

The Air Force of the future will have a “high-low” mix and a “new-old” mix.

Making the Best of the Fighter Force

by John A. Tirpak, Executive Editor

Even if the Air Force gets all the new fighters it needs—381 F-22 Raptors and 1,763 F-35 Lightning IIs—it will still have to field an unprecedentedly large number of older fighters for decades, in order to meet all the service’s obligations. No longer will “aging aircraft” issues focus solely on large mobility and sensor aircraft; the Air Force is now preparing to fly fighters that will near 50 years old.

To pull off this feat, USAF will extend the lives of its 1980s-vintage fighters—F-15s, F-16s, and A-10s—with substantial structural changes and give them new equipment that will make them as capable and “relevant” as possible, within the limits of money and technology. Some will be retained into the 2030s—perhaps longer.

The task will be a delicate balancing act, though: The Air Force must spend only so much money as necessary to keep the old fighters useful against evolving threats, while not robbing procurement accounts of funds needed to buy the new aircraft. Without the new fighters in the mix, and in sufficient numbers, the plan falls apart. And, while technology has made it possible to double up the roles of many new aircraft, there still have to be enough to go everywhere the nation asks.

Buying the new fighters is “critical,”

according to Lt. Gen. Raymond E. Johns Jr., deputy chief of staff for strategic plans and programs.

“While extending the service life of legacy aircraft meets some niche requirements,” they will find it increasingly tough to get past modern integrated air defense systems, Johns said.

“It’s critical that we keep production of our fifth generation fighters on track, ensuring sufficient quantities” to preserve the US edge in air combat, he said.

Nevertheless, there just aren’t enough F-22s or F-35s on order to meet all the Air Force’s commitments, which for the fighter force involves the ability to fight up to two nearly simultaneous major theater wars as well as ensuring sovereignty over US airspace.

Last year’s Quadrennial Defense Review validated “what the nation expects of our Air Force,” Johns said in an interview. The amount of airpower it specified—86 combat wings—will require keeping some of the legacy fighters going for decades to come. The Air Force said it has about 81 combat wings’ worth of forces now. (See “Eighty-Six Combat Wings,” December 2006, p. 24.)

The QDR also specified 183 F-22s, versus the Air Force’s long-validated





The Air Force won't be getting enough F-22s (shown above en route from Langley AFB, Va., to exercises in Alaska) and F-35s to meet all its obligations, so large numbers of "legacy" fighters will remain in service another 20 years.



The F-35 Lightning II takes off on its first flight. USAF officials want to buy F-35s in lots of 100 a year, but probably won't get that many.

requirement for 381. All agree the smaller figure was driven by monetary constraints and not by strategy.

"We still need and want 381," Johns said, but he said the lower figure is "not ... a crisis to me" because the decision on whether to go beyond 183 will take place beyond the current planning cycle, in 2010. The Air Force succeeded in winning Congressional approval to buy the F-22 on a multiyear contract basis, getting three lots of 20 each. In Fiscal 2010, when the multiyear expires, the Air Force hopes to get approval to buy at least 20 more. The decision point will come beyond the term of the Bush Administration, which set the 183 limit.

Despite pressures within and without, the Air Force has also not backed off its requirement for 1,763 F-35s to replace the F-16 and A-10. It is on track to start fielding the Lightning in squadron service by 2013.

The two new fighters are highly capable, offering major advances over their predecessors in survivability and effectiveness. The Air Force has long said it will not be necessary to replace the older aircraft with the new on a one-for-one basis.

Gen. Ronald E. Keys, head of Air Combat Command, told defense reporters in Washington last fall that "we're going to take that F-15 fleet down to about 178" aircraft, "and we'll probably retire about two or three airplanes for every Raptor we get." The Air Force will "probably, at least, take down two F-16s or A-10s per Lightning that comes on."

The rate at which F-35s will enter the inventory is causing concern. Chief of

Staff Gen. T. Michael Moseley said last fall that he doubts the Air Force will be able to buy F-35s at the expected rate of 100 per year. (See "Aerospace World: ... And Predicts Slower Buys," December 2006, p. 12.) The F-35 "ramp rate" is especially important, because the F-35 will primarily replace the F-16, which was bought in annual lots of more than 200 each in the 1980s. The earliest F-16s have reached, and in some cases surpassed, their planned life

Maj. Mark Mitchum, an F-16 pilot with the 149th Fighter Squadron, prepares for a sortie with the Virginia Air National Guard. The F-16 fleet was expected to start retiring in lots of 200 or more per year by now, since that was the rate at which they were bought in the 1980s.



expectancy and must retire. However, the F-35s won't appear in operational service for another six years.

"I want to be buying enough F-35s so that as the F-16s time out, I'll replace them with an F-35," Johns said. "We're not ramping up sufficiently to do that."

He said the Air Force is making its case to the Pentagon leadership and Congress for a more aggressive F-35 build program—he declined to discuss planned rate of production—because in the face of future air defense threats, "just more legacy aircraft are not going to meet" the Air Force's needs. In USAF budget documents released in February, the service revealed it can only afford 48 F-35s a year over the FYDP. If it can't increase that number, it will take about 40 years to buy all 1,763 required.

The Air Force is expected to buy six F-35s in Fiscal 2008. Johns said that USAF expects to field the F-35 in squadrons of 24 aircraft each, unlike the F-22, which serves in 18-aircraft squadrons.

The service's fighter needs have not been reduced because new capabilities have emerged that can do some of the traditional fighter mission, Johns noted. Unmanned combat aerial vehicles can do light strike; bombers can perform close air support; and a new bomber program

is expected to expand the speediness and range of USAF's strike capabilities. However, those new capabilities are considered a bonus, not a force-changing development, Johns said.

When bombers perform close air support, Johns said, it's because "they can, because they're not being called to their primary ... mission. I can take advantage of it. But I'm not about to count a bomber in a close air support mission when, in a war, I need it to do its primary mission." Likewise, fighters have in the last few years been providing intelligence-surveillance-reconnaissance information through advanced targeting pods even though that isn't their principal purpose. (See "Eyes of the Fighter, January 2006, p. 40.)

"No one has relieved me of my [major combat operations] ... obligations," Johns said, so he can't economize by requiring systems to do two very different missions simultaneously. The Air Force, he said, is reducing its fighter inventory because aircraft are getting more capable, but it still must have "sufficiency" to handle all its commitments.

To stave off a "waterfall" of F-16 retirements that would leave the Air Force with an unacceptable deficit of fighters until the F-35 arrives, the service is well under way with a series of upgrades and repairs to give the Fighting Falcon more time in service.

USAF has scrutinized the F-16 fleet on an individual basis, analyzing how many hours each has flown, how many problems each has had, its general condition, age, and suitability for continued service.

"Between now and the end of [Fiscal] 2013, we'll lose about 200 F-16s," said Lt. Col. Timothy Forsythe, the F-16 program element monitor at ACC.

"That's going to be pretty much all of the Block 15 fleet" and most of the Block 25s, as well. Most of these are Air National Guard aircraft.

"The plan is to retire the oldest, least-healthy iron first," Forsythe said. Those that will retire by 2013 will not be upgraded.

Structural improvements, under a program called Falcon STAR, are being performed on those F-16s identified as being worth the expense and trouble to repair and beef up for more years of service. In general, those are the Block 30s and beyond. The most recent F-16s in the Air Force are Block 52s.

The structural upgrade replaces some bulkheads, wing skins, and other pieces that engineers have determined are

Two F-15s from the 67th Fighter Squadron, Kadena AB, Japan, fly over Okinawa. USAF will retain 178 older F-15C "Golden Eagles." The moniker stems from the fact that those fighters will be kept in top physical condition.



USAF photo

failing or will fail, given the way the F-16 is now used. The Falcon was originally intended to be a lightweight, mass-produced fighter for daytime air-to-air missions and some light attack work. However, as its ground-attack capabilities improved, it became more heavily relied upon as a strike platform and was used chiefly in that mission in every major conflict since the 1991 Gulf War.

"We obviously are carrying a lot of heavyweight weapons" on the F-16, Forsythe noted, and "using the airplane quite a bit." The F-16 was expected to fly about 250 hours a year, on average, but those deployed to combat have averaged 300 hours per year or more. Put another way, that means the most heavily used Falcons are aging at the rate of five years for every four in service.

Initially, the F-16 was expected to have a 4,000-hour service life, which at 250 hours a year translates to a 16-year life. Falcon STAR will help the F-16s reach a service life of 8,000 hours, or 32 years.

The Falcon STAR is not a remanufacturing program, however, which would be much more expensive and comprehensive. And a more elaborate service life extension program, or SLEP, is not really possible because the F-16 was among the first aircraft to be made with large amounts of composite ma-

terials. Those materials were designed for a certain life expectancy.

Along with Falcon STAR is a companion program to make the F-16s more effective, called the Common Configuration Implementation Program, or CCIP. In most cases, the CCIP and the Falcon STAR are performed at the same time the fighters go into depot maintenance for planned checks, so as to keep them out of service for as little time as possible.

The CCIP provides the F-16 with the Joint Helmet-Mounted Cueing System, the ability to carry both HARM targeting pods and electro-optical targeting pods simultaneously, Link 16 data transfer system, and other improvements to make the aircraft more effective and relevant. Only Block 40 and later Falcons are getting the CCIP, because the earlier ones are expected to phase out before such capabilities become truly critical. The Block 50 and 52 F-16s already have the CCIP; it brings the older aircraft up to a similar configuration.

When F-16s reach the 8,000-hour mark, however, it remains to be seen whether they will have to be withdrawn from duty or whether they can continue in service a while longer. Forsythe said those decisions will be made on an individual basis.

"The airplane can fly for quite some time," Forsythe said. When it would

have to be retired “depends on how you treat it.”

However, for planning purposes, the Air Force expects to withdraw the last F-16 from service in about 2025. By that time, under current plans, the Air Force will have about 620 F-35s. By comparison, the Air Force today, including active and reserve components, has about 1,300 F-16s.

The F-15 story will be more expansive. The Air Force has about 720 F-15C/D aircraft in active and Guard service combined, providing front-line control of the air both at home and abroad. The service plan is to replace a large portion of the air superiority F-15Cs with the F-22. However, to cover all its bases, the Air Force will still need to augment the F-22 with the F-15 beyond 2025. By then, the F-15 will have been in service for more than 50 years, and those still flying will be more than 35 years old.

Of the F-15C fleet, the Air Force plans to retain 178, which it has already identified by tail number. Like the F-16s, these aircraft have been chosen because of their relative youth, health and a history of being good maintenance performers. The Air Force calls it the “golden fleet,” and those in it are being called “Golden Eagles.”

Those that don’t make the cut to be Golden Eagles will be retired at the rate of about 20 per year between now and 2018—roughly mirroring the delivery rate of the F-22, at least through 2010—then between two and 10 per year through 2025, according to Brian Dillon, an analyst with CPM Solutions, which is advising Air Com-

bat Command on management of the F-15 fleet.

The 178 Golden Eagles will be the ones to get a comprehensive upgrade, both in structure and capability. The biggest feature of the upgrade is to replace the F-15’s analog radar with a new, active electronically scanned array radar, or AESA, of a kind now being fitted to the Navy’s F/A-18E/F Superhornets, and which come as standard gear on the F-22 and F-35.

The AESA—in this case, the APG-63(V)3—offers many more modes of operation, more simultaneous functions, greater range, and higher reliability because it is a solid-state system without moving parts. Care of the old analog radar has always been a major driver of F-15 maintenance hours.

Golden Eagles will also get a new combined Global Positioning System/Inertial Navigation System, new radios, digital video recorder, new identification, friend or foe systems, a helmet-mounted targeting system like that on the F-16, and “anything else we come up with between now and 2025,” Dillon said. Other candidate improvements include new electronic warfare gear, a new central computer, and improved Link 16 systems. The Golden Eagles will be “the priority airplanes” to get the new equipment as it becomes available.

Moreover, the entire F-15C fleet will be powered by the Pratt & Whitney F100-PW-220, the last and most advanced version of the original F100 engine.

There will be a host of structural replacements, too, including wiring—which has started to rot on some early

aircraft—new ribbing under weapons stations, and replacement of some of the flight-control system.

For several years, some F-15Cs have been flight-restricted, unable to go to their maximum potential speed or G-loading, because of age-related problems with the vertical stabilizers. There have been episodes where the verticals have become delaminated at high speed. (See “When Aircraft Get Old,” January 2003, p. 30.) A repair is being done when the aircraft go through depot maintenance; Golden Eagles will all be fixed within the next three years.

However, Dillon said, the Golden Eagle program does not amount to a rewiring or reskinning.

An industry official said the F-15 was “overdesigned” back in the 1970s and, while it was originally specified to have a life of about 4,000 hours, the fleet is now expected to easily surpass 8,000 hours without a major SLEP. With “average” or benign usage, the F-15 could even double that figure again, to around 16,000 hours. An Air Force official noted that the F-15, being a large airplane, has “a lot of real estate inside,” making it easier to install both structural and capability upgrades.

Dillon said the idea is to upgrade the 178 Golden Eagles as soon as possible. The structural upgrades, most of which are already funded, will add years to the life of the airplanes only if the work is done on the front end of the life extension. Funding for most of the capability improvements will await future budgets.

The Golden Eagles will be used in those parts of the world where the penetrating qualities of the F-22—particularly stealth, sensor fusion, and supercruise capability—are not essential to success in the air. That could be a domestic mission or one against an adversary that lacks a sophisticated integrated air defense system. The AESA radar will give the F-15C a capability against cruise missiles, which the current versions cannot easily defeat.

The Golden Eagles will serve in both the active and Guard forces.

As for the F-15E Strike Eagles, Dillon said they are all considered to be of the “golden” variety already, being much younger than the F-15Cs and having benefited from newer technology both at production and in subsequent upgrades.

“Right now, the entire inventory of E Models are Golden Eagles, if you will,”

USAF photo



Airmen perform maintenance on an F-15 during Phase 1 of an operational readiness inspection at Langley AFB, Va.

Dillon said. “They’re all on the [combat air forces] roadmap past 2025. All 224” of them. There are no structural upgrades planned for the F-15E fleet right now. However, the F-15E will get a radar upgrade “similar” to that on the F-15C fleet, and it will also be among the first to employ the Universal Armament Interface, a new pylon system that will allow the airplane to carry practically any munition in the USAF inventory.

Perhaps the most dramatic aspect of the Air Force fighter roadmap is that involving the A-10, an aircraft the service has moved to retire several times in the last decade. Now, rather than phase out the venerable Warthog, the service plans to retain the type at least to 2028, through the use of a comprehensive life extension program.

The program, known in an earlier iteration as “Hog Up,” will see 223 A-10s receive all-new wings, “wingtip to wingtip,” according to Lt. Col. Don Henry, the A-10’s modernization requirements director for ACC.

The wings will be “100 percent brand new,” he said, with replaced “flight controls, new fuel pumps for the fuel tanks in the wings,” and new wiring. The factory-fresh wings will be externally “identical” to those with which the A-10 has been flying since late 1975.

Out of the 715 A-10s that were produced from 1975 to 1984, there are 356 still in service, and at least 223 of those are expected to be retained in the inventory until 2028.

The wing replacement became necessary when ACC discovered that a number of early A-10s, those with thinner wing skins than later versions, were suffering from wing cracks that couldn’t be repaired.

“It was fortunate that we had a lot of jets out on the boneyard” at Davis-Monthan AFB, Ariz., Henry noted. For a time, the old airplanes could be salvaged for parts to keep the A-10s flying.

“That helped us up to a point,” Henry said, but as the situation with the F-22 and F-35 evolved, it became clear the A-10s would have to serve a good deal longer than expected. Thus, the SLEP became more elaborate.

The drawings for the A-10 still exist, but not the tools. A competition will be held for design and production of the new wings. Early response from industry indicates that the Air Force underestimated how much the program would cost, “so we’re a little bit short up front” in funding, Henry said. However, there’s enough



USAF photo by Capt. Justin T. Watson

An A-10 Thunderbolt II pulls away after refueling over Afghanistan last December. After numerous brushes with retirement, the A-10 will get a major upgrade.

money to get the program started. The Air Force expects to get the first, low-rate production wings delivered in 2010 and then modify 40 A-10s a year until 223 have been equipped. The program is expected to cost \$1.5 billion for the new wings alone.

Along with the new wings, the A-10s will get some other structural repairs and a capability improvement known as “precision engagement.” It will equip the Warthogs with all the newer Air Force weapons, the ability to carry new targeting pods—either Sniper or Litening—the Universal Armament Interface, data links, a boost in DC power, new cockpit displays, a new processor, and other enhancements.

The precision engagement modification is already under way; 30 A-10s have already received it and the rest will cycle through at the rate of six per month between now and 2011.

Moseley has said that he considers improving the A-10 engines a high priority, but the funding to update the engine had to be sacrificed to pay for the wing replacement. (See “Washington Watch: Building Better Warthogs,” September 2006, p. 16.)

The propulsion upgrade program, or PUP, envisioned by the service would allow the A-10’s TF34 engines to provide up to 30 percent more thrust, Henry said. There’s no money to develop the change, but the requirement is carried as a high priority if funds do become available.

“That program is suspended, ... on hold,” Henry said.

“Any self-respecting fighter pilot

wants to have more power, but it’s one of those tough decisions. ... What it comes down to [is] ‘bang for the buck.’ There are other things that would be more important to the A-10.” While an engine improvement would improve survivability of the airplane, the wing replacement is a more urgent “sustainability” issue, Henry said.

The Air Force had to “mortgage the PUP,” Johns said, “but we still want to do that.”

The entire fleet of A-10s will be of an identical configuration once all the modifications have been made—a far cry from just a couple of years ago, when ACC was considering the possibility of having to divide the fleet among deployable and nondeployable Warthogs.

Johns said that he foresees no game-changing developments in fighter technology in the near future that would allow the Air Force to radically alter its plans. However, he said the service is gaining a great deal from networking technology that allows ever-better effectiveness in putting aircraft where they are needed, at the time they’re needed.

“Horizontal integration of [sensor information], ... the traditional sensors, the nontraditional ISR platforms, is going to be huge,” he said. He said it is important to be able to distribute the unprecedented situational awareness of the F-22 to all aircraft in the fleet, but acknowledged that doing so will take money and time to accomplish.

“I think we’re doing it as fast and as prudently as it should be done,” he asserted. ■