

F-22 Raptors Uncaged

An F-22 pilot opens up about the fighter's first combat.

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Called the world's most capable fighter, the Lockheed Martin F-22 Raptor has a thrust ratio better than 1:1 and exhaust nozzles that can vector thrust and give the pilot super-maneuverability. (Richard VanderMeulen)

In 2005, The Air Force made it official. The F-22A Raptor was ready for combat. "If we go to war tomorrow, the Raptor will go with us," said then head of Air Combat Command, General Robert Keys, at Virginia's Langley Air Force Base. However, for the next nine years, what has been called the world's most capable fighter stayed on the sidelines, sitting out, for example, U.S. strikes against Libyan air defenses in March 2011. On the night of September 22, 2014, tomorrow finally came: The 1st Fighter Wing, based at Langley, flew four F-22s to strike ISIS militants in northern Syria.

The Raptors flew in the second of three waves of coalition strikes. (Dozens of cruise missiles were the first wave.) The radar-evading, fifth generation fighters divided their time between escorting other aircraft and dropping 1,000-pound guided bombs on ISIS outposts.

At the time the Air Force put out its first request for a stealthy interceptor—in 1986—the list of missions did not include bombing enemy combatants armed with AK-47s. The twin-engine air-dominance fighter was to lead the way in overcoming any adversary's most sophisticated fighters and air defenses—"sanitizing the airspace," as the pilots say, so that the more seeable, less capable airplanes could strike targets without being struck themselves. Recently back from the deployment to the Middle East, the 38-year-old commander of the Wing's 94th Fighter Squadron sat down for an interview with Air & Space to explain why the high-cost, high-end Raptor was included in the first night of attacks on ISIS positions in Syria, where the enemy fielded no weapon dangerous even to older tactical aircraft such as the F-16 and F-15.

Those attacks, he explained, were on territory within Syria, and the Syrian regime has the very type of sophisticated air defenses that the F-22 was designed to suppress. "Everyone on the coalition side was very aware of what the Syrian regime had," Lieutenant Colonel J said. (The Air Force asked that his name not be used; last March ISIS published a list of U.S. service personnel who had participated in strikes against ISIS, including addresses and photographs, with orders that ISIS followers find and kill them.) Colonel J was referring to the integrated air defenses (in which all forms of the defense network communicate with one another) built by the Syrians with Russian assistance. No one participating in the coalition airstrikes knew how the Syrian government would react to strikes on its territory. (Australia, Bahrain, Canada, France, Jordan, Saudi Arabia, Turkey, and the United Arab Emirates have participated in strikes on Syria.)

"We're essentially going after and targeting a non-state actor within the sovereign state borders of another country that we are not technically at war with, and we're not friends with," said J. "So we went the most conservative route and said, 'Let's put F-22s in there first.' " As it turned out, during that first night and all subsequent nights, Syria didn't activate its integrated air defenses against coalition airplanes. But on certain missions during the 94th Fighter Squadron's deployment, only F-22s flew the mission—because the targets were so close to Syrian missile sites. Journalists have reported the strikes launched from Al Dhafra air base, in the United Arab Emirates, two hours by air from Syria. (The Pentagon has not acknowledged the location.)

There was another reason the F-22s were sent in: They were already there. "We happened to be in the right place at the right time," said the pilot. For the past 10 years, he pointed out, F-22 squadrons have been deployed around the world, most recently to allied bases in Europe. The Pentagon calls such deployments Theater Security Package rotations. "It sends a message to would-be adversaries," J said. It tells them that the United States is willing to deploy its most capable fighter to the bases of its allies. Since national newspapers frequently announce the arrival of the Raptors, the message is carried to the friendly countries as well. "We happened to be in the Middle East this last time," said Colonel J. "And now, something kicks off in Syria...."

Though the Air Force doctrine of air dominance has always included the capability to bomb surface targets, the fact that a high-tech, high-cost interceptor made its first combat appearance as a ground pounder came as a surprise to some. Its attributes make it a real prize-fighter in the air. The F-22 has the strength and agility to turn at nine Gs, and the power to reach high altitudes and to cruise supersonically without afterburners. At lower speeds, it can redirect engine thrust to execute maneuvers impossible for the pilots flying against it in training exercises. Supercruise, high Gs, show-off maneuverability: That's a lot to ask of any airplane with a takeoff weight of 42 tons, but most analysts agree that no airplane in production matches the Lockheed Martin Raptor, which finished its costly production run at 187 units (estimated cost, \$412 million apiece), a quarter of the original plan.



The Raptor's canopy gives its pilot exceptional visibility. (Richard VanderMeulen)



The first 94th Fighter Squadron Raptors arrived at Virginia's Langley Air Force Base in March 2006. (USAF/Tech Sgt Ben Bloker)



After flying the black T-38 Talon against an F-22 in Louisiana last October, a 2nd Fighter Training Squadron pilot collected his thoughts. (USAF/Staff Sgt Russ Jackson)



Above Estonia last September, 95th Fighter Squadron F-22s, with A-10 Warthogs, trailed a KC-135. (USAF/Tech Sgt Ryan Crane)



95th Fighter Squadron F-22s visited Spangdahlem Air Base in Germany last fall. (USAF/Staff Sgt Chad Warren)



***Master Sergeant Russell Tilley inspects a Raptor's Pratt & Whitney F119 engine.
(USAF/Senior Airman Kayla Newman)***



***Testing tactics in an exercise at Nellis Air Force Base, an F-22 pilot prepares to rejoin
the fight. (Richard VanderMeulen)***



Chocked and lined up at Nellis, F-22s show off big intakes for dual engines, canted stabilizers, and a green glow on the canopy, light reflecting from a head-up display. (Richard VanderMeulen)



An Aggressor T-38 trails the British Typhoon, French Rafale, and U.S. Raptor. All flew at Langley last December. (USAF/Senior Airman Kayla Newman)



Prior to a mission over Syria in September 2014, an F-22 fuels up. (USAF/Tech Sgt Russ Scalf)

The F-22 is also big enough to carry bombs and anti-aircraft missiles in a bomb bay, but what made it most valuable in the first strikes on Syria is something small: its radar cross-section, so small that the F-22 is in a class almost by itself—the only other member is the B-2A Spirit stealth bomber.

Walking into a hangar where a pair of F-22s were undergoing maintenance, J pointed to various computers exposed by opened panels in one Raptor's fuselage and to the single M61A2 20-millimeter cannon (which carries 480 rounds) that mounts where the wing blends into the fuselage. Ordinarily, the gun is hidden in a compartment; a door covering its muzzle opens when it's needed and closes when the firing is finished, James Bond gadget-style. The gun will rarely, if ever, be needed; the F-22 is much more likely to see (and fire a missile at) an enemy before the enemy sees it. The Raptor's radar range is classified, but one pilot said he has "seen targets beyond 320 miles." Proud of the airplane's stealth, which he calls "low observability," J said, "I tell my friends in the Army: Imagine you're a sniper at night with night-vision goggles and a high-powered rifle and the guy you're up against has no goggles and a pistol. That's what it's like flying the F-22."

Besides those advantages, an F-22 pilot has super-hero senses. On the instrument panel of the fighter's roomy cockpit, a single eight-inch-square color screen displays a picture of what's going on around the aircraft. "The neat thing about the F-22 is it fuses the data coming from all the different sensors," J said. Some of those sensors are passive and embedded in the fighter's skin, so the pilot gets information without having to turn on his own radar. Said J: "So

I see radars. I see airplanes. I see surface-to-air missiles, and the jet knows where those things are and it tells me. So I have a picture of the battle space.”

Here is how that picture became useful on J’s first mission. The target was an ISIS camp in Syria, and the airborne warning and control system aircraft escorting the group of coalition strike aircraft had problems with its radar. The Boeing E-3 AWACS is a stand-off controller with a radar system that can spot aircraft flying at medium or high altitudes 400 miles away. In its console-packed cabin, more than a dozen operators study data on screens and pass the information along to strike aircraft and to major command-and-control centers. Had this command-and-control capability been lost, the mission could have been canceled.

“So the F-22 was the only aircraft out there that had the sensors available to see the air picture,” said J. And what he saw was a Syrian fighter-bomber over the target area, something the coalition aircraft wanted to avoid. “Part of the coalition’s objective while we’re going after ISIS is to not do anything that’s going to escalate the situation,” he said. The F-22s redirected the coalition aircraft to avoid any conflict. After the Syrian pilot departed the airspace, the F-22s led the strike force to the target. The Raptors dropped the first bombs; then the other coalition fighters hit the camp.

Outside the windows of the Joint Base Langley-Eustis office where Colonel J is describing his missions, a half-dozen T-38 Talon jet trainers, painted black, await the sorties that will give F-22 pilots the opportunity to practice for their primary mission: air dominance. The black T-38s fly as Aggressors in combat maneuvers, though again, unless the F-22s are overwhelmed by numbers, it is unlikely that adversaries will get close enough for a dogfight. The pilots train for the unlikely as well as the expected.

They also train to become proficient with the F-22’s avionics system. With the system’s ability to digest information from its own sensors as well as from other data-linked aircraft and pack it all into a single screen, processing the data can be a lot for one aircrew member to handle. (The F-22 has no dual-seat model, not even for training.) Could all the data overload the pilot? “We train to different scenarios and we do it over and over again, so you know at what point during a certain type of mission you should be prioritizing one thing over the other,” J said. In addition, the F-22 never flies alone. There is always at least one other Raptor in the sky, so two pilots are seeing the data.

The 1st Fighter Wing at Joint Base Langley-Eustis in Hampton has two Raptor-equipped squadrons: the 94th and the 27th, which both date back to World War I. The 27th is the country’s oldest active fighter squadron. Last December, the wing hosted the Royal Air Force and the French Air Force for “force integration” training exercises, intended to build up collective skills at flying into radar-intense, well-defended theaters—skills that could have gone stale during recent deployments to fight low-tech insurgencies. F-22s, British Typhoons, and French Rafales flew against F-15E Strike Eagles and Langley’s T-38s.

F-22 pilots also use the simulator at Joint Base Langley-Eustis, and a sophisticated sim at Marietta, Georgia, operated by Lockheed Martin. And before the 94th's next deployment overseas, the squadron will get more training at Nellis Air Force Base near Las Vegas.

For a select few F-22 pilots, this may include the Ph.D.-level course offered by the 433rd Weapons Squadron. It's got room for just six pilots a year because the regimen requires a lot of flying over five months. Without giving many specifics about its classified contents, Lieutenant Colonel Robert Brown, the commander of the 433rd, described one part of the course syllabus, the 600-page F-22 tactics handbook. One priority is learning how to carry out missions in hostile territory when radar is offline, radio links are compromised, and GPS signals are jammed.

The F-22, which is not invisible to radar, just very difficult to track, has a different strategy for avoiding detection than the Air Force's other stealthy but much slower marvel, the B-2 Spirit bomber. To get to their targets, B-2 pilots must follow a carefully mapped path they call the blue line. F-22 pilots, on the other hand, "are all about freedom of movement, at high speed and high altitude," Brown said. "We go where we need to go."

In addition to training pilots and updating the curriculum (the next edition is due this year), Brown's squadron teams with the 422nd Test and Evaluation Squadron to check out F-22 upgrades in the pipeline, before delivery to operational units, in order to find bugs and to write up procedures for future training. The "test-coded" Raptors at Nellis are as much as two years ahead of the "combat-coded" ones flying into Syria.

Past upgrades to the Raptor include gear and software to drop the GBU-39 Small Diameter Bomb, a 250-pound, GPS-guided munition with flight control surfaces that can extend its range. Fielded by the Air Force in 2006, Small Diameter Bombs can be dropped more than 40 miles from the target. Because of the SDB's precision and its smaller size, it can destroy a building, or even a specific part of a building, without damaging neighboring structures. The F-22 can carry eight SDBs in its internal bomb racks, as opposed to two standard JDAM-tipped bombs.

"Our first time that we dropped the Small Diameter Bomb in combat, we were going after a very high value target, a safe house, and it was important that we had precision and a low-collateral-damage weapon, because one of the most important goals from this campaign, according to our leaders, is not producing civilian casualties," J said. "And the precision capability of this weapon allowed us to completely destroy this target without scratching any of the houses around it."

While in the Mideast with the 94th, Colonel J got to thinking about what the F-22 could do to help when the Combined Air Operations Center identified short-notice, or "dynamic," targets. Dynamic targets pop up after a mission has launched, and therefore aren't in the original tasking orders. They could be combat vehicles, groups of fighters, or surface-to-air missiles on mobile launchers, among other things.

Figuring that such opportunities might come the squadron's way, the colonel talked to one of the pilots in his squadron who had experience as a joint terminal air controller. A JTAC is a serviceman or –woman, usually close to the action, who directs close-air-support strikes away from friendly forces and onto the enemy. J asked the former JTAC to assemble a quick training regimen so that fellow pilots would know the essentials of hitting dynamic targets under JTAC guidance. Adding to the challenge: In Syria, unlike Iraq and Afghanistan in earlier wars, JTACs wouldn't be on the ground with a direct view of the target. They'd be watching through the camera feeds of remotely piloted aircraft.

"We happened to have some Navy SEAL JTACs that were stationed near us that we were friends with," J added, "so we brought them in and we did some practice and training missions with them and some other JTACs. And within a couple of weeks, we ended up executing the first F-22 close air support missions using JTACs."

Although the new F-22 Tactics & Procedures Handbook will not reflect experiences in Syria, the Nellis Weapons School is sometimes called on to gather tactical experts to solve a problem in the war zone. Called Operational Planning Teams, they take on a problem, pull it apart for a few days, and deliver recommendations.

Brown declined to comment on which issues the teams have taken up. Still, one can speculate on F-22-related tactical questions that might justify advanced planning. Imagine this scenario: A coalition F-16 collides with one of the many drones flying over Syria. The F-16 pilot punches out and comes down near Aleppo, in ISIS-held territory. If a flight of F-22s is close enough to be of aid in the larger search-and-rescue effort, what part might they play?

Assuming they have enough fuel, the Raptors could set up a high-altitude perch with a unique view of the area, in lieu of more distant surveillance and command-and-control aircraft. They could absorb sensor data from other aircraft and combine it with onboard synthetic aperture radar, which can see the ground regardless of weather. While watching and sending data, Raptors could drop SDBs to keep ISIS fighters away from the pilot on the ground. That scenario is strictly hypothetical, but after ISIS killed a Jordanian F-16 pilot by setting him on fire, pilots are likely to think about the consequences of falling into enemy hands, said J.

Meanwhile, the international vortex that is Syria continues to draw in more countries and new state-of-the-art munitions, even as it pushes out refugees. Latecomer Russia is making up for lost time by sending more aircraft, artillery, and troops.

Russia learned one thing from established coalition procedures: When two Su-24 Fencers bombed rebel positions along the Turkish-Syrian border without fighter escorts, Turkish F-16s had no difficulty shooting one down. Soon afterward the Russians added missile-armed escorts to their bombing missions. Russia also set up a late-model anti-aircraft system called the S-400 Triumf, plus plenty of long-range missiles. Designer Almaz/Antei Concern claims the Triumf can locate and knock down any airplane, including stealthy ones like the F-22 and B-2. Could the Triumf system in the Syrian province Latakia be storing the radar signature of the F-22 for a later conflict?

As the F-22 pilots of the 1st Fighter Wing train for their next deployments, they have in their minds an event from an earlier conflict. It was in the closing months of the Korean war, on the night of April 15, 1953, when two U.S. service personnel on Cho-Do Island died in the blast of an air-dropped bomb. "Every F-22 pilot knows that date," J said. It was the last time U.S. ground troops died in an enemy air attack. The F-22 pilots mean to keep it that way.