



# Air Force F-35 Proponents Strike Back at Critics

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For close to two decades, critics have taken shots at the F-35 joint strike fighter — and they had plenty of ammunition.

Cost overruns and schedule delays piled up as it became known as the most expensive weapon system ever fielded. There were those who wondered if the Defense Department would ever see any results from its massive investment. The plan to fly it as it was developed, known as concurrency, was at one point called “acquisition malpractice” by the Defense Department’s Undersecretary of Acquisition, Technology and Logistics Frank Kendall.

But at the beginning of August, the aircraft’s largest customer, the U.S. Air Force, declared that it had reached initial operating capability, or IOC, which means battlefield commanders can call on at least one fully equipped and trained squadron to drop precision-guided weapons on enemy air defenses in contested environments.

“It’s a major milestone in the sense that it has grown up a bit. It has still got a lot of growing to do. There is still a lot of work with the avionics and interfaces as well as the software, and those go hand in hand,” said John Venable, a former F-16 pilot with more than 3,000 hours of flying time, who is now a senior research fellow at the Heritage Foundation.

There are key components that have yet to be integrated, including parts of the helmet’s display system, a Gatling gun and the ability to shoot Sidewinder missiles. Much of that will be part of the next block of software due in August 2017.

Meanwhile, the aircraft’s defenders such as Venable are beginning to talk about what it can do as opposed to what it can’t yet do. Pilots and tacticians are just scratching the surface when it comes to understanding the aircraft and its fifth-generation capabilities.

“When people talk about situational awareness, it is exponentially higher in this airplane than it has been in any airplane up to this point. And that is a godsend for the guys in the fighter cockpits,” he said in an interview.

Venable penned an Aug. 4 backgrounder report for the foundation in which he interviewed 31 F-35A pilots and asked them to compare their new aircraft with their previous fighters in terms of maneuverability, stealth and tactics.

He noted that fighter pilots were well known for blunt opinions and a lack of tact. As an outsider he was met with a good deal of skepticism.

"When I walked out of these [interviews] I got the gospel on what each man genuinely believed about both of his jets," he said. Their first aircraft is the love of their life and the F-35A is "the mistress" they are unsure about. The pilots had F-15C, F-16C, F-15E and A-10 backgrounds, but none came from the F-22 community.

Maneuverability in a dogfight has been a big question mark since a leaked report in 2015 called into question the F-35A's air-to-air performance over a fourth-generation aircraft.

Venable noted at the time of that test F-35A pilots were governed by software control laws, known as CLAWS, that limited them to three to five Gs during turns. There have been big strides since then and they are now limited to seven Gs. Ultimately, they will be allowed nine Gs. For the purpose of the survey, he asked the pilots to consider only what the aircraft can do now at seven Gs and to not speculate on how it would perform when the software no longer restricted them.

All but two of the pilots thought the F-35A outperformed his previous airplane in air-to-air combat engagements. The two who didn't favored their old F-15Cs in the 9,000-foot perch setup, a high-altitude combat scenario.

In beyond-visual-range scenarios, they all chose the F-35. For setups where energy and maneuverability are critical to success, they chose it 80 percent of the time.

"The F-35A was not designed to be an air superiority fighter, but the pilots interviewed conveyed the picture of a jet that will more than hold its own in that environment — even with its current G and maneuver restrictions," Venable wrote.

All of the pilots ended up saying that they would choose the F-35 over their previous jet, although Venable said that question wasn't included in the survey. "I decided to let the numbers speak for themselves," he said.

Two former F-22 pilots, Maj. Gen. Jeff Harrigian and Col. Max Marosko III, recently published a paper with the Mitchell Institute about the F-35A that they hoped would "demystify things that have been written in publications," said Harrigian, who directs the F-35A integration office.

The F-35A "allows you to understand where you need to be in the next three to five minutes, where you need to move assets, and to have that battlefield situational awareness to make decisions quicker and better than we could in any other legacy airplane. And that is fundamental to the platform and what it brings to the fight," he said at a panel discussion where he presented the report, "Fifth Generation Air Combat: Maintaining the Joint Force Advantage."

The integrated avionics and sensors automatically fuse and prioritize data for the pilot to reduce his workload “allowing him to focus more on the mission as opposed to managing sensors,” he said.

He also lauded the aircraft’s stealth. “There is nothing like running an intercept and then at the end of the day realizing that no one ever saw you.”

Venable said he walked on an F-35A wings in his street shoes, and it didn’t harm the protective coating that helps provide the plane’s stealth. He could never do that on an F-22, which is known for its sensitive coating. The tougher stealth layer will allow it to be stationed in more austere settings in harsher environments.

“You can park them out in the sun in the open. ... Now you’re starting to talk about a real fighter that has the real potential to do what you need to do in a real-world environment,” Venable said.

Harrigian said: “As we look at operations in highly contested environments with modern long-range [surface-to-air missiles], increased air-to-air threats and the capability the threat has these days to move targets and make them mobile ... the only aircraft that can get there are modern, fifth-generation aircraft.”

In a fourth-gen fighter, “you might get in there and release the bomb, but the odds of escaping are not high,” he said. “In our minds, it comes down to the ability to kill and survive.” The F-35A has robust defenses against electronic warfare and cyber attacks, but he could not go into details.

The helmet with its internal displays as opposed to a heads-up cockpit display is a real-game changer, both Harrigian and Venable said.

There is still a lot of complex work to be done on the helmet, which is expected to be finished in time for the next software upgrade. Meanwhile, the current display that fuses the aircraft’s three main sensors — the radar warning receiver, distributed aperture infrared search and track system, and the passive coherent location system — finds and identifies friendly and enemy aircraft and provides unparalleled situational awareness, Venable said.

Harrigian said: “The F-35 [helmet’s] tremendous capability is really a first step toward providing that asymmetric advantage to the pilot with that situational awareness it provides for communications, navigation and identification capabilities.”

In air combat mode, when the “world is swirling around the pilot,” who may be turning 15 to 30 degrees per second with many aircraft flying around in different directions, keeping track of just the friendly jets is a big challenge, Venable said.

“What this aircraft does is to look in any direction and see who is there and you’ll be able to tell who is a good guy and who is a bad guy,” he said.

Harrigian added that the ability to allow F-35A pilots to be mission commanders will be unmatched.

Air Force tactics such as Harrigian and Marosko, who is serving as deputy director of air and cyberspace operations at Headquarters Pacific Air Forces in Hawaii, are just beginning to look at not only what the F-35A can do, but what it will be able to accomplish flying in teams with fourth-gen aircraft as well as joint forces and allies.

The F-35A will have to address threats covering an entire spectrum from relatively permissive environments found in Central Command's area of operations to more contested scenarios found in the Pacific Command, Marosko said.

For example, the F-35A could be used to destroy enemy air defenses to create pockets of permissive airspace in which fourth-generation aircraft can operate, he said.

Venable said most of the current F-35A pilots have only 100 to 300 hours of flight time on the aircraft, which isn't much. "These guys aren't getting out and standing their airplane on its tail. They're not understanding the nuances and they really need to be given that opportunity with a lot of flying time to go out there and max fly the airplane."

Harrigian said: "There is more work that needs to be done with this. ... When you give this stuff to airmen: get out of the way. They've got it."

Venable said: "This airplane is not out of the woods. It still has some growing to do and the growing pains are still going to be with us for awhile."

When the Defense Department decided to do concurrent development, it chose a path of greater risk, he said. He pushed back at the notion that concurrency was acquisition malpractice, although there were lessons to be learned from the program's mistakes.

The years between when the F-35 was conceived and today were ones of rapid technological advancement. To have frozen the requirements in place in 2001 would have resulted in a fighter that was outdated as soon as it was fielded, he argued in his report. The Royal Air Force's Tornado F-3 is one example. The technology that went into it was mature, there were no technological risks, and therefore no technological leaps. It was virtually obsolete as soon as it was fielded. The Defense Department had that program in mind when it chose concurrency.

"The risks of developmental delays and cost overruns were accepted to mitigate an even bigger risk: that the United States would field its own version of the Tornado F-3," he wrote.

That "riskier acquisition strategy had to pay off dividends ... and what the payoff is — from what the pilots told me — is an extraordinary fighter," he said.

One lesson to take away is leadership. The program's first 18 years saw nine directors. The military's habit of swapping out program managers every three years to accommodate officer career paths just doesn't work with a long, complex acquisition process, he added.

After the Defense Department recognized this, it installed Lt. Gen. Christopher Bogdan as the director, and has kept him in the position.

"The single biggest requirement [for a program like the F-35] becomes competent, long-tenured leadership," Venable wrote.