

NIGHT

How Maj. Robert Guyette Won 2018 Test Pilot of the Year

By Emanuel Cavallaro



F-35 Lightning II helmet.

U.S. Navy photo by Fred Flerlage

There's dark on shore; then there's dark at sea. There's no real comparison. So it wasn't entirely clear how well the F-35 Lightning II night vision system would perform during its first shipboard evaluation.

The 2016 Evaluation

In 2016, test pilot Maj. Robert Guyette wasn't the first one aboard USS America (LHA 6) to fly the night vision system at sea. Two other test pilots, one American and one British, had flown it over the two previous nights and reported decent results. But Guyette was the first to fly it at very low light.

"The system was actually performing fairly well at higher light levels," he said. "I was the third in the hopper for the test, and when I went out there and it got really dark, the system performed ... unexpectedly bad."

The six deficiencies Guyette's test team identified during that

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F-35B Lightning IIs from Marine Fighter Attack Squadron (VMFA) 211 sit on the deck of USS America (LHA 6) prior to a night helmet test conducted by the test pilots of Air Test and Evaluation Squadron (VX) 23.

Lockheed Martin photo by Darin Russell

initial evaluation meant that, until the system was fixed, pilots wouldn't be able to fly the aircraft at extremely low light levels. Indeed, the F-35 wouldn't be flown at low light again until Guyette's next shipboard test on USS Essex (LHD 2) in 2017.

In February, the 37-year-old Guyette received the Marine Corps Aviation Association's John Glenn Squadron 2018 Test Pilot Award, in part for his team's redesign of the night vision system and its subsequent test and evaluation.

Today their fix is being fielded—installed in the combat-coded F-35s belonging to the fleet and partner nations as well as new F-35s coming off the line—ensuring the fifth-generation strike fighter's capability to launch and recover at night on aircraft carriers and amphibious ships with covert lighting.

Thanks to Guyette and his team, F-35 pilots can now see in the blackest of night.

Drawing the Horizon The most technologically advanced helmet out there, the F-35 helmet is a remarkable piece of technology, but the task of integrating its sophisticated systems with the jet's avionics and pilots' capa-

bilities has proved so complex that it's taking the combined efforts of engineers, researchers and test pilots like Guyette to work out the kinks.

Above the wearer's forehead, the helmet bears a prominent circle. That's the lens of the mid-wave infrared camera system that captures the image that a projector inside the helmet uses to produce the helmet-mounted display for the wearer.

During initial 2016 tests, the camera and projector were working just fine, according to Guyette, but the software that performs the image post-processing for the projector wasn't fully optimized for the dynamic environment of the F-35 cockpit in low light situations. In short, it was having a hard time drawing the horizon.

"For a pilot, not being able to see the horizon is a major problem," Guyette said. "You can get disoriented. And some of the lights on the ship were not being filtered correctly, so it was obscuring the landing area—among other issues. It was just generally unsafe."

That's not a position Guyette likes to put himself in—flying blind over the sea. But his team regularly practices for such

contingencies. They run simulations, rehearse unexpected outcomes and practice emergency procedures. They identify the factors they can control and the factors they can't. In the cockpit, Guyette depends on that extensive planning and his experience as a test pilot.

“When you're in a situation where you have degraded visual cues, you transition to an instrument scan and you rely heavily on the airplane and what it's telling you,” Guyette said. “You rely on the landing signal officer in the tower to talk you down to the deck. That's his job, to assist you and bring you back down safe.”

'I thought for sure we were done'

Six months after the 2016 evaluation, Guyette was at Naval Air Station Patuxent River, Maryland, assisting with lab tests for a version of the F-35 helmet that used organic LED technology to resolve an ambient light—or “green glow”—issue.

One of the engineers there recognized him from the USS America. He told Guyette that he and the other engineers were

working on new image post-processing software. In between test runs, he showed Guyette what the beta version could do for the F-35's night vision system. “I saw it,” Guyette recalled. “And I knew these guys had pretty much solved a lot of the big problems.”

Soon after, Guyette's team had an F-35B parked in a Pax River hangar running on ground power to test the software using some visual acuity boards at a variety of light levels. That was the first round of a series of tests—some on the Pax River airfield, others offshore in the Atlantic Test Ranges—that would prepare them for another at-sea shipboard evaluation.

“We took [the F-35B] offshore and flew around out in the ocean when it was light and when it was dark,” Guyette said. “We had to do all of that before we felt comfortable going out to the ship again.”

Eventually, with deck space on USS Essex off the West Coast coordinated, they borrowed an F-35B from Marine Operational Test & Evaluation Squadron (VMX) 1, loaded the experimental software onto the aircraft at Edwards Air Force Base, California, and flew it to Marine Corps Air Station (MCAS) Yuma, Arizona.

While still ashore, Guyette had to complete required



Lockheed Martin photo by Darin Russell

Maj. Robert Guyette, F-35 Pax River Integrated Test Force test pilot, during a developmental test at sea. Guyette was named Marine Corps Aviation Association John H. Glenn Squadron Test Pilot of the Year for 2017.

field carrier landing practice at a simulated aircraft carrier in the desert to qualify for landing on the ship. The night of Guyette's last practice landing, the plane captain pointed out a puddle of coolant underneath the aircraft.

"I shut the airplane down and climbed out," Guyette recalled, "and everybody's heart sank because it was not looking good for us. I thought for sure we were done."

Back in Yuma, the Marines of VMX-1 pulled together, loaded three flatbed semi-trucks with equipment, and rolled out 30 minutes into the desert to Guyette's location, MCAS Yuma's Auxiliary Landing Field Two. Within 24 hours, the Marines had the aircraft fixed and ready for testing.

"They pulled some magic," Guyette said.

Dramatic improvements Unlike their testing in the hangar, Guyette's test team wouldn't be able to control light levels at sea. That meant they had to account in their planning for the latitude and longitude of the ship, ambient light from the sun and stars, and the phase of the moon and its angle above the horizon.

But in the months leading up to the final graduation exercise, one crucial factor Guyette's test team couldn't fully account for was the weather. USS Essex was returning from Fleet Week in San Francisco, sailing down the coast of California to San Diego for the Dawn Blitz exercise. Before Guyette could fly out, a huge storm developed over the ship. The first night was a no-go.

"They can't wait for us, so they're just still trucking south," Guyette said. "So I repositioned that airplane up to Edwards Air Force Base and then just waited for the next day. We basically had to get it all done that second night."

Ultimately, they would have to complete all their testing in a single three-hour window while the moon was setting. "It was one of those days when you see the moon at evening time, and it's way up high and huge," Guyette said. "And then the sun went down and we're testing through the moon. As the moon's going down we're basically going lower and lower and lower in light level."

As a rule, Guyette tries to stay agnostic about the results. The point of testing is to determine whether or not a system works, not to confirm your hopes that it will work.

"But in this case the improvements were dramatic," Guyette said. "We were able to clear all six category one deficiencies against it."

Team effort The Test Pilot of the Year award came as something of a surprise. Guyette's commanding officer had put him up for it without telling him.

He learned he won when Col. Steve Girard, Commanding Officer of the Marine Corps Aviation Association John Glenn



Photo courtesy of Marine Corps Aviation Association John H. Glenn Squadron

From left, Col. Steve Girard, Marine Corps Aviation Association John H. Glenn Squadron and Marine Aviation Detachment Commanding Officer; Lt. Gen. Steven Rudder, Deputy Commandant for Aviation; Maj. Robert Guyette, F-35 Pax River Integrated Test Force test pilot; and Harry Nahatis, GE Aviation, during the MCAA JGS annual awards ceremony at Naval Air Station Patuxent River, Md., Feb. 8, 2018.

Squadron at Pax River, called him to offer congratulations in December. Guyette, who at the time was working at Pax River's Hazelrigg Hangar on further F-35 testing, received his trophy at a Feb. 8 dinner ceremony.

His 7-year-old son called the trophy "a bird on a box" (a not inaccurate description). These days, it sits on the boy's bedroom dresser beside a Lego NASA Saturn V rocket. Guyette is the 13th test pilot to receive the honor since the association started giving out the award in 2005.

In April, the Marine Corps Aviation Association also recognized Guyette as the 2018 winner of the Michael A. Hough award for acquisition excellence. Guyette remains modest about all the recognition, calling himself "the most visible member of a big team."

"In reality, there's like 30 people—capable, talented, gifted engineers who were really doing a lot of work as well," he said.

Recently he has received several positive calls from squadrons who are deploying with the redesigned night vision system. One of them was from a pilot of the Marine Fighter Attack Squadron (VMFA) 121 "Green Knights," Guyette's old squadron and the first operational F-35 squadron. Their feedback on the night vision system will be invaluable.

"It's gone from a system that was unsafe to a system they can use operationally," he said. "And those guys are going to use it where it matters."

Emanuel Cavallaro is a staff writer for Naval Air Systems Command Public Affairs. 🇺🇸