsors, the fleet, and our very capable industry partners to ensure that procurements, life extension, and modernization programs are executed as required.

In that regard, I look forward to your support to avoiding the detrimental impacts of a yearlong continuing resolution. Several new start programs critical to delivering the next-generation of integrated capabilities will be delayed.

Additionally, several current programs, some of which support joint urgent operational need programs necessary to keep our aircrews safe and effective on upcoming deployments, will be delayed, as well. And others which provide critical sustainment efforts required to improve our flight line availability also will be impacted by a resolution.

If there is a yearlong continuing resolution, it is our hope that anomalies will be considered for those programs most critical to the Navy and the Marine Corps.

In terms of my second priority, readiness, we have established focused readiness teams with all stakeholders across the Navy and the Marine Corps, which are led by our naval aviation three-star leadership team to find opportunities to establish and prioritize investments.

As you have already heard, the operational demand for our Navy will continue to be challenged by the fleet's ability to meet its readiness requirements. Constrained funding levels for our primary readiness accounts, largely due to fiscal pressures imposed by the Budget Control Act, coupled with uncertainty around when budgets will be approved, drive instability to our planning, our workforce, and our industry partners.

The aviation support account, for example, has been funded below requirements for the last 8 years, which has forced programs to prioritize only safety-critical work, and projects such as reliability-centered maintenance, technical publications, structured repair manuals, things that improve the readiness on our flight lines have not been done or supported. Investments in these accounts, which the Navy is focused on today, as well as the long-term funding stability is, therefore, essential.

Finally, there is no more important safety-critical work ongoing in naval aviation than resolving the physiological episodes we continue to see across our fleet. This is naval aviation's number one safety issue. Despite the resource-constrained environment, we are taking a resource-unconstrained approach to this problem. It is our number one priority.

We are working diligently to determine all root causes of PEs. We continue to aggressively prioritize resources and engineering efforts and remain focused on mitigating the PE risk to a level that will allow us to continue safe operations.

Thank you very much for the opportunity to testify this afternoon.

Mr. TURNER. Thank you, Admiral.

General Davis, we understand that the most serious readiness concerns are found in your aviation units as you were describing. And we understand that you have temporarily reduced the number of aircraft assigned to your fighter attack squadrons because you do not believe the available aircraft meet your requirements; obviously, a very drastic step as a result of constrained resources.

General Davis, Admiral Moran was telling us some of the effects of the Budget Control Act and of continuing resolutions. We all

know that continuing resolutions and the Budget Control Act, those sequestration cuts or effects, are harming the military. Could you please give us some discussion on how it is affecting your readiness and how those cuts are affecting you? Because as we go and make the case to the rest of Congress as to why there should not be a yearlong CR and why we need to repeal the Budget Control Act, you and your counterparts are the best spokespersons to aid us in that.

And then, secondly, if you could describe what additional resources the Marine Corps aviation modernization needs in the near term. Does the fiscal year 2017 budget amendment help to address some of these challenges in readiness and modernization? And did you get everything you've asked for in regards to aircraft in the amended budget request? General Davis.

General DAVIS. Thank you, sir. I think you might have met some of the best spokesmen out there when you went out to Miramar and talked to our young Marines. They are always the best spokesmen, whether it is an aviator or a rifleman that gets the support from those Marine aviators.

I will tell you, I think I am—the impacts of not getting a budget for me and the Marine Corps, in late July or early August, we will start shutting down squadrons that aren't next to deploy. And what that looks like—so we talked about 20 TACAIR squadrons; 6 F–18 squadrons and 4 Harrier squadrons will basically cease flying operations. Okay, so half of our fleet.

And if you look at the F–18 squadrons we have, last year—actually, last month, the average F–18 pilot in the Marine Corps flew 9.1 hours a month. Okay, they are supposed to get 16 hours a month. The Navy's "tactical hard deck" is 11. Last year, we were about 9 hours a month.

So we are eking out in our readiness recovery inch by inch—those Marines are working their rear ends off out in the hangar decks to make good readiness out of the older airplanes that we have until the F–35 does get there, sir.

But stopping flying when they are not flying now—I mean, that is—I think that is a debilitating gut shot to the Nation's force in readiness. That is the last thing I want to see, and it is the—I think we need to do everything in our power to avoid that.

This is like young football players getting snaps. That would be a couple months of—they will not be getting the snap until a budget does get approved or the next year's budget. And bottom line is, I think we need to do better than that. Not only can we do better than that, we need to do better for these Marines that are doing so much to keep us safe.

So I think it would actually kind of—also it would lower the ramps. So we have actually—this readiness recovery model we briefed you on, sir, and your team, we are executing that readiness recovery model. And bottom line, we have added last year—the last year, we added another 44 aircraft to our flight line that weren't there before. This year we project to do 33.

If we don't get the money, if we have to stop flying, that is going to start to taper off again. And the Nation's force in readiness will not hit its readiness recovery targets until much later. And I don't

want to talk about what date that is, because that is information for our adversaries.

I also say, too, that as far as our budget and what we asked for, we asked for some additional F–35s out there in the budget. That is what I need to get. I need more metal on the flight lines. We asked for an additional three. They didn't make it through the budget process coming out.

But we could use any kind of help. I think we talked about the last time I testified, sir. That is still the same. An optimized ramp for F–35 does the level best to help the Marine Corps recapitalize its old metal.

The F–18s I am flying today, they've got a 55 percent break rate. So that means they are up in the morning, but they go off in the sortie—that first sortie of the day, they come back, and they are down. So that is—usually we get two or three sorties out of those airplanes back in the day. We can't do that right now.

It is just these are tried-and-true war dogs. They are great airplanes, but they are tired. So getting the new airplanes, that is—the ramp for over the FYDP 19, 23, 23, 23, then 30, that allows me to get out of F–18, trying to take that to 2030, push that left at 2025, 2026. If that was—if there is one thing I could ask on the TACAIR side, for the United States Marine Corps, besides funding our enabler accounts would be those new airplanes. That would help us the most, sir. Thank you.

Mr. TURNER. General, how do you retain pilots when they are not getting to fly?

General DAVIS. Well, I have gone to visit every single unit in the Marine Corps, with the exception of the WESTPAC [Western Pacific] units, Congressman. And I have talked to them about that. And I appeal to them that the Nation is going to need the Marine Corps. We are that force when the—in our Nation's darkest day, right, that we are going to go forward, with whatever we have we are going forward. I choose to have a fully up force that is fully trained, but we are going to go forward, just like General Neller has said.

So I appeal to their patriotism. I said, you know, bottom line, the leadership and, frankly, this body here has been working hard to get us the resources to do readiness recovery, to fight for additional airplanes, to get that optimized ramp. They know that.

So I do. I appeal to their better nature, that they won't want to be left out when the balloon goes up the next time. And I talk back in history, because I have been at this for 37 years, and the folks that did get out to go do something different missed it. And they—all Marines like to be in the fight and they want to go be in the next wave to go forward.

So I appeal to that, but it is hard. It is hard. These are probably the very best Marines we have ever had in uniform, officer, enlisted. They are very professional people, very serious. And they want to be on that team that gets the snaps and is trained. They are not asking for a lot, but what they want—what they are demanding from me is spare parts for the airplanes, and airplanes that they can fix that will stay up once they do fix them.

So they are good Marines. They are the best Marines we have ever had that I have been associated with. And we are keeping

enough of them, but I am worried about a number of those Marines breaking faith with me from what I can't deliver for them on the flight line.

Mr. TURNER. Thank you, General. Admiral Miller, as I mentioned in my opening statement, 2 years ago, Admiral Greenert, then Chief of Navy Operations, indicated that the Navy required about 36 additional aircraft to address the Navy's strike fighter shortfall. Committee staff has learned that the current shortfall requirement is now over 100 aircraft.

Admiral Miller, please explain, what has changed over the last 2 or 3 years that has exacerbated the Navy's strike fighter shortfall? And what immediate actions need to be taken to mitigate it? Also, what additional resources are required in the Future Year Defense Programs for procurement of F/A–18E/Fs and F–35Cs to address the strike fighter shortfall?

Admiral MILLER. Yes, sir. Appreciate the question. And if I have time at the end, I would love to add on to that last question with our junior officers and the retention piece, if we have that time.

With respect to the shortfall, sir, it is hard to put an exact number to it. What is the number? What Admiral Greenert estimated——

Mr. TURNER. Well, let's start with, is it over 100?

Admiral MILLER. Right now, I am standing by the—we are at 36—we consumed—shortfall was all due to consumption. We are consuming airplanes quicker than we are replacing airplanes. And we replace airplanes by either, A, extending their life or, B, buying more airplanes.

And so with about 35 to 39 aircraft at the current rate that we are flying our strike fighters is what we are consuming a year. And we are not replacing it at that rate. So we have been on that pace for the last several years.

When you hear quotes like, "is it 100?" That is when you start looking at, we realize that we are flying our strike fighter fleet at a more rapid pace and they are driving to their 6,000-hour end of service life sooner. So starting in the early 2020s, we are going to have to start inducting Super Hornets into the depots to extend their service life. And so that—we are expecting about 60 to 70 airplanes possibly pulling off.

So do you have to buy new airplanes to replace and get in front of that? If that is a solution set, then, yes, you could argue that 100 is the number. What I will tell you is we can manage a lot of that. What we need to do is buy airplanes. We appreciate this committee's support in the FY17 request for 24 additional F/A–18s. And I can tell you that that is a great first step.

You ask about the future, you know, I expect that we need to be buying airplanes, F–18s and F–35s, throughout the FYDP. Initially, as I testified to earlier, I believe that buying heavier in the F–18s because of the shortfall we currently have and because of the impending service life extension that we are going to have in the early 2020s is where we need to go, continue the ramp that we have in PRES BUD [President's Budget] 2017 for F–35s that for the Navy sustains our IOC [initial operating capability] and our squadron transition to get at least six squadrons by FY24.

And as the FYDP continues to march down towards the early 2020s, that is when all of a sudden we now start transitioning into going and buying F–35s in a greater capacity. So hopefully that answers the question, sir. I do think it is a consumption issue.

Mr. TURNER. Well, numbers do matter, as you know. In the end, we have to pencil things together. And we can't do it on just representations of more or less. We have to do it on numbers. That is why you got a number question.

Admiral MILLER. Yes, sir.

Mr. TURNER. But you would like to talk about the issue of pilots not getting to fly and the effect on them?

Admiral MILLER. Yes, sir, you asked about retention. I think when it comes to the yearlong continuing resolution, like General Davis talked about, we are going to have to shut down squadrons, as well, and shutting down air wings. And so when you couple that with a readiness issue, i.e., squadrons that, you know, pilot—young JOs [junior officers] that are in the maintenance or basic phase, and they are just not flying, you know, the hours that they were expecting to fly, and all of a sudden now they are on a squadron that is potentially getting shut down.

You couple that with airlines that are going to be hiring about 50,000 pilots over the next 10 years, and so we are seeing—already starting to see the leading indicators of some retention problems. And that leading indicator is primarily the bonus take rate. And we are already this year at the O–4 ranks about 9 percent less than where we were last year.

So we are concerned about this. I just wanted to express that concern. I do think that, as General Davis talked about, if the junior officers are flying, they have up airplanes, their satisfaction of quality of life is going to be much higher, and they are going to stay Navy and Marine Corps.

Thank you, sir.

Mr. TURNER. Ms. Tsongas,

Ms. TSONGAS. Thank you. I would like to return to my opening comments and follow up on the issue of the physiological events and talk about the status of the F–18's challenges in the area of aircrew life support right now, these issues that exist right now, specifically the crew cabin pressure issues in older F–18s and possible oxygen system contamination in newer F–18s.

The information that you all provided to the committee for this hearing showed an increase in the rate of physiological events in all three elements of the F–18 fleet throughout fiscal year 2016 as compared to 2015. This included a 90 percent increase in the rate for F–18 A–D models, a much smaller 11 percent increase for F–18E and F models, but a more than doubling of the rate for the EA–18G model aircraft.

Admiral Miller, is that correct?

Admiral MILLER. Yes, ma'am.

Ms. TSONGAS. The same information provided to the committee covering the first 3 months of fiscal year 2017 showed a further 66 percent increase for the oldest F–18s, no increase in the rate for newer F–18s, and a 30 percent decrease for EA–18Gs. Are these figures correct, Admiral Miller?

Admiral MILLER. Yes, ma'am.

Ms. TSONGAS. And for the oldest F–18s, the data show a more than tripling of the rate of incidents from the first quarter of 2015 through the first quarter of 2017. I know that increase has gotten the attention of the Navy and a lot is being done. And I certainly appreciate that.

But the committee has been informed that the Navy has done some selective grounding of problem aircraft recently, both to reduce risks and to conduct engineering studies. So, first, I would just like to get a better sense of the scope of grounded aircraft across the fleet.

Admiral Miller, can you give me a sense of how many classic or legacy F–18s are grounded across the fleet for this reason?

Admiral MILLER. Ma'am, I think I would have to defer to Admiral Moran, who probably has more information on the technical data. What I can tell you is confirm the numbers that you have, because that is what we have been presented.

I will tell you, from a naval aviation leadership perspective, which includes all three of us at the table here, as Admiral Moran in his opening remarks said, is that aircrew safety is always our number one priority. And with regard to safety, this physiological episode issue is our number one safety issue.

Since we have testified before this committee last year, efforts have expanded considerably, mostly with aircrew training and with data collection, so—as well as maintenance procedures. So with that, if okay with you, I would defer to Admiral Moran, who I think can give you a lot more information on the technical issues of how we are proceeding.

Ms. TSONGAS. Admiral Moran.

Admiral MORAN. Yes, ma'am. I appreciate the question. You know, we have a protocol, the Navy does, whenever there is a PE event on any aircraft——

Mr. TURNER. Sir, could you move your microphone up?

Admiral MORAN. Yes, sir, could you hear me?

Mr. TURNER. It is a directional object. If you would make it straight. Thank you.

Admiral MORAN. Can you hear me now, sir?

Mr. TURNER. Yes.

Admiral MORAN. There we go. Sorry about that. The protocol we have in the Navy today is anytime an aircraft experiences a PE event, it is taken out of service. And so we have protocols we have developed over the last year and a half that go ahead and review every ECS [environmental control system] component on that airplane. We check each one out. We send that and the life support systems back for an engineering investigation to verify if we can find what was a causal factor for that PE event on the airplane.

So the CO [commanding officer] of each squadron, Navy or Marine Corps, always has that ability to take that aircraft and ground it and take it out of service. But we have protocols we developed to bring it back into service. And once we go through that and verify, if we can, the causal factor and replace those ECS components to get it back into a flyable state.

We have had a couple instances in airplanes that were bad performers that were repeat no matter what the aircrew or the maintainers did on the airplane. We would get it flying, we would expe-

rience some kind of PE event. So we would take that—and the fleet really was great for us. We transferred that to Pax River, Maryland, and we took it to our test squadron, and we instrumented that airplane. And we still have it.

And so we instrumented the whole ECS system to try to figure out where the problems were on some of these components with an ECS system. So we are still going through that process. We have learned a ton on some of the valves and switches in that system that we just previously have not replaced on—you know, kind of replaced them on an as-failed nature. So if the fleet reported them as failed, we'd replace them.

And so we have determined that, hey, we are not going to do that anymore. From what we are seeing, we are going to do what we call force replacement. So let's get back on a scheduled time period to replace these parts and components. And the naval supply system deal have been fantastic. We have been going after the supply base, going to find the parts and components, so we can do this force reset. We call it the ECS reset, because we just didn't do that on some of these airplanes, and so now kind of getting to that piece. So hopefully that answers your question, ma'am.

Ms. TSONGAS. Well, is there a tipping point for any particular airplane in which you just decide to ground it permanently because despite your best efforts you can't bring it back? There are those that you find the problem and you think you fix it, but those airplanes in which you think you fixed it but you haven't. So what is the tipping point for a particular aircraft or, in general, for the fleet, in terms of just broad numbers?

Admiral MORAN. Yes, ma'am. So we do have what we call a strike board that Admiral Miller kind of is responsible for, working with the TYCOMs [type commands] out in the fleet on balancing that. And so all of that information, whether it is a PE or there is a structural challenge with an airplane that is just too costly to go ahead and repair, we go ahead and make that determination to strike it from the inventory and not do anything more with that.

The only airplane—we have had two now—that we have really had a hard time fixing in terms of the PE, that no matter what we did, we couldn't do it, the one of them is in Pax River now. The other one we are considering taking down. We are going to do what we call really a teardown of the complete ECS system on that airplane. And so I think the fleet is in the position now, has taken that one out of service, too, because that will give us insight—because there is just some components that are really hard to get that are embedded in the airframe structure that we want to get a better look at.

So this is all part of the ECS reset for the legacy Hornets. And I will tell you, lessons learned, we are going after that really hard on the Super Hornet fleet as well, so we have two airplanes at Boeing right now as we speak that are part of the SLAP [service life assessment program] effort for the Super Hornet. And they are a learning aircraft, so we can understand a material condition.

We just put Boeing on contract. Hey, as we tear that aircraft apart, both of those aircraft, let's look at the ECS system from beginning to end to understand it, so when we go ahead and take that into the sustainment mods [modifications] in the mid—you

know, early 2020s, we are going after the ECS system from the get-go on that airplane.

Ms. TSONGAS. Well, I appreciate these efforts. But I asked these questions so we have a sense of where things go from here, because as all three of you know so well, the majority of both the Navy and the Air Force, its strike fighter fleet, is made up of both older and newer F–18s, which you are addressing.

And that was not the case with the Air Force when it grounded the F–22 fleet. Whereas the Air Force could ground its F–22 fleet without major, albeit serious, consequences for its overall operations, grounding the F–18 fleet would have far-reaching implications for the majority of naval strike missions.

So I highlight this point to underscore the importance of the work being done by the independent review team and the physiological episode team and, if we have time, I will follow up with questions about that.

But also just wanted to draw attention again to the mitigation efforts you all are investing in to keep your pilots safe, whether it is wearing a dive watch so that they know if there is a decompression incident, their fleet awareness training for hypoxia, decompression chambers to help pilots who have experienced the depressurization. I think this tells you how very serious this issue is. And it calls for some real solutions.

Mr. TURNER. Mr. LoBiondo.

Mr. LOBIONDO. Thank you, Mr. Chairman. Thank you all for being here. So with the last 2 to 3 years, the Navy strike fighter shortfall, is it all due to dollars? I mean, would dollars have—if you had the dollars, would that have solved the shortfall problem? Or is it more than that?

Admiral MILLER. I think we can both chime in on this, sir. When I look at readiness, in my mind, I tie readiness to dollars. Shortfall, I tie that to consumption, OPTEMPO [operational tempo], and the fact that we are flying airplanes to their end of service life sooner.

So in terms of readiness, which is still taking airplanes that we own today, that are on the flight line, that aren't able to fly, that is 62 percent. It is getting those airplanes into flyable status. That absolutely is tied to funding. On the shortfall, yes, we mitigate that by buying more airplanes, and we need to do that, but that is primarily due to OPTEMPO and consumption.

Mr. LOBIONDO. So the readiness problem with spare parts that are just not available, we can't—I mean, I apologize for my ignorance, but we just can't anticipate what we may need based on experience from the same planes and the same problems and have parts available ready in a more ready state?

General DAVIS. If I could answer that, sir, we have done four reviews now, outside reviews looking in at each of our type/model/series in the Marine Corps to understand the readiness equation. It is not just—it is new airplanes. It is spare parts. It is also how we retain and train our enlisted maintainers, both Navy and Marine Corps, to get maximum readiness out of those platforms.

I will say that when the budgets got decremented, when we—you know, kind of a constrained budget environment, everybody is trying to survive, they are trying to modernize, because they can't—you have got to replace—the old metal is dying out. You have got

to try to replace that. But also, too, I think we underfunded our spares accounts.

And, frankly, that is what we are dealing with—you know, if we had to go to a continuing resolution, I think we are—in the Department of the Navy, we are funded at about 67 percent of our spares requirements in 2017. Okay, some of that additional money in 2017 would go to get us up to the max executable amount of spare parts certainly for the United States Marine Corps at 88 percent, as much money as I could spend in 2017, to go get those spare parts on the line.

So if you look across the Marine Corps, for all of my type/model/series, for the older airplanes, and even some of the newer ones we haven't bought the parts for have been—accounts been marked, it is the number one readiness degrader outside of having old airplanes on the flight line, old, unreliable airplanes on the flight line.

So spare parts to me is—I think we could do a better job of that. We are doing a better job. I can't talk about next year and what we plan to do next year, but I think you will see a very different profile from the United States Marine Corps, as far as what we are doing for our enabler accounts. That is the program-related logistics, engineering, and spare parts.

Mr. LOBIONDO. So, Admiral, are we in a setting that you can talk about what this means on a deployed carrier with——

Admiral MILLER. Yes, sir. What I can tell you is our—we always keep our deployed forces absolutely equipped and ready to address whatever issue they may have. When we talk—and I talked earlier on my opening remarks of the—what the Vice Chief of Naval Operations said about the bench. That is where you are seeing the impact of the degraded readiness.

We pull from the bench—meaning the guys that just returned from deployment, those squadrons that would be used to surge or that are the two air wings from now to deploy, we are pulling from them to make sure that those that are deployed absolutely have what they need. So *George H.W. Bush, Carl Vinson* deployed now, those air wings and those strike groups are fully manned, fully trained, and equipped to handle the issues.

What we are seeing is, again, that bench is where we measure the health of our readiness. And so as General Davis talked about, the enabler accounts, just to give you a sense over the last 5 to 6 years, those enabler accounts are those program-related engineering, logistics, the tech-pub [technical publication] manuals, spare parts. We have been underfunding those accounts at the 50 percent or 60 percent for several years, and that is what has taken its toll.

So what the request for additional appropriations does in the 2017 request, it really is focused on readiness. And it funds those accounts to the 90 to 100 percent. So as General Davis said, we are going to need—we didn't get here overnight. We are going to need to sustain this as we move forward. But your help with what we have just put in this budget will help out greatly, sir.

Mr. LOBIONDO. Thank you very much.

Mr. TURNER. Okay, the order of asking questions for those members who were here before the gavel will be Mr. Carbajal, Mr. Cook, Mr. Knight, Mr. Kelly, Mr. Wittman, and then we will go to those who were after the gavel. Mr. Carbajal.

Mr. CARBAJAL. Thank you, Chairman Turner and Ranking Member Tsongas, and thank you to all our witnesses that here are today. The committee was informed that there was a possible breathing air contamination incident involving an Australian Air Force F–18 aircraft that is being carefully studied by the Navy. In this event, after the pilot in question landed, he was reportedly disoriented, slow, struggled to remove items from the jet, unsteady on his feet, and had degraded cognitive ability that lasted about 30 minutes.

In addition, ground personnel that later sat in the cockpit and breathed air from the aircraft system exhibited some of those same symptoms. The Navy's briefing to the committee concluded the Navy suspects that lubricants, engine fluids, and other materials may be getting ingested into the oxygen generation system, which depends on bleed air from the aircraft's engines, and converted into more dangerous materials through a chemical process that is not yet fully understood.

Can all of you provide an update on the status of the investigation of this particular incident? And also, what has been learned so far? Is contamination stemming from the F–18 engines ingesting toxic materials a possible cause of the Super Hornet's sustained physiological event rate?

Admiral MORAN. Good afternoon, sir. I will take that. So we have a very strong partnership with the Royal Australian Air Force. And we are part of that investigation of that incident. So, yeah, we did learn some things from that incident where we did see some ingestion from what really was the biggest contaminant was what we determined to be grease lubricant on a nose wheel well of the aircraft.

And so I can tell you one outcome already that we have done is we have gone back and put out a bulletin to the fleet on how to service the nose gear grease on all of our airplanes. So we have got to control it and manage it. It just can't be put on in gross amounts. It has got to be very much limited to what is needed to grease the wheel.

So as we looked at that, that was one of the particulates in the analysis that kind of came through as a potential cause. It wasn't in the numbers that we believe would have an effect on a human. So we are still learning the human effects of things that get ingested. But that is the one thing we learned.

So also part of that process—so there is some fluid for the radar cooling, and so there is a discharge port that basically could release some contaminants into the engine, because the engines ingest air all around the airplane. So we are looking really, really hard at everything that is possible that the engine could ingest in the outside air that could get through into and contaminate the air that we are breathing.

You know, last time I was here, we told you we put new molecular sieve beds in our airplanes. They are starting to do that. And I think the number I gave you was 219 a year ago. We are up to 658, so 80 percent of our Hornet fleet now have the new molecular sieve beds with carbon monoxide scrubbers. So we never had those before. So trying to go after all those particulates that could get in through the engine intakes, into the bleed air system. So we con-

tinue to learn every day. We put absorbent tubes—I told you last time I was here we were looking at that possibility.

So what they go—and we put it on the vest of the pilots, and we have collected probably over 1,500 events now where the absorbent tubes just collects all the air that is in the cockpit. And we measure that to see what contaminants are in there.

Two things have come. One is we haven't had absorbent tube in an airplane when we had a PE event. You know, so we have been looking for that opportunity. So out of 1,200 events, we just haven't had one. But with the new sieve beds that are in, we see a decrease in the particulates in the air that is being breathed. So not that it is getting rid of everything, but we are seeing lower levels, so that is a positive sign. And one of the reasons, ma'am, I think we are seeing a little bit less increase on the Super Hornet side, which is more contamination rather than the pressurization problems we are seeing in the legacy. So there is some positive piece there.

Mr. CARBAJAL. Thank you.

General DAVIS. Sir, you asked for all of us. We operate the F–18 legacy Hornet A–D, about 11 squadrons of those, plus a training squadron. We also have F–35s and AV–8s that run on an OBOGS [On-Board Oxygen Generation Systems] system and Prowlers that run liquid oxygen. We are not having any problems with the liquid oxygen Prowlers or the Harriers or the F–35s.

On the F–18s, we track this as a team all the time, so Congressman Tsongas, we watch it like a hawk. So anytime the Navy has an issue, I review that report in detail and talk with Admiral Grosklags and Admiral Shoemaker. We aren't seeing right now the number of problems. We haven't seen any of the hypoxia events in our legacy Hornets. And we are tracking—we are not seeing a debilitating problem with any kind of pressurization problem, but we watch it very closely.

I want to let you know that you didn't ask me, but we are tracking that very closely. And so if we do have that, we share that up and down the team. But we haven't seen big problems inside. And maybe it is because we only have two squadrons that are TACAIR integrated. We don't know why right now in the Navy why we are not having the problems. But to date, we have not had big problems with OBOGS or pressurizations in our legacy F–18s.

Mr. CARBAJAL. Thank you. I yield back.

Mr. TURNER. Mr. Cook.

Mr. COOK. Thank you, Mr. Chairman. Admiral Miller, I believe it was you that mentioned about this rehab that is going to take place at Boeing. Was it the SLAP program? Did I understand the—or, I am sorry, Admiral Moran. Whereabouts is that physically going to happen? I mean, which Boeing facility?

Admiral MORAN. That will be in Boeing, St. Louis, sir.

Mr. COOK. Okay. So to kind of get an eye, if I wanted to go there to have it—you know, I am very visceral, I have to have it—I am not very bright like you guys—I have to see it in progress and everything like that—I could go to St. Louis and get an explanation on that, because I am very, very interested in that on how we can correct the problem if possible. So——

Admiral MORAN. Absolutely, sir. Love to have you out there and show you the two airplanes that are in the teardown mode today.

Mr. COOK. Okay, I want to switch gears a little bit. And I want to talk about the—General, the EA–6s. And when I was at Cherry Point last year, they are still on the flight line. I think you—what, got four or five of them there. No? Am I wrong?

General DAVIS. Three squadrons, sir.

Mr. COOK. And the—you elected not to go with the Growler. And we are waiting for the F–35. Is that wait time going to be a problem? Are the—it seems as though the EA–6s are still flying. I am not saying it is older than me, but it is getting close. And—no, it has got a long ways to go yet. But can you comment on that?

I am worried about all these other maintenance problems and everything else, and that was not part of the brief tonight. But I wondered if you can make some comments about the EA–6s, and whether you have given any thought to going with the Growler if some of these problems continue.

General DAVIS. Well, sir, our Prowlers are still serving proudly. They are out there forward deployed right now. We will sundown the Prowler in 2019. But we are very confident in the capabilities that we get resident to the F–35 that we are going to cover down a lot of our electronic warfare requirements, to include the growth in F–35 and also, too, you know, I had 24 Prowlers to cover the entire Marine Corps.

A lot of times if you were a Marine on the ground, you didn't see that Prowler support. If you were in a MEU [Marine expeditionary unit], you never saw electronic warfare support like that. So the strategy of the Marine Corps has employed is, have a high-end airplane like the F–35 that can do strike and do air-to-air, can do electronic warfare.

And also, too, a thing called Intrepid Tiger, which is something we developed in the U.S. Government out there in your neck of the woods, sir, out there at—at Point Mugu. It is an open architecture pod that allows us right now to do comms [communications] jamming. And the next one, Intrepid Tiger Block 2X, built by U.S. Government workers, will have a RF [radio frequency] jamming capability, so going after radar signals, as well.

It is carried right now by our UH–1 Yankees. It is carried by our Harriers, carried by our F–18s. It is going to be carried by our Zulus, C–130s, and V–22s. So instead of having a single point solution to the electronic warfare strategy, we will have a multiple point solution to electronic warfare strategy, so that those airplanes have that self-protect capability they need and the jamming capability.

And those—the Marine on the ground can actually reach up and basically manipulate the jammers onboard those platforms to go do jamming missions for the guy on the ground. So we think that is the strategy that makes the most sense for the Marine Corps and it will distribute electronic warfare capability to include our ground sensors, because we are always working with our guys on the ground to give us the best answer.

Mr. COOK. Thank you. The only comment I wanted to make which we are saying here, I think a number of us are very worried about the budget. The CR, the sequester, the whole works, I almost wish in this hearing we had defense appropriations with us together. Maybe we have the same angst. This is going to be tough,

but in many ways this is a more receptive audience than the rest of Congress.

And I don't think they realize how critical it is, particularly with the tempo of ops and burnout and parts and everything like that. And if we are going to talk national defense, you got to be serious about the stuff that goes into it. So I appreciate your testimony.

General DAVIS. Yes, sir. If I could, dep-to-dwell [deployment-to-dwell] of 1:2 where the Marine Corps TACAIR is right now is technically surge. And we are doing that with about half the inventory we need to go do that. So we are getting the job done. We are getting out the door. But it is not a pretty picture. We are getting it done, sir. And we are getting it done on the backs of our Marines and their families, get it out the door.

And so Congresswoman Tsongas, the number one thing that I worry about is, are they getting enough flight time? You know, are they getting the looks at the ball they need to be when the bad thing happens, they know what to do? I believe we are flying safe airplanes. We are just not flying them enough.

So it is not only recapitalization. And also, too, for all of you, I think after 37 years of doing this, I think that when we buy a new airplane or we buy any airplane, you, our elected leaders, ought to hold us to account, the senior uniformed leadership, to buy the spare parts that go along with that airplane. That is not okay to get the new bird and not get the spare parts.

So to me, they are equally important, right, and then you get your maximum readiness. I am not going to come to you complaining that I need more money and more stuff. So to me, the spare parts, from what I have seen, in my 2½ years as the Deputy Commandant for Aviation, or 2¾ years, is that spare parts are just as important as the new gear.

Mr. TURNER. Mr. Knight.

Mr. KNIGHT. Thank you, Mr. Chairman. I will just have a couple brief questions, but, Admiral Moran, I am just going to button this up. Pax River is working on this. This is an issue that can be corrected. Do you think that this is an issue that goes through the 2018 program, through the legacy fighters, or is this something that might be incident per incident? Or is it something that they are going to have to correct at Pax River and do an overhaul?

Admiral MORAN. From the PE perspective?

Mr. KNIGHT. Yes, sir.

Admiral MORAN. Yes, sir. The things we are doing now is the ECS reset I think—from the aircraft that we took out of the fleet and we instrumented, and we are seeing some failed components on the air flow. We recognize we have got to go back. And what we have done now is starting to look at all of the components that make up the ECS system. We have gone back to the manufacturer or the depot who does either the overhaul or the acceptance test maintenance.

So a review on every overhaul procedure for each of those components to validate it works. And we found some that weren't working, so we had to fix those. We updated all the acceptance test procedures for the components to make sure we are validating their performance before we get them back in the field.

So we are in that process now of really making our way through each of the components on the ECS system, taking them back field. And I will tell you, I think we are going to know a lot more—as Admiral Miller said, we have got a lot of data now over this last year. Now as we start our first aircraft really what we are calling the ECS reset here later this year, we will really be able to start seeing if that is making a difference on some of those problem airplanes.

Because some airplanes are worse than others. There are some airplanes out there, as General Davis had just—that aren't having any problems whatsoever. I mean, and then there are some that are. We have got to get down to it. So it is really going after the components that make up the ECS system; that is what we are doing.

Mr. KNIGHT. Well, and I think that is something that this committee takes very seriously. We are flying the wings off some airplanes. And we fly fighters for 30, 40, 50 years. And when we are trying to extend and continue to extend out to that 8,000-hour period, we are going to have problems.

So my last kind of basic question, General Davis, we are seeing F–35s in the field now. And it is a new technology. This is fifth-gen [generation] now. And even though we have stealth capable aircraft that we have had for now 30 years, the maintainers are an issue for me.

And we have got the young people out there that are working on now fifth-generation aircraft. And so tell me how that is going with our young Marines out in the field, seeing new aircraft, new technologies, and working with different things outside of just turning a wrench.

General DAVIS. Thank you so much for that question. I will tell you that probably the best advertisement for that, sir, is to go visit and talk to the young—I mean, really inspiring. So we are trying to do—we are not trying, we are going to do F–35 right in the United States Marine Corps. We are standing up right. So really fantastic maintainers, making sure we got the right density of people with qualifications.

VMFA–121, you know, that is a "fight tonight" squadron. It is out there poised right up there, looking at—General Brooks is using those guys, counting on those guys to be ready. And they are providing the readiness that they need. That is the sign of a solid maintenance department.

You know, we have had very good success and good productivity, and it is a solid effort. And so it starts at VMFAT–501 in Beaufort. It has got VMFA–211 out there in Yuma, and also 121. So I would say that is going well. I do think it is a challenge to make sure we grow the force the right way, so earlier today I was talking to the other Marine three- and four-star generals on exactly this topic. It is not just F–35, but it is all of it, about how we train our enlisted maintainer force.

So we stole a playbook out of the United States Air Force's playbook. Right now, we are running our first advanced aircraft maintenance officers course out there in Yuma, Arizona, in conjunction with the WTI [Weapons and Tactics Instructor] class; stole almost

everything—not—borrowed from the United States Air Force in Nellis, but training our guys to do things the right way.

Also, too, making sure we have study—when a readiness recovery—in our independent readiness reviews, we studied each and every type/model/series to make sure that we had the right density of maintainers with the right qualifications. We were off. We were off in the numbers we need.

We had it right in F–35, but in a lot of the other type/model/series, we didn't have enough of the qualifications, and we weren't measuring the military occupational specialties of those young Marines. We are doing that now. And that is going to have an outsized impact on our ability to retain the right folks with quals [qualifications], because about 10 percent of our maintainers graduate to the next step to be a collateral duty inspector, which is the first step of a guy who can—or a gal who can do the job out there with a wrench. And retaining them and coveting them and giving them the right training. So we are doing F–35. I want to spread that to the rest of the fleet, sir.

Mr. KNIGHT. Thank you very much. I yield back, Mr. Chair.

Mr. TURNER. Mr. Kelly.

Mr. KELLY. Thank you, Mr. Chairman. And thank all you officers for being here today. Lieutenant General Davis, I am still kind—I don't understand the spare parts issue. Is it a dollars issue? Is it a production issue? Or are the lag time for production because we haven't ordered? Or is it a PLL [parts load list] or—I call it PLL—a stockage problem that we are not stocking the right parts? Where would you put—and it may be a combination of those, but where do you put the onus on where our shortage of parts are?

General DAVIS. I would say first would be that we fund the spare parts and that those spare parts accounts stay funded. So we have had some challenges with F–35 spare parts early on that we were—they get marked. You know, hey, we don't think you can spend the money. Those accounts get marked, and then you end up with not enough spare parts, so there is one.

Two, I think is making sure that you have got the right density. Some of these parts take 2 or 3 years to build. So if you are dealing in 1-year money all the time for spare parts funding, that a lot of times doesn't allow you to buy the parts you need for some of these airplanes, like the CH–53 Echo, in a case in point. About 30 percent non-mission-capable supply. We are getting better at that now, but it is—we had to go after that in a concerted effort, stealing a page out of the Army's book, about how they sustain their CH–47s and H–60s.

But—and then the other part of that would be reliability, holding the manufacturers accountable for producing the parts and the quality we need to make sure that they last according to design specifications. So I would say it is multifaceted. Each type/model/series is a little bit different, but all of it—you have to have a holistic strategy for spares just like you do a holistic strategy for sustainment for the platform, for buying new airplanes, and for how you might take something like an F–18 Super Hornet through a service life extension program in the course of its life. I think we will do that with everything we own, but to me, the spare parts are absolutely a critical enabler.

And I will tell you, the Marines or sailors will get the part they need for the airplane, but they will expend three times the maintenance effort if it is not on the shelf when they go look for it. They are going to go take it off the partsman that has got a bureau number on it. Another airplane that may be deferred maintenance, whatever, they will take that part off—that is one maintenance action. They will take the part off the bad airplane, go take a part off another airplane, put it on there, so it is three or four maintenance actions for the lack of a spare part on the shelf.

So I think just demand that you hold us accountable for doing a good job with that and letting you know when our spare parts accounts aren't right-sized.

Mr. KELLY. Well, I get that, but also you got to hold us accountable as Congress, because you kind of know what is going to break on equipment after you have exercised it for a while. But if you don't have the money, because your PLL—or your parts supply, so your dollars are too low to order the things that you know you are going to break, then what that does is delay maintenance and receiving that part and all those other things. Is that not correct, General Davis?

General DAVIS. It is, sir. And I think it is all of it. I think it is easy to advocate for a new flying machine. It is harder to make the case to get a spare part. But those are just as important. And——

Mr. KELLY. Let me ask you all this question. The F/A–18, when we send that back to depot level maintenance, it comes out and—I guess is it like new when it goes to depot level maintenance? Do we get a new extended life of flying time? And is there enough space in depot level maintenance that we can fix a lot of these and get them back until we get F–35 replacements? How does that work?

Admiral MORAN. Yes, sir, it really depends on the investment we make upfront. And so the way the Navy works right now—when we buy an airplane and our service life—we determine what the service life needs to be for that airplane, and then we build the airplane to that spec [specification]. So for both the legacy Hornet and Super Hornet, we designed that airplane to last for 6,000 hours.

And for the Navy, very unique, because we are carrier based, we don't want to bring that airplane back into the depot at all. So we test that airplane to what I would say our worst, highest spectrum, 90 percent, so 90 percent of the airplanes we build are going to last their service life without any cracks whatsoever, because we don't want to worry about that in the carrier environment.

At 50 percent of the life, we make the determination to do what we call a SLAP, a service life assessment program, and evaluate, is the aircraft performing as the models predicted? And once we get that data back, then we can determine, do we need to do things—does the Navy or Marine Corps need to make that investment to do the SLEP [service life extension program], which is the extension piece you talk of? So you got to do that work.

I will tell you, we didn't do all of that work on the legacy Hornets. We didn't. And so we are not truly doing extension. We are doing the high flight hour inspections. We are repairing and fixing what we can. And the material condition past the service life is really what—we uncovered things that, you know, you can't predict

structurally. So you have got to get that right. You have got to make that investment in engineering.

So the most critical thing for the United States Navy today, in my opinion, is getting—and as we have done—get the engineering right for the Super Hornet, SLAP that we have done, and getting the engineering done for the ECP [engineering change proposal] kits in the SLEP, so when it goes into the depot, we have the material, the parts replacement, and the full kit and how to go ahead and repair that airplane so they can get it through.

The legacy today, every airplane is different. We are learning. We don't have all that engineering work and all the material in place. That is why they are being delayed. That is why we have gone to the Boeing company and challenged them, let's get the engineering done with the mods [modifications], because the concurrency of the overlap of those two is very detrimental to predicting outcome of those airplanes.

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

Mr. TURNER. Thank you. Mr. Wittman.

Mr. WITTMAN. Thank you, Mr. Chairman. Gentlemen, thank you so much for joining us today. Thank you for all that you are doing under some pretty trying circumstances.

Lieutenant General Davis and Rear Admiral Miller, I wanted to ask you specifically about the impact on pilots. You laid out what we are doing with service life extensions and acquisition of new aircraft, but I want to take a step back, because I think the most important element of that is, where are we with our pilots? Last summer, Admiral Manazir laid out for us the concept in the Navy and Marine Corps of tiered readiness. As pilots begin to fly through maintenance cycles, pre-deployment cycles, they work up to have that high-end capability in their training.

One of the things he pointed out was the impact on young pilots not getting as many flying hours, both in the maintenance cycle, but also in those high-end situations with multiple aircraft, like they get at Fallon. And then also what happens, too, when our pilots then through the years become squadron commanders.

And instead of a squadron commander having about 2,000 hours of flying time, all of a sudden now they have about 1,500 hours of flying time. And what happens when then they find themselves in this high-end fighter, their members of the squadron are going to them as their commanding pilots there, in that high-end conflict about that experience, that is so critical.

Give me your perspective about where we are today, because that is not ground that we can make up with those leaders. I want to ask both of you all to comment on that.

General DAVIS. Yes, sir, if I could, two things. I talked with Marine three- and four-stars about that very topic today. And small distinction. Marine Corps doesn't do tiered readiness, sir. You know, we are small, designed to be small, and I can't say the number of squadrons that go forward when something big happens, but it is a large percentage of our stuff. So we have to be—we have to be ready. So where we are right now is unacceptable. So we have got to drive through that.

What I say—and I remember what—I go back to what I was like as a young officer. And I was a guy who had joined the Marine

Corps not knowing we had airplanes, so bear with me here. But bottom line is, I needed to get a number of looks. And so your progression, you get into a squadron, you get through your training squadron, your fleet replacement squadron, and for me, I started flying AV–8 Harriers. And I needed to get—Lieutenant Davis needed about 20 hours a month, because I needed that training. I needed that looks at the ball.

It is like an athlete. You are being trained. It is a lot of hard work. And bottom line is, I got to be a section leader after a while, and then I got to be a division leader, and then I have worked on my instructor qualifications, and ended up being an instructor in the weapons school, doing an exchange for the Brits, and then commanding a weapons school.

Our young officers right now, because I can't—if an F–18 squadron, our Harrier squadron, I am doing great in my F–35 squadrons and doing better in Harrier. Right now, I am very worried about F–18, U.S. Marine Corps, legacy F–18, 9.1 hours a month. I don't have enough flight time to feed everybody.

And so what I am finding, I am making about one-half to one-third of the flight leads that I used to. So guys now are coming back for their second tour as a major, as a division lead. And they used to be a patch-wearer. That has an impact long-term on that person being a squadron commander and—hey, this looks stupid, that is not a good idea, don't go—all those safety things that we have now I think I worry about 5 years from now where we are, that we don't have the experience base to go, that doesn't look right and here's how you fix that. That is the debilitating impact of not having enough flight hours to generate for our youngsters right now.

Mr. WITTMAN. Very good. Admiral Miller.

Admiral MILLER. Yes, sir. Same, same. And nothing really has changed since Admiral Manazir described it to you the last time. And as we talked about the tiered readiness, we absolutely have our deployers ready to go. Where we are seeing the impact of the situation that we are in right now with our current readiness situation, which really is, you know, having the airplanes to fly, the hours for each of these young pilots, is found, you know, post deployment as they are in a maintenance and basic phase.

And as I talked about a little bit, we are also starting to see leading indicators on the retention side of this, which has us a little worried. So part of it is, subsequently through tours, the level of experience they will have, I will tell you that the impact of a year-long CR is only going to make this worse. We will probably have JOs that are expected to leave their first—junior officers—expected to leave their first squadron with a—you know, normally a division lead qual, maybe not. And so the same point that General Davis just talked about.

So it is going to actually have career-long impacts, as well as warfighting impacts as these guys get more senior. So really, sir, not much has changed at—you know, there is a saying in naval aviation that says, you know, all good things come from up airplanes. And this is one of them, sir.

Mr. WITTMAN. Very good. Gentlemen, very quickly with the time I have remaining, when this happens, obviously, if we face a con-

flict, we have pilots up there in a variety of different situations with not as much experience as we would like. Where does that lead us as far as risk? And when I talk about risk, it is survivability of pilots in those high-stress and high-end conflict scenarios. Give me your perspective about how this reverberates in that situation.

General DAVIS. I will talk about three different tries very quickly and then go over to Admiral Miller. Our F–35 pilots, the way they are popping out of our training squadron, it is a very high-end airplane and they are trained to a high-end threat, and they are getting their flight time. So I am healthy in F–35 right now, as long as we don't stop flying.

Harrier, for what we ask that squadron to do, they are taking off the ship or our land base and going deep into Iraq and Syria and doing strike missions, things we never designed the Harrier to do, but it is doing that really well.

I worry about the F–18 because it requires more—instead of a soccer match, it is more of a football match. And every player has got to have their assigned position and do their assigned rollout in order to make things work.

I think we will have—we could have—in a higher-end threat, we could have a hard time being as successful. We will still go fight, because we like to fight, we like to do what we got to do, but bottom line, I am not—I think we might have less success, we might have more losses. We will go. We will go and we will go with—and with great élan. But I think we could have some additional losses we weren't anticipating.

Mr. WITTMAN. Okay. Admiral Miller.

Admiral MILLER. Yes, sir, a couple things come to mind. One, I was a strike group commander in 2014 on *George H.W. Bush.* And I will tell you, the young men and women that are on our flight decks, in our squadrons flying those missions are the best that I have ever seen.

Mr. WITTMAN. Absolutely.

Admiral MILLER. We get them ready. Our standards—when we come to you talking about readiness, we are seeing leading indicators. We are trying to get in front of what could, you know, be a downward trend. We are doing what we need to do to make sure that those that go forward are absolutely ready. And all it takes is going out there and talking to returning strike group commanders and air wing commanders as they come back. They are—couldn't be more proud of the performance of the men and women that are in our cockpits and doing the missions and what we ask of them.

So I will tell you, I have great confidence in that. Where I get concerned, again, we have high standards, right? We are number one. And we want to stay number one. And those high standards are saying, okay, we are seeing leading indicators, specifically with regard to the budget, and as we bring things forward and make it whole from our training perspective, from our readiness perspective, from the—giving the young men and women the tools they need to continue to succeed into the future, that is the stuff that we are talking about now.

So I will tell you I have great confidence in those that are serving, and especially on our flight decks today.

Mr. TURNER. Admiral Moran, you will have to give us your response in writing. We are well over 2 minutes, and I have three more questioners, and we got votes coming. But I appreciate it, Mr. Wittman. Mr. Moran, if you would respond in writing.

[The information referred to was not available at the time of printing.]

Mr. TURNER. We are going next to Mr. Brown,

Mr. BROWN. Thank you, Mr. Chairman. I had the privilege of spending about 25 hours aboard the USS *Nimitz* this past weekend underway in the Pacific during its pre-deployment training. And Admiral Miller, just spent—I spent a few minutes in the ready room with that TACAIR squadron, and I got a lot of confidence in them, as well. The experienced pilots, the new pilots coming out.

I want to go—come back to physiological effects, but turn our attention away from the aircraft and on the pilots. I had an opportunity to speak with one of the division leaders who described to me two incidents. One was actually an over-pressurization of the cabin, and it blew the canopy, and another was the depressurization at altitude. And at least one of those events not only had physiological effects, but we also need to be thinking about the psychological effects.

And the concern that was raised was the lack of the transportable or the portable repressurization systems. I understand they are on some of the deployed fleets. The division leader didn't know. When I brought it up to the ship's captain, though—I was pleased to hear that when they go blue, they will have it.

So my question is, these portable repressurization systems, what is the availability? Why can't we put them on every aircraft carrier wherever they are stationed or wherever they need to be so that our aviators know that, hey, look, if something happens, we have got everything we need to take the best care of you?

Admiral MORAN. Sir, I will have to get back on the availability, but I think just—you share, you know, the reaction and the focus this has—I mean, Admiral Miller and Admiral Shoemaker briefed Admiral Davis, our Fleet Forces commander, and I think—in a matter of days, if no more than that, those systems were on the two deployed aircraft carriers that we had access to. So they were quickly deployed, and they are out there today, big statement.

And so we are looking to do that for all other deployed carriers when they go. I will have to get back to you on the numbers. I don't know if you have that.

[The information referred to can be found in the Appendix on page 71.]

Admiral MILLER. Yes, I don't either. But I will tell you, that the priority went to *George H.W. Bush* and *Carl Vinson* for their deployment. And as Admiral Moran indicated, boy, it was quick, because we realized that when an incident does occur, the ability to get somebody into a recompression chamber absolutely starts taking away the decompression sickness that you would have.

So my indications are—and I will get you the exact dates, but I think the mindset is for those that are doing workups like *Nimitz* on the West Coast, others, they are within a helicopter's ride of get-

ting to that sort of treatment. But we are looking at—again, I said this is resource unconstrained, so if that is what we need to do, and I believe there is an effort to get it expanded to all our carriers when they are out with an air wing embarked, I just have to get that information for you.

Mr. BROWN. And if I can just follow up, you know, in my experience, and I am sure yours as well, we will do better during a deployment when we train-up on whatever it is we need to do during that training period. And I have got to imagine that a portable repressurization system requires some skill set for the crew, the medical crew and the other crew, to use that effectively during a deployment. So it may very well make sense to have it available during training, even when the ship is close to shore, something to think about.

Mr. TURNER. Mr. Bacon.

Mr. BACON. Thank you, Mr. Chairman. I want to thank all three of you for being here. I was fortunate enough to command four different flying squadrons, and I think I know the story. Old aircraft, lack of parts, not enough maintenance folks on the line, being stretched very thin, flying half the hours to a third of the hours, people behind on instructor upgrade, evaluator upgrade, going to weapons school. It is unacceptable.

And I think Congress owes you better. The real problem is, it puts our Nation at risk. And it puts our sons and daughters at risk. So we have got to do better and work hard on it.

What I wanted to ask our Navy leaders here, I think I understand that the plan is to put the mix on the aircraft carriers of two F–35 squadrons and two F–18 squadrons. I am inclined to think that is probably budget driven and maybe production rate driven. If the world was perfect, what would be the right mix?

Admiral MILLER. We think we got it right, sir.

Mr. BACON. Two and two?

Admiral MILLER. Yes, sir.

Mr. BACON. Because it fulfills different niches a little better?

Admiral MILLER. It absolutely does. And if you look at the wide range of missions that our aircraft carriers and our carrier strikes are faced with, we think that it is a perfect mix.

Mr. BACON. Okay, that is good to know. I presume you agree.

Admiral MORAN. Yes, sir, I agree.

Mr. BACON. Okay, thank you. That is all I have, Mr. Chairman. I yield back.

Mr. TURNER. Mr. Langevin.

Mr. LANGEVIN. Thank you, Mr. Chairman. I want to thank our witnesses for your testimony. I want to thank you especially for your service to the country.

It was recently discovered that the F–35C pilots were experiencing vibration issues during catapult launches under certain conditions. As the safety of our service members is of great concern to me and I know many of my colleagues, I am greatly interested in the resolution of this issue that occurs during such a critical phase of flight. Have mitigation efforts been identified and validated to your knowledge? And what are the expected cost impacts and how has the issue affected the planned schedule for the IOC?

Admiral MILLER. Yes, sir. So what you are talking about—what we are calling Nz oscillations, and it is the—when the F–35 when we took it out to sea during the recent DT3, development test three, at-sea test period, it was the first time taking fleet pilots out. And the aircraft, as it goes through its catapult stroke, is—it is having a pretty violent catapult stroke. So initial oscillations right off when the catapult initially fires and then again as it reaches the end of its catapult stroke.

So the answers to your question—a lot of them, we don't have the answers yet, because the engineers from NAVAIR [U.S. Naval Air Systems Command] and the engineers from Lockheed Martin and the joint program office are hard at work at coming up with solutions. I will tell you that they recently conducted some tests out at Lakehurst, at our test bed site that has our catapult—land-based catapult site at Lakehurst, New Jersey. And what they were looking at there is, there is a hold-back bar that has, if you will, holds the—no kidding, holds the airplane back when you put the catapult into tension.

And so then, as the catapult fires, that hold-back bar releases. So what we did in the F–18, this was also happened in the early versions of the F–18, we had a similar issue. We released some of the pressure that it took to actually—where that hold-back bar would release a little sooner. So that was the testing that is happening at Lakehurst right now.

So we are hopeful that that is going to yield positive results. I haven't seen the data from that yet. General Bogdan may have more as the joint program office [JPO] is the one honcho in this. We are clearly watching it. Our hopes then to take the airplane back out to sea in this fall, and hopefully by then we will have—we will see if that does have an impact, and then we will take it out to sea and test it under real, live conditions to see if we are successfully through that, sir.

Mr. LANGEVIN. Okay, thank you, Admiral. I know we look forward to getting the follow-up on that.

Admiral MILLER. You bet.

Mr. LANGEVIN. So do you foresee any issues with software, delivery and test, weapons integration, or other aspects of development that threaten to delay the F–35C IOC currently plan for late 2018 or 2019?

General DAVIS. Well, it is—the software is the same for the B and the C. So I think we are on track. I think probably the number one thing—the software running 3I right now, and we are flying that in the skies over Korea. And that is working very well for us. 3F is the next—we are actually flying that and testing it right now. We are getting better and better with that every day, so I have a high degree of confidence that 3F is going to be—if not on schedule, very close to on schedule.

I think the number one thing that all of us are concerned about is follow-on modernization and making sure that those accounts stay funded. In a lot of ways, what this airplane brings, it is almost like—remember when we first got the F–18 and the Harrier, I was around when we got those, but the airplanes we fly today are vastly different than the ones we got back then. So we have to make sure that we keep the follow-on modernization going and keep

those block increments coming in. It brings warfighting capability that our Nation needs for that overmatch requirement that the Chairman and the Secretary of Defense talked about. Really important we keep that going.

So I think software is tracking. And I think the follow-on modernization is the other part of that that we need to keep on track, sir.

Admiral MILLER. The other thing I will add, sir, is our IOC for the F–35C is event-driven. So although there is a time aspect to it, its completion of system development demonstration, the SDD phase, completion of initial operational test and evaluation, our first squadron starts its transition in fiscal year 2018 and the first deployment isn't until fiscal year 2021. So although—I don't want to say we aren't concerned. We continue to put pressure and watch this as it continues to progress. But right now, we are fairly confident that the JPO has given this the attention it deserves.

Mr. LANGEVIN. Okay, thank you.

General DAVIS. And for the Marine Corps, the F–35 IOCs are not event-driven.

Mr. LANGEVIN. Okay, thank you. I have one additional question, but my time is expired. So, Chairman, do you want me to submit it for the record?

Mr. TURNER. Please. We will get to Mr. Langevin. If you want to wait, we can come back to you.

Mr. LANGEVIN. Okay, fair enough. I yield back.

Mr. TURNER. Mr. Larsen—excuse me, Mr. Larsen we need to get to. Great.

Mr. LARSEN. Thank you. And thanks for the indulgence, as well, Mr. Chairman, for allowing me to sit in on this. Admiral Moran, I have talked about almost every F–18 except the one I really care about, the Growler. They are all at Navy Air Station Whidbey Island. And this gets to the OBOGS issue.

And I guess I need some—I guess I need an update, because according to your numbers, the OBOG rate, or the PE, rate has gone from 90.83 to about 63.69, and Representative Tsongas covered that. But that is just through it looks like 1, 2, 3 months so far. But—so it is lower than last year, but it is still higher than the 2014 to 2015 rate, which is three times as high as the 2013 to 2014 rate. It is still pretty high.

And I was told last year in a briefing that as the issue—as pilots and crew become more aware, we naturally see an increase in PE because of reporting, which I certainly understand, but still, 63.69 as a rate is still much higher than even 2 years ago. So I don't know that—it doesn't seem to me that it is just an awareness issue anymore. So what are you doing now, with regard to the G [Growler]? Because you have talked about Es and Fs and every other letter in the alphabet up to G, but not G.

Admiral MORAN. Yes, sir. So I will tell you, after—I will tell you, in 2016, we had a couple months that were exceedingly high. Back in June of 2016, we had eight events, which is almost double the average of events that we had in the couple months prior, so——

Mr. LARSEN. Excuse me. The clock is not running, and I want to be sure it is—something going on here. I don't want to—yes. Yes, thanks. Go ahead.

Admiral MORAN. Yes, sir. So we sent a team—the NAVAIR Pax [Patuxent River] team, so we sent 12 folks out from Pax River to go sit down with the would-be team and really go through what they are seeing and experiencing. We also bought—and Admiral Miller bought the "Slam Stick" [sensor tool]. So we really have no way to measure on a flight the pressurization changes in the aircraft. There is nothing on it. So these sticks, Slam Sticks we call them, we really went out and got them pretty quickly and put them on all the aircraft out in Whidbey.

So collecting absorbent tube for contamination and pressurization with the Slam Stick to start collecting the data. And really went back with the maintainers to go through the airplane, how we are maintaining the ECS system, things that are unique or changing or different from the F model. So we spent almost 2 full weeks out there——

Mr. LARSEN. And can I explore that? Because aren't these going to be different than the—the Gs are as new as they can be relative to the Es and Fs, and they are going to be a little bit different, so how are you addressing that?

Admiral MORAN. So, you know, what we are looking at right now is because the ECS system, the draw on the Growler, because of all the electronics on the airplane, are really drawing on the ECS system a little bit differently. So the one Growler we had significant issues with, we are in the process of sending that back to Boeing to go take a look at the ECS system to see if there is anything we can do.

So we already changed out a restrictor plate to increase the air flow to the avionics. That really helps control the pressurization to some degree. So we are looking at those things that we need to do differently potentially on the Growler than we did on the Super Hornet to control the pressurization.

So what I will tell you is one of those airplanes from Whidbey is going to Boeing, and we are going to take a harder look at the system.

Mr. LARSEN. Do you have different contamination issues that you are looking at on the G regardless of the E and F?

Admiral MORAN. We are collecting data. I have not seen—I can't say that we have seen anything new or different in terms of contamination between the airplanes, no, sir.

Mr. LARSEN. And when you mentioned that plane going to Boeing, is that one of the two planes you discussed with——

Admiral MORAN. Yes, sir.

Mr. LARSEN. Okay, it is. Okay, great. So——

Admiral MORAN. No, it is not SLAP. This is—the one that we have in Pax River is the legacy. This one is the Growler that is going to Boeing. It is not part of the SLAP, SLEP analysis. This is really focused on PEs.

Mr. LARSEN. Okay. Do you have—do you have a working hypothesis about the higher rate, then?

Admiral MORAN. I don't. I don't. We are—like I said, it kind of—as you said, the numbers jump out at you and you can't argue what the numbers are. That is why we sent the team out there. So something was going on that we had to go address. And really getting that airplane back to Boeing to give us more insight on the system;

is the Growler, like I said, challenging the ECS system with additional avionics more than the other airplanes.

Mr. LARSEN. So it is one airplane. Do you think it is other airplanes? And therefore, is it a manufacturing issue? Is it a design issue?

Admiral MORAN. I don't know if it is a manufacture or design—it is just not—we just have an airplane that we had the problems on that we want to send back to Boeing and take a look at. So we are going to determine that when we get done with the evaluation, if there is anything further in the design we need to change or any hardware pieces that we have to change.

Mr. LARSEN. Admiral Miller, did you want to add anything on that?

Admiral MILLER. No, sir. I think he covered it. And I have nothing else to add, sir.

Mr. LARSEN. All right. Well, certainly we are very interested back home and I think the entire Navy obviously is very interested in that. I appreciate the attention on that.

With regards to Admiral Moran, can you give an update on MAGIC CARPET [landing system], on the timeline for deployment to the fleet?

Admiral MORAN. Yes. So we have released MAGIC CARPET on an early iteration of software. The fleet asked, can they have that deployed earlier than we originally planned? So we supported that on the——

Admiral MILLER. It is on *Bush* right now, deployed.

Admiral MORAN. *Bush* right now.

Admiral MILLER. So what I will tell you, sir, is it is phenomenal. And it is the same as what we saw with DT3 and the F–35 with Delta Flight Path [landing technology], very similar software. So *George Bush,* who is on deployment now, that was my old strike group, so I keep in touch with those guys. And they are saying this is absolutely phenomenal. Their boarding rates are higher than what they have obviously seen in the past. And I have only flown the simulator, because I had to see it for myself. And I was almost—not to say bored landing on a carrier, but it was—it sure made it a lot nicer.

Mr. LARSEN. I wouldn't say that.

Admiral MILLER. No, sir.

Mr. LARSEN. But on that point, what kind of an impact do you think that will have on training requirements? Specifically FCLPs [field carrier landing practices]?

Admiral MILLER. Yes, I think that is still to be determined. One, we are going to have to get it throughout the fleet. One could surmise that obviously our FCLP requirements could go down. Clearly, we still want to train especially our young pilots the full scope. And so we are talking about that right now. Can we take maybe some of those flights per pilot, per workup, and turn those into tactical flights? So I think we will learn as we go on this, and we will obviously err towards safety and making sure that launching and recovering from aircraft carriers, those skills are not diminished.

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

Mr. TURNER. Thank you. If there is no objection, we will go to Mr. Langevin for the completion of his questions.

Mr. LANGEVIN. Thank you, Mr. Chairman. So even with the service life extension programs, I understand that strike fighter readiness has taken considerable risk to meet operational commitments. Utilization rates have surpassed projected norms, leaving the maintenance depots insufficiently equipped to handle the demand rates. And your testimony indicated that the ongoing strategic requirements will further deteriorate readiness.

I don't know if this question had been addressed earlier, but in your opinion, is fast-tracking procurement of the Joint Strike Fighter the solution for strike fighter readiness today? And if it is not, or even if it is a partial solution, what is the near- to midterm solution that may aid the strike fighter inventory management process?

General DAVIS. If I could, I could start that one, sir, from the Marine Corps. So we have the oldest TACAIR platforms in the Marine Corps. And Admiral Miller talked about consumption. A lot of—when you talk about down strike fighters, a lot of those are Marine F–18s that were wearing out, some of the oldest ones. A lot of those airplanes will be replaced by F–35, so absolutely positively yes. And F–35Bs, the vast majority. The faster we can buy those airplanes, the better that will be for the United States Marine Corps.

And we are going to buy about—we are going to buy about 18 squadrons of Bs and 4 squadrons of Cs. That includes our training squadrons. And they replace 22 squadrons that we have right now, 2 training squadrons, 20 TACAIR squadrons. So kind of a one-for-one replacement. The faster we can do that, the better we get out of these old airplanes.

And you weren't here, sir, but we talked about the old F–18s we have, safe, but it is about a 55 percent failure rate after that first sortie, or break rate. They do fly that first op in the morning, and they are not able to go do the second one. So absolutely we need to do that as quickly—for Bs and Cs for the United States Marine Corps.

Mr. LANGEVIN. Thank you.

Admiral MILLER. Yes, sir, to summarize some of our earlier testimony, I break it up into readiness and shortfall as two different categories. Readiness in my mind is taking airplanes that we currently own today that are in a non-flyable status and getting them to a flying status. Partly driven they have gotten to that point because of funding issues, stability in funding, and then just being overused.

So a lot of that fixes, if you will, to mitigate that is funding related and stability in those accounts, the enabler accounts and flying hour accounts over time. The shortfall has to do with consumption, the fact that we are taking our existing—for example, F–18 Es and Fs with the 6,000-hour flight time limit and we are just flying them at a much higher rate as you mentioned than we had planned.

Additionally, if you recall, F–35 right now at this—from when it started, we are almost a decade late. We were supposed to have 10 squadrons of F–35Cs at this point in the game, which are now F–18 Super Hornets, again, consumption of those assets, which drives that shortfall.

So, in essence, sir, I think as far as the procurement goes to address the shortfall needs, we need to be buying both F–18s and F–35s.

Mr. LANGEVIN. Thank you, gentlemen. Again, thank you for your testimony here and your service to the country. Thank you, Mr. Chairman. I yield back to you.

Mr. TURNER. Our final and brief question will be by Ms. Tsongas.

Ms. TSONGAS. I just wanted to follow up on the independent review team. Last year's NDAA mandated that the Navy put together one that you would report to us by December 1st. I would take the answer in writing, but just wanted to know where that stands, the composition, what your timelines are. Do you expect to meet that December 1st deadline? So just because these incidents are ongoing and very serious, and do think this team has an important role to play. So leave it at that, but thank you all for your testimony today.

Mr. TURNER. No question then?

Ms. TSONGAS. No question. I did. I will take the answer in writing.

[The information referred to can be found in the Appendix on page 71.]

Mr. TURNER. Ah, excellent. Well, in that case, we will be adjourned. Thank you.

[Whereupon, at 5:30 p.m., the subcommittee was adjourned.]

A P P E N D I X

MARCH 28, 2017

PREPARED STATEMENTS SUBMITTED FOR THE RECORD

MARCH 28, 2017

Statement of the Honorable Michael Turner
Chairman, Subcommittee on Tactical Air and Land Forces
Naval Strike Fighters—Issues and Concerns
March 28, 2017

The hearing will come to order.

The subcommittee meets today to receive testimony on the current Readiness challenges facing the strike fighter fleets for the Department of the Navy.

I'd like to welcome our distinguished panel of witnesses:

- Lieutenant General Jon M. Davis, Deputy Commandant of the Marine Corps for Aviation
- Rear Admiral DeWolfe "Chip" Miller, Director of the Air Warfare Division for the U.S. Navy, and
- Rear Admiral Michael T. Moran, Program Executive Officer for Tactical Aircraft

I thank you all for your service and look forward to your testimony today.

We have several important issues to cover today. Before we begin, I want to briefly highlight three areas of committee oversight concern— 1) overall strike fighter readiness, 2) the Navy's current strike fighter shortfall, and 3) the issue of increased physiological episodes in the F/A-18 fleet.

Last year this Subcommittee held a hearing similar to this one to conduct oversight on the capability and capacity challenges in the Navy's Strike Fighter fleets.

During that hearing, the witnesses noted that, QUOTE "aviation readiness is in a precarious position that extends well beyond the Strike Fighter force structure—it is particularly acute in the United States Marine Corps. Marines are flying, on average, 58 percent of the required flight time necessary to be ready for the Nation's call." END QUOTE

The witnesses went on to explain this situation resulted from reduced capacity, increased operational demand and usage, under resourcing sustainment and spare parts, and F-18 depot production falling short of the required output.

Last summer I led a congressional delegation to Marine Corps Air Station – Miramar where I met with pilots and maintainers and heard first-hand their concerns regarding a lack of spare parts availability and not getting enough flight training time due to insufficient aircraft being available.

Just last month, the full committee held a hearing on the state of the military at which Admiral Moran, the Vice Chief of Naval Operations, verified that well more than half of the Navy and Marine Corps F/A-18

aircraft were out of service. We learned that 62 percent of F/A-18s cannot fly today.

The current crisis in military aviation readiness appears to be only getting worse. So we expect our witnesses today to help us better understand what can be done to reverse this damaging trend in Navy and Marine Corps aviation readiness.

In hearings two years ago for the fiscal year 2016 budget request, Admiral Greenert, then the Chief of Naval Operations, described a requirement to procure an additional "three squadrons" of F/A-18E/Fs, or about 36 aircraft to improve capacity and address a growing shortfall in Naval strike fighter inventory.

However, as a result of increasing demand and operational use, combined with continuing resolutions and budget constraints, we understand the shortfall has now grown to over 100 aircraft.

For fiscal year 2017, to help address both the readiness and strike fighter shortfalls, the Committee added 12 F/A-18E/F aircraft, four F-35C and two F-35B aircraft. The House-passed Defense Appropriations Act for Fiscal Year 2017 reflects those increases. The Department of Defense amended budget request for fiscal year 2017 also includes an additional 24 F/A-18E/Fs, and this Committee plans to work to ensure that request is fully funded.

We expect our witnesses today to provide us with additional information as to what mitigating actions and investment we need to make now in order to reverse this harmful trend of a shrinking strike fighter fleet.

Since 2009, the Department of the Navy has noticed a steady year-over-year rise in hazard reports, known as HAZREPS, regarding physiological episodes in the Navy's F/A-18 and E/A-18G fleets.

In fiscal year 2011, the Navy reported 15 physiological episodes in its fleet of F/A-18 A through D aircraft. In fiscal year 2016, 38 episodes were reported. For the first quarter of this fiscal year, there have already been 13 episodes. I am concerned about this growing trend—one that has a significant effect on readiness and one that needs to be fixed.

According to the Navy, physiological episodes occur when a pilot experiences a loss in performance related to insufficient oxygen, depressurization or other factors present during flight.

Last year, we were informed that the Navy had organized a Physiological Episode Team, to investigate and determine the causes of these physiological episodes.

In response and as a result of the subcommittee hearing, the National Defense Authorization Act for Fiscal Year 2017 required the Navy to establish an independent review team to evaluate the Navy's plan to solving this problem.

We look forward to receiving an update on these efforts from our witnesses today, and request your professional opinion on what we as Members of Congress can do to help with this process.

In closing, as I have said at our previous hearings, there is a military readiness crisis.

Continuing down this path of budget driven defense strategies rather than capability driven defense strategies places too great a burden on our men and women in uniform.

We need to close out fiscal year 2017. We need to address the additional funding requirements that we were unable to cover in the National Defense Authorization Act for Fiscal Year 2017, and finally we need to work with the Administration to develop a topline budget request for fiscal year 2018 that is as close as possible to the $640 billion topline figure identified by Chairman Thornberry in his Views and Estimates letter to the House Budget Committee.

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

General Davis please proceed followed by Admirals Miller and Moran.

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

STATEMENT OF

LIEUTENANT GENERAL JON M. DAVIS
DEPUTY COMMANDANT FOR AVIATION

AND

REAR ADMIRAL DEWOLFE H. MILLER III
DIRECTOR AIR WARFARE

AND

REAR ADMIRAL MICHAEL T. MORAN
PROGRAM EXECUTIVE OFFICER, TACTICAL AIRCRAFT

BEFORE THE

HOUSE ARMED SERVICES COMMITTEE
TACTICAL AIR AND LAND FORCES SUBCOMMITTEE

ON

NAVAL AVIATION STRIKE FIGHTER ISSUES AND CONCERNS

MARCH 28, 2017

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

Introduction

Chairman Turner, Ranking Member Tsongas 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) Strike Fighter programs. This statement addresses the DoN Strike Fighter requirement as well as efforts to recapitalize the force. Appendix A includes an overview of related physiological episodes and aircraft mishap data.

Strike Fighter Inventory Management

Through 2009, the Department's Strike Fighter force was relatively healthy. Several events transpired since 2009, however, which drove our current Strike Fighter inventory shortfall. The Budget Control Act of 2011 started multiple years of reduced military funding and F-35B/C fielding plans were delayed. As a result, the DoN decided to extend the life of legacy F/A-18A-Ds using our aviation depots. Sequestration led to furlough and a hiring freeze of a skilled government civilian artisan workforce at aviation depots, significantly impacting depot throughput and fleet readiness along with other factors such as high utilization rates, lack of aircraft procurement and lack of spare parts. Throughout this period, the operational demand for Naval Aviation forces remained high and accelerated the consumption of existing fleet aircraft. In essence, consumption of aircraft exceeded new and re-work production capacity of aircraft causing an increasing shortfall.

The Naval Aviation Enterprise (NAE) aggressively tackled Strike Fighter Inventory Management to ensure that deployed forces are properly manned, trained and equipped. Each budget year, the NAE attempts to harmonize available funding between flying hours and readiness enabler accounts in order to achieve the greatest return on investment towards improved readiness.

Under the current budget and with Secretary Mattis' focus on readiness, aviation spares and readiness enabler accounts are receiving improved funding levels. It is important to note, however, that years of underfunding cannot be corrected in one budget year and will require stable, predictable funding over multiple years to achieve positive results. This shortfall will take time and likely require several years to correct.

The Navy has taken significant risk in Strike Fighter Inventory Management. The Department remains challenged with planning for F/A-18 A-D and AV-8B aircraft that reach the end of their service life before replacement aircraft (F-35B/C) can be delivered into service. PB-17 investments begin to address the gap between the Strike Fighter inventory forecast and Global Force Management (GFM) demand by fully funding depot capacity; however, near-to-mid-term risk remains due to uncertainty in readiness accounts and procurement that fails to match Strike Fighter service life consumption. Mid-to-long-term risk is driven by a shortfall in tactically relevant aircraft to replace those F/A-18 E/F soon to be inducted into commercial depots for service life extension modifications. Long-term risk is driven by Strike Fighter procurement that fails to match Strike Fighter service life consumption and attrition.

Strike Fighter Inventory Management should be viewed in two separate and distinct phases. The near-term challenge is managing a DoN Tactical Aviation (TACAIR) force that has been reduced in capacity through a combination of historically high TACAIR utilization rates, constrained resourcing of sustainment and enabler accounts resulting in inadequate availability of spare parts, F/A-18 depot production falling short of the required output, and reduced Strike Fighter aircraft procurement. TACAIR aviation depots are expected to continue to improve productivity through 2019. In 2019, the focus will shift toward F-35 repair and begin to support F/A-18E/F service life modifications. In a similar effort to increase Harrier aircraft availability,

the Marine Corps conducted a Harrier Independent Readiness Review which identified a need for changes in the Harrier sustainment plan to achieve required flight line and inventory readiness. This year, with sufficient resources, the Department is implementing these changes to return Harrier readiness to the required T 2.0 levels.

In the far-term, the Strike Fighter inventory is predominantly affected by new procurement of F-35 B/C aircraft and F/A-18 E/F as well as the service life modifications of our current F/A-18 E/F fleet to meet future utilization rates by recapitalizing our aging Strike Fighter fleet. Combatant Commander (CCMD)-driven operational demand, Fleet Response Training Plan training and readiness requirements, and Marine Corps operational tasking are driving increased Strike Fighter utilization rates that outpace procurement.

The Navy F-35C requirement is 340 aircraft, which includes 67 Marine Corps F-35C aircraft. The total Marine Corps F-35 requirement is 420 aircraft: 353 F-35Bs and 67 F-35Cs. The Navy and Marine Corps will continue to modify transition plans to take advantage of any possible F-35 accelerated procurement. Due to delays in the F-35 program and a changing threat environment, sustainment and modernization funding will be required to maintain the relevant operational capability of the F/A-18A-F and the AV-8B throughout the extended transition to the F-35.

Strike-Fighter Force Structure

The 1,174 aircraft Strike Fighter force provides the projected DoN inventory needed to support the anticipated operational demand of nine Carrier Air Wings through the 2025 timeframe. The Navy inventory requirement of 779 aircraft supports 36 active duty DoN Strike

Fighter squadrons, including Marine Corps Strike Fighter squadrons, composed of 396 aircraft (mix of 10-12 aircraft per squadron) and two reserve squadrons with 22 total aircraft assigned. In order to maintain the operational aircraft, support aircraft are required for aviator training, flight-test, attrition reserve and the depot pipeline. This inventory entitlement is estimated based on historical averages and supports the validated requirement of four Strike Fighter squadrons per carrier air wing. Through detailed analysis, inspections and structural repairs, the DoN has been successful in extending F/A-18 A-D aircraft to 8,000 flight hours - 2,000 flight hours beyond the original designed service life. Future inventory projections are based on a service life extension for F/A-18E/F aircraft to 9,000 flight hours from the current design life of 6,000 flight hours.

The Navy's F-35C Strike Fighter program requires 18 active squadrons (14 Navy and 4 USMC) and 2 training squadrons. The F/A-18E/F capabilities complement the F-35C and enhance the overall carrier-based warfighting capabilities. This force structure supports the operational demand per the Global Force Management Allocation Plan and projected aircraft carrier deployments. The Marine Corps' F-35B/C Strike Fighter program requires 14 active, 2 reserve, and 2 training squadrons. Integral to our current force structure reductions, our tactical aviation squadrons were restructured to optimize the support they provide to the Marine Air Ground Task Force (MAGTF) and the joint force.

F/A-18 A-D Hornet:

The F/A-18 A-D was designed for, and has achieved, a service life of 6,000 flight hours, performing as expected through its design life. Ongoing service life management efforts have extended its designed 6,000 flight hour service life to 8,000 flight hours; with select aircraft being extended possibly up to 10,000 flight hours. Continued investment in the Service Life

Extension Program (SLEP), High Flight Hour (HFH) inspection program and Air Systems Support (i.e. Program Related Engineering and Program Related Logistics) will remain crucial to the flight hour extension strategy. In order to maintain warfighting relevancy in a changing threat environment, we will continue to procure and install advanced systems on selected F/A-18 A-D aircraft such as Digital Communication System Radios, Joint Helmet-Mounted Cueing Systems (JHMCS) with Night Vision Cueing and Display, High Order Language Mission Computers, ALR-67v3 radar warning receivers, ALQ-214v5 self-defense suite, Multi-Function Information Distribution System-Joint Tactical Radio System (MIDS-JTRS), APG-73 radar enhancements, Advanced Targeting Forward Looking Infrared (ATFLIR) upgrades, and LITENING targeting pods. While investing in warfighting upgrades, the Services are unable to improve the reliability of this rapidly aging airframe. While we may upgrade them and return the correct number to our flight lines, we are concerned that we will not be able to effectively train or fight these aircraft due to low reliability.

Based on inventory modeling, a portion of the existing inventory of 557 Navy and Marine Corps F/A-18 A-D aircraft will be available through the 2030s. The DoN will continue to meet Navy operational commitments with F/A-18 A-D until 2027 for active squadrons, 2030 for Marine Corps active and reserve squadrons and through 2034 for Navy reserve squadrons. Using the Structural Life Management Program, fleet managers monitor and maintain the health of the legacy F/A-18 A-D fleet through analyses of TACAIR inventories and the management of usage rates at the squadron level. 92 percent of the F/A-18 A-D fleet has over 6,000 flight hours and 24 percent (142 aircraft) have flown more than 8,000 flight hours. As of February 2017, the highest flight hour airframe has attained over 9,799 hours.

The F/A-18 A-D Service Life Assessment Program (SLAP) demonstrated the airframe can be flown beyond 8,000 hours and up to 10,000 hours with a combination of further inspections and airframe modifications via Engineering Change Proposals (ECPs) to maintain airworthiness certification. The inspection results to date have matched the SLAP data. Depot throughput of these jets is complicated by on-going discovery of corrosion which significantly increases unplanned work on the inducted airframes. Depot leadership has an aggressive plan to design and develop inspections and standard repair packages for corrosion-induced work to better manage depot workload and increase throughput.

The F/A-18 A-D SLEP effort has featured a phased approach since inception. HFH inspections are required to assess the material condition and airworthiness of aging F/A-18 A-D aircraft and meet resourcing requirements as aircraft reach 8,000 hours. The HFH suite continues to be revised as a result of on-going HFH inspections and SLEP analysis. As a result, F/A-18 A-D airframe inspections and ECPs have been developed and fielded for those components and airframe areas at high risk of fatigue and corrosion. These efforts have reduced risk in airworthiness and reduced service life extension turn-around time providing program trade space to mitigate Strike Fighter procurement delays. To date, 194 HFH inspections have been successfully completed with 113 HFH inspections currently in-work.

The Department is conducting SLEP/HFH inspections/repairs at seven locations: Naval Air Station (NAS) North Island, California; NAS Jacksonville, Florida; Cecil Field, Jacksonville, Florida; Marine Corps Air Station (MCAS) Miramar, California; MCAS Beaufort, South Carolina; NAS Oceana, Virginia; and in Montreal, Canada. While less complex SLEP modifications can be incorporated at all sites, major SLEP modifications are done concurrently with major depot events.

F/A-18E/F Super Hornet:

The F/A-18 E/F Super Hornet will be numerically the predominant aircraft in the Navy's carrier air wing Strike Fighter force through 2035. The F/A-18 E/F began full rate production in 2000. To date, 98 percent of the total procurement objective has been delivered (570 of 584 aircraft). Continued investment in capability upgrades significantly improves the lethality of the carrier air wing. The Super Hornet modernization plan features an incremental approach to incorporate new technologies and capabilities, to include Digital Communication System Radios, MIDS-JTRS, JHMCS, ATFLIR with shared real-time video, Accurate Navigation Distributed Targeting System, Infrared Search and Track (IRST) and continued advancement of the APG-79 Active Electronically Scanned Array Radar.

Due to high utilization rates, the F/A-18E/F fleet has flown approximately 47 percent of the total flight hours available within the 6,000 hour limit design life. The remaining fleet flight hour capacity will be inadequate to meet operational commitments out to the 2040's. As a result, The Department initiated an F/A-18E/F SLAP to determine what would be required to extend the airframe service life beyond 6,000 flight hours. The F/A-18E/F SLAP effort incorporates lessons learned from the F/A-18 A-D SLAP and SLEP analysis and was initiated sooner in the F/A-18 E/F life cycle. Similar to the F/A-18 A-D Hornet, the Super Hornet program is executing a phased SLAP which commenced in 2008 with completion expected in 2018. The SLAP goal is to analyze actual Fleet usage versus structural test data to support the design of Service Life Modifications (SLM) that will ultimately extend F/A-18E/F service life from 6,000 to 9,000 flight hours. The initial phases of the F/A-18E/F SLM effort began in 2014 with the development and fielding of ECP kits to upgrade life-limited locations revealed by the SLAP analysis.

EA-18G Growler:

The EA-18G Growler is a critical enabler for the joint force, bringing fully netted warfare capabilities to the fight that provides unmatched agility in the Electromagnetic Maneuver Warfare environment. To date, 136 aircraft have been delivered, representing 85 percent of the funded inventory objective. Initial Operational Capability occurred in September 2009 and Full Rate Production was approved in November 2009. Since their initial deployment, Growlers have flown more than 2,300 combat missions, expended approximately 16 percent of the 7,500 flight hour life per aircraft and are meeting all operational commitments. Electronic attack capabilities, both carrier-based and expeditionary, continue to mature with development of the Next Generation Jammer, which is scheduled to replace the legacy ALQ-99 Tactical Jamming System. We continue to invest in the EA-18G passive detection and identification capabilities while improving network connectivity to provide battlespace awareness and targeting for the carrier strike group.

The recent addition of seven aircraft will extend deliveries to FY 2018, which is expected to fulfill Navy requirements for carrier-based Airborne Electronic Attack (AEA) and expeditionary EA-18G squadrons. A number of additional EA-18Gs, above the funded procurement objective of 160, is still under consideration as the Navy is currently exploring solutions that optimize the Growler procurement plan to support an AEA force structure to meet the joint requirement. To meet the joint force and fleet AEA requirement beyond 2040, we are beginning the EA-18G SLAP to assess what is required to extend the service life beyond 7,500 hours.

AV-8B Harrier:

The current Marine Corps inventory consists of 126 AV-8B aircraft. This includes 34 Night Attack, 76 Radar aircraft and 16 TAV-8B trainers. These aircraft support 5 operational squadrons of 16 aircraft each (Primary Mission Aircraft Authorization of 80). To date, the AV-8B fleet is averaging 11 aircraft out-of-reporting for Planned Maintenance Interval and special re-work, with a five-year average of 18.1 percent per year. Most importantly, the Harrier has historically suffered from inadequate supply support, driving down the number of aircraft that can train, deploy, and support our Marines.

To address degraders to readiness, the AV-8B conducted the Harrier Independent Readiness Review (HIRR) in December of 2014. The focus of this study was to address out of reporting aircraft, manpower deficiencies, and material degraders. Since the conclusion of the HIRR there has been a positively trending readiness recovery in the AV-8B fleet due in large part to executive-level engagement with OEMs, vendors, and all DoD commands that have a supporting relationship with the AV-8B program.

The AV-8B was originally designed as a 6,000-hour airframe with expected service life through 2012. In 2010, the Department transitioned to a Fatigue Life Expended (FLE) model that more accurately measures actual stress history on individual airframe components, enabling the airframe to fly beyond 6,000 hours. Fleet average for all three single-seat variants of the AV-8B Harrier is 34.6 percent FLE; there is sufficient airframe life left in these aircraft to reach their eventual end of service. Sub-contractors and vendors divested manufacturing lines of AV-8B material in anticipation of the 2012 sundown and the United Kingdom Royal Air Force divestiture of the AV-8B (GR-9) airframe. Delays in F-35 procurement, coupled with F/A-18 A-D out-of-reporting challenges led to changes in the Marine Corps' TACAIR transition order

planning to shut down three FA-18 squadrons early and extending the service of the AV-8B to mitigate a growing Marine Corps TACAIR inventory shortfall.

Due to component obsolescence concerns and supply shortfalls, the Department purchased 72 GR-9 aircraft, 38 MK-107 engines, parts supply, and support equipment from the United Kingdom in 2011. The GR-9 buy was meant to fill a supply gap allowing the Naval Supply Systems Command immediate access to supply inventory, to develop long term sustainment strategies and give industry time to re-develop parts production lines to support the AV-8B until transition to the F-35 is complete. To date, over 75,000 parts exceeding $71 million have been used from the GR-9 purchase. This decision had an immediate impact in reducing supply backorders. However, a reduction in demand signal from the GR-9 and other lifetime-type buys may cause additional reduction in sub vendors and supply contractors unless carefully managed.

The AV-8B continues to be in high demand deploying in support of Combatant Commander (CCMD) requirements and operational contingencies. Each Marine Expeditionary Unit (MEU) deploys with embarked AV-8Bs. AV-8B and F/A-18 A-D squadrons alternate in support of Special Purpose Marine Air-Ground Task Force (SPMAGTF) deployments. Harriers deploy with 10-aircraft squadron sized units, with their remaining 6 aircraft at sea with a MEU. They are flying and leading joint and coalition strikes in Iraq and Syria today. The AV-8B, equipped with LITENING targeting pods and a video downlink to ROVER ground stations, up to six precision strike weapons, Advanced Precision Kill Weapon System, and beyond visual range air-to-air radar missiles, has continued to be a proven, invaluable asset for the MAGTF and joint commanders across the full spectrum of operations. During the first half of FY 2015, the AV-8B received the H6.1 Operational Flight Program (OFP) enabling full integration of the

Generation 4 LITENING targeting pod. During 2016, the program continued work on the H6.2 Operational Flight Program, which will integrate the initial Link 16 message sets; AV-8B successfully flew Link 16 in developmental test in October of 2016 and is expected to start fielding the capability in early 2018. Additionally, this OFP will integrate Federal Aviation Administration compliant required navigation performance/area navigation (RNP/RNAV) capability and correct additional software deficiencies identified through combat operations. Work continues on H7.0 OFP, which will complete the integration of Link 16 as well as address weapon obsolescence improvements. The Airborne Variable Message Format (VMF) terminals are being installed in AV-8Bs to replace the current digital-aided close air support (CAS) technology and additional efforts include tactical datalink and sensor improvements in support of operational contingencies until transition to the F-35. As an out-of-production aircraft, the AV-8B program will continue its focus on sustainment efforts to mitigate significant inventory challenges, maintain airframe integrity, achieve full FLE, and address reliability and obsolescence issues of avionics and subsystems.

F-35 Lightning II:

The future of DoN TACAIR relies on a combination of F-35B and F-35C 5th generation aircraft that are part of the larger Joint F-35 program. More than just the next fighter, the F-35 brings unprecedented low observable technology, modern weaponry, and electronic warfare capability to the Navy and Marine Corps. Marine Fighter Attack Squadron 121 achieved the world's first F-35 operational capability in 2015 and the squadron is now forward deployed in Japan defending the Nation's interests abroad. In 2018, the Navy and Marine Corps team will deploy two Marine Expeditionary Units with a detachment of F-35Bs aboard ship marking the first extended at sea deployments for F-35. The Navy's first F-35C squadron begins transition in

2018, Initial Operational Capability (IOC), although event-driven, is expected in late 2018 to early 2019 and the first deployment on an aircraft carrier is planned for 2021. The Marines will begin their first F-35C squadron transition in 2019 and, while also even-driven, expect IOC in 2020. Together, the Navy and Marine Corps will be operational in 2020 and replace our aging aircraft inventory with the greatest practical speed. These aircraft will help recapitalize some of our oldest aircraft – our legacy F/A-18s – which are rapidly approaching the end of their service lives.

The Marine Corps also operates the STOVL variant of the F-35, the F-35B. The fielding of the F-35B continues to make excellent progress due to the combined efforts of the Department, industry, and Congress. Critical Military Construction (MILCON) at our bases and stations is underway both at home and overseas to support this fifth generation capability. Due to the level of effort, funding, and timely MILCON, the Marine Corps' transition plan remains on-track. VMFA-211 stood up in July, 2016 on Marine Corps Air Station, Yuma, AZ and the Marine Corps' will transition its third operational squadron to F-35B in 2018.

The F-35B has performed remarkably this last year, successfully achieving a number operational and training milestones. The Marine Corps permanently deployed a squadron to Japan, conducted trans-oceanic flights across both the Atlantic and Pacific, and exercised the expeditionary capability of the aircraft both aboard ship and in austere environments. On the training side, we graduated our second class of F-35B students from our most advanced weapons schools and conducted sustained training operations across the range of military operations to include participation in large scale joint exercises such as Red Flag.

F-35 employs a block upgrade program to usher in new and advanced war-fighting capabilities. Whether the mission requires the execution of strike, close air support, counter air,

escort, and electronic warfare – this machine is the key to our future – empowering our maritime forces to fight from sea bases and expeditionary bases ashore in any clime and place, against any foe. The F-35 is the war-winning, any clime, any place, any threat 5th generation strike fighter we need. However, all Services must get the spare parts posture right, along with the rest of the supporting logistics and MILCON to take full advantage of the aircraft's advanced capability and keep the transition from legacy platforms on-track.

The Navy and Marine Corps aviation fleet is an agile maritime strike and amphibious power projection force in readiness. Such agility requires that the aviation arm of our naval strike and expeditionary forces remain fully manned, trained and equipped. Mr. Chairman, and distinguished committee members, we appreciate your continued support of our Naval Aviation programs and we look forward to working with you to build the force of the future.

Appendix A: Aviation Mishap Data

F/A-18 AND EA-18G PHYSIOLOGICAL EPISODES

Physiological Episodes (PEs) occur when aircrew experience a decrement in performance, related to disturbances in tissue oxygenation, depressurization or other factors present in the flight environment. PEs are categorized into two general groups, those related to Onboard Oxygen Generation Systems (OBOGS) or pilot breathing gas, and those caused by problems in the Environmental Control System s (ECS), i.e. – unscheduled pressure changes in the flight station. These phenomena jeopardize safe flight.

As a result of physiological episodes, the F/A-18 Program Office (PMA-265) established a Physiological Episode Team (PET) to investigate the root causes associated with F/A-18A-F and EA-18G aircraft. The core F/A-18 PET is comprised of 17 members of PMA-265, 23 members from the Fleet Support Team (FST) at NAS North Island, 14 members of the FST at MCAS Cherry Point, three members from the Aircrew Oxygen Systems In-Service Support Center, 10 engineers affiliated with NAVAIR 4.3's Environmental Control Systems (ECS) team and 21 members associated with NAVAIR 4.6's Human Systems team. The F/A-18 PET works closely with other program offices, cross-service affiliates and industry partners in evaluating each episode.

The NAVAIR PET is currently addressing hypoxia and decompression events as the two most likely causes of recent physiological episodes in aviators. As symptoms related to depressurization, tissue hypoxia and contaminant intoxication overlap, discerning a root cause is a complex process. Episodes of decompression sickness typically accompany a noticeable loss of cabin pressure by the aircrew, while the cause of hypoxic related events may not readily

apparent during flight. Reconstruction of the flight event is difficult with potential causal factors not always readily apparent during post-flight debrief and examination.

Historical data of F/A-18 physiological events prior to May 2010 is based on safety reports. The rate per 100,000 flight hours during FY 2006-FY 2010 based on safety reports follows:

Date Range	F/A-18A-D	F/A-18E-F	EA-18G
FY06	3.66	2.18	0.00
FY07	1.63	3.73	0.00
FY08	3.72	4.28	0.00
FY09	6.19	8.33	0.00
FY10	4.95	11.96	0.00

In May 2010 PMA-265 established the PET to investigate root causes of physiological episodes while Commander, Naval Air Forces directed specific reporting procedures to collect more data on the occurrence of an event. The rate per 100,000 flight hours beginning in May 2010 with the implementation of new reporting protocol follows:

Date Range	F/A-18A-D	F/A-18E-F	EA-18G
05/1/2010 - 10/31/2010	12.20	8.98	0.00
11/1/2010 - 10/31/2011	10.90	8.65	5.52
11/1/2011 - 10/31/2012	16.39	23.35	5.42
11/1/2012 - 10/31/2013	21.01	26.23	9.80
11/1/2013 - 10/31/2014	29.54	26.39	15.05
11/1/2014 - 10/31/2015	30.20	28.02	42.89
11/1/2015 - 10/31/2016	57.24	31.05	90.83

The process for investigating a physiological episode begins with the submission of data describing the event. Engineers from the ECS FST and the Aircrew Oxygen Systems In-Service Support Center work with the squadron maintenance department to identify which components of the aircraft should be removed and submitted for engineering investigation. The squadron flight surgeon also submits data on the medical condition of the pilot and in-flight symptoms that were experienced.

After completion of the component investigations, the incident is examined holistically by members of the engineering teams and Aeromedical specialists to identify the most likely cause of the incident. Of 382 cases adjudicated by the PET so far, 130 have involved some form of contamination, 114 involved an ECS component failure, 91 involved human factors, 50 involved an OBOGS component failure, 13 involved a breathing gas delivery component failure, and 76 were inconclusive or involved another aircraft system failure. Of note, some of the events resulted in assignment to more than one category.

T-45 Physiological Episodes

Data recorded since introduction of the T-45 Physiological Event Reporting Protocol form in November 2011 is presented below by calendar year. Prior years' data for T-45 aircraft is incomplete and is not included.

Calendar Year	Calendar year rate per 100K flight hours	Cumulative rate per 100K flight hours
2012	11.86	11.86
2013	16.22	13.94
2014	18.43	15.36
2015	44.99	22.70
2016	46.97	28.01

The process for investigating a physiological episode mimics that being used by the F/A-18 and is also managed by the Physiological Episode Team (PET). After completion of the component investigations, the incident is examined holistically by members of the PET's engineering teams and aviation medical specialists to identify the most likely cause of the incident. More than one causal factor can be attributed to a single physiological episode event. Of the 79 physiological episode reports adjudicated to date, 24 were assessed to be most likely caused by contamination, 12 involved human factors (these may also include incidents of airsickness and vertigo), 12 involved OBOGS component failure, 11 involved a breathing gas delivery failure, three involved cabin integrity, and the remaining 23 were inconclusive or involved another system failure.

Navy's Efforts to Mitigate Physiological Episodes

A variety of actions have been undertaken to address the occurrence of physiological episodes in the F/A-18 / E/A-18G:

1) New maintenance rules for handling the occurrence of specific ECS built-in test faults have been implemented throughout the fleet requiring that the cause of the fault be identified and corrected prior to next flight.

2) Transportable Recompression Systems have been put on forward deployed aircraft carriers to immediately treat aircrew in the event they experience decompression sickness symptoms.

3) Mandatory cabin pressurization testing is now performed on all F/A-18A-F and EA-18G aircraft every 400 flight hours and ECS pressure port testing is performed on all F/A-18A-D aircraft every 400 flight hours. Overhaul procedures for ECS components and aircraft servicing procedures have been improved.

4) Emergency procedures have been revised, all pilots now receive annual hypoxia awareness training, and biennial dynamic training using a Reduced Oxygen Breathing Device to experience and recognize hypoxia symptoms while operating an aircraft simulation.

5) Aircrew are provided portable hypobaric recording watches to alert them when cabin altitude reaches a preset threshold.

6) Internal components of the F/A-18 OBOGS have been redesigned to incorporate a catalyst to prevent carbon monoxide from reaching the pilot and provide an improved capability sieve material (filter). These new OBOGS components have been installing in 80 percent of the in service F/A-18 fleet so far.

7) Improvements to existing maintenance troubleshooting procedures and acceptance and test procedures for reworked components have been incorporated and additional improvements are under evaluation.

8) Hardware and software changes are in work for Super Hornets and Growlers to mitigate cabin pressurization issues due to moisture freezing in the ECS lines.

9) Component redesign, improved performance testing, and newly established life limits will improve component reliability across all F/A-18 configurations.

10) An increased capacity for the emergency oxygen bottles is under contract.

11) Trial sampling efforts for contamination have been conducted at EA-18G squadrons located at NAS Whidbey Island to improve real-time data collection for OBOGS related systems. "Sorbent tubes" which help collect and identify unknown contaminants have been added to oxygen masks for aircrew to collect samples of breathing gas for post-flight analysis of potentially harmful compounds.

12) An ECS laboratory is under construction to improve root cause and correct actions of ECS engineering investigations of fleet events. The projected operational date of the ECS lab is September of 2017.

13) Aircraft are flown with "slam sticks" to track and collect cabin pressure changes over time for rigorous data analysis and to compare data to what the aircrew experienced.

14) Future projects include systematic evaluations of technologies to monitor and detect physiological symptoms.

The Department of the Navy remains focused on solving this issue. Fleet awareness is high, protocols are in place and we are focused on mitigating risk, correcting known deficiencies and attacking this issue. Moving forward we will continue to fly while applying every resource to solve this challenging problem.

SUMMARY OF CLASS A, B AND C AVIATION-RELATED SAFETY ISSUES

A summary of all Naval Aviation Class A, B and C aviation-related safety issues, including recent mishaps, trends, and analysis from October 2015 through February 28, 2017 follows. The rates presented are based on mishaps per 100,000 flight hours.

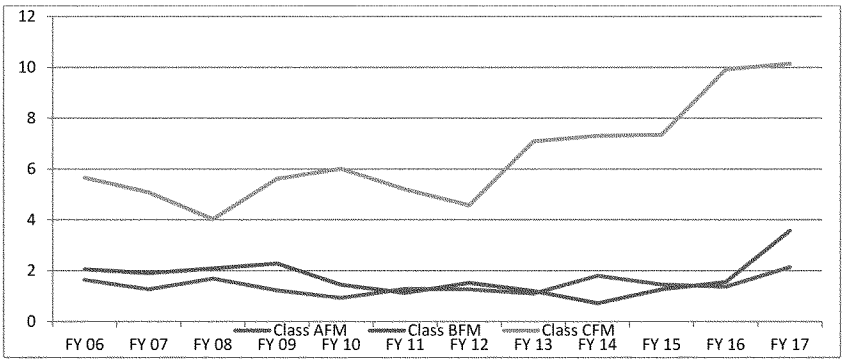
Year	Flight Hours	Class A	Class A Rate	Class B	Class B Rate	Class C	Class C Rate
FY16	1,098,519	18	1.64	29	2.64	229	20.85
FY17	420,191	12	2.86	21	5.00	97	23.08

The most recent FY17 DoN flight Class A mishaps include:

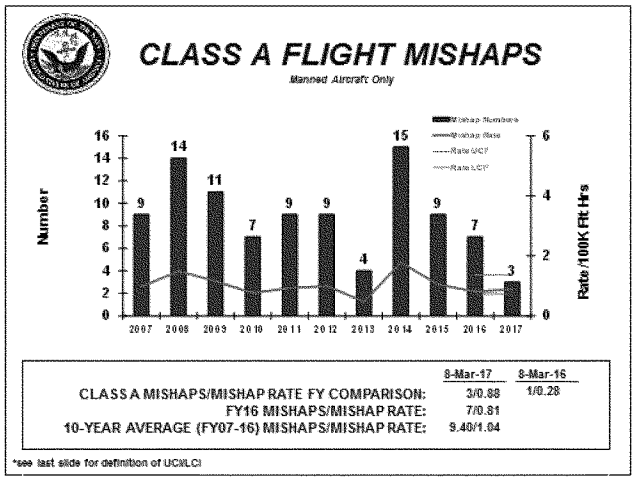
- 17 Jan 2017: (NAS Meridian, MS) T-45 crashed following a Bird/Animal Aircraft Strike Hazard (BASH) incident on takeoff. Both crewmembers ejected. No fatalities.
- 13 Dec 2016: (Off the Coast of Okinawa, Japan) MV-22B attempted a precautionary emergency landing (PEL) to dry land but crash landed in shallow water. Crew of 5 evacuated with injuries.
- 07 Dec 2016: (Off the Coast of Iwakuni MCAS, Japan) F/A-18C crashed into the water while conducting a night mission. 1 fatality.
- 21 Nov 2016: (Upper Mojave Desert Region) F/A-18F struck a tree while instructor pilot was conducting a currency low-level flight event. Returned to base safely. No injuries.

There are no recent FY17 DoN Class A flight related mishaps. There are three recent FY 2017 DoN Class A aviation ground operations mishaps (AGM):

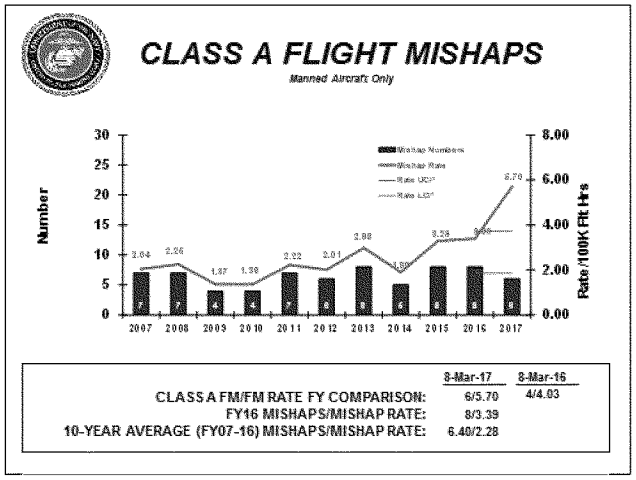
- 19 January 2017: (NAS Norfolk, VA) Three E-2C aircraft damaged in an engine oil related event. (AGM)
- 18 December 0216: (Kadena Air Force Base, Japan) Tow bar separation resulted in aircraft/tow collision with damage to nose gear and lower fuselage of P-8A. (AGM)
- 16 December 2016: (NAS Whidbey Island, WA) Canopy on EA-18G exploded/jettisoned resulting in severe injuries to two personnel. (AGM)



DoN Historical Mishap Rate Trend per 100K Flight Hours per Mishap Class
(As of 28 February, 2017)



Class A Manned Flight MISHAP Historical Data for U.S. Navy



Class A Manned Flight MISHAP Historical Data for U.S. Marine Corps

UCI = Upper Confidence Interval LCI = Lower Confidence Interval

Rate values above the UCI or below the LCI infer a statistically significant change is probable. This is only an indicator. Significance cannot be determined until end-of-year. Values between the UCI and LCI infer that nothing significant has occurred to increase or decrease mishap rate.

Lieutenant General Jon M. Davis
Deputy Commandant for Aviation

Lieutenant General Jon M. Davis assumed his current position as the Deputy Commandant for Aviation, Headquarters Marine Corps in June 2014. Commissioned in May 1980 through the PLC Program, LtGen Davis completed the Basic School in August 1980, and then reported for flight training. Upon receiving his wings in September of 1982, he was selected to fly the AV-8A Harrier.

He reported to VMAT-203 in October 1982, completed Harrier training and reported to VMA-231 in 1983 where he deployed aboard the USS Inchon. In 1985 he transferred to VMAT-203 serving as an instructor pilot. In 1986 he attended the WTI course at MAWTS-1. In 1987 he transferred to VMA-223 serving as the "Bulldogs" WTI and operations officer. From 1988 to 1991 he served as an exchange officer with the Royal Air Force. After training in the United Kingdom, he deployed to Gutersloh, Germany for duty as a GR-5/7 attack pilot with 3(F) squadron. From 1991 to 1994 he served as an instructor at MAWTS-1 in Yuma, AZ. From 1998 to 2000 he commanded VMA-223. During his tour, VMA-223 won the CNO Safety Award and the Sanderson Trophy two years in a row, and exceeded 40,000 hours of mishap free operations. After completing the Executive Helicopter Familiarization Course at HT-18 in Pensacola in 2003, he was assigned to MAWTS-1 where he served as Executive Officer and from 2004 to 2006 as Commanding Officer. From 2006 to 2008 he served as the Deputy Commander Joint Functional Component Command -- Network Warfare at Fort Meade, Maryland. He commanded the 2nd Marine Aircraft Wing from July 2010 to May 2012. From May 2012 to June 2014, he served as the Deputy Commander, United States Cyber Command.

His staff billets include a two year tour as a member of the 31st Commandant's Staff Group, and two years as the Junior Military Assistant to the Deputy Secretary of Defense. In 2003, he served as an Assistant Operations Officer on the 3rd Marine Air Wing staff in Kuwait during Operation Iraqi Freedom. In 2004, he served in Iraq as the Officer in Charge of the 3d Marine Aircraft Red Team. He served as the Deputy Assistant Commandant for Aviation from 2008 to 2010. In the course of his career he has flown over 4,500 mishap free hours in the AV-8, F-5 and FA-18 and as a co-pilot in every type model series tilt-rotor, rotary winged and air refueler aircraft in the USMC inventory.

LtGen Davis graduated with honors from The Basic School and was a Distinguished Graduate of the Marine Corps Command and Staff College. He is a graduate of the Tactical Air Control Party Course, Amphibious Warfare School, Marine Aviation Weapons and Tactics Instructor Course (WTI), The School of Advanced Warfighting (SAW), and Johns Hopkins School of Advanced International Studies (SAIS). He holds a Bachelors of Science from Allegheny College, a Masters of Science from Marine Corps University and a Masters of International Public Policy from Johns Hopkins.

His personal decorations include the National Intelligence Distinguished Service Medal, the Defense Superior Service Medal (two awards), the Legion of Merit (two awards), Meritorious Service Medal (three awards), Navy Commendation (three awards) as well as other campaign and service awards.

Rear Admiral DeWolfe Miller, III
Director, Air Warfare (OPNAV N98)

Rear Adm. DeWolfe Miller hails from York, Pennsylvania, and graduated from the U.S. Naval Academy in 1981. He holds a Master of Science in National Resource Strategy from the National Defense University, is a national security management fellow of the Maxwell School of Citizenship and Public Affairs, Syracuse University and is a graduate of the Navy's Nuclear Power Program.

Miller's command tours include Strike Fighter Squadron (VFA) 34, USS Nashville (LPD 13), USS George H.W. Bush (CVN 77) and as a flag officer, Carrier Strike Group (CSG) 2 providing support to maritime security operations and combat operations for Operations Enduring Freedom and Iraqi Resolve.

Miller's operational tours began after earning his wings of gold in 1983 as a flight instructor with Training Squadron (VT) 19 in Meridian, Mississippi, followed by his first fleet assignment with Attack Squadron (VA) 56, flying the A-7E aboard USS Midway (CV 41) in Yokosuka, Japan. After transitioning to the FA-18 in 1986, subsequent fleet tours included Strike Fighter Squadron (VFA) 25 on USS Constellation (CV 64), department head tour with VFA-131 aboard USS Dwight D. Eisenhower (CVN 69) and executive officer of USS Carl Vinson (CVN 70).

Miller's shore tours include FA-18 test director at Air Test and Evaluation Squadron (VX) 5 in China Lake, California; special aviation programs analyst on the staff of the chief of naval operations (N80); executive officer of Strike Fighter Weapons School Atlantic; deputy director of naval operations at the Combined Air Operations Center during Operation Allied Force; special assistant for Research and Development, Science and Technology and Operational Testing in the Office of Legislative Affairs for the Secretary of Defense; Aircraft Carrier Requirements officer for Commander, Naval Air Forces; and flag officer tours as director, intelligence, surveillance, and reconnaissance capabilities division and assistant deputy chief of naval operations for warfare systems, both in the Office of Chief of Naval Operations.

His personal decorations include the Defense Superior Service Medal, Legion of Merit, Bronze Star, Meritorious Service Medal, Air Medal, Navy and Marine Corps Commendation Medal, Navy and Marine Corps Achievement Medal and various campaign, unit and service awards. He has accumulated more than 4,000 mishap-free flight hours and 877 carrier-arrested landings.

Updated: 17 May 2016

Rear Admiral Michael T. Moran
Commander, Naval Air Warfare Center Weapons Division
Assistant Commander for Test and Evaluation, Naval Air Systems Command

Rear Admiral Michael Moran is a native of New York. He is a 1984 graduate of the United States Naval Academy, where he received a Bachelor of Science degree in Engineering. He was designated a Naval flight officer in 1986. He holds a Master of Science in Human Resources Management from Troy State University and is a graduate of the Air Command and Staff College.

Moran's tours included Patrol Squadron 3 (VP-23) at NAS Brunswick, the P-3C Fleet Replacement Squadron (VP-30) at NAS Jacksonville, Patrol Squadron 16 (VP-16) at NAS Jacksonville and Training Squadron 10 (VT-10) at NAS Pensacola where he served as the executive and commanding officer.

Moran also completed a tour to SDC Dallas as a project officer for an operationally sensitive, high priority Chief Of Naval Operations Program and multiple tours with the Naval Air Systems Command to include; the deputy program manager for Systems Engineering or Class Desk for the P-3 platform in PMA-290, the P-3 Aircraft Improvement Program (AIP) deputy program manager, the P-8A Poseidon deputy program manager where he led the team through several major milestones, and in June 2008 assumed Command of PMA-290 where he was responsible for the test, acquisition, budgeting, and cost-wise readiness programs for the P-8A; P-3C and derivatives; EP-3, S-3 and International Programs to 16 foreign countries. In April 2012 Moran reported to the Undersecretary of Defense for Acquisition, Technology and Logistics USD(AT&L), serving as his military assistant. In August 2013 Moran assumed his current position as the commander, Naval Air Warfare Center Weapons Division and assistant commander for Test and Evaluation, Naval Air Systems Command.

Moran's decorations include the Defense Superior Service Medal, the Legion of Merit, four Meritorious Service Medals, three Navy Commendation Medals, the Navy Achievement Medal, and various other unit awards.

WITNESS RESPONSES TO QUESTIONS ASKED DURING THE HEARING

MARCH 28, 2017

RESPONSE TO QUESTION SUBMITTED BY MR. BROWN

Admiral MORAN. Recompression chambers (RCCs) are valuable assets to the diving community and are limited in number. As part of our naval aviation's Physiological Episode (PE) mitigation efforts, the diving community was engaged to leverage their expertise with decompression sickness and effective treatments. Naval Sea System Command (NAVSEA) 00C, responsible for RCC policy, acquisition and oversight, and Navy Expeditionary Combat Command (NECC), responsible for the vast number of RCC support team qualified personnel, have been working with naval aviation to help source a deployable chamber capability while maintaining the requisite numbers of chambers and qualified personnel to support their global dive operations. Through close coordination, plans have been developed that ensure an RCC capability exists and will continue to exist for deployed aircraft carriers. As of January 2017, all carriers will be supplied with RCCs throughout their deployments. There are numerous RCC facilities throughout the country that may be used to treat aviators that may be affected while flying in one of our domestic or local off-shore training ranges; therefore, the focus has been upon sourcing those aircraft carriers that are deployed and well out of range of any land-based RCC. Working with NAVSEAA 00C, NECC and other fleet stakeholders, a plan is being developed that ensures RCC capability on those deployed carriers for as long as is needed. This plan is not only for the physical chambers but also the highly-qualified personnel required to operate and maintain these chambers. There are three primary variants of RCCs in use by the Navy, with varying capacities and size, weight and power demands, as well as varying levels of availability due to sheer numbers. Each variant is capable of being deployed on an aircraft carrier, with different degrees of impact to shipboard operations (primarily due to the size of the chambers). The staffs of NAVSEA 00C, NECC, and the Commander, Naval Air Forces, Pacific, have developed and continue to refine a plan that balances the available chambers and best ensures both the aviation and dive communities maintain rapid access to RCCs to ensure the safety and well-being of their personnel. [See page 27.]

RESPONSE TO QUESTIONS SUBMITTED BY MS. TSONGAS

Admiral MILLER. The Naval Air Systems Command (NAVAIR) has coordinated with the National Aeronautics and Space Administration (NASA) Engineering and Safety Center (NESC) to conduct an independent review of F/A–18 Physiological Episodes (PE). The team members consist of NASA engineers and aerospace medical professionals. The NESC team is reviewing the Navy's PE investigation process, ongoing root cause analysis and mitigations, as well as the performance of the F/A–18 Onboard Oxygen Generating System (OBOGS) and Environmental Control System (ECS). In additional to extensive coordination and data-sharing with NAVAIR, their itinerary includes fact-finding visits to F/A18 squadrons at Naval Air Station Oceana, the depot overhaul for ECS components at Fleet Readiness Center East, a trip aboard an aircraft carrier to witness embarked flight operations, and a visit to Training Wing ONE in Meridian, Mississippi. NASA is accelerating completion of the Independent Review and NAVAIR expects to receive NASA's report in August of 2017. [See page 34.]

QUESTIONS SUBMITTED BY MEMBERS POST HEARING

MARCH 28, 2017

QUESTIONS SUBMITTED BY MR. TURNER

Mr. TURNER. The Assistant Commandant of the Marine Corps, General Walters, recently testified before the committee "the most acute readiness concerns are found in our aviation units, and approximately 80 percent of our aviation units lack the minimum number of ready basic aircraft (RBA) for training, and we are significantly short ready aircraft for wartime requirements." You obviously are facing significant readiness challenges with respect to tactical aviation. What are you doing to help mitigate this crisis and improve the current situation described by General Walters?

General DAVIS. In an effort to recover readiness, Marine Corps leaders have prioritized and balanced funding between readiness accounts and procurement of new aircraft to enable recovery. 2016 was a transitional year, and while some efforts for recovery of funding were identified, the majority of long-term recovery efforts began in 2017.

There are many reasons for these reduced readiness numbers.

1. Budget constraints lowered readiness funding;

2. High Operational Tempo;

3. Aging aircraft have not been replaced or reset. Less-than-optimal procurement rates to replace over-age and aging aircraft, which is critical to maintaining our capability over near peer competitors;

4. Spares—Aircraft Not Mission Capable Supply rates are 25+%;

5. RBA recovery has stalled. There is a two-year lag between funding readiness accounts and realized gains;

6. Continued support of readiness and Flight Hours Program is critical;

7. RBA aircraft is 441. Marine aviation requires 589 to maintain T–2.0 and 690 to achieve a ready bench.

The flight hour metric, while not the only measure of capability, is an indicator of the depth of the material bench and of the ability to surge. Marine aviators and aircrew operate in high-tempo environments, flying increasingly complex mission profiles. The time between operational deployments is decreasing, the inventory of aircraft to train with is decreasing and today's aviators are not getting enough "looks at the ball" to ensure they are as proficient as they should be.

Marine aviation initiated six Independent Readiness Reviews (IRRs) beginning in December 2014. To date, AV–8Bs, CH–53Es, H–1s, MV–22s, as well as an aviation ground MISHAP review are complete. These reviews, led by independent leaders outside the Naval Aviation Enterprise, provide different perspectives, assessments and courses of action to achieve positive gains and meet readiness requirements. Since implementation, there are more Ready Basic Aircraft (RBA) on the flight line than previous years, and the recovery effort focuses on four primary lines of effort: 1) Depot throughput; 2) In-service repairs; 3) Non-mission capable supply; 4) Non-mission capable maintenance. The common thread in each IRR focused on non-mission capable supply aircraft and identified funding shortfalls in readiness accounts as a critical factor. PB–18's focus is to fund these accounts to to the maximum executable level, ensuring stable and predictable funding to support Marine Aviation's recovery to training levels by FY20 and a ready bench by FY22.

Four main factors surfaced within each IRR (with different combinations in each Type/Model/Series): People, Parts, Process, and Funding. The Marine Corps is tackling these components head-on. Continuing resolutions and delays in budgets have stalled recovery in the short-term.

The real key to reducing risk in capacity and recovering future readiness is through recapitalization of the fleet—transitioning to new aircraft. The Marine Corps is 41% through its aviation fleet transition of every type/model/series. 28 squadrons are complete with 40 awaiting transition. This recovery plan balances current readiness and modernization to maintain and increase our operational advantage as we procure a new aircraft and transition to a modern force.

Mr. TURNER. In your written testimony, you mention recent improvements in your AV–8B Harrier readiness due to initiatives you have incorporated since the Harrier Independent Readiness Review. What improvements have the Marine Corps made as a result of this review?

General DAVIS. Major initiatives taken post-2014 Harrier Independent readiness review (HIRR) include: establishment of the PMA–257 readiness cell; key recurring stakeholder engagements; prudent Operations and Maintenance, Navy (OM&N) funding justification and execution, to identify, develop, and implement sustainable solutions for AV–8B readiness inhibitors through transition (moving from reactive to predictive); and the "Green in 3" Initiative which concentrates TMS focus on supply support, support equipment, maintenance training, and technical publications as the critical paths to AV–8B readiness optimization by FY19. Specifics associated with each of these initiatives are:

—Readiness cell: (current readiness) direct flight-line support—GR9/Mk107 material management, Reclamation in Lieu of Parts (RILOP), and Stricken Aircraft Reclamation and Disposal Program (SARDIP); (future readiness) trend analysis and stakeholder integration, Engineering Bills of Material (EBOM) development, consumable material forecasting, Critical Parts Repository (CPR), Diminishing Manufacturing Sources and Material Shortages (DMSMS) and obsolescence management.

—Key stakeholder engagements: Bi-monthly F402 engine and Gas Turbine Starter (GTS) management boards, monthly Periodic Maintenance Interval (PMI) inhibitor calls, monthly Critical Parts Review (CPR) calls, bi-annual Harrier Alignment Working Group (HAWG) meetings, and bi-annual UK vendor summits. The regular "drumbeat" engagements have synergized stakeholder efforts to improve material availability for AV–8B airframe and mission systems and the F402–RR–408B Pegasus engine at both Naval Supply Systems Command for repairable components and at Defense Logistics Agency for consumable "piece parts".

—Prudent Operations and Maintenance, Navy (OM&N) funding justification and execution: close collaboration with USMC and OPNAV Resource Sponsors, to clearly define and articulate Program Related Logistics (PRL) and Program Related Engineering (PRE) funding requirements ensured that all requirements were accurately identified and entered into the Optimized Performance Model, prioritized, and executed. This Planning, Programming, Budgeting and Execution discipline helped garner full funding in FY18.

—"Green in 3": AV–8B Support Equipment (SE) reconciliation and sustainment (18-month initiative) commenced April 2017. A comprehensive assessment of fleet AV–8 common and peculiar SE is in work, to include sourcing of material equipment shortfalls, enhanced repair capabilities, review of fleet management practices, and supplemental training. Additionally there was a large effort to modernize and update AV–8B publications; 266 publication updates are on contract with 171 delivered as of 31 May 2017, with the remainder on schedule to be delivered by the end of the FY17. 528 Technical Publications Discrepancy Reports (TPDR) were initiated with 415 closed or incorporated. Integrated Publication Reviews (IPR) with PMA–257, AV–8B FST, AV–8B Fleet, and OEM(s) participation have been conducted or are planned; three IPRs are complete and three are scheduled for completion in FY17.

Mr. TURNER. What is the optimal production ramp rate for F–35B procurement for the Marine Corps? When are you projecting to be at this optimal rate and if additional funding was provided could you accelerate this production?

General DAVIS. An optimal F–35B ramp for Marine Aviation, across the FYDP would be 19, 23, 23, 23, 30 and up to 37 in 2023, increasing to full rate production outside the FYDP until we complete our program of record. This gets us out of legacy aircraft and into new aircraft faster, saves money in procurement spending, avoids the increasing O&S costs of legacy platforms, and eliminates redundancies by modernizing from the current three legacy aircraft into the Joint Strike Fighter.

Mr. TURNER. How will F–35B production help with mitigating current strike fighter readiness challenges for the Marine Corps?

General DAVIS. The Marine Corps has a very different readiness model when compared to the other services. We are small in size, but are required to maintain a constant state of high readiness. As the "Nation's Force in Readiness," the answer to our tactical aircraft readiness challenges lies in the recapitalization of our legacy fleet, a process currently flowed out over the next 14 years, completing in 2030. The average age of any Harrier or Hornet in the Marine Corps is 22 years. The oldest Harrier in the inventory is 28 years old. The oldest C and D Hornets in the inventory are pushing 30 years, built just after Apple rolled out the first personal computer. These aircraft will be well into their 40s at the end of the transition. While these aircraft have met the call of duty and performed brilliantly in battle, maintaining aging legacy platforms is a challenge that costs more over time, especially with today's high operational tempo. Transitioning the fleet from legacy into F–35 as fast as prudently possible is the only way to ensure tactical readiness for future demands.

Mr. TURNER. The Navy finds itself in the unique position of being able to leverage the progress of the F–35C program efforts before having to operationally field the aircraft. This also provides the Navy the opportunity to recapitalize their strike fighter fleet with the F/A–18E/F Super Hornet, to bridge the near term need while preparing for the increased capability of the F–35C to be completely fielded. Please describe for the subcommittee how the Navy envisions this process moving forward to achieve the warfighting requirements now and in the future? Will you require additional resources to achieve your plan?

Admiral MILLER. To provide force projection and maintain air superiority for the Carrier Strike Group, a mix of 4th and 5th Generation Strike Fighters is required to win the fight. The Navy's current strike fighter acquisition strategy, blending F/A–18E/F and F–35C procurement, while modernizing all Carrier Strike Wing platforms optimizes resources to meet Fleet requirements under the current fiscal and production constraints. In the near term, the Super Hornet is planned to be the majority of the Carrier's Air Wing into the 2030's. The F/A–18 E/F provides capability and capacity to the fleet to meet all the carrier strike tactical aviation mission sets and kill chains. Of the 551 FA–18E/F inventory, 132 are older Block I aircraft with limited capability against advanced threats compared to the later Block II Super Hornets. The Department is committed to maintaining the F/A–18 E/F lethality and survivability through affordable and achievable upgrades throughout the life of the platform to achieve the capabilities required to win. With rapidly evolving potential adversaries, substantial force modernization is necessary to pace the threat. The Department continues to evaluate an F/A–18E/F Block III upgrade. Block III includes low risk changes which can be incorporated in the near term with a combination of forward fit production line incorporation and via retrofit modifications to the aircraft already planned as part of the Service Life Modification Plan. These Block III capabilities in a networked Integrated Fire Control Environment with the F–35C, EA–18G and E–2D will keep the Air Wing ahead of the projected threat. Block III Super Hornets will be complementary to the F–35C in range, in data processing and in direct Air-to-Air and Air-to-Ground combat operations, and is considered to be very low risk from a technology maturity, cost and technical feasibility to integrate. Follow on options involving changes to the radar, the engines or the electronic warfare suite are considered higher risk and can be considered in the future.

Mr. TURNER. What has changed over the last 2–3 years that has affected the Navy's strike fighter shortfall? How is the Navy addressing this shortfall? Are the Navy's current plans in the future year defense program for procurement of F/A–18E/Fs and F–35Cs sufficient to address the strike fighter shortfall?

Admiral MILLER. We deploy our Carrier Strike Groups for strategic maritime control, for deterrence in places like the South China Sea or off the Korean Peninsula, and to project power where needed as in Syria and Iraq for the global fight on terror. The pace of deployed operations has not slowed, but the Strike Fighter inventory to conduct those operations continues to shrink as we expend approximately 2–3 Strike/Fighter squadrons per year. Navy tactical aircraft are designed for a limited service life. The F/A–18 variant was designed to fly 6,000 flight hours and to be in service 23 to 25 years. After 6,000 flight hours, the aircraft will need to be stricken from the inventory since it has expended the designed service life of the airframe, systems and components. The F/A–18 fleet is flying on average 180,000 flight hours per year, which equates to the entire fleet expending 24–36 aircraft worth of service life per year, or approximately 2–3 squadrons. To complicate the situation, years of underfunded readiness accounts due to fiscal constraints of the Budget Control Act, and Bipartisan Budget Acts, have left Navy shelves short of parts, and many aircraft sit on the ramp in a non-mission capable status. This operational tempo and aircraft expenditure made strike fighter inventory management more challenging. To address this growing strike fighter shortfall, the Navy has three basic options or "levers":

Manage and conserve hours on our aging fleet—unfortunately the world gets a vote and our operational tempo has not slowed;

Extend aircraft service life from their originally planned 6,000 hours to 9,000 hours (or more) using our aviation depots and commercial assistance;

Procure new aircraft. The Navy expects the first F/A–18E/F to reach 6,000 hours in CY 2018. By the mid-2020s, we expect to induct 60–70 aircraft per year into our depots. To solve our existing Strike Fighter gap, cover the surge in depot throughput, and increase capacity and readiness on the flight line, we must procure aircraft throughout the FYDP. The FY17 Appropriation begins to address these issues through increased funding of readiness accounts, depot maintenance and Super Hornet procurement, but sustained funding of procurement are necessary to solve the long-term Strike Fighter inventory problem.

Mr. TURNER. Please provide the subcommittee with a short update on the readiness status of current Navy strike fighters. Do you have enough inventory capacity to meet current demands?

Admiral MILLER. The current readiness of Navy strike fighters is at, or near, historical averages but remains significantly below the Chief of Naval Operation's goal of 56 percent Full Mission Capable and 73 percent Partial Mission Capable. The Department of the Navy has the required inventory of strike fighter aircraft to meet current demands. This inventory can be described in terms of available aircraft and non-available aircraft. Available aircraft totals are challenged by fleet demands. Non-available aircraft include any aircraft that is not available for flight or mission operations. Generally, aircraft are not-available due to extended maintenance in depots or they are on the flight line awaiting parts or maintenance. The Navy will continue to manage available aircraft to meet operational commitments. The Navy mitigates available aircraft inventory by moving aircraft from Air Wings that are in maintenance phase following deployments to fill strike fighter gaps in deployed squadrons, Fleet Replacement squadrons and Test and Evaluation squadrons. This lack of available aircraft to support maintenance phase squadrons imposes significant risk to the Navy's next deployers. Non-available aircraft are managed through the Department of the Navy's Strike Fighter Inventory Management (SFIM) program. SFIM is an ongoing Naval Aviation Enterprise effort to manage capacity, readiness gaps and future inventory shortfalls.

The high risk in strike fighter inventory levels is due to:

Unexpected Consumption Rates: Global Force Management Allocation Plan (GFMAP) demand higher than planned. Strike Fighter readiness levels have been reduced due to overutilization and years of underfunded and unstable readiness enabler accounts.

F/A–18E/F Service Life Modification (SLM) Program: The first aircraft in the F/A–18E/F fleet reaches design limits (6,000 hours) in Fiscal Year (FY) 2018. The Navy needs to extend the life of these aircraft to 9,000 hours to meet SFIM targets through 2035. This will require 60–70 aircraft, at a time, to undergo a year long extended maintenance in a not-available status.

F–35C delays: Navy requires block 3F-equipped F–35C aircraft to support Initial Operational Capability (IOC) in early 2019. Based on this unique Service requirement, sliding the procurement of properly equipped F–35C aircraft from 2012 to 2019 has exacerbated the impact of not replacing F/A–18s at a requisite rate. Strike fighter demand pressure is expected to remain high through FY18. In addition to expected (continued) operational demands the Navy will experience peak depot inductions for F/A–18A-Ds reaching 8,000 hours. PB–17 investments fully funding depot capacity will improve depot turn-around time.

The Navy has a focused approach to return not-available aircraft to available status faster:

Prioritized funding will continue to improve readiness (available aircraft) that has resulted from years of underfunded readiness enabler accounts. Ongoing High Flight Hour (HFH) inspections, repairs/modifications and recurring inspections will improve availability out to 8,000 flight hours for select F/A–18A–D Legacy Hornets. F/A–18E/F Service Life Assessment Plan (SLAP) will complete in FY 2018. Planned E/F tear-downs validate SLAP hot-spot engineering analysis and reduce risk by identifying corrosion problem areas early. Based on SLAP analysis, Service Life Extension Program (SLEP) kits were pre-ordered and are planned for FY 2024.

Procurement Capacity: Production capacity currently exists in the F/A–18E/F production line to meet the required need for strike fighter inventory shortfalls caused by current shortfalls. The PB17 F–18E/F procurement plan complements planned F–35C deliveries as F–35C capabilities mature. FY 2017 Appropriations Act funds 14 F/A–18E/F, 8 F–35C and 18 F–35B aircraft. The table above updates the current readiness status of Navy strike fighters as of 13 June 2017.

Mr. TURNER. The Navy has always said that their requirement is to have a combination or mix of 4th gen and 5th gen aircraft. Based on the current assessment that the Navy is doing in regards to the SECDEF directive, will the Navy's requirement for F–35C variants remain at 260 aircraft?

Admiral MILLER. As mentioned in our written statement of 28 March 2017 the Navy's F–35C requirement and Program of Record (POR) is 340 aircraft, which includes 67 Marine Corps F–35C aircraft. This requirement supports 18 operational squadrons distributed across nine carrier air wings.

Mr. TURNER. What are the effects of a year-long continuing resolution to the Navy's strike fighter fleets?

Admiral MILLER. A year-long Continuing Resolution (CR) would limit surge capability and substantially impact Naval Aviation's personnel, training and equipment

readiness. The Navy's associated impacts to Naval Aviation is based on the draft 2017 CR plan provided below. A full CR in 2018 would have similar impacts.

1. Personnel: a. Reduce accessions by 1,000—gaps billets in both sea and shore positions. b. Stop incentive (bonus) payments—reduces retention of experienced and specialized Sailors. c. Delay shore duty orders—maximize sea duty manning. d. Delay orders funding until one month prior to transfer—causes undue family stress and reduced quality of life—reduces retention. e. Training impacts to manning—delays accession deliveries due to reduced training flight hours. f. Cancel 29 Blue Angels demonstrations—reduces interest for accession candidates. g. Reduce/Cancel Fleet Weeks—reduces interest for accession candidates.

2. Training: a. Reduced flight hours for all aviation—reduces readiness and proficiency. b. Fleet Replacement Squadrons flight hours reductions (15–20 percent). One-third of all junior aviators will not achieve basic qualifications. Squadrons undermanned 20–30 percent (experience and qualification)—impacts readiness for several years. c. Cancel exercises such as Northern Edge—degrades fleet readiness and Joint integration training.

3. Equipment: a. Depot maintenance and parts funding shortfalls—one-third of all aircraft will remain fully mission capable through with recovery time measured in months. b. Shut down four of nine non-deployed Carrier Air Wings—delays deployments and gaps Carrier Strike Group availability. c. Fleet readiness degraded by cancellation/deferment of depot maintenance (carriers, surface ships and submarines)—impacts private shipyard and contractor work and reduces surge capability of the Carrier Strike Group

Mr. TURNER. What has the Navy done since last year's testimony to resolve the physiological episode issues being experienced in the F–18 Fleet?

Admiral MORAN. Over the past year, the Navy has pursued multiple lines of effort to reduce the frequency and consequence of physiological episodes in the F/A–18 and EA–18G fleet. We have implemented conservative life limits on critical Environmental Control System (ECS) components to reduce the likelihood of on-aircraft component failure. Previously, these components were replaced only after a failure was detected, which sometimes manifested itself in a pressurization-related event. The Naval Air Systems Command (NAVAIR) has identified and corrected production deficiencies with F/A–18A–D Cabin Exit Air Valves and Temperature/Flow sensors that contributed to Hornet ECS malfunctions. As a broader corrective action, we have initiated a review of depot Acceptance and Test Procedures (ATP) for other critical components. Aircrew procedures (NATOPS) and maintenance procedures have been updated to ensure lessons learned from investigations are provided to the fleet. The Navy acquired and fielded Slam Sticks™ to record cabin altitude for use in aircraft ECS troubleshooting and when necessary to aid in aircrew diagnosis. Slam Stick™ are currently employed by all Navy F/A–18A–D squadrons, and are rapidly being acquired for remaining F/A–18 variants. We have continued to replace sieve bed material and add a carbon monoxide catalyst to F/A–18 Onboard Oxygen Generation System (OBOGS) concentrators, with 84% of in reporting aircraft and 99% of deployed aircraft complete. Additionally we have used sorbent tubes to collect breathing gas samples from over 300 EA–18G sorties, none of which suggested breathing gas contamination as a source of EA–18G PEs. On the aircrew side, we have increased the frequency and quality of awareness training using the Reduced Oxygen Breathing Device, and are in the early stages of developing a wearable physiological monitoring system. Aircrew are also being protected from the effects of decompression sickness by ensuring decompression chambers are readily available both afloat and ashore.

Mr. TURNER. We have heard about lessons learned from legacy Hornets that should help the service life extension program for the Super Hornet. With the aviation depots falling under NAVAIR's purview, can you provide some specific details on how the Navy is altering the workflow and processes at the depots to extend the life of the F/A–18 E–F?

Admiral MORAN. Lessons learned from legacy Hornet have resulted in a significantly different approach for Super Hornet service life extension. Material supply challenges and non-standardized repair requirements driven by material condition challenges have hampered legacy Hornet life extension efforts. For the first several years, the Super Hornet Service Life Modification (SLM) program will be accomplished at a Boeing commercial depot rather than using organic depot facilities. This approach will leverage the supply chain and technology of the currently active F/A–18E/F Super Hornet production line while incorporating the latest industry best practices to standardize production flow and speed delivery of extended life aircraft. Rather than relying on government resources, these improvements will empower Boeing to perform engineering and material requirements under the SLM Contract. In addition, protocols have been established to ensure knowledge gained from mate-

rial condition findings during SLM are incorporated into fleet preventative maintenance practices resulting in better aircraft material condition at induction. Taken in the aggregate, these efforts are expected to minimize material issues, enhance service life extension predictability and reduce SLM cycle time, thus returning aircraft to fleet customers in less time than under previous efforts.

Mr. TURNER. Sustainment of the F–18E/F fleet is critical but what type of capability requirements are also necessary to keep the platform operationally relevant into the 2030s as required to meet evolving threats?

Admiral MORAN. To provide force projection and maintain air superiority for the Carrier Strike Group, a mix of 4th and 5th Generation Strike Fighters is required to win the fight. The Navy's current strike fighter acquisition strategy, blending F/A–18E/F and F–35C procurement, while modernizing all Carrier Strike Wing platforms optimizes resources to meet Fleet requirements under the current fiscal and production constraints. In the near term, the Super Hornet is planned to be the majority of the Carrier's Air Wing into the 2030's. The F/A–18 E/F provides capability and capacity to the fleet to meet all the carrier strike tactical aviation mission sets and kill chains. Of the 551 FA–18E/F inventory, 132 are older Block I aircraft with limited capability against advanced threats compared to the later Block II Super Hornets. The Department is committed to maintaining the F/A–18 E/F lethality and survivability through affordable and achievable upgrades throughout the life of the platform to achieve the capabilities required to win. With rapidly evolving potential adversaries, substantial force modernization is necessary to pace the threat. The Department continues to evaluate an F/A–18E/F Block III upgrade. Block III includes low risk changes which can be incorporated in the near term with a combination of forward fit production line incorporation and via retrofit modifications to the aircraft already planned as part of the Service Life Modification Plan. These Block III capabilities in a networked Integrated Fire Control Environment with the F–35C, EA–18G and E–2D will keep the Air Wing ahead of the projected threat. Block III Super Hornets will be complementary to the F–35C in range, in data processing and in direct Air-to-Air and Air-to-Ground combat operations, and is considered to be very low risk from a technology maturity, cost and technical feasibility to integrate. Follow on options involving changes to the radar, the engines or the electronic warfare suite are considered higher risk and can be considered in the future.

QUESTIONS SUBMITTED BY MS. TSONGAS

Ms. TSONGAS. This quote appears in your joint prepared testimony: "Of 382 cases adjudicated by the PET so far, 130 have involved some form of contamination, 114 involved an ECS component failure, 91 involved human factors, 50 involved an OBOGS component failure, 13 involved a breathing gas delivery component failure, and 76 were inconclusive or involved another aircraft system failure."

Can you define the term "adjudicated" in this case? You note that "76 were inconclusive" which might lead some to believe the others were conclusive, and I'd appreciate clarification on this terminology.

Admiral MILLER. At the conclusion of its investigation into a physiological event, the investigating team presents its findings to a board consisting of subject matter experts from around the Naval Aviation Enterprise. The board reviews the findings of the investigation team and "adjudicates" the event by either assigning it a root cause or rendering its cause inconclusive.

Ms. TSONGAS. As you know, the Independent Review Panel is taking shape as the Navy-led Physiological Episode Team continues to work with industry to investigate and determine the causes of these episodes. Both of these teams are working while we continue to invest in service life extensions (or SLEP) for older F–18s and in the acquisition of new F–18s. Though neither team has reached definitive conclusions, I'd like to get your sense on how the Navy and industry are using preliminary findings—both during SLEP and for new buys—to enhance the safety of the fleet with regard to the life support system.

Admiral MILLER. The findings to date have led to the implementation of new maintenance policies to include a shift to life-limited Environmental Control System (ECS) components. Although the majority of ECS-related events have occurred on F/A–18A–D aircraft, the same life limits were placed on F/A–18E/F and EA–18G, and this change is expected to reduce ECS failure rates as these aircraft continue to age. This change will also be incorporated into our Service Life Management (SLM) effort and any design changes realized through this process will also be incorporated into the production line. Similarly, when Onboard Oxygen Generating System (OBOGS) concentrators were upgraded with new sieve bed material and carbon monoxide catalyst (currently 84% complete with in reporting aircraft), these items

were tracked to enable preemptive replacement. Additionally, we currently have two Super Hornets at Boeing for an "early look" investigation as part of our build up to F/A–18E/F Service Life Modification (SLM). The ECS of these aircraft will be examined, and the findings will also be used to plan any necessary ECS maintenance during SLM of future aircraft.

Ms. TSONGAS. The information provided by the Navy in the testimony shows a rate of "physiological events" in the T–45 flight training aircraft during fiscal year 2016 of 46.97 events per 100,000 flight hours. That is actually higher than the rate of such events for the F–18 E/F "Super Hornet" during that same time period.

Many efforts are underway in the F–18 fleet on this issue. What mitigation measures are in place in the T–45 fleet to reduce the risk of accident from such events?

Because this is an aircraft flown by inexperienced student pilots, is there additional risk from these incidents since the students don't have the experience on how to deal with them?

Admiral MILLER. Measures already in place to mitigate T–45 Physiological Episode rate and severity include oxygen system changes, process improvements and elevated aircrew awareness. System changes include an upgrade to newer and higher-performing oxygen-generating material, addition of a carbon monoxide catalyst to neutralize this known contaminant produced by jet engines, and revised component installation procedures to eliminate known sources of air leaks. Process improvements include procedure changes to optimize oxygen system health during both operation and maintenance, more conservative decisional thresholds, more stringent passing standards for regularly-scheduled oxygen system performance checks, and broader air leak detection methods. Heightened aircrew awareness efforts include recurring scenario-based hypoxia training using the Reduced Oxygen Breathing Device, ready room training operational briefs, and new media forums to expand idea exchange. Lack of student experience has been mitigated during under-graduate training through a strong ethos of adherence to carefully prepared procedures. These procedures are the foundation of safe operations in all training events and especially the roughly 25 percent of syllabus flights flown by student solos.

QUESTIONS SUBMITTED BY MR. LANGEVIN

Mr. LANGEVIN. China has been increasingly aggressive in the South China Sea in exerting a military presence. They've invested in an indigenous carrier capability, developed domestic stealth fighters in the J–20 and J–31 that can attack from land and sea, and have converted man-made islands and atolls into military bases. How will the initial operating capability (IOC) of the F–35B enable the U.S. to counter this aggression beyond what is achievable with previous aircraft?

General DAVIS. The F–35 is without a doubt the most advanced, mass-produced fighter aircraft in the world today. However, advanced aircraft and corresponding capabilities produced by competitors shows our advantage is shrinking. Other countries are aggressively developing low observable aircraft, advanced radars and IR sensors, along with highly capable air to air and air to ground weapons to compete with U.S. technology.

The 5th generation capabilities of the F–35 bring stealth and sensor fusion to the fight. In an operational setting, this means the aircraft has unfettered access to high threat environments and can provide real time targeting through overcast weather. Our legacy systems cannot target through visible obscuration such as an overcast cloud layer. Even a single well-placed medium threat surface-to-air capability would create a significant hurdle for a legacy system—where a 5th gen aircraft would probably categorize a medium threat system as a minor nuisance on a strike or close air support mission. Today we use a combination of strategic targeting and electronic warfare (EW) assets to overcome the aforementioned threats, but an F–35 can operate independently and unsupported by dedicated EW assets.

The F–35 not only has the ability to operate autonomously in these environments, but also provides a significant enhancement to our high-end strategic fight. The jet is not only an extremely effective platform for penetrating complex Integrated Air Defenses, it has also proven to be a significant contributor to the overall situation awareness of the larger combat force by providing threat and targeting data to supporting assets over multiple waveforms.

The proliferation of long-range, precision, conventional threats such as advanced SAMs, cruise missiles, and armed UAVs, contests the use of traditional bases and methods of operations. With the Short Take-Off and Vertical Landing (STOVL) variant of the aircraft, the Marine Air Ground Task Force (MAGTF) aviation combat element has the ability to conduct distributed aviation operations (DAO) in support of land and/or naval campaigns. DAO is a task organized MAGTF operation, em-

ploying aircraft in a distributed force posture, independent of specialized fixed infrastructure. The F–35B will be a key part of DAO due to its STOVL capabilities because it expands basing options by reducing runway requirements. The F–35B can launch from a sea base or land base to conduct multiple missions then re-arm and re-fuel at mobile forward arming and refueling points (M–FARPS), which may be located closer to or within the operating area.

The Marine Corps' F–35B brings strategic agility, operational flexibility and tactical supremacy to the MAGTF and represents the centerpiece of Marine aviation transformation. This aircraft is incredibly capable in its 5th generation day one IOC configuration. The F–35B unites 5th generation stealth, precision weapons and multi-spectral sensors with the expeditionary responsiveness of a STOVL fighter-attack platform.

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Admiral MILLER and Admiral MORAN. Penetrating an advanced integrated air defense system (IADS) of a peer/near-peer adversary is extremely high risk. The F–35B is capable of exceeding every mission essential task assigned while operating in a high threat environment due to its advanced stealth technology and sensor fusion technology. This ensures greater survivability and mission success in a robust IADS environment without external support.

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The Marine Corps declared F–35B IOC in July of 2015. The aircraft is currently tracking to reach its full program-of-record operational capability (Block 3F) in the first quarter of calendar year 2018, and the full transition from legacy to F–35 will complete with the Marine Corps' transition of our second reserve squadron in 2031. Additionally, thanks to the support of Congress, as of January 2017, the F–35B is now permanently stationed at Marine Corps Air Station Iwakuni, Japan with Marine Fighter Attack Squadron 121, at MCAS Yuma, AZ with VMFA–211, and at Beaufort, SC with VMFAT–501. VMFA–121 is now forward-deployed with Ten F–35Bs in Japan and will have their full complement of 16 aircraft by this summer and, by the end of this year, they will fill both the 31st Marine Expeditionary Unit (MEU) requirement and the land-based requirements within PACOM.

The F–35 is the next generation strike weapons system designed to meet potential adversaries that are equipped with advanced anti-access/area denial long-range precision strike capabilities that threaten traditional U.S. power projection through fixed infrastructure and naval strike groups while improving lethality, survivability, and supportability. It will be the cornerstone of the MAGTF aviation combat element and of a multi-mission joint force possessing improved mission flexibility and unprecedented effectiveness to engage and destroy both air and ground threats. The F–35 was developed using a complete analysis of legacy systems strength and weaknesses, emerging threats, and consideration of future operating locations. This approach led to an aircraft design that incorporates advanced stealth characteristics and a powerful sensor suite that provides superior awareness to the pilot and ensures increased survivability and lethality in all environments.

The F–35 has an autonomous capability to strike a broad range of moving or fixed targets, either day or night and in adverse weather conditions. These targets include air and ground threats, as well as enemy surface units at sea and anti-ship or land attack cruise missiles. The F–35 can complete the entire kill chain without reliance on external sources by using fused information from its onboard systems and/or other F–35s. This capability allows shortened engagement times, less exposure to threats, and retains the element of surprise. Together these elements allow the pilot to control the tactical environment using proactive tactics. The F–35 provides sensor data to MAGTF command and control agencies to enable intelligence collection and targeting across the force. The proliferation of long-range, precision conventional threats, such as advanced SAMS and cruise missiles and armed UAVs, has contested the use of traditional bases and methods of operations. While advances have been made to counter such threats, such as interdiction, interception, and base hardening, the complexity of the problem and sheer number of threats demands that more must be done. The MAGTF aviation combat element has the ability to

conduct distributed aviation operations (DAO) in support of land and/or naval campaigns. DAO is a task organized MAGTF operation, employing aircraft in a distributed force posture, independent of specialized fixed infrastructure. The F–35B will be a key part of DAO due to its short take-off and vertical landing (STOVL) capabilities that allows it to expand basing options based on reduced runway requirements. The F–35B can launch from a sea base or land base to conduct multiple missions, with fuel and ordnance resupply conducted at mobile forward arming and refueling points located closer or within the operating area. The contributions of the F–35B immeasurably enhanced the effectiveness of the Marine Air Ground Task Force, most notably through increased lethality and battlespace awareness. The 5th generation capabilities that the F–35B brings to the mission increase the synergy, awareness, lethality and survivability of the entire force.

QUESTIONS SUBMITTED BY MR. GAETZ

Mr. GAETZ. The T–45 physiological episode rate has increased each year from 11.86 per 100,000 hours in calendar year 2012 to 46.97 per 100,000 in calendar year 2016. The Navy has identified material solutions including changes to the oxygen monitor and concentrator. The Navy has also identified non-material solutions including training, data collection events, and advisories. These actions do not appear to be arresting the frequency of physiological episodes in the T–45. What additional actions is the Navy contemplating to address these problems?

Admiral MILLER and Admiral MORAN. The Naval Air Systems Command is pursuing additional system changes to include increased coverage of air quality monitoring during training operations, incorporation of a water purge valve, a bleed air water separator to improve air dryness, renewal of the existing bleed air heat exchanger to improve air cooling, new system cleaning procedures, incorporation of a bleed air shut-off valve and rapid development of a mask-mounted air filtration system to improve air purity.

Mr. GAETZ. For the F/A–18C community, the Naval Air Systems Command (NAVAIR) has taken delivery of an F/A–18C known to have poor environmental control system performance to study this aircraft and better determine causal factors. Has the Navy considered releasing a T–45 to NAVAIR to study the on-board oxygen generation system (OBOGS) to determine causal factors in this aircraft?

Admiral MILLER and Admiral MORAN. The Naval Air Systems Command (NAVAIR) already possesses two T–45s that have been used to support development of oxygen system improvements. Additionally, CNATRA has transferred custody of three Fleet aircraft to NAVAIR that have experienced Physiological Episodes previously, which are being studied actively via engineering investigations to identify root causes. They are also being used as test beds for the development of mitigations.

Mr. GAETZ. The National Defense Authorization Act for Fiscal Year 2017 included a provision that requires the Navy to conduct an independent review of plans, programs, and research with respect to physiological episodes in the F/A–18 Hornet and F/A–18 Super Hornet fleets. Does the Navy plan to extend this review to the T–45 aircraft as well? If so why, if not why not.

Admiral MILLER and Admiral MORAN. In response to a congressionally mandated review of PEs, Naval Air Systems Command (NAVAIR) has coordinated with the National Aeronautics and Space Administration (NASA) Engineering and Safety Center (NESC) to conduct an independent review of F/A–18 Physiological Episodes (PE); in March they were asked to include T–45C in that review. The team members consist of NASA engineers and aerospace medical professionals. The NESC team is reviewing the Navy's PE investigation process, ongoing root cause analysis and mitigations, as well as the performance of the F/A–18 Onboard Oxygen Generation System (OBOGS) and Environmental Control System (ECS). In addition to extensive coordination and data-sharing with NAVAIR, their itinerary includes fact-finding visits to F/A–18 squadrons at Naval Air Station, Oceana, the depot overhaul for ECS components at Fleet Readiness Center East, a trip aboard an aircraft carrier to witness embarked flight operations, and a visit to Training Wing ONE in Meridian, Mississippi. NAVAIR expects to receive NASA's report in August of 2017.

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