SLEP Through the Cracks

The F-15 and F-16 need service life extension programs. What’s needed, and how long should they keep flying?

By John A. Tirpak, Editorial Director

After years of internal wrangling about whether to stretch the service lives of its old fourth generation fighters, the Air Force is moving forward with improvements to keep the F-15 Eagle and F-16 Fighting Falcon viable for at least another decade. Still to be decided, though, is just how much the Air Force will invest in capability upgrades for the jets—and just when the sun will set on the F-15 and F-16 in USAF service.

A number of fighters from both fleets are receiving new active electronically scanned array (AESA) radars and new computers. They will also need new or strengthened structural parts to replace elements suffering from fatigue stress. Fleetwide capability upgrades, however, depend on how fast the fifth generation F-35A is delivered and the results of studies in the works about whether to stretch the service lives of the F-15C/D fleet remains uncertain. In March, Maj. Gen. Scott D. West, then director of operations in the Office of the Deputy Chief of Staff for Operations, told the House Armed Services Committee that the service is reviewing the idea of retiring the F-15C fleet and employing upgraded F-16s for the homeland defense mission. The F-15C’s age and its cost per flying hour are working against it, he said.

“We do have capacity in the F-16C community to recapitalize it with an improved radar to serve the same [mission] as the F-15 has done,” he said. Air National Guard Director Lt. Gen. L. Scott Rice, at the same hearing, said such a plan is one option among many, and that no choice has been made.

“There is a risk in changing any of our force structure decisions,” Rice noted, but capabilities that can be added to the F-16C community to recapitalize it with an improved radar to serve the same [mission] as the F-15 has done,” he said. Air National Guard Director Lt. Gen. L. Scott Rice, at the same hearing, said such a plan is one option among many, and that no choice has been made.

“there is a risk in changing any of our force structure decisions,” Rice noted, but capabilities that can be added to the F-16C to enable it to do the mission with that aircraft. “Our readiness and then our protection of the US will change, but I think, overall, we will be OK,” he said of the idea.

MOVING PARTS

In an April interview, Air Combat Command chief Gen. James M. "Mike" Holmes said there are many moving parts to the air superiority mission in the coming years: the F-35, F-22, PCA, F-15, and F-16. Most likely, not all of those platforms can be in the Air Force at the same time, he said.

“We have to figure out whether we can afford” new aircraft and SLEPs [service life extension programs] of the old ones, Holmes said. “I don’t know what my budget will be at the end of the 2020s, but I can assume it won’t be radically different from what it is now.”

Given limits on the size of the force and the budget, “I have choices that I have to make. Something has to go and it will come down to, how much does it cost to operate” each platform.

The F-15C’s, he said, have been “used really hard” and need structural reinforcement to keep flying safely beyond the next few years. “You risk them coming apart” if flown to their full design envelope, he said.

That risk came into sharp focus when, in 2007, an Air National Guard F-15C broke in half in a high-G turn during dogfight training. The culprit was found to be a failed longeron, a structural element connecting the front and rear of the airplane that bears much of the load in a hard turn. The crash resulted in a new inspection regime and flight limitations on some F-15s. New longe-

rions—considered life of the airplane parts when the F-15 was new—are being purchased and installed through 2023. The upgrade will allow the F-15 to continue serving into the late 2020s.

Holmes said he has to make a choice, he favors upgrading F-16s rather than F-15s because F-16s are generally younger and more versatile—hav-

ing a ground-attack capability—than the F-15s, used strictly for control of the air.

The Viper would be “the most cost-effective service life extension,” he contended.

For homeland defense, either aircraft would require an AESA radar because of the increasing threat from cruise missiles—small, potentially stealthy, and able to fly at very low altitudes. The advanced radar is needed to see and track cruise missiles among the clutter of trees and hills. Holmes said it would cost about $1 million per F-15C to buy the longeron and other modifications needed to keep the fleet safe to fly out into the late 2020s, and “I think that is probably a good deal,” but a hefty upgrade permitting the type to serve into the 2040s and beyond “may not be.”
CAN THEY CARRY ON? Before embarking on a SLEP, the Air Force needed to answer a basic question: Can the jets carry on? The F-15 and F-16 initially were warranted for service lives of 9,000 and 8,000 flying hours, respectively. In both fleets the aircraft technically past their original life expectancy. After nonstop combat deployments for the last 26 years, the jets are tired. Lockheed Martin was tasked to put a representative F-16 Block 50 through a Full Scale Durability test to see how many more flight hours it could sustain and establish which test would be cost-effective in terms of additional years of life. The rig was rigged with caissons and bars that incessantly pushed, pulled, flexed, and bent it to simulate, on the ground, the forces it would endure through more years of heavy maneuvering. (See “New Life for Old Fighters,” February 2011.) This torture test finally called it off after 27,713 simulated flight hours, showing that the F-16 could theoretically last beyond the 2030s. The goal was to demonstrate that the F-16 could serve to 12,000 hours, and the Air Force “is confident that we are likely even to be able to extend beyond 12,000 at some point,” said Lt. Gen. Arnold W. Bunch Jr., USAF’s top uniformed weapons buyer, said in an interview with Air Force Magazine, “We... know that there are places in an [anti-access, area-denial] environment that a fourth gen fighter is just not going to be able to do the mission. So it is constant, a balancing act of: What can I do for readiness today, how fast can we procure [new jets and upgrades] and what’s the cost to procure them.” The Air Force is hedging its bets. There are a number of improvement programs for the F-15C in development.

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A depot field team member from Robins AFB, Ga., works with a maintainer to rewire an F-15C in Oregon. 13 years or so—and probably much more. The test was completed near the end of 2015. Boeing is still conducting a durability test on the F-15. The fleet is at about the 10,000-hour mark, and the test is aimed at certifying it can reach 15,000 hours. The Air Force has said repeatedly that the F-15 and F-16 cannot survive against modern air defenses in the mid- to late-2020s, and if they are retained, they would be relegated to bat- tles where enemy air defenses are less advanced or have already been beaten down by the stealthier F-22 and F-35. Lt. Gen. Arnold W. Bunch Jr., USAF’s top uniformed weapons buyer, said in an interview with Air Force Magazine, “We... know that there are places in an [anti-access, area-denial] environment that a fourth gen fighter is just not going to be able to do the mission. So it is constant, a balancing act of: What can I do for readiness today, how fast can we procure [new jets and upgrades] and what’s the cost to procure them.”

The F-22 Raptor was originally intended to start replacing it in the mid- to late-1990s, but didn’t arrive until a decade later. The F-22 was terminated at half the planned production, so some F-15Cs were retained to supplement them. The F-16—operational since 1980—was planned for retirement starting in the mid-2000s, but delays with the F-35 added 15 years to that timetable. The Air Force has long pushed for a faster buy rate on the F-35A, hoping to bring on enough of the jets quickly enough to make a F-16 SLEP cost-effective. Service leaders now say that an annual buy of about 46 F-35s—two squadrons’ worth—“are all the Air Force can afford in the coming years. USAF is faced with a mandate from the Trump Administration to increase the number of aircraft, and add thousands of more people to the ranks, and preserve the rest of an over-subscribed modernization program.”

Heather A. Wilson, the new Air Force Secretary, said in early June that she wants to buy F-35s “as quickly as possible,” and added that the 14 additional fighter aircraft called out in the service’s Unfunded Priorities List for Congress would help USAF get to a goal of buying 60 a year. She wants a look at the conclusions of the new National Security Strategy, and the current ramp rates, she said.

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Air Force Magazine, Boeing F-15 Vice President Stephen Parker said an overall SLEP cost of $40 million per F-15C, quoted previously by Holmes and others, was a “worst-case” scenario representing the cost of taking the F-15 fleet essentially to a zero-time aircraft. This restoration would practically rebuild the airplane from scratch, making it capable of serving to 2045. USAF requested the information and Boeing provided it, but such a proposal is not currently under consideration, Parker said.

Most of these upgrades are going to be common with the F-15E Strike Eagle—exception for the radar, which will be the AN/APG-82(V)-1—or even if they aren’t widely disseminated in the air superiority C fleet, they can be applied to the younger Es, likely to serve into the late 2030s. The Air National Guard also announced recently that it will evaluate buying conformal fuel tanks such as those used on the F-15E for use on the F-15C fleet. The CFTs would expand the F-15C’s range or loiter time and would not take away any weapon stations.

FOR THE VIPERS AND EAGLES On the F-16, capability upgrades include the APG-83 AESA radar, MIDS ITRS as on the F-15, a new mission computer, FAA-required transponders, a programmable display generator, and Automatic Ground Collision Avoidance System, or Auto-GCAS. Among the F-16s already equipped with GCAS, four aircraft and their pilots have been saved by the system so far. (See “The Science of Avoidance,” February 2016.)

The Air Force already has funding for 72 F-16s to be equipped with the APG-83 radar—it’s a response to a Joint Urgent Operational Need, for the homeland defense need and to add thousands of more people to the ranks, and preserve the rest of an over-subscribed modernization program. However, as the original equipment manufacturer, “I think we’re off and running,” Bunch asserted.

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Image from a video produced by Boeing as part of the Air Force’s accident investigation reconstructing the in-flight structural failure of an ANG F-15C in November 2007. The breakup was caused by fatigue cracking of a forward fuselage longeron; the pilot survived.

The Air Force, for now, will keep sending the F-15C “through depot, like we have been doing,” and fixing the jet up as Holmes and other leaders debate how much more to ask of the Eagle.