National Audit Office

REPORT

The UK's F-35 capability

Ministry of Defence

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Key facts

37

UK F-35 aircraft in service at June 2025

2069

planned UK F-35 out of service date (previously 2048)

£11bn

National Audit Office (NAO) estimate of the minimum amount spent to date on the UK F-35 capability

Many times	extent to which the F-35 is more able to survive and successfully deliver attacks than previous UK aircraft
December 2023	planned date for Full Operating Capability in the UK F-35 Concept of Use document (2018), now expected by the end of 2025
Approximately one-third	extent that UK F-35 fleet was available to perform all required missions in 2024 against the Ministry of Defence's (MoD's) target. The NAO is not disclosing the actual percentage for national security reasons
Approximately half	extent that UK F-35 fleet was available to perform at least one of seven possible required missions in 2024 against the MoD's target. The NAO is not disclosing the actual percentage for national security reasons
Early 2030s	expected integration onto F-35 of full Spear 3 standoff weapon capability
At least 15%	approximate percentage value of each F-35 aircraft that is produced by UK companies
£57 billion	the recently compiled MoD estimate of F-35 whole-life equipment and support costs for 138 aircraft until 2069, although this figure has not been subject to full MoD validation
£71 billion	NAO estimate of F-35 whole-life cost, which includes wider MoD costs relevant to F-35 capability in addition to equipment and support, for example personnel, fuel and infrastructure, but excluding weapons development expenditure and other central overheads

Summary

1 The F-35 Lightning II Joint Strike Fighter (F-35) is a technologically cutting-edge multirole stealth fighter aircraft. Originally conceived in the 1990s by the US Department of Defense, the UK is one of 8 nations that are partners in the global F-35 programme, although the US has by far the most influence on the programme, so far ordering approximately 80% of all aircraft. Other countries purchase F-35s as foreign military sales customers. F-35s from different countries are designed to be interoperable.

2 The Ministry of Defence (MoD) began taking delivery of F-35B aircraft, a variant which can be used from land or aircraft carriers, in 2012 and has committed to purchasing 138 F-35 aircraft, with 48 currently on contract and 38 having been received but no approved timetable for purchasing the rest. The UK's policy is to be able to use the F-35 at any time or place of its choosing, which it calls 'freedom of action'. The MoD intends to demonstrate the F-35 capability as part of a Carrier Strike Group deployment in 2025, embarking up to 24 aircraft. The MoD expects its F-35 aircraft to remain in service until 2069 (extended from 2048).

3 The global programme is run by the Joint Program Office (JPO) based in Washington DC. The MoD is heavily dependent on the performance of the JPO for cost-effective delivery of the aircraft, engines and provision of support. While there are established processes within the global programme to allow partners to seek changes they want to see, influence remains a very important factor to secure change. The MoD is fully responsible for providing all other elements of capability, such as providing trained pilots, engineers and other personnel, infrastructure, weapons, and logistics. The MoD is also responsible for providing related capabilities, such as the aircraft carriers and air bases which the F-35 is designed to fly from.

4 We have previously reported on the UK F-35 capability as part of our Carrier Strike reports, as well as in wider reports on MoD capability and the MoD Equipment Plan but this is our first report considering F-35 capability in detail. The report covers:

- F-35 aircraft capability, delivery and availability (Part One);
- supporting enablers (Part Two); and
- how the MoD manages the programme and its costs (Part Three).

5 We undertook fieldwork between December 2024 and April 2025 and our methods and evidence base are described in further detail in Appendix One. We have not included in the scope of this report the other capabilities that the F-35 works with to form the UK's Carrier Strike Group capability, although we have referenced those capabilities when discussing the value that the F-35 can provide. Following discussions with the MoD we have not disclosed certain facts where publication posed a threat to national security (Appendix One).

6 In June 2025, the Government published the Strategic Defence Review (SDR), which stated that more F-35s will be required over the next decade, and that "this could comprise a mix of F-35 A and B models according to military requirements to provide greater value for money". Later in June 2025, the government announced its intention to buy at least 12 F-35As capable of carrying both nuclear and conventional weapons (Dual Capable Aircraft – DCA), and that they will form part of NATO's nuclear mission. The MoD has stated that it hopes that delivery will begin before the end of the decade. It also confirmed that the UK would purchase 15 F-35Bs alongside 12 F-35As in the next procurement phase. The MoD did not provide any details on timelines or further purchases but stated that it would examine options in the upcoming Defence Investment Plan.

Key Findings

Aircraft capability, availability and delivery

7 The capability provided by the F-35 across its multiple roles is significantly superior to any previous UK aircraft. It is a particular improvement in stealth capabilities, fusion of information from different sensors and electronic warfare capabilities. These combine to produce an aircraft many times more likely to survive and deliver operational effects in contested environments. Moreover, the F-35 can enhance the capability of other UK platforms, including Queen Elizabeth Class aircraft carriers and Typhoon aircraft, through its survivability, jamming of enemy air defences and intelligence-sharing capabilities (paragraphs 1.9 and 1.10).

8 There are some important capabilities that the MoD has delayed into the next decade. Most significantly the F-35 does not have a standoff weapon to attack ground targets from a safe range, which will impact its effectiveness in contested environments. It does not expect to have this capability in full until the early 2030s. Nor will the MoD have a sovereign facility to assure that the aircraft retain their stealth characteristics until the 2030s, much later than originally planned. Hardware and software updates, known as Block 4 and provided by the global programme, have also been delayed (paragraphs 1.11 and 1.12).

9 The MoD expects to finish receiving its first phase of 48 aircraft by the end of April 2026, although this is behind schedule partly for financial reasons and partly because of global programme delays. In 2016 the MoD announced its plan to buy 48 aircraft by the end of 2024, which it amended in February 2020 to the end of 2025. It currently has received 38 aircraft, of which one was lost in an accident in November 2021, leaving 37 currently in service. The MoD now forecasts that it will have 41 aircraft by the end of 2025 and receive its 48th aircraft at the end of April 2026. This has been caused by a combination of the MoD delaying its delivery profile to save money in the short term in response to wider financial pressures and, subsequently, problems in the global programme with the Technology Refresh 3 software upgrade (paragraphs 1.14 and 1.15 and Figure 3).

10 The MoD has publicly committed to acquiring 138 aircraft, giving it a prominent position in the global programme, although slow progress towards this target risks undermining that position. Although this commitment is the highest among programme partners after the US services, the UK has contracted for a lower percentage of its publicly committed number of aircraft than most other partners and for no additional aircraft since 2016 (paragraphs 1.16 to 1.18 and Figure 4).

11 The MoD expects to declare Full Operating Capability (FOC) by the end of 2025, two years later than set out in the 2018 Concept of Use, despite facing several gaps against FOC requirements. The MoD has also revised FOC requirements to be more qualitative since 2023. The MoD believes that it can declare FOC without resolving all these gaps, such as the lack of a standoff weapon, a sovereign facility to check that aircraft retain stealth characteristics and personnel shortages, although it does have mitigations in place for some of them. Furthermore, FOC will not be achieved sustainably. Evidence of FOC will be partly provided by the 2025 Carrier Strike Group deployment, which relies upon borrowing people and aircraft from the training squadron and will also reduce aircraft availability for several months after its conclusion (paragraphs 1.19 to 1.21).

12 The MoD has not been able to sustainably deliver its targets for aircraft availability, resulting in flying hours that were below its requirements for pilots. In 2024 the UK F-35 fleet had a mission capable rate (defined as the ability of an aircraft to perform at least one of its seven possible required missions) which was approximately half of the MoD's target. It had a full mission capable rate, (defined as the ability of an F-35 aircraft to perform all its required missions) which was approximately one-third of the MoD's target. The MoD's targets are themselves lower than global programme targets. The NAO is not disclosing actual percentages for national security reasons. The poor availability rates are driven largely by a UK shortage of F-35 engineers and a global shortage of F-35 spare parts. Comparable figures for the period between October 2024 and January 2025 also showed that UK rates were significantly lower than those of the global F-35B fleet. The MoD improved these metrics in April 2025 during the Carrier Strike Group 2025 deployment, meeting its target for mission capable rates and almost meeting its target for full mission capable rates, but these rates are unlikely to prove sustainable after the deployment. These problems with aircraft availability have resulted in fewer flying hours for pilots than the MoD wants. The MoD told us that it closely monitors live flying hours and synthetic training to judge individual pilot competence (paragraphs 1.20 and 1.22 to 1.27).

Supporting enablers

13 The F-35 force has major personnel shortages across a range of roles, which it does not expect to fully resolve for several years, although it is currently recruiting to fill some of these gaps. Most significantly it had serious gaps in engineering posts in November 2024 with especially acute gaps at supervisor grades. It also had shortages of cyber professionals, pilots and flying instructors. These gaps partly reflect MoD-wide shortages, but the F-35 force is also perceived by some Royal Air Force personnel as a comparatively unattractive posting because of long Carrier deployments. In addition, there are poor living arrangements and the MoD has previously underestimated the number of engineers required. The MoD is attempting to reduce these gaps, most importantly by funding the recruitment of 168 new F-35 engineers (paragraphs 2.3 to 2.7 and 2.13).

14 The MoD has delivered most of the infrastructure required for UK freedom of action but still needs to improve its other F-35 infrastructure. It has delivered four of the five facilities required to enable the UK to operate the F-35 at a time and place of its choosing. The exception is the Aircraft Signature Assessment Facility to assure its stealth characteristics. This was originally delayed for affordability reasons and will now not be delivered until the 2030s, albeit with partial mitigations planned. Beyond its freedom of action infrastructure, the MoD has yet to provide permanent working space for its second frontline squadron to operate independently and the poor quality of some domestic accommodation and amenities at RAF Marham act as a disincentive to personnel joining the F-35 force (paragraphs 2.8 to 2.13 and Figure 5).

15 The MoD is far behind its planned delivery dates for integrating UK developed missiles onto the F-35 and is pursuing interim alternatives. The original need by date for the Spear 3 air-to-surface and Meteor air-to-air missiles was December 2024. However, the MoD now expects to have both in full service in the early 2030s. These delays have been caused by poor supplier performance, the MoD negotiating commercial arrangements that failed to prioritise delivery and low priority given to Meteor by the global programme. The MoD wants to mitigate capability risk by early delivery of a limited capability and by purchasing interim weapons. However, it has not yet purchased an effective standoff air-to-surface weapon (paragraphs 2.14 to 2.16).

16 The MoD faces challenges getting the logistics support it requires from the Global Support Solution (GSS) but has arrangements in place to support deployments. The GSS, run by the global programme, has not been able to deliver spare parts at the rate that the UK, and other F-35 partners, require because the global spares pool has not grown as quickly as the global F-35 fleet. The MoD has also had problems accessing support equipment and its engineers have ongoing, though diminishing, problems with the maintenance management system. Despite these challenges the MoD has arrangements in place to receive additional support to mitigate these issues during operations such as the Carrier Strike Group 2025 deployment (paragraphs 2.17 to 2.21).

How the MoD manages the programme and its costs

17 The MoD's early $2 billion (£1.7 billion) commitment to the global programme and continuous presence in the JPO have helped bring the UK industrial and other benefits, and some limited influence in design, development and cost management. The MoD's 2001 commitment gave it 25% voting rights on design and development and secured UK freedom of action. UK companies now manufacture at least 15% of all F-35 aircraft by value, even though the MoD is buying under 5% of total production, which has resulted in £22 billion of contracts for UK companies so far. There are currently 38 MoD staff embedded with the JPO in Washington, more than any other partner nation, one of whom is now in charge of identifying potential areas of cost reduction within the global programme (paragraphs 3.5, 3.6 and 3.25).

18 The MoD's short-term affordability decisions and serious global programme delays have hindered the delivery of aircraft and other supporting capabilities. In 2010 the MoD removed £1.5 billion from the F-35 budget and since then Air Command has delayed delivery of F-35 aircraft on several occasions, most recently in 2020 when it delayed a batch of seven aircraft by a year to 2025, to save money. The MoD has also delayed F-35 infrastructure, for example in 2021 by stopping construction of the Aircraft Signature Assessment Facility for three years to save £82 million, even though this would lead to higher costs in the long term. More widely, the global programme has suffered from manufacturing problems with both aircraft and engines, and recent issues have meant that the completion of Block 4 upgrades is also running late. In 2023, the global programme delivered 91% of aircraft and 100% of engines late (paragraphs 1.11, 3.13 and 3.15).

19 We estimate that the MoD has spent £11 billion to date on F-35 capability, which is more than it has reported, and more than it anticipated it would spend at the time of the 2013 business case. As for all its programmes, the MoD monitors only the amount it spends on equipment and support, on which it reports spending of £9.35 billion by the end of March 2025. If spending on personnel, infrastructure, training flights, other overheads, and earlier sunk costs, are included, we estimate this would add at least £1.5 billion to the total. The 2013 business case stated that F-35 would be comparable to or cheaper than fourth-generation fighters such as Typhoon, but higher than forecast global programme production, development and support costs since then is proving this to be over-optimistic. The UK has limited influence on global programme costs, but has helped introduce a more disciplined approach to its cost management in particular since 2023 (paragraphs 3.22 to 3.28).

20 Despite the problems and increased costs, in recent years the MoD's day-to-day programme management has had strong leadership and some robust processes in place, although some standard MoD management practices have acted as barriers to progress. The MoD's management of F-35 has involved the co-ordination of nine capability areas, and other capabilities, each with their own accountability structures. Strong programme management and collaborative leadership within Air Command have helped bring integrated management and deliver capability. But each of the approximately 20 requests for approval for spending on the programme and related infrastructure have been time-consuming, and the expected tenure of two to three years for senior managers has acted against the need for them to build long-term relationships with key stakeholders (paragraphs 3.9 to 3.11, 3.16 and 3.22).

21 The programme does not have a robust measurement of success, which means that its overall value is difficult to assess. The programme monitors nine military and non-military benefits, covering areas such as operational advantage, freedom of action, reputation, economic benefits and environmental sustainability, as well as numerous sub-benefits. But they are not weighted in terms of priority or importance. Success or failure in military capability delivery is also based on judgment at a point in time, but the basis of the judgment is not clear, especially where some previously expected capabilities are absent. The MoD also does not capture some benefits, such as transfer of learning (paragraph 3.17 and Figure 6).

22 The programme's whole-life costs are considerably higher than the MoD has publicly reported. The programme's public forecast of whole-life costs of £18.76 billion assumes only 48 aircraft will be procured and that their out of service date will be 2048, even though MoD policy is to procure 138 aircraft and take them out of service in 2069. Following National Audit Office prompting, the MoD has forecast that the cost of 138 aircraft to an out of service date of 2069 would be just under £57 billion, although it describes this forecast as pessimistic and notes that it has not been subject to independent validation. This figure does not include non-equipment costs, such as personnel, fuel, and much infrastructure. We estimate these costs would add £14 billion to the MoD's estimate, making a full whole-life cost of £71 billion (paragraphs 3.27 to 3.35).

Conclusion

23 The 37 F-35 aircraft now in service represent a significant improvement in the warfighting capability of the UK's Armed Forces, with the ability to operate in high threat environments and to enhance the effectiveness of other UK defence platforms. They are in operational use, including on the current Carrier Strike Group deployment. But due to failings of both the MoD and the global programme, the level of overall UK F-35 capability is currently lower than the MoD intended it would be by now at the time of its 2013 business case, and will be for several years. For example, in 2024, the extent to which the UK's fleet was capable of carrying out its full range of missions was far below both UK and global programme targets. Moreover, the aircraft's standoff weapon will not be fully integrated on to the aircraft until the early 2030s.

24 Since 2010, MoD decisions to meet wider affordability challenges have led to delays in the delivery of aircraft and key infrastructure. The MoD has also failed to address personnel shortages and does not expect to fill gaps until 2028. And the global programme has had a series of issues which have delayed production and hindered logistical support while technology upgrade and support costs have also increased markedly over recent years. Despite this, in recent years the MoD's F-35 programme team has demonstrated effective day-to-day management, working collaboratively to deliver capability. Because of early and consistent commitment the UK's position in the global programme has remained influential and contributed to UK companies earning significant contracts supplying the global programme.

25 The MoD can do more to increase capability by urgently improving delivery of the enabling activities that will allow more F-35 aircraft to fly more hours. A robust measurement of success balancing all benefits and a comprehensive cost statement would together provide both a strong basis for future decisions, and a clear benchmark by which to measure the UK programme's overall value for money. In our view, the capability achieved for the estimated £11 billion spent to date is a disappointing return so far compared with MoD plans, even if other programme benefits have been significant.

Recommendations

26 These recommendations are intended to support the MoD as it seeks to get the maximum through-life value out of the F-35, identifying how it can improve its evidence for the programme's value and cost to inform future investment decisions. They may also be applicable to delivery of other major Defence programmes including the next-generation Global Combat Air Programme, as well as wider plans for Defence Reform.

a The MoD should develop, maintain and update an assessment of the value it intends to deliver throughout the life of the programme. This should include a clear weighting of all military and non-military benefits over the short, medium and long-term, for example in a balanced scorecard, to give decision-makers a fuller understanding of the programme's value and support to informed choices about trade-offs.

b In support of this assessment, and to enable full accountability, the MoD should calculate the following costs, including all relevant Defence Lines of Development and operational costs, including:

- costs to date, including all sunk costs;
- 10-year forecast costs which take a prudent view on programme issues and plans which could materially affect costs; and
- building on its recent whole-life cost calculation to 2069, including adapting for different scenarios depending on the number and variant of equipment type ordered, and adding in other relevant Defence Lines of Development and operational costs.

c As part of its wider plans for reform, the MoD should consider what structural changes it can make to support more effective F-35 programme delivery, including:

- extending the length of Senior Responsible Owner (SRO) and other senior programme staff tenures;
- providing appropriate financial and commercial freedoms including increasing delegations;
- simplifying lines of accountability so that, where appropriate, relevant Defence Lines of Development report more formally to the programme's SRO; and
- streamlining approvals regimes. In particular, the MoD should ensure that F-35 investment requests receive scrutiny based on the value of the specific request being made rather than the value of the total F-35 programme, thereby encouraging a proportionate scrutiny approach to lower value requests within the programme.

d The MoD should tighten its measurement of the capability of the F-35, relating it to an objective measure based on the high-level characteristics and key user requirements derived from the Secretary of State's policy baseline relating to F-35.