



UK AIRPROX BOARD

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**Selected extracts from UKAB Reports
for use by General Aviation pilots:**

Book Number 16

Airprox in UK Airspace Involving General Aviation Pilots

FOREWORD

The purpose of this publication is to identify for the General Aviation (GA) community some of the flight safety lessons arising from Airprox events which have occurred in UK airspace.

Hugh Woodsend, the Member of the UK Airprox Board nominated by the British Gliding Association, undertook to collate this edition in our series of GA Books. It has been a UKAB intention for some while to produce a book of particular value to GA helicopter pilots and this was the brief that Hugh Woodsend accepted. He is the first to say that his experience of rotary wing flying is not extensive: he has therefore consulted UKAB's specialist helicopter Members and other people as necessary. Hugh's goal was to select from the main Reports those Airprox which identify lessons of value to a GA helicopter audience. He has then added his personal commentary which you will find at the head of each of the main sections. As Hugh says in his Introduction overleaf, he has elected to use those Airprox from year 2003 to mid-2008 in which at least one aircraft was a GA helicopter. This time span allows him to select from a wider range of incidents in support of his commentary.

At the risk of making Hugh Woodsend blush, I would like to pay tribute to his considerable efforts in support of the UK Airprox Board's work. Hugh is a vigorous Member of the Airprox Board, his wide ranging experience on aircraft from the simplest glider through to fast jets and larger aircraft being invaluable. In addition, he has an excellent 'slide show' presentation which explains the capabilities of modern gliders. At his own initiative, Hugh has given this presentation to many audiences and it is always well received.

Please keep in mind as you read through the Airprox in this Book that the UK Airprox Board has no intention of allocating blame: the purpose of the Airprox process is to find out what happened and then to disseminate the details so that people can benefit from the unfortunate experiences of others. In this respect, I have no hesitation in paying tribute to those who reported their experiences honestly and openly so that fellow aviators might benefit.

This Book and other UK Airprox Board publications can be found through the 'Publications' page of our website at www.airproxboard.org.uk Please pay us a visit! Another valuable source of 'UK Airprox' information is the CDs that we publish from time to time. These contain not only the most-recent UK Airprox Board publications but also an archive of earlier Books and other safety information. UKAB's CDs are widely distributed to flying clubs; air traffic control units; military units and many other organisations and individuals. We usually have a stock in the office: if you would like one, please make your request to info@airproxboard.org.uk.

In closing, whatever your experience level; whatever you fly, I hope that you will find much of value to safe operations in the pages of this Book. In a few weeks time, I reach the end of my five years at UKAB and will be handing over to my successor. Please give your support to the new Director's work in enhancing flight safety as you have supported me.

Peter Hunt

Director, UK Airprox Board

Introduction

As far as I know, the UK Airprox Board has never published an extract from its main Reports* concentrating on General Aviation Helicopters: the time is therefore right to do just that and look at this very important discipline within the GA world. Helicopters have a number of different attributes to fixed-wing aircraft and occasionally the flexibility of the helicopter causes concern to other aviators.

I decided to choose a number of themes, all of which we see at the Airprox Board and which we can use as valuable 'lessons learned':

- Airspace infringements
- Misunderstanding or not following ATC instructions
- Incidents involving Paragliders & Hang Gliders
- Circuit related incidents
- Incidents involving unlicensed airfields or landing sites
- Gliding site penetrations
- Airprox with aircraft on procedural approaches

I analysed Airprox involving helicopters from 2003 until the middle of 2008 to get a picture of how often these same themes come up. My analysis showed that these themes account for 50% of the total analysis, the other half being non-specific 'Class G' encounters.

Sometimes other aircraft are very difficult to spot even when keeping a good lookout. However there are things we can do to improve the chances of seeing or being seen by other traffic. I have included three examples under an extra 'general Class G encounters' section to highlight some useful points raised by the UK Airprox Board.

As you will know, the Board assesses each Airprox and awards a risk level to each incident. The risk used in the assessment of Airprox is only designed to categorise the likelihood of the two participants colliding: it is therefore not a measure of how hazardous the activities prior to the incident were. It is quite possible to have 'Risk A' category incidents (near accidents) which involved two aircraft whose pilots just didn't see each other but were otherwise doing nothing wrong. Equally, 'Risk C' category incidents (no risk of collision) could have come about by very poor airmanship by one or both parties. For that reason, I have chosen examples from all risk categories.

Before turning to the first of my themes, that of 'Airspace infringements', an extract from the most-recent ***Analysis of Airprox in UK Airspace ~ Report Number 21*** is given to set the overall scene.

Hugh Woodsend

Member - UK Airprox Board

* **Analysis of Airprox in UK Airspace** - Reports produced jointly for The Chairman, CAA, and Chief of the Air Staff, RAF.

**GENERAL AVIATION (GA) SECTION - Taken from the UKAB Publication
Analysis of Airprox in UK Airspace ~ Report Number 21**

GA Risk Results

Figure 6 shows the Risk distribution for those Airprox in which at least one aircraft was categorised as GA. More often than not flying outside controlled airspace; in aircraft from the size of microlights through to sophisticated aeroplanes and helicopters; piloted by student pilots through to the very experienced professional, this range of activities and experience levels makes it unsurprising that the largest proportion of Airprox in UK airspace involve GA pilots. As Figure 6 illustrates, over the last three years the 'All Airprox' trend is essentially flat as indeed are the figures for Airprox having a GA involvement which now hover around 100 Airprox per annum. In 2008, approximately 40% of the total number of Airprox involving at least one GA aircraft were Risk Bearing, the same as the average figure for the prior nine years.

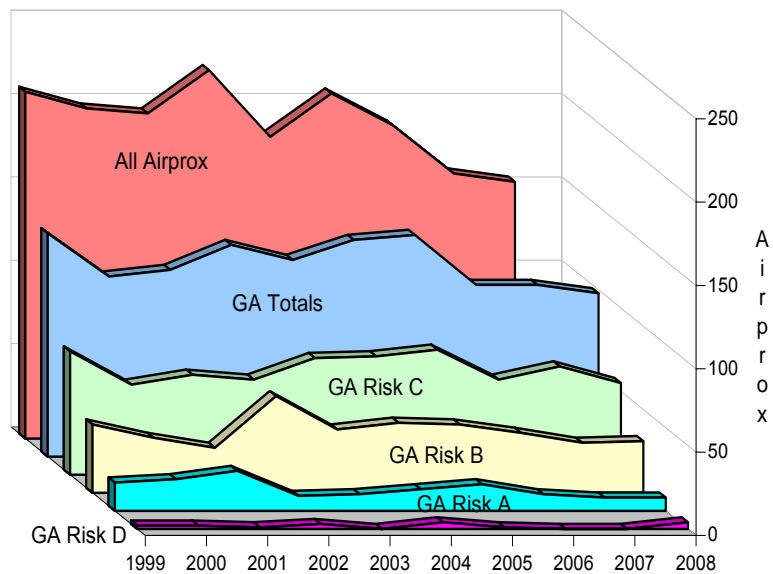


Figure 6: GA Risk distribution 1999 - 2008

As has been noted before in these Reports and elsewhere, being involved in an Airprox is one thing - being involved when safety was compromised quite another. In the course of their work, the Airprox Inspectors frequently speak with GA pilots who have found themselves very shaken by the unexpectedly close proximity of another aircraft. Lessons identified from Airprox investigations into GA events continue to repeat themselves:

- plan a flight thoroughly;
- keep well clear of notified and active gliding sites unless operating therefrom;
- join and fly circuits correctly;
- maintain a good lookout; and
- both carry and operate a transponder with Mode C switched 'on' during flight.

Table 5: GA Risk data 1999 - 2008

GA Risk	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
GA Risk A	17	19	24	9	10	13	16	10	8	8
GA Risk B	41	33	27	58	38	42	41	36	30	31
GA Risk C	74	54	60	57	70	71	75	57	65	55
GA Risk D	2	2	1	3	0	4	1	0	0	4
GA Totals	134	108	112	127	118	130	133	103	103	98
All Airprox	208	198	195	221	181	207	188	159	154	155

GA Airprox Rates

The chart at Figure 7 and Table 6 give more information regarding GA Airprox, this time from the perspective of rates rather than absolute numbers. The current 'best estimate' of GA hours flown in 2008 is 1,351,000 hours (but see Note 2, in **Notes regarding the calculation of rates of occurrence** on page 5 above). Using this and the numbers of Airprox in Table 5, rates have been calculated both for risk bearing (i.e. Risk A plus Risk B) and for all GA Airprox. Trend lines have been added from which it can be seen that the 10-year trend in rate per 100k hours flown is sloping gently downwards - by visual inspection, more so since year 2002 - for the two groups of events.

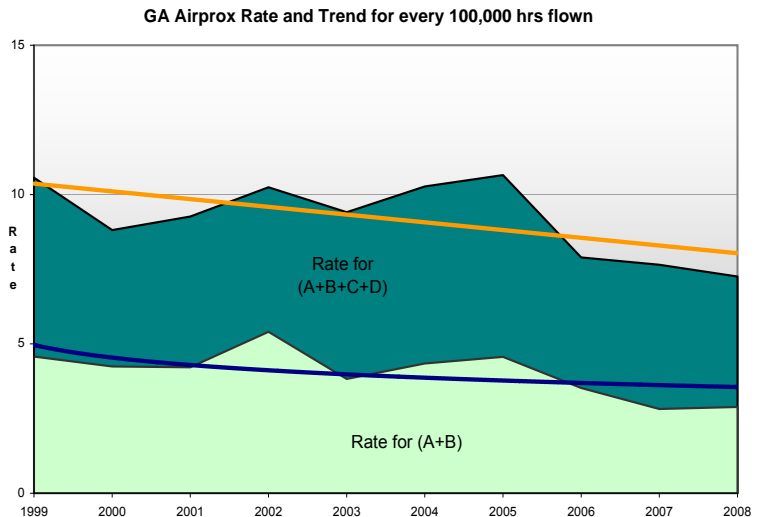


Figure 7: GA Risk rates 1999 - 2008

Table 6: GA Airprox Rates per 100,000 flying hours

GA Rates	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Rate for (A+B)	4.57	4.24	4.22	5.40	3.83	4.35	4.56	3.53	2.82	2.89
Rate for (A+B+C+D)	10.57	8.81	9.26	10.24	9.41	10.27	10.65	7.89	7.65	7.26
Hours flown in K	1,268	1,226	1,209	1,240	1,254	1,266	1,249	1,305	1,346	1,351

GA Causal Factors

A total of 35 different factors were assigned to the 98 'GA Airprox' in 2008, many of them more than once such that there were 171 'assignments' in total. Table 7 below gives the ten causal factors most frequently assigned to Airprox involving GA pilots. Top of the list, as in previous years, are causal factors involving sighting issues. 'Did not see the conflicting traffic' and 'Late sighting of conflicting traffic' were assigned a total of 55 times in 2008: in terms of ratio, that's one-third of the total, 171. Note too that the Risk Bearing rate for GA is more than 20 times that for CAT. These figures again serve to emphasise the importance of good lookout and also serve to remind all who fly, in particular in Class G airspace, of the importance of full use of an aircraft's transponder

Table 7: Most common causal factors in Airprox during 2008 having a GA aircraft involvement

Ser.	Cause	Totals
1	DID NOT SEE CONFLICTING TRAFFIC	29
2	LATE SIGHTING OF CONFLICTING TRAFFIC	26
3	INADEQUATE AVOIDING ACTION / FLEW TOO CLOSE	9
4	DID NOT ADHERE TO PRESCRIBED PROCEDURES (PILOT)	9
5	DID NOT SEPARATE/POOR JUDGEMENT	8
6	PENETRATION OF CAS/ATZ WITHOUT CLEARANCE	7
7	NOT OBEYING ORDERS/ FOLLOWING ADVICE/ FROM ATC	5
8	CONTROLLED AIRSPACE CONFLICT IN VMC	4
9	DID NOT ADHERE TO PRESC'D PROCED'S/OPERAT INSTR'S (CONTROLLER)	4
10	FLYING CLOSE TO/OVER GLIDER OR PARADROP SITE	4

Section 1

Airspace infringements

'other example Airprox include 162/07 and 075/07'

We continue to get infringements caused by aircraft entering airspace for which they have not obtained clearance. Much of this is down to pre-flight planning but it is also essential that maps and charts are up to date and that if you do use electronic mapping, then up to date files have been correctly loaded. Planning is even more important for helicopter pilots as the heights normally flown and the extra handling needed to control the helicopter during flight require better pre-flight preparation. Additionally, many modern helicopters are quite fast and it doesn't take long before you are somewhere you shouldn't be as the example Airprox (below) shows. Interestingly, pilots are often creatures of habit: having found a way of going from A to B, people continue to use that route until someone else tells them they are actually doing something wrong.

AIRPROX REPORT No 091/08

Date/Time: 24 Jun 1008

Position: 5249N 00128W (5nm FIN APP
RW09 East Midlands - elev 306ft)

Airspace: CTR (Class: D)

Reporting Ac Reported Ac

Type: B757-200 H500

Operator: CAT Civ Pte

Alt/FL: 2000ft↓ 700ft
(QNH 1018mb) (QNH)

Weather VMC CAVK VMC CLBC

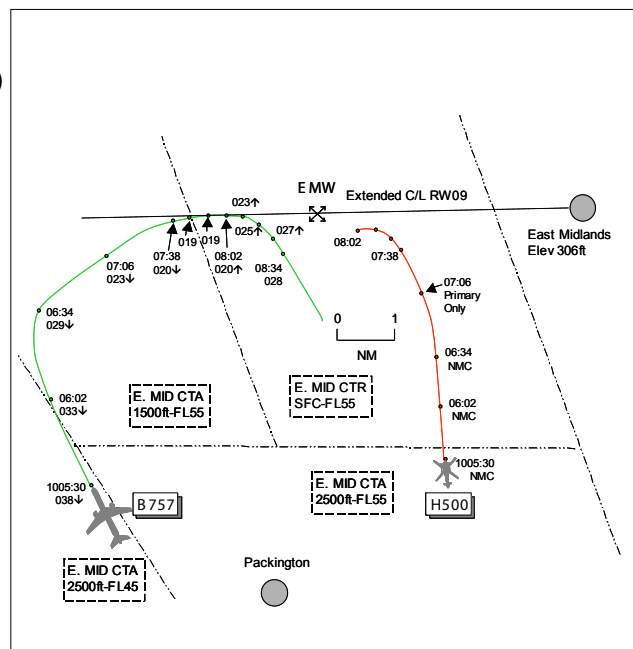
Visibility: 25km 10nm

Reported Separation:

NR "Well above"

Recorded Separation:

NR



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE B757 PILOT reports inbound to East Midlands IFR and in receipt of a RCS from East Midlands squawking with Mode C. The visibility was 25km in CAVOK and the ac was coloured blue with strobe lights switched on. On establishing on the LLZ/DME-only approach for RW09 heading 091° at 145kt descending through 2000ft QNH and just prior to selecting flap 30°, they were given avoiding action by the radar controller owing to a helicopter infringing the CTR and not being in communication with ATC. A go-around was flown with a R turn onto heading 150° and climb to 3000ft and a second approach was flown to a landing. At no time did they see the other traffic and there was no TCAS return. On the second approach radar asked if they could see a helicopter in their 9 o'clock at 3nm low level but it was not visible. He assessed the risk as low.

THE H500 PILOT reports flying solo VFR between a private site near CPT VOR and another site near Northampton, not in communication with any ATSU. The visibility was 10nm flying well below

cloud in VMC and the helicopter was coloured black; no lighting was mentioned. After departure enroute at 700ft QNH he realised that he was early so he decided to carry on 'up country' to build hours routing to turn at Packington Airfield [8.5nm SW East Midlands]. On nearing Packington heading NW'ly at 100kt, he could not see the actual airstrip and whilst searching he saw a large RW ahead, about 5nm to his NE. He immediately turned L to avoid and took up a W'ly track to find a safe place to land and evaluate his position on the ground. He found himself to the W of the EMW NDB and using a topographical map and GPS he established his position as being outside CAS. He took-off and routed back to Northampton remaining outside CAS at all times for the duration of that flight leg.

UKAB Note (1): The H500 pilot was contacted post incident to discuss the geometry of the incident. He recalled that when turning W'ly away from East Midlands, he descended low-level and saw the B757 which went around and passed well above and to his R.

THE EAST MIDLANDS APR reports a primary contact was observed on radar about to cross the flight path of the B757. Being unknown, avoiding action was given (R 150° climb 3000ft) to take the B757 behind the primary contact. The B757 was re-vectorred for a further (successful) approach. The primary-only contact was seen to turn W and the return suggested that it was low level. The ADC saw the infringing ac as possibly a black (or very dark in colour) EC135/Squirrel/Eurocopter type.

UKAB Note (1): Met Office archive data shows the East Midlands METAR as EGNX 0950Z 0606KT 010V110 9999 FEW030 17/10 Q1018=

ATSI reports that the incident took place approximately 5nm WSW of East Midlands Airport, in Class D CAS of the East Midlands CTR. It occurred in that part of the CTR, identified as CTR-2, which extends vertically from the SFC to FL55.

The B757 was inbound to East Midlands IFR and established communications with East Midlands Approach at 0957:30. The pilot reported copying ATIS Information 'Foxtrot', descending to FL80 and heading N. The APR informed the flight that the QNH was 1018mb and radar vectors would be provided to an ILS LLZ only approach to RW09.

Over the course of the next few minutes the B757 was issued with descent clearances and radar headings to position it RH downwind to RW 09. By 1006, the B757 was about 10nm SW of the airport and had just been cleared to descend to 2000ft QNH and turn R heading 060° to establish on the LLZ. The Clee Hill radar recording also shows an unknown target (the H500), squawking 7000 with NMC, on a consistent N'ly track, which had just entered the CTR at its southern boundary. Occupied with other traffic, the APR did not initially detect the presence of the intruder, but it had been seen by the ADC on his ATM. The ADC recalled, when asked during a telephone conversation, acquiring the unknown traffic visually when it had reached about 2nm inside the boundary and at this time notified the APR that it was a helicopter maintaining approximately 1000ft agl (Note airfield elevation is 306ft). By 1007:05, the helicopter's SSR label is no longer being displayed, leaving only a primary radar contact.

At 1007:18, the pilot of the B757 reported established on the LLZ and was instructed to continue approach. Up to this point, the unknown traffic had continued on the same track, but over the next 2 sweeps of the radar, a track adjustment of 20° L can be detected on the recording. By this time the aircraft's position was about 1nm S of the RW C/L. The APR then assessed the threat of the intruder and, anticipating that it may continue on a NNW'ly track, elected to break-off the B757 to the S and vector it behind the intruder. Hence, at 1007:40, the APR transmitted "*(B757 c/s) traffic right one o'clock range of four miles no height no level break-off the approach climb altitude 3000 feet turn right heading one five zero degrees avoiding action*", which was read back correctly. (Note: 3000ft is the normal go-around altitude) The Unit report explains that mid-transmission, the APR had noticed the unknown traffic turn W towards the B757 and so had added the words 'avoiding action' to convey the sense of urgency now required. The ADC had also witnessed the helicopter turn W and descend to, what he estimated to be '500ft agl or below'. Not surprisingly, therefore, a few seconds later, the primary return of the helicopter disappears from the Clee Hill recording, though, according to the Unit report, it remained captured on the local airfield radar for several minutes more. The last radar sweep before the primary return of the helicopter drops out of cover on the Clee Hill, occurs at 1008:02, at which point the B757 is still on the final approach C/L with

the helicopter in its 12:30 position, range 2.3nm, having just commenced the turn W. The B757's Mode C is indicating FL020 (approximately 2150ft altitude QNH 1018mb) climbing.

The B757 is passing FL023 Mode C (2450ft alt) when a turn to the R is detected on the radar recording. After the initial instructions to break-off the approach, no further TI was provided to the B757 by the APR. This is disappointing; as radar derived data and sighting reports from the ADC were both available and could have helped the pilot to assess more accurately the risk posed to his ac by the helicopter.

MATS Part 1, Section 1, Chapter 5, Page 15, Paragraph 15.2, describes the action to be taken by controllers when they observe an unknown ac, which they consider to be in unsafe proximity to traffic under their control in various types of airspace. For Class A, C and D airspace it states *"If radar derived, or other information, indicates that an aircraft is making an unauthorised penetration of the airspace, is lost, or has experienced radio failure – avoiding action shall be given and traffic information shall be passed."* Paragraph 15.3, on the same page, adds further relevant guidance *"When avoiding action is issued to an aircraft under a Radar Control Service, controllers must seek to achieve the required minima and pilots must comply with the instructions given. In these circumstances, pilots must comply with avoiding action even if they report visual with the other aircraft."* The required minima referred to were 5nm horizontally or 5000ft vertically, however, a vertical solution would not have been practical. The action taken by the APR was in the spirit of the MATS 1 guidance, but was not going to achieve 5nm minimum required, even if the helicopter had continued on its newly adopted NNW'ly track. In the end, taking into account all the information available, vertical separation between the two ac was most likely in the order of 2000ft at their closest point, which, after interpolation is estimated to have been less than 0.5nm laterally.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

Pilot Members were not surprised that this incident had occurred considering the H500 pilot's actions. Once airborne he had changed his intended plan and flown an extended route, apparently without any planning beforehand. It was only after realising that his air picture was not quite right, when his turning point at Packington did not materialise and then seeing a large airport close to his track, that he had turned away and landed to establish his position by using a GPS receiver. However, during this flight phase, the H500 pilot had entered the East Midlands CTR without clearance and this had caused the Airprox.

Members wondered why the pilot had not used this GPS equipment earlier as it would have assisted with his navigation, particularly during the unplanned portion of the flight 'up country'.

It was noted that the H500 was only displaying Mode A with NMC before fading completely as the pilot manoeuvred away from East Midlands. Members reiterated the importance of squawking Modes A and C, when fitted, to ensure that ATC conflict alert systems and ACAS 'safety nets' are able to function fully.

Turning to risk, the APR had been alerted to the H500's presence by the ADC and had given the B757 crew a 'go-around' with a R turn to pass behind it, assuming that the helicopter would continue NW'ly. However, the H500 pilot's turn onto a W'ly track had reduced lateral separation but the ensuing descent to low-level had alleviated the situation in the vertical plane. The H500 pilot had seen the B757 passing well clear above during the latter's 'missed approach'. These actions taken by all parties when combined with the geometry that pertained were enough to allow the Board to conclude that any risk of collision had been effectively removed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The H500 pilot entered the East Midlands CTR without clearance.

Degree of Risk: C.

Section 2

Not following ATC instructions 'other example Airprox include 051/08 and 023/06'

Again, it may well be the versatility of the helicopter that leads to quite a few incidents involving misunderstandings or not following ATC instructions. With fixed-wing aircraft, often an alert controller or another pilot spots the error and it is corrected but helicopters can manoeuvre very quickly, often before anyone can call. Sometimes instructions can appear to be unclear: if you are not 100% certain of what you have been told to do, it's good airmanship to ask again, don't just presume it will all turn out OK.

AIRPROX REPORT No 016/08

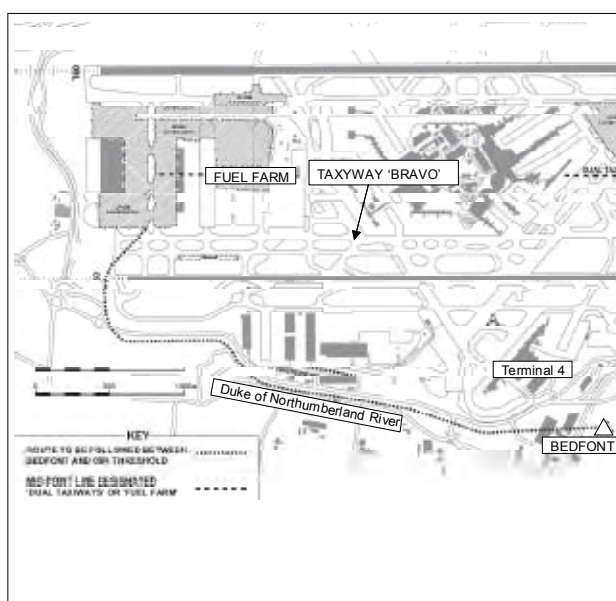
Date/Time: 11 Feb 1532
Position: 5128N 00027W (London/Heathrow Airport - elev 83ft)
Airspace: Heathrow ATZ (Class: A)
Reporting Ac Reported Ac
Type: A321 Enstrom 480B
Operator: CAT Civ Pte
Alt/FL: Take-off↑ 800ft
QNH QNH (1032mb)
Weather VMC Ovc VMC In haze
Visibility: 10km 10km

Reported Separation:

400ft V/200-300m H 800ft V/500m H

Recorded Separation:

Not recorded (~300yd H) Also see diagram at page 4



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE A321 PILOT reports that his ac was lined up on RW09R at London/Heathrow ready for a BPK5J SID outbound for Copenhagen under IFR, in VMC, and in communication with TOWER on 118.7MHz. The crew was aware of helicopter traffic to the S of the RW, in the vicinity of Terminal 4, and the TCAS display indicated the helicopter was 400ft above them. With traffic information that the helicopter would remain to S and W, TOWER issued their take off clearance. The Captain was the PF and so was looking inside the cockpit with the 1st Officer PNF looking forward along the runway. Whilst their A321 was on the RW the helicopter moved to the N side of RW09R, the 1st Officer only spotting the helicopter visually as it started to cross RW09R creating a hazard as they took-off. The helicopter passed abeam some 200-300m to port at a height of 400ft agl - by then flying W parallel to RW09R on a reciprocal course - as his A321 was still on the RW about to take-off heading 092° at 155kt. No avoiding action was taken. The risk was assessed as "high".

THE ENSTROM 480B HELICOPTER PILOT provided a very frank account reporting that he was in transit from Shoreham to Denham in his black & silver helicopter. HISLs were on. In communication with TOWER on 118.7MHz, squawking the assigned code of A7035 with Mode C, he was flying through the CTR on helicopter route H9 to cross Heathrow airport under Special VFR in VMC at an altitude of 800ft London QNH (1032mb)

He cannot remember the exact RT instruction that was given to him but, for whatever reason, he believed at the time [erroneously] that he was cleared to fly direct from BEDFONT RP to the FUEL FARM RP. Seeing the Airbus A321 lined up at the end of RW09R about 1000m away, before crossing he made sure that there was not an ac rolling on the RW. He crossed RW09R by taking the shortest route on a perpendicular track and after crossing the RW turned L to take a route to the FUEL FARM in the centre of and parallel to the RW's. The Airbus only started its take-off roll after he had crossed, when he was approximately half way down RW09R, westbound at 60kt. The risk was assessed as "low". In hindsight, he understands fully that it would have been highly unusual to be cleared across RW09R without there being a specific instruction.

Formal training on the helicopter Routes and Heathrow crossing procedures was conducted in 2004 with an instructor. Additionally, he had refresher training with an instructor, including a Heathrow crossing, in May 2007. Whilst very familiar with the crossing procedure when the westerly RW's are in use, this was the first occasion that he had crossed when the easterly RW's were active. It is clear that he misunderstood the procedure. The 2008 copy of Pooleys and the latest edition of the helicopter routes map were aboard but he was unable to consult the detailed crossing procedures en-route as he was flying solo. He opined that, in hindsight, when he was informed that it was an easterly RW in use he should have asked the controller for precise instructions.

THE AIR NORTH ARRIVALS 09L (AIR 09L ARR) controller reports that she was mentor to a trainee. The Enstrom was "warned-in" by Special VFR to cross the Airport S to N and that the pilot would call them approaching BEDFONT RP. On first RT contact the Enstrom pilot was instructed to hold at BEDFONT. The trainee then instructed the Enstrom pilot to "follow the Duke of Northumberland River, pass to the west of the 09R threshold and hold at the FUEL FARM" which she thought, the pilot read back accurately. Their attention was then directed to the ac on the runway and subsequently to the next 'lander'. Turning around to check where the helicopter was, it seemed the Enstrom was a little close to the southern runway – 09R. Air South DEPARTURES 09R (AIR 09R DEPS) said she was not happy with where the helicopter was, just as the AIR 09L ARR mentor asked the Enstrom pilot to confirm he was following the Duke of Northumberland River as the helicopter appeared to be to the N of it. The pilot replied that he was and that he was routeing to the FUEL FARM. When holding over the FUEL FARM the Enstrom pilot actually routed very close to the VCR and had to be asked to return to holding over the FUEL FARM. It was also reiterated that the hold should be N of RW09R and S of RW09L at all times. The subject A321 - once airborne - informed AIR 09R DEPS that the helicopter was at an altitude of 400ft and passed very close to them when they were just airborne. Visual observations from the VCR appeared to indicate to her that the helicopter could have been flying above the runway.

THE AIR SOUTH DEPARTURES 09R (AIR 09R DEPS) controller reports that she had been given prior warning by Special VFR of the helicopter crossing the airport from S to N. "A southbound check" up to the point where the helicopter arrived at BEDFONT had been applied. AIR 09L ARR had also warned her of the crossing helicopter and notified her that the Enstrom was progressing via the Duke of Northumberland River S and W of RW09R. Just as she thought the helicopter had turned westbound at BEDFONT, she cleared the A321 crew for take-off, having passed traffic information on the helicopter, telling the crew it would pass "south and west of the runway". The A321 was watched rolling down RW09R and as the ac rotated, she noticed the helicopter appeared to be closer to the runway than it should have been. From the VCR it was difficult to tell exactly where the helicopter was in relation to RW09R but it appeared to be somewhat N of the river. The helicopter's position was pointed out to AIR 09L ARR and she heard them transmit to the helicopter pilot about his position. Once the A321 was airborne and climbing away, she asked the pilot about the relative position of the helicopter as he took-off. The A321 pilot told her that the helicopter had been N of 09R at an altitude of about 400ft as he departed. Some minutes later, the driver of an Operations vehicle called on the frequency to say that he had been on taxiway BRAVO SOUTH at the time of the incident and that the helicopter had passed overhead.

ATSI reports that Heathrow was operating easterlies with arrivals to RW09L and departures from RW09R. The AIR 09L ARR position was being operated by a mentor and a relatively inexperienced trainee. At 1523, the LTCC Special VFR Controller telephoned AIR 09L ARR to co-ordinate the transit of the Enstrom helicopter across the airport from S to N from Helicopter Route H9. The trainee was advised of its squawk – A7035 (to allow it to be tracked on the ATM) and that it would

hold S of BEDFONT RP. Due to a number of departure routeings i.e. CPT; MAY; MID and SAM SIDs not being separated from traffic on H9, a southbound check was placed on departures. AIR 09L ARR was informed, at 1524, that the Enstrom was at Oxshott, routeing northbound up H9. The Enstrom pilot established communication with the AIR 09L ARR controller at 1528, reporting its squawk – A7035. The Enstrom pilot was instructed to hold at BEDFONT RP and was passed the surface wind of 090°/6kt. Reporting at BEDFONT about 2min later, the hold instruction was repeated by the AIR 09L ARR controller. At 1531:50, the Enstrom pilot was instructed to “[C/S] route the Duke of Northumberland River to the west of the 0-9 threshold right and hold at the FUEL FARM”. The Duke of Northumberland River runs along the southern side of the airport, S of RW09R and the perimeter road, until it turns N to pass to the W of the RW09R threshold. The Fuel Farm is situated E of Terminal 5 in between RW09L and 09R. The pilot read back the clearance “Hold at the Fuel Farm” but no mention was made about the routeing before that point. Neither the mentor nor the trainee challenged the pilot’s incomplete readback.

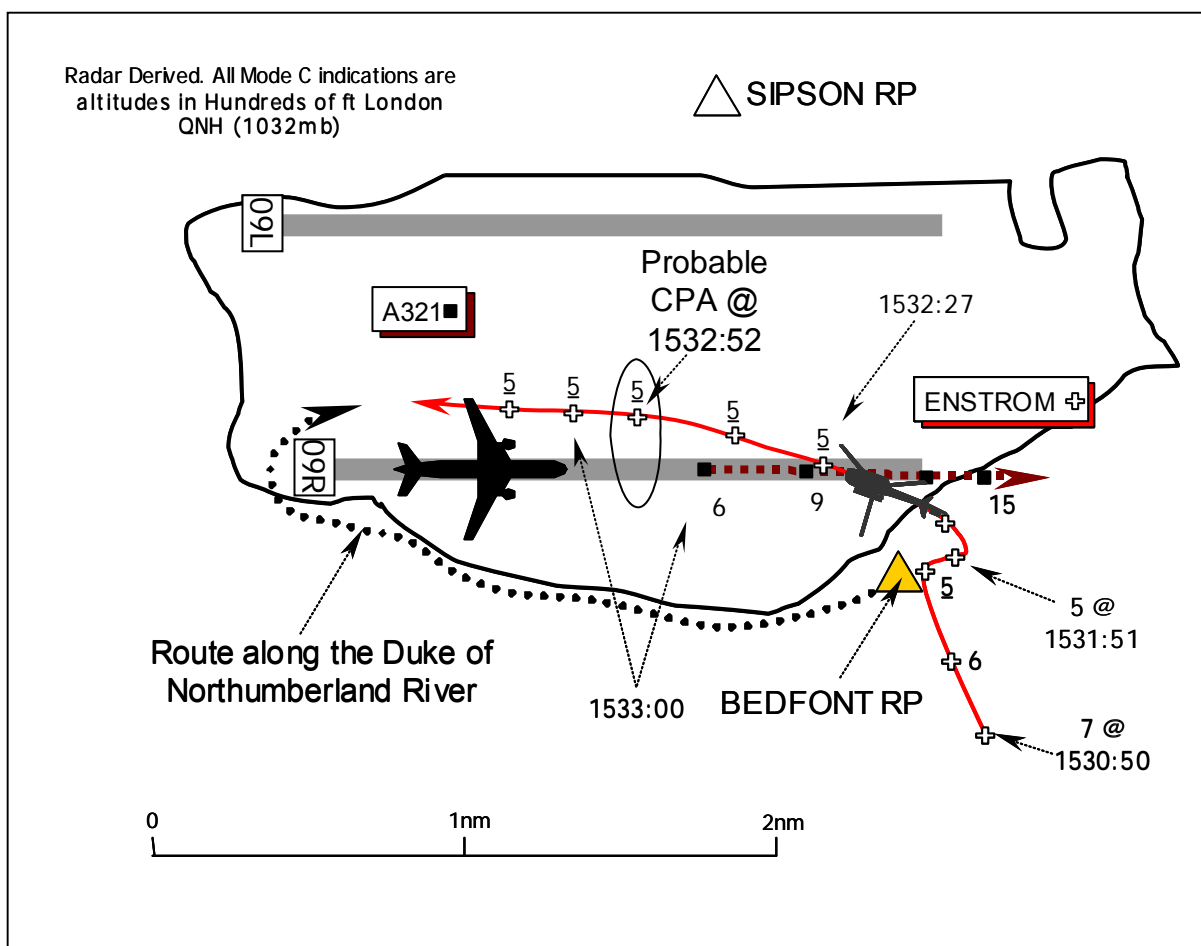
Meanwhile, the subject A321 had been cleared to line up on RW09R by AIR 09R DEPS who was aware of the Enstrom’s cleared routeing. At 1531:52, traffic information and take off clearance was issued to the A321 crew “...traffic information there’ll be helicopter traffic routeing south and west of the airfield you’re cleared for take-off 0-9 right surface wind 0-8-0 degrees 10 knots”. The pilot reported “Cleared take-off 0-9 right visual with the helicopter traffic [C/S]” just after 1532:00. The AIR 09R DEPS controller commented that the helicopter was turning westbound at BEDFONT at the time. As the A321 rotated on the RW, it appeared to this controller that the helicopter was closer to the runway than intended and the AIR 09L ARR Controller was alerted. The latter had just turned round to check the helicopter’s position. The mentor then transmitted to the Enstrom pilot “and [C/S] just to confirm that you are following the Duke of Northumberland River you appear to be north of it at the moment”. The pilot replied “er roger just heading for the FUEL FARM now [C/S]” and the instruction to hold at the FUEL FARM RP was repeated.

After the incident, following a query from ATC whether the helicopter had passed to the right or left of his ac, the A321 pilot commented “I wondered whether to have a word with you about that he was on the north side of the runway at 4 hundred feet with separation less than a quarter of a mile”. Additionally, the driver of an Operations vehicle reported that whilst he was on Taxiway Bravo, the helicopter had flown overhead. Taxiway Bravo is approximately 1000ft N of the centreline of RW09R.

The UK AIP, at AD 2-EGLL-1-23, states the flight procedures for helicopters crossing 09L/09R. This includes the routeing ‘FELTHAM-BEDFONT-Duke of Northumberland River-West of RW09R threshold-FUEL FARM-(direct, or as instructed by ATC)-SIPSON and vice versa’. Also, ‘Helicopters are to transit the airport at not less than 800ft Heathrow QNH. Additionally, a map is promulgated at AD 2-EGLL-4-1, showing the routeing via the Duke of Northumberland River.

Neither the AIR 09L ARR Controller mentor nor the trainee challenged the Enstrom’s pilot about his incomplete readback of the transmitted transit instructions. Nevertheless, the clearance was issued clearly and followed the standard routeing for helicopters transiting Heathrow during easterly operations. It is understood that local NATS Management are reviewing the easterly operations crossing procedures for helicopters.

UKAB Note (1): The Heathrow 10cm radar recording does not illustrate this Airprox clearly as the A321 is understandably not shown until airborne. The Enstrom helicopter is shown approaching the vicinity of BEDFONT Reporting Point following H9 in a slow descent through 700ft London QNH (1032mb). Thereafter the helicopter levelled at 500ft London QNH – about 417ft aal - which is maintained throughout the encounter as the Enstrom pilot holds at BEDFONT reducing speed to a radar GS of <20kt. After 1531:51, the moment that both the A321 crew was cleared for take-off and the Enstrom pilot was instructed to “...route the Duke of Northumberland River to the west of the 0-9 right threshold...”, the helicopter is shown turning L to steady WNW’y. Crossing RW09R at about 1532:27, indicating 500ft QNH at a radar GS of 85kt, the Enstrom steadies on a westerly course displaced some 300yd to the N of RW09R at 1532:52 which is probably when the CPA occurred as the ac passed port-to-port during the A321’s take-off. The airliner is not shown for a further two sweeps until it climbs into coverage through 600ft QNH the first contact being shown at 1533:00, by which time the Enstrom is drawing astern into the airliner’s 7 o’clock at a range of ½nm a radar GS of >90kt.



UKAB Note (2): The UK AIP at AD 2-EGLL-1-7 notifies the London Heathrow ATZ as a radius of 2½nm centred on RW09L/27R, extending from the surface to 2000ft above the airport elevation of 83ft amsl.

UKAB Note (3): The 1520UTC Heathrow weather was sfc wind 080/07kt; CAVOK; QNH 1032mb NOSIG.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authority.

The Board noted the concise report from ATSI which, coupled with the RT transcript, had allowed the essential facts of this Airprox to be made plain. It was clear that the Enstrom pilot had been issued with an appropriate clearance which, if it had been followed correctly, would have ensured that no conflict resulted between the helicopter and the A321 during the critical stages of the latter's take-off and departure from RW09R. When the Enstrom pilot had been told by the AIR 09L ARR trainee controller to "...route the Duke of Northumberland River to the west of the 0-9 threshold right" it was clear that he had not absorbed this instruction fully. However, a key issue here was the incomplete readback by the Enstrom pilot. With hindsight, it was readily apparent that the Enstrom pilot's short reply of "hold at the FUEL FARM" illustrated that he had not correctly absorbed what he was being told. Controller Members recognised immediately that the AIR 09L ARR control team should undoubtedly have challenged this incomplete readback at the time, but evidently they did not. The busy traffic scenario, plus the additional weight of instructional duties perhaps, had apparently prevented the AIR 09L ARR Mentor from recognising the Enstrom pilot's omission. If she had been aware of this, Members believed that the AIR 09L ARR Mentor would undoubtedly have questioned this incomplete readback which from her report she evidently thought

at the time was correct. Thus the Mentor had not prompted her trainee to recheck the helicopter pilot's understanding of what he was required to do. It was plain to Members that this unchallenged incomplete readback was part of the cause.

It was clear that the Enstrom pilot's transit altitude was significantly lower than that prescribed and helicopter pilot Members were of the view that pre-flight planning and briefing were factors here. Whilst the trainee controller's instruction was transmitted clearly enough, pilot Members believed that the Enstrom pilot's unfamiliarity with Heathrow Special VFR procedures and routeings had also played a part here. From his very frank and honest account it was also clear that he had not flown through the Heathrow CTR before, when Easterly operations were taking place.

The A321 crew had no hand in the cause whatsoever, but after leaving the hold at BEDFONT, the inexperienced Enstrom pilot flew on toward the FUEL FARM in the mistaken belief that he had been cleared to cross RW09R when, unbeknownst to him, the A321 crew had been cleared for take-off. Members recognised that this non-compliance with ATC instructions was the result of unfamiliarity and inexperience rather than any blatant disregard for the instruction. However, the Enstrom pilot patently did not comply with his clearance, which was also the other part of the cause. Members concluded unanimously that this Airprox had resulted because following an incomplete readback that went unchallenged by AIR 09L ARR, the Enstrom pilot did not comply with his ATC clearance and crossed RW09R ahead of the departing A321. For his transit through the CTR the Enstrom pilot should have ensured that he was appropriately briefed but this was plainly inadequate. Nevertheless, it was explained to the Board that subsequent to this Airprox, the Enstrom pilot had arranged for further instruction with a qualified helicopter instructor that demonstrated a very positive approach and willingness to learn from this experience.

Turning to risk, whilst aware of the helicopter, it was not until they had commenced their take-off run that the A321 crew recognised that the Enstrom pilot was not proceeding as he had been expected to do. Highlighted by TCAS, the 1st Officer sighted the helicopter ahead some 400ft above them as it crossed the runway. CAT pilot Members were of the view that 'in extremis' the A321 crew could have rejected their take-off: that they did not do so and continued with their departure suggested to Members that as the helicopter had cleared the runway the A321 pilots were content with the separation. For his part the Enstrom pilot had seen the A321 at the RW09R threshold – wisely having checked the runway before crossing – but still not appreciating at the time that he had not been cleared so to do. By that stage it seemed that it was too late for the controllers to prevent the occurrence. However, the pilots of both ac were visual with one another's ac and the Enstrom was already clear to the N of the RW and some 300yd to port before the A321 lifted from the RW. This was sufficient to convince the Board that no actual risk of a collision had existed in the circumstances conscientiously reported here.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Following an incomplete readback that went unchallenged by AIR 09L ARR, the Enstrom pilot did not comply with his ATC clearance and crossed RW09R ahead of the departing A321.

Degree of Risk: C.

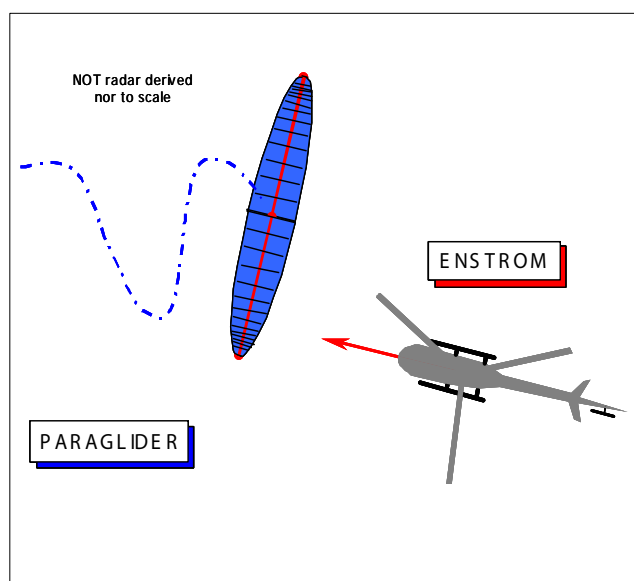
Section 3

Involving Paragliders or Hang Gliders 'another example Airprox is 149/03'

Paragliders, in particular, are prone to canopy collapse which can be disastrous near the ground. As helicopters naturally create a good deal of downdraft, it is essential to give paragliders a much wider berth. Even getting a little close will cause the paraglider pilot a great deal of concern and he or she might make a mistake through not fully concentrating on flying. The example I chose involves a GA helicopter, but it might also be worth having a look at 149/03 which involved a military Chinook. Paraglider pilots reading this paragraph should also be careful not to un-necessarily fly into areas where helicopters are known to be carrying out aerial work as this puts extra constraints on the helicopter pilots, potentially increasing the risk.

AIRPROX REPORT No 174/05

Date/Time: 19 Sep 1615
Position: 5044N 00252W (1nm E of Charmouth)
Airspace: London FIR (Class: G)
Reporting Ac Reported Ac
Type: Paraglider Enstrom 280
Operator: Civ Club Civ Pte
Alt/FL: NR 400ft (N/K)
Weather NR VMC CLOC
Visibility: >10nm >10km
Reported Separation:
100-150ft V/nil H 300ft V/200ft H
Recorded Separation:
Not recorded



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE OZONE ELECTRON (MEDIUM) PARAGLIDER PILOT reports his paraglider has a blue upper wing surface with a red longitudinal stripe and white underneath. He was soaring above the cliffs between Charmouth (Dorset) and Golden Cap near West Bay, either crabbing along the cliffs W to E - i.e. at 45° to the wind - or trying to gain a bit of height, when he first saw the black helicopter as it approached from over the top of the cliffs at Golden Cap about 2nm away to the E. At the point where he was soaring at the time the cliffs are not sheer, they actually slope and shelf back a couple of hundred yards or more, in a couple of steps to their highest point. The wind was giving him plenty of lift in this area between the front cliffs and the highest point to landward but he was not over the sea. As the helicopter approached, he turned directly toward it [E'ly] and made some 'S' turns both to avoid the helicopter and to try and make himself more conspicuous but the helicopter pilot made no alteration at all to his course. The helicopter passed 100-150ft

directly overhead and as it did so the paraglider pilot recalled he was most definitely facing the helicopter's direction of approach and waving his arms frantically to show that he was concerned and even shouting - not that the helicopter pilot would have heard him! He assessed the risk of his wing collapsing as "high".

THE ENSTROM 280 HELICOPTER PILOT reports that he was in transit from Goodwood to a private HLS at Plymouth in his black helicopter. Whilst not in receipt of any ATS at the time of the Airprox he had selected a squawk of A7000 with Mode C. Heading W along the coast near Lyme Regis at 60kt, he was proceeding at low-level some 400ft above the cliff line whilst taking advantage of the up-draft due to high head wind and low ground speed. He saw the dark blue paraglider "in good time at least 500ft away", climbed gently to remain "well clear" and saw him wave. He did not know what the minimum separation was at the time of the Airprox but opined there was "no risk, no danger". The paraglider passed some 200ft horizontally to starboard and about 300ft below his helicopter, according to his diagram illustrating the encounter.

In his view, if the paraglider pilot was worried that he had not been seen then he should wear bright reflective colours, emphasising that the wing was coloured dark blue against a green cliff background. The Enstrom 280 pilot opined that he may have frightened the paraglider pilot but he saw him waving and was sure it was "a happy wave". He stressed that at no time was the paraglider in any danger from his Enstrom helicopter.

UKAB Note (1): This Airprox occurred outwith the coverage of recorded radar.

THE BHPA comments that various aspects of the helicopter pilot's description are contradictory; flying along the lift giving cliff line into a high head wind. The wind must have been virtually perpendicular to the cliff line to give lift described by both pilots. Also the wind must have been about 10 knots for the paraglider to be flying as he was. If the helicopter pilot's minimum separation is as per the diagram then he passed some 360ft clear of the paraglider. Taking the stated sighting of "at least 500ft away" and the 60kt then the helicopter had some 2 seconds between seeing the paraglider and passing it. It would appear that the miss distance may well have been less than the drawn 200ft horizontally and 300ft vertically. It is not clear whether it was a conscious decision of the helicopter pilot's to pass upwind of the paraglider, if so it is regrettable as it means that the risks to the paraglider pilot from the helicopter's wake were greatly increased. A wing collapse at that height could easily have resulted in a fatal crash.

Where the wind direction is known a helicopter should always pass downwind of a light weight aircraft such as a paraglider or hang glider so as to minimise the risks of wake turbulence. Helicopter pilots can get a rough assessment for their aircraft of what distance is too close by looking for the effects their passage has upon foliage, if leaves move then there is sufficient air movement to collapse a paraglider.

UKAB Note (2): The Meteorological Office estimate for the winds in the vicinity of Charmouth for the period of the Airprox is: surface: 210/8 -10kt; 500ft: 240/13kt; 1000ft: 260/15kt.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available included reports from the pilots of both ac.

A commercial helicopter pilot Member commented that the Enstrom pilot was not flying his helicopter at a particularly high speed but it was most unwise to fly so close to the paraglider given the helicopter pilot's estimates of the separation that pertained here. If the helicopter pilot had believed that he saw the paraglider in good time then he should have given it a wider berth downwind. However a sighting range of 500ft suggested to some Members a very late spot indeed given the helicopter pilot's comment that the paraglider was not very conspicuous against the green background of the surrounding terrain. In the helicopter pilot Member's view the advice proffered by the BHPA was sound and helicopter pilots should be in no doubt that the effect of rotor downwash and wake vortex on fragile ac such as a paraglider can be potentially catastrophic. Other Members commented that pilots should always be wary of the presence of paragliders at coastal locations and should be prepared to alter course to give as wide a berth downwind as possible to ensure the

safety of those concerned. Unfortunately Airprox involving paragliders/parachutists such as this are never captured on the recorded radar data available to the Board. Consequently the differing perceptions of the separation that pertained here could not be resolved with any certainty, but it seemed to the Board on balance that it was too close at this low altitude. In the Board's opinion this Airprox had resulted because the Enstrom 280 Helicopter pilot had flown sufficiently close to cause the paraglider pilot concern for his safety and that the safety of the ac involved had not been assured by any means.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Enstrom 280 helicopter pilot flew sufficiently close to cause the paraglider pilot concern for his safety.

Degree of Risk: B.

Section 4

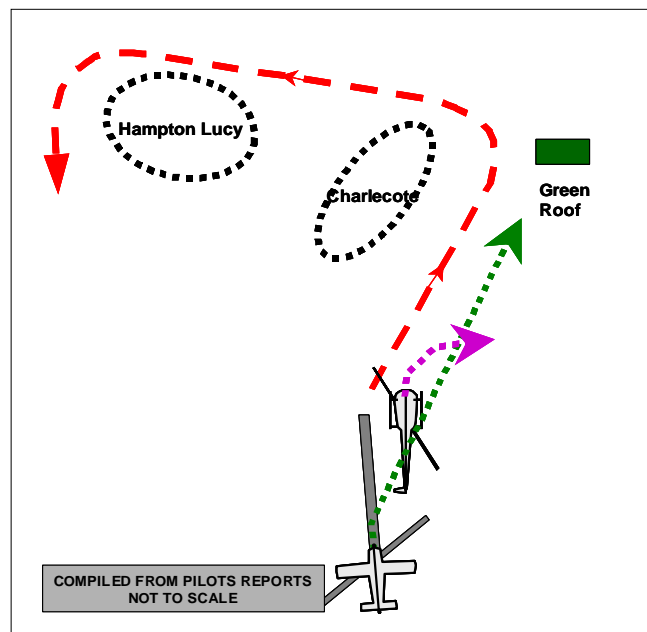
Circuit related incidents

'other example Airprox include 113/06 and 181/04'

An interesting topic because helicopters do not always follow standard fixed-wing patterns. However, it is incumbent on the helicopter pilot to integrate safely so it becomes even more important for helicopter pilots to ensure they know when they must follow the procedures (often local rules) and when they can use judgement.

AIRPROX REPORT No 069/06

Date/Time: 8 Jun 1351
Position: 5212N 00136W
(Wellesbourne Mountford
Circuit - elev 159ft)
Airspace: Wellesbourne ATZ (Class:G)
Reporting Ac Reported Ac
Type: Robin 2160i Robinson R44
Operator: Civ Trg Civ Trg
Alt/FL: 500ft 500 ft ↑
(QFE 1021mb) QNH NR
Weather VMC NR VMC NIL
Visibility: Unl NR
Reported Separation:
V 150ft/ H100m Not Seen
Recorded Separation:
NR



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE ROBIN 2160i PILOT reports flying a local training flight with another pilot in a grey and white ac, with strobes selected on, and squawking 7000 with Mode C while in receipt of a FIS from Wellesbourne. He took off from RW 36 and was heading 030° at 80kt on climb-out as required by the notified noise abatement procedure (after take off turn right to track 030° *sic*), he saw a helicopter ½nm away in his left 11 o'clock and slightly above. The helicopter appeared to be level at about 6-700ft agl. He asked ATC what it was doing as prior to that he had heard no ATC transmissions; ATC called the helicopter but received no reply. He started to level off at about 500ft to avoid it but it turned across the front of his aircraft about 100-150ft above him and about 100m in front. On landing he spoke to the FISO who informed him of the aircraft registration and that he only had radio contact with it after it had landed at Wellesbourne. He assessed the risk as being medium.

He stated that this is a common problem at Wellesbourne as helicopters often fly in the circuit and turn the wrong way as well as not conforming to recognised RT procedure. Other than the helicopter circuit height, there are no procedures laid down for helicopter operations at Wellesbourne Mountford.

THE ROBINSON R44 PILOT reports that he was flying a local training flight with an examiner conducting a licence proficiency check in a red and white helicopter squawking 7000 with Mode C and in receipt of a FIS from Wellesbourne. They believed that that they were manoeuvring on the 'dead side' of the runway but the reporting pilot subsequently told him that he turned 30° to the right after take off in accordance with the published noise abatement procedure. The helicopter crew did not see the Robin but accept the other pilot's description of the incident. As a result of this incident the helicopter company has instituted new procedures and the use of new 'training areas' on the airfield in order that such a conflict does not arise in the future.

UKAB Note (1): Wellesbourne Mountford is listed in the UKAIP as a licensed airfield with a 2nm ATZ. The aerodrome is not available to ac with no radio. The noise abatement procedure for RW36 is notified as: '*After departure turn right onto a track of 030° to 1000ft QFE before turning crosswind*'. The diagram in Pooley's Flight Guide (from which the diagram above is compiled) shows the ground track as being to the far end of the RW then a right turn onto 030° towards a building with a green roof.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available consisted only of reports from the pilots of both ac.

While accepting that there were scant procedures for helicopter operations at Wellesbourne, the Board could find no reason for the Robin pilot flying into conflict with the Robinson. Members considered that even allowing for the imprecise noise abatement procedures, the Robin pilot could have flown to the far end of the RW - or even the airfield boundary - before commencing a right turn and still remained well clear of the noise sensitive areas and the helicopter.

Members could not determine the reason why the helicopter pilot apparently did not reply to the call from ATC questioning his intentions.

The Board was pleased to learn that clarification of the Wellesbourne Mountford procedures is already underway and that the helicopter company has moved its training operations to a new area.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Robin pilot, although aware of the R44, turned into conflict with it.

Degree of Risk: C.

Section 5

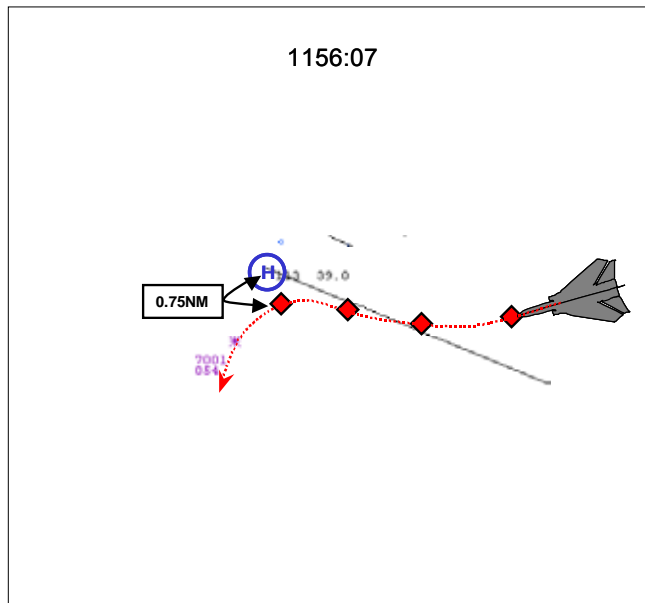
Unlicensed airfields or landing sites

'other example Airprox include 126/07 and 049/07'

There are an enormous number of landing sites in the UK and most do not have ATZs around them. Some are semi-official (hospitals, maintenance bases, small airfields etc) but others are just private sites. Unless justified - by enough movements - then no special protection will be afforded. The biggest problem to the GA helicopter pilot is likely to be military aircraft operating perfectly legitimately at low level. Generally they will be flying at 250ft, but occasionally higher. Try to avoid loitering at between 250ft and 500ft near your landing site and liaise as much as possible with ATC to help separation. Not all military aircraft can see your squawk, but they certainly won't if you traditionally turn off your transponder (and/or the Mode C) while approaching to land at your site. If you think your site is overflowed by military aircraft regularly at low level then you may find it useful to talk to the Low Flying Unit (at RAF Wittering) who may be able to advise you on a suitable procedure.

AIRPROX REPORT No 004/05

Date/Time: 12 Jan 1125
Position: 5137N 00425W (Trewen,
4nm W Launceston)
Airspace: LONDON FIR/UKDLFS
(Class: G)
Reporting Ac Reported Ac
Type: MD500 Helicopter Tornado
Operator: Civ Pte HQ STC
Alt/FL: 75-100ft NR
(QFE)
Weather VMC CLBC NR
Visibility: 6-7km NR
Reported Separation:
100-150ftV/ 0H Not seen
Recorded Separation:
Not recorded.



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE MD500 HELICOPTER PILOT reports that he was flying a black helicopter without strobes but with the anti-collision beacon selected on, on a flight from a private site near Trewen. Ten sec after he lifted off and when he was passing about 75ft agl heading 190° at 60kt a low wing military jet ac passed over him from behind between 100 and 150ft directly above. It appeared in his right window at approximately his 2 o'clock position, banking left, but at the time had been on a similar heading. He immediately broke right turning up the valley and stopped his climb.

UKAB NOTE (1): The recording of the Burrington Radar shows a very high number of military low level contacts operating in the area on the day of the incident. There is no reason to believe that any were not squawking IAW the Mil AIP and the squawking ac are painting at low level in the area of the reported incident. At the reported time and position of the incident, several ac can be seen in the area but the nearest was 2nm to the E and its flight profile did not meet the description provided by the reporting pilot. That ac was traced, the pilot contacted and a confirmatory report was filed which verified the radar information. Further, the HUD video confirmed that it was not in the immediate area of the helicopter operating site.

Following this analysis a further examination of the radar tapes was conducted and a low level military contact was seen to overfly the vicinity of the helicopter site at 1156, 31min after the reported time of the incident. The helicopter pilot was contacted by the UKAB but, although he believed the reported time to be accurate, conceded that if the flight profile of the second ac fitted his description (which it did), it was most probably the one involved.

By good fortune, the data from the Burrington Radar was still available and Radar Analysis Cell was able to identify the second ac as a Tornado from RAF Marham. It was not possible to get a report from the pilot as he was deployed on operational duty and the video information had been routinely destroyed. His wingman was also contacted but his recollection of the incident was hazy and could not provide any significant detail of the sortie.

Although the helicopter did not show on the radar at any time, the Tornado can be seen passing 0.75nm to the SE of the promulgated position of the site in a tight left turn.

UKAB NOTE (2): The site from which the helicopter was operating is promulgated in the UK Mil AIP at 1-2-2-7 as a 'Helicopter Landing Site'. As such it is a 'Warning' but does not attract any mandatory avoidance.

HQ STC comments that it is unfortunate that the initial timing given by the helicopter pilot may have been in error thus delaying the identification of the military ac. However, from the description of the occurrence it is likely that the Tornado pilot had little chance of spotting the helicopter that had just lifted off and would have been most difficult to spot while on the ground.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available included reports from the pilot of the MD500, radar video recordings, and reports from the appropriate operating authorities.

The Board agreed with STC that the apparently incorrect reported time of the incident had inhibited the investigation. Since no report was available from the Tornado pilot to confirm that he was the reported ac, much of the Board discussion was conjecture. A Member familiar with Tornado low-level operations suggested that the Tornado pilot might have been flying directly towards the helicopter site, seen it on his moving map display, jinked to the S to avoid it and by so doing flown into conflict with the helicopter which would not have been visible to him as it was beneath his ac's nose.

There was discussion as to the merits of a 'clearing turn' after take off for helicopters with differing views between military and civil helicopter pilots; in the military it is standard practise but not the norm with civilian pilots. Members agreed, however, that in this case such a turn might have revealed the approaching Tornado.

Since the Tornado pilot did not also report the incident it could be assumed that neither pilot had seen the other ac in time to initiate avoiding action; it was therefore only by good fortune that they did not collide. That being the case, there probably had been an actual risk of collision.

The Board noted however, that they had no reason whatsoever to suspect that the Tornado had been operating below 250ft agl, its minimum authorised height. That being the case and that the helicopter had only been airborne for 10sec, the evidence supporting an 'actual collision risk' was not compelling. On balance the Board elected to assess the risk as 'A' whilst accepting that this was a fine judgement in the absence of further information.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Effective non-sighting by the helicopter pilot and possible non-sighting by the Tornado pilot.

Degree of Risk: A.

Section 6

Gliding sites

'other example Airprox include 199/05 and 109/06'

High on the list is the number of incidents involving overflying gliding sites. Most of the sites do not have zones around them, Halton being a notable exception, but flying over an active site, especially one with wire launching, is one of the most dangerous things you can do in aviation. It is very unlikely you will survive a wire strike in any aircraft, particularly a helicopter. The charts are marked with the maximum launch height above sea level (QNH), usually 2000ft or 3000ft above the ground. Above the launch height, and in the general area, on soarable days, you can expect a high concentration of gliders that launched earlier, up to cloudbase or to the base of limiting airspace above the site.

AIRPROX REPORT No 009/08

Date/Time: 27 Jan 1530 (Sunday)

Position: 5237N 00028W

(Wittering – elev 273ft)

Airspace: Wittering ATZ (Class: G)

Reporting Ac Reported Ac

Type: ASK21 R22 Heli

Operator: Civ Club Civ Pte

Alt/FL: 1300ft NR
(QFE 1020mb) (QNH NR)

Weather VMC VMC Clear

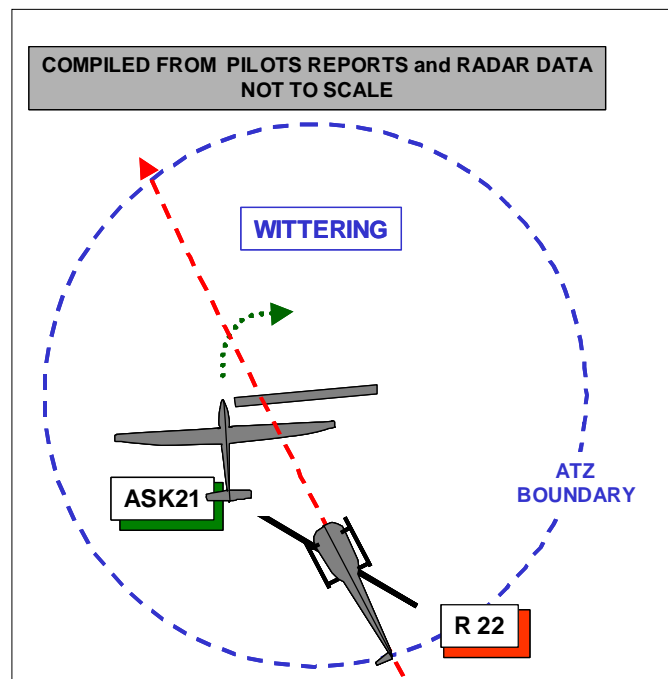
Visibility: >50km 40nm

Reported Separation:

100ft V/<20m H 500ft V/Nil H

Recorded Separation:

NR



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE ASK21 PILOT reports that glider winch launching was taking place to the W at RAF Wittering, within the ATZ up to 2300ft. He launched on an instructor training flight at about 1525hrs to a height of 2000ft aal. After a brief climb in wave, the glider was descending gently (about 1 mps) in a series of turns about 1km N of the centreline and abeam the W end of the RW. As they were turning from a heading of approx 000° to 090° at 50kt, an R22 helicopter appeared from their 6 o'clock position and flew over them with less than 50ft horizontal separation and 50 to 100ft vertical separation (their turn meant that they crossed under the R22). The R22 had also crossed the active winch line below the top height of the cable and well within both the ATZ and the published Glider Launch zone. The ac was sufficiently close to them that they had a brief glimpse of its registration on the boom as it passed.

He did not assess the risk.

THE R22 HELICOPTER PILOT reports flying a blue and white ac to Gamston from a private site 5nm S of Wittering. The strobe was switched on and he was squawking 7000 but Mode C was not fitted. After takeoff whilst climbing on a heading of 330° at 80kt, he called Cottesmore LARS on 130.20 but they did not reply so he passed the details of his flight blind. Shortly afterwards he saw a glider just N of Wittering flying parallel with the RW but just to the W. The visibility was excellent and he first saw the glider from 4nm and as a result climbed from 1500ft to 2500ft agl. Since there was no risk he took no other avoiding action.

UKAB Note (1): The recording of the Debden Radar shows the R22 tracking 330° about 1nm to the W of the airfield datum at Wittering. It is squawking 7000 but has no Mode C readout. The glider does not show at any time.

UKAB Note (2): The Wittering ATZ is a circle of 2½nm radius up to 2000ft aal (2273ft amsl) and is active H24. Neither Wittering ATC nor Cottesmore LARS is however active at weekends.

UKAB Note (3): Wittering is promulgated as a Glider Launching Site (by winch/ground tow (W) and tug aircraft/motorglider (T) in the UKAIP (Civ) at ENR 5-5-1-6 up to 3000ft [agl] for the hours above. It is also notified in Vol 3 of the UK Mil AIP as operating up to 3000ft [agl].

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available included reports from the pilots of both ac and a radar video recording.

Members were disappointed to note that this was another occurrence where a light ac flew through an active glider launch site below the height promulgated and clearly marked on the VFR chart as maximum winch launch height. The Board considered why this had happened.

The Board noted that when seeing the glider at a distance of 4nm (shortly after lift off) the R22 pilot was flying at 1500ft and he climbed as a result of the sighting. One Member pointed out that if 1500ft had been his planned height for the leg, then he would also have infringed the Wittering ATZ which was on his track and is permanently active up to 2000ft aal. Bearing this in mind he suggested that the source of the problem had most likely been poor route selection followed by inadequate flight planning and route study. This, he considered was further exemplified by the R22 pilot being unaware that Cottesmore LARS is not available at weekends and apparently that the Wittering ATZ is permanently active and therefore cannot be penetrated without permission from ATC. (If there is no response to a call to them the ATZ must be avoided).

Due to the differing height reports given by the two pilots and the lack of any Mode C information, Members could not be certain whether or not the R22 had actually infringed the ATZ in addition to overflying the glider launch site. The Helicopter Member, who was very familiar with the R22, pointed out that the registration, which is painted on the tail boom (itself little over a foot in diameter), is only of the order of 9 inches in height and therefore one must be fairly close to be able to read it as the glider pilot did; in his opinion much less than 500ft, the separation reported by the R22 pilot. Members therefore, agreed that the 100ft vertical separation reported by the glider pilot had probably been the more accurate.

Despite that flying close to a glider launch cable (the Gliding Member described a moving launch cable as being akin to a chain-saw) is a very dangerous activity, the glider in this instance was not at the time on a winch launch and Members agreed that the R22 pilot had seen and maintained visual contact with the glider until he passed above it, albeit by a closer margin than ideal; therefore there was no risk that the ac would have collided.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The R22 pilot flew through a notified and active Glider Launching Site and into conflict with the ASK21 glider

Degree of Risk: C.

Section 7

Involving aircraft on procedural approaches

'other example Airprox include 145/06 and 154/05'

This is not limited to helicopters alone but the versatility of the helicopter and the hovering ability occasionally lead to problems. The pilot of an instrument rated aircraft will be concentrating on the approach itself, especially in marginal weather, and will be distracted if helicopters plan to fly across ILS or other approach paths. With better planning it is generally possible to avoid the critical heights of approach paths; work with ATC to effect a safe crossing. If you have liaised with ATC and been told to cross after the aircraft on approach passes, remember to give the other aircraft enough room as TCAS can be triggered by your presence which may well result in an unnecessary go-around for the aircraft concerned.

AIRPROX REPORT No 124/07

Date/Time: 26 Aug 1719 (Sunday)

Position: 5153N 00018W (2.5nm
FIN APP RW26 Luton -
elev 526 ft)

Airspace: CTR/ATZ (Class: D)

Reporting Ac Reported Ac

Type: A319 A109

Operator: CAT Civ Pte

Alt/FL: 1250ft↓ 500ft
(QNH 1028mb) (agl)

Weather: VMC NR VMC

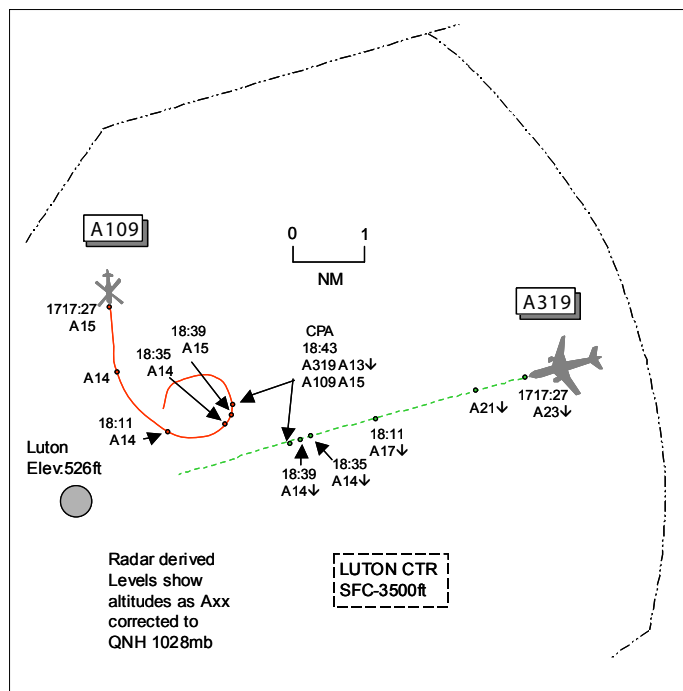
Visibility: 1.5nm

Reported Separation:

Nil V/1nm H NR

Recorded Separation:

200ft V/0.9nm H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE A319 PILOT reports inbound to Luton IFR and in communication with Luton Tower on 132.55MHz squawking 5471 with Mode S. Just prior to transfer to Tower, the Radar controller told them of an Agusta 109 helicopter which they may pick up on TCAS but will remain clear holding NE of the FAT. They acknowledged that they had the traffic on TCAS (a normal intruder target to the L of the C/L 1000ft below) and contacted Tower who never made any reference to the traffic. As they continued their approach the intruder disappeared from the ND display. At 1350ft QNH (850ft Rad Alt) heading 257° at 135kt they received a TCAS TA 'traffic, traffic' with a solid amber square at -01 (100ft below) range 1.5nm directly on the FAT. They continued their approach with no visual contact (looking straight into the setting sun) as TCAS showed no vertical separation at 1nm range. The intruder started to move to the NE of the FAT and only then did they make

visual contact on it, the A109, in their 1 o'clock <1nm away at about 1000ft. They contacted Tower immediately who were unaware of the exact position of the other ac and to the best of their (ATC's) knowledge the other ac passed above and behind them, which was not the case. They continued their approach for landing whilst still receiving TA aural calls until 400ft Rad Alt with the traffic remaining displayed on the ND until actual landing. After discussing the incident with the Luton ADC and the Airports Supervisor post landing, the Capt was not happy with the account of events given. Subsequently he was told the next day by another controller that the helicopter had passed directly in front of their ac and carried out a LH orbit on the FAT before moving to the NE and carrying out a second orbit. He assessed the risk as high.

THE A109 PILOT reports 8 weeks after the incident flying between 2 private sites VFR and being in receipt of a RCS from Luton Radar on 129.55MHz squawking with Mode C; TCAS was fitted. He couldn't recollect exactly the details of the incident but he believed that he was heading S'y at 100kt and after reporting visual with the A319 about 5nm away on final approach, he slowed to a hover as instructed by ATC. Once the A319 was well clear he continued to cross the threshold once cleared. During the encounter a TA alert was generated; he did not report separation distances nor the risk. He apologised if his recollections were not factually correct but he was not contacted until about 6 weeks after the incident as was unable to complete the CA1094 form for a further 2 weeks.

UKAB Note (1): The Capt was contacted 4 months post incident as his recollections were not borne out from the geometry shown on the recorded radar or the RT transcript. He commented that he really couldn't remember much of the incident as he flew the route regularly and the ATC instructions vary and these are always followed.

THE LTCC LUTON RADAR CONTROLLER reports he was applying standard VFR procedures to the A109 flight crossing the CTR against the IFR A319 on an ILS approach to RW26. The A319 flight, under SOPs, was working Tower and subsequently expressed concern about the close proximity of the A109 and filed an Airprox report.

UKAB Note (2): Met Office archive data shows the Luton METAR as EGGW 261720Z 01005KT 330V070 9999 FEW049 20/09 Q1028=

ATSI comments that the A109 flight established communication with Luton Approach at 1709. The pilot was asked to standby and further communication took place 2min later. The A109 pilot reported routeing from Middlesbrough to Potters Bar and was N of Bedford, flying VFR, at 2500ft. The pilot requested to transit the Zone routeing through Pirton, just to the E. The flight was issued with a Luton squawk 4670. One minute later the pilot was informed *"identified just north of Cardington or just northeast of Cardington in fact give you Flight Information Service. Clear you to enter the Luton's controlled airspace hold to the northeastern side of their airfield and expect when cleared to cross our Two Six threshold."* The pilot replied *"Clear enter controlled airspace and then hold at the northeastern side of the airfield wilco and I'll be descending to not above fifteen hundred feet"*.

In the meantime the A319 flight had contacted Luton Approach and was being vectored for an ILS approach to RW26. At 1713, the flight was instructed to turn L heading 185° for R base. At the time, the A109 was 14nm N of Luton Airport and the A319 was 17nm NE. The A109 pilot was updated on the controller's proposed action *"just to keep you in the picture what I'm gonna do is hold you in northeast corner and cross you between IFR traffic got quite a few little bit of a stream coming inbound at the moment"*. The A319 was vectored to the ILS RW26 and at 1716 the crew reported established. It was cleared for the ILS to maintain 160kt to 4 DME. The pilot was then given TI *"it's an Agusta One Oh Nine entering the Zone from the north (A319 c/s) I'm gonna hold him to the right of the final approach for Two Six you may see him there he'll cross behind you"*. The pilot replied *"No problem we have him on TCAS fine thanks (A319 c/s)"*. The A319 flight was then transferred to the Tower frequency. At 1716:38, the controller transmitted to the A109 pilot *"just hold in that position I was talking about there's a Seven Three Seven on a short final just bout to go through your twelve o'clock look out on your ten o'clock about six miles let me know when you see an Airbus Three Nineteen there please should be wearing (company) colours"*. The radar

shows the A109 just entering the Luton CTR to the N of the airport, at 1500ft. (The A109 pilot was not informed he was entering CAS or the ATC service had necessarily changed.) The B737 is on short final to its S and the subject A319 is on the ILS at 8nm, 3000ft. The A109 pilot did then report 'visual' with traffic. However, this was the B737 ahead of the A319 (same company).

[UKAB Note (3): The RT transcript reveals that after the A109 pilot's 'visual' report, the following exchange took place: -

ATC: *"Okay copied thanks behind the landing Airbus three nineteen cross and report the Southside keeping Luton on your right at all times".*

A109: *"Keeping Luton on the right clear cross behind the one that's landing now".]*

TI was updated about the subject A319 *"No the no that's not the one that's the one I was talking about earlier the other three nineteen I'm looking at out on your left ten o'clock let me know when you see him at about four miles".* At 1717:27, the A109 pilot was instructed to *"Just hold the northeast until you've got the Airbus Three Nineteen visual".* The helicopter is now 2.5nm NNE of the airport still tracking south at 1500ft, with a G/S of 170kt. The A319 is just inside 6nm, passing 2300ft. Shortly afterwards the A109 pilot reported visual and was cleared *"behind that landing Airbus Three Nineteen cross and report southside".* The pilot acknowledged *"Roger behind the Airbus wilco".* Twenty-Five seconds later the A109 pilot transmitted *"I'll just do one quick orbit if that's okay just want to stay clear of the wake turbulence".* *"Yes that's fine."* No further comments were made to, or from, the A109 pilot until he reported clear to the S at 1719:50.

The A319 contacted the Tower frequency at 1716 and was informed it was just becoming No 1 with a departure to go ahead. The ADC noticed the A109's squawk on his ATM and queried its type with the INT DIR. He was informed it was a helicopter and it was confirmed that the A319 pilot was aware of it. Subsequently, at 1718:40, the controller passed information *"the helicopter traffic you were told about by radar is in your right one o'clock has you in sight and will be passing behind".* The radar recording at 1718:39, shows the A109, at 1500ft, in a L turn 1nm NW of the A319, which is at 1400ft.

[UKAB Note (4): The CPA occurs on the next sweep as the A109 turns through N at altitude 1500ft with the A319 passing 0.9nm to it SE descending through altitude 1300ft, 200ft below.]

The A319 pilot replied *"we've just got a TCAS there looked at nine hundred feet he was level flight".* Adding afterwards *"just a little too close but not to worry".* The radar recordings show the A109 in its LH orbit turning just N of the 26 C/L. Both flights were at the same altitude, 1400ft at 1718:35, when they were 1.2nm apart but by this time the A109 was turning through a NE'ly track. It continued its orbit and passed 0.2nm behind the A319.

The Airprox occurred within Class D airspace. The MATS Part 1, Section 1, Chapter 2, Page 1, states the minimum services to be provided by ATC. In Class D '(a) separate IFR flights from other IFR flights (b) pass traffic information to IFR flights on VFR flights and give traffic avoidance if requested (c) pass traffic information to VFR flights on IFR flights and other VFR flights'. On this occasion, both flights were informed of the presence of the other ac. The A109 pilot reported visual with the A319 and the latter's pilot had a TCAS return on the A109. The A109 was not given a specific VFR clearance to enter the CTR but there is no reason to suggest that it was not continuing its flight VFR. The MATS Part 1, E (Attach), Page 2, states the phraseology for crossing clearance *"Cleared from (place) to (place) VFR via (routeing) not above (level), maintain VMC while in the (name) control zone".*

It was surprising that the ADC was not informed about the details of the traffic overflying the CTR in close proximity to the airport and the A319 flight had to ask for its details. The LTCC MATS Part 2, Page LTN-20, under the heading *'VFR Overflights/Non Airways Inbound Flights'* states *'Details of VFR overflights in the Luton ATZ, for which Luton AIR require details or non-airways arrivals will normally be passed to the Luton AIR ATSA. Subsequent coordination of such flights is effected with Luton AIR'.* It would appear that helicopter overflights are handled differently at Gatwick and Stansted (both Class D CTRs) in comparison with Luton. At both TC based units the Air Controller is advised of the helicopter routeing O/H and would have to agree to its movement and to work the ac through the O/H. Additionally, there are specific points for helicopters to route towards and to hold at, if necessary, before crossing.

LTCC ATSI made a recommendation which SRG ATSI endorses: - 'It is recommended that LTCC Ops consider a more comprehensive MATS Pt 2 entry on the handling of VFR overflights and in consultation with Luton Tower include advice on coordination and transfer of communications in appropriate circumstances.'

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

The NATS Advisor informed Members that as a result of this and a previous incident, procedures have been published specifying coordination that needs to be effected between Tower and Approach controllers at Luton and Stansted. In summary, all traffic routeing within 3nm of the aerodrome, at or below 3000ft will be notified to the Tower and coordination agreed as required.

Pilot Members understood the A319 crew's dilemma during this incident. The TI given on the A109 stated that it would be holding NE of the FAT whereas the TCAS equipment indicated that the helicopter was on the C/L. The TA alert had heightened their concerns as the A109 was displayed straight ahead and just below their level, but they were unable to see it visually owing to the prevailing visibility whilst flying into sun. Undoubtedly, the TA would have been distracting to the A319 crew during a critical phase of flight and its continued presence on TCAS would have been a continued concern until just before landing. An ATCO Member opined that in circumstances like these where the A319 crew were concerned about continuing their approach, one option would have been to execute a 'go-around'. It appears that the A109 pilot had initially set up his flightpath to pass behind the B737 which was the preceding ac in the landing sequence ahead of the A319 but, following updated TI from ATC, the A109 pilot saw the A319 but by now was probably closer to the FAT than he would have liked. Helicopter Members opined that the A109 pilot would have been 'hard-pressed' to have slowed down to a hover and remain N of the FAT by that stage, which probably led to the pilot asking for approval to carry out an orbit to the NE of the airport to position behind the A319. ATC approved this request and during this manoeuvre, the A109 pilot had executed a tight LH turn and remained N of the FAT, eventually rolling out on a S'y track before passing behind the A319. Members noted that ATC had fulfilled their responsibilities within Class D airspace by passing TI to both crews and it was the VFR A109 pilot's responsibility to remain clear of the A319. However the A319 crew were unhappy with the situation when on short finals. Taking all of these factors into account, Members agreed that the cause of this Airprox was that the A109 pilot flew sufficiently close to the RW26 FAT to cause the A319 crew concern.

ATC had ensured that both crews were aware of each other's presence but the A319 crew had only visually acquired the A109 at a late stage as it cleared to their R in its LH orbit. Meanwhile, the A109 pilot had seen the approaching A319 and turned away which had resolved the potential conflict, the CPA occurring whilst the helicopter was turning through a N'y heading with the subject ac's tracks diverging. This element was enough to allow the Board to conclude that any risk of collision had been quickly and effectively removed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The A109 pilot flew sufficiently close to the RW26 FAT to cause the A319 crew concern.

Degree of Risk: C.

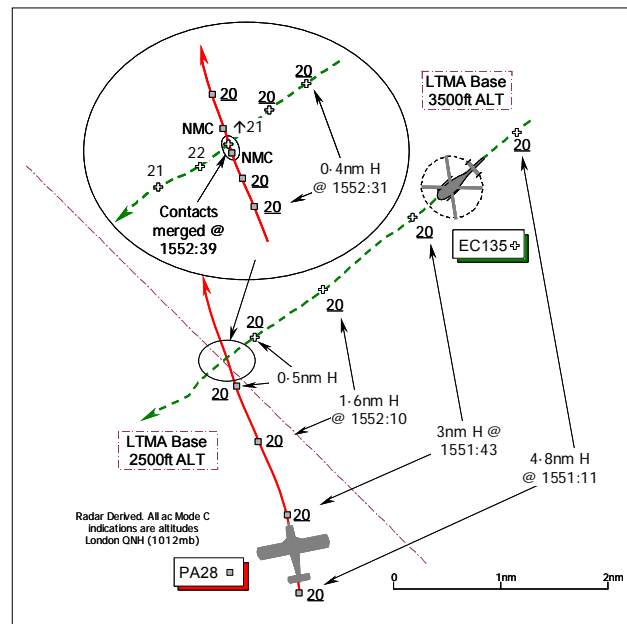
Section 8

General Class G encounters

I already made the point on planning properly (in Section 1, the 'airspace infringement' theme) to avoid too much heads-down activity. This and the possibility of getting behind the helicopter will almost certainly degrade the effective lookout. Here are three examples to highlight other points worth considering. In the first, the other aircraft was spotted by the helicopter but the pilot left it much too late to take avoiding action as he had right of way. A small correction early will often ensure you never get close enough to cause concern to other traffic. The next incident highlights the importance of using Mode C on the transponder on suitably equipped aircraft. TCAS and similar collision avoidance systems rely on this to provide the guidance and safety to both parties. There are many aircraft that do not have transponders, especially as - with many vintage aircraft and gliders - power is provided by battery. If you have a transponder fitted, do please ensure you use it. The last example shows that even in very good weather, under 'see and avoid' we need to be very careful flying into Sun - which can be a real problem during winter months. Try and avoid flying directly into Sun, perhaps introducing a little dog leg, adjusting the heights or reducing cockpit activity - anything to improve your chances of seeing other traffic.

AIRPROX REPORT No 064/08

Date/Time: 14 May 1552
Position: 5137N 00017E (5nm ESE of Stapleford)
Airspace: London FIR (Class: G)
Reporting Ac **Reported Ac**
Type: EC135 T2 PA28
Operator: Civ Com Civ Pte
Alt/FL: 2000ft 1800ft
 QNH (1012mb) amsl
Weather NK CAVOK VMC Haze
Visibility: 40km+ 10nm
Reported Separation:
 100ft V/30m H 150ft V/250m H
Recorded Separation:
 Contacts merged/~100ft V



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE EC135 T2 PILOT, flying a bright yellow EMS helicopter, reports that he was in transit from Colchester to Queens Hospital Romford at an altitude of 2000ft London QNH (1012mb) under VFR in CAVOK conditions. Flying with a patient aboard, under Category 'Alpha' status, the patient was "spinally compromised" which required that the flight be flown as smoothly as possible.

Whilst in receipt of a FIS from Thames RADAR on 132.7MHz, approaching a position 110° LAM 5nm [W of Brentwood] heading 240° at 135kt, Thames Radar informed him of traffic in his 11o'clock - 5nm indicating 2000ft alt unverified Mode C. The controller informed him again when the range

had closed to 2nm whereupon he became visual with a fixed wing ac – a PA28 low-wing monoplane coloured white with blue stripes - on a constant bearing in his 11 o'clock. He maintained his course and altitude until it became obvious that the PA28 pilot was not going to deviate and 'give way' to his helicopter. To avoid the PA28, he initiated a climb passing slightly ahead of (30m) and 100ft above the aeroplane whilst maintaining visual contact until it passed below him in readiness for further avoiding action should it be necessary. He could clearly see the two front seat occupants and reported the registration. He assessed the risk as "very high".

No TCAS is fitted and he added that it was single pilot lookout with both paramedics busy in the back. He subsequently passed a message to the PA28 pilot concerned that he was filing an Airprox.

THE PA28 PILOT reports he was in transit from Goodwood to N Weald under VFR. As Farnborough LARS East was not available, he was not under any form of ATS, just listening out on the N Weald RADIO A/G Stn frequency. A squawk of A7000 was selected with Mode C on.

Whilst in a level cruise at an altitude of 1800ft in VMC, heading 350°(M) at 110kt an Air Ambulance helicopter was spotted 250-300m away to starboard as it crossed very quickly from R to L some 250m ahead and about 150ft slightly above him. He had not seen the helicopter at all prior to this and it cleared to port in seconds. He assessed the risk as "medium".

Subsequently, he has given this incident considerable thought. He considers his personal lookout to be of a high standard and had never experienced an incident like this before. The front passenger seat occupant was a trainee NPPL (National PPL) and there was a rear seat passenger as well. Neither of them saw the helicopter before it passed in front of his aeroplane. This is rather ironic as part of the pre flight brief to his RHS passenger to help with his flying training was the importance of lookout. They had discussed this en-route and had picked up several other ac and gliders on this sector. Without knowing the previous track of the helicopter he could only conclude that it was maintaining a constant bearing in the 'blind spot' caused by the door pillar/windscreen frame of his aeroplane and if it was slightly higher than himself the sun visor may have compounded the problem.

The other factor he has considered is that in the vicinity of the Airprox there were a large number of fields of bright yellow rapeseed. Given the bright but slightly hazy conditions, could the bright yellow and green of the helicopter colour scheme have acted as a camouflage? In his view, it is possible that this may have contributed not only to himself not seeing the helicopter – and he fully accepts that he was responsible for the lookout - but also his passengers on whose side it must have approached.

His ac has a white and blue colour scheme. HISLs are not fitted.

THE LTC THAMES RADAR CONTROLLER reports that he was operating with a trainee as an OJTI Mentor on Thames RADAR during the period of the Airprox.

The EC135 pilot called Thames RADAR en route from Colchester to the hospital at Romford at an altitude of 2000ft. Following identification, the EC135 pilot was given a FIS and the London QNH (1012mb).

At approx 1545, a squawk was noticed in the FIR on a converging track to the EC135 and at a similar level. The EC135 pilot was given traffic information on this contact. At about 1549, since the contacts were still converging at similar levels, the traffic information was updated using the clock code at a range of about 2nm. Following this second piece of traffic information, he believed the EC135 pilot reported visual with the unknown ac. Once the contacts had passed each other, the EC135 pilot informed them that he would be filing an Airprox report about the encounter.

ATSI reports with RT transcript that the EC135 pilot established communication with Thames RADAR at 1548. The pilot reported passing Chelmsford, routeing from Colchester to Romford at an altitude of 2000ft 1012mb. He requested a FIS, which was agreed. Approximately 2min later at 1551:10, the controller passed traffic information on a 7000 squawk "look out for traffic northbound just coming into your 11 o'clock now at 2 thousand feet unverified" – the PA28. The pilot reported looking and the range was added as "about 5 miles". Traffic information was updated about 1

minute later just after 1552:10, *“traffic now just coming into your 12 o’clock 1 mile left to right 2 thousand 1 hundred feet unverified”*. The pilot reported visual at 1552:20 and, subsequently, that he had to take avoiding action and would be filing an Airprox.

The Thames Radar Controller fulfilled his responsibilities whilst providing a FIS. He issued appropriate traffic information which resulted in the EC135 pilot becoming visual with the unknown aeroplane.

The unknown aeroplane was subsequently identified as the subject PA28 inbound to North Weald from Goodwood. The PA28 pilot contacted North Weald RADIO at 1553, just after the Airprox had occurred, reporting just approaching Ongar at 1700ft ALT. No mention was made about the EC135 helicopter.

UKAB Note (1): Analysis of the Heathrow Radar recording shows the subject ac converging on broadly perpendicular tracks from a range of 4-8nm at 1551:11. The EC135 helicopter, identified from its individual squawk, is shown maintaining 2000ft London QNH (1012mb) as it approached the Airprox location on a steady SW’ly heading. The PA28, squawking A7000, tracked broadly NNW’ly also indicating 2000ft London QNH (1012mb) unverified Mode C - occasionally 2100ft – as both ac close to a range of 0-5nm. The diagram inset shows the latter stages of the close quarters encounter derived from the Stansted 10cm Radar source. The contacts merge at 1552:39 with no measurable horizontal separation, maintaining their respective headings; the EC135 crossed marginally ahead of the PA28 from the latter’s starboard side and is shown at an altitude of 2100ft at this point (there may be an element of Mode C lag here but NMC is indicated by the PA28). The EC135 ascends to a maximum indicated altitude of 2200ft as the PA28, still with NMC displayed, draws aft, off the helicopter’s starboard quarter. The next sweep shows the PA28 still at 2000ft and the EC135 descending back through 2100ft. Interpolation of the Mode C at the CPA suggests that vertical separation was in the order of 100ft as the helicopter overflew the PA28.

PART B: SUMMARY OF THE BOARD’S DISCUSSIONS

Information available included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controller involved and a report from the appropriate ATC authority.

As this EC135 commonly operates in Glass G airspace, a helicopter pilot Member who routinely operates Air Ambulance services was concerned that it was not fitted with a form of collision warning system. TCAS I equipment is now commonly fitted to such ac and their effectiveness was emphasised. However, in the absence of such a device it was clear that the ATS provided here by Thames RADAR had been very helpful and Members commended the Thames RADAR control team for their comprehensive service to the EC135 pilot. It was plain that useful traffic information was promptly provided about the unknown PA28, initially from a range of about 5nm. The Board noted that this traffic information was updated one minute later when the range had closed to about 1nm, which had allowed the EC135 pilot to monitor that sector, acquire the light ac visually and report this to ATC. One Member suggested this might have been a late sighting but it was pointed out that in his account the helicopter pilot had reported that he acquired the small PA28 from a range of about 2nm, which was not unduly tardy.

Clearly the traffic information provided by ATC was perhaps over and above that normally to be expected under a FIS, but this illustrated ‘best practice’ and was clearly very helpful to the helicopter pilot. However, pilots should be aware that higher priority ATSS such as the provision of radar approach services to inbound traffic, or transiting flights that have requested a RIS/RAS, could understandably result in incomplete information or no warning being passed at all to those that had merely asked for a FIS. Whilst ‘see & avoid’ prevails in Class G airspace, pilots should always bear in mind that a FIS is the most basic of ATSS and generally under such a service little or no warning would be forthcoming from ATC about other flights.

Having visually acquired the PA28, the EC135 pilot reports that he elected to maintain his course and altitude until it became obvious that the PA28 pilot was not going to deviate and ‘give way’ to his helicopter, as was required in this situation under the ‘Rules of the Air’. Members recognised that ‘the Rules’ can only work if the other pilot has spotted your ac in time to take appropriate action

to remain clear. Evidently this was not the case here and it was left to the EC135 pilot to avoid the PA28 by climbing above and passing 30m ahead of the other ac, it was reported. Whilst this had just about resolved the conflict, another helicopter pilot Member was concerned that the EC135 pilot had not acted more promptly when it was apparent that the PA28 pilot was not taking action. Leaving avoiding action to this late stage was considered to be a contributory factor here. The EC135 pilot was plainly faced with a difficult dilemma and clearly Members did not know exactly to what extent the helicopter pilot could manoeuvre with his injured patient. Nonetheless, in a helicopter pilot Member's view it would have been feasible to give the PA28 a wider berth - either turning smoothly to the L to pass further astern or climbing above the aeroplane were feasible in this situation as the helicopter pilot was not unduly constrained by the base of the LTMA.

The nub of this Airprox was, however, that the PA28 pilot reports that he had not seen the helicopter at all until it was spotted 250-300m away to starboard as it crossed from R to L, very close ahead the radar recording reflected, and, he thought, 150ft above his aeroplane. Whilst noting that the RHS seat occupant had been carefully briefed to look out to starboard thereby sensibly supplementing the PA28 pilot's own lookout, it was clear that the PA28 pilot's own scan had been defeated by the small yellow helicopter closing – cross-cockpit on a constant relative bearing, with little crossing motion to draw attention to it – possibly against the background of a yellow oilseed rape field in the slight haze prevailing. Furthermore, the PA28 pilot would have been unaware of the urgency of the EC135's mission. The potential for obscuration was apparent to pilot Members. However, the GA Member was keen to point out that known blind spots must be taken into account within a disciplined scan regime and pilots must be prepared to move their head and/or ac around to clear ac blind spots regularly. Nonetheless, having spotted the helicopter at close quarters, pilot Members recognised that the PA28 pilot might have been unable to take effective avoiding action at this point. Therefore this was effectively a non-sighting by the PA28 pilot, which the Board concluded was the cause of this Airprox.

Turning to the inherent Risk, the helicopter pilot should not have been placed in this situation. But it was clear to Members that with only the EC135 pilot visual with the other ac from 2nm, he was inherently responsible for the separation that finally existed as the two ac passed each other. Pilot Members were surprised that having spotted the PA28 in reasonable time, the EC135 pilot had flown into close quarters before he climbed sharply to avoid the PA28 and having done so would have found it difficult to move out of the way if the PA28 had made a sudden unpredictable manoeuvre. Whilst he might have considered that the PA28 had been predictable up to this point, it might not have been a wise assumption that such would continue to be the case. Whilst acknowledging the nature of the helicopter's mission, Members believed that the EC135 pilot should have afforded a wider margin over the other ac, especially as the likelihood of losing sight of the aeroplane – again cross-cockpit, from the RHS - as it passed close beneath the helicopter was high. Here, the EC135 pilots chose the separation that finally pertained against the PA28. Whilst accepting that the nature of the patient's injuries might have necessitated especial consideration, having elected to 'stand on' to route expeditiously on his urgent task and just climb 100ft or so above the light ac, it was the helicopter pilot's decision to pass this close to the PA28 which, in the overwhelming view of the Members, had compromised the safety of both ac.

PART C: ASSESSMENT OF CAUSE AND RISK

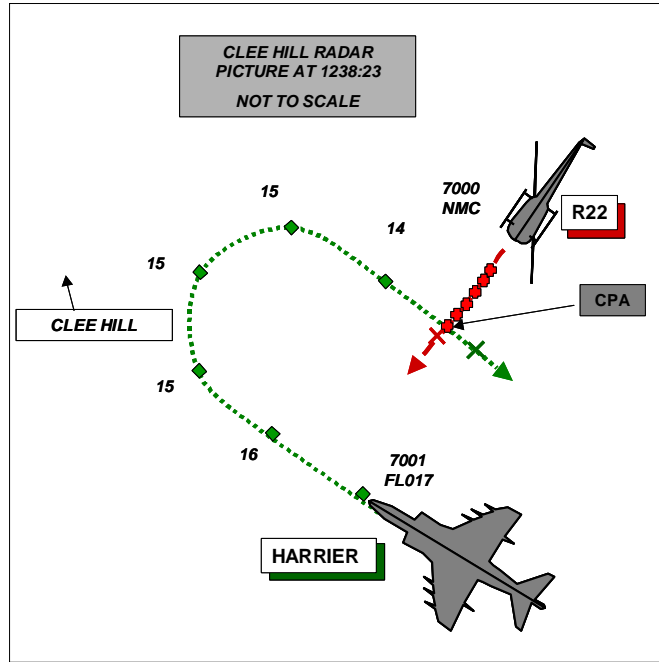
Cause: Effectively, a non-sighting by the PA28 pilot.

Degree of Risk: B.

Contributory Factors: Late avoiding action by the EC135 pilot.

AIRPROX REPORT No 156/07

Date/Time: 1 Nov 1238
Position: 5223N 00230W
(6nm W Kidderminster)
Airspace: UKDLFS/FIR (Class: G)
Reporting Ac Reported Ac
Type: Harrier T10 R22
Operator: HQ AIR (Ops) Civ Trg
Alt/FL: 1000ft 2300ft
(RPS 1021mb) (NR)
Weather: VMC NR VMC NR
Visibility: unlt 20km
Reported Separation:
50ft V/100m H Not Seen
Recorded Separation:
NR V/ 100m H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE HARRIER T10 PILOT reports flying as No2 in a high workload, 4-ship low level tactical instructional sortie, in grey 2 seat ac with HISLs on; the handling pilot was in the front seat and the instructor in the rear. They were squawking 7001 with Mode C. After completing a climbing evasion manoeuvre at 450kt, ending up at 1000ft agl, the formation was called to turnabout to the R from heading 300° onto a heading of 120°. They maintained their level and after the turn descended back to 250ft agl. Although the handling pilot was concentrating on collision avoidance with the other members of the formation element the instructor began to clear the flightpath ahead of their ac and shortly after the descent was initiated he noticed an object 'blooming' directly ahead and below them (estimated as 300m away). By the time he began to take control to initiate avoiding action the object identified as a R22 was behind them in their 5 o'clock position and no longer a threat. He assessed the risk as being high.

THE R22 PILOT reports flying as an instructor on a training flight from Wolverhampton in a red and white ac in receipt of a FIS from London Info and with SSR and Mode C selected on [he thought]. He had flown several student training flights on that day and could not recall the precise details of the flight but thought that at the reported time of the incident they were in the cruise and would have been at an alt of about 2300ft flying at 70kt and in the area that the incident was reported. He had checked the NOTAMS prior to departing. Neither he nor his student saw the reporting Harrier although they did see 2 other fast jet ac in the Clee Hill area but he could not recall positively if this had been on that flight or an earlier one. [Very close to the reported position].

UKAB Note (1): The Recording of the Clee Hill radar shows both ac throughout the event; the R22 however is not displaying Mode C information. The Harrier approaches the area initially tracking 300° displaced about 2nm to the S then commences a R turn onto a reciprocal track. The R22 is steady on a track of 220° throughout the incident. Less than 10sec after the Harrier rolls out on 120° it passes about 100m behind the R22 which crosses the Harrier's track at right angles from L to R.

UKAB Note (2): The nearest available METAR was Birmingham where the 1250 was:

EGBB 011250Z 27013KT 9999 SCT024 17/11 Q1031

The terrain in the area of the incident is rolling with a mean height of about 210m (690ft). If the R22 were at 2300ft amsl as reported, it would have been at about 1600ft agl.

HQ AIR OPS comments that, since the Harrier pilot reported that the R22 was below them and probably lower than he reported, it would have been very difficult to see in the winter light, especially as it was effectively on a 90° collision course (after the Harrier rolled out of the right turn).

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available included reports from the pilots of both ac, a radar video recording, and a report from the Harrier operating authority.

The Board noted that both ac had been operating legitimately in Class G airspace, the Harrier in the UKLFS and the R44 in the open FIR; that being the case the pilots had an equal and shared responsibility to see and avoid their respective ac. Members were briefed that the Harriers had been operating slightly higher than is usual for tactical low level sorties since they were on a high workload, initial conversion, 4-ship, tactical evasion mission. The student pilot in the front seat would have been concentrating on maintaining visual with and forming on his leader following the turnabout through 180 degrees. Following the turn however, the Harrier instructor in the rear seat saw the R22 appear slightly below them (below the horizon) in their 12 o'clock but not in time to take any avoiding action; the R22 pilot did not see the Harrier(s) at any time. Specialist Members thought that the helicopter had probably been slightly lower than its pilot reported and it would have been very difficult to see in the winter light, especially as it was effectively on a 90-degree collision course with the Harrier.

Since the R22 was not squawking Mode C and its pilots had not seen the Harrier, there was insufficient information to verify the Harrier crew's estimation of the vertical separation; that being the case the Board accepted the crew's estimation of 50ft and that the radar showed that the horizontal miss-distance had been minimal.

Due to the effective lack of sighting of the other ac by all 4 pilots involved and that the Helicopter had not been called by any of the Harrier formation members, the Board concluded that it had only been by good fortune that the ac had not collided and consequently that there had been an actual collision risk in this incident.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Non-sighting by the R22 pilots and an effective non-sighting by the Harrier pilots.

Degree of Risk: A.

AIRPROX REPORT No 148/07

Date/Time: 5 Oct 1555

Position: 5142N 00022W (3½nm NW by N from Elstree)

Airspace: London FIR (Class: G

Reporting Ac Reported Ac

Type: Jodel D150 Hughes 369

Operator: Civ Club Civ Pte

Alt/FL: 1400ft 1500ft
QNH (1026mb) QNH

Weather VMC CLOC VMC CAVOK

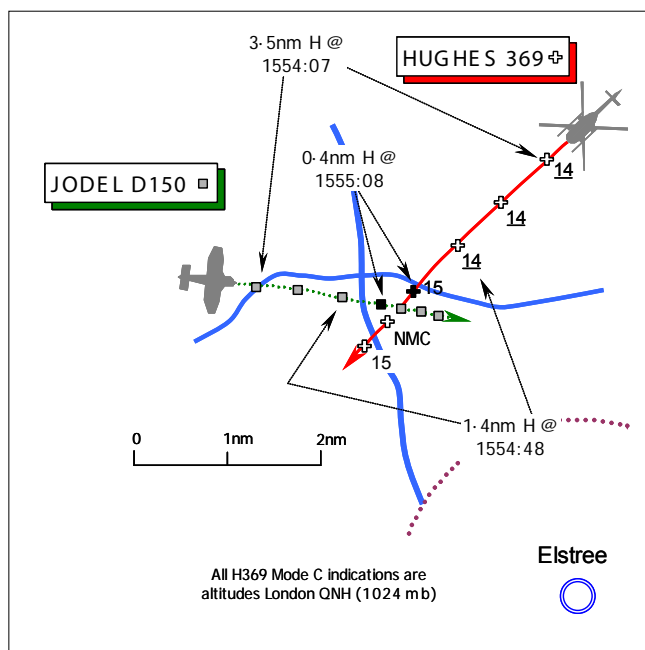
Visibility: 10km+ 10nm

Reported Separation:

30-50ft V/nil H 15-20ft V/nil H

Recorded Separation:

Contacts merged



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE JODEL D150 MASCARET PILOT provided a comprehensive and candid account, reporting that he was enroute under VFR from Sleaf to Headcorn routing direct to LIC, thence to DTY, BNN & LAM. A squawk of A7000 was selected but Mode C is not fitted (NMC). At the time of the Airprox, weather conditions were very good and he was flying in VMC, with a visibility of 10km+ and a good horizon, but with some relatively low stratus - base of about 2000ft – visible to the NE.

As it was a very fine day, there was a lot of traffic around and especially flying past the Bovingdon VOR, he saw a lot of GA ac in the locality. For this very reason, he was conscious of other traffic and was keeping a very sharp look out. His track took him past Elstree aerodrome, but not through their ATZ, so he was maintaining a “listening watch” on their frequency of 122.2MHz rather than contacting them, as they appeared to be quite busy.

Flying between Bovingdon and Stapleford in a level cruise at 1400ft, QNH (1026mb), approaching a position some 3½nm NW of Elstree heading 100° at 100kt, he looked down at his chart and then, upon looking up and L, saw a dark coloured black or dark green Hughes 500 helicopter at about the same level closing on a constant relative bearing in his 10 o'clock about 100m away and heading towards him. To avoid the helicopter he immediately pushed forward on the stick into a descent as he wanted to keep the Hughes helicopter in his view as it passed some 30-50ft directly overhead with a “high” risk of a collision. No deviation in the helicopter’s course was evident and he assumed the helicopter pilot had not spotted his aeroplane.

Whilst annoyed with himself that he only saw the helicopter at a very late stage, especially as he was supposedly keeping a good lookout, he put this down to the fact that the Hughes helicopter was on a steady relative bearing and it was also partly hidden behind his ac’s doorframe until he spotted it.

He stressed that he is used to flying in very close proximity to other ac, as a formation and air display pilot, but this was much closer than he would have liked to have been without a formation briefing! If he had not seen the helicopter or altered his height, he believes that they would have collided.

THE HUGHES 369 (H369/500) PILOT reports his helicopter is finished in a disruptive pattern green camouflage scheme, but the 2 HISLs were on whilst flying under VFR between a private landing site near Wattisham to White Waltham at 115kt.

Cruising level at an altitude of 1500ft QNH, in CAVOK weather conditions, he was however flying a heading of 250°(M) directly into the sun with very limited forward visibility. After passing Stansted, he contacted Heathrow initially and was then passed onto Northolt “who had the space”. Just after establishing RT contact with Northolt ATC and whilst setting their new transponder code he noticed a “white flash” very close below his helicopter – he quoted about 15-20ft - as another ac passed directly below with a “*very high*” risk of a collision. No avoiding action was taken, as the other ac was not seen until it was already passing immediately below his helicopter. He stressed that with 2 frequency selections and transponder squawk changes in a short period his workload was high, furthermore, the transponder is sited low down on the central radio “stack” in the cockpit.

MIL ACC had nothing to report.

UKAB Note (1): The Heathrow Radar recording illustrates this Airprox, although the H369 is not shown just at the point that the tracks cross. The Jodel – squawking A7000 NMC fitted - is shown flying steadily eastbound on a track of about 100°, crossing over the M25 motorway. The H369 approaches SW bound, squawking A7000, on a steady relative bearing in the Jodel’s 11 o’clock at a range of 3.5nm at 1554:07, indicating 1400ft London QNH (1024mb) unverified Mode C. The Jodel maintains its course S of the M25 motorway, subsequently crossing the M1 and at 1555:08, the H369 has closed to a range of 0.4nm – still in the 11 o’clock - but has now climbed very slightly to 1500ft London QNH. Secondary contact on the H369 is then lost and one primary return of dubious reliability shows in the Jodel’s 10 o’clock at <0.15nm - 300yd. The Airprox occurs at 1555:16, as the tracks cross, with no contact on the H369 that is then shown as a primary contact opening in the Jodel’s 5 o’clock and rapidly drawing aft, before a Northolt code of A0260 subsequently appears indicating 1500ft London QNH.

PART B: SUMMARY OF THE BOARD’S DISCUSSIONS

Information available included reports from the pilots of both ac and radar video recordings.

The candid accounts provided by both pilots had made it clear that neither was in receipt of an ATS at the moment this Airprox occurred and the Board readily agreed that this was intrinsically a sighting issue. Both pilots were operating quite legitimately in the narrow confines of Class G airspace beneath the LTMA, where see and avoid prevails. Whereas the Jodel 150 pilot had stressed that he was cognisant of the busy traffic scenario and was maintaining a careful scan for other ac, a member postulated that his attention might naturally have been drawn to any traffic in the circuit at Elstree off to starboard. Unfortunately, the other ac was approaching unseen from the port side. This Airprox illustrated clearly the difficulties of sighting a small helicopter in a mock camouflage colour-scheme of very small cross sectional area, closing on a steady relative bearing with no crossing motion to draw attention to its presence, despite a disciplined lookout and the two HISLs fitted to the Hughes H369. Providentially, the Jodel pilot did manage to spot it, just in time at minimal range in his 10 o’clock - about 100m away he reported – which enabled him to push forward and take avoiding action. This was clearly less than ideal and the Members agreed that a very late sighting by the Jodel D150 pilot was part of the cause.

Commercial helicopter pilot Members were concerned that the H369 pilot had elected to press-on into a low setting sun and whilst his route to his destination took him that way, it might have been wiser to have purposefully introduced a dogleg into his route so as to enable him to see where he was going more clearly. A GA Member wondered if this was a practical thing to do, however, good airmanship would naturally dictate this should be considered when weighing up the risk of encountering another ac. This Airprox was a salutary lesson of the unseen dangers existing in good weather when flying ‘into sun’. Moreover, in this instance the H369 pilot was responsible for sighting the other ac and ‘giving way’ under the ‘Rules of the Air’. But ‘the Rules’ can only work if the other ac is seen in time to take positive action when necessary. Here, the H369 pilot reports he only saw the Jodel as it was already passing immediately below his helicopter. Furthermore, it was evident that this Airprox occurred as the H369 pilot was changing his SSR code – another distraction that can be time consuming. A pilot Member noted that it could take about 7sec to change a code setting, which is a long time to have eyes in the cockpit. A technique he uses is to

change two numbers – before taking a scan outside the cockpit – and then changing the last two numbers. However, here the helicopter pilot was unable to take any action whatsoever to forestall this close quarters situation and the Board agreed that this was effectively, a non-sighting by the Hughes H369 pilot and the other part of the cause.

In this instance the Jodel D150 pilot attempted to avoid the Hughes helicopter by diving below it. His reasoning - to keep the other ac in sight - was sound, but the resultant separation was apparently minimal. As Mode C was not fitted to the Jodel, the absence of comparable altitude data made accurate independent assessment of the vertical separation that pertained here impossible. The Jodel pilot had reported transiting in a level cruise at 1400ft QNH (1026mb); whereas the H369 was indicating 1500ft London QNH (1024mb) moments before the tracks crossed. This suggested 160ft of theoretical separation existed, but given the applicable tolerances of Mode C [*verified* data] this was clearly minimal. There was no reason to doubt the veracity of the reports provided – 15-20ft reported by the helicopter pilot and 30-50ft from the Jodel pilot's account - who was probably better placed to judge the distance anyway. Whether the Jodel pilot had sufficient time to physically move his aeroplane out of the way to avert a collision was debateable, but the radar data had shown the tracks had crossed exactly which corroborated the pilots' reports. Therefore, with at most 50ft reported between them and one of the pilots unable to react because the Jodel was not seen until it was already passing immediately below his helicopter, Members agreed unanimously that an actual risk of a collision had existed in the circumstances conscientiously reported here.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: An effective non-sighting by the Hughes H369 pilot and a very late sighting by the Jodel D150 pilot.

Degree of Risk: A.

List of Abbreviations

aal	Above aerodrome level	CLOC	Clear of Cloud
ac	Aircraft	CMATZ	Combined MATZ
ACAS	Airborne Collision Avoidance System	CPA	Closest Point of Approach
ACC	Area Control Centre	C/S	Callsign
ACN	Airspace Co-ordination Notice	CTA	Control Area
A/D	Aerodrome	CTR/CTZ	Control Zone
ADC	Aerodrome Control(ler)	CWS	Collision Warning System
ADF	Automatic Direction Finding Equipment	DA	Decision Altitude
ADR	Advisory Route	DAAvn	Director Army Aviation
AEF	Air Experience Flight	DAP	Downlinked Ac Parameters [Mode S]
AEW	Airborne Early Warning	DAP	Directorate of Airspace Policy CAA
AFIS(O)	Aerodrome Flight Information Service (Officer)	D & D	Distress & Diversion Cell
agl	Above Ground Level	DF	Direction Finding (Finder)
AIAA	Area of Intense Aerial Activity	DH	Decision Height
AIC	Aeronautical Information Circular	DME	Distance Measuring Equipment
AIP	Aeronautical Information Publication	DUA	Dedicated User Area
AIS	Aeronautical Information Services	E	East
alt	Altitude	EAT	Expected Approach Time
amsl	Above mean sea level	elev	Elevation
AOB	Angle of Bank	ERS	En Route Supplement
A/P	Autopilot	est	estimated
APP	Approach Control(ler)	FAT	Final Approach Track
APR	Approach Radar Control(ler)	FIR	Flight Information Region
ARP	Aerodrome Reference Point	FIS	Flight Information Service
ASR	Airfield Surveillance Radar	FISO	Flight Information Service Officer
ATC	Air Traffic Control	FMS	Flight Management System
ATCC	Air Traffic Control Centre	FO	First Officer
ATCO	Air Traffic Control Officer	fpm	Feet Per Minute
ATCRU	Air Traffic Control Radar Unit	fps	Flight Progress Strip
ATIS	Automatic Terminal Information Service	GAT	General Air Traffic
ATM	Aerodrome Traffic Monitor	GCA	Ground Controlled Approach
ATS (U)	Air Traffic Service (Unit)	GCI	Ground Controlled Interception
ATSA	Air Traffic Service Assistant	GMC	Ground Movement Controller
ATSOCAS	ATSs Outside Controlled Airspace	GP	Glide Path
ATSI	Air Traffic Services Investigations	GS	Groundspeed
ATZ	Aerodrome Traffic Zone	H	Horizontal
AWACS	Airborne Warning and Control System	HISL	High Intensity Strobe Light
AWR	Air Weapons Range	HLS	Helicopter Landing Site
BGA	British Gliding Association	HMR	Helicopter Main Route
BHAB	British Helicopter Advisory Board	HPZ	Helicopter Protected Zone
BHPA	British Hang Gliding and Paragliding Association	HQ Air	HQ Air Command
BINA ERS	British Isles/N Atlantic En Route Supplement	HUD	Head Up Display
BMAA	British Microlight Aircraft Association	IAS	Indicated Air Speed
c	circa	iaw	In accordance with
CAA	Civil Aviation Authority	ICF	Initial Contact Frequency
CANP	Civil Air Notification Procedure	IFF	Identification Friend or Foe
CAS	Controlled Airspace	IFR	Instrument Flight Rules
CAT	Clear Air Turbulence	ILS	Instrument Landing System
CAVOK	Visibility, cloud and present weather better than prescribed values or conditions	IMC	Instrument Meteorological Conditions
cct	Circuit	JOI	Joint Operating Instruction
CFI	Chief Flying Instructor	JSP	Joint Services Publication
CinC Fleet	Commander in Chief Fleet, Royal Navy	KHz	Kilohertz
CLAC	Clear Above Cloud	kt	Knots
CLAH	Clear Above Haze	km	Kilometres
CLBC	Clear Below Cloud	L	Left
CLBL	Clear Between Layers	LACC	London Area Control Centre (Swanwick)
		LARS	Lower Airspace Radar Service
		LATCC(Mil)	London Air Traffic Control Centre (Military)
		LFA	Low Flying Area

LFC	Low Flying Chart	SAP	Simulated Attack Profile
LH	Left Hand	SAS	Standard Altimeter Setting
LLZ	Localizer	SC	Sector Controller
LJAO	London Joint Area Organisation (Swanwick (Mil))	ScATCC(Mil)	Scottish Air Traffic Control Centre (Military)
LoA	Letter of Agreement	ScOACC	Scottish and Oceanic Area Control Centre
LTMA	London TMA	SFL	Selected Flight Level [Mode S DAP]
MACC	Manchester Area Control Centre	SID	Standard Instrument Departure
MATS	Manual of Air Traffic Services	SMF	Separation Monitoring Function
MATZ	Military Aerodrome Traffic Zone	SOP	Standard Operating Procedures
mb	Millibars	SRA	Surveillance Radar Approach
MHz	Megahertz	SRE	Surveillance Radar Element of precision approach radar system
MoD	Ministry of Defence	SSR	Secondary Surveillance Radar
MRSA	Mandatory Radar Service Area	STAR	Standard Instrument Arrival Route
MSD	Minimum Separation Distance	STCA	Short Term Conflict Alert
N	North	SVFR	Special VFR
NATS	National Air Traffic Services	TA	Traffic Advisory (TCAS)
NDB	Non-Directional Beacon	TAS	True Air Speed
nm	Nautical Miles	TBC	Tactical Booking Cell
NMC	No Mode C	TC	Terminal Control
NK	Not Known	TCAS	Traffic Alert & Collision Avoidance System
NR	Not Recorded	TRA	Temporary Restricted Area
NVG	Night Vision Goggles	TFR	Terrain Following Radar
OAC	Oceanic Area Control	TI	Traffic Information
OACC	Oceanic Area Control Centre	TMA	Terminal Control Area
OAT	Operational Air Traffic	TRUCE	Training in Unusual Circumstances and Emergencies
O/H	Overhead	UAR	Upper Air Route
OJTI	On-the-Job Training Instructor	UHF	Ultra High Frequency
OLDI	On-Line Data Interchange	UIR	Upper Flight Information Region
PAR	Precision Approach Radar	UKDLFS	United Kingdom Day Low Flying System
PFL	Practice Forced Landing	UKNLFS	United Kingdom Night Low Flying System
PF	Pilot Flying	UNL	Unlimited
PI	Practice Interception	USAF(E)	United States Air Force (Europe)
PINS	Pipeline Inspection Notification System	UT	Under Training
PNF	Pilot Non-flying	UTA	Upper Control Area
QDM	Magnetic heading (zero wind)	UTC	Co-ordinated Universal Time
QFE	Atmospheric pressure at aerodrome/airport elevation (or at runway threshold)	V	Vertical
QFI	Qualified Flying Instructor	VCR	Visual Control Room
QHI	Qualified Helicopter Instructor	VDF	Very High Frequency Direction Finder
QNH	Altimeter sub-scale setting to obtain elevation when on the ground	VFR	Visual Flight Rules
R	Right	VHF	Very High Frequency
RA	Resolution Advisory (TCAS)	VMC	Visual Meteorological Conditions
RAS	Radar Advisory Service	VOR	Very High Frequency Omni Range
RAT	Restricted Area (Temporary)	VRP	Visual Reporting Point
RCO	Range Control Officer	W	West
RH	Right Hand		
RIS	Radar Information Service		
ROC	Rate of Climb		
ROD	Rate of Descent		
RPS	Regional Pressure Setting		
RT	Radio Telephony		
RTB	Return to base		
RVSM	Reduced Vertical Separation Minimum		
RW	Runway		
RVR	Runway Visual Range		
S	South		
SA	Situational Awareness		