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Aviation Procurement: Winging it?

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Report, together with formal minutes relating to the report

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Summary

2021's Defence Command Paper, *Defence in a Competitive Age*, made significant cuts to the UK's air power capabilities, with some aircraft to be retired early and plans to purchase replacements scaled back. Less than one year later, Russia's full-scale invasion of Ukraine brought the implications of these cuts into sharp focus. The UK's diminished air capability has left it dangerously exposed in the face of what the MoD has described as "the greatest threat to the open international order in decades".[1] Despite this, July's Defence Command Paper Refresh did not reverse any of the 2021 cuts.

There are serious questions as to whether the UK's diminished combat air fleet can successfully deter and defend against enemy aggression. Whilst made up of highly capable aircraft, it is just too small to withstand the levels of attrition that would occur in a peer-on-peer war. The imminent retirement of the Tranche 1 Typhoon and continued slow force growth of the F-35 fleet will only exacerbate these shortcomings: the MoD and RAF must urgently address this lack of combat mass.

The retirement of the E-3D Sentry has left the UK without a land-based fixed-wing Airborne Early Warning & Control capability. This capability gap has already been extended as the in-service date for the Sentry's replacement, the E-7A Wedgetail, has slipped by a year. Moreover, when the Wedgetail does eventually enter service, it will be as a reduced fleet of just three aircraft rather than the five originally ordered. The cost savings which the MoD cited to justify this cut are disproportionate to the significant reduction in capability which it will entail, and the Department must reverse this irrational decision at the earliest possible opportunity.

The MoD's decision to retire the C-130J Hercules some seven years before its planned out-of-service date will severely reduce the overall capacity of the RAF's air mobility fleet, which provides critical support to operations across Defence as well as fulfilling a humanitarian role, and will have a particular impact on our Special Forces.

Persistent and unacceptable delays in the flying training pipeline mean that pilots are waiting years to qualify, with serious implications for morale and for the effectiveness of our armed forces. We will hold the MoD and the RAF's senior leadership accountable for bringing these delays within acceptable limits by mid-2024. They must ensure that the system has sufficient flexibility and resilience to adapt to future changes in aircrew requirements without introducing further delay, and should review and streamline contractual arrangements to improve transparency and accountability.

1 Ministry of Defence, Defence Command Paper 2023: Defence's Response to a more contested and volatile world, CP 901, July 2023, p6

1 Introduction

Background to this inquiry

1. The role of air power has evolved since the First World War to become fundamental to modern warfare. Defined in UK doctrine as "the ability to use air capabilities in and from the air, to influence the behaviour of actors and the course of events",[2] the Ministry of Defence (MoD) describes the UK's military aviation capabilities as playing a "vital role" in addressing threats in an increasingly competitive modern age:

> Whether it be provision of UK Air Defence, global power projection, rapid delivery of humanitarian aid, strengthening relationships with our allies, or delivery of decisive and lethal action, the UK's air and space power protects the people of the UK, helps to prevent conflict, stands permanently ready to fight the UK's adversaries, and plays a key role amplifying UK global influence with a global network of relationships with key allies and partners.[3]

2. Successfully delivering on these ambitions is reliant on our Armed Forces being equipped with a well-balanced, and sufficiently resourced, fleet of aircraft, capable of carrying out a range of operations in support of the UK's military and political goals. Having already carried out major inquiries into Army and Naval procurement during this Parliament, in March 2022 we therefore decided to turn our attention to the air domain.

3. Due to the scope of the issues to be examined, we decided to split our work into two separate, but connected inquiries.

a) The first inquiry would focus on the strategic context, existing contracts and capabilities, and the impact of planned reductions to the fleet: this report concludes that inquiry.

b) Our second, follow-on, inquiry will be launched shortly and will focus on decisions around future capabilities, including the Global Combat Air Programme.

4. We received 23 submissions of written evidence and held four oral evidence sessions:

- on 28 June 2022 with Dr Sophy Antrobus, Research Fellow at the Freeman Air and Space Institute, King's College London; and Justin Bronk, Senior Research Fellow for Airpower and Technology at the Royal United Services Institute;
- on 29 November 2022 with representatives of BAE Systems, Boeing Defence UK, Airbus UK and Lockheed Martin UK;
- on 22 March 2023 with Squadron Leader (ret'd) Andy Netherwood; Captain RN (ret'd) Dan Stembridge; and Lieutenant General US Air Force (ret'd) David Deptula; and

2 Ministry of Defence, Joint Doctrine Publication 0–01.1, *UK Terminology Supplement to NATOTerm*, p1
3 MoD (AVP0010)

- on 17 May 2023 with James Cartlidge MP, Minister for Defence Procurement; Air Chief Marshal Sir Richard Knighton, Chief of the Air Staff Designate; and Vice Admiral Richard Thompson, Director General Air, Defence Equipment and Support.

In February 2023 we held a one-off evidence session on the work of the Chief of the Air Staff, where we heard from Air Chief Marshal Sir Mike Wigston and Air Chief Marshal Sir Richard Knighton.[4] Whilst not formally part of this inquiry, the evidence we received has also informed our report.

5. We undertook several visits to inform our work:

- in September 2022 we visited STS Aviation and Boeing in Birmingham, where we observed E-7 Wedgetails undergoing conversion;
- in January 2023 we visited RAF Marham, home of the UK's F-35B fleet;
- in February 2023 we visited BAE Systems at their sites in Warton and Samlesbury, where we saw the Typhoon production line and were briefed on progress on the Global Combat Air Programme.

6. We have been ably assisted in our work by our Special Advisor, Douglas Barrie, Senior Fellow for Military Aerospace at the International Institute for Strategic Studies.[5] We would like to take this opportunity to thank him and all those who have contributed to this inquiry.

RAF culture and leadership

7. Since we launched our inquiry, the RAF has faced serious allegations relating to its culture and leadership. In August 2022 the Group Captain Recruitment and Selection resigned after refusing to carry out what she considered to be an unlawful direction to prioritise ethnic minority and female candidates on pilot training courses. Following a non-statutory inquiry into the events surrounding her resignation, she and her team received an unreserved apology from the Chief of the Air Staff.[6] In late 2022, two pilots were dismissed from the flagship Red Arrows Team after an inquiry into reports of widespread misogyny and sexual harassment.[7]

8. In February 2023 we questioned the then Chief of the Air Staff, Air Chief Marshal Sir Mike Wigston, on the circumstances surrounding these deeply regrettable events.[8] We will continue to hold the RAF and MoD leadership accountable for tackling unacceptable and discriminatory behaviours. However, these events fall outside the terms of reference of this inquiry and so we do not address them directly in this report.

4 During the course of our inquiry, Sir Mike Wigston stepped down as Chief of the Air Staff and was replaced by Sir Richard Knighton.
5 As a Special Advisor, Douglas Barrie declared his interests, which can be found in the Committee's formal minutes.
6 Chief of the Air Staff Statement on RAF Recruiting Inquiry, 29 June 2023
7 RAF Red Arrows: Two sacked after unacceptable behaviour at squadron, BBC News, 18 November 2022
8 Oral evidence taken on 1 February 2023, HC (2022–23) 1108

2 Strategic Context

The Integrated Review and the Defence Command Paper

9. In March 2021 the Government published its Integrated Review of Security, Defence, Development and Foreign Policy, *Global Britain in a Competitive Age* ("the Integrated Review"), laying out its assessment of the major trends that would shape the national and international security environment to 2030. It predicted an era of systemic competition, with a deteriorating security environment and growing conflict and instability, and set out an intention to modernise Defence to create a force structure that would deter through "persistent engagement": deploying more of our forces overseas more often, and for longer, to achieve greater global presence.[9]

10. The Integrated Review was followed by a Defence Command Paper, *Defence in a Competitive Age*, in which the Ministry of Defence set out the changes it would make to the Armed Forces to deliver on the Integrated Review's strategic vision. For the Royal Air Force, this would mean retiring "equipment that has increasingly limited utility in the digital and future operating environment… [to] include rationalising older fleets to improve efficiency."[10]

11. In reality, this rationalisation meant cuts to aircraft numbers across the piece, with fleet sizes reduced across combat air, air mobility and airborne early warning and control (AEW&C):

- **Combat air**: Tranche 1 Typhoons would be retired by 2025 and the previous planning goal to procure 138 F-35s was replaced with a scaled-back undertaking to grow the fleet size beyond the 48 already ordered;
- **Air mobility**: the C-130J Hercules tactical transport aircraft would be taken out of service by 2023 (seven years prior to the 2030 retirement date signalled in the 2015 SDSR);
- **AEW&C**: The E-3D Sentry Airborne Early Warning (AWACS) aircraft would be retired in 2021, and the fleet size for its replacement, the E-7A Wedgetail, was reduced from five to three.[11]

12. These cuts have been the main focus of our inquiry and their implications for specific capabilities are examined in detail in this report. We examine the impact of more recent developments, including the war in Ukraine and the Defence Command Paper Refresh, in our concluding chapter.

9 HM Government, The Integrated Review of Security, Defence, Development and Foreign Policy: Global Britain in a Competitive Age, Cm 403, March 2021

10 Ministry of Defence, Defence in a Competitive Age, Cm 411, March 2021, p56

11 Ibid pp 56–57

Table 1: Reduction in the UK's fixed-wing fleet since the end of the Cold War*

	1990	2001	2019	2023
Combat air	463	350	162	159
Air mobility	110	98	91	46
AEW&C	6	7	4	0
Total	579	455	257	205

* Aircraft numbers exclude those in store.

Source: International Institute for Strategic Studies: *The Military Balance*

3 Combat Air

13. The MoD defines Combat Air as:

> An aircraft, manned or unmanned, whose prime function is to conduct air-to-air and/or air-to-surface combat operations in a hostile and/or contested environment, whilst having the ability to concurrently conduct surveillance, reconnaissance, electronic warfare and command and control tasks.[12]

14. Two crewed platforms currently fulfil the Combat Air role for UK Defence: Typhoon and F-35B. Both fleets faced actual or prospective cuts in the Defence Command Paper, with a scaled-back commitment to a future order of the F-35B, and the announcement of the retirement of Tranche 1 Typhoons.[13]

Table 2: Weapons carried by the UK combat air fleet

	AIM-120 AMRAAM	ASRAAM	Paveway II	Paveway IV	Brimstone 2	Storm Shadow	Meteor	Spear Cap 3
Typhoon (Tranche 1)	Y	Y	Y	N	N	N	N	N
Typhoon (Tranche 2)	Y	Y	Y	Y	Y	Y	Y	N*
Typhoon (Tranche 3)	Y	Y	Y	Y	Y	Y	Y	N*
F-35B	Y	Y	N	Y	N	N	Expected from 2028	Expected from 2028

* The Defence Command Paper said that Typhoon would be fitted with Spear Cap 3, but no timescale has been given.

Source: Compiled by Committee staff from publicly available information

Box 1: Global Combat Air Programme (GCAP)

The UK is currently partnering with Japan and Italy on the Global Combat Air Programme (GCAP), a multinational effort to develop a 6th generation combat fighter aircraft (commonly referred to in the UK as 'Tempest'). GCAP is still at an early stage of development but has the potential to be one of the most significant defence programmes for the UK over the next decade both in terms of military capability and economic prosperity. We will examine the prospects for GCAP in greater detail in our follow-on inquiry into future aviation capabilities. At this stage we note its significance as an important factor in decisions made around the size and composition of the combat air fleet in the short to medium term. Development work on Tempest, particularly the 'loyal wingman' unmanned aerial vehicles that are expected to form part of the force mix, may also contribute to bridging the gap between 4th/5th and 6th generation aircraft.

12 MoD Combat Air Strategy, 2018 p11
13 Ministry of Defence, Defence in a Competitive Age, Cm 411, March 2021, p56

Combat mass

15. There was a consensus amongst our witnesses, including the MoD, that the ability of the UK's combat air fleet to deter aggression and to gain air superiority in a warfighting context had taken on a new significance as the prospect of conflict with a peer or near-peer adversary had drawn closer. Against this backdrop, we heard widespread concern that the Command Paper cuts would leave the UK with simply too few combat aircraft to credibly deter and defend against aggression, with the fleet only around a third of the size it was at the end of the Cold War. Dr Sophy Antrobus argued that

> we need to be taking seriously deterring, and deterring by denial rather than ever trying to countenance deterrence by punishment, which means seriously reviewing our combat capability in the air.[14]

Whilst cautioning against like-for-like comparisons, she added that "there is no way of getting away from it: the number of fast jet combat aircraft and squadrons that the RAF has is a significant step back from where we were at the end of the Cold War".[15]

16. The UK is not alone in having reduced its combat air fleet, but it has cut more deeply than others. The table below illustrates cuts to combat air across NATO since the Cold War:

Table 3: Reductions in combat air fleet size for the UK and selected European NATO partners

	1973	1993	2013	2023
UK	500	450	230	169
France	500	630	290	231
Germany	460	450	209	214
Italy	330	320	220	199

Source: International Institute for Strategic Studies, *The Military Balance*

17. As the MoD observed in their written evidence, combat mass must be seen in the broader context of the UK's membership of and contribution to NATO. They also noted that Russia's superior combat mass had not proved decisive in the skies above Ukraine,[16] a point echoed by Justin Bronk.[17] Air Chief Marshal Sir Mike Wigston highlighted the advanced capabilities of modern combat aircraft which, he told us, make up for the absence of mass.[18]

18. It is true that mass alone does not win wars. There is, however, a fine balance to be struck between exquisite capability and aircraft numbers. Several witnesses expressed concern that the size of the current combat air fleet meant it would not be able to endure the levels of attrition which could occur were we to go to war–a scenario which until recently seemed remote, but is now a very real possibility.

14 Q6
15 Q27
16 MoD (AVP0010)
17 Q30
18 Oral evidence taken on 1 February 2023, HC (2022–23) 1108 Q5

19. David Deptula, Dean of the Mitchell Institute for Aerospace Studies and a retired US Air Force Lieutenant General, warned that a conflict with a peer adversary would see attrition "on scales that we have not witnessed since World War Two"[19] and the Human Security Centre argued that the UK's "restricted force mass" would be "unable to endure significant attrition".[20] Whilst not confining his comments to the air domain, General (ret'd) Sir Nick Carter, former Chief of the Defence Staff, told our inquiry into Armed Forces Readiness that "[m]ass and scale is a serious predicament for us" and that he was not confident that "if a peer-on-peer war broke out, we would have any capability after the first couple of months of the engagement".[21] The risk posed by our lack of combat mass is exacerbated by the RAF's lack of any operational reserve.

20. Our readiness inquiry has also heard that the range of operations currently carried out by an increasingly overtasked Air Force means that training for high-intensity warfighting has not been a priority. As Justin Bronk explained:

> readiness for warfighting is not quite diametrically opposed, but close to opposed, to the readiness and degree to which you use the force for lots of small presence and signalling operations. The activity that you do in that space is taking away from the regular training activity that would allow you to maintain a high rate of warfighting readiness. If you look at the forces in Europe that prioritise warfighting readiness the most, which at the moment would probably be Finland and Sweden, as well as Poland to a degree, in terms of air forces, they do very little other than train for their warfighting roles.[22]

21. **With the prospect of UK involvement in a major war on the European continent closer than it has been for decades, there are serious questions as to whether the UK's reduced combat air fleet still provides a sufficient deterrent and whether its limited numbers of admittedly highly capable aircraft could overcome a peer adversary in a warfighting context. These questions arise not only in the context of the UK's sovereign capability, but also in relation to its contribution to any wider alliance.**

22. **The RAF's combat aircraft fleet now provides a boutique high capability: it lacks numerical depth and has an inadequate attrition reserve. Exquisite capability has its place, but in a peer-on-peer conflict such as a shooting war with Russia, every airframe will count. Combat aircraft numbers are already low. The Defence Command Paper cuts will create a combat air capability gap which, on current plans, will persist well into the 2030s. This is unacceptable. *The MoD and RAF must consider as a matter of urgency how they can increase combat air mass in the short term.***

19 Q281
20 Human Security Centre (AVP0009)
21 Oral evidence taken on 21 June 2023, HC 1317 (2022–23) Q167
22 Oral evidence taken on 6 June 2023, HC 1317 (2022–23) Q1

F-35

F-35B

The F-35 is a fifth-generation multi-role stealth aircraft capable of conducting air-to surface, electronic warfare, intelligence gathering and air-to-air missions simultaneously. The B variant operated by the RAF and Royal Navy has a short take-off and vertical landing (STOVL) capability, meaning it can operate from land and sea.

23. As of 1 May 2023, the UK had taken delivery of 31 F35-Bs, with a total of 48 due to be delivered by the end of 2025 as part of an initial 'Tranche 1' order. The MoD has confirmed its intention to place a further 'Tranche 2' order for 27 aircraft, bringing the total fleet size to 74.[23] There remains ambiguity about plans for the F-35 fleet in terms of its eventual size, operational deployment, and attribution; and there are ongoing concerns about programme costs and force growth rate.

Size of the fleet

24. Several witnesses advocated an increase in the UK's F-35 order as the best way to address the combat mass deficit.[24] The currently stated plan to purchase 74 F-35s represents a significant scaling-back of previously outlined intentions for the size of the fleet: the 2015 Strategic Defence and Security Review (SDSR) envisaged a total fleet size of 138.[25] The MoD told us that they were open to the possibility of purchasing further F-35s beyond the 74, with a decision likely to be taken around the middle of this decade and to take into consideration:

> the future operating environment, the capabilities of likely adversaries, how we are planning to evolve the way we fight, and the number of aircraft required to maintain planned force elements throughout the life of the Queen Elizabeth Carriers. Additional factors include the development of the Global Combat Air Programme, how our crewed aircraft might operate with additive capabilities and un-crewed platforms, and how all of these might be connected digitally.[26]

25. Force growth rate of the UK's F-35 fleet has so far been slower than planned. The MoD told us that current difficulties are primarily due to the original number of aircraft maintainer posts being insufficient in the face of "programme realities" such as annual leave, training and professional development.[27] It is inexplicable that these fundamentals

23 Letter from the Minister for Defence Procurement to the Committee Chair, 10 July 2023. One aircraft from Tranche 1 was lost following an incident on board HMS Queen Elizabeth in 2021; the Tranche 2 order includes an additional aircraft to replace it.

24 Q21 and Q25 (Justin Bronk), Q278 (Captain Dan Stembridge), Q279 (General David Deptula)

25 HM Government, National Security Strategy and Strategic Defence and Security Review 2015, p31

26 MoD (AVP0024)

27 Letter from the Minister for Defence Procurement to the Committee Chair, 10 July 2023

were not factored into the calculation of requirements from the outset. At present the UK intends to stand up its second F-35 squadron at the end of 2023 and Lightning Force is planned to reach Full Operating Capability in 2025.[28]

Variants and attribution

26. The F-35 comes in three variants. The "A" variant is a conventional take-off and landing (CTOL) aircraft which can only be operated from land. The "B" variant, operated by the UK, has a short take off and vertical landing (STOVL) capability, meaning that it can operate from both land and carriers. The "C" variant is also carrier-capable but requires carriers to be fitted with catapults (and is thus incompatible with the UK's Queen Elizabeth class carriers).

27. To date, the UK has exclusively operated F-35Bs, and the MoD has confirmed that the forthcoming Tranche 2 order will also be for the "B" variant.[29] We explored whether there would be advantages to instead purchasing F-35As to create a mixed fleet, noting the superior range and payload of the F-35A:

Table 4: Comparison of F-35A and B

Variant	Range (nautical miles)	Maximum payload (kg)
F-35A	1,200+	8,160
F-35B	900+	6,800

Source: Lockheed Martin

28. The MoD have cited the flexibility offered by the B variant's STOVL capability as key to their decision. Vice Admiral Richard Thompson told us that:

> We are far more effective when we can operate the aircraft from land and sea. It gives us more productivity and it gives us more flexibility. So the fact that we have joint squadrons and we can operate the aircraft from land or sea—we are the only nation in the world that has that capability and the intent of doing it from land or sea—gives us far more flexibility. Personally, as a Fleet Air Arm officer, I support it—it is the right way to go—and I always have done.[30]

29. Dr Sophy Antrobus and Justin Bronk also recognised the advantages offered by the B variant's flexibility, although Justin Bronk noted that the eventual fleet size could change the equation:

> The key decision point is whether you are buying a sufficient number. If you were buying, for example, two squadrons' worth of primarily land-based F-35s, it would start to make sense to buy As … you are introducing a lot of additional inefficiency and lack of flexibility there, so, unless it is a significant chunk of additional aeroplanes, it does not really make sense. If it is another, let us say, 16 on top of the 27, it probably makes sense to stick with Bs.[31]

28 ibid
29 Q322
30 Q336
31 Q24

General David Deptula was more forthright, telling us that "frankly, you ought to be considering buying F-35As between now and when you get Tempest on board."[32]

30. The practicalities of operating the joint Lightning Force have created ambiguities about the attribution of the fleet. Captain (ret'd) Dan Stembridge told us that this created tension between the RAF and the Royal Navy and made it hard to quantify how many aircraft were required:

> The politics of this is, are the F-35s that we have in the UK carrier-borne air systems that are able to operate on land, or are they land-based systems that are able to operate at sea? Fundamentally, we make the choice to not decide. That drives double accounting over what you are using those systems for. We currently have a Navy that force generates a maritime taskforce. We have an Air Force that generates air systems, and then we place the responsibility for force generating carrier strike to the Navy, but they do not have the levers to be able to effect that, because they do not own the air systems and they don't own the money and therefore they do not own the capability development or the force generation for it. That creates tension, whether that is intentional or not. It creates tension and it creates question marks over what is enough… Is 72 or 73 enough to deliver carrier strike? It is if you attribute them to do that. If you attribute them to also do other things, it is not enough.[33]

Dr Sophy Antrobus made a similar point about over-attribution:

> All the expectations are on the head of F-35B, and you have a bit of a problem if you assume that it is going to be doing all of the things that we would like it to be doing, at the same time, in one high-end conflict.[34]

Operational deployment

31. During the Carrier Strike Group's tour of the Indo-Pacific in 2021, F-35s from the US Marine Corps deployed on the Queen Elizabeth aircraft carrier alongside UK F-35s.[35] We explored with Dan Stembridge whether this could be the default deployment model in the future. He cautioned that:

> to assume that, with all the challenges that the United States military has, it has spare capacity to hop on to our carriers—notwithstanding the sovereignty issues about wanting to be able to deliver sovereign capability as well as joint and coalition capability—is a bit of a tall ask.[36]

32 Q289
33 Qq282–3
34 Q10
35 US Marine Corps depart Carrier Strike Group, Royal Navy news story, 24 November 2021
36 Q284

Costs

32. The F-35 is undoubtedly an extremely capable aircraft: as Justin Bronk noted, "every country that has seen it has opted to buy it."[37] It is also, however, correspondingly expensive. Figures provided to the Committee by Lockheed Martin show that the Unit Recurring Flyaway (URF) cost (i.e. the pure acquisition cost) for each aircraft ordered in 2020 was $101 million.[38] The aircraft price decreased by 32% between 2014 and 2022, but the price of each aircraft delivered between 2023–26 will nonetheless be 6% above 2021 forecasts.[39]

33. Operating costs have been a particular concern. The United States Government Accountability Office, Congress's spending watchdog, found in 2021 that the projected sustainment cost per F-35B would need to reduce by $2.3 million per year to meet established affordability constraints for the US Marine Corps fleet.[40] The Secretary of State acknowledged in 2021 that he was "very keen… that the contractors recognise the through-life support costs and the service support costs" of the aircraft.[41]

34. Lockheed Martin argue that given the F-35's range of advanced capabilities, a pure cost-per-flying-hour metric is simplistic and that, instead, the aircraft should be assessed on a 'cost-per-mission' basis. According to their UK Chief Executive, "[t]he reality is that the F-35 can achieve effects that would otherwise take multiple aircraft types in formation".[42]

35. **Increasing the UK's F-35 fleet beyond the 74 aircraft already planned would be one way to address the combat air capability gap, and this was an approach supported by several of our witnesses. However, although acquisition costs for the aircraft may have reduced, sustainment costs remain unacceptably high. The fleet's slow force growth rate is a continued concern: the RAF's failure to correctly calculate the number of maintainers required to service the aircraft is simply inexcusable. At present there are too many unresolved questions about the development and operational deployment of the fleet.**

36. ***The MoD must be transparent and realistic about the eventual size of the F-35 fleet, recognising that the planned deferral of this decision to the middle of this decade will damage the ability of UK industry to maintain an ongoing production capacity for combat air, and should also make clear whether it is attributed to the Royal Navy or the RAF. When deciding whether to purchase further F-35s, the MoD should carefully consider the advantages that would be offered by a mixed fleet of F-35A and B variant aircraft. The MoD should also clarify whether its intention is that the fleet will routinely be deployed alongside US Marine Corps F-35Bs on UK carriers.***

37 Q29
38 Lockheed Martin (AVP0019)
39 Letter from the Minister for Defence Procurement to the Committee Chair, 10 July 2023
40 F-35 Sustainment: Enhanced attention and oversight of F-35 affordability is needed, US Government Accountability Office, 22 April 2021, p19
41 Oral evidence taken on 23 June 2021 (HC 166) Q273
42 Q203

Typhoon

Eurofighter Typhoon

The Typhoon is a 4th generation multi-role combat aircraft capable of a spectrum of air operations including air-to-air combat, ground support and close air support missions. It provides the Quick Reaction Alert (QRA) capability for UK airspace and detachments have also been used to bolster NATO air defence in the Baltic and Black Sea regions.

Retirement of Tranche 1

37. The Defence Command Paper announced that the remaining Tranche 1 Typhoons, originally due to leave service in 2030, would instead be retired by 2025.[43] Figures provided by the Minister for the Armed Forces suggest that the 30 aircraft affected will be retired with an average of almost 60% of their airframe fatigue lives remaining.[44] The MoD told us that that the Tranche 1 Typhoons were "at risk of losing relevance against an increasingly complex and challenging threat" and would otherwise face obsolescence challenges in the second half of the 2020s.[45]

38. The RAF currently has no operational reserve: we explored whether mothballing these Typhoons would provide an extra layer of resilience for the fleet. We put this to Justin Bronk, who acknowledged that there was a valid argument (as made by the MoD) that "the money you would spend keeping them going could be better spent elsewhere" but agreed that for the combat-capable Tranche 1s "there is definitely an argument" for mothballing.[46]

Upgrades for Tranche 2 and 3

39. Retirement of the 30 aircraft in Tranche 1 will leave 107 Tranche 2 and 3 Typhoons in service, and the MoD has committed £2.55 billion to upgrading the remaining aircraft.[47] The main upgrade will be the integration of a new active electronically scanned array radar, the ECRS2, now due to reach IOC on the Typhoon towards the end of this decade[48] (although originally expected to be in-service in the mid-2020s).[49] The Defence Command Paper also indicated that Typhoon would be fitted with the SPEAR Cap 3 air-launched weapon, but no timescale for this has yet been set out.[50]

43 The MoD has since indicated that whilst the bulk of Tranche 1 Typhoons will be retired in 2025, four are expected to remain in service until 2027 (see UIN 140022)
44 UK to retire Tranche 1 Typhoons with more than half of airframe hours remaining, Janes, 8 September 2021
45 MoD (AVP0010)
46 Qq20–21
47 £2.35 billion Typhoon upgrade sustains 1,300 UK jobs, Ministry of Defence, 15 July 2022
48 ibid
49 Counter-drone tech and state-of-the-art radar for the RAF, Ministry of Defence, 3 September 2020
50 Ministry of Defence, Defence in a Competitive Age, Cm 411, March 2021, p56

40. Ian Muldowney, Chief Operating Officer at BAE Systems Air, said that investment in the planned upgrades would be key to keeping Typhoon "right at the forefront of the combat air capability of the United Kingdom for the next 20 years" whilst also allowing a segue of capability transfer into Tempest.[51]

41. ***Planned sensor and weapons upgrades to the Typhoon fleet must be delivered at pace. In light of the RAF's lack of any operational reserve, the MoD should seriously consider mothballing the Tranche 1 Typhoons which are due to be retired in 2025 rather than disposing of them.***

Uncrewed Aerial Systems

42. Another option to increase combat mass at a reasonable cost is the employment of Uncrewed Aerial Systems (UAS).

43. UAS are expected to be integrated into the Future Combat Air System from the outset. Significant research and development work on combat-capable UAS has already been carried out in the UK, with the Defence Science and Technology Laboratory (Dstl) and the RAF Rapid Capabilities Office (RCO) announcing the Lightweight Affordable Novel Combat Aircraft (LANCA) project in 2019.[52]

44. In June 2022 the MoD announced the cancellation of Project Mosquito, an uncrewed Combat Aircraft demonstrator under development as part of LANCA, saying that

> The Rapid Capabilities Office will now quickly launch activities to aggressively pursue the RAF's unchanged firm commitment to integrate advanced uncrewed capabilities into the near-term force mix with more immediate beneficial value.[53]

45. The MoD told us that it was now developing an Autonomous Collaborative Platform strategy: "In the short term, our focus is on low-cost expendable ACP. In the medium term, we are looking at higher end attritable and survivable ACP."[54]

46. Northrop Grumman told us that the early adoption of UAS intended for the Future Combat Air System force mix would play an essential role in addressing the forthcoming risk of a combat air capability deficit and called for a funded capability programme to address this.[55]

51 Q112
52 Dstl to develop conceptual unmanned aircraft for RAF, Dstl press release, 22 July 2019
53 Royal Air Force Rapid Capabilities Office announce review of Project Mosquito, MoD press release, 24 June 2022
54 MoD (AVP0024)
55 Northrop Grumann (AVP0004)

Box 2: Reaper and Protector

The RAF currently operates ten Reaper drones within its Intelligence, Surveillance, and Reconnaissance fleet. The Reaper was originally due to go out of service in 2015, but it has been heavily committed to Operation Shader in Iraq and Syria. They are now expected to leave service in 2025 and will be replaced by a new fleet of 16 Protector aircraft.[56]

In 2017 the MoD decided to delay the Protector programme by two years as a short-term cost-saving measure. In 2020 it emerged that programme costs rose by £186.8 million as a direct result of this delay. Additional cost increases attributed primarily to sensor upgrades and inflation mean that the overall programme cost has increased by £326 million from the original £816.2 million budget.[57]

The conflict in Ukraine has raised questions around the survivability of high-end drones such as Protector in a contested environment. A fleet of sixteen aircraft may prove insufficient in the face of attrition.

47. **Uncrewed Aerial Systems (UAS) offer a cost-effective means of increasing combat mass. As we identified in our 2021 report "*We're Going to Need a Bigger Navy*", the role of UAS within the force mix on the UK's aircraft carriers remains unresolved. This may have implications for decisions around the eventual size of the F-35 fleet. *The MoD must rapidly progress its work to develop and deploy UAS alongside the UK's existing combat air fleet. Publication of the Autonomous Collaborative Platform strategy should be accompanied by clear (and ambitious) timescales and an adequate funding commitment for a UAS capability programme.***

56 Royal Air Force, Reaper (MQ-9A), accessed 29 August 2023

57 Letter from the Ministry of Defence to the Chair of the Public Accounts Committee, 5 November 2019

4 Airborne Early Warning and Control (AEW&C)

Retirement of the E-3 Sentry

48. The Defence Command Paper announced that the UK's E-3D Sentry fleet, which had provided the RAF's Airborne Early Warning and Control (AEW&C) capability for over 30 years, would be retired in 2021, to be replaced by a new fleet of Boeing's E-7A Wedgetail aircraft.[58] The Wedgetail is a proven capability system which is already operated by the Royal Australian Air Force, and Air Chief Marshal Sir Richard Knighton described it as providing a "step change" in capability compared to the aging Sentry.[59]

E-7A Wedgetail

The Wedgetail is an advanced Intelligence, Surveillance and Reconnaissance (ISR) platform providing command and control and situational awareness capabilities. The modified Boeing 737 aircraft incorporates a Multi-role Electronically Scanned Array (MESA) radar capable of covering 10 million square kilometres over a ten hour period.

49. The Defence Command Paper said that transition to the Wedgetail would take place in 2023,[60] creating what was expected to be a short-term capability gap during which the UK would have no fixed-wing land-based AEW&C capability. That gap has now stretched to at least three years as the Wedgetail programme has slipped, with the MoD confirming to us that the first aircraft is now expected to be delivered in the second half of 2024.[61]

50. The capability gap is compounded by continued delays to the Crowsnest programme. Intended to provide AEW&C coverage for the Queen Elizabeth class aircraft carriers by integrating an AEW&C radar onto a Merlin helicopter, Crowsnest was due to reach Initial Operating Capability (IOC) in 2020.[62] Three years on, and over £400 million later, IOC remains elusive.[63]

51. Air Chief Marshal Sir Richard Knighton acknowledged that "our ability to see and understand what is happening in the air domain is fundamental to our ability to direct our forces and our assets and protect our country."[64] It is, therefore, astounding that the MoD has accepted a capability gap that has left the UK reliant on NATO for AEW&C coverage since the outbreak of the Ukraine war, at a time when capacity is stretched across the Alliance. **With only a limited number of (comparatively vulnerable) fixed and**

58 Ministry of Defence, Defence in a Competitive Age, Cm 411, March 2021, p57
59 Q366
60 Ministry of Defence, Defence in a Competitive Age, Cm 411, March 2021, p57
61 Oral evidence taken on 1 February 2023, HC (2022–23) 1108 (see footnote to Q14)
62 Written evidence submitted by Lockheed Martin in connection with the Committee's Third Report of Session 2021–22, *We're going to need a bigger Navy* (HC 168).
63 PQ 182508; PQ 182511
64 Q366

mobile land-based radars on UK soil, all of which would be primary targets for our opponents were the current Ukraine conflict to escalate, the capability gap in Airborne Early Warning & Control coverage created by the retirement of the E-3 Sentry and compounded by the delays to the E-7 Wedgetail and Crowsnest programmes presents a serious threat to the UK's warfighting ability.

Reduction in the Wedgetail fleet

52. When the Wedgetail does eventually enter service, it will be as a fleet of only three aircraft; the result of yet another Defence Command Paper cut. The fleet was originally planned to number five, and the reduction has been acknowledged by the MoD to be a cost-cutting measure, as Air Chief Marshal Knighton explained:

> The savings associated with reducing from five to three provided £700 million-plus that could be spent elsewhere in defence. That was the decision that Ministers took.[65]

53. This reduction in the fleet was met with vocal opposition in evidence to us. Captain (ret'd) Dan Stembridge told us that it was "simply not enough",[66] and there were doubts that such a small fleet would be able to reliably provide even a single 24/7 orbit, as explained by General David Deptula:

> Three aircraft might be able to maintain a single orbit, but what happens when one of those aircraft drops out for some sort of attrition—if it goes down for maintenance or some other reason? The short answer is that you lose your airborne warning picture and command and control. That is a big risk to take.[67]

Justin Bronk felt that although four aircraft could enable a single orbit, a fleet size of six or seven aircraft would be preferable, allowing a second, closer, orbit to be put up if needed.[68] Northrop Grumman noted that "[p]revious experience… showed that to deploy the three aircraft needed to constitute an enduring capability took four deployed crews and used the entirety of a seven aircraft fleet in rotation".[69]

54. Witnesses also highlighted the impact that the reduced fleet would have on the UK's contribution to NATO, with the Royal Aeronautical Society observing that "It is difficult to see how three air systems (however capable) will be able to meet the NATO commitment plus provide a global sovereign capability."[70] Justin Bronk told us:

> It is also worth remembering that we do, I believe, have a commitment to NATO to provide an AWACS orbit. One of the questions I believe the Treasury asked internally during the debates back and forth about numbers—five, four or three—was how we are going to meet our NATO requirement. I am not aware that a satisfactory answer was given on that.

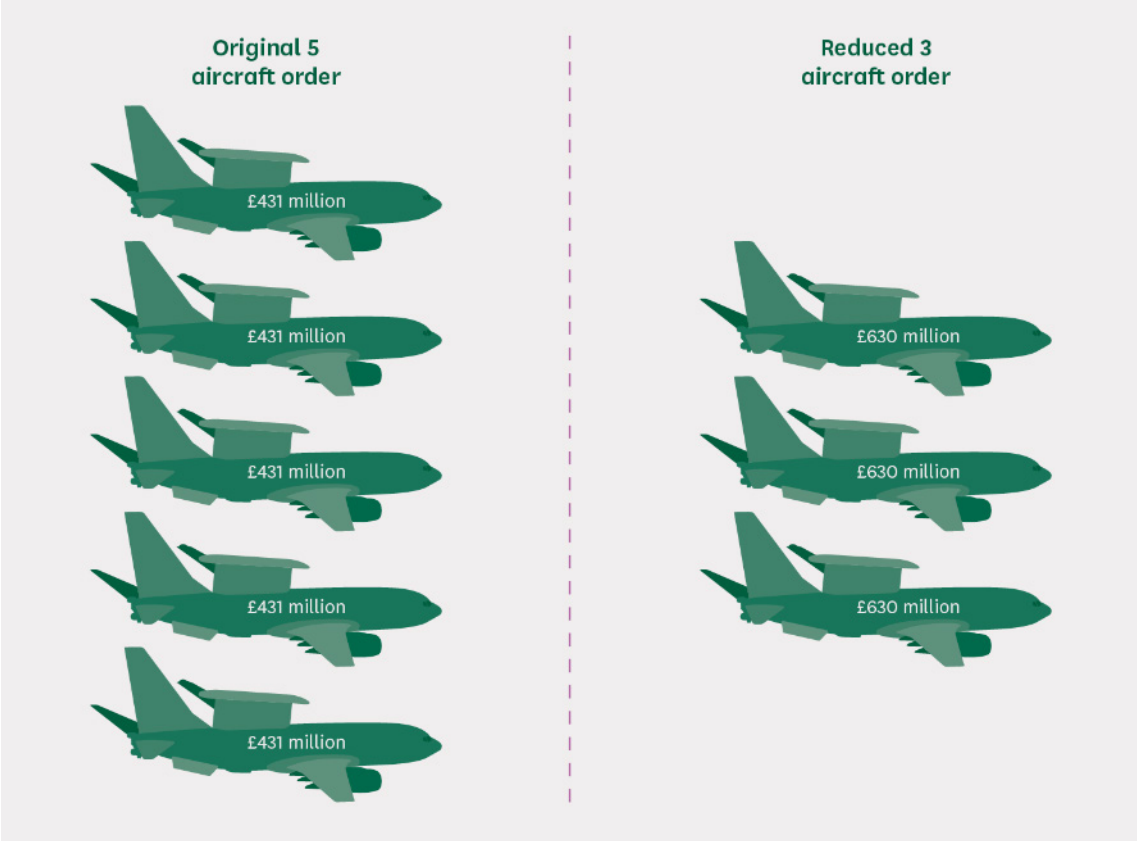
65 Q367
66 Q260
67 Q261
68 Q63
69 Northrop Grumann (AVP0004)
70 Royal Aeronautical Society (AVP0007)

He described the fleet reduction as "an incredibly expensive way of not meeting your commitment properly."[71]

55. Against the weight of this evidence, the MoD nonetheless told us that "a fleet of three Wedgetail aircraft, with improved availability when compared to the Sentry, would provide Defence with the capability it needs and provide the UK's contribution to NATO".[72]

56. Given that the cuts to the fleet were made on cost grounds, we examined the proposed savings in detail. Acquisition costs for the original fleet of five aircraft were estimated at £2.155 billion; the MoD now expects to pay £1.89 billion for three.[73] Thus, whilst the fleet size has been slashed by 40%, acquisition costs have reduced by just 12%. The graphic below demonstrates the acquisition cost of each aircraft in the original and revised fleet. As our recent report on MoD procurement noted, the decision to cut the fleet clearly represents extremely poor value for money.[74]

Figure 1: E-7 Wedgetail cost comparison



57. Alongside the acquisition savings set out above, savings will also accrue from the reduced sustainment costs of the smaller fleet, which Vice Admiral Richard Thompson put at £300 million.[75] These support costs are still to be finalised, but the MoD anticipates a total saving of £715-720 million once acquisition and support savings are combined.[76]

71 Q62
72 MoD (AVP0010)
73 PQ 1028 1
74 Defence Committee, Ninth Report of Session 2022–23, It is broke - and it's time to fix it: The UK's defence procurement system, HC 1099, para 43
75 Q378
76 ibid

58. **Of all of the Defence Command Paper's cuts, the decision to reduce the UK's Wedgetail E-7 fleet from five to three aircraft stands out as the most perverse, with the fleet cut by 40% for an acquisition saving of just 12%. Moreover, our witnesses told us that three aircraft will simply not be sufficient to meet the UK's commitment to NATO and our own sovereign needs. The MoD has committed almost £2 billion for a fleet of aircraft that, due to its reduced size, will be unable to meet the basic capability requirement. *The MoD should set out in its response to this report what discussions it has had with NATO regarding the UK's Airborne Early Warning & Control obligations to the Alliance. The decision to reduce the Wedgetail fleet must be revisited at the earliest possible opportunity with a renewed commitment to a fleet of at least five aircraft.***

A troubled programme

59. Fleet size aside, we also have serious concerns about the progress of the Wedgetail programme itself. We outlined above the delay to IOC, which Boeing told us was predominantly due to industry-wide supply chain issues.[77] We heard during our inquiry that more than two years on from the Defence Command Paper, the full business case for the reduced fleet has yet to be submitted for Treasury approval. The project was rated Amber by the Infrastructure Projects Authority in its 2023 report,[78] and the MoD's Equipment Plan acknowledged that cost inflation was being experienced throughout the programme.[79] Having originally planned to buy five aircraft, the Department has remained liable for the purchase of all five of the Multi-role Electronically Scanned Array (MESA) radar. We were not convinced by the Minister's assertion that this was "a conscious decision" which would allow for savings on spare parts in future.[80]

60. **Whilst the E-7 is undoubtedly a capable aircraft, its procurement has been a woeful but depressingly familiar story of MoD failings and contractor underperformance combining to deliver a programme over time and over budget. *Our recent report on defence procurement made a series of recommendations to tackle the systemic procurement issues which persist at the MoD: these must be implemented without delay.***

61. The three aircraft making up the UK's Wedgetail order are undergoing modification work in Birmingham, carried out by Boeing and STS Aviation using a 136-strong workforce.[81] This truncated run will contribute little to the UK's broader requirement for sustainable investment in its defence sector. Boeing in particular has received billions of pounds' worth of MoD aviation contracts in recent years, including orders for nine Poseidon P-8 maritime patrol aircraft, 14 Chinook CH-47 ER helicopters, and 50 Apache AH-64E helicopters, but as of December 2022, Boeing Defence UK directly employed just 1,733 people in the UK. They told us Boeing UK have committed to increase their UK workforce to 4,000 by 2026,[82] but nonetheless we consider this an extremely poor return on the taxpayer's investment. These off-the-shelf purchases from the United States

77 Q205, Q207
78 Annual Report on Major Projects 2022–23, Infrastructure and Projects Authority, 20 July 2023, p70
79 The Defence Equipment Plan 2022–23, Ministry of Defence, 22 November 2022, p34
80 Q400
81 Boeing Defence UK (AVP0020)
82 ibid

have also exposed the defence budget to fluctuations in the currency markets. Air Chief Marshal Sir Richard Knighton acknowledged that "as the pound has weakened against the dollar… that has caused a 15% increase in costs".[83]

62. Additionally, having at least generated the industrial capacity to modify the aircraft (and having committed to purchasing the five radar originally ordered) we fail to understand the logic behind the Government's decision not to commit to completing the envisaged five aircraft fleet even if two of them were then mothballed or sold on. The current cap on three aircraft is, from an industrial perspective, counterproductive and self-defeating.

63. **The Ukraine war has underlined the importance of a thriving and resilient domestic defence industry.** ***The Government must ensure that where it buys equipment off-the-shelf, it demands meaningful and sustainable investment in the UK from contractors in return, and holds them rigorously to account for fulfilling their pledges.***

83 Q384

5 Air mobility

64. The air mobility fleet underpins operations across Defence and provides a vital contribution to the UK's broader diplomatic and humanitarian objectives. In the words of Andy Netherwood, a former C-130 Commander who gave evidence to our inquiry:

> Air mobility is a vital component of both hard and soft power and is essential to realise the 'Global Britain' ambition set out by the Integrated Review. It is required to support, sustain and recover the 'persistently engaged force' envisaged by the Review and this applies to every aspect of it. For example, even the HMS Queen Elizabeth-led Carrier Strike Group required multiple air mobility missions to support CSG21, and the enhanced forward presence in response to Russia's invasion of Ukraine would not be possible without sufficient air mobility to sustain it. It is needed to conduct Non-Combatant Evacuation operations, as we saw during Op PITTING and is the means by which the UK can support allies and influence the course of conflicts without direct military intervention, as we saw with the movement of equipment and supplies for Ukraine. It also contributes to UK soft power by allowing humanitarian supplies to be moved quickly anywhere in the world to support disaster relief. Finally, it is an essential pillar of national resilience as we saw during the covid pandemic when air mobility aircraft were used to transport vaccines, patients and essential personnel. In short, air mobility is woven through every thread of the Integrated Review.[84]

The RAF air mobility force is based at RAF Brize Norton and includes:

- 8 C-17 Globemaster heavy-lift strategic transport aircraft
- 22 Atlas A400M strategic and tactical medium-lift aircraft
- 14 Voyager air-to-air refuelling and strategic lift aircraft.[85]

Retirement of the C-130J Hercules

C-130J Hercules

The C-130J is a mid-range tactical transport aircraft. Until its retirement in 2023 it was the RAF's primary tactical transport aircraft, used for a range of operations including troop movements, air drops, special forces, and humanitarian relief.

84 Andy Netherwood (AVP0001)

85 The Voyager fleet is provided under a Private Finance Initiative with AirTanker. The 14-strong fleet includes a core fleet of nine aircraft, and a further five which can be utilised as a surge capacity. See Royal Air Force, Voyager, accessed 29 August 2023.

65. The Defence Command Paper announced that the RAF's 14 C-130J 'Hercules' aircraft, for many years the backbone of the air mobility fleet, would be taken out of service by 2023,[86] some seven years before the 2030 out-of-service date envisaged in 2015's Strategic Defence and Security Review.[87] The MoD intends to counterbalance the retirement of the Hercules with the continued growth of the Atlas A400M fleet, describing the Atlas as "the next-generation of air mobility aircraft".[88] The retirement of the Hercules is predicted to result in savings of £1.829 billion over the period from 2021 to 2035.[89]

66. During the course of our inquiry, and in the face of significant criticism, the C-130J was duly retired. 47 Squadron was officially stood down at RAF Brize Norton on 30 June 2023.[90]

67. The criticism of the MoD's decision to retire the Hercules can be broadly categorised into two themes: the consequent reduction in the air mobility fleet's overall capacity, or available 'task lines'; and the gap which arises for several niche tactical airlift capabilities, which will have a particular impact on our Special Forces. We examine each of these below.

Task lines

68. Andy Netherwood described a task line as "a discrete task that is made up of an aircraft and crew that is capable of carrying a load from A to B". Task lines should not be confused with the capacity by volume of a fleet:

> The reason why the distinction is important is that there is a tendency to take a sort of spreadsheet approach and look at the total cargo tonnage that the RAF air mobility force can take as a whole… but that is irrelevant if those tonnages aren't always going to the same place. You need discrete task lines—one going somewhere, some going somewhere else.[91]

69. Figures provided by the MoD show the average number of aircraft available for the C-17, C-130J and A400M between October 2022 and April 2023:[92]

Table 5: Air mobility fleet aircraft availability

Date	C-17		C-130J*		A400M	
	Available	% of fleet	Available	% of fleet	Available	% of fleet
1 October 2022	7	88	9	64	14	70
1 November 2022	7	88	9	64	13	65
1 December 2022	7	88	10	71	14	70
1 January 2023	7	88	10	64	15	72

86 Ministry of Defence, Defence in a Competitive Age, Cm 411, March 2021, p56
87 HM Government, National Security Strategy and Strategic Defence and Security Review 2015, p32
88 MoD (AVP0010)
89 PQ 18780
90 Number 47 squadron mark the end of an era with a royal parade, RAF news story, accessed 29 August 2023
91 Q238
92 MoD (AVP0024)

Date	C-17		C-130J*		A400M	
	Available	% of fleet	Available	% of fleet	Available	% of fleet
1 February 2023	6	75	8	57	14	70
1 March 2023	7	88	8	57	16	75
1 April 2023	7	88	7	50	13	65

*The MoD note that C-130J figures since January include aircraft undergoing disposal or centre-wing replacement, accounting for the drop in percentage terms in 2023.

70. It is clear from these figures that the loss of the C-130J will significantly reduce the number of task lines available to the air mobility force, which will only add to the workload of the (already overtasked) C-17 and the A400M.

71. Air Chief Marshal Sir Mike Wigston acknowledged that the loss of the Hercules would result in a shortfall in tactical airlift in this decade.[93] Similarly, Air Chief Marshal Knighton was clear that:

> if you retire C-130, you lose capacity in terms of the number of points of presence and the number of aircraft in the air—of course that is right. That will force us to make decisions around priorities, and to move lower-priority freight and lower-priority tasks in other ways.[94]

72. Having been involved in making those prioritisation decisions in the past, Andy Netherwood warned of the likely consequences:

> Historically, it has tended to be training—both collective training, in terms of air mobility support for exercises and participating in UK exercises, but also whenever defence needs to exercise overseas, that requires air mobility support and, if there isn't enough air mobility support, the exercise is either curbed or cancelled.[95]

73. Captain (ret'd) Dan Stembridge cautioned that some of the knock-on effects of the reduction in capacity would not be immediately obvious:

> … a lot of decisions that have been made in wider UK defence may have been based on the assumption that there is that air mobility available… Of course, if you have reduced the number of lines by the number of lines that we have, that will have an impact that is perhaps not necessarily readily in view when you make that decision. It is the follow-on, knock-on effect.[96]

Capability

74. During the course of our inquiry, the MoD repeatedly assured us of the comparative advantages of the A400M. The Minister for Defence Procurement told us that "it can carry

93 Oral evidence taken on 1 February 2023, HC (2022–23) 1108 Q141
94 Q349
95 Q241
96 Q258

twice as much [as the Hercules] 50% further and 25% faster".[97] Similarly, the Defence Secretary told us that "[t]he A400 has a better performance, better lift carry … I think in nearly every characteristic, the A400 is better".[98]

Atlas A400M

The Airbus A400M provides strategic and tactical airlift capabilities for the RAF. It has a payload of up to 37 tonnes and a range of 4,100 nautical miles.

75. We do not dispute that the Atlas is clearly a larger and faster aircraft and that, in many cases, it will be more than equal to the tasks demanded from it. Indeed, for some tasks it will undoubtedly be better-suited than the Hercules. However, we felt that Ministers were too quick to promote these advantages, whilst underplaying the Atlas's remaining limitations.

76. Since the decision to retire the Hercules, the MoD and Airbus have sought to expedite the transition of its capabilities onto the Atlas. Sir Kevin Leeson, Director of Military Affairs at Airbus UK, told us that:

> We are working closely with the MoD against their priority order to advance a number of the capabilities that would have been coming along over the next two to three years, to ensure that they meet the MoD's priorities for the early retirement of the C-130… I am confident that we will meet the MoD's priorities on delivering the capabilities necessary to make that change and minimise the risk of it.[99]

77. The MoD has accepted, however, that even under this faster timescale, some capabilities, including what they described as "niche" air drop capabilities, would not be transferred until 2025, leaving a gap of up to two years. Air Chief Marshal Knighton was at pains to make clear that Ministers had accepted this gap when they took the decision to retire the Hercules:

> My point was that Ministers were fully aware of that issue when they made the decision, and nothing has changed for Ministers to change their mind.[100]

78. We are particularly concerned about the implications of this for Special Forces operations and training. The Government has a long-standing policy not to comment on Special Forces capability, a point which Air Chief Marshal Knighton reiterated to us when giving evidence,[101] but the possible impact has been widely reported,[102] and indeed seems an obvious conclusion given that the MoD has acknowledged that air drop will be one of the capabilities affected.

97 Q337
98 Oral evidence taken on 23 April 2023 (HC 792) Q56
99 Q122
100 Q339
101 Q340
102 UK will be left 'dangerously exposed' when it cuts fleet of special forces aircraft, Sky News, 15 May 2023

79. Beyond specific operational capabilities, the smaller size of the Hercules in comparison to the A400M gives it an operational advantage for some tasks which, as Andy Netherwood explained, is "an unresolvable matter of physics".[103] As a comparatively smaller aircraft, the C-130J is able to land on smaller airstrips at smaller airfields and is less easily detectable by enemy radar.[104] The loss of the flexibility this affords cannot be resolved by any capability transfer, and it will be a permanent reduction in the overall capability of the air mobility fleet.

Atlas A400M

80. The last of the 22-strong Atlas fleet was delivered to the RAF during the course of our inquiry.[105] There is an aspiration, although not yet a firm commitment, to expand the fleet by a further six aircraft towards the end of this decade.[106]

81. Although a capable aircraft, the multinational A400M programme has a long and difficult history. Significant problems have impacted the engine in particular, with issues with the propellor gearbox, combustion chamber and sensors. These problems, and the resulting delays, have led to aircraft being delivered late and requiring time-consuming upgrades.[107]

82. The MoD addressed these issues in their written evidence, acknowledging that "the availability of Atlas has not yet fully met the expectations from the IR". They told us that "the situation is under direct and focused high-level scrutiny with significant improvements demanded before Hercules retires".[108]

83. Although the Atlas has been designed with a air-to-air refuelling (AAR) capability, the MoD has to date chosen not to utilise this capability, instead relying solely on the Voyager. This decision is reportedly due to a contractual undertaking with AirTanker, the company which supplies the Voyager aircraft to the RAF, which would see the MoD liable to pay compensation should it use another aircraft for AAR.[109] With the Atlas fleet now complete, the MoD should look to revisit this issue and bring improved flexibility to the air mobility fleet.

84. **One of the most significant cuts in the Defence Command paper was the early retirement of the C-130J Hercules fleet some seven years before its planned out-of-service date. Our witnesses were almost unanimously critical of this decision, which has significantly reduced the overall capacity of the air mobility fleet, undermined the Integrated Review's "Global Britain" objective, and created a capability gap which could hamper Special Forces. We find it deeply unsatisfactory that the Government has sought to hide behind the cloak of secrecy which covers Special Forces to limit meaningful scrutiny of the capability decisions which will affect their operations.**

103 Andy Netherwood (AVP0001)
104 Ibid; Q230
105 Atlas transport aircraft delivered to RAF Brize Norton, RAF news story, 22 May 2023
106 Oral evidence taken on 1 February 2023, HC (2022–23) 1108 Q140
107 A400M: The €20 billion military aircraft that has bedevilled Airbus, Financial Times, 3 July 2018
108 MoD (AVP0010)
109 MoD rule out Atlas being given in-flight refuelling capability, UK Defence Journal, 20 June 2018

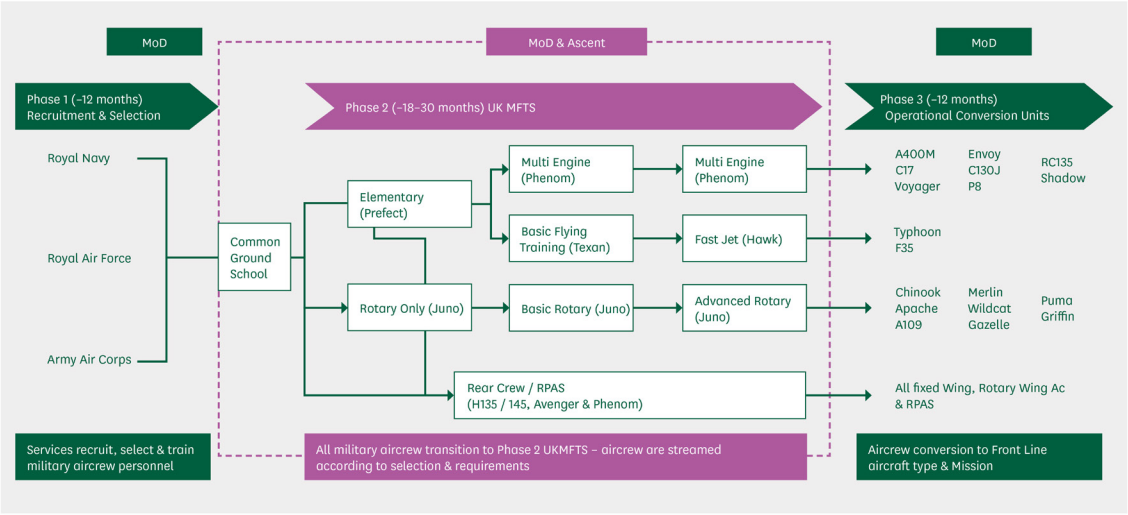
85. **The RAF has been left scrambling to migrate essential capabilities onto the A400M Atlas and will be reliant on this aircraft which, however capable it may be on paper, has a poor track record of reliability. We intend to closely scrutinise the performance of the A400M.** ***In its response to this report the MoD should commit to providing this Committee with six-monthly updates on the availability of the A400M fleet.***

6 Flying Training

86. The UK's system of training military pilots can be broken down into three phases. The first and final phases (initial training and operational conversion) take place within the three front-line commands: initial training identifies suitable candidates through aptitude testing and provides initial military training, and operational conversion trains pilots on specific front-line aircraft (eg Typhoon or F-35B).

87. The middle phase of flying training, sometimes known as "core flying", is the UK Military Flying Training System (MFTS). It can be broken down further into an initial elementary flying training stage, followed by more specialised training on jet aircraft, multi-engine aircraft such as transport aircraft, or rotary wing aircraft. In 2008, a contract was awarded to Ascent Flight Training (Management) Limited, a joint venture between Lockheed Martin UK and Babcock International, to deliver MFTS, with the transition beginning in 2012.[110]

Figure 2: Overview of the flying training model



Source: Ascent Flight Training Management Ltd

88. The National Audit Office (NAO) investigated the MFTS in 2015 and 2019 and both reports identified problems. The 2019 report found that:

- at July 2019 training of the RAF's fast-jet pilots took an average of 7.1 years, compared with the Department's optimum time of 3.9 years;
- At the same date, 145 RAF students were due to start their Phase 2 training, having waited an estimated average of 90 weeks, compared with an expected position of 26 students waiting 12 weeks;
- As at 31 March 2019, 44 out of the 369 planned MFTS courses had been cancelled due to one or other party failing to fulfil its responsibilities.[111]

110 Investigation into military flying training, National Audit Office, HC 2635 (session 2017–19), p5
111 Investigation into military flying training, National Audit Office, HC 2635 (session 2017–19), pp8–10

89. The NAO identified several underlying causes for these failings, including a shortage of qualified instructors and poor aircraft availability. Notably, the initial contract with Ascent was to deliver the requirements of the 2010 Strategic Defence and Security Review (SDSR), meaning that the number of trained aircrew that Ascent was contractually obliged to deliver did not reflect the increased numbers required by the 2015 SDSR.[112]

90. Shortly after the NAO report was published, in his introductory session with this Committee in October 2019, the Defence Secretary said that he had told the Chief of the Air Staff that fixing the MFTS should be his number one priority.[113] Giving evidence to the Committee in November 2022, he was clearly unimpressed by the lack of progress in the intervening three years. For the F-35 in particular, he noted that the frontline squadron of 12 planes had only 13 pilots, which, he said, was "not where I would want to be". He went on:

> On the more strategic point about the pilot pipeline… I am concerned that in the middle of that process, basically at the RAF Valley place, we have gone effectively backwards from when I gave my instruction to the Chief of the Air Staff … I do not think that is acceptable.[114]

91. Figures subsequently provided by the MoD showed that the number of pilots holding post Elementary Flying Training (i.e. waiting to be allocated a place on a more specialised stream for fast jet, multi-engine or rotary wing training) increased four-fold from October 2019 to October 2022, from 40 to 161. Within this group, the number of fast jet pilots on hold increased more than seven-fold, from seven to 51.[115] During our visit to RAF Marham, home to the F-35 fleet, we met pilots who had already spent the best part of a decade in training. It is hard to see how such long delays can be anything but deeply damaging to pilot morale and military effectiveness.

92. Despite these quite extraordinary figures, and seemingly in marked contrast to the Secretary of State's assessment of the situation, the then Chief of the Air Staff, Sir Mike Wigston, told us just three months later that the military flying training system itself was "in a much, much, better place" and was in fact "fixed".[116] He attributed current delays in the overall flying training pipeline to wider factors: the effects of the Covid pandemic leading to fewer pilots leaving for industry, and others seeking to return; changes to the number of frontline seats brought about by Defence Command Paper cuts; and a decision to prioritise the Typhoon frontline over the Operational Conversion Unit as a response to the situation in Ukraine.[117] He assured us that:

> I have absolute confidence that, in the absence of any other changes to our force structure or external injects, by the middle of next year, by the middle of 2024, the maximum hold that anyone will experience between flying courses is six months.[118]

93. **Flying training is undoubtedly complex. Air Chief Marshal Sir Richard Knighton observed that "if you take your eye off it for a moment, it can get out of the tolerances**

112 Ibid, p10–11
113 Oral evidence taken on 23 October 2019 (HC 179) Q144
114 Oral evidence taken on 2 November 2022, HC 184 (2022–23) Q209
115 Ibid (see footnote to Q209)
116 Oral evidence taken on 1 February 2023, HC (2022–23) 1108 Q21
117 Ibid Q20
118 Ibid Q22

that you set"[119] and it is clear to us that for too long, the senior leadership of the RAF has been looking in the wrong direction. The result of this complacency is simple: a reduction in the MoD's ability to produce combat-ready aircrew within expected timescales, with serious implications for the effectiveness of our armed forces and for pilot morale. The delays and backlogs of recent years have been completely unacceptable and cannot be allowed to continue.

94. **The former Chief of the Air Staff told us that current delays will be resolved by mid-2024, and we will hold the MoD and the RAF's senior leadership accountable for delivering on that promise.** ***In its response to this report, and then on a quarterly basis to the end of 2024, the MoD should provide this Committee with updates on the number of pilots holding between courses at each stage of the flying training pipeline as well as the average time taken for a pilot to pass through each stage.***

95. We were struck by the assertion that changes to frontline seats had been a key factor in recent delays. Air Chief Marshal Wigston described these changes as an "external element", setting out some of the 2021 cuts to aircraft numbers and explaining that:

> All those were frontline seats, and all those forces had operational conversion units to train that would normally be training people for those seats. So somebody who had been loaded into flying training off the street some three or four or, in some unfortunate cases, five or six years previously, thinking that they were on target for a Hercules operational conversion unit place, found themselves, by the time they got to it, without the frontline seats or the training place to go to.[120]

96. Changes to frontline seats are a common feature of defence reviews. Indeed, the NAO identified changes to frontline seats in 2015's SDSR as being one of the factors causing previous delays in the pipeline. Ascent suggested that contracting for additional capacity in MFTS would provide more flexibility and resilience to adapt to changed requirements.[121] This would, of course, come at additional cost. As Captain (ret'd) Dan Stembridge noted:

> In my personal view, there is one constant that we will have in military training, and that is that we will change our minds. We will constantly change our minds over how many we want, when do we want them, where are they going. And so to contract for that either becomes extremely expensive because you are contracting for that flexibility, or you contract to something that looks relatively cheap, and you are contracting to stay down a consistent path. You get what you pay for in that sense.[122]

97. **Changes to the number of frontline seats are a routine feature of Defence reviews. Whilst they will unavoidably have some impact on the training pipeline, this must be managed so that any consequential backlogs are minimal. A flying training model which cannot adapt to changed crewing requirements without introducing years of delay for pilots is clearly not fit for purpose.** ***The MoD should set out in its response to***

119 Q436
120 Ibid Q20
121 AVP0023 (Ascent)
122 Q293

this report how it will ensure that the flying training pipeline is sufficiently flexible to adapt to future changes in requirement whilst still representing value for money for the taxpayer.

98. The contractual arrangements between the MoD and the contractors and sub-contractors involved in flying training are also extremely complex. This limits transparency and accountability: Wing Commander (ret'd) Stephen Orwell argued that "[w]hen things go wrong there is no clear way of placing responsibility, with blame being batted back and forth between the MoD and Ascent".[123]

99. We heard of anomalies within the existing system such as differing approaches to fixed-wing training for rotary pilots across the three front line commands. Air Chief Marshal Knighton told us that he intended to look at this specific issue again upon taking up his post as Chief of the Air Staff.[124]

Advanced Fast Jet training

100. Recent issues within the advanced fast jet training component of the MFTS illustrate how overly complex contractual arrangements limit accountability.

101. Advanced fast jet training takes place using the Hawk T2 trainer aircraft. BAE Systems are contracted to provide the aircraft to the MoD, who then make it available to Ascent under a different contract. The engine is provided to the MoD by Rolls Royce under yet another contract.[125]

102. In March 2022 a fault was reported within the Hawk T2's Rolls Royce/ Safran Adour MK951 engine, reducing the planned design life of each engine from 4000 to 1700 hours. According to BAE Systems, this

> significantly and immediately affected the number of serviceable engines available for the Hawk T2 fleet, leading to an average of eight serviceable aircraft being made available each day throughout FY22/23 and a revised forecasted outturn flying rate of approximately 3700 flying hours, which is 50% of the contracted levels.[126]

103. Lockheed Martin told us that as a result, the Hawk T2 fleet was constrained to a planning limitation of 18 flights per day instead of the expected 55.[127] In January 2023 the entire Hawk T2 fleet was temporarily grounded after an engine-related incident on the runway.[128]

104. The MoD told us that mitigations had been put in place to reduce the impact of reduced Hawk availability on pilot training over the next three years:

- 15 RAF pilots will be trained on the Euro-NATO Joint Jet Pilot Training programme in the USA (this is in addition to six RAF pilots who are currently

123 Wing Commander (ret'd) Stephen Orwell (AVP0016)
124 Qq425–6
125 BAE Systems (AVP0021) This arrangement is an exception within MFTS - in all other cases Ascent are responsible for sourcing and providing the aircraft used for training.
126 ibid
127 Lockheed Martin (AVP0019)
128 Royal Air Force grounds its entire fleet of fast jet training aircraft, Sky News, 25 January 2023

being trained as part of the previously funded agreement). The course duration is 18 months which includes both basic and advanced flying training, at a cost per trainee of around £2 million.

- 12 pilots will receive advanced fast-jet training at the International Flight Training School in Italy. The course duration is anticipated to be 9 months, at a cost per trainee of circa £2.2 million.[129]

105. On these figures, the MoD will be paying over £55 million to mitigate the failure of its contractors. It told us that it would not be seeking to recoup these costs from industry, and that:

> there are no contractual obligations on industry partners (BAE Systems, Rolls-Royce or Safran) that require them to pay for the technical problems that have been encountered with the Adour 951 engines, or costs incurred because of the reduction in Hawk T2 availability.[130]

106. Moreover, some of the limited fast jet training spaces available to UK pilots have been taken up by overseas students. Figures provided by Ascent show that during 2022–23, twelve overseas students received Fast Jet training in the UK under the International Defence Training scheme.[131]

107. **Fast-jet training in particular has suffered a significant reduction in capacity due to a lack of aircraft availability. As a result, the MoD will spend over £55 million sending pilots overseas for training whilst the contractors responsible will face no financial penalty, a farcical situation which only underlines the requirement for the MoD to better resource its legal and commercial teams, as we identified in our recent report on defence procurement. *We recommend that the MoD carry out a full review of contractual arrangements and processes across the flying training model, identifying areas where contracts can be streamlined and processes simplified, and ensuring that contractors are liable for costs incurred by their failures.***

Synthetic training

108. A large proportion of flying training is now synthetic (i.e. carried out in simulators). The MoD told us that by 2040 it expects up to 80% of training to be synthetic, noting that "flying hours that would otherwise have been used for training can then be used for more operational missions and global deployments".[132] Synthetic training also allows pilots to train without the security or airspace constraints that would be a factor in live flying.

109. Air Chief Marshal Sir Mike Wigston expanded on the benefits of synthetic training:

> You can do repetitions. You can put the aircraft in a position that you wouldn't want to in a live environment. You can give the student all sorts

129 MoD (AVP0024)
130 ibid
131 AVP0023 (Ascent)
132 MoD (AVP0010)

of stresses that you wouldn't be able to replicate. We get better training in a synthetic environment with our operational squadrons now that they are networked.[133]

133 Oral evidence taken on 1 February 2023, HC (2022–23) 1108 Q66

110. Our witnesses did, however, express reservations about the increased reliance on simulators. Captain (ret'd) Dan Stembridge told us that "there is no supplement for actually spending time in the cockpit".[134] Justin Bronk highlighted that the reduction in live flying would have negative implications for the engineers and ground crew who develop an "intimate knowledge" of the idiosyncrasies of individual aircraft which it is impossible to do synthetically. He told us that "[t]he consistent feedback from the frontline is that going above 70% synthetic is too far"[135] and in a paper published earlier this year for which he interviewed fighter pilots from across NATO, he reported that "the universal view was that if the planning priority were warfighting readiness, then the synthetic/live flying balance across European air forces would be different".[136] Wing Commander (ret'd) Stephen Orwell suggested that the increased reliance on simulators "has little to do with the quality of student training and everything to do with cutting costs."[137]

111. **Synthetic training offers many benefits, but live flying cannot be replaced, and we are concerned that the RAF's stated intention for 80% of flying training to be synthetic by 2040 will be sub-optimal for both pilots and ground crew.** ***The MoD should review the planned 80/20 mix of synthetic and live flying training, with particular regard to the implications for ground crew and engineers, and the increased need for warfighting readiness in view of the European security situation. The MoD should also ensure that the proposed mix is broadly in alignment with the approach taken across NATO.***

134 Q299
135 Q74
136 Justin Bronk, Regenerating Warfighting Credibility for European NATO Air Forces p23
137 Wing Commander (ret'd) Stephen Orwell (AVP0016)

7 Conclusion

112. It is clear from our inquiry that the RAF has not been immune from the hollowing out of the Armed Forces, a theme which has run through much of our work during this Parliament and which remains a source of deep concern. In the words of one of our witnesses: "The Royal Air Force at present is too small, with too little depth and too few resources to meet the demands of the growing challenges that it faces."[138]

Capability gaps

113. We have been particularly struck by the MoD's apparent willingness to accept capability gaps as a way of balancing the budget. The clearest example of this is the decision to retire the E-3 Sentry before its replacement, the E-7 Wedgetail, has been brought into service, which has temporarily left the UK without a land-based fixed wing airborne early warning and control system. Cuts to combat air, meanwhile, have so reduced the fleet that there are serious doubts as to whether it could successfully defend the UK in the event of conflict: the diminishment of the fleet can rightly be described as creating a capability gap in its own right.

114. The Royal Aeronautical Society argued that:

> The MoD has become conditioned to removing or disinvesting in capabilities and calling it '*risk*' when the reality is that it is a gamble: a punt that the capability in question won't be required or that the job could be done in another way. This has been reinforced by 'success' due to the discretionary nature and small scale of recent conflicts, plus a reliance on the capacity and support of allies.[139]

115. As Northrop Grumman observed, "[t]he major issue with this cultural acceptance of capability holidays is that risks will eventually be realised."[140] Russia's full-scale invasion of Ukraine less than a year after the Command Paper's publication did indeed see that risk become a reality, with NATO facing its most significant challenge in decades in the face of Russian aggression. Writing at the time of the invasion, Dr Sophy Antrobus and Andy Netherwood reflected on the implications of the Command Paper cuts in the changed strategic context:

> The UK's most meaningful contribution to Ukraine is the provision of intelligence using ISR aircraft and supplies flown by the AMF [Air Mobility Force]. These are two capabilities that the Defence Command Paper chose to cut. Meanwhile the need to reinforce NATO allies in Eastern Europe has exposed our lack of combat air mass … the ongoing crisis may leave the UK looking exposed on several flanks at the same time.[141]

138 Q259 (General David Deptula)
139 Royal Aeronautical Society (AVP0007)
140 Northrop Grumman (AVP0004)
141 One year on: How did air power fare in the Integrated Review? Dr Sophy Antrobus and Andy Netherwood, 5 May 2022

Lessons from Ukraine

116. Events since Russia's full-scale invasion of Ukraine have not only laid bare the potential consequences of the capability cuts taken in the Command Paper; they have also led to a rethinking of some of the assumptions which have underpinned UK military planning.

117. For the past two decades, the UK's projection of air power has largely been limited to air-policing and expeditionary missions in uncontested airspace. Air Chief Marshal Sir Richard Knighton recognised that the changed security situation means that military planners must now face the increased likelihood of a peer-on-peer conflict in contested airspace:

> I expect that in future we will have to be more prepared than we have been for the last 20 years to fight for control of the air. That will probably be limited—limited in time and limited in geography—but without it you cannot deliver any kind of military effect, either from the air or on the ground.[142]

118. Similarly, Lieutenant General (ret'd) David Deptula reflected that the war had underlined the "vital importance of air power", noting that:

> … Ukraine is a stark demonstration of the consequences of not securing air superiority. Air superiority enables the freedom from attack and the freedom to attack. Without it, you see how the Russia-Ukraine conflict has devolved into a war of attrition… The ability to gain air superiority through a combination of combat aircraft and ground-based air defences is a hallmark of the western way of war. Unlike the 20 years post-9/11 of operating in permissive airspace in Iraq and Afghanistan, control of the air will be a fight in the future.[143]

The UK's role within NATO

119. Were the current conflict to escalate, the UK would be expecting to fight as part of an alliance and, as the MoD observed, aircraft numbers must therefore be seen in the broader context of the UK's membership of and contribution to NATO, which, they say, "also provides combat mass, over and above that of individual nations."[144]

120. The UK may indeed be able to call on NATO to fill in some of the capability gaps we have identified: the former Minister for Defence Procurement has suggested, for example, that the UK will make use of NATO's AEW&C capability during the transition from the E-3 Sentry to the E-7 Wedgetail,[145] and in response to concerns raised about the size of our combat air fleet, Air Chief Marshal Knighton observed that by the early 2030s there would be 550 NATO F-35s in Europe.[146] However, as General (ret'd) Sir Nick Carter told our Armed Forces Readiness inquiry, there is a fine balance to be struck between reliance on NATO and sovereign capability:

142 Q315
143 Q259
144 MoD (AVP0010)
145 PQ 67860
146 Q316

> If we are going to match ourselves against our peer opponents… as an individual nation, that is different from how we might share collective responsibility within NATO. It needs to be considered in relation to allies and partners, but there will be a bottom line about what we absolutely need to have for ourselves.[147]

121. Moreover, the Command Paper cuts risk diminishing the UK's role and standing within NATO by reducing its contribution to the Alliance. The reduction in the Wedgetail fleet will limit the amount of AEW&C support that the UK is able to offer NATO. We heard that the UK's air mobility fleet was particularly valued by the United States:[148] the retirement of the C-130J will reduce its capacity. And we were told that the Typhoon fleet, once highly regarded by the US in its air superiority role, was now spread so thin across multiple mission sets that it could no longer perform to the same level.[149]

The Defence Command Paper Refresh

122. In July 2023, in response to Russia's invasion of Ukraine, the MoD published a "refresh" of 2021's Defence Command Paper ("the DCPR"). It acknowledged that "[t]he immediate threat to the Euro-Atlantic region, and to the UK, has increased sharply as a result of Russia's actions" and said that the full-scale invasion "poses the greatest challenge to the open international order in generations."[150] Speaking as the DCPR was published, the then Secretary of State for Defence appeared to acknowledge that the Department's previous acceptance of capability gaps had been a mistake, saying that Russia's actions in Ukraine had made the MoD realise that they needed to "change the risk appetite" of the original Command Paper:

> "Originally we were taking things out of service, having a bit of a gap in the middle of the decade, and then we'd have the new equipment. That's something I don't want to risk any more."[151]

123. Despite the DCPR's stark assessment of the deteriorating global security situation, and the Secretary of State's apparent recognition that capability gaps created an unacceptable level of risk, the DCPR did not reverse any of the 2021 Command Paper's cuts. In fact, it openly reaffirmed them, saying in the Ministerial Foreword that protecting the nation "does not just mean more ships, tanks and jets - indeed in this document there are deliberately no new commitments on platforms at all - because on that we stand by what we published in 2021".[152]

124. The DCPR recognised the importance of Government engaging closely with industry, calling for "a new alliance" built on "transparency and trust".[153] We agree, and we are concerned that ongoing delays to the New Medium Helicopter procurement have jeopardised the Government-industry relationship: we intend to examine this in detail in our follow-on inquiry into future capabilities.

147 Oral evidence taken on 21 June 2023, HC 1317 (2022–23) Q146
148 Q256 (Andy Netherwood)
149 Oral evidence taken on 6 June 2023, HC 1317 (2022–23) Q36
150 Ministry of Defence, Defence Command Paper 2023: Defence's Response to a more contested and volatile world, CP 901, July 2023, p6
151 Ben Wallace: Ukraine has 'tragically become a battle lab' for war technology, BBC News, 18 July 2023
152 Ministry of Defence, Defence Command Paper 2023: Defence's Response to a more contested and volatile world, CP 901, July 2023, p3
153 Ibid p39

125. **The far-reaching cuts to aircraft numbers set out in the 2021 Defence Command Paper weakened the UK's air power capability at a time when the armed forces were already over-stretched. The scale of this gamble became clear less than a year later, when Europe faced its most serious security crisis in decades as Russia launched its full-scale invasion of Ukraine. The MoD's acceptance of capability gaps and its cuts to combat mass across the fleet have left the UK dangerously exposed at a time of increasing threat to national security and risk diminishing our role within NATO.**

126. **Although these risks were acknowledged in the Defence Command Paper Refresh (DCPR), the actions taken to address them are totally inadequate to the scale of the challenge. The DCPR stands as a missed opportunity to reverse the deeply damaging cuts of 2021: the Royal Air Force, as with all our Armed Forces, must be afforded the funding and equipment it needs to properly carry out its critical role in protecting our nation.**

Conclusions and recommendations

Combat Air

1. With the prospect of UK involvement in a major war on the European continent closer than it has been for decades, there are serious questions as to whether the UK's reduced combat air fleet still provides a sufficient deterrent and whether its limited numbers of admittedly highly capable aircraft could overcome a peer adversary in a warfighting context. These questions arise not only in the context of the UK's sovereign capability, but also in relation to its contribution to any wider alliance. (Paragraph 21)

2. The RAF's combat aircraft fleet now provides a boutique high capability: it lacks numerical depth and has an inadequate attrition reserve. Exquisite capability has its place, but in a peer-on-peer conflict such as a shooting war with Russia, every airframe will count. Combat aircraft numbers are already low. The Defence Command Paper cuts will create a combat air capability gap which, on current plans, will persist well into the 2030s. This is unacceptable. *The MoD and RAF must consider as a matter of urgency how they can increase combat air mass in the short term.* (Paragraph 22)

3. Increasing the UK's F-35 fleet beyond the 74 aircraft already planned would be one way to address the combat air capability gap, and this was an approach supported by several of our witnesses. However, although acquisition costs for the aircraft may have reduced, sustainment costs remain unacceptably high. The fleet's slow force growth rate is a continued concern: the RAF's failure to correctly calculate the number of maintainers required to service the aircraft is simply inexcusable. At present there are too many unresolved questions about the development and operational deployment of the fleet. (Paragraph 35)

4. *The MoD must be transparent and realistic about the eventual size of the F-35 fleet, recognising that the planned deferral of this decision to the middle of this decade will damage the ability of UK industry to maintain an ongoing production capacity for combat air, and should also make clear whether it is attributed to the Royal Navy or the RAF. When deciding whether to purchase further F-35s, the MoD should carefully consider the advantages that would be offered by a mixed fleet of F-35A and B variant aircraft. The MoD should also clarify whether its intention is that the fleet will routinely be deployed alongside US Marine Corps F-35Bs on UK carriers.* (Paragraph 36)

5. *Planned sensor and weapons upgrades to the Typhoon fleet must be delivered at pace. In light of the RAF's lack of any operational reserve, the MoD should seriously consider mothballing the Tranche 1 Typhoons which are due to be retired in 2025 rather than disposing of them.* (Paragraph 41)

6. Uncrewed Aerial Systems (UAS) offer a cost-effective means of increasing combat mass. As we identified in our 2021 report "*We're Going to Need a Bigger Navy*", the role of UAS within the force mix on the UK's aircraft carriers remains unresolved. This may have implications for decisions around the eventual size of the F-35 fleet. *The MoD must rapidly progress its work to develop and deploy UAS alongside the*

UK's existing combat air fleet. Publication of the Autonomous Collaborative Platform strategy should be accompanied by clear (and ambitious) timescales and an adequate funding commitment for a UAS capability programme. (Paragraph 47)

Airborne Early Warning and Control (AEW&C)

7. With only a limited number of (comparatively vulnerable) fixed and mobile land-based radars on UK soil, all of which would be primary targets for our opponents were the current Ukraine conflict to escalate, the capability gap in Airborne Early Warning & Control coverage created by the retirement of the E-3 Sentry and compounded by the delays to the E-7 Wedgetail and Crowsnest programmes presents a serious threat to the UK's warfighting ability. (Paragraph 51)

8. Of all of the Defence Command Paper's cuts, the decision to reduce the UK's Wedgetail E-7 fleet from five to three aircraft stands out as the most perverse, with the fleet cut by 40% for an acquisition saving of just 12%. Moreover, our witnesses told us that three aircraft will simply not be sufficient to meet the UK's commitment to NATO and our own sovereign needs. The MoD has committed almost £2 billion for a fleet of aircraft that, due to its reduced size, will be unable to meet the basic capability requirement. *The MoD should set out in its response to this report what discussions it has had with NATO regarding the UK's Airborne Early Warning & Control obligations to the Alliance. The decision to reduce the Wedgetail fleet must be revisited at the earliest possible opportunity with a renewed commitment to a fleet of at least five aircraft.* (Paragraph 58)

9. Whilst the E-7 is undoubtedly a capable aircraft, its procurement has been a woeful but depressingly familiar story of MoD failings and contractor underperformance combining to deliver a programme over time and over budget. *Our recent report on defence procurement made a series of recommendations to tackle the systemic procurement issues which persist at the MoD: these must be implemented without delay.* (Paragraph 60)

10. The Ukraine war has underlined the importance of a thriving and resilient domestic defence industry. *The Government must ensure that where it buys equipment off-the-shelf, it demands meaningful and sustainable investment in the UK from contractors in return, and holds them rigorously to account for fulfilling their pledges.* (Paragraph 63)

Air mobility

11. One of the most significant cuts in the Defence Command paper was the early retirement of the C-130J Hercules fleet some seven years before its planned out-of-service date. Our witnesses were almost unanimously critical of this decision, which has significantly reduced the overall capacity of the air mobility fleet, undermined the Integrated Review's "Global Britain" objective, and created a capability gap which could hamper Special Forces. We find it deeply unsatisfactory that the Government has sought to hide behind the cloak of secrecy which covers Special Forces to limit meaningful scrutiny of the capability decisions which will affect their operations. (Paragraph 84)

12. The RAF has been left scrambling to migrate essential capabilities onto the A400M Atlas and will be reliant on this aircraft which, however capable it may be on paper, has a poor track record of reliability. We intend to closely scrutinise the performance of the A400M. *In its response to this report the MoD should commit to providing this Committee with six-monthly updates on the availability of the A400M fleet.* (Paragraph 85)

Flying Training

13. Flying training is undoubtedly complex. Air Chief Marshal Sir Richard Knighton observed that "if you take your eye off it for a moment, it can get out of the tolerances that you set" and it is clear to us that for too long, the senior leadership of the RAF has been looking in the wrong direction. The result of this complacency is simple: a reduction in the MoD's ability to produce combat-ready aircrew within expected timescales, with serious implications for the effectiveness of our armed forces and for pilot morale. The delays and backlogs of recent years have been completely unacceptable and cannot be allowed to continue. (Paragraph 93)

14. The former Chief of the Air Staff told us that current delays will be resolved by mid-2024, and we will hold the MoD and the RAF's senior leadership accountable for delivering on that promise. *In its response to this report, and then on a quarterly basis to the end of 2024, the MoD should provide this Committee with updates on the number of pilots holding between courses at each stage of the flying training pipeline as well as the average time taken for a pilot to pass through each stage.* (Paragraph 94)

15. Changes to the number of frontline seats are a routine feature of Defence reviews. Whilst they will unavoidably have some impact on the training pipeline, this must be managed so that any consequential backlogs are minimal. A flying training model which cannot adapt to changed crewing requirements without introducing years of delay for pilots is clearly not fit for purpose. *The MoD should set out in its response to this report how it will ensure that the flying training pipeline is sufficiently flexible to adapt to future changes in requirement whilst still representing value for money for the taxpayer.* (Paragraph 97)

16. Fast-jet training in particular has suffered a significant reduction in capacity due to a lack of aircraft availability. As a result, the MoD will spend over £55 million sending pilots overseas for training whilst the contractors responsible will face no financial penalty, a farcical situation which only underlines the requirement for the MoD to better resource its legal and commercial teams, as we identified in our recent report on defence procurement. *We recommend that the MoD carry out a full review of contractual arrangements and processes across the flying training model, identifying areas where contracts can be streamlined and processes simplified, and ensuring that contractors are liable for costs incurred by their failures.* (Paragraph 107)

17. Synthetic training offers many benefits, but live flying cannot be replaced, and we are concerned that the RAF's stated intention for 80% of flying training to be synthetic by 2040 will be sub-optimal for both pilots and ground crew. *The MoD should review the planned 80/20 mix of synthetic and live flying training, with particular regard to the implications for ground crew and engineers, and the increased need for*

warfighting readiness in view of the European security situation. The MoD should also ensure that the proposed mix is broadly in alignment with the approach taken across NATO. (Paragraph 111)

Conclusion

18. The far-reaching cuts to aircraft numbers set out in the 2021 Defence Command Paper weakened the UK's air power capability at a time when the armed forces were already over-stretched. The scale of this gamble became clear less than a year later, when Europe faced its most serious security crisis in decades as Russia launched its full-scale invasion of Ukraine. The MoD's acceptance of capability gaps and its cuts to combat mass across the fleet have left the UK dangerously exposed at a time of increasing threat to national security and risk diminishing our role within NATO. (Paragraph 125)

19. Although these risks were acknowledged in the Defence Command Paper Refresh (DCPR), the actions taken to address them are totally inadequate to the scale of the challenge. The DCPR stands as a missed opportunity to reverse the deeply damaging cuts of 2021: the Royal Air Force, as with all our Armed Forces, must be afforded the funding and equipment it needs to properly carry out its critical role in protecting our nation. (Paragraph 126)

Formal minutes

Tuesday 5 September 2023

Members present

Tobias Ellwood, in the Chair

Sarah Atherton

Robert Courts

Mark Francois

Kevan Jones

Emma Lewell-Buck

Gavin Robinson

John Spellar

Derek Twigg

Draft Report (*Aviation Procurement: Winging it?*), proposed by the Chair, brought up and read.

Ordered, That the draft Report be read a second time, paragraph by paragraph.

Paragraphs 1 to 126 read and agreed to.

Summary agreed to.

Resolved, That the Report be the Tenth Report of the Committee to the House.

Ordered, That the Chair make the Report to the House.

Ordered, That embargoed copies of the Report be made available (Standing Order No. 134).

Resolved, That the Committee inquire into Aviation Procurement: future capabilities.

Adjournment

Adjourned till Wednesday 13 September 2023 at 2.00pm.

Witnesses

The following witnesses gave evidence. Transcripts can be viewed on the inquiry publications page of the Committee's website.

Tuesday 28 June 2022

Dr Sophy Antrobus, Research Fellow, Freeman Air and Space Institute, Kings College London; **Justin Bronk**, Senior Research Fellow for Airpower and Technology, Royal United Services Institute (RUSI) Q1–77

Tuesday 29 November 2022

Ian Muldowney, Chief Operating Officer, BAE Systems Air; **Sir Kevin Leeson**, Director of Military Affairs, Airbus UK Q78–144

Anna Keeling, Vice President and Managing Director, Boeing Defence UK; **Paul Livingston**, Chief Executive UK, Lockheed Martin Q145–224

Wednesday 22 March 2023

Squadron Leader (ret'd) Andy Netherwood Q225–256

Captain Royal Navy (ret'd) Dan Stembridge, Chair, Air & Space Power Group, Royal Aeronautical Society; **Lieutenant General USAF (ret'd) David Deptula**, Dean, Mitchell Institute for Aerospace Studies Q257–300

Wednesday 17 May 2023

James Cartlidge MP, Minister for Defence Procurement; **Vice Admiral Richard Thompson**, Director General Air, Defence Equipment and Support; **Air Chief Marshal Sir Richard Knighton KCB**, Chief of the Air Staff Designate, Royal Air Force Q301–452

Published written evidence

The following written evidence was received and can be viewed on the inquiry publications page of the Committee's website.

AVP numbers are generated by the evidence processing system and so may not be complete.

1 ADS Group Ltd (AVP0002)

2 Airbus UK (AVP0018)

3 Ascent Flight Training Management Ltd (AVP0023)

4 Ascent Flight Training Management Ltd (AVP0003)

5 BAE Systems plc (AVP0021)

6 BAE Systems plc (AVP0013)

7 Boeing (AVP0011)

8 Boeing Defence UK (AVP0020)

9 GKN Aerospace Services Limited (AVP0015)

10 Human Security Centre (AVP0009)

11 Lockheed Martin UK (AVP0022)

12 Lockheed Martin UK (AVP0019)

13 Lockheed Martin UK (AVP0006)

14 London, Mr James (AVP0005)

15 Ministry of Defence (AVP0024)

16 Ministry of Defence (AVP0010)

17 Netherwood, Mr Andy (AVP0001)

18 Northrop Grumman (AVP0004)

19 RN, Commander Nigel D MacCartan-Ward DSC AFC (AVP0012)

20 Rolls-Royce plc (AVP0008)

21 Royal Aeronautial Society (AVP0007)

22 Wing Commander S J Orwell (ret'd) (AVP0017)

23 Wing Commander S J Orwell (ret'd) (AVP0016)

List of Reports from the Committee during the current Parliament

All publications from the Committee are available on the publications page of the Committee's website.

Session 2022–23

Number	Title	Reference
1st	The Treatment of Contracted Staff for The MoD's Ancillary Services	HC 187
2nd	The Integrated Review, Defence in a Competitive Age and the Defence and Security Industrial Strategy	HC 180
3rd	Defence Space: through adversity to the stars?	HC 182
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