

# Sharpening the Raptor's Talons

By John A. Tirpak, Executive Editor

**T**hough there are potential fifth generation challengers on the horizon, pilots and maintainers of the stealthy F-22 Raptor say they'll own the competitive edge in air combat for years to come, not just because of the advanced technology embodied in their fighter but because of their comprehensive training.

In the period immediately following the F-22's initial operations in 2005, pilots focused mainly on honing dogfighting skills and on a few large-scale exercises where Raptors were set apart from the bulk of the force. After eight years of exploring what the F-22 can really do, the Raptors have become more than a limited, silver bullet force and can now partner and integrate with other USAF combat systems and with those of the other services and allies.

At JB Langley-Eustis, Va., Col. Kevin A. Huyck, commander of the 1st Fighter Wing—the flagship F-22 unit for USAF—said the Raptor is the “enabler” of the US military and bears a heavy burden of expectation from combatant commanders to provide unquestioned air superiority.

Air Combat Command “has said that [the] F-22—fifth generation capability—is a priority,” Huyck noted. Because the F-22 would be first to go into a fight with any well-equipped, real-world adversary, ACC gives the 185-airplane fleet solid support in flying hours, simulators, maintenance, people, and training overall.

The smallness of the fleet and the priority it receives is not lost on the unit, Huyck said.

“We know we have a national treasure out on this ramp,” he said during an interview in his Langley office.

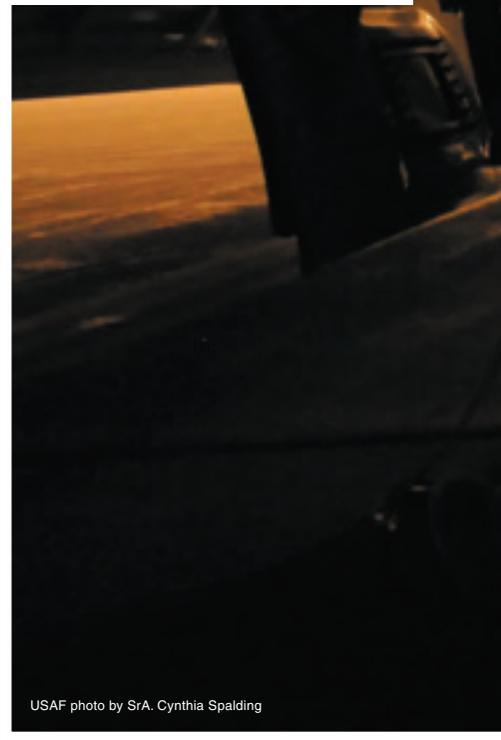
The service is “well aware of the importance to the nation of keeping [the F-22] up and running and continually improving,” Huyck said, adding that the wing makes every effort to extract full training value from the resources it gets. Flying hours are “precious,” he said, and a host of tasks are accomplished on each sortie.

Frequently, challenging missions are rehearsed in the simulator so that maximum benefit can be squeezed out of real flying time. Moreover, for every sortie of about 90 minutes, the debrief can last as much as six hours, as pilots scrutinize their every move in the airplane, looking for ways to improve.

In countless practice engagements with any other type of aircraft, the Raptors invariably come out on top with a wildly lopsided margin of victory, its sparring partners “destroyed” before they even knew the F-22s were there. This performance is not a secret, and Huyck said it provides real deterrent value.

“We make it very difficult on ourselves,” he said of F-22 training. Scenarios played out in training are “very realistic. All of our training needs to be realistic.”

To keep combat readiness at a peak, training is incessant, and the aircraft are extremely well-kept. For two years, the 1st FW has beaten ACC's goal of achieving an 80 percent mission capable rate. The stealth features of the F-22 are constantly checked and refurbished to go to war anytime. With little prep time likely if called to a real-world conflict, the F-22 fleet has no “tiered” readiness, Huyck said.



USAF photo by SrA. Cynthia Spalding

Because the F-22 performs so many missions—although air superiority is its primary function—“it takes about five or six months to go from basics all the way through every basic mission set that we train to,” said Capt. Marcus McGinn, chief of weapons for the 94th Fighter Squadron and builder of the master training plan for that unit.

“Normally, I will look about a year ahead,” planning engagements with adversaries from other services and allies, deployments to Red Flag and Razor Talon exercises, weapon system evaluations where F-22 pilots will drop live bombs or shoot real missiles, and practice of all variations of air combat, McGinn said. “It’s an evolving cycle” with constant changes.



*A1C Robert Miller checks the pressure on an F-22 tire at JB Elmendorf-Richardson, Alaska. Below: SrA. Simon Zemanek marshals an F-22 during a Phase One Operational Readiness Exercise in 2012. USAF's premier fighter is now fully integrated into the fleet.*

**The F-22 is the air dominance cream of the crop. USAF intends to keep it that way.**

USAF photo by SrA. Kasey Close





USAF photo by SrA Cynthia Spalding

Raptor pilots leave Tyndall with basic proficiency in the F-22. It's up to the receiving squadrons to see that they are developed into wingmen, then flight leads, and eventually into squadron leaders.

Experienced Raptor pilots at Langley get about eight flying sorties and two simulator rides per month, while young pilots get up to 10 sorties and three simulator sessions.

"Within those sorties, I have certain requirements" that must be met to ensure pilots remain proficient, Huyck said. For example, each pilot must fly in a four-ship employment, fly in day and night, fly with night vision goggles, perform aerial gunnery, aerial refueling, practice



USAF photo by A1C Daniel E. Liddicoat

**Top:** A1C Jennifer Craig works with Australian pilot Maj. Matthew Harper to prepare an F-22 for a flight from JB Elmendorf-Richardson, Alaska, to Tyndall AFB, Fla. **Here:** A Raptor takes off from the runway at Holloman AFB, N.M., during the culmination of a Phase One Operational Readiness Exercise.

Operational F-22 pilots start out at Tyndall AFB, Fla. Some are veterans of other fighters, such as the F-15 or F-16, while some come right out of undergraduate pilot training. The young officers began coming to the program early in its operational life, in order to grow future F-22 leadership.

Even in initial training, a sort of triage is applied to spend flying hours as efficiently as possible. While the typical pilot gets 19 flights and 29 simulator rides at Tyndall, "somebody with 2,000 hours in the F-15 may not need 19 sorties," said Huyck, himself a former Eagle driver.

Such pilots already have a firm grasp of air combat maneuvering basics, radar theory, and other skills, he said, and likely will progress rapidly, while the young officers may need more flying time. It's extremely competitive to be selected to fly the F-22 straight from undergraduate pilot training; officers must have demonstrated that they can rapidly master flying skills and have impeccable qualifications.

alert and alert scrambles, and complete composite force training.

The latter—usually conducted with dissimilar aircraft from other USAF units or aircraft from other services—is essential, Huyck insisted.

"I need to find a way to integrate because it's not just the strength of our platform. The strength of our Air Force is the systems integration, data link integration, fighter integration, composite force integration through all the services and all the platforms." The F-22s are good, but they can make everyone better, he said.

Within those mandatory tasks, he said, are subtasks such as electronic attack, "going against jamming," or operating under degraded or denied conditions,

such as the loss of radio communications or GPS signals. Other subtasks that must be demonstrated on a 30-, 60-, or 90-day cycle include dropping bombs, shooting missiles, and distributed mission operations. In a DMO, F-22 pilots, either in the aircraft or in the simulator, fly with and against aircraft from around the world brought together in a virtual battlefield.

### **Simulators No Substitute**

Maintaining proficiency is a never-ending task, McGinn said. "I never want to have [pilots] go months at a time and not see one of those scenarios," he said.

Simulators—Langley has four—are used to practice emergency procedures too dangerous to try in the real airplane. They also let pilots rapidly cycle through a series of combat "setups," where the simulator can put the pilot right at the scene of action without the need for the ground prep and transit time a real flying sortie would require.

The simulators also provide a channel for the DMO virtual exercises—something that Huyck anticipates will increase with time. All F-22 bases (save JB Pearl Harbor-Hickam in Hawaii) have simulators, and Hickam will have them in 2015. Until then, the Hawaii-based pilots travel to other F-22 bases for sim time every few months.

An ACC spokesman said the F-22 units have not resorted to offsetting flying hours with simulator time to save money and that "there has been no increase in simulator facilities." However, Huyck said that during the recent sequester-driven stand-down of one F-22 squadron—and before that, the grounding of the F-22 fleet due to a cockpit oxygen issue—simulators were used heavily to try to keep pilots minimally proficient until the stand-downs were over. But simulators are simply "not a substitute" for live flying; the two complement each other, he said.

When the F-22 was new at Langley, the base also had F-15C fighters, providing at-hand adversaries for the Raptors. It wasn't a fair fight, though, since the F-15Cs were easily seen on radar and the F-22s were invisible.

When the F-15s went away due to force structure cuts, the F-22s were left without a sparring partner on base, so the squadrons began to solicit training opportunities with Navy F/A-18s from NAS Oceana, Va., or Marine Corps F/A-18s and AV-8Bs from MCAS Beaufort, S.C. The F-22s also began to engage with Navy aircraft embarked on carriers in the Atlantic Ocean.

Those engagements have grown into a periodic exercise called Razor Talon, usually hosted by Seymour Johnson AFB, N.C. Typically in four-ship deployments, the F-22s get to fight against and alongside other services' aircraft and F-15Es from Seymour Johnson. The battlespace is usually area Whiskey 122, off the East Coast.

"It's still evolving," McGinn said of Razor Talon. During a November iteration, there were more than 40 Blue Air players. "We had 16 Red Air and then multiple air and ground threats," he said.

The exercise included Marine and Navy F/A-18s, F-16s from Shaw AFB, S.C., both an E-3 Sentry and a Navy E-2 Hawkeye for airborne warning and control, an E-8 JSTARS for ground target tracking, and KC-135 tankers for refueling.

Organizing the exercises with the other services is crucial because that's how it must work in wartime, Huyck said, and the Raptor pilots must be conversant with all the players they'll have to coordinate with during combat.

McGinn said it is "an end state goal" to make the exercise a kind of miniature Red Flag, such as the one run at Nellis AFB, Nev.

"The infrastructure is not really there; it isn't and never will be Nellis," McGinn said. The East Coast simply doesn't offer the same space, ground threats, or range instrumentation that the Nellis range does. But considering the 94th Fighter Squadron—one of the 1st FW's two—hasn't been to Red Flag in four years, "we'll take Razor Talon, absolutely."

Unlike a Red Flag, where the aircraft marshal together at a single base and brief the day's missions en masse, players in Razor Talon brief together via teleconference and launch from their own bases. Moreover, while a deployment to Red Flag may take a year's worth of planning and most of a squadron, the Razor Talon exercises can be thrown together in a few weeks and may involve only four of Langley's jets, McGinn said.

For a Red Flag, virtual DMO exercises are often practiced beforehand with the same units that will go to Red Flag, said Maj. Henry Schantz, an F-22 instructor pilot and ACC's Raptor demonstration pilot.

Just like rehearsing a complex flight in the simulator before a mission, the DMO rehearses techniques that will be used at Red Flag "with the same guys," he said. During the live-fly, they have familiarity with the other players, as in, "'Hey, remember when we did this two or three weeks ago? Remember what we learned here?' ... And it will end up making Red Flag a much better experience," Schantz said.

### **Even Getting Close Is a Win**

When not working up to a Red Flag, DMOs are run as often as weekly, he reported. A "white force" organizes them, administratively.

Dissimilar air combat training is vital for F-22 pilots, but one Air National Guard pilot said it can be hard recruiting F-22 adversaries.

"You don't want to play if you never see the F-22 and you just keep getting shot down, no matter how many runs you make," she said. "If you're the adversary, you're not getting good training."

To provide more cost-effective dissimilar air combat training, the 1st FW hosts a unit of T-38s, which play the role of Red Air. Fourteen aircraft are currently on station at Langley, said Lt. Col. Brian Kelly, director of T-38 operations at the 1st FW.

The aircraft—Air Force-owned and -flown but contractor-maintained—are ex-Republic of Korea T-38A and B trainers once leased from the US, then returned when the ROK got T-50 trainers.

"It does its mission great," Kelly said. "It's a low-cost, high utility-type aircraft that can present air-to-air targets [and] simulate fighter-type targets." The purpose of the T-38s is not to engage the F-22s in visual-range dogfights but to "provide long-range targeting problems," Kelly said. Should a T-38 actually close to "the merge" with an F-22, "the training point has been made," he said, meaning that if the T-38s got through, the F-22s did something wrong.

Besides Langley, Tyndall also has T-38s. The F-22s at JB Elmendorf-Richardson, Alaska, tangle with F-16s assigned as dedicated aggressors at Eielson AFB, Alaska, while JB Pearl Harbor-Hickam relies on transiting fighters, Navy aircraft, and other F-22s using embedded simulator training as their adversaries.

Huyck pointed out that F-22s fighting F-22s is like two blindfolded boxers feeling around for each other, trying to land a lucky blow. It's not especially useful training.

The F-22s typically take on much larger forces and nearly always fight outnumbered. They practice this scenario



USAF photo by Christopher Bush

or better enemies in real war? Why not use, say, F-16s or F-15s to simulate the Su-27 Flanker?

“If I tell you a Flanker is not going to see me and I’m going to be victorious at range, ... why would I waste all the money to pay for an advanced generation fighter to go against when I can get the same training benefit out of a T-38?” Huyck asked.

“That’s the fiscal prioritization that the 1st Fighter Wing, the Air Combat Command, [and] ... our Air Force, quite frankly, has to make with this F-22 platform.”

While he would “love to have a few extra millions around to have an adversary fighter squadron here,” it wouldn’t provide any additional training benefit, Huyck said.



USAF photo by ATC John Nieves Camacho

**Top: A Raptor from Elmendorf-Richardson moves to a final parking position at Andersen AFB, Guam. It arrived as part of US Pacific Command’s theater support package. Here: F-22s and F-15Es ready for takeoff during Exercise Razor Talon at Seymour Johnson AFB, N.C., in November. Razor Talon enables the F-22 crews to test the Raptor against F-15Es and aircraft from other services.**

on the F-22, the T-38s can be made to look like just about any other kind of threat aircraft.

“The importance of the T-38” cannot be overstated, Huyck said. Its value is not that it’s a nimble aircraft—which wouldn’t help it in an engagement with the Raptor anyway—but because “it’s another manned platform with a decision-maker” onboard, “a seasoned fighter pilot who is trained in air combat tactics, trained in adversary air.” When it shows up on the F-22’s radar as a foreign threat aircraft, “I can react based on that,” he said.

Why, though, use a T-38 when the F-22 is likely to face fourth generation

“When I look at the way we fight, ... the tactics and techniques that we use, the scenarios that we fight in, I can get myself to a level of training that’s fiscally responsible in the budget and flying hours we’ve been given, and I can transfer just a little of that into the simulator, to increase the fidelity of my training.”

McGinn said the T-38s also save money by relieving the Raptors of playing Red Air against other Raptors.

“If we don’t have the T-38s, then we have to provide our own Red Air” for day-to-day training. “Those Red Air sorties count as our combat mission readiness. ... So that is a huge benefit

constantly because it is probably the situation they’ll encounter early in a conflict. With embedded simulation

we get from the T-38s.” Instead of half of a 10-sortie mission being dedicated to Red Air, he said, eight or nine can be Blue Air missions, providing more realistic training.

The T-38s are also better than the computer-generated threats of the simulator, McGinn said.

“Even the best video game in the world can’t compare to a slightly dumbed-down live-fly event,” he said.

### Keeping Nimble

Asked what the biggest adjustment is for pilots coming to the F-22 from other fighters, McGinn said it’s the Raptor’s stealth.

“Incorporating the stealth piece ... is a significant mind shift,” he said, because the pilots have to unlearn the idea that everyone can see them, and they can operate “in that same portion of the airspace” and proximity to adversaries and remain undetected.

“That tactical jump is significant,” he said—the idea that “somebody isn’t necessarily shooting back.” The other adjustment is the change in spacing. Fourth gen fighters tend to fly closer together, while F-22s fly with “geographic separation.”

Besides pilot training, the day-to-day prepping, launching, and fixing of F-22s provides on-the-job training for the maintainers.

Capt. Travis Hilliard, 1st Aircraft Maintenance Squadron officer in charge, said, “Really, our guys are training right along with the pilots.” As the pilots do, the techs go to schools, but nothing keeps them mentally agile in supporting the F-22, particularly on a deployment, like the daily effort of identifying problems and fixing them. When F-22s don’t fly, skills get stale.

Another piece of maintenance training is “just the exercise of movement,” Hilliard said. “We are getting tasked to deploy more, now, so when we go” to a weapons-firing exercise, or a Red Flag, or another destination, “our guys learn how to get ready, deploy, get there, unpack everything.” They do this “in a place that’s probably not as nice” as home base, “and get the jets ready to start flying again. We’ve gotten very good at that.”

An added benefit of the ability to “tailor” the number and types of technicians who go on deployments, along with their gear, is that it has reduced the number of C-17 loads required for a deployment. In the early days of the F-22, without long-term experience, it was thought the requirement for C-17-loads of people and gear could never be met. Now, that metric rarely even comes into the conversation.

Part of the reason the support package can be tailored for a deployment is that the F-22 works pretty well, according to SSgt. Stanley Nelson, an F-22 crew chief at Langley.

“I really like this jet,” he said. “I can’t think of anything negative to throw at [it]. It’s ... maintenance-friendly. I don’t work the crazy amount of hours I did on my prior airframe: Strike Eagles, F-15Es.” The F-22 is easier to fix than other aircraft, Nelson said, and when an engine change is done, it’s almost always to comply with time-compliance technical orders, not because there’s something wrong.

TSgt. Arron Schultz, who works on the F-22’s stealth materials and coatings, said the F-22 is a leap ahead of his previous jet, the F-117. While there still is some “art” to maintaining the F-22’s low observable (LO) systems, gone are the days of tape and caulk, he said. Each F-22 gets a look-over after every mission, he said, and computer programs tell maintainers when coatings need fixing. All the LO except for a few “certain areas” can be repaired by squadron techs, he said. If those areas need work, they call in the engineers.

Hilliard said that when the F-22s were grounded during the oxygen issue—and again during sequester—the backshops

did a lot of LO remediation. When flying resumed, “we were able to manage these jets as if they had a brand-new” stealth level.

While the F-22 units are not technically part of the air and space expedition force, Huyck said they mimic the AEF timetables to provide predictability for their personnel. The F-22s aren’t necessarily tagged to a particular combat commander. An ACC spokesman said that F-22 units do participate in theater security packages and theater security cooperation deployments, such as one to South Korea early last year that was seemingly effective in quieting North Korea’s belligerent threats. If the units know they’ll be making a deployment to, say, Kadena AB, Japan, they will “work up” to that deployment, emphasizing the threats in that area.

Given that Russia and China are both developing fifth generation fighters that they say they will export, do the F-22s ever train against a notional fifth generation threat?

Huyck did not address the question directly, but offered two comments.

### Make It All That It Can Be

“One is that there is no fifth generation threat,” he said. “There is a challenge of a fifth generation threat [and] advancements in fourth generation.” At some point, he said, “there may be competition,” but he thinks it will be a long time before any potential adversary takes a fifth generation machine and wrings it out enough and trains with it enough to operate it systematically and reliably. Secondly, that challenge will only be a problem “if the F-22 is stagnant in training and capabilities and modernization and upgrades and maintenance, ... which I don’t see happening.”

Senior USAF leaders have said in recent months that in addition to the F-35, KC-46 tanker, and Long-Range Strike Bomber, a top spending priority under sequester is to continue to enhance the F-22 and make it, as Chief of Staff Gen. Mark A. Welsh III said, “all it can be.”

Asked about photos circulating on the Internet of an F-22 in the crosshairs of an F/A-18 or French Rafale or Indian Su-27, Huyck said “Adobe Photoshop is a wonderful thing.” More seriously, he said Raptors have to practice fighting within visual range, just in case something goes wrong and they find themselves in that situation. The Raptor is considered the most maneuverable airplane in the world, so that situation isn’t a crisis.

“We know how to fight within visual range. We win, pretty much all the time, because of [our] advanced maneuverability,” he said. Moreover, while the F-22 always flies at its full combat configuration—full fuel tanks and weapons bays—most adversaries “probably [don’t] show up to that fight in anything other than a demo-clean configuration” and “maybe they burn off some gas on the way in, to get the max performance they can out of their airplanes.” The Raptor “puts ‘cuffs’ on itself” so adversaries can get something out of the engagement as well.

While an opponent may grab a rare photo of an F-22 in its sights during a dogfight, “you know what that does? That increases the stock of the F-22’s air dominance capability,” Huyck insisted.

“Everyone puts the prize fighter up on the wall as the target. We don’t do that as the F-22. We go out on a daily basis, we do realistic training, we know that we are the most effective combat force in our United States Air Force. ... Our mission is to fly, fight, and win. We don’t need to go post pictures.” ■