

# Still soaring: Boeing takes F-15 Eagle to the next level

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The first F-15s became operational more than 45 years ago, but the latest aircraft rolling off the St Louis production line bear little resemblance to those early machines. *Gareth Jennings* explores Boeing's ongoing efforts to keep the venerable Eagle at the forefront of military capabilities

With more than 1,600 airframes having rolled off the Boeing (and previous to that, McDonnell Douglas) line since 1972, the F-15 Eagle has been in continuous production for longer than any other fighter aircraft in history.

Throughout the last four decades and more, the F-15 has been the cornerstone of the US Air Force's (USAF's) combat capabilities, and has served in the air forces of Israel, Japan, Saudi Arabia, Singapore, and South Korea. The notion, however, that the Eagle might be past its prime in the face of its latest 'fifth-generation' competition is one that Boeing is eager to dispel as it promotes its latest Advanced Eagle concept to the market.



*The Advanced Eagle is the latest incarnation of the F-15 that has been in production for more than 40 years. The improvements in this latest version are so marked that Boeing officials mulled giving the platform an entirely new name. (Boeing)*

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“The Advanced Eagle that we have developed and are delivering today is not the Eagle of the 1970s. We want to crush that perception, and show why the F-15 is absolutely relevant today. It looks kind of the same, but it is a totally different animal today,” Steve Parker, vice-president of F-15 programmes at Boeing, said recently.

Speaking at the site of the F-15 production line in St Louis, Missouri, Parker suggested that the differences between the first F-15s and those being offered today are so profound as to almost warrant a change in name for the fighter. “We should have looked at re-naming this aircraft a long time ago, and that is actually something that we are actively looking at today from a Boeing perspective. The 'problem' is that the Eagle has such a strong reputation, but in what we are delivering today the outer mould-line remains the same but everything else has changed. It looks the same, but it is a totally different aircraft today,” he said.

“When we talk to prospective customers we find that 9 times out of 10 there is the realisation that some presumptions they have made [as to the Eagle's capabilities] aren't quite correct,” Parker said. “From an education and a branding perspective, [renaming] is something that could definitely be worth looking at. For an in-production air superiority aircraft, nothing compares to the F-15 today – nothing flies faster; nothing goes higher; nothing carries more.”

*Jane's World Air Forces* lists the current global Eagle fleet as being comprised of 458 F-15C/D/Es for the USAF; 59 F-15C/D/Is for Israel; 201 F-15J/DJs for Japan; 165 F-15C/S/SAs for Saudi Arabia (deliveries of the latest SA-model are ongoing); 40 F-15SGs for Singapore; and 60 F-15Ks for South Korea. A sale of 36 F-15QAs for Qatar was recently signed also.

## **Domestic upgrades**

As the largest operator of the Eagle by some margin, the USAF fields the platform in its F-15C air superiority guise, its F-15D operational trainer guise, and in its F-15E Strike Eagle ground attack guise.

From a modernisation perspective, Boeing is currently upgrading the USAF and Air National Guard (ANG) F-15C and F-15E fleets. Indeed, such is the need and desire to modernise the Eagle that the USAF is currently investing in excess of USD12 billion – the largest amount for the type in many years – to take the platform out to 2040 and beyond.

The USAF's upgrade roadmap is funded through to 2025, with a number of enhancements already carried out and fielded; pilots are now equipped with Joint Helmet Mounted Cueing Systems (JHMCSs), for example, which when coupled with the latest variant AIM-9X Sidewinder air-to-air missiles (AAMs) offer a 'look and shoot' dogfighting capability. Besides the single-seat F-15C, the JHMCS is integrated into the front and rear cockpit of the F-15E also.

The latest round of upgrades is built around a new advanced mission computer. The F-15C fighter and F-15E strike variant Eagles will be fitted with the new Suite 9 hardware and software package that are designed to power advanced capabilities, Boeing said. "Suite 9 is the first software release to add capability to the new Advanced Display Core Processor II computer. It is the world's fastest flight mission computer and capable of processing up to 87 billion instructions per second," Parker said, adding: “This is important as it unleashes the 'horsepower' of the electronic warfare suite currently being developed.”

The electronic warfare suite that Parker referred to is the Eagle Passive/Active Warning and Survivability System (EPAWSS) upgrade. EPAWSS is designed to sample the radio frequency (RF) spectrum, identify threats, prioritise them, and then allocate jamming resources against them. It will replace the 1980s-vintage Tactical Electronic Warfare Suite (TEWS) currently fitted to the USAF's Eagle fleets.

In February 2017 Boeing completed its Critical Design Review (CDR) of the system following a CDR for the system's EW suite that was undertaken by sub-contractor BAE Systems in late 2016. "This will be the most state-of-the-art EW system, that has taken some proven technology already out there in the fifth-gen domain," Parker said. "This programme is the poster child for the Department of Defense acquisition cycle right now – we have been approximately 60 days ahead of every milestone. We will begin modifying some aircraft towards the end of [2017] and begin flight testing [in 2018]. We will begin deploying the capability across the wider fleet in the early 2020s." Media reports in March suggested the EPAWSS upgrade for the F-15C had been dropped by the USAF, but a notification issued by the service at around the same time for the commencement of low-rate initial production for the F-15C and F-15E suggests that it is still going ahead.

Besides the Suite 9/Advanced Display Core Processor (ADCP) II computer and EPAWSS enhancements, a central tenet of the Eagle upgrade plan is replacing the mechanically scanned (M-Scan) radar with a new active electronically scanned array (AESA) system. The USAF is putting AESA radars on the F-15C (Raytheon AN/APG-63[V]3 for air-to-air) and F-15E (Raytheon AN/APG-82[V]1 for air-to-ground). "The AESA is a game-changer in terms of range and also for homeland protection against cruise missiles, etc," Parker noted.

Carried out under the Radar Modernization Program (RMP), the work involves modifying the M-Scan radars with transmit/receive modules from the AN/APG-79 AESA already fitted to the Boeing F/A-18E/F Super Hornet. More than 125 F-15Cs have been upgraded with a new AESA so far, and the F-15E upgrade is ongoing also and will run through to the early 2020s.

[Continued in full version...]

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