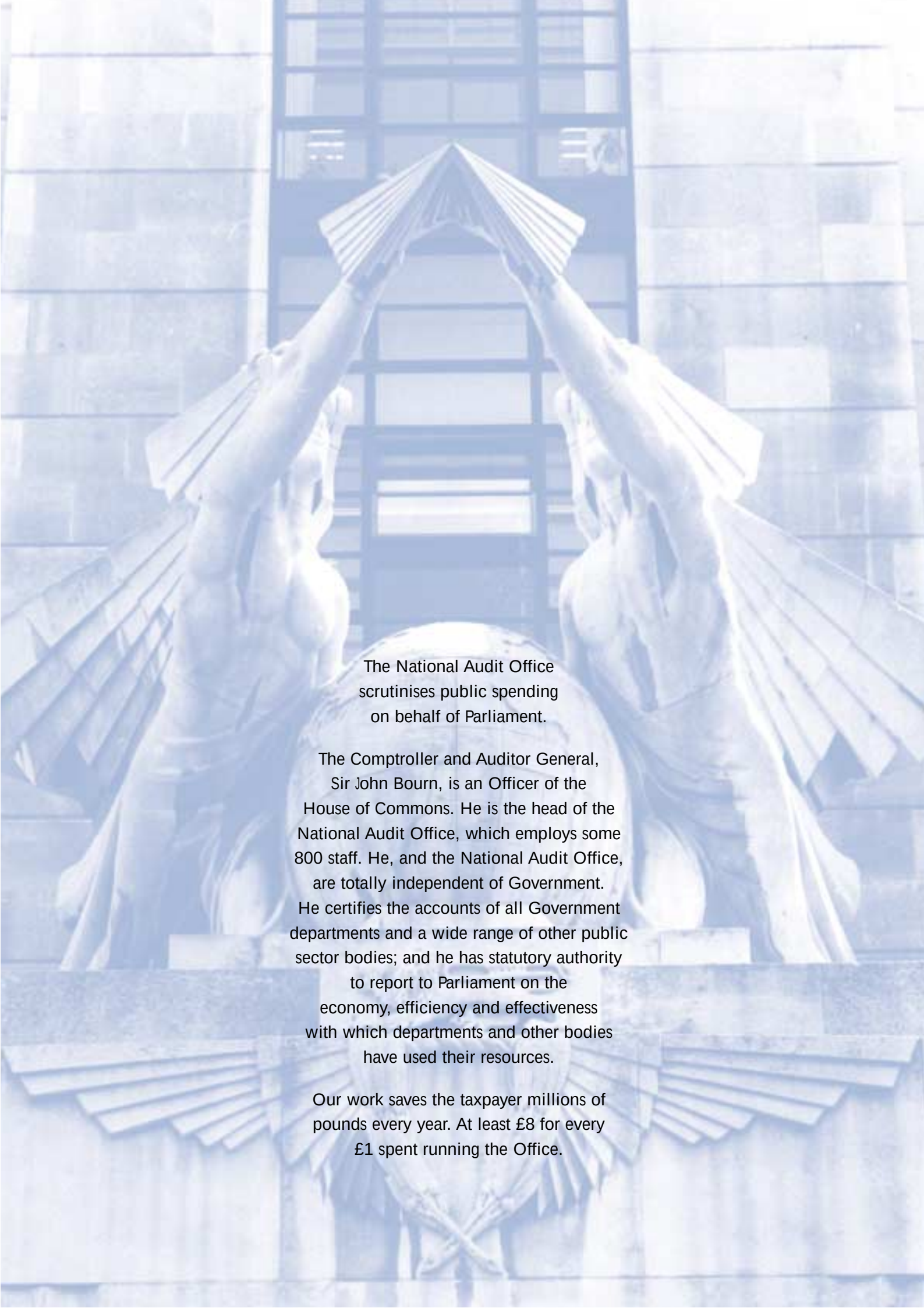
NATIONAL AUDIT OFFICE

Ministry of Defence

Battlefield Helicopters

REPORT BY THE COMPTROLLER AND AUDITOR GENERAL
HC 486 Session 2003-2004: 7 April 2004



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LONDON: The Stationery Office
£9.25

Ordered by the
House of Commons
to be printed on 1 April 2004

This report has been prepared under Section 6 of the National Audit Act 1983 for presentation to the House of Commons in accordance with Section 9 of the Act.

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Comptroller and Auditor General

National Audit Office
1 April 2004

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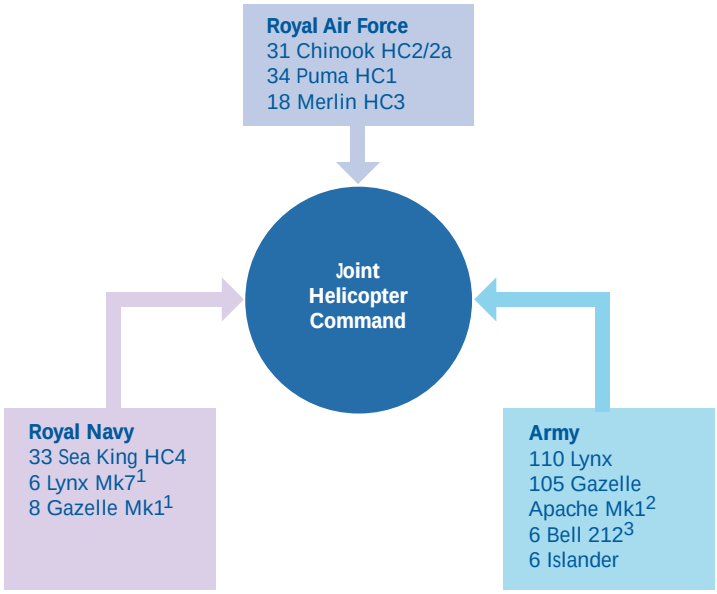
executive summary

1 The United Kingdom's armed forces operate battlefield helicopters in support of land, amphibious, and Special Forces' operations. In 1998, the Ministry of Defence (the Department) published its Strategic Defence Review, which proposed the formation of the Joint Helicopter Command to bring all battlefield helicopters under one organisation. The Joint Helicopter Command was formally established in October 1999. Its aim is to deliver and sustain battlefield helicopters and air assault forces in support of the Department's objectives. **Figure 1** shows the number of helicopters, by Service, under the operational command of the Joint Helicopter Command.

1 Helicopters under the operational command of the Joint Helicopter Command



NOTES

1 Operated by the Royal Navy but owned by the Army with fleet management the responsibility of the Joint Helicopter Command.

2 67 delivered to the United Kingdom but not yet available for operations. Anticipated Initial Operating Capability - August 2004.

3 Contractor Owned, Military Registered aircraft.

Source: National Audit Office

2 This Report examines the progress made since the inception of the Joint Helicopter Command. The methodology we adopted is set out in Annex A.

3 The Report shows that battlefield helicopters are a key capability in fulfilling the majority of the Department's objectives as defined in its Military Tasks. Since it was formed, the Joint Helicopter Command, which reports to Commander-in-Chief Land, has made significant progress in delivering efficiencies and a more joined up approach, despite a background of high tempo operations. However, on its own calculations, the Department is some 38 per cent short of its required battlefield helicopter fleet, and on present plans, the overall shortage will not be overcome until 2017. Moreover, this will be affected by ongoing work to determine future force structures and changes to the Department's equipment programme. This Report suggests ways of reducing the gap between requirements and capabilities by using the present fleet of battlefield helicopters more productively. The question of purchasing additional helicopters beyond present plans is a policy matter, which is outside the remit of the National Audit Office.

Battlefield helicopters are a key capability

4 Battlefield helicopters play a major role in the United Kingdom's military operations. The battlefield helicopter fleet, arguably the most capable helicopter force in Europe, has recently operated in a wide variety of theatres, including urban and rural areas in Northern Ireland, the Iraqi desert, the mountains of Afghanistan, and the jungles of Sierra Leone.

5 Battlefield helicopters contribute to a wide range of roles from anti-armour operations to casualty evacuation. These roles were demonstrated during Operation "TELIC" in Iraq when 77 battlefield helicopters were deployed, the largest ever operation managed by the Joint Helicopter Command. For example, the Royal Air Force's Support Helicopter Force and the Royal Navy's Commando Helicopter Force worked together successfully to support the assault on the Al Faw peninsula during one of the most significant helicopter operations of the campaign.

6 Battlefield helicopters will continue to be a key capability in the future. The introduction into service of the Apache helicopter greatly increases this capability, and with a greater emphasis on manoeuvre warfare, the helicopter is set to play an even more central role in most future operations.

Progress has been made by the Joint Helicopter Command

7 Significant progress has been made since the formation of the Joint Helicopter Command in 1999. The Command gives more focus to the joint employment of battlefield helicopters. It can draw on equipment and personnel from each of the three Services to provide tailored packages to meet particular operational demands. This addresses some of the inefficiencies that were apparent when all three Services deployed helicopters separately. For example, the Department estimates that, in Bosnia in 1996, the separate Services deployed some 40 per cent too many helicopters, often duplicating facilities, particularly combat service support.

8 The Department has also made progress in harmonising operating and engineering standards across the Services. It has recently introduced a more comprehensive joint publication on military flying regulations, which incorporates a number of standard operating procedures. Moreover, the Joint Helicopter Command has provided additional impetus to the Department's initiative to harmonise engineering standards and helicopter engineering training. For example, all three Services are bringing together their engineering policies and procedures.

9 In 1997, the Defence Helicopter Flying School, which reports to the Royal Air Force's Personnel and Training Command, was formed to provide a tri-Service focus for helicopter flying training. Both the Joint Helicopter Command and the Defence Helicopter Flying School have been instrumental in developing a more coherent, tri-Service approach to helicopter flying training. Generally, all three Services are satisfied with the School's output. Despite recent high operational tempo, the flying training pipeline has continued to operate. Collective training is also benefiting from joint exercises, which ultimately underpin joint operations.

There is scope for further enhancements to maximise battlefield helicopter efficiency

10 Further enhancements can potentially be made to maximise the efficiency of battlefield helicopters in training, airworthiness processes, rank structure, and procurement.

Training

11 There remain a number of areas where further improvements in training arrangements could be made. These might include further developing a joint approach to initial training to reduce the time it takes to train pilots, and developing the best balance of training undertaken on operational helicopters, training helicopters, and fixed-wing aircraft. It is also important that training is appropriately resourced. Currently, both individual and collective training have suffered as a result of operational commitments and a lack of available helicopters, with some Army pilots unable to maintain the recommended NATO minimum level of 15 flying hours per month.

Airworthiness

12 Although the regulations for ensuring that helicopters are airworthy are joint, responsibility for applying them is delegated separately by the Secretary of State for Defence to each of the three Services. In practice, there are different interpretations of the regulations. For example, the Services differ in the execution of trials work on their aircraft. The Royal Navy operates some Army aircraft marks and has streamlined the process of regulating airworthiness in conjunction with the Army, thereby showing that there is scope for greater efficiency if a more consistent approach is applied. Tri-Service airworthiness issues are now well in-hand with scope for further streamlining.

Aircrew Ranks

13 Almost two-thirds of the Army's aircrew are non-commissioned officers, whereas the Royal Navy and the Royal Air Force use only officer pilots and navigators/observers. Historically, the perceived complexity of Royal Navy and Royal Air Force helicopters has supported this position. However, Army non-commissioned officers are now flying the complex Apache Mk1. In addition, other forces, for example in the United States, use non-commissioned officers to fly Apache, and also aircraft such as the Chinook, which are exclusively flown by officers in the United Kingdom. The bringing together of helicopters into one command throws these issues into sharp relief. Separately, in its Report on the Apache,[1] the Committee of Public Accounts recommended that the Department examine the possibility of using non-commissioned officers as aircrew across all three Services.

Learning procurement lessons

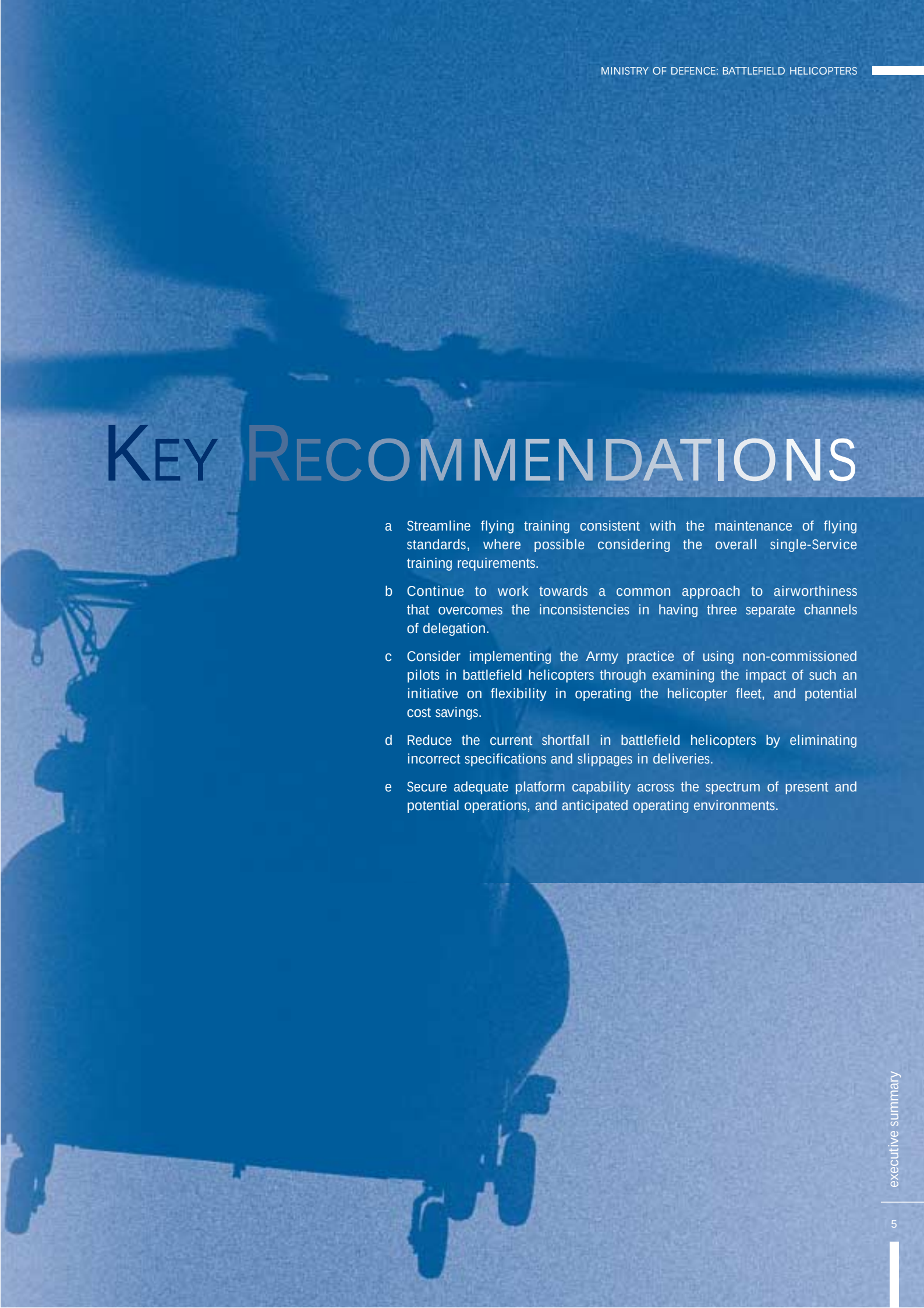
14 Flawed procurement of eight Chinook HC3 helicopters means that, although they were delivered to specification by the contractor in December 2001, they cannot yet be used operationally, principally because there is insufficient evidence to demonstrate that the avionics software meets United Kingdom Defence standards. This is primarily because the programme was not de-risked prior to investment decisions being taken; nor did the contract specify that the software should be analysed in accordance with United Kingdom Defence standards. Other user requirements categorised as essential have not been delivered because, for a variety of reasons, they too were not included in the contract. To bring the helicopters broadly up to the standard of the existing Chinook fleet would require approximately £127 million, over and above the £259 million originally estimated, and would mean the helicopter would enter service in mid-2007 - some nine years later than the original In-Service Date, although this latter was re-defined in March 1998 to June 2002.

The shortfall in battlefield helicopter capability will continue

15 Even if improvements to efficiency and effectiveness are made, there will still be a shortfall in helicopter capability. A recent Departmental study concluded that there is currently a 38 per cent shortfall in overall battlefield support helicopter lift, which includes an 87 per cent shortfall in ship-optimised support helicopter lift. Primarily, the latter deficit is a manifestation of a changed strategic environment over the past decade, which has generated a greater requirement to undertake littoral operations. According to the Department, the shortfall in ship-optimised lift will remain until 2018, while overall battlefield lift will remain inadequate until 2017.

16 In addition, the nature of the legacy fleet means that many platforms are not fully equipped to undertake missions in certain operational and environmental conditions, including those recently experienced in Afghanistan and Iraq. The helicopter force has a number of critical capability shortfalls, some of which can only be addressed by expensive modifications. Owing principally to a lack of resources, these capability shortfalls are often met by Urgent Operational Requirements. For example, part of the current Chinook fleet has acquired the necessary capabilities to meet operational demands. However, this process has often not only been costly but it is essentially short-term in nature.

1 *Forty-sixth Report from the Committee of Public Accounts, Ministry of Defence: Building an Air Manoeuvre Capability - The Introduction of the Apache Helicopter, HC 533, Session 2002-03.*



KEY RECOMMENDATIONS

a Streamline flying training consistent with the maintenance of flying standards, where possible considering the overall single-Service training requirements.

b Continue to work towards a common approach to airworthiness that overcomes the inconsistencies in having three separate channels of delegation.

c Consider implementing the Army practice of using non-commissioned pilots in battlefield helicopters through examining the impact of such an initiative on flexibility in operating the helicopter fleet, and potential cost savings.

d Reduce the current shortfall in battlefield helicopters by eliminating incorrect specifications and slippages in deliveries.

e Secure adequate platform capability across the spectrum of present and potential operations, and anticipated operating environments.

Part 1

Battlefield helicopters are a key capability

"Once the Cinderellas of the battlefield trying to keep up with the insatiable demands of artillery and forward operating base resupply, support helicopters have been a vital factor in both manoeuvre and the manoeuvrist approach, enabling not just vertical envelopment, but also reinforcing the perception of reach, speed of reaction and reassurance to local populations undecided on whether to follow the local warlord or the writ of law."

Speech by Sir Michael Boyce, former Chief of the Defence Staff, to the Royal United Services Institute, 18 December 2002

1.1 This Part of the Report examines the key role of battlefield helicopters in contributing to the Department's ability to meet its current Military Tasks. Battlefield helicopters contribute to the majority of these tasks; can be used in a wide range of roles; are integral to conducting manoeuvrist operations; and will continue to be important in the future.

1.2 The United Kingdom's armed forces operate battlefield helicopters in support of land, amphibious, and Special Forces' operations. **Figure 2** shows the numbers of all battlefield helicopter types in April 2003. The rest of the Department's helicopter fleet - which accounts for 30 per cent of all helicopters - are Royal Navy and Royal Air Force Search and Rescue helicopters, and naval helicopters that operate as part of ships' weapon systems.

1.3 In 1998, the Strategic Defence Review proposed the formation of the Joint Helicopter Command to group all battlefield helicopters and air assault forces in a single, joint command. The relevant section of the Strategic Defence Review, setting out the rationale for the Joint Helicopter Command, is at Annex B.

1.4 The Joint Helicopter Command was formally established in October 1999, and includes the Royal Navy's Commando Helicopter Force, the Army's 16 Air Assault Brigade, and the Royal Air Force's Support Helicopter Force. The Joint Helicopter Command has an annual budget of almost £400 million, and manages approximately £1.4 billion worth of assets. There are some 13,500 personnel within the Joint Helicopter Command, approximately 7,500 of whom belong to 16 Air Assault Brigade, which is the Department's principal "air-minded" formation combining airborne and air assault units, and battlefield helicopters. The distribution of manpower across the Joint Helicopter Command is set out in Annex C.

1.5 The Joint Helicopter Command aims to deliver and sustain battlefield helicopters and air assault forces in support of the Department's objectives across all operating environments. **Figure 3** describes the vision of the Joint Helicopter Command.

Battlefield helicopters contribute to the majority of Military Tasks

1.6 Battlefield helicopters have played a major role in the United Kingdom's military operations since the 1960s. The battlefield helicopter fleet has accumulated a vast amount of operational experience in recent years and is arguably a more capable force than that possessed by any other European nation. The fleet has operated in a variety of theatres, including urban and rural areas in Northern Ireland, the Iraqi desert, the mountains of Afghanistan, and the jungles of Sierra Leone. **Figure 4** shows the extent to which the fleet was committed around the world in September 2003.

2 Establishment of battlefield helicopters in April 2003

There were 357 battlefield helicopters across all types

A: Royal Navy

33 Sea King HC4

6 Lynx MK7[1]

8 Gazelle Mk1[1]

B: Army Aviation

110 Lynx

105 Gazelle

Apache Mk1[2]

6 Bell 212[3]

6 Islander

C: Royal Air Force

31 Chinook HC2/HC2a

34 Puma HC1

18 Merlin HC3

NOTES

1 Operated by the Royal Navy but owned by the Army with fleet management the responsibility of the Joint Helicopter Command.

2 67 aircraft delivered to the United Kingdom but not yet available for operations. Anticipated Initial Operating Capability - August 2004.

3 Contractor Owned, Military Registered aircraft.

Source: National Audit Office

3 The Joint Helicopter Command's Vision

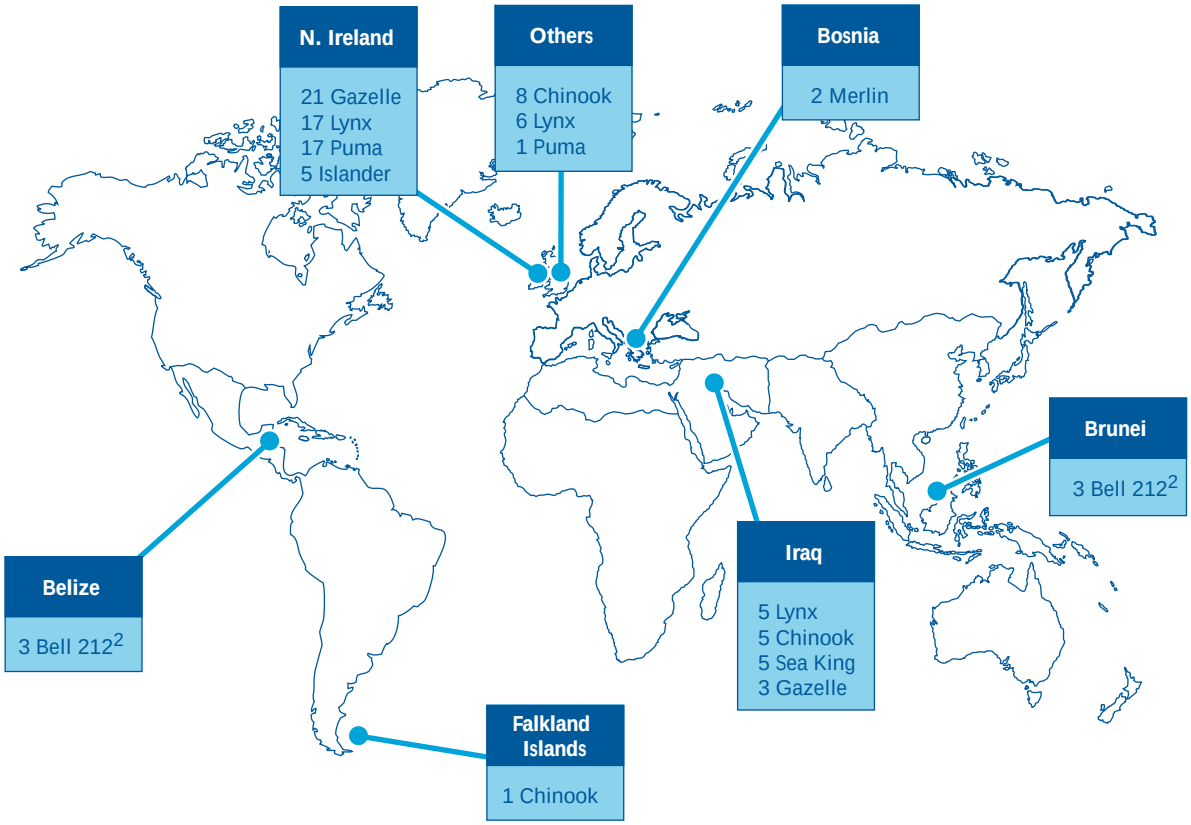
The Joint Helicopter Command's Vision states its aims and objectives

"The Joint Helicopter Command will provide a unified command structure for the integration of battlefield helicopter and air assault combat, combat support and combat service support units. The principal focus of all Joint Helicopter Command activity is the delivery of effective battlefield and air assault combat power in support of operations. We will provide a coherent structure to ensure that the correct level of appropriately resourced, trained and sustained forces are available for employment by a Joint Commander in support of land, Special Forces or amphibious operations. To achieve this vision, we will need to provide an efficient joint approach to doctrine, structures, training support and working practices; harmonising these across the three Services. The Joint Helicopter Command seeks to build on the skills and knowledge of individuals as well as the strengths and traditions of the single Services in order to raise standards of safety and quality. It also seeks to forge strong links across the Command. In short, the Joint Helicopter Command will value the individual and maintain the ethos of the three Services, whilst focusing their joint capabilities to enhance the operational effectiveness of battlefield helicopter and air assault forces."

Source: Ministry of Defence

4 Battlefield helicopter fleet: commitments in September 2003[1]

The fleet was operating in seven theatres across the globe



NOTES

1 The remainder of the helicopter fleet was involved in training and maintenance tasks.

2 Contractor Owned, Military Registered aircraft.

Source: National Audit Office

1.7 Since the Strategic Defence Review, operations across the globe have demonstrated the ability of battlefield helicopters to act throughout the spectrum of operations from warfighting to providing humanitarian assistance. As illustrated in **Figure 5**, battlefield helicopters contribute to all of the Department's current Military Tasks other than those categorised as Standing Strategic Tasks.

Battlefield helicopters contribute to a wide range of roles

1.8 Unlike armour and infantry, which frequently have sufficient time once deployed to acclimatise and train before operations begin, battlefield helicopters are in almost immediate demand for a wide range of tasks. During a campaign, these tasks might include anti-armour operations, reconnaissance, escort, combat recovery, deployed Search and Rescue, troop lift, direction of fire, screening, command and control, logistic support, casualty evacuation, and the delivery of humanitarian aid.

5 Military Tasks

Battlefield helicopters contribute to 15 Military Tasks

Standing Strategic Tasks

MT 1.1 - Strategic Intelligence.
MT 1.2 - Nuclear Deterrence.
MT 1.3 - Hydrographic, Geographic, and Meteorological Service.

Standing Home Commitments

MT 2.1 - Military Aid to the Civil Authorities.
MT 2.2 - Military Aid to the Civil Power in Northern Ireland.
MT 2.3 - Integrity of UK Waters.
MT 2.4 - Integrity of UK Airspace.
MT 2.5 - Public Duties and VIP Transport.

Standing Overseas Commitments

MT 3.1 - Defence and Security of the Overseas Territories.
MT 3.2 - Defence and Security of the Cyprus Sovereign Base Areas.
MT 3.3 - Defence Diplomacy, Alliances, and Support to Wider British Interests.

Contingent Operations Overseas

MT 4.1 - Humanitarian Assistance and Disaster Relief.
MT 4.2 - Evacuation of British Citizens Overseas.
MT 4.3 - Peacekeeping.
MT 4.4 - Peace Enforcement.
MT 4.5 - Power Projection.
MT 4.6 - Focused Intervention.
MT 4.7 - Deliberate Intervention.

Source: National Audit Office

1.9 The flexibility of battlefield helicopters was demonstrated in 2003 during the United Kingdom's military operations in Iraq, Operation TELIC, which has been the Joint Helicopter Command's largest operation to date with 77 helicopters deployed. Although a Joint Helicopter Force (Iraq) was established at Safwan near the Iraq-Kuwait border during operations to support 1 (UK) Armoured Division, a number of Royal Air Force Chinook HC2/2as were initially deployed aboard Royal Navy ships to operate within the Commando Helicopter Force. Once this operation was complete, the Chinooks again demonstrated their flexibility by re-deploying to support 1 (UK) Armoured Division.

1.10 In addition, 3 Regiment, Army Air Corps, with two Pumas from the Support Helicopter Force attached, was deployed forward as a combined-arms battlegroup, initially within 16 Air Assault Brigade and later in conjunction with 7 Armoured Brigade. The battlegroup had responsibility for an area that extended over 6,000 square kilometres, and provided a versatile combat arm during the warfighting phase. In the immediate aftermath of hostilities, helicopters proved to be the most efficient means of covering the vast operational area allocated to British forces, and also in distributing humanitarian aid to isolated villages.

Battlefield helicopters are integral to manoeuvre warfare

1.11 The United Kingdom's armed forces practise the manoeuvrist approach to warfare, which entails momentum, shock, surprise, and tempo to shatter an adversary's cohesion and will to fight. Battlefield helicopters are integral to this approach because they possess range, speed, and offer a variety of deployment options, from austere forward airbases to maritime platforms. Their tactical mobility has been especially useful when a rapid response to events is required over a large operational area. So, for example, during Operation "BARRAS" in Sierra Leone in September 2000, battlefield helicopters enabled British forces to rescue a number of Service personnel held hostage by local militia.

1.12 During the early stages of Operation TELIC, battlefield helicopters again demonstrated their importance to the conduct of manoeuvre warfare. For example, battlefield helicopters from both the Commando Helicopter Force and the Support Helicopter Force supported the United Kingdom's first dual Commando Group aviation assault, by 40 and 42 Commando Royal Marines, which secured the strategically important Al Faw peninsula.

Battlefield helicopters will continue to be important

1.13 Battlefield helicopters are vital to executing Land Manoeuvre (Ground and Air Manoeuvre) and Littoral Manoeuvre, evolving concepts that form an important part of the Department's current doctrinal development. Air Manoeuvre consists of combined-arms operations within a joint framework, but principally within the Land component. Air Manoeuvre concepts rely heavily on all battlefield helicopters being integrated within combined-arms operations. While the United Kingdom's forces have developed elements of capability for Air Manoeuvre in the past, the concept has gained further impetus from the acquisition of the Apache Mk1. Littoral Manoeuvre, which would be conducted at the interface between the three environments of air, land, and sea, uses the fundamental principles of Air Manoeuvre to support land operations from the sea.

1.14 In 2003, the Department's Management Board acknowledged the importance of battlefield helicopters by mandating an increase of £17 million in resources so that the Joint Helicopter Command could conduct an additional 5,000 support helicopter flying hours for that year.[2] While, in future, the annual bid for flying hours will be increased by 5,000 hours to provide improved training opportunities, the enduring commitment to Iraq consumed some 4,800 of these hours in 2003.

2 The Joint Helicopter Command was mandated a total of over 100,000 flying hours in 2003-04 by the Defence Logistics Organisation for its Lynx, Gazelle, Chinook, Puma, and Sea King fleets. With the exception of Lynx, each individual aircraft is resourced to fly approximately 400 hours per year. The Lynx fleet is resourced for 23,900 hours, which averages 206 hours per aircraft.

Part 2

Progress has been made by the Joint Helicopter Command

2.1 This Part of the Report examines the steady progress made by the Joint Helicopter Command, since its inception in 1999, against a background of high tempo operations. The Strategic Defence Review stated that the Joint Helicopter Command would be responsible for training, standards, doctrinal development, and support for operations. This Part explains how the Joint Helicopter Command has given battlefield helicopters a greater organisational focus; its role in developing doctrine; the harmonisation of standards; issues related to sustainability of battlefield helicopters; and certain aspects of flying training.

Battlefield helicopters now have a greater organisational focus

2.2 By locating the Joint Helicopter Command within Land Command, the Department has significantly increased the overall profile of battlefield helicopters. Compared to the battlefield helicopter forces of other NATO nations, the Joint Helicopter Command has a unique organisational structure, to which all three Services contribute assets. This has allowed for greater operational flexibility, for example, by further developing the deployment of battlefield helicopters on board naval platforms.

2.3 As the Joint Helicopter Command's assets primarily support land operations, it is logical that it should reside within Land Command. Although Headquarters Joint Helicopter Command is at two-star level, it reports directly to the four-star Land Command. This structure helps to give a focus and a higher profile to the employment of battlefield helicopters. **Figure 6** illustrates the composition of the Joint Helicopter Command within the context of Land Command. A more detailed organisational chart is presented at Annex D.

2.4 Although it provides support to operations, Headquarters Joint Helicopter Command has no deployable command responsibilities. The single-Service Commanders-in-Chief retain "Full Command"[3] responsibility over their respective helicopter fleets within the Joint Helicopter Command. This comprises career management, welfare, conditions of service, personnel policy, administration, and the operating and engineering regulatory framework (i.e. airworthiness).

2.5 The Joint Helicopter Command allows the Department to draw on equipment and personnel from the three Services to provide joint force commanders with tailored packages of battlefield helicopters to meet operational demands. For example, the Royal Air Force's Tactical Supply Wing and Support Helicopter Force have been brought closer to their principal customer, 16 Air Assault Brigade. This organisational structure is unique to the United Kingdom when compared to other NATO nations as **Figure 7** shows.

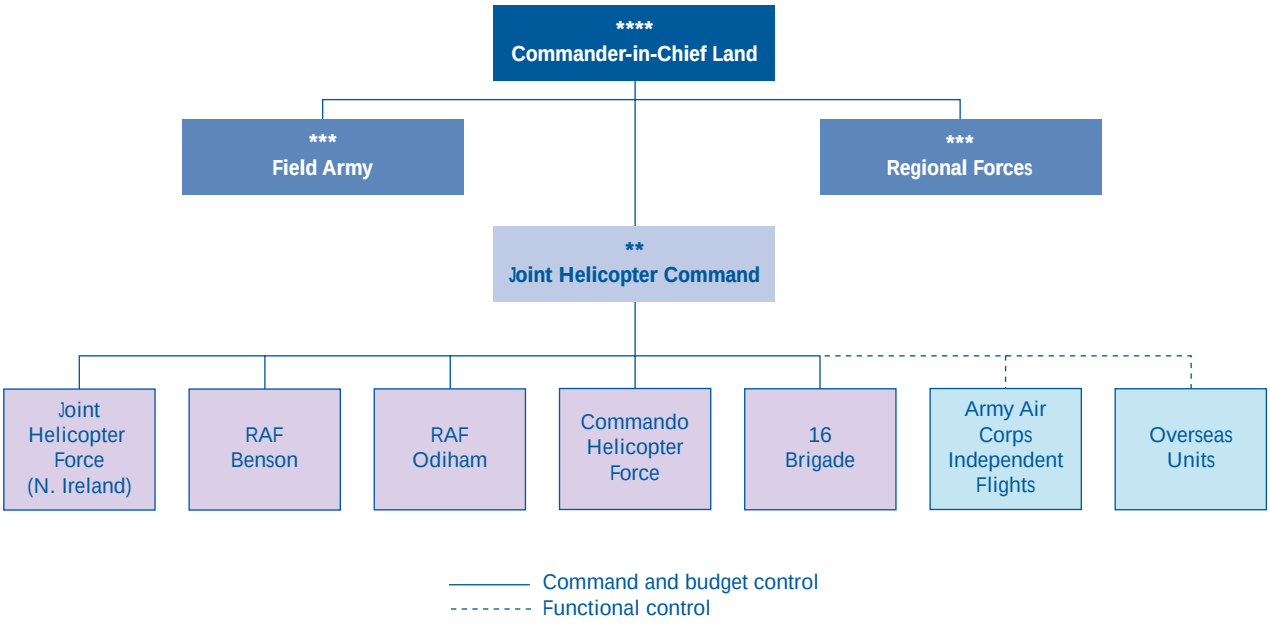
2.6 Prior to the formation of the Joint Helicopter Command, battlefield helicopters were not necessarily deployed in the most efficient manner, as illustrated in Bosnia in 1996 when all three Services deployed a total of 28 helicopters as part of the NATO Implementation Force. The Department has subsequently estimated that the United Kingdom deployed some 40 per cent too many helicopters to that operation, often duplicating capabilities, particularly combat service support.[4]

3 *Full Command covers every aspect of military operations and administration, and is defined as the military authority and responsibility of a senior officer to issue orders to subordinates.*

4 *Combat service support consists mainly of administration and logistics, which is provided to combat forces.*

6 The Composition of the Joint Helicopter Command

The Joint Helicopter Command includes units from the three Services but sits within Land Command



Source: National Audit Office

7 Comparison of land-based battlefield helicopters' organisation in NATO

The organisation of battlefield helicopters in the United Kingdom is unique within NATO

NATO countries with battlefield helicopters as part of their Army		NATO countries with battlefield helicopters as part of their Air Force
Belgium	Italy	Netherlands
Canada	Hungary	Norway
Denmark	Poland	Czech Republic
France	Spain	
Germany	Turkey	
Greece	United States[1]	
Portugal		
	United Kingdom[2]	

1 The United States Air Force also employs battlefield helicopters within its Special Operations Command.

2 Similarly, the Joint Helicopter Command incorporates the battlefield helicopters of the Commando Helicopter Force. However, this Figure excludes other organisations with battlefield helicopters optimised to support maritime forces, for example, the United States Marine Corps.

Source: National Audit Office

The Joint Helicopter Command is fulfilling an advisory role on developing doctrine

2.7 Doctrine is a fundamental principle by which a military force guides its actions in support of its objectives. In the Strategic Defence Review, one of the roles envisaged for the Joint Helicopter Command was to develop doctrine. The development of concepts for Air Manoeuvre and Littoral Manoeuvre has taken place in the Joint Doctrine and Concepts Centre[5], and in the single-Service doctrine centres, under the auspices of the Joint Operational Concepts Committee. The development of these concepts into doctrine will occur in the future with input from the Joint Helicopter Command. There is a cell within the Joint Helicopter Command that translates concepts into practical advice to the Commando Helicopter Force, the Army Air Corps, the Support Helicopter Force, and 16 Air Assault Brigade.

2.8 At a higher policy level, the Joint Helicopter Command has been represented on the Air Manoeuvre Policy Group, which debates the crosscutting issues affecting Air Manoeuvre and Littoral Manoeuvre in the joint context, and also provides guidance on shaping the respective capabilities for each. In late 2002, a framework was set up for the further joint development of Air Manoeuvre, which emphasised a stepped approach to achieving this capability. However, the most ambitious step planned, Deep Air Manoeuvre[6], remains an unendorsed and unaffordable aspiration. In part, this is because of an enduring shortage of helicopter lift, which is unlikely to be rectified in the medium term, as explained further in Part 4.

2.9 One of the lessons of recent operations in Iraq is the need to closely integrate helicopters with ground forces. During the campaign's early stages, United States Army Apache helicopters, when operating independently of allied ground support, encountered some difficulties. When integrated with ground forces, Apache operations were generally much more successful. The British forces (Commando Helicopter Force and 3 Regiment, Army Air Corps), given the absence of their Apache Mk1 helicopters, successfully used their Lynx and Gazelle helicopters in a combined-arms role throughout the campaign. The Department will draw upon these lessons to inform the continuing development of Air Manoeuvre doctrine, in particular, through countering the potential vulnerability of helicopters by emphasising the coherence of an all arms approach in the design of operations.

Progress has been made in harmonising standards

2.10 Each of the Services has traditionally employed distinctive operating and engineering standards because of the different environments in which they operate. The Department is now working to converge and develop joint logistic policies, procedures, and practice. Since its inception, the Joint Helicopter Command has taken steps to harmonise operating and engineering standards across the Services in accordance with one of its objectives as stated in the Strategic Defence Review: "[To] provide a single focus for the ready transfer of best practice from Service to Service and [to remove], over time, differences in current operating procedures."

Operating standards

2.11 Historically, the operating standards of the force elements inherited by the Joint Helicopter Command have been determined by single-Service practice. For example, operating effectively within the maritime environment requires a particular type of training that is not necessary for operating within the land or air environments. In January 2002, the Joint Helicopter Command formed a Joint Air Regulations Team to examine its guidance on military flying, which was initially divided along single-Service lines. The Team has produced a tri-Service publication on military flying regulations, containing a number of harmonised operating standards. Examples are shown in **Figure 8**.

8 Examples of operating standards

There has been harmonisation of several operating standards

Standard	Description
Night Vision Goggles	By July 2003, pilots from all Services were to be trained in Night Vision Goggles' use and transit, and also qualified "in role" Night Vision Goggles (operational).
Crew Duty Times	In July 2003, the Royal Air Force moved closer to the Army Air Corps' system of crew duty time by adopting eight hours continuous (but not necessarily the same eight hours each day) rest in 24, rather than the fixed ten hours in 24. However, the Commando Helicopter Force feels these harmonised crew duty times are less flexible than their previous regulations.
Low-level flying	There is standardisation across the Services for Above Ground Level below 500 feet. However, all three Services' aviators need to fly lower than 100 feet in transit to execute their tasks.

Source: National Audit Office

5 *Reporting to the Department's Policy Director, the Joint Doctrine and Concepts Centre was formed in September 1999. Its remit is to formulate, develop, and review joint military doctrine.*

6 *The ability to sustain aviation operations up to 150 kilometres beyond friendly forces for a period in excess of 48 hours.*

Engineering standards and trades

2.12 The number of engineers required to support different helicopter types varies across the Services because of different support philosophies. The Commando Helicopter Force, restricted by the space available when deployed on board naval vessels, has a small support structure. The Army also tends to deploy on operations with a small support organisation, which provides a template for Army Aviation establishments. The Royal Air Force, as a Service orientated towards air operations, has a relatively large support structure with engineering standards adapted from those developed for fixed-wing aircraft.

2.13 The Royal Air Force currently has five engineering trades, the Royal Navy three, and the Army two. All three Services aspire to have harmonised policies and procedures regarding trade structures with a view to gaining civil accreditation for Service qualifications. To this end, a tri-Service Air Engineering Trades Convergence Working Group was set up in 2002. Harmonisation is also intended to ensure that some cross-fertilisation between the Services can take place where this is feasible. As a result, the Joint Helicopter Command may be able to amalgamate the engineering chain of command on exercises and operations rather than having single-Service hierarchies.

2.14 At present, the Services also train their engineers differently. The Royal Air Force uses RAF Cosford for initial training with specific "to-type" training taking place at its various bases. The Royal Navy operates similarly, with to-type training done at Royal Naval Air Station, Yeovilton. Army training takes place at the School of Electronic and Aeronautical Engineering, Arborfield. As a result of the 2001 Defence Training Review[7], a single defence engineering training school will be established at RAF Cosford. Electrical and mechanical engineers will undertake initial generic training there, and then go for aircraft type-specific training within each Service.

Some issues related to sustainability have been eased

2.15 Sustainability refers to the ability of a force to maintain the necessary level of combat power for the time required to meet its objectives. There have been improvements in sustaining helicopters in the field as a result of the Joint Helicopter Command's policy to have common combat service support where feasible. For example, some commonality was achieved between the Army and the Royal Air Force during Operation TELIC.

2.16 During Operation TELIC, staff from RAF Odiham and RAF Benson were attached to 7 Air Assault Battalion, Royal Electrical and Mechanical Engineers, which allowed for an efficient division of labour. For example, Army engineers did all blade repairs, a capability that has been developed to avoid relying on re-supply by scarce transport aircraft. This joint deployment also created a capability to rotate manpower with no impact on training at home.

2.17 The flexibility provided by having common combat service support was further illustrated during the operation when a problem occurred with the Puma's ALQ-144 infra-red jammer, which is designed to defeat infra-red homing missiles. The environment in which Puma operated threw up stones, damaging the jammers. The Joint Helicopter Command requested that the Joint Helicopter Force (Northern Ireland) support 7 Battalion, given that Northern Ireland Pumas and Lynx are fitted with similar equipment.

2.18 The Joint Helicopter Command is now advancing a concept for air maintenance, shown in **Figure 9**, which could optimise the support required on operations. It is based on a distinction between front-line maintenance that is essential to the operability of the aircraft (Manoeuvre Support) and routine maintenance, which is done in the rear (Depth Support) rather than having first to fourth line support as now.[8] Lessons from Operation TELIC are being examined to determine the extent to which certain functions could be carried out in theatre and also whether contractors could be used in this process.

Helicopter flying training has benefited from joint approaches

2.19 The helicopter flying training regime is adapting to meet the challenge of joint operations. The Defence Helicopter Flying School has addressed earlier concerns about the quality of pilots, and efforts have been made to seek efficiencies within the training pipeline. The Department has also made provision to continue its pilot training in spite of a high operational tempo, and is increasingly conducting joint exercises.

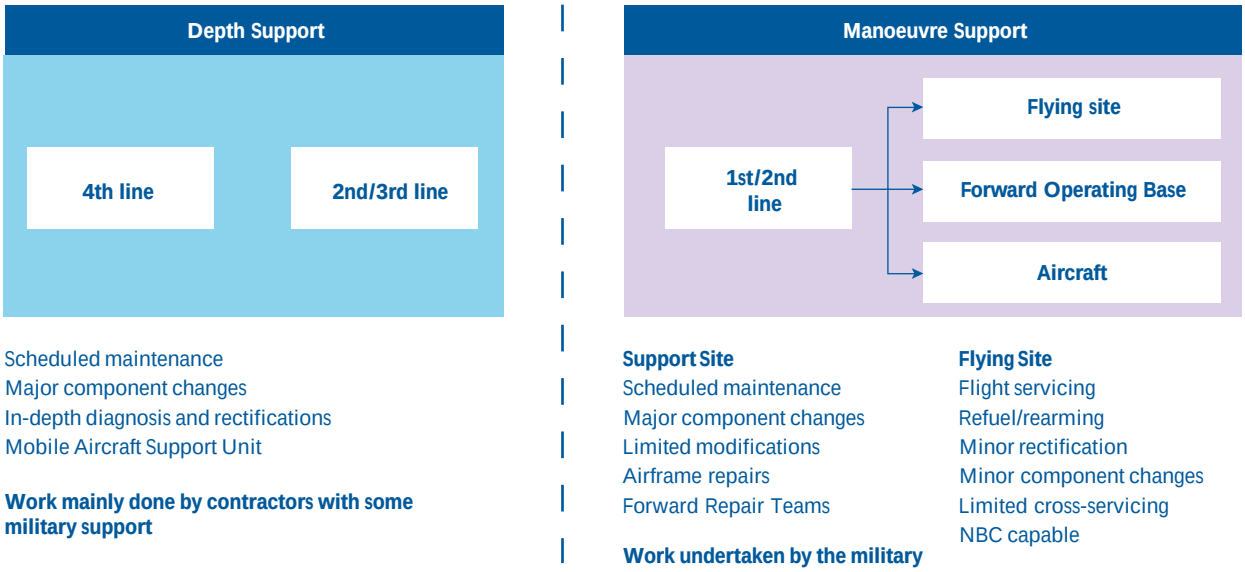
2.20 Outside the Joint Helicopter Command, the Defence Helicopter Flying School, formed in 1997, provides tri-Service helicopter flying training. Based at RAF Shawbury, it reports to the Royal Air Force's Personnel and Training Command. The Central Flying School (Helicopters), which trains helicopter instructors and provides external assessment of students at the Defence Helicopter Flying School, is also based there.

7 The Defence Training Review examined all individual training and education across the Department.

8 First line support involves daily servicing and maintenance; second line support consists of minor repairs and parts replacement; third line support entails major repair carried out by Departmental bodies such as the Defence Aviation Repair Agency; and fourth line support is deep repair or overhaul carried out by industry. First and second line support is performed by front line units while third and fourth line support is the responsibility of the Defence Logistics Organisation.

9 Potential Maintenance Concept for Battlefield Helicopters

In future, helicopter maintenance could distinguish between Depth Support and Manoeuvre Support



Source: Ministry of Defence

2.21 We have previously noted[9] that, while the Army were broadly satisfied with the output of the Defence Helicopter Flying School, the Royal Air Force felt there had been a "significant diminution" in pilot quality since the formation of the School and that low wastage rates reflected weak pilots being passed to the Operational Conversion Units as a training risk. More recent evidence, such as that from the Chinook Operational Conversion Flight, suggests that this has been rectified and, generally, all three Services and the Joint Helicopter Command are content with the School's output. In particular, it was noted that the students were more accustomed to working in a joint environment.

2.22 Efficiencies have already been made by the Defence Elementary Flying Training School (the tri-Service elementary flying training school, which initial pilots attend before being posted to the Defence Helicopter Flying School) as part of Phase 1 of the Army's Flying Training Study, with course length being reduced from 18 weeks to between 10 and 12 weeks, although winter weather conditions may extend this. Similarly, at the Defence Helicopter Flying School, repetition of certain elements of the course between the basic and advanced rotary training squadrons has been reduced, and the Royal Air Force's multi-engined training squadron has successfully reduced its course length by four weeks, without affecting the output standard.

2.23 In spite of the high tempo placed upon the front-line commands by exercises and operations, including both the operational and enduring commitment phases of Operation TELIC, the overall flying training pipeline has continued to operate. This was a valuable lesson learnt after Operation "HAVEN"[10] in 1991, where the deployment of the Chinook Operational Conversion Unit to northern Iraq effectively curtailed the conversion of pilots onto the Chinook for some two-to-three years.

2.24 Collective training has also benefited from more joint exercises. The Army-led Exercise "SWIFTHAWK" now involves Army and Royal Air Force pilots from the Joint Helicopter Force (Northern Ireland). Similarly, in Canada, 16 Air Assault Brigade and the Support Helicopter Force have co-operated on Exercise "IRONHAWK", developing the Air Manoeuvre concept. This underpins a more tri-Service approach to operations, which will be essential if Air Manoeuvre and Littoral Manoeuvre are to be fully realised.

2.25 Despite these advances, however, there remains scope for further improvements to helicopter flying training. These are examined at Part 3 of this Report.

9 *Report by the Comptroller and Auditor General, Training New Pilots, HC 880, Session 1999-2000.*
10 *Operation HAVEN was executed in 1991 to protect the Kurdish population of northern Iraq.*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Part 3

Enhancements to maximise battlefield helicopter efficiency

3.1 This Part of the Report focuses on areas where enhancements could be made to maximise the efficiency of battlefield helicopters including: helicopter flying training; a more common approach to airworthiness; ways to sustain battlefield helicopters; the disparity in aircrew ranks and levels of command; rationalisation of the Joint Helicopter Command's aviation estate; applying procurement lessons learned; and making the most of the potential benefits of a joint approach within the United Kingdom's Search and Rescue and Combat Recovery fleets.

3.2 The Joint Helicopter Command is only one of several stakeholders involved with battlefield helicopters. Several issues, which impact upon the efficiency of battlefield helicopters, lie in other areas of the Department.

Helicopter flying training could be improved further

3.3 Over the last seven years, as set out in paragraphs 2.19 to 2.24, several improvements have been made to training arrangements for helicopter pilots including the formation of the Defence Helicopter Flying School. A number of potential areas for improvement remain, however. These include further developing a joint approach to initial training, providing resources to enable individual and collective training to be carried out at recommended levels, and learning the lessons from the contracting arrangements at the Defence Helicopter Flying School.

Initial Flying Training

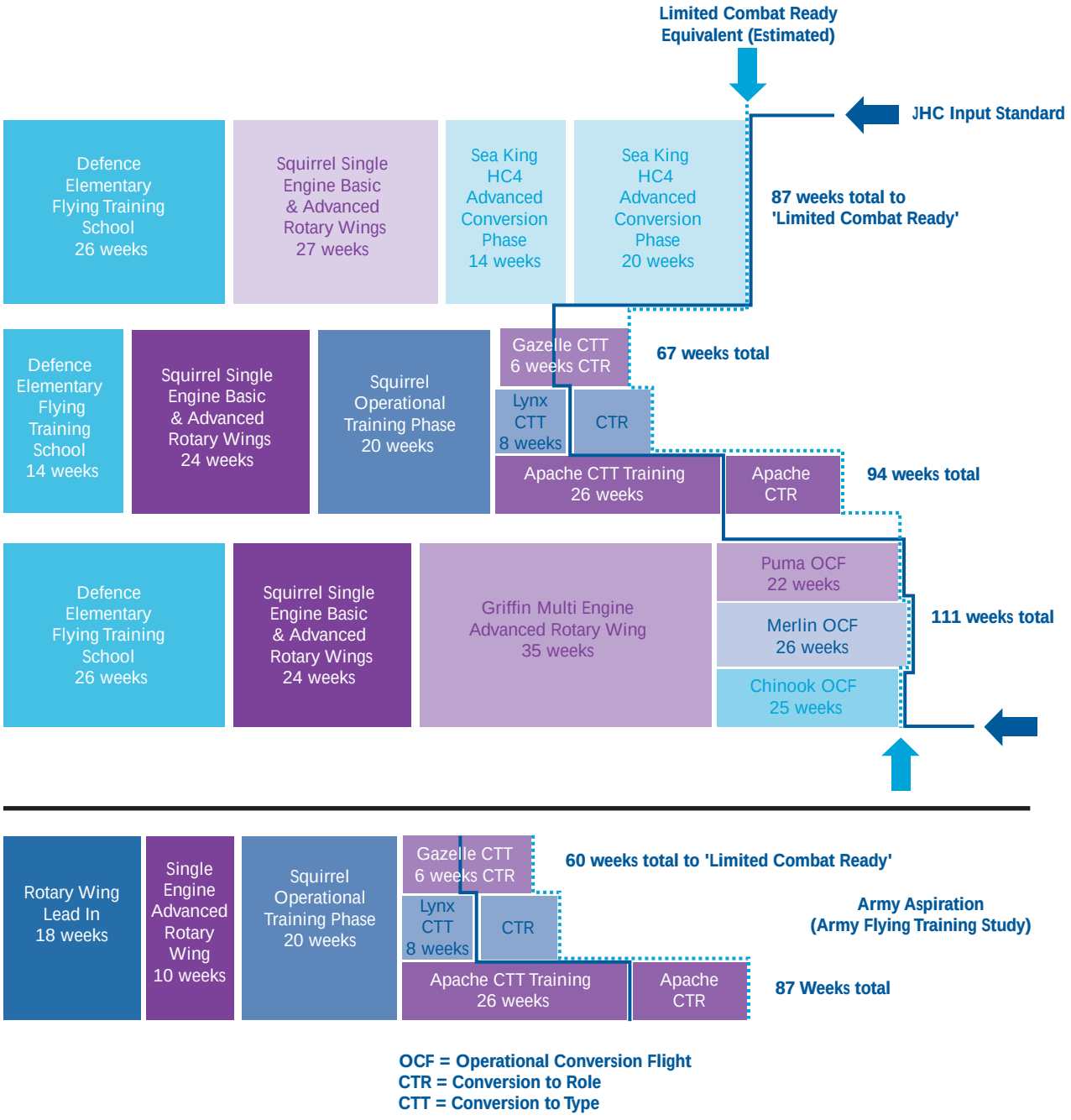
3.4 There is scope for developing further the coherent approach to initial training by bringing together best practice from within the three Services and elsewhere.

3.5 Although there have been benefits from the formation of the Defence Helicopter Flying School, it has led to Army pilots taking considerably longer to pass through initial flying training - for example, a Lynx pilot takes 66 (training) weeks to complete "Conversion to Type" training as opposed to 42 weeks previously. In addition, during this time, Army pilots are receiving fewer flying hours - 192 hours against 215 hours under the old scheme. **Figure 10** illustrates the current (and the Army's proposed Flying Training Study) training pipeline for all battlefield helicopter pilots passing through the Defence Helicopter Flying School.

3.6 One potential source of improvement is through adjusting the balance between initial training carried out on fixed-wing aircraft compared to that carried out on helicopters. Apart from a small fleet of fixed-wing aircraft, the Army Air Corps trains almost exclusively helicopter pilots. Therefore, the Army is conducting a Flying Training Study which suggests that, although flying is cheaper per hour on fixed-wing training aircraft, overall course length can be reduced by training exclusively with helicopters - thereby increasing the time pilots spend on operational squadrons. This "all rotary" approach to Army helicopter flying training would be in line with other Army helicopter schools, such as those in France, Germany, and the United States, although output standards may well be different. Adopting this solution could reduce, for example, Lynx course length up to completion of Conversion to Type training from 66 weeks to 56 weeks, which would incorporate 157 flying hours.

10 Training Pipeline

There are divergences within the United Kingdom's training pipeline



Source: Ministry of Defence

3.7 A second area of potential improvement relates to how much training should be carried out on cheaper, non-operational helicopters. The Royal Air Force initially trains its pilots on the Squirrel and Griffin helicopters before they move onto their operational helicopter types. Conversely, Royal Navy and Army pilots initially train only on the Squirrel before advancing to fly their operational helicopters. Therefore, it is difficult to compare these dissimilar training systems in order to judge which maximises effectiveness. However, including training at the Defence Elementary Flying Training School, a Royal Navy Sea King HC4 pilot takes 87 weeks to become so-called "Limited Combat Ready", whereas an Army pilot would take between 67 weeks and 94 weeks, depending upon helicopter type. A Royal Air Force pilot, however, can take up to 111 weeks to reach Limited Combat Ready status. This is because the Royal Air Force carries out a greater proportion of its initial training on non-operational helicopters, which necessitates type conversion to the Griffin platform and additional course administration.

3.8 Conversely, the United States Army and its "Flight School XXI" concept might also offer a future training model for Joint Helicopter Command pilots. It aims to provide trainees with proportionately more time on operational platforms, and uses more simulator time to reduce the overall flying training programme. The United States Army hopes eventually to pass Chinook and "D" model Apache pilots to the front-line in approximately 44 weeks and 53 weeks, respectively. This compares to 110 weeks and 94 weeks, respectively, in the United Kingdom. However, it is not yet possible to gauge the impact this might have on front-line aircrew standards, and an additional training burden might be placed upon operational platforms. Given the acknowledged shortage of battlefield helicopter lift, as discussed further in Part 4, the introduction of such a system clearly would require a Combined Operational Effectiveness and Investment Appraisal.

3.9 Overall, as the Department prepares for the introduction of modern helicopters across its fleet, there is an opportunity to review initial training to examine the extent to which the training pipeline can benefit from greater harmonisation across the Services to maximise efficiencies, whilst at the same time maintaining or improving training quality. This issue is currently being addressed by the Department, to determine whether a greater proportion of tri-Service rotary-wing flying training can be conducted on cheaper non-operational platforms. This study is due to report in mid-2004.

Individual Flying Training

3.10 Army pilots are not meeting their individual flying training targets. NATO guidance recommends helicopter pilots fly 15 hours' individual flying per month to maintain competency. Meeting this target has proved challenging, however, primarily because of poor Lynx availability. This has been exacerbated by demand for the limited pool of combat-capable Lynx Mk7 aircraft for ongoing operations in Iraq, which has left few platforms on which to train. For example, having left five of its Lynx Mk7 helicopters in Iraq for ongoing operations and having refurbished aircraft coming back from Operation TELIC, in the first five months after returning to the United Kingdom, 3 Regiment, Army Air Corps had only one or two Lynx Mk7 or Mk9 aircraft available daily for training, resulting in 65 per cent of the Regiment losing flying currency. Although other Lynx aircraft were available within 16 Air Assault Brigade, these were principally required to support 4 Regiment, Army Air Corps in Iraq, who were also suffering from poor aircraft availability.

3.11 The Army Air Corps has also been unable to undertake adequate environmental training, such as desert flying, again owing to a lack of resources. Lack of such training erodes readiness. During the build-up to Operation TELIC, the need to recover this shortfall placed an additional burden on in-theatre training, which was already severely constrained because of the short notice given to formally deploy and because the helicopters of 3 Regiment, Army Air Corps were transported by ship rather than air to theatre, "losing" a further 21 days of training time. Lack of training time also meant that, 3 Regiment Army Air Corps, was unable to qualify all of its aircrew for night flying, reducing operational flexibility.

Collective Flying Training

3.12 Collective training is the means by which units are collectively prepared for operations. In order to meet operational demands, however, collective training has been reduced. For example, in order to cover Operation "FRESCO", the Government's response to the fire brigade strike in late 2002, two exercises had to be cancelled because personnel were unavailable.

3.13 Although lack of collective training can partially be offset by operational flying, such as in Iraq, too much operational exposure can focus on selective skills to the detriment of developing the wider range of proficiencies needed to maintain full operational effectiveness. Collective training will become even more important as the Department develops its Air Manoeuvre and Littoral Manoeuvre capability.

3.14 Overall, pressure to reduce flying hours outside operational flying tours, combined with a shortage of aircraft/spares, and a lack of training opportunities, has led to a marked decrease in aircrew operational capability. It is apparent from recent operations, in Iraq and elsewhere, that the United Kingdom continues to maintain an effective battlefield helicopter force. However, if earlier standards are to be recovered then it is essential that both individual and collective aircrew training programmes are adequately resourced.

Contractual Arrangements at the Defence Helicopter Flying School

3.15 Although the formation of the Defence Helicopter Flying School has brought benefits, the contract, let in 1996 as a Private Finance Initiative, was weak, and approximately 100 amendments have since been applied to it. It was expected in 1996 that this arrangement would save £80 million over 15 years.[11] The Department estimates that the contract amendments have now reduced overall savings to approximately £10 million.

3.16 The use of Contractor Owned, Military Registered aircraft at the Defence Helicopter Flying School has brought many benefits, such as reduced initial procurement costs and time. There have, however, been difficulties. For example, a threatened contractor's strike in 2002 would have impacted on training; and the contract ring-fenced flying hours at different training sites meaning the Department had to fund any extra hours it needed in one training site even though hours in other sites had not been used up. In December 2003, the contract was modified, at no expense to the Department, to incorporate a more flexible "Bucket of Hours" concept, allowing surplus flying hours to be shifted between the different training sites at RAF Shawbury. An amendment to the contract is currently under consideration to extend this concept to the School of Army Aviation. If accepted, this might permit more flexible use of resources at the School of Army Aviation, while enabling the transfer of flying hours, and/or aircraft, between the School of Army Aviation and the Defence Helicopter Flying School.

3.17 A further issue is whether the contract provides sufficient incentives to the contractor to react to new events or to correct any deficiencies in current training arrangements. One improvement might be periodic break points for contractual re-negotiation, which would maintain some commercial pressure on any future long-term flying training contract. While recognising that the Department is still defining its requirements for the 25-year "Military Flying Training System" contract for fixed- and rotary-wing flying, a timely review of the Defence Helicopter Flying School would be particularly valuable, providing additional contractual lessons.

There should be a more common approach to airworthiness

3.18 Although the regulations for ensuring that helicopters (and other aircraft and weapon systems) are airworthy are joint,[12] responsibility for applying these regulations is delegated separately by the Secretary of State for Defence to each of the Services. Therefore, in practice, there are differing approaches and interpretations.

3.19 Ultimate responsibility for airworthiness resides with the Secretary of State for Defence. There are two main stages: Military Aircraft Release, with Integrated Project Teams as the responsible authorities who ensure that the aircraft is safe to operate; and Release to Service, for which each Service is responsible. Release to Service provides a clear statement that the aircraft is airworthy and fit for its operational role.

3.20 The existence of three different channels of delegation means that certain issues, for example, trials work to meet operational requirements, is conducted in different ways by the three Services. The Royal Air Force uses the Joint Helicopter Command's Rotary Wing Operational Evaluation and Training Unit, the Army uses the Directorate of Army Aviation's own trials unit, and the Royal Navy uses the Operational Evaluation Unit contained within the operational squadrons. However, the respective Integrated Project Team, in close conjunction with the respective Service, uses the resources of external trials establishments, such as QinetiQ, for major development work.

11 Hansard, Col. 521, 6 November 1996.

12 The Department's Military Airworthiness Regulations have recently been updated to reflect increasing harmonisation. Moreover, the Defence Aviation Safety Board, which develops flight safety policy standards, has representation from the three Services.

3.21 These routes can take different lengths of time. This is most apparent when a single aircraft type is examined for airworthiness by two or more of the Services. For example, the Army released the Islander aircraft[13] to service several months earlier than the Royal Air Force. On current plans, the future Battlefield Light Utility Helicopter/Surface Combatant Maritime Rotorcraft (which will replace the various marks of Royal Navy and Army Lynx and Army Gazelle), will be operated by both the Royal Navy and the Army. Although the acquisition is being administered by a single Integrated Project Team, both Services will conduct their own Release to Service as the aircraft are specified according to their operating role (predominantly land and maritime).

3.22 However, there is a recent precedent for streamlining the airworthiness process between the Royal Navy and the Army. Although the Assistant Chief of Staff (Aviation) is responsible for the airworthiness of Royal Navy helicopters, including the Commando Helicopter Force's Sea King HC4s, responsibility for the airworthiness of the Lynx Mk7s and Gazelle Mk1s of 847 Naval Air Squadron has reverted back to the Director of Army Aviation who had been responsible for this until 1996. This decision was taken because of the small fleet size (six Lynx Mk7 and eight Gazelle) which, though operating predominantly in the maritime environment, are Army Air Corps-owned helicopters with fleet management the responsibility of Headquarters Joint Helicopter Command.

3.23 There is, therefore, potential for more consistency in applying airworthiness regulations and for the process to be streamlined, particularly for those helicopter types owned by more than one Service. Recently, the Generic Aircraft Release Process, which was piloted on the Merlin HC3, has been incorporated in the airworthiness regulations. Such a process more closely aligns the respective Integrated Project Team to the Release to Service Authority. The Generic Aircraft Release Process is gradually being adopted by all three Services, and represents a step forward in tri-Service harmonisation. For example, Apache will convert to the new process from March 2004 onwards.

3.24 Tri-Service airworthiness issues are now well in-hand. Several options for further streamlining airworthiness could be considered. One would be for a single Service to take over responsibility for the airworthiness of helicopters. There are disadvantages to this approach, however, in that the operational knowledge and expertise that the other Services bring to bear (particularly in the maritime environment) might be dissipated. Another option might be to have a joint airworthiness process under a joint organisation. Alternatively, the existing structure for airworthiness could be maintained with there being a greater focus on having more consistency between the Services.

The Joint Helicopter Command is reviewing areas of sustainability where further enhancements could be made

3.25 As described in Part 2 of this Report, Operation TELIC demonstrated that refinements have been made in sustaining the battlefield helicopter fleet. However, the Joint Helicopter Command continues to review areas where capabilities could be further improved. Particular capabilities now under review are the availability of deployable engineering facilities and the supply of fuel.

3.26 In its lessons identified analysis of Operation TELIC, the Joint Helicopter Command highlighted the inadequacy of deployable engineering facilities across the fleet - a shortfall that could constrain the future support of deployed aircraft. More specifically, 7 Air Assault Battalion, Royal Electrical and Mechanical Engineers, which provides second line equipment support to 16 Air Assault Brigade, has examined the possibility of developing lighter, more deployable groupings. The Battalion is also examining the integration of maintenance and servicing across equipment support; the management and visibility of spares; and the need for better task organisation. In conjunction with this work, the Joint Helicopter Command is working to clarify its required engineering capabilities.

3.27 During Operations "JACANA" (in Afghanistan) and TELIC, the Commando Helicopter Force's Support Echelon and the Royal Air Force's Tactical Supply Wing both carried out some cross-fuelling, including that of American helicopters. However, only the Commando Helicopter Force have personnel to re-fuel and re-arm multiple types of aircraft. The Army has both re-fuellers and re-armers, who operate in Forward Arming and Re-fuelling Points but are specific to aircraft type. Operational concepts allow the Army to re-fuel helicopters from the other Services and other NATO countries though its ability to do so on operations may be restricted in order to preserve fuel stocks. The Joint Helicopter Command is looking at the feasibility of joint fuel re-supply on future operations to prevent any unnecessary duplication of capabilities.

13 The twin-engined Islander operates in a reconnaissance role.

Aircrew ranks should be reviewed

3.28 The Army Air Corps employs a mix of non-commissioned and officer pilots whereas the Royal Navy and Royal Air Force use only officer pilots.[14] With the formation of the Joint Helicopter Command and the introduction into the Army Air Corps of increasingly complex and powerful helicopters, this position is becoming increasingly anachronistic.

3.29 The Royal Navy and the Royal Air Force have not always excluded non-officer pilots. The policy was introduced in the 1950s when the two Services assumed responsibility for delivering nuclear weaponry, although only fixed-wing aircraft and anti-submarine helicopters actually carried such weapons. It was assumed that only an officer would have the requisite decision-making abilities and authority to drop nuclear munitions. The phasing out of the Royal Navy's nuclear depth charges and the Royal Air Force's nuclear bombs has, however, removed this rationale for excluding other ranks from becoming pilots.

3.30 The distinction in aircrew ranks between the Services has also partly been justified on the grounds that the helicopters of the Army Air Corps have been less complex to fly. This argument, however, does not appear to have the same strength with the introduction into service of the Apache Mk1, which is a highly complex helicopter. The ratio between non-commissioned and commissioned officers in an Apache regiment will be 62:38.

3.31 In addition, it is difficult to see why a non commissioned officer could not fly a larger support aircraft, such as the Chinook. Indeed, the Joint Helicopter Command has experimented with this in the "Templar" exchange programme where a senior non-commissioned officer from the Army Air Corps was seconded to a squadron flying Chinooks. Moreover, Puma and CH-53 support helicopters are piloted by non-commissioned officers in France and Germany, respectively.

3.32 The question of the variation of front-line aircrew ranks was last addressed by the Department in 1996. The Department concluded that the status quo should remain. Moreover, it concluded that no significant cost savings would arise from using non-commissioned officer pilots because of the differences in individual Service training costs, rates of pay, and time spent in the various ranks. It also noted that there was little scope to harmonise aircrew ranks because the Services operated their helicopters differently. However, the work that informed the establishment of the Joint Helicopter Command suggested that the issue should be re-examined once the Command had "bedded in". Furthermore, in considering the introduction into service of the Apache, the Committee of Public Accounts has recommended that the Department should examine the possibility of using non-commissioned officers as aircrew across all three Services.[15]

There are anomalies in levels of command between the Services

3.33 Traditionally, there have been differences between the Services in certain levels of command. Such differences were largely irrelevant when the three Services operated independently but have now been brought into greater prominence with the creation of the Joint Helicopter Command. For example, in the Royal Air Force, squadrons are commanded by Wing Commanders, whereas in the Army, squadrons are commanded by officers one rank lower, at Major. The Royal Navy has recently decided to raise the level of command in the majority of its squadrons from Lieutenant Commander to Commander. At the next level, Royal Navy Captains command ships and certain shore establishments, and Royal Air Force stations are commanded by Group Captains, whereas Army Colonels do not normally have command opportunities.

3.34 One of the more prominent examples of these anomalies in command structures can be seen within the Joint Helicopter Force (Northern Ireland), which is based at RAF Aldergrove. This Force consists of two squadrons within 5 Regiment, Army Air Corps and 230 Squadron, Royal Air Force. However, both units are commanded by officers of equivalent rank, even though the Army Air Corps deploys more than twice as many helicopters within the Force. Moreover, despite the existence of this joint command, the whole station is under the permanent command of a Royal Air Force Group Captain. The Department's view is that, while Aldergrove might be a good example of where joint command is more appropriate, a wider review of the issue would also have to consider spans of command, personnel under command, independence of action, and net value of assets before any firm conclusions could be drawn.

14 However, both the Royal Navy and the Royal Air Force employ non-commissioned officers as aircrew in non-pilot roles.

15 Forty-sixth Report from the Committee of Public Accounts, Ministry of Defence: Building an Air Manoeuvre Capability - The Introduction of the Apache Helicopter, HC 533, Session 2002-03.

3.35 The principal issue here is the lack of equality of opportunity between the Services to command deployed elements of the Joint Helicopter Command, particularly where these require a commander of the rank of Group Captain in the Royal Air Force or equivalent from the other two Services. The Royal Air Force seems more able to generate officers at this rank, and thus obtains a higher proportion of command opportunities. This is likely to have an impact on promotion opportunities to even higher ranks within the helicopter specialisation in years to come.

The Joint Helicopter Command's aviation estate could be reduced

3.36 On its formation, the Joint Helicopter Command inherited a large aviation estate, shown in **Figure 11**, from the individual Services. The work undertaken to create the Joint Helicopter Command noted that its formation would create a "greater incentive to reduce the number of bases, with the potential to make savings in capital and operating costs". More recent work, based on the provision of maintenance support, has also identified the potential for estate rationalisation. As new platforms enter service, there will be further opportunities to rationalise the aviation estate.

3.37 In 1999, the Joint Helicopter Command reviewed its aviation estate. Two principal options, the disposal of Dishforth or RAF Odiham, presented the most significant opportunities for savings. The Department calculated, however, that it would have taken 23 years and 24 years respectively to break even, given the costs involved in relocation.

3.38 A recent study by the Department recommended that logistic support should be concentrated at specific air bases; for example, the Apache Mk1 at Wattisham. Current planning envisages two Apache Mk1 regiments being based at Wattisham with the third at Dishforth. In principle, it might be more efficient for the Army to co-locate its three Apache Mk1 regiments, thereby benefiting from centralised command, training and engineering facilities as well as reducing the need to move personnel and their families. Wattisham provides limited facilities, however, particularly in meeting the emerging requirement to operate the Apache Mk1 at night, and also because of environmental concerns. Therefore, no decisions on centralised basing can be made until the Department has a better understanding of its future training and environmental needs. Moreover, the currently planned introduction of the Battlefield Light Utility Helicopter/Surface Combatant Maritime Rotorcraft, and the Support Amphibious and Battlefield Rotorcraft (which will replace Royal Navy Sea King HC4s and RAF Puma HC1s), will present the Department with an excellent opportunity to examine its aviation estate.

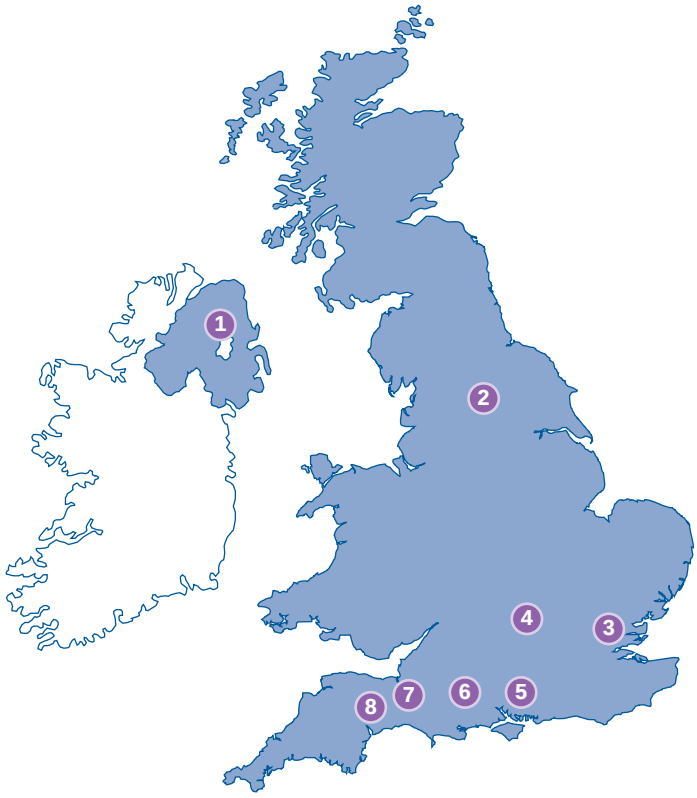
Lessons can be learned from the procurement of the Chinook HC3

3.39 There are a number of procurement lessons that could be learned from the example of the Chinook HC3, although the programme pre-dates the introduction by the Department of its "Smart Acquisition" initiative, with its tighter risk controls. The inability to bring these enhanced helicopters into service exacerbates the shortfall in battlefield helicopter lift capability and has placed further strain on an overstretched helicopter fleet. The knock-on effect of this flawed procurement in terms of available helicopters is discussed in Part 4.

3.40 In July 1995, the Department decided that eight of the 14 Chinook HC2 helicopters that it was procuring to meet part of its requirement for a Medium Support Helicopter, should be made to an enhanced (HC3) standard. The upgrade would include improved range, night vision sensors and navigation capability. The eight aircraft were to cost £259 million and the forecast In-Service Date was November 1998 (defined as delivery of the first six aircraft). As work proceeded, it became evident that displays for the weather radar and other systems anticipated for an avionics upgrade programme (put to contract in 1997) would not fit inside the existing cockpit. One potential solution was to adopt a fully digital cockpit, as used by Chinooks purchased by the Royal Netherlands Air Force. However, this was not affordable within the funding available for the HC3 programme, and a hybrid solution was adopted, incorporating elements of the existing analogue cockpit and the new digital systems and displays. In March 1998, the In-Service Date was redefined to allow for the Military Aircraft Release work that would be required following delivery to the Department and prior acceptance of the aircraft by the Royal Air Force. Taking account of this and some programme slippage, the new In-Service Date was set at January 2002.

11 The Joint Helicopter Command's aviation estate

The aviation estate is concentrated around eight sites



1 RAF Aldergrove, County Antrim

Joint Helicopter Force (Northern Ireland) is based here. It consists of 230 Squadron RAF and 5 Regiment, Army Air Corps together with Joint Logistics and Administration Wings. 230 Squadron consists of 17 Pumas. 5 Regiment has 21 Gazelles, 17 Lynx and 5 Islanders.

2 Dishforth Airfield, North Yorkshire

9 Regiment, Army Air Corps is based here. Currently, it has two squadrons of six Gazelles and six Lynx Mk7. The Regiment is part of 16 Air Assault Brigade, and will eventually be roled as an Attack Helicopter Regiment with two squadrons of eight Attack Helicopters and one squadron of eight Light Utility Helicopters.

3 Wattisham Airfield, Suffolk

Both 3 and 4 Regiments, Army Air Corps are based here. Each Regiment has three flying squadrons with a Regimental total of 12 Gazelles, 12 Lynx Mk7 and 11 Lynx Mk9. Both Regiments will convert to the Attack Helicopter role and will each have two Apache squadrons, as at Dishforth, and one Light Utility Helicopter squadron.

4 RAF Benson, Oxfordshire

33 Squadron and 28 Squadron are based here. 33 Squadron comprises 15 Puma; 28 Squadron has 11 Merlin HC3. In addition, the Medium Support Helicopter Advanced Training Facility is based here.

5 RAF Odiham, Hampshire

7 Squadron, 18 Squadron and 27 Squadron are based here. 7 Squadron comprises five Chinook; 18 Squadron comprises 18 Chinook, including the Operational Conversion Fleet; 27 Squadron comprises 12 Chinook. 657 Squadron Army Air Corps is also based here.

6 Middle Wallop, Hampshire

Middle Wallop is under the ownership of the Army Training and Recruitment Agency. There is a detachment of 132 Aviation Support Squadron, Royal Logistics Corps, which comes under the Joint Helicopter Command, based here. The Headquarters of the Director of Army Aviation is also based here, as is the School of Army Aviation. There are 12 Attack Helicopters allocated to the School of Army Aviation for training purposes.

7 Netheravon Airfield, Wiltshire

7 Regiment, Army Air Corps is based here with 658 and 666 Squadrons, each with six Gazelles. 7 Regiment is predominantly a Territorial Army unit. One squadron of Lynx from 1 Regiment, Army Air Corps is also based here as is the Aviation Training and Engineering Standards Team.

8 RNAS Yeovilton, Somerset

RNAS Yeovilton is under the ownership of Commander-in-Chief Fleet. The Commando Helicopter Force is based here. It consists of 845 and 846 Naval Air Squadrons, each with 10 Sea King HC4s; 847 Naval Air Squadron, which comprises six Army Lynx Mk7 and eight Gazelle Mk1 aircraft. It is planned that six Lynx Light Utility Helicopters will replace these after the introduction of Apache with the Army aircraft returning to their parent Service.
848 Naval Air Squadron, the Sea King training squadron, also has four Sea King HC4 on notice to supplement 845 and 846 Squadrons and five Sea King HC4 on readiness for Maritime Contingency Operations.

Source: National Audit Office

3.41 All the aircraft were accepted from the contractor by December 2001, meeting, and in some cases exceeding, the contract. But none have so far been accepted into service. A key issue is that the Chinook HC3's unique, hybrid digital/analogue cockpit is reliant on software to operate. However, the contract did not specify that software documentation and code for avionics systems should be analysed in accordance with United Kingdom Defence standards in order to demonstrate the integrity of the software. It has not, therefore, been possible to demonstrate that the helicopter's flight instruments meet the required United Kingdom Defence standards. This arose because it was thought that, since the systems and displays in the HC3 cockpit were based upon those in the Royal Netherlands Air Force's Chinooks, an adequate safety case could be constructed on the basis of similarity with the Dutch avionics, and this was reflected in the contract. However, the HC3 hybrid cockpit has a unique configuration and this assumption proved unfounded. One of the main contractors for the avionics system has recently indicated that it would allow access to some software data. However, the process of analysis is time-consuming and expensive and, in addition, there is no guarantee of a successful outcome because the legacy software is not amenable to the techniques required to confirm the robustness of software design. Consequently, the Chinook HC3 is currently restricted to day/night flying above 500 feet in weather clear of cloud, and where the pilot can fly the aircraft solely using external reference points without relying on the flight displays. These restrictions mean that the helicopters cannot be used other than for limited flight trials.

3.42 When the original contract was placed in 1995, it was recognised within the Department that neither the HC2 nor HC3 programmes would deliver aircraft to the full requirement but that this would be met by retrofitting the necessary systems. Of the 100 "essential elements" outlined in the requirement, the contract delivered 55. Of these, 32 were specified in the contract, with a further 23, such as troop carrying capability, being inherent in the Chinook's design. Of the 45 elements not delivered, a number of capabilities could not be included owing to immature technology, some of which were planned to be fitted later. However, in the majority of cases, the Department has been unable to discover an audit trail to explain why no action has been taken to contract for the remaining elements of the requirement, although it would appear that lack of funding has played a significant part.

3.43 These issues, together with the Chinook HC3's unique configuration (which necessitated additional testing), and the need for enhanced capability to deal with the changing operational environment, means that an In-Service Date for an aircraft at least as capable as the current Chinook HC2/2a will not be achievable prior to mid-2007. The Department is considering a number of options regarding how best to achieve the required capability. To provide the capability required by mid-2007 will necessitate additional funding, estimated to be in the region of £127 million.

National and Deployed Search and Rescue could be enhanced through the development of a Joint Personnel Recovery capability

3.44 Search and rescue refers to the use of aircraft, surface craft or other assets to search for and rescue personnel in distress on land or at sea. It relates primarily to non-hostile situations in the United Kingdom and overseas territories. The Home Department[16] is responsible for United Kingdom search and rescue (known as National Search and Rescue), and the Department for Transport, through the Maritime and Coastguard Agency, for civil maritime and aeronautical incidents.

3.45 The Department retains a home-based Search and Rescue capability primarily for the recovery of military personnel. As this capability is not deployable, the Joint Helicopter Command relies on ad hoc arrangements when overseas. While the Department has endorsed the continued relevance of National Search and Rescue, it continues to develop a Joint Personnel Recovery capability (currently undertaken by the Commando Helicopter Force), within which there will be an element available for expeditionary operations (known as Deployed Search and Rescue). However, it is doing so without allocating additional resources.

16 *The Home Department comprises the Home Office, the Scottish Office, and the Northern Ireland Office.*

3.46 Both the Royal Navy and the Royal Air Force have dedicated home-based helicopter squadrons, equipped with Sea King helicopters, for National Search and Rescue. However, the search and rescue forces are not resourced for overseas deployments, with the exception of the Falklands. Therefore, the Joint Helicopter Command has had to provide for military search and rescue requirements overseas, which has been sufficient in relatively benign operational environments such as Bosnia. However, during Operation TELIC, although Royal Navy helicopters were able to provide an over-water search and rescue capability, the United Kingdom had to rely upon United States' assets for both over land Deployed Search and Rescue and Combat Recovery (see paragraphs 3.50-3.51).

3.47 The Department has now produced a Search and Rescue Policy paper, which endorses both the continued relevance of the military element of National Search and Rescue, and the need to further integrate the Royal Air Force's disparate Support Helicopter and Search and Rescue forces. This would allow for the migration of experienced search and rescue personnel across to the Support Helicopter Force, generating what is termed Deployed Search and Rescue. In addition, it would enable Support Helicopter experience to be passed on to the search and rescue forces while also providing a respite tour for personnel deployed on operations.

3.48 Among a number of options, the Department is considering rationalising National Search and Rescue within a wholly civilian context. It should be noted that of the 1,213 persons rescued in 2002 in the United Kingdom, less than four per cent were Service personnel. The Maritime and Coastguard Agency concentrates on over-water rescues whereas only military helicopters are able, through legislation, training and the use of night vision goggles, to conduct unlimited over land training and rescue operations. Certain police forces, however, already use night vision goggles when flying above 500 feet, as a means of safety enhancement. The Department and the Civil Aviation Authority are in negotiation to further align flying practices with the Maritime and Coastguard Agency. This might permit civilian helicopter crews to fly search and rescue operations overland by day or night. It would be possible to attach military aircrew to this civilian organisation to gain valuable search and rescue experience, benefiting the deployed helicopter force.

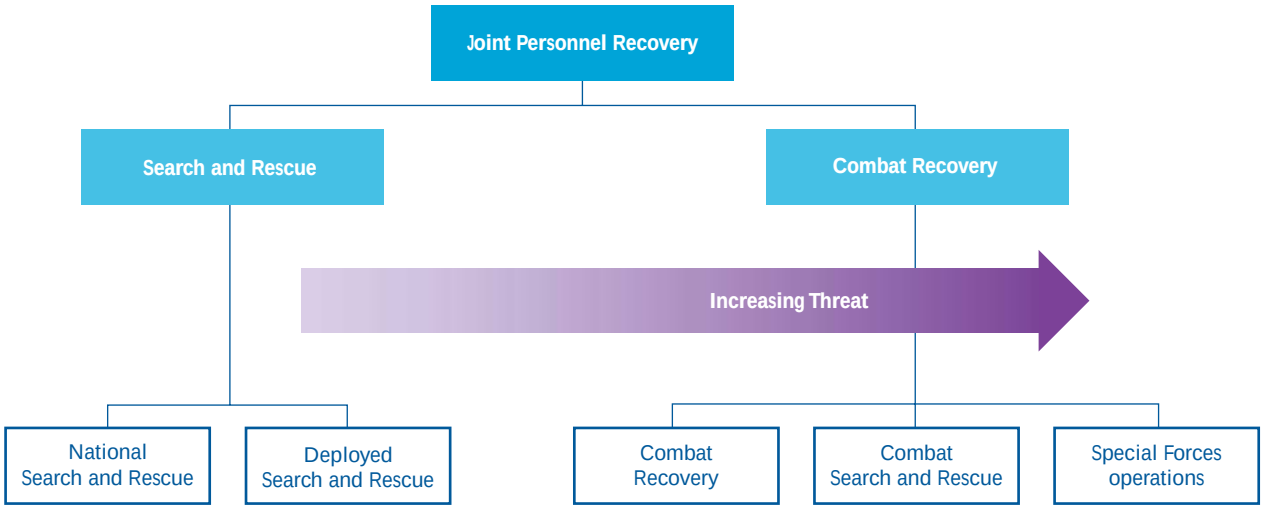
3.49 Some work has already been done to rationalise the existing search and rescue estate. The Department recently noted that five military bases provide logistic support to the Sea King fleet, including Royal Naval Air Station Culdrose and RAF St Mawgan, which are situated only 30 miles apart. The recommendation was that St Mawgan should cease supporting the Sea King fleet. Moreover, a recent Royal Air Force review suggested closure unless a significant civilian use could be found. However, different equipment fits and command and control arrangements separate the various search and rescue fleets, and the force could be more co-ordinated with the other Emergency Services, such as provision of a common radio system, which would be of benefit in the context of homeland security.

3.50 As well as its Search and Rescue Policy paper, the Department has also endorsed doctrine on Joint Personnel Recovery. As **Figure 12** illustrates, both National and Deployed Search and Rescue is subsumed within Joint Personnel Recovery, defined as the aggregation of military, civil and political efforts to obtain the release or recovery of personnel from uncertain or hostile environments.

3.51 Although the Department has capabilities at both ends of the spectrum (National Search and Rescue, and Special Forces' operations), and has set out an approach for addressing Deployed Search and Rescue, it lacks a robust non-Special Forces Combat Recovery capability. The Joint Helicopter Command has already "double-earmarked" some of its existing Royal Navy Sea King HC4s to provide a Deployed Search and Rescue capability and an initial Combat Recovery capability. The addition, by 2005, of Royal Air Force Merlin HC3s, is intended to provide the Joint Helicopter Command with a full Combat Recovery capability. However, this may not be possible without extra resources, for example, to cover additional night vision training and helicopter modifications. While provision of a double-earmarked Combat Recovery and Combat Search and Rescue capability is undoubtedly an improvement on existing arrangements, it would put further strain on the remainder of the helicopter force.

12 Joint Personnel Recovery

Joint Personnel Recovery covers the spectrum of operations



Source: Ministry of Defence

Recommendations

a Tri-Service aircrew flying training should be further streamlined to better meet the specific needs of each Service within a joint context.

b It is important that the Department ensures that all pilots, where appropriate, receive at least 15 hours flying per month, to include individual training in accordance with Joint Helicopter Command/Service training directives.

c The Department should continue to work towards a common approach to airworthiness.

d The Department should explore the possibility of rationalising further the re-fuelling capability for all battlefield helicopters.

e In reviewing the use of non-commissioned pilots, the Department should consider the impact on the operation of the fleet and potential cost savings.

f The Department should review anomalies between levels of command, which emerge when operating in a joint environment. Such a review would also look at the wider context of spans of command, personnel under command, independence of action, and net value of assets.

g Once future platform requirements are determined, the Joint Helicopter Command should conduct an Investment Appraisal in order to ascertain what its future estate requirements are.

h The Department must learn the lessons from the flawed procurement of the Chinook HC3.

i The Department, with other government departments, should subject the delivery of National Search and Rescue to a Combined Operational Effectiveness and Investment Appraisal.

j Joint Personnel Recovery is a key battlefield helicopter capability, which is unlikely to be fully developed with existing resources. The delivery of this capability should, therefore, be addressed alongside the resourcing of the military element of National Search and Rescue.

Part 4

The shortfall in battlefield helicopter capability will continue

"It is widely recognised that there is a severe lack of rotary assets to meet the multiple tasks placed on the Joint Helicopter Command and it has become the accepted norm to double, triple and sometimes quadruple earmark these assets."

Paper by the Joint Helicopter Command, March 2003

4.1 This Part of the Report examines some of those areas where the Department has significant gaps in capability. In order to meet a wide range of battlefield tasks, helicopters provide a myriad of capabilities, of which helicopter lift is a fundamental component. Consequently, this Part focuses on the discrepancy between the battlefield helicopter lift required to meet the Department's own planning assumptions and the amount actually available; and the lack of suitable equipment available to the existing battlefield helicopter fleet.

There is a considerable deficit in the availability of helicopter lift

4.2 The Department does not quantify the total amount of helicopter lift required to fulfil its Military Tasks (paragraph 1.7). Rather, the Department infers the total requirement from a range of operational scenarios, designed under a series of planning assumptions derived from the Military Tasks. Using the latest assumptions, the Director of Equipment Capability (Air Littoral Manoeuvre) has modelled the Department's total helicopter lift requirements over the next 20 years against its available assets, assumed within the Department's most recent Equipment Plan **(Figure 13)**.

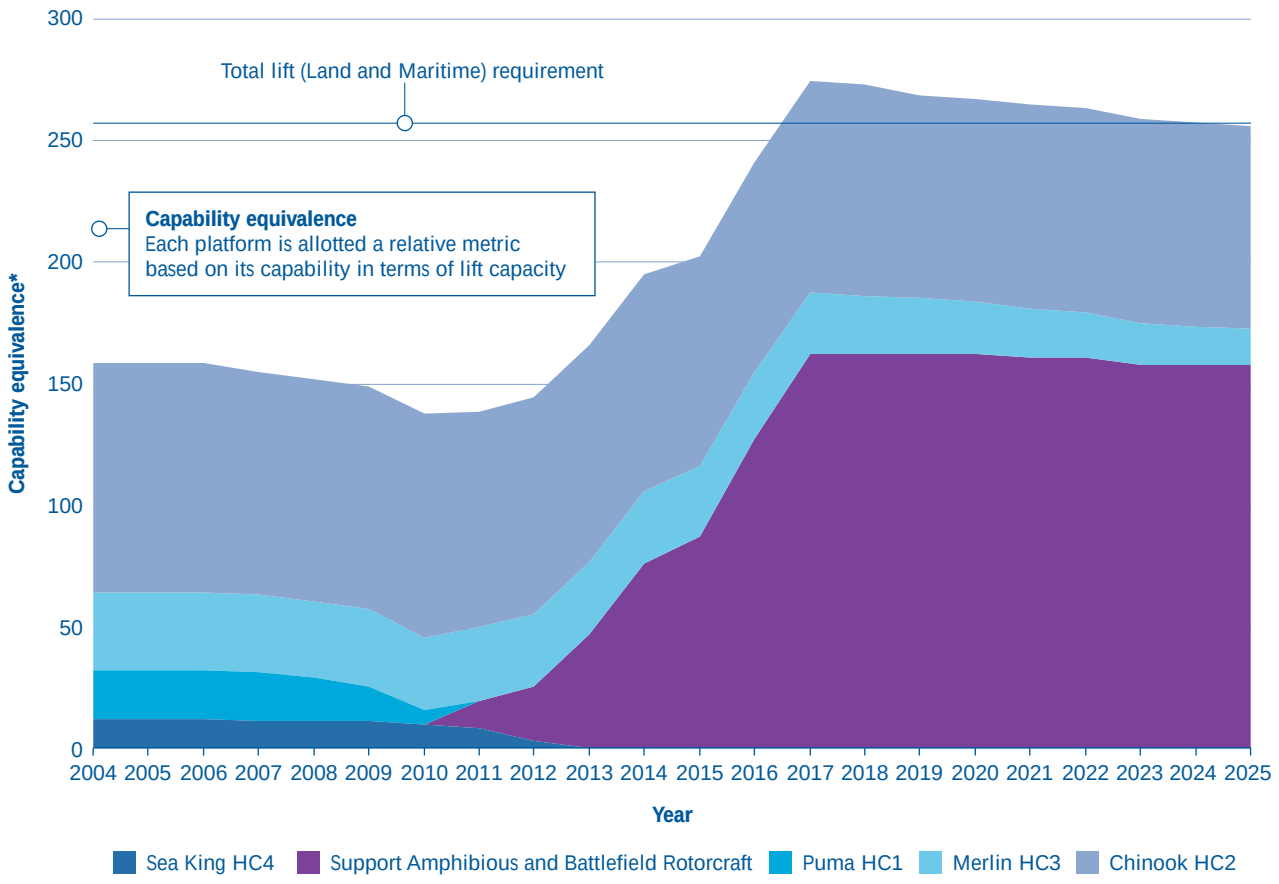
4.3 Figure 13 indicates that, currently, there is an overall deficit of 38 per cent in helicopter lift available to the Department, although this may well be affected by ongoing force structure work, such as the Future Army Structure.[17] Within this overall deficit, there is a 17 per cent shortfall in helicopter lift needed for land operations. There is also an 87 per cent shortfall in ship-optimised helicopter lift - currently provided by the Sea King HC4. This capability can be partially addressed by deploying land-optimised helicopters, such as the Chinook, from ships, but this imposes penalties in terms of operational flexibility and support costs. Figure 13 predicts the Department will continue to have insufficient helicopter assets to meet its assumed requirements until 2017-18. (More information on the methodology used in the model is provided at Annex A.) However, it should be noted that the model does not measure factors such as mobility, amphibiosity, launch platform considerations, load sizing to minimise attrition risks, and through-life costs. All of these factors would be examined in a thorough analysis of support helicopter capability.

4.4 Furthermore, the scenarios illustrated in Figure 13 make no allowance for the Department's so-called "Harmony" guidelines, which are designed to balance the time spent by personnel deployed on exercises and operations against periods of training, preparation, recuperation and leave. If the Department were to observe Harmony guidelines, the current overall deficit in available helicopter lift would rise from 38 per cent to 66 per cent. Harmony guidelines have a direct impact on the number of pilots in the helicopter force as ongoing individual and collective training must be carried out. This, in turn, affects the overall size of the helicopter fleet because additional aircraft are required to facilitate such training.

17 *The Future Army Structure is outlined in the Government's recent Defence White Paper. Cm 6041-I, Delivering Security in a Changing World, December 2003.*

13 Future Battlefield Support Helicopter Lift Requirements

There will be a significant deficit in helicopter lift until 2017



Source: Ministry of Defence

4.5 Moreover, each of the Services has different Harmony guidelines. The Royal Navy and the Royal Air Force calculate Harmony based on the time spent on deployment by an individual, for example, the time spent by personnel away from a naval base or the time spent by personnel on deployed duties with their air force formation. The Army, on the other hand, measures Harmony by unit, based on different levels of readiness. If Air Manoeuvre is to be successfully delivered across the three Services, it would undoubtedly benefit if Harmony guidelines were to be standardised.

Many platforms lack the ability to operate effectively in warfighting environments

4.6 To be fully combat effective, the battlefield helicopter fleet should be equipped for operations across the spectrum of conflict and for various environmental conditions. Although some tasks undertaken by helicopters from the Joint Helicopter Command are benign, the development of the Air Manoeuvre and Littoral Manoeuvre concepts, and ongoing operations in Afghanistan and Iraq, have illustrated the need for helicopters to have a wide range of capabilities. These operations have highlighted the requirement for essential additional capability, which in many cases has been provided using the Urgent Operational Requirements[18] process to address "critical shortfalls" within the helicopter force. However, this process has significantly exacerbated the problem of "fleets within fleets", and funding to continue to support such additional capability is often not available once the operation has concluded.

18 *The Department defines an Urgent Operational Requirement as a procedure used for the rapid purchase of new or additional equipment, or for an enhancement or essential modification to existing equipment, in order to support a current or imminent military operation.*

4.7 Shortfalls exist in the areas of communications, helicopter protection, and nuclear, biological and chemical warfare protection for aircrew. The need for this aircrew protection was a lesson of Operation "GRANBY" in 1991, and while the Royal Navy and Royal Air Force have limited amounts of effective individual and collective protection, Army helicopter crews lacked this capability. As a consequence, Army aircrew were rapidly equipped with more effective individual protection as part of an Urgent Operational Requirement for Operation TELIC, resulting in inadequate training and support solutions.

4.8 The Department's policy decision only to deploy on operations aircraft which are suitably protected by defensive aids suites means that, even after recent Urgent Operational Requirements action, it possesses only 24 Lynx Mk7 aircraft suitable for coalition warfighting operations. Against a background of a capability shortfall, there was subsequently considerable pressure on industry and the Department to satisfy some technically complex and logistically challenging Urgent Operational Requirements within the required timescale for Operation TELIC. It is important, therefore, to have unambiguous requirements and early industrial engagement. The shortfall in defensive aids suites further limited platform flexibility and dictated the size of the helicopter force that could be sent to the Gulf in 2003.

4.9 Similarly, all helicopters deployed on Operation TELIC needed to be fitted with sand filters. A shortage of sand filters for the Lynx fleet meant that, despite re-conditioning some filters used during Operation GRANBY and purchasing others through the Urgent Operational Requirements process, the Department could only deploy 24 Lynx platforms against a requirement for at least 33. Having given up six sand filters to equip the Commando Helicopter Force's Lynx fleet, and once other priority users were equipped, sufficient filters remained for 3 Regiment, Army Air Corps to deploy only 12 Lynx aircraft. Ordinarily, the Department would have wished to deploy its entire Lead Aviation Task Force, including 23 Lynx helicopters. Therefore, rather than the mission determining the force package, the lack of suitably-equipped aircraft limited one of the principal weapon systems available to 16 Air Assault Brigade.

4.10 More generally, the lack of equipment fit on helicopter platforms has been partially alleviated by a patchwork of Urgent Operational Requirements. However, this process strains availability, supportability and efficiency, and creates fleets within fleets. Particular problems are: items procured for a specific operation are often removed once aircraft return to the United Kingdom as the process does not address longer-term replacement or running costs; and items are not normally available for pre-deployment training, leaving crews and engineers to gain familiarity after deployment. For example, such was the haste to deploy refitted Lynx Mk7s on Operation TELIC, that two aircraft flew direct from modification at the Defence Aviation Repair Agency, Fleetlands, to embarking ships. 3 Regiment, Army Air Corps were, therefore, unable to familiarise themselves with the new defensive aids suite until they arrived in the Gulf, not having had the opportunity to practise with suitably equipped helicopters during their previous year's training. Moreover, the need for trials (and for sufficient time to train) on new equipment does not fit naturally within the timescales dictated by Urgent Operational Requirements.

4.11 Nevertheless, the Department has successfully used the Urgent Operational Requirements process to address some capability gaps. For example, the addition of the Night Enhancement Package to some Chinook HC2/2as, to improve pilots' night-time situational awareness and provide secure communications, was completed in nine months, at a cost of approximately £70 million. Under conventional acquisition, this process could have taken up to five years, and, in some respects, the use of Urgent Operational Requirements has provided an improved capability to that offered by the Chinook HC3, which is not yet in service (paragraphs 3.39-3.43). However, the eventual cost of retaining and design-incorporating such complex upgrades should not be underestimated. Some Urgent Operational Requirements added to the Chinook after Operation GRANBY remain on the fleet, but without adequate funding this capability becomes unusable and further exacerbates the differences in training and support required between different marks of Chinook. This factor also applies, to differing degrees, to the entire battlefield helicopter fleet.

Recommendations

a The Department should address its current shortfall in battlefield helicopters by seeking to avoid further slippage in its forward programme.

b The Department should investigate the feasibility of having a tri-Service Harmony guideline.

c The Department should ensure that it provides adequate platform capability across the spectrum of conflict and also in anticipated operating environments.

d The Department should review all capability provided through the Urgent Operational Requirements process, ensuring that essential capability is incorporated into the baseline standard of the helicopter.

Annex A

Study Methodology

1 This Annex sets out the methodologies utilised in the course of the study.

Review of the Department's planning and policy papers

2 We undertook a wide-ranging review of the Department's planning and policy papers. This included the papers that were produced setting out the rationale for the formation of the Joint Helicopter Command. In addition, we have examined papers written within and outside the Joint Helicopter Command on issues related to battlefield helicopters since 1999.

Interviews and correspondence with key stakeholders

3 During the study fieldwork, we consulted with a large number of key individuals and organisations responsible for issues affecting battlefield helicopters:

- Headquarters Joint Helicopter Command
- Directorate of Special Forces
- Director of Army Aviation
- Director of Equipment Capability (Air Littoral Manoeuvre)
- Deputy Chief of the Defence Staff (Commitments)
- Defence Procurement Agency
- Defence Logistics Organisation
- Joint Doctrine and Concepts Centre
- Directorate General Doctrine and Development
- Royal Air Force Strike Command
- Medium Support Helicopter Aircrew Training Facility
- Army Resources and Plans
- Defence Helicopter Flying School
- Training Group Defence Agency
- Defence Elementary Flying Training School
- Director Helicopter Operations, QinetiQ
- Assistant Chief of Air Staff (Aviation), Commander-in-Chief Fleet
- Joint Helicopter Force (Northern Ireland)
- Directorate of Strategic Support
- Chief Engineer, Royal Electrical and Mechanical Engineers
- Commando Helicopter Force
- 3 Regiment, Army Air Corps
- Support Helicopter Force
- Chinook Integrated Project Team Leader

Operational Analysis

4 We commissioned the Department's Director of Equipment Capability (Air Littoral Manoeuvre) to apply some of its ongoing Combined Operational Effectiveness and Investment Appraisal developmental work into profiling future helicopter lift requirements. Based upon studies being conducted with the Defence Science and Technology Laboratory for the Support Amphibious Battlefield Rotorcraft and the Battlefield Light Utility Helicopter programmes, the results, known as the "Battlefield Support Helicopter Lift Requirements and Future Capability", are illustrated in Figure 13. This study is based on comparisons between the Department's own Defence Planning Assumptions and the Equipment Plan, which indicates anticipated future capability. This new work supersedes the widely distributed Intra-Theatre Lift Balance of Investment work, which was based on the 2002 Equipment Plan. The model assumes accident attrition rates of one aircraft per 75,000 flying hours, and flying rates of 500 hours per platform, per year.

Consultants

5 In order to provide us with high level military guidance for our work, we engaged Air Commodore Alan Waldron CBE AFC SLJ RAF Retd, as a consultant.

Annex B

Extract from the Strategic Defence Review

"Our work has emphasised the need for joint approaches to capability areas in which more than one Service is directly involved. One of the main examples is battlefield helicopters. All three Services operate battlefield helicopters in support of forces on the ground; these include the Royal Navy's Sea Kings; the Army's Lynx and Gazelles (and Longbow Apache when in service); and the Royal Air Force fleet of Chinooks, Pumas and Wessex (and Merlin Mk3 when in service). Other helicopters are employed in anti-submarine warfare/anti-surface warfare, airborne early warning and search and rescue roles. But their roles and the equipment they use have little in common with battlefield helicopters.

"Operational experience in Northern Ireland, Bosnia and the Gulf has demonstrated the unique contribution of battlefield helicopters throughout the conflict spectrum. Moreover, it has become evident that there are frequently too few of them available to meet the collective demands they face.

"One option which has frequently been discussed is the transfer of all battlefield helicopters to a single Service. But, as with merger of the Services, we believe that any advantages would be outweighed by the damaging impact it would have on ethos, morale and operational effectiveness.

"We therefore propose to form a Joint Helicopter Command, responsible for training, standards, doctrinal development and support for operations. The Command will draw on the equipment, personnel and expertise of the single Services and be charged with providing the Joint Force Commander tailored packages of battlefield helicopters (from one or more Service), support equipment and personnel, to meet operational requirements. The Command will provide a single focus for the ready transfer of best practice from Service to Service and for removing, over time, differences in current operating procedures.

"Significant rationalisation of the engineering and supply arrangements for helicopter operations has already taken place in recent years. The Defence Helicopter Support Authority has become the tri-Service organisation for the management of all helicopter support, and its responsibility will be expanded to include the direction and tasking of the non-deployable elements of helicopter support in each Service. This will help develop a taut customer/supplier relationship with the new Joint Helicopter Command.

"Further study is now underway to determine the best location for the new Command's Headquarters, and its detailed responsibilities. Our assessment is that this initiative will produce small savings and that, in time, the new Command will provide the framework for much greater efficiency and operational effectiveness."

Annex C

Distribution of manpower across the Joint Helicopter Command

	Officers	Others	Total
JHC Command			
Army	120	981	1,101
Royal Air Force	37	216	253
Royal Navy[19]	175	645	820
Joint Helicopter Force (Northern Ireland)			
Army	38	373	411
Royal Air Force	77	281	358
Royal Navy	2	0	2
RAF Benson			
Army	0	0	0
Royal Air Force	215	1,197	1,412
Royal Navy	0	0	0
RAF Odiham			
Army	8	166	174
Royal Air Force	192	1,381	1,573
Royal Navy	0	0	0
16 Air Assault Brigade			
Army	555	6,935	7,490
Royal Air Force	16	60	76
Royal Navy	1	2	3
Totals	**1,436**	**12,237**	**13,673**

19 The vast majority are in the Commando Helicopter Force: 162 officers and 643 others.

Annex D

Detailed structure of the Joint Helicopter Command