

COMING TO AME



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US Marine Corps F-35Bs headed back to sea in October and November 2016, this time aboard the *USS America*, for the third phase of developmental test (DT-III) and a proof-of-concept demonstration.

report: **Jamie Hunter**

HAVING DECLARED INITIAL operational capability (IOC) in July 2015, the US Marine Corps is busy ticking the necessary boxes in order to deploy its Lockheed Martin F-35Bs into the field. Seven Lightning II's were embarked for the initial

developmental test (DT) work as part of DT-III. Five F-35Bs landed on the Corps' newest amphibious assault ship, the *USS America* (LHA 6), on Friday, October 28, as the vessel cruised off the coast of southern California. An additional pair joined them the following day.

These were composed of Integrated Test Force (ITF) F-35Bs BF-01 and BF-05 from

Naval Air Station Patuxent River, Maryland, plus three supplementary jets from Marine Operational Test and Evaluation Squadron (VMX) 1 at Edwards Air Force Base, California, and two fleet aircraft from Marine Fighter Attack Squadron (VMFA) 211 'Avengers' at Marine Corps Air Station Yuma, Arizona.

This embarkation was designed to initially test short take-off and vertical landing (STOVL) operations in a high sea state and at night. 'It's exciting to start the execution phase of our detachment with VMX-1 on *USS America*', remarked Lt Col Tom 'Sally' Fields from the ITF at Air Test

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This image: F-35Bs, AH-1Z, MV-22Bs and UH-1Ys share the flight deck of the amphibious assault ship USS America (LHA 6) during the latter stage of DT-III and the proof of concept phase. Lockheed Martin/Andy Wolfe

Inset: BF-05 from VX-23 at NAS Patuxent River, Maryland, launches in the course of DT-III. Lockheed Martin/Darin Russell



Left: Crews from VMX-1 load live GBU-12s and GBU-31s during an operational test element of DT-III. Lockheed Martin/Andy Wolfe

and Evaluation Squadron (VX) 23 'Salty Dogs'.

During the next three weeks of the embarkation, the integrated test team completed both DT and operational test (OT) to help establish the boundaries of safe operation for the F-35B in the latest Block 3F software configuration. VMX-1, meanwhile, focused specifically on preparing maintenance crews and pilots for the debut deployment of the F-35B aboard *USS Wasp* (LHD 1), which is scheduled to start in just over a year.

Test points

The *USS America*, the first ship of its class, incorporates several key design elements to accommodate the F-35B. These include an enlarged hangar deck, realignment and expansion of the aviation maintenance facilities, and a significant increase in available stowage of parts and equipment, as well as increased aviation fuel capacity.

Lt Gen Jon 'Dog' Davis, the Marines' deputy commandant for aviation, said: 'The America class of amphibious assault ship design enables it to carry a larger and more diverse complement of aircraft, including the tilt-rotor MV-22 Osprey, the F-35 Lightning II, and a mix of cargo and assault helicopters. *America* is able to support a wide spectrum of military



operations and missions, including putting Marines ashore for combat operations, launching air strikes, keeping sea lanes free and open for the movement of global commerce, and delivering humanitarian aid following a natural disaster.'

The first DT-I and II sea trials for the F-35B were conducted aboard the USS *Wasp* in 2011 and 2013 respectively. DT-III marked the first stint aboard USS *America*, and there were some specific test points that the ITF team was going after. 'There was really good weather for DT-I and DT-II,' says Lt Col Richard Rusnok of VMX-1. 'So, the big thing was about going after higher deck motion events. Being on the West Coast and out on the Pacific tends to be [rougher] than the Atlantic, and actually we were able to find some pretty significant deck motion. They were really good test points.'

'I was LSO [landing signals officer] for some of those deck motion points and we were doing the exact opposite of what you would normally do as an LSO. We were intentionally trying to launch the test jets into the absolutely worst deck motion. So, we're holding them on the deck, getting the launch signal, then we're watching the wave cycles come at us waiting for the best time to launch [the

Above left to right: **A VMFA-211 'Avengers' F-35B ready to launch from the deck of USS America.** Lockheed Martin/Andy Wolfe

The Pax River test pilots were going after some stronger winds and rougher seas for DT-III. USMC/LCpl Dana Beesley

best time being the most challenging time].'

As well as the pitching deck, external loads were carried in relation to the Block 3F software load. The loads enabled the ITF to drive the aircraft's center of gravity to extremes, while the jets also flew with asymmetric loads to analyze the impact of this on operations. 'You'll see that we had pylons and weapons on one side only specifically to drive the asymmetric conditions,' Rusnok added.

The ITF expanded the F-35B's flight envelope as the test program with the DT aircraft unfolded. However, the VMX-1 operational testers were not in a position to use that work as DT-III progressed, since that information needed to be analyzed prior to being released to fleet-representative aircraft. 'They expanded the

envelope within their test plan, going after some offset winds, etc, but from a VMX-1 perspective we couldn't take advantage of that in real time,' explains Rusnok.

With a background in the program, Rusnok was able to participate in combined DT/OT of the Joint Precision Approach and Landing System (JPALS). 'We pushed hard to get our jet BF-19 into upgrade. It came to us from the factory with TR-1 hardware, which means it couldn't accept the new Block 3i or 3F software. We managed to put the jet into a four-week modification in August to add both TR-2 hardware and simultaneously upgrade it to Block 3F software standard. We were able to get a special flight clearance and that meant we had a second jet at the same standard as BF-05, both of which were capable with JPALS.'

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LT COL RICHARD RUSNOK



This meant VMX-1 could augment the test team for the JPALS work on DT-III. 'Essentially, the JPALS system aboard the USS *America* and the Block 3F software in the aircraft allows them to talk to each other,' Rusnok explains. JPALS is a differential GPS-based precision landing system from Raytheon that guides aircraft to carriers in all weather conditions and in surface conditions up to sea state five, using an encrypted, jam-proof datalink. In 2018, the Marine Corps plans to declare early operational capability on two amphibious assault ships to support F-35Bs. All three F-35 models will have JPALS capability embedded in their Block 3F software, although the US Air Force pulled out of the project.

The system should enable the F-35B to auto-land on the amphibious assault ship, although that ambition is still some way off. 'BF-05 did fly auto-decelerations to the ship this time around and they started to refine that process,' says Rusnok. 'The fleet pilots are manually flying the jet at the moment but we can still plug the ship's speed into the autopilot. So, we are essentially flying formation with the ship at 10 to 15kt. The jet will ultimately communicate via JPALS with the ship to

get that speed and set a GPS offset to the location we need to hover abeam the spot. Eventually the aircraft will do a completely automated landing.'

Preparing for the real world

Providing an overview of the current Marine F-35B program, Lt Gen Davis recently told reporters: 'We have 46 jets in the fleet and five brand-new pilots now in training. We start moving VMFA-121 to Japan in January 2017 and the first slug of 10 jets will be joined by a second group in the summer to give us a 16-jet squadron at [MCAS] Iwakuni.'

The 'Green Knights' of '121' are expected to embark the USS *Wasp* in February 2018 as part of the 31st Marine Expeditionary Unit (MEU). VMFA-211 'Avengers' at MCAS Yuma is set to deploy with a 'southern California' MEU in June 2018.

'With the Block 3F software we will have full ordnance clearance — that means [the F-35B will be able to carry] 4,000lb more than a Marine Corps F/A-18,' enthuses Davis. 'We will use this airplane in every clime, every place, every fight.' His biggest concern is spare parts, for which he says the Pentagon has only funded 33 per cent of his overall requirement.



Above left: **Nice to see a bit of colored paint—VMFA-211's 'boss-bird', BuNo 168732/CF-01.** Lockheed Martin/Darin Russell

Below left: **BF-01 hares down the deck. VMX-1 used the sea trials to evaluate the complete removal of an engine and the lift fan.** Lockheed Martin/Andy Wolfe

Right page top: **Night operations played a big part in the DT-III test plan.** Lockheed Martin/Andy Wolfe

Right page middle: **The F-35B looks a little awkward as it launches from the flat deck.** Lockheed Martin/Andy Wolfe

Right page bottom: **The test pilots completed a few test points with the new JPALS system.** Lockheed Martin/Darin Russell

When it comes to the F-35B, that spares requirement is being fleshed out during initial operational testing. The embarkation on the USS *America* included the simulation of extensive maintenance aboard a ship. VMX-1 boss Col George 'Sack' Rowell explained that one of his jets was placed in the hangar bay, taken apart, and put together again. That work involved the removal and replacement of the entire engine, drive shaft and lift fan of a fleet-representative VMX-1 F-35B over 12 days, some of it spent in heavy seas. Live ordnance was also loaded and carried for the first time at sea.

'VMX-1 was geared toward force demonstration,' adds Rusnok. 'That was really only the last four days of the deployment as we shifted gears from the DT effort to us leading in order to demonstrate how a larger complement of F-35s will interact with the ship. VMFA-211 brought a further five jets to the boat to take us up to 12, so then it became about how we get those 12 airplanes on board and move them around the deck.'

This was the so-called 'proof of concept demonstration,' led by Col Rowell as the Air Combat Element (ACE) commander. 'We flew an assault support escort mission,' Rusnok explains. 'This was six F-35s, two V-22s, a UH-1Y Venom and an AH-1Z Viper, along with a Navy MH-60R search and rescue helicopter. It was about getting those platforms all working together; until now we haven't had much interaction with those airplanes, and in VMX-1 we have them organic to us.'

The time spent on the *America* enabled the Marine Corps to carrier-qualify (CQ) 19 pilots, plus the first Royal Navy pilot, Lt Cdr Ian Tidball. 'We worked up our FCLPs [field carrier landing practice] from late September; then the VMFA-211 guys did their work-ups while we were at sea in the first part of DT-III,' says Rusnok. 'Of those 19 pilots, only four of us had flown on the ship before in the F-35. Eight of them had never flown to a LHA/LHD class carrier before. We qualified five LSOs as well, which was one of our main objectives — four of those were training LSOs, which allows us to build fleet pilots in that role.'

The deployment underscores the progress being made by the Marines, all the while pressing on with service entry, and balanced against the arrival of new capabilities. Block 3F looks set to be a major milestone in 2017, and one that will enable the Marine Corps to deploy its F-35Bs on operations for the first time. 



LIGHTNING LOW DOWN

An F-35A Lightning II of the Royal Netherlands Air Force's 323 Test and Evaluation Squadron (TES) screams along at low altitude during a mission from Edwards AFB, California. The squadron currently works alongside international partners in the F-35 Operational Test and Evaluation (OT&E) program. Frank Crébas/Bluelife Aviation





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