

**T**HE US AIR Force is moving forward with plans to purchase new F-15EX Eagles from Boeing. In March 2019, the Fiscal Year 2020 defense budget included \$1.05 billion for eight aircraft, which included front-loaded production line set-up costs for the US aircraft. The DoD allocated \$7.86 billion over the five-year future spending plan to acquire as many as 80 F-15EXs, which will be used to directly replace the oldest F-15Cs.

In addition to the first eight jets, which will be delivered by the end of 2022, \$1.65



billion was earmarked for 18 more Eagles in 2021, and the same number through each year to 2024. Ultimately, the USAF could procure as many as 144. USAF chief of staff Gen Dave Goldfein told the Senate Appropriations Committee on March 13, 'We used the best cost estimates that we had and looked at the various options. The most affordable options, as long as we keep the F-35 on track with our program of record, was to look at an F-15 variant to replace the F-15C.'

Speaking to *Combat Aircraft* in London this July, Goldfein said of the new F-15EX procurement, 'Let me tell you what it is not. It's not in any way, shape or form in competition with the F-35. The F-15EX, or any fourth-generation airplane, isn't an F-35 — it's not even close and it never will be. The difference between fourth and fifth-generation is not the platform, it's the fusion of information that allows the pilot of an F-35 to see and understand the operational environment in a way that no other platform can do it. It's why I call them the quarterback of the penetrating joint and allied team.'

### Why buy Eagles?

The USAF's fighter aircraft fleet faces huge challenges, with an average age of 28 years across the mission designation

**This image:** Directly replacing the F-15C, the F-15EX will not impact the F-35 program.

**Jamie Hunter**

**Inset:** USAF chief of staff Gen Dave Goldfein. **USAF**



# NEW EAGLES WILL



Discussing the plan to buy new F-15EX Eagles from Boeing, US Air Force chief of staff Gen Dave Goldfein made it clear when talking to *Combat Aircraft* this summer that the F-35 remains untouchable.

REPORT **Jamie Hunter**

# NOT IMPACT **F-35**



An F-15SA on test, flying from Palmdale, California, which served as the home of intensive trials for the range of new capabilities in the Advanced F-15. **Richard VanderMeulen**

series (MDS). Future USAF fighter needs were set to be absorbed by the F-35 Lightning II. However, Lockheed Martin's stealthy successor to the F-16 is running far later than scheduled. Conversely, the F-22 Raptor is the undisputed king of air supremacy, but with only 187 ordered, the USAF simply doesn't have enough of them — numbers fell well short of those required for the Raptor to replace the F-15C as the Department of Defense (DoD) slashed F-22 production.

The USAF started looking at long-term plans for its fleet of 1970s-era F-15C/D air superiority fighters in a bid to figure out exactly how to provide 'mass' alongside the Raptors. These ranged from complete retirement to a major upgrade. The problems facing the F-15C were extremely complex and included both structural and capability concerns that needed urgently to be addressed. Initiatives were launched to re-wing the oldest Eagles, replace fatigued forward-fuselage longerons in some examples, and refresh the avionics and outdated self-protection systems.

Boeing started talking about an upgrade proposal dubbed the 2040C, an F-15C overhaul that looked at porting new technology into the

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**Gen Dave Goldfein, USAF chief of staff**



existing airframes. However, the USAF's need increasingly sought a more comprehensive means of addressing a tired Eagle fleet that would be rendered obsolete by 2028. The FY 2018 budget request saw the USAF only funding production of the much-awaited Eagle Passive/Active Warning Survivability System (EPAWSS) for its F-15E Strike Eagles, deleting plans for its installation in 196 F-15Cs. Changes were afoot.

The F-15 2040C proposal was simply too expensive and the airframes too worn out. Goldfein told *Combat Aircraft*, 'Our future is invested in fifth-generation in the F-35, but as chief of staff of the USAF here's a challenge I face, which is a near-term challenge. When we stopped [producing] the F-22, the plan was to put that money into an accelerated plan for the F-35. If that plan had been executed at the time we canceled the F-22, I should have 1,100 F-35s on the ramp today. I have less than 300. So I've got four fourth-generation [aircraft types] that are part of the inventory that I've got to maintain into the 2030s to keep the capacity I need to be able to meet combatant commander requirements.

Featuring the new 11in x 19in large area display, the F-15EX will have an advanced cockpit.  
**Boeing**



**Below:** The F-15EX will be a 'plug-and-play replacement' for the F-15C. It's not clear what will happen to the new AN/APG-63(V)3 radars that have been installed in front-line Eagles.  
**Jamie Hunter**

One's not going to make it and that's the F-15C. It's too old and I'm not going to be able to fly it for many more years.'

Of the 2040C life-extension option, Goldfein said, 'We predict what will fail in the future, we buy those parts but it's a predictive model and it's a crystal ball, then what happens? We've seen it before. All of a sudden a part breaks — like a nosewheel steering part — and it wasn't

part of the predictive model and nobody makes it any more, so then we're paying top dollar trying to find a part to keep it from being grounded. I have zero interest in another modification of the F-15C.

I had to find a way to be able to meet this near-term capacity challenge. The only option that was available that was an affordable option was to leverage the hot line that currently exists — that has





investment from both Saudi Arabia and Qatar — that allows me to put an F-15EX in the same hangar, use the same support equipment, have a local check-out for both maintainers and operators and do it on a timeline that I can maintain the capacity I need. So the F-15EX is to solve only one challenge I have, and that is that the F-15Cs are not going to continue flying and I have to have that capacity. I'm not willing to put a nickel of F-35 money into the F-15EX — this is not a trade, this is capacity I need to fulfill a shortfall that's staring me in the face.'

## The solution

The USAF F-15EX will be a two-seat aircraft, aligned with the Advanced F-15, and will be powered by the same General Electric F110-GE-129 Improved Performance Engines. It will be ready almost immediately to roll off the active production line in St Louis, Missouri, with a few of the USAF F-15E's latest modernization elements sprinkled in. The exercise brings about cost avoidance by using existing spares chains and support equipment. It also facilitates ease of transition, not taking a squadron off-line for an 18 to 30-month re-equipping and training phase.

The F-15EX will have a large area cockpit display and digital Joint

Helmet-Mounted Cueing System (JHMCS). Because partly of the foreign investment in the new displays and management of the systems, everything can be run from the front seat of the EX — the missionized rear cockpit can be optionally occupied by a weapons systems officer. All talk to date has centered on the two-seat EX, not a spin-off single-seat F-15CX. In fact, the USAF has said that F-15C units receiving F-15EXs will operate them with the rear seat unoccupied. Porting the Advanced F-15 into a single-seat CX would require some sort of re-certification of the complex fly-by-wire system, and although the two aircraft retain the same overall dimensions, any risk incurred from new testing may prove unacceptable.

The F-15EX is the preferred out-of-the-box solution, initially at least. In fact, the first F-15EXs will likely go straight into test, in order to support the existing USAF EPAWSS initiative. The F-15EX minimizes the training burden for an already overstretched system that is trying to maximize pilot production and retention. Transitioning an F-15C pilot to an F-15EX will be very straightforward as Boeing uses USAF pilots to deliver new Eagles that are currently coming off the St Louis production line.

The F-15EX will directly replace F-15Cs in both active-duty and Air National

Guard units, although Goldfein says exact fielding plans still rest with Congress. Plans call for the initial two jets to be provided on a fast timeline to provide extra capacity for the EPAWSS test work, with subsequent aircraft destined for the USAF Weapons School at Nellis AFB, Nevada, and a few joining training activities for the initial conversion process. A source familiar with the discussions told *Combat Aircraft* that no specific F-15EX testing is planned.

While this acquisition brings about recapitalization of the F-15C fleet, it also enables significant capability advances. The new Advanced Eagles are well-placed to complement the USAF's large fifth-generation fleet. The air force has been structured with a range of penetrating platforms and a robust fleet of F-22s and F-35s that need to be complemented effectively. The F-15EX will act as a weapon 'truck', able to carry the kind of large hypersonic weapons that are in development, but will not fit inside a fifth-generation fighter weapons bay. It will also be able to carry a wide range of armament, all cleared from day one, and enable a versatile development road-map, rather than forcing the USAF to develop specific solutions as new, and previously unforeseen, requirements emerge. 

The first USAF Eagle variant to be powered by General Electric engines will be the F-15EX. **Boeing**

# CUTTING EDGE

DISPATCHES FROM THE FRONT LINE  
OF AEROSPACE TECHNOLOGY

BY DAVID AXE

## ROYAL AIR FORCE EYES WINGMAN DRONES

**T**HE ROYAL AIR Force is considering acquiring wingman drones to accompany manned fighters in combat.

Buying inexpensive but highly capable unmanned aerial vehicles (UAVs) in large numbers could help the RAF to add 'volume' to its over-stretched forces.

The RAF in July 2019 announced the Lightweight Affordable Novel Combat Aircraft (LANCA), codename 'Project Mosquito'.

LANCA 'will produce a preliminary system design for an unmanned air vehicle and assessment of the key risk areas and cost-capability trade-offs for an operational concept', the UK's Ministry of Defence stated. 'Initial flight test of the demonstrator air vehicle could take place as early as 2022.'

The Project Mosquito's capabilities could include swarming. 'The swarm will hunt for enemy radar and missile systems and then cue our other aircraft to avoid or destroy them,' the defense ministry said.

LANCA aims to deliver 'dramatic reductions in traditional cost and development timeline's, according to official documentation. A single F-35 manned fighter today costs around \$100 million.

The RAF views a fast, armed wingman drone as an affordable way to add mass to its fighter force. The UK air arm in mid-2019 operates just 119 fighters, the lowest number in its history.

'Volume is the key part to this [swarming UAV concept]; Air Chief Marshal Sir Stephen Hillier told reporters at the Air and Space Power Conference. 'We have great capabilities in the RAF, but not much of it. This mass is what constantly concerns me — we need to create more targets in the air; we need to grow mass.'

The shrinking of the British fighter fleet has happened even faster than observers predicted just a few years ago. And it could be years before the force significantly grows again.

As of June 2019, the RAF had 102 Typhoons and 17 F-35B stealth fighters in seven front-line squadrons. The last squadron of 1980s-vintage Tornado strike aircraft disbanded in March 2019.

The RAF's 119 fighters represent a 40 per cent reduction compared to the air force's fleet in 2007. That year, the RAF possessed a little more than 200 Tornados, Jaguars and Typhoons. In 1989 the RAF possessed around 850 fighters including Tornados, Jaguars, Phantoms, Harriers and Buccaneers.

The United Kingdom isn't alone in developing wingman drones. The US Air Force's XQ-58 Valkyrie drone took off for its second test flight

over Yuma, Arizona, on June 11, 2019. The 29ft-long, jet-powered drone 'successfully completed all test objectives during a 71-minute flight,' the Air Force Research Laboratory (AFRL) announced.

The Valkyrie is part of a wider US Air Force effort to acquire fast, stealthy, armed drones that can fly and fight alongside manned fighters.

Boeing's Australian subsidiary unveiled the so-called Airpower Teaming System at the Australian International Airshow at Avalon in February 2019. The most striking part of the new system is a 38ft-long, jet-powered drone that Boeing said could carry weapons and sensors and fly as far as 2,000 miles — all while being more affordable than a \$100-million manned jet.

China and Japan also are working on wingman drones. A mock-up or prototype of China's 30ft-long Dark Sword drone first appeared in public in an undated photo that circulated online in mid-2018.

Japan revealed its own Combat Support Unmanned Aircraft wingman drone concept in a technology roadmap that *Aviation Week* first published in late 2016.

Wingman drones could change the way major air forces fight, according to Peter W. Singer, author of *Wired for War*. 'The idea of a robot wingman is that it can keep pace with manned planes, but be tasked out for parts of the mission that you wouldn't send a human teammate to do.'

Project Mosquito has two planned phases. After the 12-month first element, part two will select up to two of the offered solutions to mature the designs, complete manufacturing of a technology demonstrator and conclude with flight-testing. 



An official computer-generated impression of a UK F-35B controlling a 'swarm' of unmanned aerial vehicles of the type that could be developed under the LANCA program. **Dstl**