



**USAF'S BIGGEST PROBLEM
WITH THE F-22? THERE AREN'T
ENOUGH TO GO AROUND.**

Open wide: An F-22 displays its weapons bay for an air show at JB Elmendorf-Richardson, Alaska. In wartime, the Raptor carries AMRAAMs, JDAMs, and SDBs. Specialized munitions could make the limited fleet even more effective.

By John A. Tirpak, Editorial Director

CRITICAL INGREDIENT *in* SHORT SUPPLY

TEN years after the Air Force declared initial operational capability with the F-22 Raptor, the jet is receiving high marks for its combat performance, proving itself to be everything USAF expected—and more. The biggest challenge for the Raptor community now is how to stretch the limited fleet so USAF can guarantee air superiority until a successor aircraft comes along. That may not happen for another 20 years.

Raptors deployed in Operation Inherent Resolve against ISIS over Iraq and Syria have proved so crucial to the coalition air campaign over the last 17 months that Air Combat Command chief Gen. Herbert J. “Hawk” Carlisle has said US Central Command simply won’t send strike packages into some areas without them. Far beyond merely protecting coalition aircraft from hostile fighters, the F-22s are serving as the quarterbacks of the campaign. As the forward-reaching eyes and ears of the Air Force, the Raptors are directing strikes, shepherding air packages away from danger, destroying high-value ground targets, and vastly enhancing the situational awareness of the whole enterprise.

The F-22 has been a potent show-of-force tool with which to demonstrate US capability and resolve to adversaries. Rapid, unannounced deployments of F-22s have been made to various bases in the Pacific, the Middle East, and Europe when tensions with North Korea, China, Iran, and Russia have escalated. The presence of the fighters has frequently quieted belligerent rhetoric.

Although the F-22 has not yet been called on to demonstrate its prowess in a live dogfight, the jet has built a dominant record of wins in both domestic and international air-to-air exercises and live combat missions.

The fifth generation F-22 “is even better than we thought it was. It does more than we even thought it could do,” Carlisle told reporters last September at AFA’s Air & Space Conference. Indispensable in the fight against ISIS, the Raptors “allow those fourth generation airplanes to be even better than they would be on their own. ... They make everybody better.”

The Raptor, he said, “is showing itself to be absolutely critical to the success of those air fights.”

In the anti-ISIS campaign, F-22s are quarterbacking the fight “to make sure the right people are in the right place at the right time,” said Maj. Justin Anhalt, ACC’s F-22 requirements officer.

“In this type of environment, we’re keeping everyone ... safe. We’re keeping [coalition aircraft] away from the Syrian aircraft and the Russian aircraft and ... we continue to make sure things are de-escalated.”

The F-22’s unique attributes are its stealthiness, high speed, ability to fly at very high altitude, and sensor fusion.

The Raptor’s sensor fusion integrates both the airplane’s own impressive intelligence-collecting capabilities with inputs from AWACS and other sensor aircraft to provide a comprehensive picture of the battlespace.

Anhalt explained that while AWACS is good at marshaling forces and seeing the large-area picture, the F-22, “at the tip of the push downrange, puts you in a great position to be able to see everything that’s going on out there and maneuver the force.” The F-22, deep inside hostile territory, can see behind mountains and other “radar blind spots,” track hostile aircraft with fine-grain detail, and control “the flow of the fight,” Anhalt said. Moreover, the Raptor provides the information it collects to



USAF photo by SrA. Cynthia Spalding

the other aircraft in the package, boosting their situational awareness.

The US-led coalition tries to give Syrian and Russian aircraft operating in the area a wide berth, but a ground threat—in the form of surface-to-air missiles and anti-aircraft artillery—“has not been an issue for where we’ve been operating,” he noted.

Last June, Carlisle spoke of an F-22 mission lasting nearly 12 hours, with multiple aerial refuelings, in which the striking F-22 was “re-roled” into other pressing tasks to collect sensor information, protect a wayward package, or take charge of aircraft retasked to strike different targets.

WRITTEN INTO THE PLAYBOOK

Such missions are a testament to the ability of the Raptor to stay in the fight,

but these incidents are not common, Anhalt said. “They’ve been less and less frequent as time has gone on,” he said.

The Air Force declines to describe the size of the F-22 force deployed and its operating location, but Anhalt explained that the F-22s change out periodically, along with their crews. Several F-22 units have deployed to Operation Inherent Resolve, each arrival overlapping with the departing unit by a week or so in order for the crews to share lessons learned. These lessons are being collected and written into the F-22 playbook, shared with other F-22 pilots at a regular meeting, called Fighter Dominance, in Marietta, Ga., and disseminated to other elements of the combat air forces through conferences such as the annual Weapons/Tactics meeting at Nellis AFB, Nev., in January.

The number of F-22s assigned to OIR has not changed from the original deployment, so USAF accurately assessed the number needed to do the job at the outset, Anhalt said.

One of the expected obstacles to employing the F-22 in large-force operations like OIR was that F-22s, to preserve their stealth, don’t have the same kind of data-sharing equipment as the fourth generation force. This issue has been overcome through voice communications, exhaustive planning, and the air tasking order, Anhalt explained.

“There currently is no common data link between the F-22 and the fourth gen fighters,” he said, but smart lieutenants and captains have “gotten around” that capability gap.

Above: A1C Robert Miller checks an F-22’s tire pressure. Maintainers have turned the F-22s at a rapid pace, helping USAF get the most out of the fleet. At right: A Hawaii ANG Raptor takes off from JB Pearl Harbor-Hickam last September for a CENTCOM combat deployment.



ANG photo by A1C Robert Cabuco

The fourth and fifth gen pilots have figured out “how to integrate tactics ... without that shared data link” through the use of “contracts” regarding who will do what and when. The pilots are then “able to pass very specific things over traditional UHF [and] VHF radios, to where not only can we execute the mission, but ... at the same level, as if we were sharing information perfectly.”

He explained that once the ATO is developed, units that are geographically separated will email and call each other by phone to script the mission in fine detail.

“Everyone knows what to expect from everyone else. And then within that construct, we have set tactics that are standardized throughout the combat air forces, and [which] we’re also starting to share with our coalition air forces.”

So exhaustive is the planning and well-understood the environment that “there’s very little improvisation. As it turns out, the way we train is the way we fight, and everything that we were training for is working extremely well,” Anhalt said.

It’s not perfect, though, and the F-22 improvement plan, known as “Tactical Mandates,” has a line item to integrate the Link 16 transmit function on the F-22. In fact, this is considered so vital that it has been accelerated a year.

“In 2020, we’re going to start modifying 72 aircraft so they will have Link 16 transmit and open mission systems on it,” Anhalt said, joking, “Never before seen: Air Force actually moves a program to the left and does something faster.”

Even with all the mission leadership duties and a real battlefield with many different nations—having different objectives—in the air all at once, F-22 pilots are not finding themselves taxed.

“Our training ... is orders of magnitude more stressful for the pilot than what we’re calling on them to do in OIR,” Anhalt asserted.

Russian and Syrian pilots are “interested” in the F-22, and may have tried maneuvering close by to see how the jet operates, but “because of our sophisticated avionics and ... stealth and ... supercruise and maneuverability,” there’s “not a time where we allow Syrians or Russians to see us or influence us in any way without us choosing for them to do that,” Anhalt explained. He said there were “some incidents ... early on” in which F-22s had to steer coalition air packages away from the



USAF photo by MSgt. Carlos Claudio

SSgt. Greg Willis, A1C Darby Ryan, and SSgt. Christopher Stacklin (left to right) inspect an ammunition loading system at JB Langley-Eustis, Va., in 2012.

Syrian or Russian jets and “we were very close to them and they never realized it.”

Asked about the principal lessons learned about employing the F-22 in combat, Anhalt said, “Before you send an aircraft to war, you always worry, is it going to perform?” So far, “everything is working exactly as we would expect.”

Prior to OIR, he said, F-22 pilots had little experience performing air-to-ground missions, dropping “only a handful” of bombs over a decade. In the last 17 months, however, bomb-dropping missions have become routine. Because of that, “we’ve ... learned a lot about our air-to-ground ordnance and how to better allocate weapons for certain targets” and mission planning. The experience has been “good for the [F-22] community. We’ve wrung out that portion.”

The F-22 is limited to the 500- and 1,000-pound JDAMs and the Small Diameter Bomb in the ground attack regime. Though there have been times the F-22 community has expressed a desire to add other types of munitions to the portfolio, “we realize there’re many other platforms, like fourth gen platforms or bombers, that are carrying these very specific weapons” and “so long as they’re doing it,” the F-22 fleet doesn’t necessarily need to replicate that capability, Anhalt said.

Near-term improvements for the F-22 include the latest air-to-air weapons: the AIM-120D AMRAAM and the AIM-9X Sidewinder. Anhalt said the AIM-9X would deploy with whatever F-22 unit deployed to theater first in early 2016. Longer term, the Air Force is looking

at several candidates to put a helmet-mounted weapon aiming system on the F-22. A new helmet is expected around 2021.

Other near-term improvements include software updates providing ground collision avoidance and “stability” updates that test pilots have “really loved,” Anhalt noted.

IT JUST WORKS

Carlisle said deployed F-22s are turning in a “75 to 80 percent mission capable rate, which is in line with airplanes we’ve been flying in the inventory for decades.”

The low observables maintainability “is still something we’re working on,” he said, but no F-22 sorties have been scrubbed for maintenance.

Parts are somewhat in short supply, but that’s because the F-22s are flying vastly more hours than expected. “We’ve exceeded those [planned and funded] hours by thousands of hours,” Carlisle said, compelling USAF to find extra funding to make up the shortfall.

Even so, “when supplies are short,” deployed aircraft get precedence and turn in better mission capable rates than jets at home station.

The Rapid Raptor deployment in August to Europe also was “amazingly successful,” he said. “We flew 100 percent of the sorties,” operating from bare-bones bases.

“When American airpower shows up in a place and a time” when it’s not expected, “it’s a pretty big message to assure our allies, friends, and partners”

F-22s at JB Elmendorf-Richardson, Alaska, prepare for a training mission. Though it has not been in a live dogfight, the F-22 has flown combat missions against ISIS.

as well as to “potential adversaries,” Carlisle observed.

Battle lessons learned have prompted quick-reaction upgrades which expand the number of ways ground coordinates can be entered into the F-22’s computers from the pilot or offboard sources, like the Army’s Military Grid Reference System, or MGRS. It will enhance F-22 communication and integration with ground units accustomed to MGRS. Raptor pilots will have the new capability in theater this month.

The biggest deficiency in the F-22 fleet, though, has to do with the number of F-22s. There simply aren’t enough of them.

The Air Force’s vetted requirement for the F-22 was 381 aircraft—a number that evolved from a Cold War high of more than 750. Although the 381 number had been verified by numerous studies inside and outside the Pentagon, then-Defense Secretary Robert M. Gates terminated the program at 187 aircraft in 2009.

As a result, the Air Force has had to craft a new strategy to use the F-22 as

a “silver bullet” force, enhancing the fourth generation fleet and parsing jets out to various contingencies in small quantities. Last year’s Rapid Raptor deployment to Eastern Europe, while quick and unexpected, only involved four aircraft. A similar deployment was made to the Persian Gulf region in 2013 in response to Iran’s threatening rhetoric and aircraft movements. The very first such deployment to Kadena AB, Japan, was to send a message to North Korea, and former squadron officials involved with that deployment said it accomplished the mission handily.

“I think we got their attention. ... They shut up pretty quick,” said one former F-22 squadron commander.

DREAMING

One obvious solution to the shortage of F-22s would be to simply buy more—but that is much easier said than done. The production line at Lockheed Martin’s Marietta facility took years to develop and build; workers had to be cleared,

trained, and certified. While Congress ordered the F-22’s tooling to be stored when the production line was stopped, as a practical matter, it would take years to get the line up and running again. Compounding the problem, the learning curve of workers would have to start over from nearly scratch.

Asked if the Air Force would ever put the F-22 back in production, Carlisle said in September, “I dream about it every night.” It’s a “very tough question,” he said, adding, “I don’t know if we would be able to get that through Congress.”

At the time of the F-22’s termination, a RAND study found it would cost upward of \$19 billion to shut down the F-22 production line, then reconstitute it later and produce 75 new jets. Anhalt said he knows the current-dollar number to restart the F-22 line because “the question gets asked” within government, but he declined to discuss it.

Brig. Gen. Jeffrey B. Taliaferro, ACC’s director of plans, programs, and requirements, said in a January interview that

USAF photo by A1C Matthew Lancaster

During a 2011 Red Flag at Nellis AFB, Nev., crew chiefs SrA. Idma Ramirez and SrA. Sheila Smith work on an F-22. During deployments, the multirole fighters have had a 75 to 80 percent mission capable rate.

An F-22 flies over the Pacific Ocean. After 10 years in service, the Raptor remains USAF's newest operational fighter.



“we’re really challenged in the number of recapitalization programs that the service is taking on, over the next decade or two,” and an F-22 restart or an acceleration of its successor, tentatively penciled-in for the 2030 time frame, might be one program too many.

With no new jets likely coming, the Air Force will have to find ways to get more out of the F-22 force that it already has. Anhalt said the maintenance force is doing an excellent job turning the F-22s at a rapid pace, “keeping the jets flying and the people trained.” The logistics train is “pretty mature” so “I think there’s very little juice to squeeze out of that.”

What about taking some of the F-22s used to train pilots and converting them to combat status?

Taliaferro said the schoolhouse doesn’t really have any “overcapacity” such that it could give up any Raptors. Also, the jets at Tyndall AFB, Fla., are not maintained to the same configuration as the combat-coded force, “so there’d be a bill to bring that fleet up” to the same combat-ready configuration.

USAF owns “two fleets that are getting farther and farther apart as time goes by,” Anhalt explained.

Discussion of whether the training fleet could give up some aircraft will probably have to wait for the Fiscal 2021 spending plan, Anhalt said. That would be the time to develop a “midlife update” on the F-22 fleet, because it will have been operational for 20 years and its technology will be “30 years old” by then.

“We’re probably going to have to do a very significant upgrade on the aircraft at that point,” he predicted, and that would be the best time to consider “whether we take all those training jets and [bring them to the] common configuration.”

There are other initiatives being considered. One way to get more out of the existing fleet would be to squeeze more munitions into the F-22’s weapons bay. The jet can carry six AMRAAMs or two JDAM bombs and two AMRAAMs in the main bay and one Sidewinder in each of the “cheek” bays. Smaller munitions with the same capability could boost the effectiveness of each sortie by increasing the number of shots each F-22 could make. Former ACC chief Gen. Gilmory Michael Hostage III said the limited weapon load-out was his only regret about the F-22.

“I think we see having a deep magazine for our combat-coded fleet is important and is a challenge,” Taliaferro said. “Over time, shrinking munitions may be a way to influence that challenge,” he added, declining to comment further.

HANGAR QUEEN NO MORE

The F-22 can carry stores externally, but doing so sacrifices its stealth.

Anything that can be done to avoid reducing the F-22 fleet further is being done. A senior USAF official said it is unofficial policy that any F-22 damaged in an accident will be repaired if it’s technically possible to do so, but there are few spare components laying around.

USAF has considered reconstituting production of some major F-22 parts, but “what it comes down to, is, we more or less have to lose a wing before we decide we’re going to buy a new wing,” Anhalt said.

A “hangar queen” former F-22 flight-test article that has been reassigned as a maintenance trainer at Edwards AFB, Calif., will be restored to flying status. This bird will be used for some “very specific” testing the Air Force envisions coming in the future, Anhalt reported. “It is going to be a workhorse in one very specific realm, which I won’t get into.”

Chief of Staff Gen. Mark A. Welsh III has said on numerous occasions the shortage of F-22s means the Air Force will rely on the F-35 to achieve air superiority in future conflicts much more than originally planned. Even though the F-35 was to be a multirole jet and not a dedicated dogfighter, Anhalt said it will be superior to the F-15 in the air-to-air regime.

“As threats continue to evolve ... having stealth is basically your ticket to get into the fight, and if you don’t have stealth, you will not be there,” he said.

“I sit in the vault with the F-35 requirements guys, and we have discussions every single day about how we’re going to be complementary to each other, and how we can attack this problem as we move into the future.”

Similar to its communications problems with F-15s, F-16s, and other fourth gen fighters, the Raptor also cannot securely communicate with the F-35. This issue will be answered circa 2020 with the Link 16 solution.

“It just makes sense for us to get Link 16,” Anhalt said.

Taliaferro said the F-22 push from here on will be to “keep it relevant,” adding, “We know fifth gen is needed to complete the mission.” While the F-22’s role against ISIS is getting a lot of attention, the Raptor has been deploying overseas to various theaters “for several years now, and even those sorties that don’t shoot a missile or drop a bomb—they have an effect.”

Carlisle said, “We have to figure out how to make” the Raptor “a long-term, viable part of the fight, just like we have with other low-density, high-demand assets.”

As have many other high-demand assets, the F-22 has proved itself in combat without there being enough assets to meet demand. ✪