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Subcommittee on Seapower

COMMITTEE ON
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UNITED STATES SENATE

MARINE CORPS GROUND MODERNIZATION

Tuesday, June 6, 2017

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HEARING TO RECEIVE TESTIMONY ON

MARINE CORPS GROUND MODERNIZATION

IN REVIEW OF THE DEFENSE AUTHORIZATION REQUEST

FOR FISCAL YEAR 2018 AND

THE FUTURE YEARS DEFENSE PROGRAM

Tuesday, June 6, 2017

U.S. Senate

Subcommittee on Seapower

Committee on Armed Services

Washington, D.C.

The subcommittee met, pursuant to notice, at 2:29 p.m. in Room SR-232A, Russell Senate Office Building, Hon. Roger F. Wicker, chairman of the subcommittee, presiding.

Committee Members Present: Senators Wicker [presiding], Cotton, Rounds, Tillis, Sullivan, Hirono, Blumenthal, Kaine, and King.

OPENING STATEMENT OF HON. ROGER F. WICKER, U.S. SENATOR FROM MISSISSIPPI

Senator Wicker: The hearing will come to order.

The Senate Armed Services Subcommittee on Seapower convenes this afternoon to examine the Marine Corps ground system modernization programs.

This afternoon we welcome Mr. John M. Garner, Program Executive Officer for Land Systems Marine Corps; Lieutenant General Robert S. Walsh, who serves as Deputy Commandant for Combat Development and Integration. General Walsh is also the Commanding General of Marine Corps Combat Development Command. And Brigadier General Joseph F. Shrader, Commander of the Marine Corps Systems Command.

Our subcommittee thanks these distinguished witnesses for their selfless and steadfast service to the Nation.

As the saying goes, there is no better friend than a marine. There is also no worst enemy than a U.S. marine. I truly believe this sentiment captures the professionalism and tenacity of the Marine Corps. That perseverance, ingenuity, and smarts are traits engrained in the Marine Corps' DNA. These traits have served the marines well during the last 15 years of war.

However, even marines have limits. An unrelenting operational tempo has damaged readiness and undermined critical modernization efforts to replace aging equipment.

Today the subcommittee will focus on modernization, but I cannot emphasize enough the connection between readiness and modernization.

In terms of modernization, for too long many Marine Corps modernization programs have suffered from drown-out development timelines and unrealistic requirements and cost overruns. These factors have often conspired to prevent fielding replacements for aging systems. An ever-increasing array of threats is exacerbating the need to modernize, which include explosive foreign projectiles, IEDs; long-range rocket artillery; anti-tank guided missiles; electronic warfare drones; and cyber threats, just to name a few. Additionally the use of anti-access/area denial tactics is putting a premium on increasing the lethality and survivability of smaller, more dispersed ground units. Today our witnesses will update us on the Marine Corps' efforts to meet these threats head on.

First, the subcommittee wishes to discuss the Marine Corps strategy for modernizing its vehicle fleet, particularly amphibious combat vehicles. These programs are crucial for enabling the marines to maintain their amphibious assault capabilities while providing mobile armored protection for ground maneuver forces.

There are two key vehicles. One is the assault amphibious vehicle, AAV, survivability upgrade program,

which modernizes some of the AAVs remaining in service. The other program is the amphibious combat vehicle, ACV 1.1 program. Both programs will provide increased maneuverability and protection over current platforms until the future ACV 1.2 is ready, hopefully around 2025. The Marine Corps intends ACV 1.2 to match capabilities similar to those envisioned for the canceled expeditionary fighting vehicle.

However, a recent GAO report contends that the Marines may be overstating potential savings when comparing the ACV 1.1 to the retiring AAVs it will be replacing. The subcommittee is interested in hearing the Marine Corps' perspective on the GAO's findings and a current update on these programs.

The wars in Iraq and Afghanistan have demonstrated the urgent need for increased protection and mobility offered by the joint light tactical vehicle. The subcommittee wants to hear how the Marine Corps plans to acquire its fleet of 5,900 JLTVs particularly in light of the fiscal year 2018 budget request for just 527 vehicles. That figure is about half the level that the Marine Corps projected to procure in the fiscal year 2017 budget request. Such shortfalls have an impact on capability, readiness, and program costs that should be addressed so our Humvees can be replaced as soon as possible.

While the Army is upgrading its Stryker infantry fighting vehicles and planning Abrams main battle tank, or MBT, modernization, it is worth nothing that the Marines use the light armored vehicle 3, or LAV-3, a vehicle very similar to the Army's Stryker and also the Abrams. The subcommittee is interested in the Marine Corps' plans for modernizing these two platforms.

In addition to tactical vehicle modernization, the witnesses should discuss ground-air task oriented radar development, a system which will replace five older radars. G/ATOR is an all-purpose radar system that can provide marines with early warning from missiles, indirect fire, and aerial systems, and also eventually provide air traffic control capabilities. The subcommittee wishes to learn more about this complex program and its future role.

We are also going to hear our witnesses discuss less prominent equipment essential to the Marine Corps mission, such as small arms. Over the past year, the Marine Corps has collaborated with the Army on a joint 5.56 millimeter round. Recent testimony, however, has cast doubt on the effectiveness of this round in light of the proliferation of advanced body armor. The committee looks forward to getting a better understanding of this strategy.

The subcommittee is also concerned with potential capability gaps within the Marine Corps ground tactical

formations centered primarily on short-range air defense systems and long-range precision fires. Given the Marine Corps' close relationship with the Navy, this subcommittee is very interested in how the two services can leverage each other's capabilities to meet these requirements, especially given the Navy's experience in long-range fires and air defense systems.

Finally, this subcommittee is committed to maintaining a healthy industrial base which fosters innovation and competition. The Marine Corps leveraged competition to assess technological feasibility and affordability early on in the ACV and JLTV programs. Competition requires viable competitors which we do not always have. This might be why the prototypes of the last two contenders for the ACV 1.1 program are based on designs from Italy and Singapore. I would like our witnesses to address the state of the U.S. industrial base for ground combat and tactical vehicles and perhaps to suggest options to sustain its viability.

The Marine Corps budget accounts for approximately 6 percent of DOD's total budget. I remain concerned about the impact of budget uncertainty on modernization and readiness across the Defense Department but especially for the Marine Corps. As such, I hope our witnesses today will elaborate on the impact that such uncertainty would have on our expeditionary marines, their ability to execute our

country's national security strategy, and the vitality of our defense industrial base.

For these reasons, it is imperative that Congress and the Corps continue to work together to ensure that the brave young men and women of the Marine Corps have the very best to accomplish their dangerous missions.

So I look forward to the testimony of our witnesses.

In the meantime, Senator Hirono, our distinguished ranking member, is recognized for her statement.

STATEMENT OF HON. MAZIE HIRONO, U.S. SENATOR FROM HAWAII

Senator Hirono: Thank you, Mr. Chairman. Thank you, of course, for holding this important hearing on Marine Corps ground modernization.

I also, of course, would like to welcome our witnesses to today's hearing and thank you for your service to our country.

Some of the areas that I will highlight or focus on in my short remarks today will be areas that the chair has already talked about, but it just means that the chairman and I are on the same page, on the same wavelength.

Last year, I had the honor of attending the change of command ceremony for the 3rd Marine Regiment at Marine Corps Base Kaneohe Bay in Hawaii. The 3rd Marine Regiment has a proud and storied history as a fighting unit. They fought in some of the fiercest battles of the wars in Iraq and Afghanistan, including the battle of Marjah, the second battle of Fallujah, and Operation Khanjar in Helmand Province. In the years to come, these marines will continue to be an integral part of supporting our strategic interests in the Indo-Asia-Pacific region.

We ask our marines to do an awful lot. We ask them to take on some of the toughest jobs on the front lines. Given the evolving nature of the threats we face, it is also

crucial that our marines remain ready and capable to address contingencies at a moment's notice. We owe it to these men and women to ensure that resources are available for training and readiness activities and to ensure that they have fully functional equipment to get the job done.

To ensure that our marines will be supplied with the most effective equipment, the fiscal year 2018 budget request makes targeted investments in the ground combat and tactical vehicle portfolio of the Marine Corps. The amphibious combat vehicle, ACV, is one of the most important Marine Corps ground modernization programs. The ACV will eventually replace the amphibious assault vehicle, the AAV, that has been in operation for over 40 years.

As part of the ACV acquisition strategy, the Marine Corps has awarded contracts to two vendors, each tasked with building 16 prototypes for testing and evaluation. Following the testing, the Marine Corps plans to down select to a single vendor in 2018 with the goal of purchasing 204 vehicles for the program. I welcome an update from our witnesses on the status of this program and if our witnesses anticipate any problems with the program's schedule.

While we wait for the ACV to come into service, it will remain critically important to modernize our existing AAVs. This vehicle has been in the Marine Corps inventory, as I mentioned, for more than 4 decades and requires

modernization to meet today's threats. The Marine Corps has decided to modernize a portion of their AAV fleet with survivability upgrades to address obsolescence and increase the vehicle's capacity. Currently 10 prototypes are undergoing testing, and I would welcome any updates from our witnesses on the progress of this update program.

The joint light tactical vehicle is another priority in the Marine Corps combat vehicle program. The JLTV is a joint Army and Marine Corps program that will replace the high mobility multi-wheeled vehicle, the Humvees. The fiscal year 2018 budget included $234 million to procure 527 vehicles. Over the course of the program, the Marines will procure at least 5,500 vehicles to replace roughly one-third their legacy Humvee fleet. The Marines are scheduled to receive approximately 300 JLTVs in 2020. However, it is my understanding that the Marine Corps would like to procure additional quantities for future JLTV increments if resources are available. And I would be interested in hearing more from our witnesses on this matter and this need.

In addition to the major ground modernization programs that I have highlighted, the Marine Corps is also developing the ground-air task oriented radar, G/ATOR, which the chairman also mentioned. The G/ATOR is an expeditionary radar system that will replace legacy radar systems

currently fielded by the Marine Corps Ground Task Force. The Marine Corps has begun testing the block 1 variant of the G/ATOR, and I would welcome an update from our witnesses on the status of this program.

Again, thank you, Mr. Chairman, for holding this hearing, and I look forward to hearing from our witnesses.

Senator Wicker: Thank you, Senator Hirono.

Gentlemen, I understand from a discussion beforehand that Lieutenant General Walsh will make an opening statement that will suffice for all three of you. So, Lieutenant General Walsh, we are delighted to have you, and you may proceed with your statement.

STATEMENT OF LIEUTENANT GENERAL ROBERT S. WALSH, USMC, DEPUTY COMMANDANT FOR COMBAT DEVELOPMENT AND INTEGRATION; COMMANDING GENERAL, MARINE CORPS COMBAT DEVELOPMENT COMMAND; AND COMMANDER, UNITED STATES MARINE FORCES STRATEGIC COMMAND; ACCOMPANIED BY: JOHN M. GARNER, PROGRAM EXECUTIVE OFFICER, LAND SYSTEMS MARINE CORPS; AND BRIGADIER GENERAL JOSEPH F. SHRADER, USMC, COMMANDER, MARINE CORPS SYSTEMS COMMAND

General Walsh: Thank you, Chairman Wicker, Ranking Member Hirono, and distinguished members of the subcommittee for this opportunity to testify before you today.

Joining me today are my combat development partners, Brigadier General Joe Shrader, who is the Commander of Marine Corps Systems Command, and Mr. John Garner, who is our Program Executive Officer for Land Systems Marine Corps.

The Marine Corps' ability to serve as our Nation's premier crisis response force is due in large part to the subcommittee's continued support, and on behalf of all marines, I thank you.

The United States is a maritime nation with global responsibilities. These responsibilities include guaranteeing freedom of navigation and commerce on the seas, promoting international stability and order, and protecting ourselves and our allies and partners from threats and aggression. Our Navy and Marine Corps' persistent presence

and multi-mission capability represent U.S. power projection across the global commons. Where adversaries would prefer to keep us distant, we are already present on scene, engaging with our allies and partners, and operating routinely inside the potential engagement zone of threat weapons as a deterrent force.

Today we are at an inflection point. Our priority of effort over the 15 years of war in Iraq and Afghanistan has been meeting the immediate requirements of combat operations. We risked modernization to ensure the combat readiness of deploying marines. While our focus was elsewhere, our potential enemies modernized, reducing the technological advantage American forces once stood or took for granted. In many theaters, we can no longer assume superiority in any domain: sea, air, surface, or the electromagnetic spectrum.

Growing instability in multiple areas around the globe is increasingly a requirement for forward naval forces to protect our national interests. Potential adversaries seek to secure their objectives by taking a continuous series of small steps to incrementally establish new conditions favorable to their objectives, undermining existing authority and eroding prevailing norms without resort to actual fighting. As a result, the traditional technological and professional advantages enjoyed by U.S. forces for

decades is eroding.

Over a period of 18 months, the Marine Corps conducted an extremely exacting capabilities-based review of our force structure. This iterative effort examined end strength, force structure, equipment of all types, and across all warfighting functions in order to identify needed changes to meet this threat. This effort, which is collectively called Marine Corps Force 2025, sought to define a Marine Corps optimized to meet future challenges. The Marine Corps Force 2025 effort identified both broad capability gaps and specific requirements in developing a fifth generation Marine Corps.

Within current budget and end strength limits, the Marine Corps has prioritized its efforts across the Marine Air-Ground Task Force. Ground program priorities include modernizing the amphibious vehicle fleet, the combat and tactical fleet, and our sensor and command and control capabilities. We are committed to delivering the required warfighting capabilities to our marines in a timely and affordable manner. However, continued budget uncertainty risks our ability to fulfill this commitment.

The Marine Corps is at a critical juncture. We have delayed modernization so long that our technical advantage over our adversaries has been diminished. The continuing need to maintain and update legacy systems takes the focus

off innovation and is costly in its own right. Experience tells us that investing in new capabilities and technologies is a proven cornerstone for your marines and sailors to achieve mission success and into an uncertain but no less demanding future.

The Marine Corps continues to improve our essential ground capabilities through a series of strategy of stability and affordability. We recognize the need for continued vigilance in achievement of a proper balance between current readiness and long-term imperatives of modernization and innovation. This balance is critical to ensuring the Marine Corps and the individual marines have the ability to fight and win in the future battlefields and are prepared to respond to our Nation's force in readiness.

Principal combat and tactical vehicle modernization programs account for a significant portion of the Marine Corps' ground combat modernization investment. The Marine Corps overarching combat and tactical vehicle investment priority, the modernization of our amphibian capability, the amphibious assault vehicle survivability upgrade, and the amphibious combat vehicle programs are a means to replace the legacy AAV and are both in engineering and manufacturing and development phase.

The second highest priority for combat and tactical vehicle investment remains the replacement of a portion of

the high mobility multi-purpose wheeled vehicle, or Humvee, fleet that is most at risk. Those trucks have performed a combat function and are typically exposed to enemy fires. In partnership with the Army, the Marine Corps has sequenced the joint light tactical vehicle, or JLTV, program to ensure affordability while, in the first increment, replacing about one-third of our legacy Humvee fleet with a modern tactical truck in conjunction with fielding the ACV.

Our third priority concerns our ability to coordinate and synchronize command and control sensors and systems to ensure the critical success of the MAGTF both afloat and ashore. These capabilities are ever more important as our adversaries' technological capabilities continue to advance. Our top priority in this area is the ground/air task oriented radar, or G/ATOR radar. The state-of-the-art ground-based medium range multi-role radar is designed to detect low and low radar cross section air threats for the MAGTF. It adds superior tracking capability and sensor coverage, flexibility to the MAGTF. This critical MAGTF enabler is central for identifying and destroying air and surface targets. Combined with the common aviation command and control sensors ensures no other service is more capable in controlling MAGTF airspace.

On behalf of the marines and sailors who provide the Nation with the forward-deployed crisis response capability,

we thank you for your constant support in an era of competing challenges. We are proud of our reputation for frugality, and we remain one of the best values for the defense dollar. These critical modernization investments, among many others, will ensure our success not if but when the future conflict occurs. Fiscal uncertainty is threatening both our capability and capacities. Recognizing these fiscal challenges, we remain committed to fielding the most ready Marine Corps the Nation can afford.

Mr. Chairman, distinguished members of the committee, on behalf of your marines, we request your continued support for our modernization strategy.

[The prepared statement of General Walsh, General Shrader, and Mr. Garner follows:]

Senator Wicker: Well, thank you. You were kind enough to thank the committee, but thank you.

With regard to your record of frugality, we appreciate that, but frankly I think frugality can only go so far. We need to get you what you need, General. And so I hope this hearing will enlighten us and perhaps those who are watching this hearing about what we need.

So let us drill down on some of the things that Senator Hirono and I mentioned in our opening statements. Walk us through the concept of operations for getting ashore from the amphibious ships in the future, the roles of ship-to-shore connectors, utility landing craft, and amphibious combat vehicles.

General Walsh: Thank you, Chairman.

I would start with whatever the mission may be. The Navy-Marine Corps team forward deployed is ready for a number of missions. Those could be from the lower end humanitarian assistance missions to the higher end of joint forcible entry operations where we may be the first ones on the scene. So taking a look at that capability, I would start with whatever the mission is, and we always start with what that threat may be and defining how we will approach that threat based on the capabilities that not only we but also the naval force and the joint force at large.

So with that said, the first thing that we always have

to do is take a look at the threat and set the conditions to operate in that environment. So depending on that threat bringing in joint and naval capabilities to set those conditions right to be able to allow us to operate from those amphibious ships to conduct amphibious operations is a critical part of setting those conditions right.

We have got the landing force that is out on those ships on the amphibious task force that we have got. To be able to get ashore to move those both marines, sailors, and equipment ashore, we start with the AAV, or our primary vehicle that we have today that we are upgrading, to be able to move those marines ashore in a requirement that we have today for a two Marine expeditionary force forcible entry capability that would allow in that size operation in a large-scale operation.

Now, those same vehicles can be used all the way down to the low end for humanitarian assistance all the way to more crisis response type missions. Those AAVs are those first capabilities that bring those marines ashore to conduct those amphibious operations.

At the same time, we are developing the amphibious combat vehicle 1.1. That 1.1 capability will be a follow-on amphibious capability that we will be using into the future.

Senator Wicker: Well, let us go ahead and then talk about the 1.2 and the 2.0.

General Walsh: The 1.1 is -- again, it is two companies or two battalions -- an amphibious company supports a Marine battalion. So the ACV 1.1 is 204 vehicles to be able to support Marine operations with two battalions of marines. So that is the next increment.

And the program itself is designed along an incremental approach. So these vehicles, as we talked about at the beginning, were by two contractors right now, two vendors, that we will evaluate over the next year to be able to decide as we downsize which one has the best capabilities. But those capabilities are really designed to get the marines, once they are ashore, to operate in a lethal and maneuverable fashion.

As we evaluate what we see out of the 1.1 capability, those 204 vehicles, about 3 years behind that is we are developing the 1.2 capability. That 1.2 capability is going to be a little over double in size the requirement of the 1.1. So we will learn from the 1.1 capability, and as we then look to see how the incremental approach towards the 1.2 capability to spiral in new capabilities into that, that would provide the capability for four battalions to operate once they are ashore. So between the AAV with the amphibious assault capability of four battalions, two battalions on the 1.1, and four battalions on the 1.2, that would be our requirement for 10 battalions' worth of

amphibious capability.

Senator Wicker: Very good. I really anticipated that that question would take my entire first round. So Senator Hirono, you are recognized, and then Senator Cotton.

Senator Hirono: Thank you very much.

General, I noted in your testimony that you paint a very serious picture of where we are in terms of our capabilities. And I quote. While our focus was elsewhere, our potential enemies modernized, reducing the technological advantages American forces once took for granted. In many theaters, we can no longer assume superiority in any domain: sea, air, land, space, or the electromagnetic spectrum. In short, the Marine Corps is not organized, trained, or equipped to meet the demands of the future operating environment. So clearly, you need help. That is what we are here to do.

So the various vehicles that you are -- the ACV, for example, are really critical to your mission. And the ACV is your highest priority in the ground combat and technical vehicle portfolio, as it will replace, as you said, the existing AAV.

In November 2015, the Marine Corps awarded, as I mentioned, two contracts. I just want to make sure that these contracts are on time, and there has already been a bid protest. So do you feel confidant, General, that the

program is on track and will still meet the development and testing guidelines because there are 32 vehicles that are going to be developed by these two companies, and there will be all kinds of testing? Can you assure us that things are on track?

General Walsh: Yes, ma'am. We are just getting ready to start the testing, and we are on track for that. But if I could, I would ask if I could defer the question to Mr. Garner, who has really the expertise and can really walk you through that.

Mr. Garner: Yes, Ranking Member. This is actually a good day for me to do this because we have had some successes as recently as today.

Both contractors are delivering. It is a competitive environment. One of them is ahead on the delivery schedule, is meeting all criteria, is ahead on testing, and by the end of this week, we will have 13 vehicles from one of them. We currently have 12 already from them.

The other one -- we are accepting four vehicles today, which is why I say it is a good day to do this. We already had two. So we will have six.

By the end of next week, it will be 15 from one and it will be 12 from the other. And that is enough to fully support the test schedule to maintain the critical milestone, the milestone C, about this time next year, next

July or August time frame.

These are in many cases well developed vehicles and are doing well in the testing and are in fact exceeding some of our expectations. So we are very much comfortable that we are on course. Between the two competitors, we are going to have a very good selection that will bring really good capabilities to the Marine Corps, and we will be prepared to move forward this time next year into production.

Senator Hirono: To follow up, the GAO office noted in an April 27 report that the protest, as I mentioned, resulted in testing delays for the program. And while you are articulating that we are on track, I have a concern that there will be an overlap between the testing and the production. So what should follow is the testing is completed and then you produce the vehicles. But apparently with the time frame, there may be an overlap? So there may be some vehicles that will be built that potentially will require costly modifications. So what are you doing to make sure that that --

Mr. Garner: Well, ma'am, we have done a couple of things. One is that we actually adjusted the schedule to accommodate the protest. So we actually moved the schedule almost 3 months to the right in terms of the testing and the milestone C. So the protest did slow down the overall program, but it did not affect the testing. The testing

that we are conducting is all of the testing prior to milestone C, is all of the testing that was originally in the testing plan that was approved by DOT&E and all the agencies. And all of the critical testing required prior to milestone C will still be done. On practically any program, some testing like continued reliability growth, other testing continues after milestone C. That is considered to be actually very low risk.

Our budget includes the ability to do the retrofit for the initial vehicles which is actually a pretty low number of vehicles. It is in the 20s. So we believe we have accommodated that.

And frankly, DOD non-concurred with that GAO report, to include the DOT&E strongly non-concurred with it. They believe we are doing what we need to do.

Senator Hirono: Thank you.

Senator Wicker: Senator Cotton?

Senator Cotton: Thank you.

Thank you, gentlemen.

General Walsh, I found a line from your opening testimony to be particularly notable. You said on page 3: Some regional actors seek to secure their objective by taking a continuous series of small steps to incrementally establish new conditions favorable to their objectives. This undermines existing authority and erodes prevailing

norms without resorting to actual fighting. That is pretty much the definition of strategy. Is it not?

General Walsh: Yes, Senator, it is.

Senator Cotton: To achieve a preponderance of force and strategic position from which to deploy to force your enemy to submit to your will, preferably without fighting.

General Walsh: Yes, Senator.

Senator Cotton: And as you say, without resorting to actual fighting, that is because the forces in defense of the international order that are attempting -- that is being challenged are refusing to commit to fighting to defend that order against such incremental steps.

General Walsh: Yes, sir. Like I said, I think since we have been so focused on Iraq and Afghanistan, that a lot of things have gone on around the world, and we are being challenged in areas where we have not -- we have taken for granted in the past.

Senator Cotton: So you say some regional actors. Who are those regional actors?

General Walsh: I would start with Russia, China, North Korea, Iran would be the four main actors, and certainly a lot of violent extremist state actors around the world.

Senator Cotton: Are Russia and China the biggest challengers since they are the ones who have global or at least continental ambitions?

General Walsh: As we look at the threats that are out there, obviously there are threats like North Korea and a very conventional fight in North Korea, a major adversary for us to deal with. But I think as we have looked at modernizing the force and looking at the future operating environment, there is no question that as we look at as regional actors, Russia, China, and Russia operating in areas well outside of where we have seen them operate before, the capabilities that they are developing are certainly capabilities that work asymmetrically against our strengths. And I think that is what we are seeing is that for us to be able to stay with overmatch wherever we go we expect our marines to have, we are going to have to continue to look at that threat and outpace that threat in a lot of areas that we have not had to deal with in the last 15 years.

Senator Cotton: Can you say more about those asymmetrical capabilities that they are developing, in particular Russia and China?

General Walsh: Things I think that we focus on is when we talk about maneuver warfare, maneuvering today in all domains. So when we talk about maneuvering in the electromagnetic spectrum, we see today capabilities that while Russia kept a lot of their Cold War capabilities when it came to electronic warfare, they have kept those, they

have improved on those, and they have kept a lot of their fielded formations that we have let those capabilities recess that we did not need. A lot of our EW capabilities -- we worked in the counter-IED areas. We did not work against counter long-range fires, counter-battery, electromagnetic spectrum denial, the EW capabilities that we had back in those days. So I think the electromagnetic spectrum we see, we see in cyber them operating in that area, along with capabilities and information operations that we have seen expand tremendously when you look at some of the operations that they have done in Ukraine.

Long-range precision fires, now capabilities that in the Cold War days we would constantly have to meet that threat and outpace that threat. We see in a lot of cases today that their long-range precision fires, their ability to sense, make sense of the area, then act, and use long-range precision fires is well beyond what we have been looking at over the last few years in our own arsenal.

Senator Cotton: And long-range precision fires, whether that is in Eastern Europe with Russia advancing a more advanced air defense system or on the Chinese shore with anti-access/area denial weapons -- we often focus on what that means for air power pushing, for instance, ships out of the first island chain in East Asia or even out to the second. What does it mean, though, for amphibious

warfare? How will the Marines conduct amphibious warfare in a hostile A2/AD environment?

General Walsh: The first thing I would say is pushing us out -- that is some of the things that we do, your forward-deployed naval forces do every day. We operate inside that contested space every day, building alliances, building partners, working with our allies. So with the hope that we are there, we build partners. We have done the deterrence that we never go the war.

At the same time, when you see China building some of the islands that they have done in the South China Sea, those kind of things challenge not only freedom of navigation, but they also threaten our allies. So building those kind of partnerships to ensure we can persist and operate with advanced expeditionary bases is a piece of that.

But when it comes to operating in that contested environment, it is certainly going to take not only our amphibious force and our marines, but the entire joint force and probably more specifically, the entire naval force when it comes to submarines, aircraft carriers, cruisers, destroyers to be able to persist and operate in that contested environment.

Senator Cotton: Thank you, gentlemen.

Senator Wicker: Senator King?

Senator King: Thank you, Mr. Chairman.

We are talking mostly about amphibious vehicles here so far. Over the last 20 years, what percentage of marine deployments have involved amphibious assaults? Any idea?

General Walsh: We kind of track that and show that over the years, depending on what type of amphibious operation, but between exercises, deployments, humanitarian assistance operations, we use our amphibs all the time. I mean, there are times -- I mean, we use examples where we were conducting humanitarian assistance, disaster relief operations that were conducted in Pakistan at the same time we were doing deep strike operations into Afghanistan from the same three ships, and the third ship doing maritime counter-piracy operations. So these type of operations are going on every day with those amphibious ships.

Senator King: These amphibious attack vehicles, though -- were they used in those?

General Walsh: Certainly in the case of our humanitarian assistance in Pakistan specifically, they would have been used. Anytime our marines are going ashore, they are taking these vehicles with them to operate. In many cases, they are coming ashore where they do not need any type of pier capability to be able to come ashore. They can come ashore, bring their capabilities with them, along with the connectors we bring like our LCACs and our LCU

capability.

Senator King: These vehicles that we are talking about, the AAV and now the ACV -- how effective are they on land? They will drive up on the beach. Are they effective fighting vehicles on land, or does that have to be an entirely different vehicle?

General Walsh: That is a great question. So one of the things that we were struggling with the EFV program that was canceled was trying to design a vehicle that could go fast like a connector would, like an LCAC, something like that, and could fight ashore. And what we decided with that was the tradeoff was just too high to try to do both things within one vehicle. So the effort that we have put into now with the ACV is to be able to get a vehicle that can get us ashore, but when it operates, it is probably going to operate 99 percent of the time ashore. It is going to be able to operate a fighting vehicle with our marines when they get ashore.

Senator King: When it is ashore.

General Walsh: When it is ashore.

Senator King: So the ACV is designed to do both.

General Walsh: It is designed to do both, but I would argue where we were with the EFV where we were trying to optimize in warfare at sea, the ACV is more optimized to operate and fight ashore.

Senator Wicker: So what will it not be able to do that you hoped the --

General Walsh: What we had hoped is we had speed desirements up to about 25 knots back on that vehicle, to try to be able to come from the ships to shore at about 25 knots. Now we are looking at vehicles that are at a much lower number than that because of the technology. To get them to go that fast, we are trading off too many capabilities, armor protection, lethality, and mobility, the ability to maneuver quickly when they got ashore.

Senator King: Our question is how effective is it as an onshore vehicle.

General Walsh: Once it gets ashore?

Senator King: Correct.

General Walsh: I think that is where we are going to see the real benefit. It is a wheeled vehicle, number one, which is probably going to operate much better ashore than we had with some of the tracked vehicles that we have had in the past. So I think by going in this direction, the marines that are going to be optimized when they are ashore -- they are going to have a much better capability now with the two vendors we are using today as we compete those two capabilities that we will see as probably a much better fighting vehicle ashore than we have in our current AAV force today.

Senator King: How heavily armored is this? And is there any consideration of active defensive measures?

General Walsh: The armor protection that we have got in those vehicles today would be what we call a two times armor protection capability. So on the order of what we have got in our MATVs or MRAP capabilities. So built into that vehicle is high protection capability once that vehicle gets ashore.

Going back to what we were talking about earlier with the threats that we are seeing today, the active protection system, by buying a new vehicle like the ACV with the growth capacity that the vehicle will have, we will be able to bring in active protection systems into the future. And it is something we are looking at very hard right now. The technology really has just not been where we wanted it to be. It is starting to get there. And coming from the sea as more of a light force, these active protection systems have weighed an awful lot, and we did not want to be able to put them -- some of it is a buoyancy thing being able to get the vehicles ashore. The technology is getting better, and we are looking at that. We think in the ACV in the future we will be able to do that. With General Shrader, we are already, along with the Army, experimenting with an active protection system, the Trophy system, on our M1A1 tank because it can carry a lot more weight than our amphibious

vehicles can.

Senator King: I hope when you are designing, testing, and developing the manufacturing that modularization is part of the concept so that we do not have to build new platforms as technology changes. I think that is a key thought because technology is developing so fast. We have to be able to plug and play different systems and different types of technology. General, is that part of your design concept?

General Shrader: Yes, sir, absolutely. Right now, speaking about active protection systems, the challenge right now is size, weight, and power. As General Walsh said, a lot of the systems -- right now, what we have basically non-developmental or off-the-shelf -- are heavy and they draw a lot of power. So while we are looking at those to how it would adapt to the M1A1 tank, we are also looking at how can we now take that and design it into future vehicles so that we can plug and play because maybe we only want to buy a battalion's worth of set --

Senator King: We do not want to be bringing marines ashore in a vulnerable vehicle given development of offensive capability.

General Shrader: Yes, sir.

Senator King: Thank you very much, Mr. Chairman.

Senator Wicker: General Walsh, before I recognize

Senator Rounds, if we came back early on a Monday morning and went to Aberdeen, what could this subcommittee -- what sort of testing could you show this subcommittee?

General Walsh: We need to defer that to Mr. Garner, if you do not mind, Senator, because he is probably a little bit more familiar than I am in the exact testing. I know a lot of it is how the vehicle can sustain damage hits. And we have got the testing going on in a lot of different places, but specifically to Aberdeen, which is close by, if you do not mind, I would like to defer to Mr. Garner, sir.

Mr. Garner: Mr. Chairman, had you gone this morning, you would have seen the final live fire shot on the ABASU which was successful, the survivability upgrade. So ABASU, as of about 10 o'clock this morning, has met all of its survivability requirements.

Senator Wicker: I did not get the invitation. I was with General Goldfein on this originally.

[Laughter.]

Mr. Garner: So Aberdeen does a lot of our testing. We do a lot of the swim testing out at the amphibious vehicle test branch in California. What is primarily done at Aberdeen is all of the live fire testing. We do a lot of the reliability testing where they run it over various mobility courses. And in fact, they will swim it up there and they do reliability growth testing. They do a lot of

the other what we call just general mobility testing, how it handles rough courses, how it goes over obstacles, et cetera. That is the bulk of it -- the mobility. And the live fire is the big one up there. But we currently have ACVs up there doing testing every single day from both vendors.

Another thing they do is what we call transportability testing where they hook onto the tie-downs and pull on them to make sure they do not break and that you could hook the vehicle down on a ship or on a connector, an LCAC.

If you were to go up on a Monday morning, you would see right now primarily ACV doing those sorts of things because AAV is pretty much finished up there. They are within the last week of their operational assessment, and they are done with their first round of testing leading to a potential milestone here in about 2 months.

Senator Wicker: Senator Rounds?

Senator Rounds: Thank you, Mr. Chairman.

Gentlemen, thank you for your service.

General Walsh, in testimony before the full committee, General Dunford identified inventories of Javelin, TOW, and HIMARS weapons programs as insufficient to meet U.S. Marine Corps requirements. Can you describe in more detail the risks being assumed by these shortfalls and your efforts to mitigate them?

General Walsh: Senator Rounds, we have had those shortfalls that were identified because of the numbers that we had been using. And so during the last year and into this budget year, we are plusing up all three, the Javelin, the TOW, the HIMARS, to include the new HIMARS AW round, alternate weapon. So we have seen that, and I think with the focus with the additional money that Congress has been giving us, the Secretary of Defense has had us focused on near-term readiness, along with filling holes, as we have called it, in 2018 with looking at more modernization growth into 2019. And in that filling holes, one of it was exactly what you are talking about, filling holes in our ammunition accounts. And the ones that have been focused on in this budget was the Javelin, TOW, and certainly the HIMARS pieces.

Senator Rounds: Any other weapons systems that are facing similar shortages?

General Walsh: The 155. As you have probably seen in the paper, we have been firing a lot of 155 HE rounds in Syria and Iraq. And so that is an area that we are funding and plusing up that account also, Senator.

Senator Rounds: Can you update the subcommittee on the Marine Rotational Force Darwin? They will be conducting exercises and training on a rotational basis with the Australian defense force. Can you kind of give us an update

on what is going on? I understand that the intent in the coming years is to establish rotational presence of up to, I believe, 2,500 Marine Air/Ground Task Force members in Australia.

General Walsh: Thanks for that question, Senator.

I tell you, the partnership that we have always had with the Australians is it is just a tremendous ally all the way back to the days where marines were working with the Australians in World War II. This has become a very good partnership. As you know, the Pacific is such a huge area, and trying to find good locations where we can train as a Marine Air/Ground Task Force Darwin operating down there, along with other places in Australia, has been a great place to now train and operate in the Pacific.

We have been at it now for a few years. We continue to gain and learn from that. This last cycle that we -- we go there in what is considered the dry period, which is April through October. We are there right now. And for the first time, Senator Hirono, we flew four MV-22's all the way from Hawaii all the way to Australia. So we now have four MV-22's. You have seen them fly from the east coast or the west coast going over to the CENTCOM AOR. We just flew them all the way to the Pacific in a lot of areas marines throughout World War II had flown.

And now we have got 1,250 marines there. We are

continuing to maintain that. We have got ambitions to grow up to 2,500, and a lot of that so far has been fiscally constrained. But we have got a lot of great ideas we have to work with our partners over in Australia.

Senator Rounds: Either for General Walsh or Mr. Garner. During the full committee as well as the Airland Subcommittee testimony, Army leadership and outside experts have cast doubt on the ability of the 5.56 round's ability to penetrate modern composite body armor that is proliferating at an alarming rate. We are concerned that Marine infantry units could find the standard issue M4A1 ineffective, which naturally we would consider to be wholly unacceptable.

How closely is the Marine Corps working with the Army in terms of fielding a new round that can penetrate enemy body armor? And is there a strategy in place to accomplish this? And if so, please provide an update.

General Walsh: We are. We have been after this for quite a while with the Army trying to -- and Congress has pushed us in this direction too to try to find a common round with the Army. And just as you said, we are seeing more body armor wherever our marines and soldiers deploy, more of it and better quality or better capability.

So the rounds that we currently have are 855 rounds. We have been in the process of looking at a SOCOM round, the

318A1, along with the 855A1 that the Army is using. We have been testing with them now for well over a year, trying to figure out the best round to go with. Indications are that we are trying to go with the direction that the Army is. In fact, right now our marines that are deployed into Afghanistan with our weapons are using the Army round. So there is a lot of good reason to have commonality.

The good news with that round -- both rounds actually -- much more capable, and specifically the Army 855A1, much better at penetrating armor, along with personal armor protection. So that is a good reason to go with that. We have to work through a lot of things on our own weapons. The M-4, our M-27's, our IAR, infantry advanced weapon, along with our M-16's that we are working through some of the reliability things we are learning and testing. But we will make some adjustments from that, and I think in the end our marines will have a much better capability when we are done with it.

Senator Rounds: So you think are moving in the right direction with regard to the new --

General Walsh: I do, sir. And not only that is we are looking with the Army at another weapon that would give us increased capability for our marines, to include a higher caliber weapon.

And if you do not mind, I would like to let General

Shrader who knows a little bit more about the testing of the 5.56, if he has time for that.

General Shrader: So, sir, General Walsh is referring to the testing that we have been doing with the Army on the EPR round, which is their advanced round. It is the M855A1 round. That is the one we have heard a lot about. The Marine Corps and the Army have been working toward trying to get to the same round.

The testing that we are doing is that round has had some durability -- it causes some durability issues for our new infantry automatic rifle that we fielded, the M-27. The testing will be complete by July of this year, and along with performance, specifically stopping power, effect on the durability of that weapons system, the ancillary equipment like the rifle combat optic -- it has a flatter trajectory than the round that we currently have. And also training facilities -- that round requires a larger surface danger area that we have to take into account for our ranges. So those four areas is what we are looking at for testing to inform us to make a decision how we will go forward.

With regard to maybe a higher caliber, to answer the question about proliferation of body armor, we are working with the Army and SOCOM. As late as last week, there was a limited technical demonstration that was done with SOCOM on a higher caliber round specifically for their sniper rifle

suite that we are working with them on. That could potentially address that. So we are very in tune with that. And we do understand that that is a capability we have to pay attention to.

Senator Rounds: Thank you, gentlemen.

Thank you, Mr. Chairman.

Senator Wicker: Senator Kaine?

Senator Kaine: Thank you, Mr. Chair.

And thanks to the witnesses. Good discussions so far. There are a couple of things I wanted to ask about.

Power source increasingly is a limiting factor that I know we are all trying to grapple with. Secretary Mattis, when he was General Mattis, used to come before the committee and once testified that we needed to unleash us from the tether of fuel, and recently Tesla surpassed GM in market capitalization. There is a lot of potential in markets for alternative power sources, and I wondered if you would talk about how you are looking at new power sources either for amphibious or ground combat vehicles.

General Walsh: Thank you, Senator Kaine.

This last year, as we were looking at where the force should go, one of the things that we did was we took 3rd Battalion 5th Marines as experimentation force. We took that battalion, redesigned the way they were configured by each company designed in a different configuration, and we

gave them different capabilities from weapons, electronic warfare capability, intelligence.

One of the things that we have been working very hard with is how do we save power differently, and not only how do we save power, how do we do things like purify water in different ways so we are not carrying as much water to things like General Shrader is looking at, how do we use polymer casing to lighten the load on the ammo to be able to do that.

We did a lot of solar efforts with the experimentation force and hybrid generators. And what we are seeing is with that experimentation battalion, between those different efforts, we are allowing them to maneuver much further and much faster because they have much less logistics requirements and able to operate on their own.

One of the things that we are trying to do is operate in a distributed manner. The more we can distribute, the more we can maneuver and out-maneuver the enemy. But to distribute, you have got to have a lot of capabilities and be able to go further, and some of it is on the power side.

So we are moving forward. We realize that that is something that has been our weak link, and it is going to allow us to operate in new ways. So I think between the hybrid generators that we are seeing to be able to pull dirty power from a lot of different places, along with the

solar capabilities that we are getting down to the squad level, it is moving us in the right direction.

Senator Kaine: That is exciting and something that we focus on a little bit in the Readiness Subcommittee too, and we will continue to ask questions about that.

Another innovation question that I am interested in. Ranking Member Hirono talked about the G/ATOR system in her opening comments. This one interests me because it is an open systems architecture model. And I wonder about pursuing open systems architecture. Are there acquisition challenges to that? Is that relatively easy? Are you finding the private contractors you are working with are excited about that model? Talk a little bit about open systems architecture and the G/ATOR system and what you are learning as you are using that model.

Mr. Garner: Senator, that is the way to go because it allows you to have the flexibility, obviously, to continue to develop a system for the future. That is one of the reasons that G/ATOR will actually replace five other radars and will fill multiple roles that will fill the role of air defense. It will fill the role of counter-battery, counter-radar, and counter-mortar, and eventually it will be a traffic control. And it is the open system that allows us to do that.

Back to Senator Hirono's remarks, G/ATOR is also doing

extremely well. We are on track to field around February of next year the first block, which is the air defense, and later next year, the second block, which is the counter-battery radar. And as we speak, it is down at Wallops Island conducting very, very successful DT and, I would comment, linking with the common air command and control system, which provides an overall capability to the Marine Corps to detect but also to communicate. And when you link that with shooters, that is a big part of your counter-UAS and other evolving threats.

So I could have given a shorter answer which says we are very focused on it. Industry works with us on it. It is absolutely the way we have to go, and it is being very successful.

Senator Kaine: It is vendor independent. It is nonproprietary. It allows interoperability among a number of different platforms. It allows private contractors to kind of use the open architecture and then build add-on units that you can more easily incorporate as you are working on --

Mr. Garner: Absolutely, sir. All of those things and very successful.

Senator Kaine: You know, the open architecture in G/ATOR --is this something that you are doing in other acquisition programs? I just have not focused on this as

much in other hearings we have had, and I was interested in the use of the open systems architecture on the G/ATOR.

Mr. Garner: Generally, yes, sir. We are mandated, but we would do it anyway whether we were mandated or not. But that is across our acquisition programs we want to do that.

Senator Kaine: That is great.

Mr. Garner: Because we absolutely want to be able to -- the ACV is a perfect example. The mention was made earlier of plug and play. We can plug and play weapons systems on that. We can plug and play things like the active protection. We can plug and play all the communications type systems, eventually even engines and transmissions. So we focus on it.

Senator Kaine: If I could ask just one more question, Mr. Chair. Did the open systems architecture create security challenges of, you know, easier to hack? I mean, by being a more open system, are there unique security challenges to it?

Mr. Garner: To be perfectly honest, sir, everything we do right now is creating --

Senator Kaine: They have their own challenges.

Mr. Garner: We have to go through the same measures regardless, and that is a growing and very complicated thing. But I would not say it is any harder because it is open architecture. You get into the issues of who is

providing it and what the sources are for a lot of the stuff, but we have to do that with everything we do anyway.

Senator Kaine: I appreciate it.

Thank you, Mr. Chair.

Senator Wicker: Senator Tillis?

Senator Tillis: Thank you, Mr. Chair.

Thank you, gentlemen, for being here.

General Walsh, in your opening testimony in closing, I think you said that you are working to have the most ready Marine Corps the Nation can afford. The question that I have is, is the Marine Corps the Nation can afford the best possible Marine Corps to protect our troops and to project lethality on the battlefield? And what is the gap, if there is one?

General Walsh: I think that has been a real challenge or us looking back to where we have been. We have been so focused on forward-deployed readiness, very high tempo, and looking at the constant, same area we were deploying to, Afghanistan and Iraq, pretty much the same threat -- it changed a little bit -- trying to keep the readiness up so those marines had the best ready equipment to go forward.

What we see now, though, as I touched on earlier, is if you continue to do that and do not modernize your force, you are not going to be ready to fight the next threat or these threats today with the high technology we are seeing, for

example, unmanned aerial systems, some of the signals intelligence capabilities that they are getting. These things are pretty off-the-shelf technologies that they can buy, and now we are putting our marines at risk if we do not modernize also.

So the challenge that I am seeing that we are working with the Commandant on is we cannot modernize across the entire force. So we are looking at where we can buy two battalions' worth, four battalions' worth of a capability to get modernized in these different areas so that we are getting these advanced capabilities but it is unaffordable to get them across the force in many cases. So the focus now is to modernize in discrete ways where we see a capability that we have got to have and try to bring that in as fast as we can, maybe at smaller quantities than we would have in the past.

Senator Tillis: The next question has more to do with just the underlying processes of modernization and going from the concept to actual testing and certification. What work is being done to look back at the current processes and drive out efficiencies, compress timelines, and reduce cost? What specific efforts, beyond just fielding the capability, can you point to that you think are good practices to get to leaner execution?

General Walsh: Two areas I would say is, one, the

amphibious combat vehicle is one. It is an example of taking a non-developmental program that is pretty far along that somebody else has put the R&D into, that you can look at it, compete it, and be able to procure that right in, bring that right in like we are doing right now. That is one example.

The other one that I would say -- and a lot of the help that Congress has done with the law with rapid acquisition that now what we are able to do much more effectively is something that works underneath me down at Quantico is the Marine Corps warfighting lab where we are able to bring in -- buy a capability, experiment with our experimentation force, with our marines, experiment that, use that within our rapid capabilities office, and if we like what we see, to bring this in very quickly instead of in a slow developmental process where we would develop the requirement and go through our normal requirements process that in many cases can take years. So I think what we are seeing is being able to buy things quickly that have already been developed, a lot of technologies that way, and bring them in much later that when we experiment with it, try it, and then go out and buy it very quickly.

Senator Tillis: Are you moving to a point to where when you are looking at fielding new capabilities, that you would use the why not rapid acquisition process to go

through that process before you choose a more lengthy or costly process? Is that a standard operating procedure?

General Shrader: Senator, I think what you are describing is probably the rapid prototyping effort where we go out on the market and see if there is something out there that matches a need that we need. And if we find it, we will go after it, buy it, and try it. And once we have tried it, if we think it is worthy of then fielding, the challenge, frankly, is trying to figure out how to take it from that to fielding and the funding that goes along with that, making sure that you have a long-term funding stream to support it, once it is fielded because if you buy it, try it, and then field it and if it is not supported in the long term, then you can run into problems there downstream with readiness and how do you refresh it.

Senator Tillis: So that speaks to our ability to provide reliable funding streams on the tail end after you determine you need to deploy it.

General Shrader: Yes, sir.

Senator Tillis: Today, how would you rate our reliability in terms of providing those kind of reliable funding streams?

General Shrader: I would say there have been some challenges in the past, sir.

Senator Tillis: Thank you.

Thank you, Mr. Chair.

Senator Wicker: Were you asking the witness to rate the Congress, Senator?

[Laughter.]

Senator Wicker: Good question.

I have been an advocate, gentlemen, of giving the Ukrainian military the weapons they need to get the job done. And, General Walsh, you and I discussed this earlier when you came by the office. What does that mean? What do I mean when I say what is going to be necessary and what are the Russians doing that we will have to combat? We are not going to put ground troops there. If we give them lethal weapons so they have a chance to win, which I think is in the vital national security interests of the United States' taxpayer, what are the dynamics there, sir?

General Walsh: I think the dynamics would be the same whether it is equipping the Ukrainian forces -- and I really probably am not smart enough to talk to exactly what they need specifically. However, what we see and how they are operating against Russian forces or Russian-supported forces is the same thing that we are viewing on how we would operate against them. So as we study them and watch, it is literally becomes a laboratory both for the Russian forces and the Russian-supported forces and also what we are seeing. It is a laboratory both ways. They are testing

their capabilities. They are using their capabilities, and then we are having to see what they are doing, just like we did in a lot of cases in the Cold War, but this is on an actual battlefield.

So as I look at that and look at a lot of the ways the forces are being used -- I mentioned to you earlier, Senator Wicker, a lot of this is stuff we had never dealt with for a long, long time, Cold war capabilities that certainly to be able to detect our radios when we operate. Everything we are doing today is the ability to share information, sharing information as our computers are up, our radios are up. We are emitting. In Afghanistan and Iraq, we took that for granted. We did not in the Cold War. We knew what our signatures were, what the requirements for signature management was.

So in today's force, as we are experimenting based on what we see the Russians doing and what we now have to do in our own force-on-force training that we are doing today and the equipment that we are buying, is looking at how we can detect how we are emitting, what our electromagnetic signature is. Some of it is training. Some of it is capability on much they emit. But if they turn their radios on, what we see there, they are quickly detected. The Russian capabilities will know what units are located, just like they did in the Cold War and just as we did. We could

locate units very quickly.

And a lot of what the UAS capability, unmanned systems that we see today that lots of proliferation of unmanned systems that are up that have electronics capability, along with EOIR capability, can quickly figure out where the units are located based on their electromagnetic signatures, and then with that, be able to target them very quickly with long-range precision fires that can move. And how that equates to is if the enemy has better capabilities and they are able to bring that into their command and control construct better, that they can outpace and out-tempo the enemy. So in essence, when a force like us would turn on our gear to try to detect where an enemy force that has a higher capability, by the time we can pull it all together and target them, they have already got incoming rounds at us before we can target them.

Senator Wicker: But how does that translate into what the Ukrainian forces need?

General Walsh: I think it is a lot of cases, the same type of capabilities that we need, the ability to sense the electromagnetic spectrum, how we are emitting, where are our radios, how far out the distances are going, how we can detect enemy signals, where they are located, how strong they are, and quickly be able to figure out what type of unit that is located, get precision locations against those

units to be able to jam those units, and be able to target them with precision fires.

Senator Wicker: How helpful would this be to the Ukrainian effort to combat what the Russians are doing?

General Walsh: I think just as helpful as it is for our own forces.

Senator Wicker: It might be a game changer. Might it not?

General Walsh: I will give you an example. One of the things, if you are familiar with our CREW jammers, are jammers that have been used to detect and defeat IEDs on the ground. We have got good capabilities against that. Now today, we are looking at those CREW jammers to use them to be able to sense the electromagnetic spectrum and also jam enemy capabilities. That is one example of repurposing what we already have in a way that we are going to be able to use that to get all of our ground formations the ability to operate in an electromagnetic way that we have never done since probably the Cold War. So those same kind of capabilities that we are trying to develop in our own force would be useful for the Ukranians or any other friendly force.

Senator Wicker: What would you advice be to commander-in-chief about what our policy should be with regard to supplying lethal weapons to the Ukrainians?

General Walsh: Sir, I would have to take that for the record, and that would be one that would be outside my lane to be able to talk into that area. I could talk to capabilities, but what they should be getting and what they do not have today is something that --

Senator Wicker: No reason I should not try. But I did expect that answer.

Senator Hirono?

Senator Hirono: General Walsh, you describe scenarios where it is really important that technologically we are able to keep up with whatever our enemies are doing in terms of detection and jamming. In line with some of the modernization questions that Senator Tillis was asking, are you satisfied with the targeted investments in research and development that are included in this budget request, and do we need additional investments? Because they are constantly improving their ability to see what we are doing and prevent us from doing whatever we are doing. We have to do the same thing. So are we keeping up or advancing actually?

General Walsh: You know, I think, Senator, in the past -- I think we have to look at research and development and experimentation in a new way. In the past, when we have put research and development out there, the money that we put into R&D is tied to a specific program in most cases. So as we develop an amphibious combat vehicle, we review the

requirements process. We know we have to do the R&D to develop the program. We kind of know where we are going. The technology is moving so fast today that we do not necessarily know where it is going. And a large vehicle like an F-35 or a Ford class carrier or an ACV, you have got to put that R&D into the program to develop the program.

What I think what we really need is, as General Shrader was touching on, money for R&D past the S&T world, but in the R&D world where we can have money that we can experiment and use some of these non-developmental capabilities that are out there to be able to procure some of it, to use it, test it, experiment with it, and see where those capabilities are going to take us. And if we learn from it quickly -- we may fail in certain cases and say that is not the direction we go. But I think in a lot of cases, what we are seeing is as we experiment in that area -- I will give you an example of what Senator King was talking about.

We have got a lot of light utility vehicles that are lightening the load. They are ATVs that can move marines and equipment very quickly around the battlefield, go on our MV-22's, and give mobility as we go forward. We were just out in an experiment that we did out at Camp Pendleton where we had over 10 different vendors come in that allowed us to kind of see what their wares were, and we experimented with those capabilities. Afterwards, we went forward with

contracts to buy a few more of those capabilities to put them into our next series of exercises like Bold Alligator.

In the past when we have gotten the money for that R&D is I have had to tie to that to say, hey, this is tied to ship-to-shore maneuver, and I would squeeze John's programs, Mr. Garner's programs, out of money he needed for something that it was already designed for. What we need is money in the R&D budget to be able to experiment with to be able to move forward in ways that we can learn from that experimentation as we see this technology moving so fast. It is almost a way to look at colorless money that we could work with Congress on set areas that we want to work on with congressional oversight, but yet we have got the ability to experiment and demonstrate capabilities.

Senator Hirono: And is there such monies in the fiscal year 2018 budget?

General Walsh: We put some money in this year. We put about $10 million to do this. And what I am hoping to do is that the appropriators -- we can have the right conversation with the appropriators that they see what we are doing, and we can explain to them the different project areas that we are working and that money can stay in the budget. I think we can do a lot more of this. But the law that you have written allows us to move in that direction, but I think there is some hesitancy to allow us to have funds that may

not have the discrete money tied to existing programs like we have had in the past. I think that is the old way of thinking, and I think you may have to do that on the large programs, but some of the things we are talking about we are talking about spending $10 million to $50 million in a year to be able to move things much faster in our acquisition process.

Senator Hirono: I am very intrigued by your approach. Are other services also wanting to do these kinds of experimenting, and do they have monies in their budgets, the Navy, the Air Force?

General Walsh: On the Navy side, we tried that last year from the Department of the Navy, and I think it was around $55 million that was put into that. And when it got up, it was taken.

Senator Hirono: When you say it was taken, it was taken away?

General Walsh: It was taken away when it got up with the Congress.

And I think this is something that we just need to have better dialogue back and forth. As we put the money in, what are we going to use it so Congress understands it may not be on a specific because we cannot, a year in advance, figure out exactly, but we know areas that we want to experiment in. It could be electronic warfare jamming

capability. It could be how we are going to have unmanned vehicles get us ashore in a different way. We know we want to kind of go in that direction. We do not have the exact project a year out. Then when we see what is out there and having that dialogue with Congress so you know where we are going to spend the money, and then it is appropriated in the right way.

Senator Hirono: Well, it make sense to me. It is very intriguing. I would want to have further dialogue with you, and I would like to be as supportive as I can be. And I hope the chair is there too.

Thank you, Mr. Chairman.

Senator Wicker: Thank you, Senator Hirono.

Gentlemen, I said I would ask about the industrial base. So who would like to take that question? Assess the state of our industrial base for ground combat and tactical vehicles and suggest options.

Mr. Garner: Senator, on my programs, which covers that portfolio of basically all the ground vehicles and G/ATOR and common aviation command, we do not really have significant industrial base issues right now in the traditional sense of your thinking of the heavy steel or the turrets or things of that nature.

Part of our strategy is that a lot of the things we use have commercial applications. So to use again ACV as an

example, the engines and transmissions and things of that nature are used in a lot of agricultural applications and they are worldwide.

Where we do have an issue is sometimes with some of the suppliers of not the major components but the lesser components and the fact that if you do not have enough demand for them, they will go out of business and then you do not necessarily have a supplier. So we use a lot of mechanisms to deal with that, including foreign military sales in the case of the AAV.

But quite frankly, at our scale -- now, the Army may have a very different issue, but at our scale with our heavy vehicles -- for example, when we did the ACV competition, we did have five vendors, and all of them had the industrial capability that they could have built it. It is not the standard model that it was in the past. But, for example, with ACV, about 80 percent of those vehicles and eventually more is being transitioned to U.S. production, and it has not been a major issue with us yet.

What is an issue is when you go low and then you come back up. So it is true that some of the major producers -- BAE, being a perfect example -- went into a trough a couple of years ago. So now they are having to ramp back up, and it is less their plant capacity. It is the skilled workers. It is the highly trained welders, people of that nature.

That is a challenge as they ramp back up to production.

Senator Wicker: On the BAE situation, what was the reason for that?

Mr. Garner: It was just lack of demand, Senator. It was the fact that they were not doing enough work to keep the size workforce they had had in previous years. And in a place, for example, like York, Pennsylvania, those skilled workers will move away. They will go somewhere else. And then it takes a while to train them and grow them back up. So I would say on the labor end of it, it is an issue. In terms of plant capacity and things of that nature, it has not been as much of an issue for us.

Senator Wicker: I also said in my opening statement -- on short-range defense systems and long-range precision fires, can you give us anything on the Navy and the Marine Corps leveraging each other's capabilities?

General Walsh: I think, Senator, one example that I would say that we have had is looking at this threat. And it was a little bit the piece that Senator Cotton was touching at like in the Pacific -- is to be able to operate inside that A2/AD environment. So many times people ask this question. How are amphibs going to be able to operate in that environment? Well, they are not going to operate in a contested environment in the big shooting or all by ourselves. It is going to be the Navy and the Marine Corps

working together, along with the joint force.

Over the last year, one of the things we focused on very heavily -- and I co-chair the Naval Board for the CNO and the Commandant, along with Vice Admiral Aquilino -- is operating together. And we have developed a concept called littoral operations in a contested environment. That has driven many war games and experiments. One exact experiment that we are doing here -- I think it is next month -- is to put a HIMARS rocket firing battery or capability, one of our HIMARS shooters, onto an LPD-17 ship. That is just one example on how we could use that, but there are many more on how we are using our long-range precision fires to try to use them in more a sea-controlled role going from shore to sea, then using them from just on land in that capability. So there are many capabilities. I think we do like that.

I think another example would be our F-35's operating off the amphibious ships and how they would support the Navy in a sea-controlled mission.

Senator Wicker: General Shrader, we have a budget request for 527 JLTVs. The Marine Corps says they want to acquire 5,500. Do you acknowledge that is an unrealistic budget request in light of what it will buy?

General Shrader: Sir, I would love to answer the question, but John manages it, so I am going to defer to John Garner, sir, on JLTV.

Mr. Garner: Sir, the 5,500 is the ultimate acquisition objective over many years. The 527 is, of course, this year.

Senator Wicker: Are you okay with that for a year?

Mr. Garner: Would I like it to go higher? Yes, sir. But there are always other competing priorities, including things like ACV. So that is balanced. And right now, that works fine for 2018. What we would like to do is probably in future years, we may decide we would like to accelerate and increase that requirement. But for right now -- remember, Senator, we are still in the low rate initial production phase. We have not completed the IOT&E. So between our buy and the Army buy, we are pretty much against the LRIP cap right now.

Senator Wicker: Well, we will have some questions for the record.

Senator Hirono: I just have one question --

Senator Wicker: Senator Hirono?

Senator Hirono: -- regarding the JLTVs. So the ultimately goal is 5,500 JLTVs. So what is the time frame for that 5,500 to be procured?

General Walsh: Senator Hirono, so right now, as we look at the requirement, the initial acquisition objective was 5,500. And just as Mr. Garner said, with the delays in the program initially, that slid the full rate production

decision a year. So that caused some of the reduction in the vehicles that we would have been buying. But in the long-term, we have got that 5,500 objective. But our entire Humvee fleet is up over 17,000 vehicles. We are not exactly sure what that objective is going to be in the long term on those numbers. It is going to be much higher than 5,500 we think out in the future. But what we do not know is also do all those Humvees need to be JLTVs. Could they be some other type of lighter truck that does not have the same protection requirements that a JLTV would have? Because not all our vehicles may be operating in a highly contested threat environment. So that is part of the decision as we continue to build this increment from increment 1 to increment 2 to increment 3. We will look through what that long-term requirement will be.

Senator Hirono: So setting aside any potential further delays with the JLTVs, what is the time frame for when you will be getting to the 5,500 number? Are we talking about 2030? What kind of time frame?

Mr. Garner: Ma'am, I would like to take that one for the record. I believe it is within the FYDP.

Senator Hirono: Within the what?

Mr. Garner: Within the next 5 years. It is in the 2022-2023 time frame.

Senator Hirono: Thank you.

Mr. Garner: Because we hope to kick up significantly as soon as we hit the full rate production decision.

Senator Hirono: And my understanding is that you would like to get to more than 5,500.

General Walsh: Senator Hirono, if I could correct that. Actually what I have got is within PB-18, we funded a quantity of 7,241. So we move into increment 2 inside the FYDP.

Senator Hirono: Thank you.

Senator Wicker: Might some of those vehicles continue to be Humvees for a long time?

General Walsh: So the 7,241 that I just briefed -- that would be coming from the 17,000. There would be plenty of Humvees out there for many, many more years until we figure out how many we are going to turn into JLTVs.

Senator Wicker: Gentlemen, thank you very much. We appreciate your service and we appreciate your information today.

The hearing is closed.

[Whereupon, at 3:56 p.m., the hearing was adjourned.]