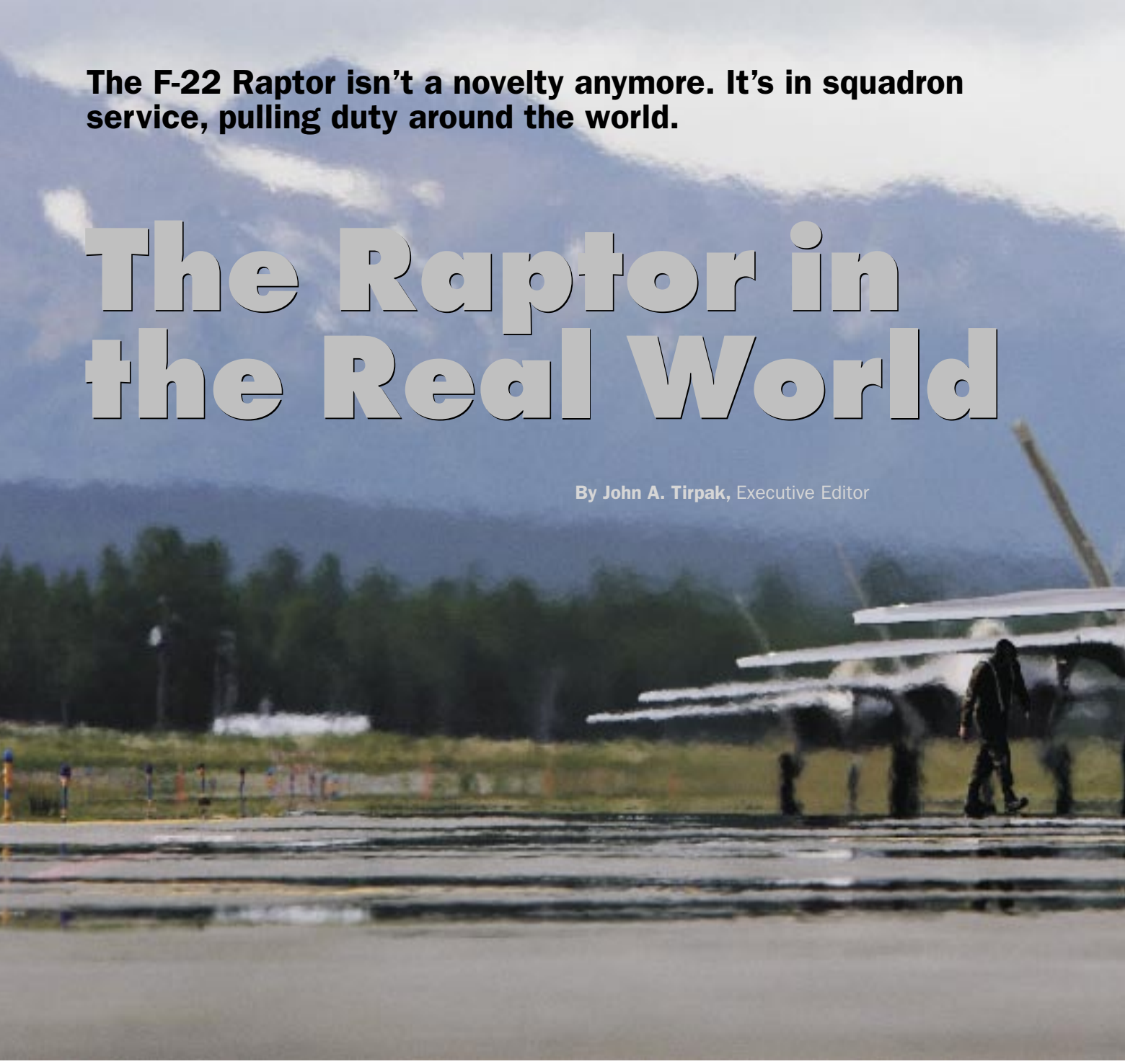
The F-22 Raptor isn't a novelty anymore. It's in squadron service, pulling duty around the world.

The Raptor in the Real World

By John A. Tirpak, Executive Editor



In little more than a year, the Air Force has transformed its newly operational F-22 into something remarkable—a weapon of true intimidation. The Raptor has proved itself time and time again in USAF's toughest wargames. In live exercises, it has trounced the best "opponents" USAF can muster. It hits them at unprecedented speeds and altitudes—and with impunity.

The F-22 does this while in the hands of operators—not test pilots, but rank and file fighter pilots. They consider it to be nearly as reliable as mature F-15 and F-16 fighters. Moreover, the Raptor has shown capabilities that may vastly amplify the power of the rest of the force.

In short, the F-22 is delivering on even the most ambitious claims made for it.

The 1st Fighter Wing, located at Langley AFB, Va., now operates two 20-fighter F-22 squadrons. The 27th FS, which in December 2005 became the first operational unit, is today pulling real-world alert as part of an Air and Space Expeditionary Force (AEF) deployment to Kadena AB, Japan. The 27th's sister squadron, the 94th FS, is at Red Flag exercises in Nevada this month, marking the Raptor's operational debut in that wargame.

In May, the 94th will also deploy on an AEF rotation. Its destination has not been announced. A third F-22 squadron, to be based in Alaska, is now taking shape.

Lt. Col. Wade Tolliver, 27th FS

Lockheed Martin photo by Eric Hehs

F-22s line up on the flight line at Elmendorf AFB, Alaska, in preparation for Northern Edge, the Raptor's first major exercise.

commander, said his unit has been working toward the Kadena deployment for about two years.

"We worked hard to bring this jet to initial operational capability," Tolliver said in an interview in his Langley office, "and, when we accomplished that in December '05, the celebration was great, but the next day, we got everybody in the squadron [together, to] make sure they understand the focus: what's next. Well, AEF 5 and 6 [has] ... been our focus ever since."

Big Contribution

He added that, "AEFs aside, we're sitting here at Langley with two squadrons the COCOMs [combatant commanders] can call on right now, anywhere in the world." In any conflict in which the US is engaged, said Tolliver, the F-22 can make a big contribution.

"The jet's performing very well for where it is at this stage—probably better than any other fighter that we've brought on line," he said. It all adds up to "a significantly increased combat capability" compared to what the F-22 had when IOC was declared.

The F-22 has had a busy year, prompted in part by circumstance: Last summer, Langley's runways had to be closed for major repair, obliging all flying units at the base to relocate for two months. The 1st Fighter Wing dispatched its F-22s to multiple locations, where it could demonstrate or confirm new capabilities.

A dozen F-22s, flown by a cadre of

USAF photo by TSgt. Ben Bloker

Two F-22s fly over Langley AFB, Va., in fall 2005. Langley's 1st FW now operates two squadrons of Raptors, each with 20 aircraft.

handpicked pilots and kept in shape by the 27th's best maintainers, went to Northern Edge, a two-week joint-force wargame in Alaska. Participants included 5,000 troops in Army ground units, Marine Corps ground units, Navy Aegis cruisers and aircraft, and Air Force aircraft ranging from fighters and search and rescue helicopters to E-3 Airborne Warning and Control System aircraft.

Col. Thomas Bergeson, the 1st Operations Group commander, said it was the largest exercise for him in 20 or so years. In one Northern Edge engagement, USAF and its sister services put more than 40 fighters in the air at once, as well as E-2C Hawkeye and E-3 AWACS aircraft.

To confront the F-22-led "Blue Air" collection, the joint force mustered its best "Red Air" threat—front-line F-15s, F-16s, and Navy F/A-18 Super Hornets. The F-22's team blitzed the opposition with a favorable 241-to-two kill ratio. What's more, the two lost aircraft were F-15Cs, not F-22s. The Raptors came through the engagements untouched.

In Red Flags, Bergeson said, "you have a great day if you lose only 10 percent of your forces." The massively lopsided victory for the stealthy F-22-led force was unprecedented.

"They [the Red Air adversaries] couldn't see us," Tolliver said. This was true even when the opponents were assisted by AWACS. "And that's what makes the F-22 special," Tolliver went on. "I'm out there and I have weapons like an F-15C or an F-16, but ... I'm basically invisible to the other guy's radar."

The 241-to-two record was amassed over two weeks of air engagements. Tolliver noted that, in such battles, Red Air units were allowed to regenerate and return to the fight, but lost Blue forces could not. Even with such handicaps, in the largest single engagement, F-22-led forces claimed 83 enemies to one loss, after facing down an opposing force that had generated or regenerated 103 adversary fighters.

And what about the two losses?

"If you see numbers where you never have a loss, I don't think you're training to your full ability," Tolliver said. "If you don't, at some point, have that simulated loss, we're not going to push ourselves to be as capable as we are."

Lt. Col. Dirk Smith, commander of the 94th FS, said that these aircraft losses stemmed from the aggressiveness of pilots, which was a good thing.

"They wanted to fly to the merge, they wanted to show" what such a fighter package can do "when you're highly outnumbered." Such exercises are "the perfect place to learn that kind of lesson ... so that, when it comes to real bullets flying, they've learned that."

"No Problem"

Although the Air Force would prefer that F-22 pilots destroy their targets at long range, there's no penalty if pilots get close enough to use heat-seeking missiles or guns.

Bergeson said he and a captain, flying F-22s, engaged six F-16s at close range, but it was "no problem." "We have a lot of capability in the close-in regime," noted Smith.

Red Air forces in Northern Edge posed a threat stiffer than what real-world enemies might generate, Tolliver added. "These are some of the best pilots in the world flying the best machines in the world," he said, "so

USAF photo by TSgt. Ben Bloker

Lt. Col. Dirk Smith, commander of the 94th Fighter Squadron at Langley, speaks with reporters after delivering the unit's first F-22 in March 2006.

Lockheed Martin photo by Eric Hehs

During Northern Edge, Raptors from Langley dropped 26 inert JDAMS, such as the ones seen here. All scored direct hits.

we're fighting a pretty lethal threat out there."

The exercise called for alternating air-to-air and ground-attack engagements. The F-22s dropped 26 inert 1,000-pound Joint Direct Attack Munitions, responding to close air support requests from ground troops. It was the first time Raptors had coordinated with ground-based joint tactical air controllers, and "every one of those [targets they designated] was a hit," Tolliver said. For some of the Raptor pilots, it was the first time they'd released real ordnance from the F-22.

Tolliver cautioned, "We're not an A-10; we're not an F-16. We don't do close support like that, but we do carry two 1,000-pound JDAMs, and we can support that ground troop, and that's ... what we proved." He noted that in the future, the F-22 will be rigged to carry up to eight 250-pound Small Diameter Bombs, so USAF's F-22 fleet is going to increase its ground-attack power.

Tolliver noted another eye-opening aspect of the exercise.

Even after using up all eight of their air-to-air missiles, he said, the F-22s did not have to leave the fight. The Raptors, protected by their stealthiness, could fly far ahead of the rest of their force, using their powerful onboard sensors to fill in the gaps where AWACS could not see, such as behind mountains. Raptor pilots could talk their non-Raptor colleagues into the vicinity of enemies no one else could spot. The F-22s were acting, in effect, as forward air controllers.

"Being airborne, with our sensors, ... basically increased the combat capability of every single asset that was sitting out there, including the AWACS, including the EA-6Bs," said Tolliver.

Advantage Raptor

The F-22's futuristic avionics suite, Tolliver said, allows the Raptor pilot to see all air and ground threats in a single picture, "without my having to build it mentally in my mind." It is "an amazing advantage for a fighter pilot," he asserted.

Overall, Tolliver went on, the exercise was "a great opportunity to work with all those assets and find out what the Raptor really does bring to the fight."

Air Force Secretary Michael W. Wynne has said that he wants all friendly platforms in an area to be able to see what an F-22 sees with its systems. At present, this kind of "common air picture" is not attainable because existing systems cannot transmit F-22 displays to other aircraft. Pilots must communicate by voice. Several F-22s, however, can share the same situation display. Data links that will allow the transmission of more information to other aircraft is one of the planned improvements for the program.

Though the F-22's Northern Edge combat victory was impressive, the Raptor reliability story may have been the bigger news. Of the 105 sorties assigned to the Raptor, it flew 102. That signifies an astounding 97 percent mission effective rate, Tolliver noted. He pointed out that it was an unprecedented achievement for any brand-new fighter.

"In all the things we did at Northern Edge, I think that ... is the biggest success story," said Tolliver. "We proved ... that this jet can go on the road, away from its [support] structure here at Langley, ... and be able to generate those kinds of sorties [outside the continental US], and make it happen with that kind of effectiveness. We proved we can be an immediate contributor to the fight."

The 27th took with it about 170 short tons of cargo, somewhat more than would be needed for an F-15 squadron. When it has been flown for about 100,000 hours, the F-22 will have achieved what is considered "maturity" and will require less baggage on a deployment. Maturity is still about five or six years away.

"We're still kind of learning which parts fail, for the supply chain," Tolliver said. In future deployments, it won't be necessary to take as many spares since the unit will have an ever-better handle on what it needs to take—and what it really doesn't.

While the 27th was fighting the massed Red Air battles in Alaska, the 94th FS, commanded by Smith, flew to Hill AFB, Utah, for a different kind of action. Smith took 16 airplanes along, which was all of the 94th's airplanes as well as a few from the 27th that didn't go to Northern Edge. His force grew to 20 airplanes over the summer, as four more Raptors arrived from the Lockheed Martin plant in Marietta, Ga.

At the Utah Test and Training Range, the 94th's F-22 fighters dropped 40 JDAMs while in supersonic flight. It was further validation of a capability that had been demonstrated in testing just once, with one bomb. It was also the first supersonic weapons delivery by an operational unit.

Just before the F-22s arrived, the test community cleared the Raptor for release of JDAMs at Mach 1.5, from an altitude of 50,000 feet. At that altitude and speed, Smith said, "we're dropping on coordinates from quite a long ways away." The rounds were inert, but were released in a variety of ways so as to further "validate the weapons employment zone" for the F-22's main ground-attack weapon.

On Target

"They were all direct hits," Smith said. The JDAMs do not need to be altered for supersonic delivery.

Smith noted that his group included the least-experienced F-22 pilots and maintainers, many of whom were getting on-the-job training. "I was just completely blown away by how these brand-new [people] figured out how to get the job done," Smith said.

During the time at Hill, without the F-22's regular support facilities, the maintainers turned in a utilization rate of 17.9 sorties per aircraft, per month, compared to about 20 for the F-15C, which is a mature system.

Smith said it was worth noting that the F-22 is no longer a pampered machine that has experts standing around to take care of the slightest glitch. "Here it comes, out of the factory, and you give it to a 26-year-old pilot and 20- to 22-year-old crew chief, and they figure it out ... and figure it out fast."

While at Hill, the 94th FS sent some airplanes to Mountain Home AFB, Idaho, to demonstrate the F-22's ability to deploy to an away base, recover at yet a third base, operate from there as a transient, and come back to the deployment base.

From Hill, the F-22s flew down to Tyndall AFB, Fla., where the 94th demonstrated live shots with real AIM-120C radar-guided and AIM-9 heat-seeking missiles, marking yet another first—that of an operational F-22 shooting real missiles and killing real aircraft.

Not many drones "died" in the Weapon System Evaluation Program piece of the road trip, because the weapons test organization has a limited budget for missiles and drones alike. Weather claims some sorties, as do required functions such as clearing the ocean test range of fishing boats. Drones may have mechanical problems. Other tests may take precedence.

"About 94 major and minor miracles" all have to happen to conduct a live missile shot, Smith noted.

Some shots were fired at the very edge of the employment envelope in hopes that the missile would score a "lethal miss," allowing the drone to survive and live to "fight" another day. Three AIM-120C-5 AMRAAMs and 13 AIM-9M Sidewinders were fired, because that's what the test budget would allow.

Why is shooting a live missile such a big deal?

Smith said the missile launches help pilots to know what a real missile launch will look, sound, and feel like, so they will know when it looks right and when it doesn't.

Practice It First

"When I push the pickle button, it takes about a second, time slows down, it seems like it takes an eternity, and you hear a clunk, and you hear a big roar, and you see a big fireball and a smoke trail, and then all of a sudden, it's gone," Smith said of the experience. "And what does it look like if it's guiding right? And what's it look like if it's not guiding right and you need to shoot another one?" The first time a pilot experiences this should not be in combat, he added.

Likewise, the experiences of the ground crews in handling, loading, and wiring up real missiles that are going to be fired is different than working with training shapes or inert rounds.

Also at Tyndall, the 94th's pilots got a chance to use the F-22's internal gun—another operational first—by firing at a target dragged by a Learjet.

Northern Edge, the supersonic drops, and the missile firings: all were part of the workup to get the 27th and 94th ready for their AEF deployments, Tolliver said. Most AEF units get to go to a Red Flag as part of their workup; Northern Edge counted as the 27th's Red Flag equivalent.

Maintenance continues to improve on the F-22 as experience is accumulated with the airplane. Col. Dain West, chief of F-22 maintenance at the 1st Fighter Wing, noted that, as good as things are now, they will improve, as "the book" on the airplane is written.

He doesn't have "a whole lot of well-seasoned mid- and senior-level NCOs that have been working on the plane forever," and those who are there don't have the benefit of years of tech orders that describe how best to diagnose and repair problems.

"We're writing the book. And while you're writing the book, you're also trying to train new guys, with a book that's continuing to be updated." The "book" will also form the basis of an Air Education and Training Command curriculum in F-22 maintenance, to be ready by 2008.

The F-22 is helping to make that go faster, however, with the most advanced self-diagnostic system ever fielded. The airplane will tell the maintainer about any anomalies during a flight, so he can check them out as soon as it lands. Frequent updates, in which contractors update the software to reduce the number of false alarms, help streamline the work even more.

West said there has been strong teamwork between the Air Force and its contractors on the F-22, what Smith called "the blue shirts and the polo shirts."

He also said that mission capable rates, a common measure of how well aircraft are performing mechanically, are hovering at "about 70 to 75 percent," which is "just below" the Air Force-desired 75 to 78 percent.

Fewer Fighters

About the only thing holding back the F-22 program at this point is the planned inventory. The Air Force was compelled to accept a fleet of 183 Raptors as

Lockheed Martin photo by Eric Hehs

Two aircraft maintainers from the 27th Fighter Squadron at Langley leave the flight line after checking out the F-22s.

USAF photo by TSgt. Ben Bloker

Two F-22s of the 27th FS fly in formation with an F-15 over the Virginia countryside during a training sortie.

one result of last year's Quadrennial Defense Review. The service has long maintained that it requires a minimum of 381 to meet its obligations.

The Air Force has accommodated to the lower number by making changes at nearly every level. The 1st FW was to have fielded three squadrons of F-22s, for a total of 72 aircraft, or 24 combat-ready fighters per squadron. Now, the size of the squadrons has been trimmed to 18 (plus two attrition spares per squadron). Moreover, the 1st FW will field just two squadrons of Raptors.

"Post-QDR, when the decision was made to reduce to ... 183 Raptors, then the decision was made to field them at seven full squadrons at 20 jets per squadron," Bergeson said. The 1st FW's third squadron—the 71st FS—will keep its F-15Cs.

The third F-22 squadron will stand up at Elmendorf AFB, Alaska, next year.

Already, the first Elmendorf-bound aircraft are arriving at Langley. Pilots and maintainers will gain experience at Langley by integrating with the 27th and 94th for a time. When Elmendorf is ready to receive the aircraft and there are enough personnel to make it work, the F-22s with the "AK" tail code will head out to Alaska.

"The pilots that we populate Elmendorf with will come from a few different locations," Bergeson explained.

"We'll give them some seed corn—some experienced pilots from the 1st Fighter Wing," between six and eight who are instructors, and the rest will be drawn from other fighter types. The same model was applied in standing up the 94th.

However, peeling off pilots to give to Elmendorf, as well as the normal attrition of pilots who must leave to go to schools or new assignments, means the Raptor fleet will be chronically short of pilots for awhile. That means the pilots who do fly the type get a few more hours every month than fighter pilots in other aircraft. Smith, however, noted that this will contribute to developing a seasoned cadre of F-22 pilots more rapidly than would normally be the case.

"We define 100 hours [in the aircraft] as 'experienced,'" Smith said, and this benchmark has affected the transition of Virginia Air National Guard crews to their new assignment working on the F-22 at Langley.

Under the Base Realignment and Closure commission, the 192nd Fighter Wing from Richmond, Va., is giving up its F-16s and becoming an "associate" unit at Langley. Members of the ANG unit will work alongside the 1st FW's personnel in almost all fields, from maintainer to pilot. However, Smith said it will take some time before the F-22 can be a typical Guard pilot assignment.

Not Smart

"Both parties agreed, we didn't think it would be smart" to put a 2,500-hour F-16 pilot in the F-22 "and fly one weekend a month in a brand-new airplane," Smith said.

"We want you to get seasoned for a period of time as a full-time guy," but the mechanics of how this will work have yet to be decided, because ANG pilots are assigned and paid differently than active duty pilots.

"I personally think it ought to be about a year" for a pilot to work at the squadron full-time, "and then he probably has enough soaked in about the airplane to be ready to start doing part-time."

One good thing about the ANG coming in, though, is that as the Guard maintainers and technicians become practiced with the F-22, they will stay put, helping ease the experience drain that will come as active duty personnel leave the unit.

The F-22 pilots and maintainers have few complaints about the F-22, but they are developing a wish list of things they would like to add to its impressive portfolio of capabilities. They would like to add an ability to use a dual mode bomb, able to guide either by satellite or laser, to provide a more responsive ground-attack capability. They would like to have a helmet-mounted weapons cuing system and are anxious for the day when they can transmit their comprehensive picture of the airspace to anyone in the air or on the ground who needs it.

Already in the program—improvements called "spirals"—are upgraded synthetic aperture radar, new radars (already being delivered in new aircraft), better geo-location of targets, and shadowy capabilities in airborne electronic attack. (See "Where Next With Electronic Attack?," October 2006, p. 30.)

Bergeson said he is trying to educate the rest of the Air Force and the services as a whole about what the F-22 can offer.

"I've had one of my operations officers travel around to the various combatant commands and give a capabilities briefing at the classified level to all their planners, so they know what we can bring to the fight right now—what we can and can't do."

The regional commanders have started to "develop us into their war plans. And all the briefings have been very well received," he said.

"As people become more familiar with the fact that we're really here, we're really flying, there will be more demand." Already, however, he acknowledged that the long-anticipated F-22, with its awesome capabilities, is "right now ... a low-density, high-demand asset." ■