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Summary of Helicopter Operations in the UK

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Abstract

This paper gives a non-technical overview of civil helicopter operations in the UK including comment on the concerns of the public and the awareness of those concerns by the helicopter industry. The profile of helicopter noise was recently raised with the publication, by the Greater London Authority, of the report entitled London in a Spin. This highlighted several issues including the lack of public information on helicopter operations in the London area. The Civil Aviation Authority is now logging this information and making it freely available. Helicopters provide a number of vital services in today's society that would be difficult to provide without them. These include emergency services, access to remote areas, transport to offshore oil rigs as well as business travel. The British Helicopter Association, BHA, represents the UK helicopter industry and it raises awareness of environmental issues amongst its members. One of the primary impacts of helicopter operations is noise and the BHA have developed several codes of practice to limit noise as well as promoting a noise abatement training programme developed by the Helicopter Association International.

1. INTRODUCTION

This is a short non-technical paper summarising helicopter operations in the UK, mainly from the perspective of the helicopter industry. In writing this paper much information has been provided by the British Helicopter Association (BHA).

The BHA was formed in 1969 at the instigation of some of the leading commercial helicopter operators in the UK. It is a non-profit making organisation whose objectives are to promote the use of helicopters throughout the UK. It also promotes safety and actively tries to ensure that proper consideration is given to environmental issues.

This paper gives a brief introduction to helicopter types and the unique services they are able to provide. It goes on to describe the issues of environmental noise and its perception, with specific reference to London. Finally it describes the efforts by the industry to raise awareness amongst helicopter operators and to minimise the adverse effects of their operations.

2. HELICOPTERS

Leonardo da Vinci is credited as having first thought of the concept of vertical flight with a design for a helical airscrew device in 1493, however it never made a practical application. The first mass produced helicopter came onto the market in 1946 and the market has expanded considerably since then. The UK helicopter fleet reached almost 1400 helicopters by 2007 and is now the 5th largest in the world.

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Types

Modern helicopters can carry up to 20 passengers at speeds of up to 200 mph. They are comparatively fast and versatile providing a unique mode of transport. One of their main advantages is that they can operate from limited ground facilities and from areas that would be inaccessible by any other means of transport.

Common helicopters in use today range from light turbines (for example the Squirrel and Jet Ranger), which have 4 or 5 seats with a speed of 140 mph, to the somewhat larger helicopters such as the Sikorsky S76, with up to 13 seats and a speed of 180 mph or the 12 tonne class Sikorsky S92 with 19 seats.

Services

Helicopters are used in a multitude of different ways which can capitalise on their ability to operate from remote and unprepared sites. A summary of helicopter uses is provided below.

Air taxi - Corporate use and air taxi business travel by helicopter is not necessarily the prerogative of the super rich but can be regarded as an essential means of increasing the productivity of those businessmen for whom travel by congested surface means is simply a waste of time. Many corporate users choose to fly by business helicopter for the additional security and simplicity of use that it affords.

Off shore - A major use of helicopters is for offshore hydrocarbon exploration, oil and gas production support and transport to and from oil rigs. It is a very efficient and cost effective solution for getting specialist workers to and from their place of work, sometimes hundreds of miles from land. Helicopters typically transport some 1.5 million workers to and from the rigs each year on the UK continental Shelf.

Inspection - Essential jobs that would be very difficult, expensive and time consuming to carry out by any other means such as power cable and pipeline inspections. In times of bad weather when surface transport can be seriously disrupted helicopters provide essential support in the detection and repair of damaged power lines.

Filming – The use of helicopters for filming and electronic news gathering allows film crews to be rapidly and advantageously positioned to obtain the best view points for their audiences.

Police - Helicopters are now widely used by the police service and their use is regarded as an essential aid in crime detection and prevention. With the aid of thermal image cameras and high powered lighting, such as the Nitesun, they provide both a deterrent effect and a tracking and apprehension service.

Medical - Most people in the UK are aware of the Air Ambulance services that operate throughout the country and also the Search and Rescue services provided jointly by both civil agencies and the military authorities. In cases of major injury it is the most effective and quickest way of getting a specialist medical team to the casualty and then of evacuating to hospital. On average, an emergency air ambulance takes off every 10 minutes in the UK, flying 365 days a year in daylight hours attending some 19,000 accident and medical trauma missions every year

Fire fighting – Helicopters can provide a cost effective role in fire fighting particularly for remote moorland locations or for forest fires.

Load lifting – There are many situations where the only option for moving heavy loads is to use a helicopter with the load under slung, for example transporting telegraph poles for the erection of power lines across mountainous or remote areas.

3. Noise

Despite the many advantages of helicopter use there are also disadvantages and one of the main disadvantages is that they cause noise. In addition, due to their flexibility in use, they can cause noise in areas that are otherwise unaffected by noise. Much has been done over the years by way of improved design to reduce and control noise at source, but the industry must continue to raise awareness of the potential of their operations to cause a noise impact.

Helicopter noise results from many sources, but the primary sources can be impulsive in character and can be very directional in nature. For example Blade Vortex Interaction noise (BVI) can be perceived as a slapping noise and propagates forwards in the plane of the main rotor disc. Tail Rotor Interaction noise (TRI) again propagates in the plane of the tail rotor disc which means it can be both a forward and a downward propagating noise. Both of these noises are dependent on the flight regime and, importantly, can often be inaudible to the pilot due to the directionality of the sources. This demonstrates the need to raise awareness of the issue with the pilots as it may not be obvious to them that they are potentially creating an environmental noise nuisance.

As part of Air Worthiness requirements since 1981 all helicopters have to be noise certificated. Helicopter noise certification is regulated in the UK by The Air Navigation (Noise Certification) Order 1990 and Schedule 1 Part IX applies to helicopters. This is a type testing procedure similar to noise certification for fixed wing aircraft. The test procedures are contained within chapters of the International Civil Aviation Organisation (ICAO) Annex 16 to the Chicago Convention. Chapters 8 and 11 relate to helicopters; Chapter 8 being for heavy helicopters (>3175 kg) and Chapter 11 for light helicopters. Chapter 8 specifies 3 flight procedures; take off; overflight; and approach. The noise measurements are repeated several times for each flight procedure to ensure a statistically significant average is obtained. In order to pass the certification requirements the measurements must be less than the reference limit for each procedure. However a trade off arrangement exists whereby the limit can be exceeded by up to 3 dB for one procedure or by 4 dB for 2 procedures providing those exceedances are fully compensated for at the other measurement. Chapter 11 is a simpler procedure whereby only 1 flight procedure is measured under the take off path under maximum power.

4. HELICOPTERS IN LONDON

Routes

To assist Air Traffic Control Helicopter Routes are sometimes established. These are usually associated with large cities which have busy airports nearby. A good example is London where its heliport at Battersea is located underneath the flight path of aircraft approaching London Heathrow Airport. The London Helicopter routes, see Figure 1, cover the whole of the London Control Zone and one of their functions is to ensure adequate separation between helicopters and fixed wing aircraft.

These routes have been established for many years and were developed to avoid flying over built up areas as much as possible. There are no limitations on hours of use for the helicopter network. The routes have been chosen to enable helicopters to fly over open spaces where ever possible, for example route H4 follows the River Thames. All helicopters operating within the zone must have Air Traffic Control, ATC, clearance and, in the main, pilots fly using visual ground features. Maximum heights are specified for each route or section of route designed to ensure a safe separation between helicopters and Heathrow fixed wing traffic. There is a general "rule of the air regulation" which requires pilots to maintain at least a 500ft separation from any person, vessel, vehicle or structure.

Use of the routes is not compulsory and providing the pilot can comply with the law he is at liberty to request a route of his choice from ATC. However, in practice single engine helicopters generally follow the routes. According to the CAA statistics, 90 to 95% of helicopters operating in the London Heathrow and London City Control Zones (CTRs) at some point route direct, i.e. off the designated routes. Although very variable, a typical busy day could see over 100 flights in the area.

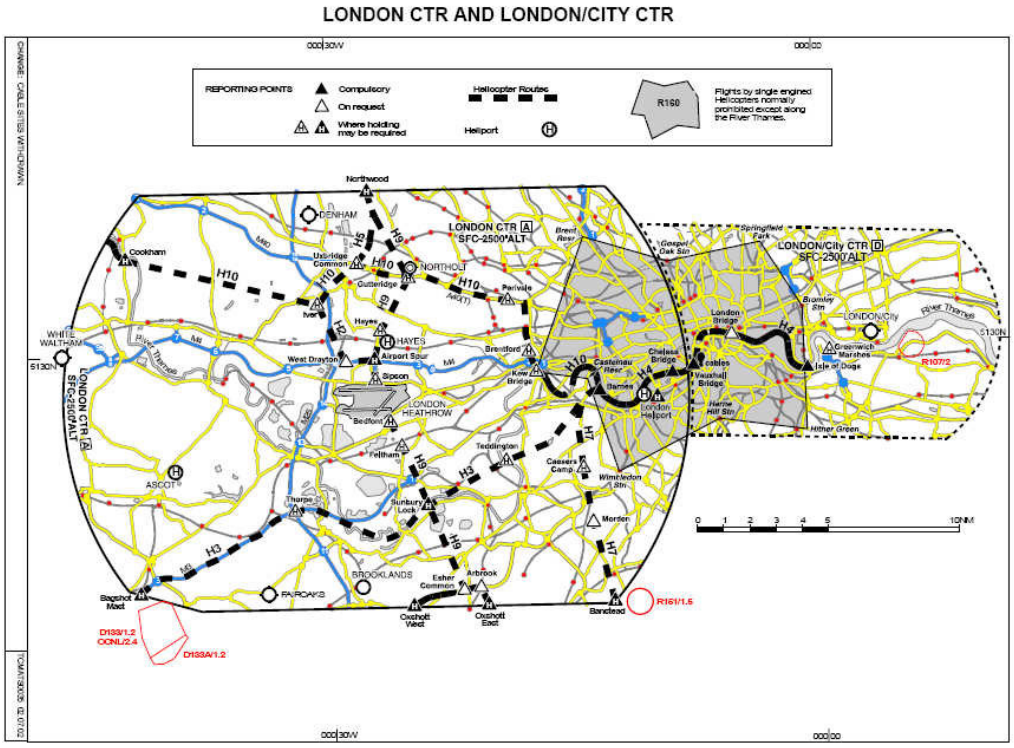

Figure 1: Helicopter routes in London

London in a Spin [1]

There has been a perception that the use of helicopters is increasing, especially in London, with a growing concern about helicopter noise. To address those concerns in October 2006 the Greater London Authority (GLA) published the results of a comprehensive review of helicopter noise in London. The GLA Environment Committee heard evidence from a wide variety of sources including from central government, local government, the aviation sector, environmental organisations and the public. At that time there were no publicly available data on helicopter movements in the London area hence

the concerns were anecdotal rather than factually based. The report made 14 recommendations including that the complaints procedure for helicopter noise should be made clearer and that data on helicopter movements should be collated centrally and made available to the public. These data are now available on the CAA web site and provide a comprehensive breakdown of helicopter movements in various categories.

The statistics seem to show that for London June is generally the busiest month with an average of about 130 movements per day. Other months are typically of the order of 65 to 100 movements per day. There are very few flights between the hours of midnight and 07.00 hours with typically 1 flight per night and on a few occasions up to 4 flights. The data indicate about 20% of helicopter movements are by single engine helicopters and confirm that virtually all single engine helicopter movements adhere to the route network.

In terms of specific flights, taking the month of June 2008 as a worst case example, some 10% of movements were by police helicopters and a further 9% were by the London Air Ambulance. The police Air Support Unit in London operate three Eurocopter EC145 helicopters on a 24-hour basis flying an average of over 275 hours per month throughout London. The Air Ambulance service operates an MD 900 Explorer which is a helicopter that does not have a tail rotor. The main function of the tail rotor is to prevent the helicopter contra rotating against the main rotor, however in this helicopter small jets are employed to control contra rotation. This means that the helicopter rates as one of the quieter machines in common use.

5. BRITISH HELICOPTER ASSOCIATION

The BHA is very conscious of its responsibilities in respect of noise and actively promotes awareness of environmental noise amongst its members. It has developed a series of Codes of Practice to ameliorate the adverse noise impacts of its members operations. These codes are available as a free download from the BHA website [2] and they urge pilots to fly responsibly and to minimise the impact of their operations.

They include the Pilot's Code of Conduct which lists 12 recommendations including;

- Always Fly as High as Possible;
- Always Avoid Populated Areas;
- Never Bank Sharply;
- Lower Your Cruise Speed over Populated Areas.

In addition there are also recommendations for Aerial Photography work such as limiting duration of work at 800ft in one position to 5 minutes or less; avoiding work before 07.00 hrs and after 17.00 hrs, and there are also special recommendations for work in National Parks.

6. HELICOPTER ASSOCIATION INTERNATIONAL TRAINING

The BHA has embraced the Helicopter Association International (HAI) Noise Abatement Training Programme. This programme is available as an individual tuition course on DVD or as a free down load from the HAI web site [3]. It explains in depth how each element of the helicopter (engine, exhaust, rotor system etc) generates noise and how the perceived effects of this noise to those on the ground can be moderated. Temperature, wind and even the direction of rotation of the blades are covered, together with the specific noise issues for named helicopter types. For example under certain manoeuvres it is preferable, from a noise control point of view, to keep noise sensitive locations to one side of the helicopter, i.e. making a clockwise circuit of an area rather than an anti-clockwise circuit.

The accountable managers of all BHA member companies have received a letter from the BHA inviting them to sign up to a series of noise reduction initiatives that have been agreed by the BHA's Noise Action Group (NAG). In addition, the BHA has written to every major rotorcraft manufacturer to explain the UK's concerns about rotorcraft noise and the ready market for new, quiet technology helicopters in the UK.

7. CONCLUSIONS

This paper has given a general non-technical overview of helicopter operation in the UK illustrating typical types of helicopters and the uses made of them including as a means of transport, for filming and for the emergency services.

A brief description of helicopter noise sources is given together with detail of the noise certification requirements. Reference has been made to the London area and the route structure operated there to avoid conflict with inbound aircraft at London Heathrow Airport.

Finally information is provided on the noise abatement initiatives of the BHA and the HAI including the BHA Codes of Practice and the HAI noise abatement training programme.

ACKNOWLEDGEMENTS

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