

Bright Future?

David C Isby spoke with Commander Naval Air Forces, Vice Admiral Mike Shoemaker about the current and future status of US naval aviation

The US Navy's air forces are in transition. Vice Admiral Mike Shoemaker, who has been the air boss (more formally, Commander, Naval Air Forces), since January 2015, said in Washington on August 18 that only the navy's Sikorsky MH-53E Sea Dragon minesweeping helicopters and Boeing E-6B Mercury communication aircraft are steady state. Every other type community is changing, transitioning in new-production aircraft and having to hold on to its predecessors longer than envisaged.

Vice Admiral Shoemaker said: "The ability to generate current readiness and recover readiness at the same time . . . the supply of our forces is not sufficient to meet the demand right now. Challenges are increasing and funding is decreasing." Nevertheless, he believes the trends are in the right direction: "The needles are moving. They are moving slowly, not fast as I would like."

Readiness Issues

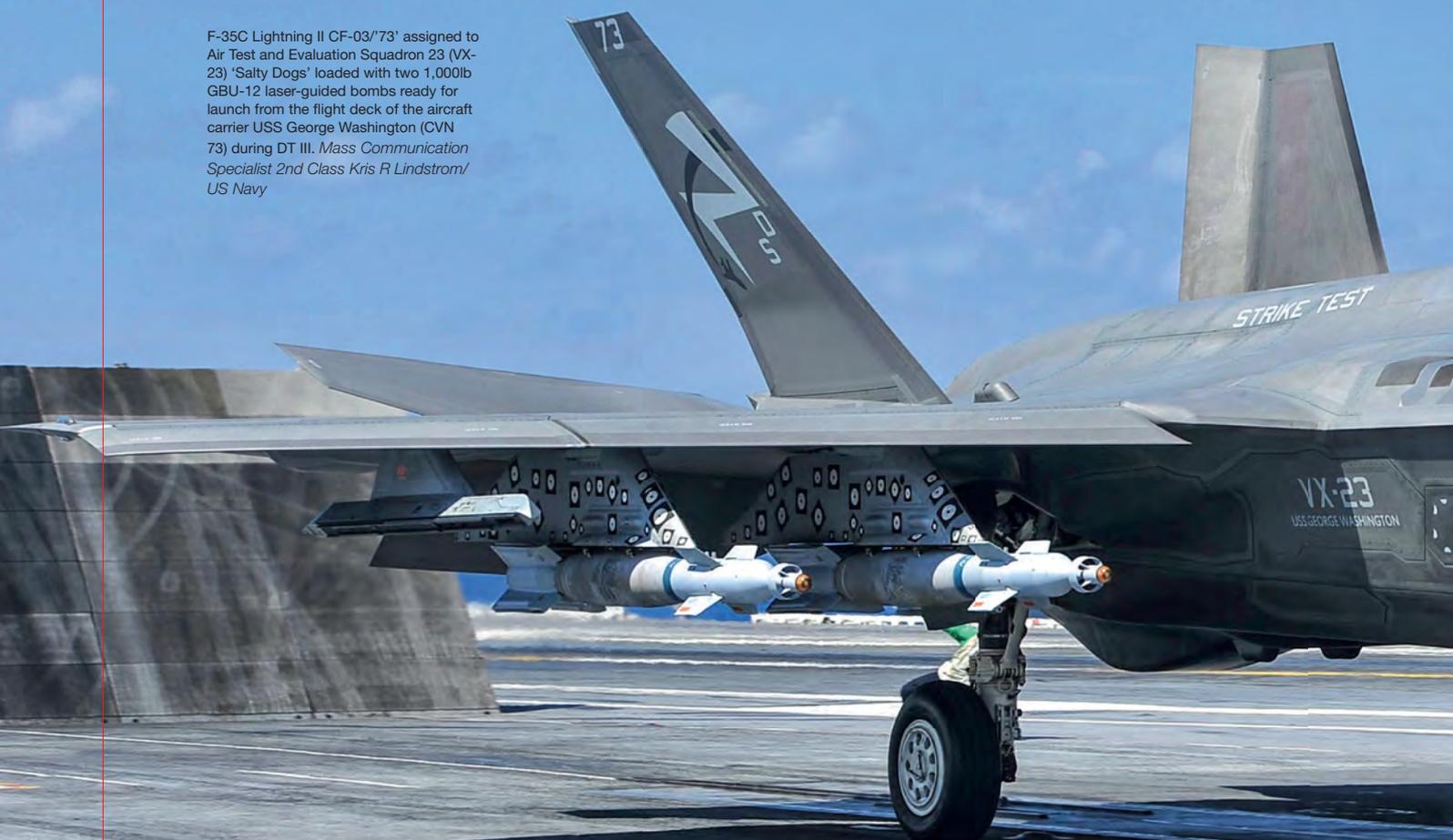
Shoemaker told AIR International the future of naval aviation is bright, "but we need to work through fiscal challenges and short term readiness issues." The US Navy has not suffered from the shortfalls in flight hours like the US Marine Corps,

"that directly translates into readiness and ready-to-fly aircraft," he said.

The US Marine Corps – America's rapid response force – aims to have all its deployable squadrons ready on short notice. The US Navy, instead, operates on a tiered readiness system. Nor, underlined Shoemaker, is the navy currently experiencing a pilot shortage like the one the US Air Force is facing: "We still have quality across the force and we do not see a shortage [developing] this year or next year."

However, many navy aircraft are unable to fly operationally, because they are awaiting overhaul or parts. US Navy sustainment accounts were drawn down during the budget sequestration that started in 2013. Shoemaker outlined

F-35C Lightning II CF-03/73' assigned to Air Test and Evaluation Squadron 23 (VX-23) 'Salty Dogs' loaded with two 1,000lb GBU-12 laser-guided bombs ready for launch from the flight deck of the aircraft carrier USS George Washington (CVN 73) during DT III. Mass Communication Specialist 2nd Class Kris R Lindstrom/US Navy



how many squadrons don't have sufficient "up aircraft" on the flight lines to fly, a reference to mission-ready aircraft. This has resulted in levels of readiness that are below what the air boss described as "our tactical hard deck", a navy-defined level of recent experience without which pilots are not combat ready: "There are readiness challenges across the force."

Squadrons assigned to carrier air wings recently returned from deployment or whose aircraft carrier is in dock have had their flight hours cut back. Vice Admiral Shoemaker said F/A-18, C-2 Greyhound and E-2 Hawkeye squadrons are the most impacted with pilots authorised for 12-14 flight hours a month on a squadron in its maintenance phase: "This is not ideal. Some are in single digits," he said.

Pilots assigned to such squadrons are often unable to meet the reduced flight hour requirements, because so many of their aircraft are not fit to fly and the US Navy lacks the funding and parts (which should have been ordered years ago) to get them back in the air.

Current Issues, Future Opportunities

The backlog of F/A-18C and F/A-18D Hornets waiting to go through a service life extension programme (SLEP) is a high-profile problem that will be compounded



in 2017, when the first Super Hornets reach their designed airframe life of 6,000 flight hours. Shoemaker wants to ensure a SLEP for the Super Hornet works out better: "We learned a lot in managing legacy F/A-18s and are looking to industry for additional capability beyond our organic depots. There is an opportunity to tap into original equipment manufacturers to do frontline repairs, F/A-18 maintenance teams dedicated to work

with our own. We have got to keep less than one-fifth of our Super Hornets out of action due to overhauls."

Ageing Super Hornets means a greater need for operational F-35C Lightning II Joint Strike Fighters. "We absolutely need the F-35 as soon as we can get it," he said.

The US Navy will not consider the F-35C operational until the aircraft has Block 3F software installed, so, based on the current prediction, the navy can expect to achieve initial operating capability with the F-35C in late 2018.

In August, two F-35Cs assigned to Air Test and Evaluation Squadron 23 (VX-23) based at Naval Air Station Patuxent River, Maryland, were testing Block 3F software on board the USS George Washington (CVN-73) off the US east coast as part of Developmental Test Phase Three at sea or DT III, the F-35C's third and final at sea period during developmental testing.

Shoemaker recently visited Naval Air Station Fallon, Nevada, to watch F-35Cs operating with Super Hornet and EA-18G Growlers. Commenting on the navy's desire the air boss said: "We want to pair them up together [Super Hornet, Growler and F-35C]. We understand the low-observable penetration capability of the F-35, its ability to fuse data, put it all together – both active and passive sensors – and share that with the other





platforms in the air wing and joint force.” However, the US Navy’s air boss would also like to continue building Super Hornets beyond the scheduled end of production in FY2018 to ensure sufficient numbers in service up to 2040. At Fallon, Shoemaker also saw how strike fighter squadrons clearly value the contributions of the EA-18G Growler and what it brings to the fight, and why the type remains in high demand: “When operational the Raytheon Next Generation Jammer pod will make the EA-18G more formidable.”

Technology developed for the F-35C will make the Super Hornet more effective, Shoemaker cited the BAE Systems-

developed Delta Flight Path system that provides glide slope inputs directly to the F-35’s all-digital flight control and avionics systems on final approach. When used in conjunction with a carrier’s Joint Precision Approach and Landing System (JPALS) during recent testing, Delta Flight Path enabled 80% of all F-35C landings to hook the number three arresting wire, the indicator of a precise touchdown. According to the air boss when used at Choctaw Field near Naval Air Station Pensacola, Florida, the system made simulated carrier landings so precise that the F-35Cs, “were landing in the same spot on the runway every time, tearing it

up where the hook touches down.”

The system also reduced the number of missed approaches, bolters (failure to engage an arresting wire) and fouled decks (when the need to get a landed aircraft out of the way delays aircraft waiting to land) to close to zero.

Upgrading Super Hornets by retrofitting Magic Carpet, a Super Hornet-compatible version of the Delta Flight Path system, is a priority. Shoemaker has pressed for an interim version to enter service with operational squadrons starting in autumn 2016, with IOC being achieved in 2019: “I think it is going to give us the ability to look at the way we work up and expand the number of sorties. I think it will change the way we operate around the ship.”

Hooray – Stingray!

Today, the risk of landing delays requires an F/A-18 with a pod-mounted refuelling drogue and extra fuel tanks, the so-called buddy tanker, to be airborne when other aircraft assigned to the air wing are landing aboard the carrier. Shoemaker said under current doctrine a carrier air wing configures six to eight tankers aboard the ship. Tanker missions consume a substantial percentage of F/A-18 flight hours, but the air boss believes that once Magic Carpet is operational the buddy tanker requirement will no longer be required: “That will give us flexibility in our strike fighter numbers, increase the number of Growler, which I know we’re going to do, and probably the number of E-2D Advanced Hawkeyes, as well.”

2 An F/A-18F Super Hornet assigned to Strike Fighter Squadron 32 (VFA-32) ‘Swordsmen’ takes off from the flight deck of the aircraft carrier USS Dwight D. Eisenhower (CVN 69). The aircraft is configured for the buddy tanker role with an air refuelling pod under the fuselage and four underwing fuel tanks. *Mass Communication Specialist 3rd Class J. Alexander Delgado/US Navy*

3 An E-2D Hawkeye assigned to Airborne Early Warning Squadron 125 (VAW-125) taxis across the flight deck aboard the aircraft carrier USS Theodore Roosevelt (CVN 71) prior to a mission in support of Operation Inherent Resolve. *Mass Communication Specialist 3rd Class Anna Van Nuys/US Navy*

4 A US Navy MH-53E Sea Dragon assigned to Helicopter Mine Countermeasures Squadron 15 (HM-15) ‘Blackhawks’ approaches the hose of a KC-130J Super Hercules during an air refuelling exercise to maintain inter-service operability. *Lance Cpl Jered Stone/US Marine Corps*



The change envisaged will also affect the US Navy's future MQ-25 Stingray carrier-based unmanned aerial vehicle (UAV). Until an MQ-25 lands on a carrier flight deck, the only UAV to have done so is the stealthy Northrop Grumman X-47 demonstrator. Air refuelling is the primary role planned for the MQ-25 Stingray to meet a current doctrine for air refuelling aircraft at locations distant from the carrier, but outside the range of enemy weapons. Competing Stingray designs – from Boeing, General Atomics, Lockheed Martin and Northrop Grumman – will have to meet the challenge of reconciling the tanker mission with the secondary continuous intelligence, surveillance, reconnaissance and communications relay mission. Neither air refuelling nor the ISR roles require a stealthy design.

Vice Admiral Shoemaker said: "If you send the MQ-25 out by itself, you need to know where you're sending it so that it doesn't get shot down. Industry is defining where the sweet spot lies to enable the air vehicle to do both missions." A contract for MQ-25 development is planned to be issued in 2018.

Rather than recruiting and training specialist UAV pilots (like the US Air Force), the navy is considering whether to train pilots qualified on multi-engine aircraft to fly the Stingray. Helicopter pilots currently fly the Northrop Grumman MQ-8B and MQ-8C Fire Scout UAVs, and pilots with a maritime patrol career fly Northrop Grumman MQ-4C Triton UAVs. As Shoemaker said: "We need

to get the fleet learning concepts for manned-unmanned teaming."

COD Ospreys

The planned replacement of the current Northrop Grumman C-2 Greyhound with the Boeing-Bell CMV-22 Osprey tiltrotor in the carrier onboard delivery (COD) role was studied in a recent Fleet Battle Experiment (FBX) staged between July 22 and August 4. The FBX involved the USS Carl Vinson (CVN 70) battle group underway off the coast of California.

US Marine Corps MV-22B Ospreys flew 25 COD missions with C-2 pilots in the jump seats. Shoemaker said the CMV-22's extended range package will give the type a similar range to the C-2. Though slightly smaller, the CMV-22 will be able to operate at night, which C-2s do not normally do, and make three runs a day to the carrier battle group instead of the two usually operated by C-2s.

According to Shoemaker, the air boss assigned to the USS Carl Vinson liked the flexibility provided by the MV-22 Osprey: "Handlers have to work to bring a COD in between cycles. They learned how to receive and launch the MV-22 without refuelling. As they learned how to operate the Osprey, it took 20 minutes with passengers or 30 minutes with cargo. It takes about six guys to launch and recover an Osprey. The same process takes about 40 or so minutes to man up the ship to bring in the [C-2] COD. It can fly in and out between cycles and so there's some unique operating benefits that come with the Osprey."

P-3C Orion to P-8A Poseidon

The US Navy's transition from the Lockheed P-3C Orion to the Boeing B-8A Poseidon is about half complete, Shoemaker said. The active-force east-coast-based patrol squadrons assigned to Commander Patrol and Reconnaissance Wing 11 (CPRW-11) are now all equipped with the P-8A. Two

P-8As recently deployed to Bahrain, the type's first deployment to US Central Command's area of operations. Earlier deployments went to the western Pacific (where a second P-8A deployment is currently taking underway) and Europe. Shoemaker said P-8A squadrons have been exercising with both shore-based and carrier-based MH-60R Seahawks, and working together against maritime targets and simulated threats to US warships.

However, he expressed concern over the future of the two US Naval Reserve P-3C squadrons: Jacksonville-based Patrol Squadron 62 (VP-62) 'Broad Arrows' and the Whidbey Island-based VP-69 'Totems'. He said: "Both squadrons routinely deploy. We would like to transition them to the P-8, but we are not in that position from a resource perspective. We will need them around for a little while." Both squadrons will continue to operate P-3Cs: "If that is what we leave them in, it will be the best of breed, they will get the best airplanes [retired from the active force]."

E-2D Transition Plan

The Northrop Grumman E-2D Advanced Hawkeye is replacing E-2C Hawkeyes in fleet squadrons. Three have transitioned to date, though not as fast as Shoemaker would like. He said VAW-125 'Tigertails' deployed as part of Carrier Air Wing 8 on the USS Theodore Roosevelt (CVN-71) last year and flew the first E-2D combat missions, supporting operations over Iraq and Syria. The squadron is now set to deploy to Naval Air Facility Atsugi, Japan, in a permanent change of station and form part of Carrier Air Wing 5, which is due to have the navy's most capable equipment. Shoemaker stressed the importance of the E-2D likening it to the quarterback for the air wing and joint forces: "It extends the reach of the air wing and its capabilities for long range combat identification and integration are crucial in supporting integration of fire through robust and common networked technologies."



Dogs and Reaper



Gert Kromhout attended a media day on board the USS George Washington during the final developmental test phase at sea for the F-35C Lightning II

Four F-35Cs from VFA-101 overfly the USS George Washington with tail hooks lowered on their departure back to Eglin Air Force Base, Florida. Todd McQueen/Lockheed Martin

The US Navy plans to declare the Lockheed Martin F-35C Lightning II with initial operational capability (IOC) at some point between August 2018 and February 2019. From then on this new jet can be operationally deployed. However, a lot of work still has to be done before it is ready. In August, the navy made a huge step when the F-35 Integrated Test Force (ITF) based at Naval Air Station Patuxent River, Maryland, conducted the Developmental Test Phase Three, commonly referred to as DT III, on the aircraft carrier USS George Washington (CVN-73).

Validation

DT III focused on validation of the aircraft's flying capabilities with full inert internal and external stores, handling tests with asymmetrical loads, testing for maximum weight launches at minimum power and evaluating all tests in a variety of wind and sea conditions. Additionally, some night flying took place to verify the performance of the Generation III helmet.

Thomas Briggs, the Air Vehicle Engineering Department Head of the F-35 Lightning II ITF, described DT III as the culmination of five years of hard work on the F-35C: "We did the first DT in November 2014 on the USS Nimitz (CVN-67). That was focused on the flying characteristics of the jet. The second test phase [DT II] was on the USS Dwight D.

Eisenhower (CVN-69) in October 2015. In that test phase, the flight envelope was further expanded, aircraft loaded with internal weapons were launched and recovered while evaluating their flying and handling qualities under various wind conditions and catapult settings.

"In DT III, we basically do the same as in DT II but with external and asymmetrical loads. We take off and land, evaluate handling qualities and compatibility with the ship with those weapons underneath. Then we proceed to the next test points. We are also using Block 3F software, which will be the software load that has to be operational at IOC."

Bulletins

According to Briggs, the objective of DT III was to prepare the so-called aircraft launch and recovery bulletins (ALB/ARB): "The ALB/ARBs are guidelines deck personnel have to use in order to set the catapult and arresting gear, which depend on the weight of the aircraft. These bulletins ensure that we can launch and recover aircraft safely."

The ITF sent 170 personnel on board. Two test aircraft CF-03/SD73 and CF-05/SD75 arrived on the George Washington on August 14.

Over a 14-day period, five test pilots completed 500 test points as Lieutenant Commander Daniel Kitt, Carrier Suitability Lead with the F-35 ITF, explained: "Of the 500 test points, 315 are of the so-called threshold type, which means they have to be completed. The others are objective test points which we do when we have

time and assets available on the ship."

Many, if not all, of the test points undertaken on board the USS George Washington were carried out to verify what the ITF had already tested on ashore. Naval Air Systems Command has TC-7 catapult and Mk7 arresting gear systems at Patuxent River and Naval Air Engineering Station Lakehurst, New Jersey, which are identical to those on the carriers. However, some conditions cannot be simulated ashore. Examples are the absence of ground effect on the deck and the turbulence behind the ship caused by the carrier's island, a phenomenon called the burble.

Intensive Preparation

Preparations for DT III were intensive and according to Lt Cdr Ted Dyckman, a test pilot with Air Test and Evaluation Squadron 23 (VX-23) 'Salty Dogs', focused on the tests to be conducted on the carrier: "We rigorously simulated and tested in simulators, computers and on land bases. Executing the tests on the ship is often an anti-climax, because they usually go as expected."

During DT II, the squadron completed launch and recoveries with two internally carried inert 1,000lb GBU-32 Joint Direct Attack Munitions. In DT III, up to four 500lb GBU-12 laser-guided bombs and two AIM-9 Sidewinder missiles were added on external pylons. Lt Cdr Dyckman said: "We gradually increased the loads up to the maximum launch weight of 66,000lb [29,937kg]. First we load the wings symmetrically with an identical configuration under each wing, then we change the configuration under one wing. Aircraft CF-03 and CF-05 are fully instrumented for capturing and transmitting data in real time to the mission control rooms in the hangar bay where many engineers measure behaviour and the physical condition of the aircraft to ensure we do not exceed the limits. We make sure that everything goes as planned before we proceed with the next test point."

Carrier Qualifications

Before commencing DT III, the Patuxent River-based test pilots first had to qualify for deck landings, known as CQs, and did so with instructors from Strike Fighter Squadron 101 (VFA-101) 'Grim Reapers' Fleet Replacement Squadron based at Eglin Air Force Base in Florida, the unit tasked with the training new US Navy and US Marine Corps F-35C pilots.

All 12 of VFA-101's instructors have made many deck landings in other types, but for most of them landing on the flight deck of the USS George Washington was their first time they put down the F-35C

s Share the Deck

on a carrier.

For daylight qualification, two touch and goes and ten landings, dubbed traps, are required. The CQs went very well. VFA-101 had planned two full days to complete the task, but within 24 hours almost all VFA-101 and VX-23 pilots were qualified. Lt Cdr Kitt loved it: "This proves the many hours VX-23 spent making the aircraft ready for the fleet paid off."

Lieutenant Graham Cleveland, VFA-101's lead Landing Signals Officer, who was also the LSO during DT I and DT II in 2014 and 2015 respectively, expressed his relief: "It is my job to qualify the pilots and ensure that everything goes safely. You know, when the weather is this good, it cannot get any better than landing on a carrier."

Delta Flight Path

All of the VX-23 and VFA-101 pilots agreed the favourable weather and sea conditions contributed a lot to the success of them qualifying, but all added that a new landing technology played a much more important role. Known as the Delta Flight Path (DFP), the system was developed by Naval Air Systems Command in cooperation with BAE Systems in the UK. It automates the glideslope, which in the final phase before touchdown on the deck is a really precise piece of flying. Without DFP, the average pilot makes between 200 and 300 corrections with throttle, stick and rudder in the last 18 seconds before the trap. DFP reduced the number to 20 for a pilot using it for the first time.

Major Eric Northam, a US Marine aviator assigned to VX-23 who had completed 160 traps in legacy F/A-18 Hornets prior to DT III, made his first F-35C trap on the George Washington during the period at sea: "To come aboard, in particular at night, was always stressful, but with the F-35C and DFP it is a non-factor. When I landed for the first time I was surprised about how easy it was. Even if you make a significant deviation from the glide slope it is easy to get back on."

Briggs contends that what the Naval Air Systems Command, BAE Systems and the F-35 ITF have developed really works in the fleet, but that pilots have to change their mindset: "You should not approach DFP as you do with a strictly manual approach. If you work it really hard, you are not allowing it to work for you. The fleet must understand that DFP means you have to fly the aircraft very differently to get the most out of it."

Green Glow

Despite the success at qualifying by day, VFA-101 pilots were unable to qualify for night operations. Software for the Generation III helmet has not been released



F-35C Lightning II CF-05 takes off from the USS George Washington on a pilot carrier qualification flight on August 15. Todd McQueen/Lockheed Martin

to the fleet, but was being tested in DT III. Briggs explained that during DT II the helmet did not function optimally: "During DT I, test pilots discovered a green glow, as if they were looking through a dirty window. The pilots could not see the lighting of the ship and also had difficulty seeing aircraft around them. In DT II we saw an improvement, but the problem was not fully solved. In normal overland night operations it was not really an issue, but in a moonless dark night at sea it was. We expect to have this problem fully solved now."

Early Completion

Aircraft CF-03 and CF-05 returned to Patuxent River on August 26, one week earlier than planned, after completing all tests. They had flown 41 flights

accumulating 39.7 flight hours, 121 catapult launches, 70 touch and goes, one bolter and 121 traps, but their return to Patuxent River does not mean it's time to relax, as Thomas Briggs explained: "After we finish here we unload in Norfolk. Our equipment does not go to Patuxent River, but directly to San Diego for embarkation on the USS America (LHA-6) for the F-35B's DT III phase."

As for the F-35C, some catapult and arresting gear tests remain to be completed at Patuxent River for IOC in the summer of 2017. Concluding, Briggs said the F-35 ITF and VX-23 will not go back to the carrier again: "VX-23 will be involved in ongoing developmental tests because it's a continuing process as long as the F-35C is in service."



F-35C Lightning II CF-05 over the flight deck of the USS George Washington immediately before catching the wire. The aircraft is loaded with one inert GBU-12 laser-guided bomb. Michael Jackson/Lockheed Martin