

BACKGROUND INFORMATION**1 Commander's flying training**

The commander trained as a helicopter pilot in the British Army. He started flying training as an observer in 1980 and became a pilot in 1985. Three years later he was trained at the Central Flying School and became a Qualified Helicopter Instructor (QHI). Soon afterwards he also became an instrument rating examiner (IRE). He completed his engagement with the Army in August 1993.

During his last Army non-procedural instrument rating test dated April 1992 the commander renewed his "Mater Green/IRE" status. At the time he declared the following IF (instrument flying) hours:

	Simulated IF hours	Actual IF hours	Flight Simulator hours	Instrument approaches
IF hours in last 6 months	4.0	6.2	1.0	6
Total IF hours	83.9	80.4		

For his last military flying assessment in June 1992, the commander declared a total of 2,310 hours, almost all of which were acquired in Gazelle and Lynx helicopters. He was graded 'Above Average' and from his Army Air Corps Service record, it was clear that the commander was held in high esteem by his superiors.

2 Commander's civilian employment

Before leaving the Army, the commander obtained a civil ATPL(H) [Air Transport Pilot's Licence (Helicopters and Gyroplanes)] in 1992, to which he added an instructor rating early in 1995. After leaving the Army he instructed on the Robinson R22 and Bell 206 Jet Ranger for established flying schools before jointly forming a new company, Polo Aviation Ltd, with two colleagues. The commander was the Chief Pilot of Polo Aviation Ltd which was primarily engaged in public transport operations using turbine-engined helicopters. In May of 1994 he acquired a type rating on the AS355F and AS355N twin-engined Squirrel helicopters. This enabled him to fly revenue-earning public transport flights using two Twin Squirrel aircraft belonging to another company. After acquiring sufficient experience on type, in March 1996 the commander obtained authorisation to instruct on multi-turbined engined helicopters. He was also actively instructing private pilots learning to fly the Jet Ranger.

3 MGA Limited

During the summer of 1996 the commander evidently set about forming his own aviation company, MGA Ltd. He was the sole pilot and Managing Director of the company which traded from his home address. It is understood that MGA Ltd was neither a subsidiary nor an alternative trading name of any other air transport undertaking.

Early in October 1996 MGA Ltd accepted a series of bookings from the vice-chairman of a football club (hereafter termed the client). The essence of the bookings was transport between London and seven 'away' football matches, the first on 22 October 1996 and the last on 11 May 1997. All but the last match would involve a return flight in darkness and apart from one in Birmingham, all the venues were in the North of England. The accident occurred during the return flight from the first of these bookings.

For these flights MGA Ltd had quoted an hourly charge and informed the client that he would also be invoiced for landing fees, airport charges and any pilot expenses incurred. A substantial deposit was sought and reportedly paid. Neither MGA Ltd nor the client owned a helicopter suitable for the flights so MGA Ltd leased a helicopter from another company and paid a substantial deposit for the lease. These arrangements were consistent with the definition of a public transport flight contained in the Air Navigation Order (ANO) Article 119.

4 Polo Aviation Limited

To conduct the return flight to Bolton under public transport regulations (specifically Article 6 of the ANO) the flight should have been conducted by a company holding an Air Operators Certificate (AOC). MGA Ltd was newly-formed and had yet to apply to the Civil Aviation Authority (CAA) for the issue of an AOC. However, the commander was still the Chief Pilot of Polo Aviation Limited which had the requisite AOC. On or before 16 October the commander obtained permission from the Managing Director of Polo Aviation Ltd to "*utilise the Polo Aviation Limited air operators certificate*". Apart from this agreement, Polo Aviation Ltd had no apparent involvement in the planning, financing or operating of the accident flight.

5 Aeromega Limited

To comply with public transport regulations for night flights the commander required a twin-engined helicopter. He arranged to lease an AS355 (Twin Squirrel) from Aeromega Limited. Before agreeing to the lease, Aeromega sought and obtained documents from the commander. These included: a photocopy of the page in his pilot's licence which declared him to be a CAA authorised

examiner on the AS355; a copy of his most recent base check (handling check) on type; and written confirmation from Polo Aviation Ltd that the commander had permission to utilise their AOC. Apart from maintaining and leasing the helicopter, and briefing the commander on the helicopter's equipment fit, Aeromega had no involvement in the planning or operation of the accident flight.

6 Commander's flying hours

The commander's badly burned pilot's licence and his personal organiser were retrieved from the wreckage together with numerous maps and charts but there was no trace of his flying logbook. It was found by a friend several months after the accident but there were no entries within it dated after 23 July 1996. Consequently, his total flying hours after 23 July had to be estimated on the basis of 30 hours per month. His flying hours on the Twin Squirrel were calculated accurately from his logbook entries supplemented by hours recorded in the technical logs of the three aircraft he was known to have flown.

7 Flight schedule on the day of the accident

The schedule for the day was to collect the client and three other passengers from Battersea Heliport at 1300 hrs and then to fly to a private landing site in Oswestry, Shropshire. There the passengers would disembark and tour a factory whilst the commander flew to Welshpool Airfield to refuel the helicopter. He would then fly back to Oswestry to await the return of the passengers. On completion of their visit he would then fly them from Oswestry to Bolton in Lancashire where they would all attend a football match.

The commander arranged to land in a company car park in Bolton which was close to urban housing and commercial premises. On the day, part of the car park had been cordoned off with plastic tape and more tape had been nailed to the ground to indicate a temporary helipad. There was no perimeter lighting in the vicinity of the helipad but the exterior of the company building was lit during the hours of darkness by sodium flood lights. The car park was surrounded by a perimeter wall or fence and guarded during the hours of darkness.

Because he had not previously landed at this car park, the commander had apparently insisted on leaving Oswestry in time to land at Bolton in daylight. He had not sought permission from the CAA to land at this site but he had obtained permission from the site owners.

After the football match, which was due to finish at 2030 hrs, the commander intended to fly to London's Heathrow Airport where he would disembark the passengers and stay in a local hotel before returning the helicopter to its owners on the morning of 23 October.

Commander's duty times

For the assessment of duty times, it is assumed that the accident flight was conducted in accordance with Articles 62 and 63 of the ANO which specify that the operator of the aircraft shall have a scheme for the regulation of flight times for crew members and that scheme has to have the approval of the Civil Aviation Authority. In practice, companies holding an AOC must have a company Operations Manual and the scheme is contained in that manual. There are usually two limitations: the flying duty period which includes pre-flight, inflight and post-flight duties; and the aggregate of flying time within that duty period.

The commander had not submitted any crew duty records to Polo Aviation Ltd after 19 August 1996. It is possible that he kept records of his recent work in his flight case and that these records were destroyed in the post-accident fire, but no trace of such records was found. Moreover, on the day of the accident he was operating under the guise of his own company which did not possess the requisite AOC nor did it have its own approved Flight Time Limitation Scheme. The duty times described in the report are, therefore, based on the Scheme contained in the Polo Aviation Ltd Operations Manual, the scheme with which, as Chief Pilot, the commander should have been familiar because he was responsible for its implementation and record keeping.

Flight time limitation schemes are complex but three aspects of the Polo Aviation Ltd scheme are relevant to this report. Firstly, positioning was defined as *'the practice of transferring crews from place to place as passengers in surface or air transport at the behest of the Company'*. Secondly the scheme stated that *'when crew members are required to travel from their home to an airfield other than the one from which they normally operate, any travelling time over and above the journey time from home to the usual operating airfield shall be classed as positioning'*. Thirdly the scheme stated that *'travelling time, other than that spent on positioning, shall not be counted as duty'*.

Flying duty period

The commander began his working day when he left his home to travel by car to Stapleford Tawney Airfield. The time at which he left home is uncertain but he purchased food and fuel at the Fleet Service Area on the M3 motorway at 0924 hrs UTC (1024 hrs local time). The journey from his home was primarily on dual carriageway or motorway and would have taken him just over an hour. Therefore, he probably left home at about 0820 hrs UTC.

Since the commander normally flew from Bristol Airport, his journey to Stapleford Tawney could be classified as travelling time up until the point that the

journey took longer than the usual journey to Bristol. After that time the journey counted as positioning and would be a part of the flying duty period.

The journey from the commander's home to Bristol would have taken him about 70 minutes so, effectively, he started positioning at about 0930 hrs which was 70 minutes after leaving home.

The time spent positioning was not eligible for split-duty because positioning does not count as a sector when calculating the flying duty period. Therefore, the commander started his flying duty period at about 0930 hrs. Thereafter the commander was on duty continuously until 15 minutes after landing at Bolton at about 1600 hrs. He took off again at 2127 hrs and allowing for the stipulated 30 minutes pre-flight duty, half the intervening period of 4 hours 42 minutes spent on the ground in Bolton could legitimately be used to extend the permitted duty period of 10 hours. This extension allowed the commander a maximum flying duty period of 12 hours 21 minutes and a maximum flight time within that period of 7 hours. At the time of the accident he had been on duty for about 12 hours 20 minutes but flying for less than 5 hours.

Irrespective of the method by which the flying duty period is calculated, the commander left home at about 0820 hrs and was flying 13 hours 30 minutes later, having had no intervening bed rest.

10 Rest period before duty

The commander carried out an instructional flight in a Jet Ranger on the night before the accident (Monday 21 October). That aircraft's technical log recorded a last landing time of 1820 hrs. Allowing for 15 minutes post-flight duties, the commander had a rest period of 14 hours 55 minutes before starting duty on the day of the accident. His work pattern before that rest period is uncertain but he was free of duty during the preceding weekend.

11 Conduct of the flights to Oswestry and Bolton

The schedule was followed with only three noteworthy events. Firstly, en route to Oswestry the commander flew, without prior permission or notification, through the air traffic zone of Halfpenny Green, a small airport near Wolverhampton. The AFISO (Aerodrome Flight Information Service Officer) at Halfpenny Green noted the passage of G-CFLT and that it had infringed the zone whilst it was active with air traffic. He contacted the RAF Station at Shawbury and established that the commander was, by then, in RTF contact with Shawbury Air Traffic Control (ATC). The Shawbury controller passed a request to the commander that he should telephone the AFISO on landing to explain his

conduct. This the commander did at 1422 hrs and the AFISO decided to take no further action regarding the zone infringement.

The second noteworthy event was that in the vicinity of 'The Wrekin', a prominent hill south-west of Telford, the cloudbase was low and the in-flight visibility deteriorated in rain and mist to such a degree that the commander had to continue the flight in marginal weather conditions by following the main A5 road at reduced speed. However, the weather improved between Shrewsbury and Oswestry and the commander landed there at about 1420 hrs.

The third noteworthy event was that the commander departed Stapleford Tawney Airfield with full fuel tanks. Later that day he refuelled at Welshpool with 358 litres of the correct type of fuel and this quantity filled the tanks to full.

12 Commander's activities in Bolton

The helicopter landed at Bolton at about 1600 hrs. During the landing a section of plastic cordon tape broke free and became entangled in the main rotor blades. No damage was evident and the commander removed the tape. He and the passengers then left the site to obtain refreshment in the town before going to the football ground. There the commander was accommodated in the Directors' Box and Boardroom where he was able to sit in comfort. The match was scheduled to finish at 2030 hrs and so he could plan on relaxing from 1615 hrs to 2030 hrs.

13 Pre-flight preparation

After the football match had finished, at 2039 hrs, the commander telephoned the meteorological office at an Army base. He identified himself as an Army Officer and asked for a route weather briefing for a flight from Manchester to Heathrow. He was advised of cloud at 1,000 feet on the hills to the south of Manchester. The forecaster recommended that to avoid the low cloud, the commander should head west after takeoff until he reached "the motorways" and then turn south to overfly Shawbury (an RAF airfield near Shrewsbury). After Shawbury he was advised to route via Birmingham to Heathrow.

The commander left the football ground by car to return to the helicopter in order to prepare for the flight whilst the passengers remained behind. On the way he talked to the driver who later stated that the commander did not seem tired or nervous. When they arrived at the car park the gates were opened by a security guard and the driver used his headlights to allow the commander to perform a cursory inspection of the helicopter's exterior. Apparently satisfied with its condition, the commander bade the driver farewell and the driver and car departed leaving the commander and the security guard alone in the car park.

Standing in the car park close to the sodium lights on the main building, the security guard watched the commander enter the helicopter and sit in it for about two minutes, apparently making switch selections and generally preparing the machine for flight. The commander then left the helicopter and came over to where the guard was standing in order to study his aeronautical chart by the light of the security lights. The sodium lighting was dim and of orange hue. The guard noticed that the chart had a shiny surface and that there were lines on it. He perceived that the commander was having difficulty in reading the chart and so he offered the use of his office with brighter, white lighting but the commander declined his offer. The commander then returned to the helicopter where he remained for about two minutes before leaving it once again to study his chart beside the guard. The commander then returned to the helicopter and sat in it for a short while before returning a third time to where the guard was standing in order, once more, to study his chart. After this third meeting with the guard, at 2108 hrs the commander made a telephone call to a handling agent at Heathrow and then talked to the guard for a while before returning to the helicopter to await the arrival of the passengers. At no time did the guard see the commander with anything other than the chart and a mobile telephone in his hands.

APPENDIX B

RTF TRANSCRIPT PREPARED BY NATIONAL AIR TRAFFIC SERVICES LTD WITH THE ASSISTANCE OF THE AAIB

To	From	RECORDED INTELLIGENCE	Time	Remarks
Manchester	G-CFLT	(*) MANCHESTER GOOD EVENING HELICOPTER GOLF CHARLIE FOXTROT LIMA TANGO	2128	
G-CFLT	Manchester	GOLF CHARLIE FOXTROT INDIA TANGO		
Manchester	G-CFLT	FOXTROT LIMA TANGO IS A TWIN SQUIRREL (**) HELICOPTER WITH FIVE ON BOARD JUST LIFTED FROM A PRIVATE SITE AT BOLTON ROUTEING WESTBOUND ER TO THE FURTHEST MOTORWAY TO THE WEST BEFORE TURNING SOUTHBOUND TO ROUTE DIRECT TRACK IF POSSIBLE FOR SHAWBURY AND THEN FROM SHAWBURY TO HEATHROW	2128 1/2	
G-CFLT	Manchester	GOLF INDIA TANGO DO YOU INTEND TO ROUTE VIA THE LOW LEVEL ROUTE		
Manchester	G-CFLT	ER FOXTROT LIMA TANGO ERM I WILL I WILL IF I MUST BUT I'D RA- LIKE TO ROUTE DIRECT IF I CAN		Part word 'ra-'
G-CFLT	Manchester	(*) GOLF LIMA TANGO SQUAWK THREE SIX TWO ONE	2129	
Manchester	G-CFLT	THREE SIX TWO ONE LIMA TANGO		
Manchester	G-CFLT	LIMA TANGO'S SQUAWKING THREE SIX TWO ONE (**))	2129 1/2	

To	From	RECORDED INTELLIGENCE	Time	Remarks
G-CFLT	Manchester	GOLF LIMA TANGO IDENTIFIED AND WHAT'S YOUR INTENDED LEVEL		
Manchester	G-CFLT	ER LIMA TANGO I'D LIKE TO CLIMB TO FIFTEEN HUNDRED FEET PLEASE AND IF POSSIBLE I'D LIKE ER RADAR VECTORS FROM YOURSELF DIRECT TO THE SHAWBURY OVERHEAD IF POSSIBLE AND FROM MY PRESENT POSITION IF THAT'S ACCEPTABLE		
G-CFLT	Manchester	GOLF LIMA TANGO I CAN'T GIVE YOU RADAR VECTORS AT THAT KIND OF LEVEL BECAUSE YOU'LL HAVE TO MAINTAIN YOUR OWN TERRAIN (*) CLEARANCE AND ER CLEARANCE AGAINST WEATHER BUT I CAN GIVE YOU A SUGGESTED RADAR HEADING	2130	
Manchester	G-CFLT	ROGER I'LL ACCEPT THAT AND I'LL CLIMB INITIALLY TO TWO THOUSAND FEET IF I MAY AND I THINK THAT'S JUST ABO- JUST UNDERNEATH THE CLOUDBASE		Part word 'abo-'
G-CFLT	Manchester	GOLF LIMA TANGO ROGER YOUR ZONE CLEARANCE IS SPECIAL V F R NOT ABOVE TWO THOUSAND FEET Q N H OF ONE ZERO ONE NINER		
Manchester	G-CFLT	SPECIAL V F R NOT ABOVE TWO THOUSAND FEET ON ONE ZERO ONE NINE LIMA TANGO (* *) (*)	2130 1/2 2131	
G-CFLT	Manchester	GOLF LIMA TANGO AND ER RECOMMENDED TRACK FOR SHAWBURY IS ONE NINER ZERO		

To	From	RECORDED INTELLIGENCE	Time	Remarks
Manchester	G-CFLT	ROGER TURNING LEFT ONTO ONE NINE ZERO LIMA TANGO (* *)	2131 1/2	
G-CFLT	Manchester	GOLF LIMA TANGO YOU'RE SIXTEEN MILES TO THE NORTHEAST OF MANCHESTER AIRFIELD AND THIS IS A RADAR INFORMATION SERVICE		
Manchester	G-CFLT	(*) ROGER THAT'S COPIED RADAR INFORMATION LIMA TANGO	2132	
G-CFLT	Manchester	GOLF LIMA TANGO ARE SHAWBURY EXPECTING YOU		
Manchester	G-CFLT	(* *) NEGATIVE I'M JUST ROUTEING THROUGH THEIR OVERHEAD BEFORE TURNING ER SOUTHEASTBOUND FOR HEATHROW	2132 1/2	
G-CFLT	Manchester	ROGER		
Manchester	G-CFLT	AND LIMA TANGO THAT'S JUST TO AVOID THE HIGH GROUND TO THE SOUTH OF MANCHESTER		
G-CFLT	Manchester	-GER		Part word '-ger'
		(*)	2133	
		(* *)	2133 1/2	
		(*)	2134	
G-CFLT	Manchester	GOLF LIMA TANGO TO KEEP YOU CLEAR OF LIVERPOOL'S AIRSPACE MAKE YOUR HEADING NOT GREATER THAN ONE EIGHT ZERO UNTIL ADVISED		

To	From	RECORDED INTELLIGENCE	Time	Remarks
Manchester	G-CFLT	ROGER ONE EIGHT ZERO 'TIL ADVISED LIMA TANGO		
?	?	- (**)	2134 1/2	Mic switched/Origin unknown
?	?	-		Mic switched/Origin unknown
		(*)	2135	
?	?	-		Mic switched/origin unknown
		(**)	2135 1/2	
?	?	-		Mic switched/origin unknown
		(*)	2136	
?	?	(**) -	2136 1/2	Mic switched/origin unknown
?	?	(*) -	2137	Mic switched/origin unknown
		(**)	2137 1/2	
G-CFLT	Manchester	(*) GOLF LIMA TANGO JUST CONFIRMING NOT ABOVE TWO THOUSAND FEET STILL	2138	
Manchester	G-CFLT	THAT'S AFFIRM I'M ACTUALLY AT SIXTEEN HUNDRED FEET		
G-CFLT	Manchester	ZULU TANGO THANKYOU		Sic 'zulu'

To	From	RECORDED INTELLIGENCE	Time	Remarks
G-CFLT	Manchester	AND GOLF LIMA TANGO JUST CONFIRM THAT YOU SPECIFICALLY WISH TO ROUTE VIA THE SHAWBURY OVERHEAD		
Manchester	G-CFLT	NEGATIVE I JUST WANT TO AVOID THE HIGH GROUND TO THE SOUTH OF YOU ERM WHEN CONVENIENT I'LL TURN TOWARDS BIRMINGHAM		
		ROGER (* *)	2138 1/2	
		(*)	2139	No transmissions made between these times
		(*)	2141	
		(* *)	2141 1/2	
Manchester	G-CFLT	AND MANCHESTER LIMA TANGO COULD YOU GIVE ME THE LATEST BIRMINGHAM WEATHER		
G-CFLT	Manchester	GOLF LIMA TANGO JUST STANDBY FOR THAT		
G-CFLT	Manchester	GOLF LIMA TANGO JUST CONFIRM AGAIN THAT CALLSIGN PLEASE IS IT GOLF FOXTROT INDIA LIMA TANGO		
Manchester	G-CFLT	NEGATIVE CHARLIE FOXTROT LIMA TANGO (*)	2142	
G-CFLT	Manchester	GOLF CHARLIE FOXTROT LIMA TANGO OKAY THANKS		
		(* *)	2142 1/2	

To	From	RECORDED INTELLIGENCE	Time	Remarks
G-CFLT	Manchester	GOLF LIMA TANGO THE BIRMINGHAM WEATHER AND THIS IS THE TWENTY ONE TWENTY WEATHER SURFACE WIND IS ONE FIVE ZERO AT FIVE KNOTS ONE EIGHT KILOMETRES BROKEN CLOUD AT TWO THOUSAND FEET BROKEN CLOUD AT FOUR FIVE ZERO ZERO FEET TEMPERATURE IS PLUS ONE THREE AND THE QNH ONE ZERO TWO ZERO		
Manchester	G-CFLT	THAT'S COPIED THANKS VERY MUCH LIMA TANGO (*)	2143	No transmissions made between these times
G-CFLT	Manchester	(*) (* *) GOLF LIMA TANGO ER SUGGESTED TRACK FOR BIRMINGHAM OVERHEAD IS ONE FIVE ZERO DEGREES	2146	
Manchester	G-CFLT	ROGER COMING LEFT ONTO ONE FIVE ZERO LIMA TANGO	2146 1/2	
G-CFLT	Manchester	GOLF LIMA TANGO I'M JUST CONFIRMING THAT'S A SUGGESTED TRACK THE WIND MAY DRIFT YOU A LITTLE BIT		
Manchester	G-CFLT	ROGER THAT'S COPIED (*)	2147	
G-CFLT	Manchester	GOLF LIMA TANGO JUST CONFIRMING THAT YOU'RE RESPONSIBLE FOR YOUR OWN TERRAIN CLEARANCE DO YOU REQUIRE FURTHER CLIMB		
Manchester	G-CFLT	ER NEGATIVE NOT AT THE MOMENT		

To	From	RECORDED INTELLIGENCE	Time	Remarks
G-CFLT Manchester	Manchester G-CFLT	(* *) OKAY AND LIMA TANGO YES I REQUEST A CLIMB PLEASE TO I THINK WE'LL GO FOR THREE THOUSAND FEET	2147 1/2	
G-CFLT	Manchester	GOLF LIMA TANGO ROGER NOT ABOVE THREE THOUSAND FEET MANCHESTER Q N H ONE ZERO ONE NINER WITHOUT LETTING ME KNOW PLEASE		
Manchester	G-CFLT	- KAY ON ONE ZERO ONE NINE LIMA TANGO (*)	2148	Clipped transmission
Manchester	G-CFLT	(* *) AND LIMA TANGO REQUESTING A HEADING FOR STRAIGHT BACK TO THE FIELD FOR MANCHESTER PLEASE	2148 1/2	
G-CFLT	Manchester	GOLF LIMA TANGO DO YOU HAVE A PROBLEM		
Manchester	G-CFLT	ER AFFIRM I'M INADVERTENT INDIA MIKE		
G-CFLT	Manchester	LIMA TANGO SAY AGAIN		
Manchester	G-CFLT	I'M INDIA MIKE AND REQUESTING A FURTHER CLIMB ABOVE THREE THOUSAND FEET		
G-CFLT	Manchester	GOLF LIMA TANGO ER ROGER YOU MAY CLIMB ABOVE THREE THOUSAND FEET LET ME KNOW WHAT LEVEL YOU STOP AT AND ARE YOU LOOKING FOR VECTORS (*) TO THE IL S OR WHAT SORT OF APPROACH	2149	

To	From	RECORDED INTELLIGENCE	Time	Remarks
Manchester	G-CFLT	YEAH I'M LOOKING FOR VECTORS FOR AN I L S I THINK I'M IN A DESCENT AT THE MOMENT HOLD ON (**)	2149 1/2	Buzzing noise audible at end of transmission
G-CFLT	Manchester	GOLF LIMA TANGO FROM MANCHESTER		
G-CFLT	Manchester	GOLF LIMA TANGO FROM MANCHESTER (*) (**)	2150 2150 1/2	
G-CFLT	Manchester	GOLF CHARLIE FOXTROT LIMA (*) TANGO (**) (*)	2151 2151 1/2 2152	

Explanatory Notes

1. Time Signals may be injected into the recorder automatically by a time injection unit or orally. These signals may or may not occur simultaneously with speech, but for clarity are bracketed and entered in Column 4 either in their correct position or immediately after the word in which the time signal occurred. They are entered again in column 5 to assist in the interpretation of the log.
2. The entries in Columns 1 and 2 have been made to assist in the interpretation of the log, and they do not necessarily occur on the recording. These entries represent the opinion of the transcriber and are based on his knowledge of the recording.
3. All significant pauses in a message are indicated by a space of about half an inch. Where possible, the approximate duration of such pauses is indicated in Column 5.
4. Words that are doubtful are indicated in Column 3 by a series of question marks at the appropriate place. Where possible, the duration or number of such words and/or a probable interpretation of them is given in Column 5.
5. Words that are unintelligible are indicated in Column 3 by a series of question marks at the appropriate place. In addition, the word 'Unintelligible' and where possible the number or duration of the missing words are entered in Column 5.
6. Further to Note 1. The time signals used with the recording from which this transcript was prepared were obtained from a digital timing device. The time indicated on the digital display is shown in Column 4. In Column 3 the asterisk indicates the time relative to the recorded speech, at which the digital time, quoted in Column 4, occurs.

APPENDIX C

METEOROLOGICAL DATA

1 Meteorological aftercast

An aftercast provided by the World Area Forecasting Centre London (part of the National Meteorological Office) described the weather as follows:

A south to south-westerly airstream covered the route with nil weather near Winsford. The visibility in the Winsford area was more than 10 km but there were isolated hill fog patches over the southern Pennines and Welsh Hills. The freezing level was at 11,000 feet. There were two layers of low altitude cloud: one scattered layer with a base of 1,200 to 1,500 feet amsl and above that, a second, broken layer with a base between 2,000 and 2,500 feet amsl and tops at 3,500 feet amsl. The average winds and temperatures were:

Altitude Feet amsl	Wind direction (°T) & speed (kt)	Air Temperature °C	Dewpoint °C
Surface	150/08	15	13
1,000 feet	170/15	13	10
2,000 feet	180/25	14	11

2 Pilot weather reports

The pilots of two police aviation services aircraft who arrived on scene shortly after the accident each made a weather report as follows:

The first pilot to arrive on scene (20 minutes after the crash) stated that the visibility was greater than 5 km and the lowest cloud was between two and three eighths cover at 1,300 feet above ground level with a wind of approximately 180° at 10 kt. He remained as high as possible for operational reasons to allow the second aircraft to attend the scene safely beneath his orbit.

The second pilot to arrive stated that the lowest cloud was between six and eight eighths cover with a base between 1,200 and 1,400 feet amsl (1,050 to 1,250 feet agl). Visibility beneath the cloud was 12 to 14 km.

3

Manchester Airport weather

Routine weather observations were recorded at Manchester International Airport which was 12 nm north-north-east of the crash site. The following table shows the observations recorded before and after the accident:

Time (UTC)	Mean Surface Wind (DegT/kt)	Visibility (km)	Cloud (agl)	Temp/ Dewpoint °C	QNH (HPa)
2020	160/09 110/200*	more than 10	Few 1,000 Scattered 1,500 Overcast 2,000	16/12	1019
2050	160/09 110/200*	more than 10	Few 1,000 Scattered 1,500 Overcast 2,000	16/13	1019
2120	160/07 110/230*	more than 10	Few 1,400 Overcast 2,000	16/13	1019
2150	150/08 090/200*	more than 10	Few 1,600 Overcast 2,000	16/13	1019
2220	160/06 110/200*	more than 10	Few 1,200 Scattered 1,500 Overcast 2,000	16/13	1019

* Indicates the extremities in direction of a variable wind (eg at 2020 hrs the wind direction was variable between the extremes of 110° and 200°)

'Few' means a quarter or less of the sky covered by cloud

'Scattered' means between a quarter and a half of the sky is covered

'Overcast' means unbroken coverage.

4

Witnesses

In their statements, 19 witnesses each gave a brief description of the weather at the time of the accident. Their opinions on the extent of cloud coverage varied yet everyone reported that the visibility was good, that there was no fog or mist, and that the wind was light.

Route forecast

Before departure from Bolton, the commander obtained a route forecast from the meteorological office at a military airfield. The brief written record of this verbal forecast kept at the office is reproduced as follows:

SCT ST at MM, OVC/BKN 010 on hills to S. Head W to M'ways then S to OS BB LL Vis gen 10-12KM, LOC 5000M, cloud ^ 2000 FTAMSL OS-^BB then NSC.

Converted to text, this code means:

'Scattered stratus at Manchester, overcast or broken at 1,000 feet on hills to the south. Head west to motorways then south to Shawbury, Birmingham and Heathrow. Visibility generally ten to twelve kilometres, locally five kilometres. Cloud approximately 2,000 feet above mean sea level from Shawbury to approximately Birmingham then no significant cloud.'

Commercially available meteorological information

Several aviation weather forecasts and reports are commercially available by telephone or facsimile machine at premium call rates (beginning with 0891). The service is automated and updated regularly and there was no restriction placed on the commander's mobile telephone which prevented him from accessing the premium rate telephone numbers. He could, if he had wished, have obtained actual and forecast weather information for Manchester, Birmingham and Heathrow Airports using his mobile telephone. He could also have accessed the appropriate 'Airmet Area Forecast Central England' in the same way. This forecast would have been a recorded voice message without access to a forecaster or route advice, but it would have been valid for the entire route from Bolton to Heathrow. The forecast, issued at 1600 hrs and valid for the period 1700 hrs to 0100 hrs is shown below. Explanatory notes, which would not have been part of the forecast, are in italic text contained in brackets.

MET SITUATION: STABLE SOUTHERLY FLOW COVERS THE REGION

STRONG WIND WARNING; SURFACE WINDS WILL GUST 20-25KT, ESPECIALLY EXPOSED COASTS AND HILLS.

WINDS:

1000FT: 180/15KT PS13 (+13°C)

3000FT: 200/25KT PS 13

6000FT 190/20KT PS 12

FREEZING LEVEL: 12000 FT

WEATHER-CONDITIONS:

GENERALLY 15KM WITH 3-6/8 STRATO-CUMULUS 2000FT/4000 (*ie three to six eighths coverage, base 2000 ft tops 4000ft*) AND NIL TO 4/8 ALTO-CUMULUS 10000FT/14000.

OCCASIONAL, MAINLY IN EAST, 12 KM WITH 1-3/8 STRATO-CUMULUS 1500FT/2500 AND 4-7/8 SC 4000FT/8000. ISOLATED, MAINLY SOUTHERN FACING HILLS IN WEST, 6 KM IN PATCHY DRIZZLE WITH 3-5/8 STRATUS 800FT/1500, AND 8/8 STRATO-CUMULUS 1500FT/5000

WARNING: CLOUD ON HILLS. MODERATE ICING AND MODERATE TURBULENCE IN CLOUD, OCCASIONAL MODERATE TURBULENCE BELOW 5000FT IN WEST. MOUNTAIN WAVES, MAXIMUM VERTICAL SPEED 450 FEET PER MINUTE AT 6000FT

OUTLOOK: UNTIL OCT23/0900Z:

LITTLE GENERAL CHANGE.

ENTIRE GROUND TRACK FLOWN BY G-CFLT

(Using composite radar data)



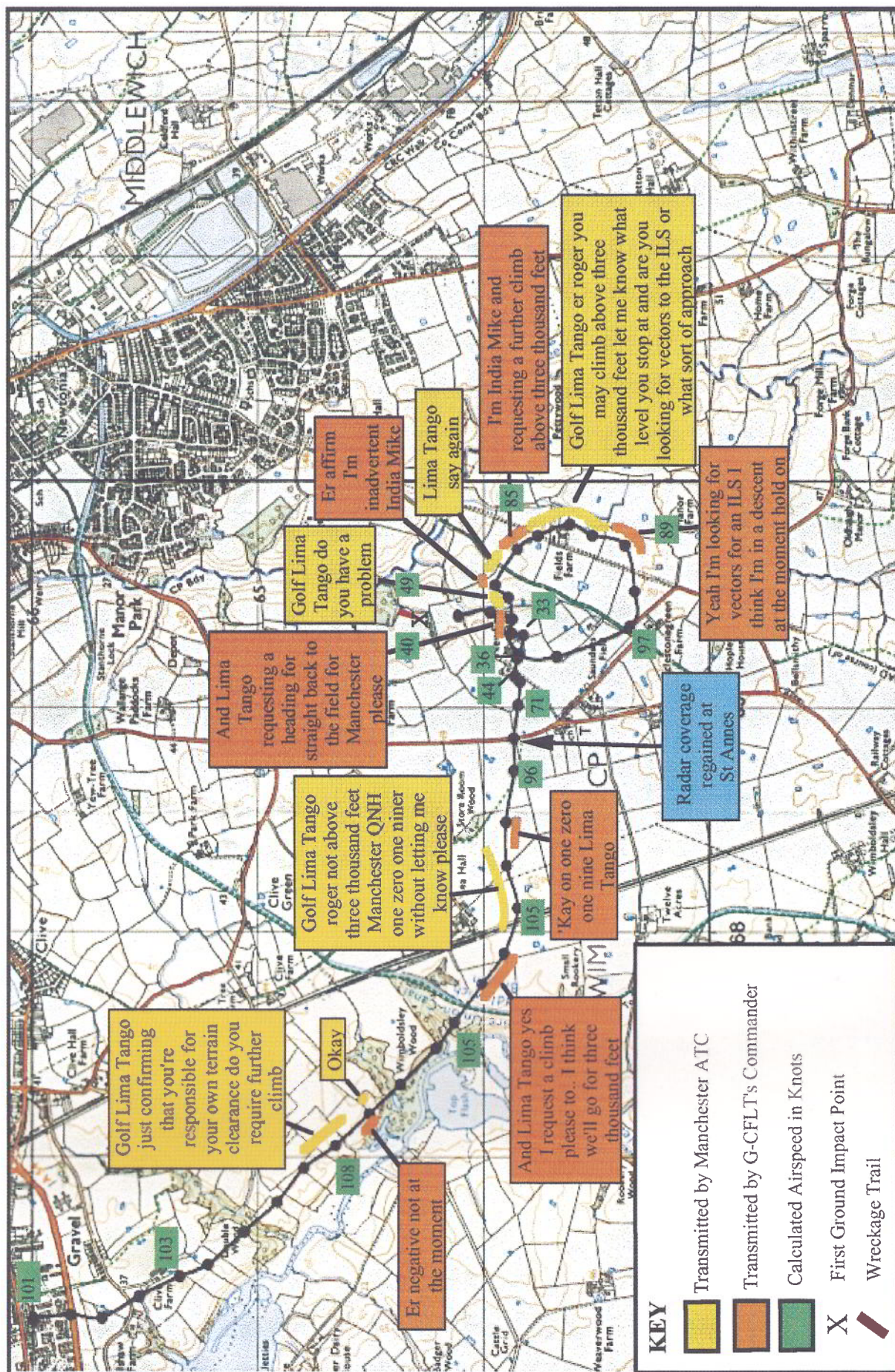
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HELICOPTER'S PROJECTED FLIGHTPATH



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FINAL AIRCRAFT TRACK WITH RADIO TRANSMISSIONS AND CALCULATED AIRSPEEDS



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EXTRACTS FROM CAP 393
AIR NAVIGATION: THE ORDER AND THE REGULATIONS

DEFINITIONS

The following definitions have been extracted from Article 118 of THE AIR NAVIGATION (NO. 2) ORDER 1995 and Section I of the RULES OF THE AIR REGULATIONS 1996:

‘Visual Meteorological Conditions’ means weather permitting flight in accordance with the Visual Flight Rules.

‘Instrument Meteorological Conditions’ means weather precluding flight in compliance with the Visual Flight Rules.

‘IFR flight’ means a flight conducted in accordance with the Instrument Flight Rules in Section VI of the Rules of the Air Regulations.

‘Special VFR flight’ means a flight made at any time in a control zone which is Class A airspace, or in any other control zone in Instrument Meteorological Conditions or at night, in respect of which the appropriate air traffic control unit has given permission for the flight to be made in accordance with special instructions given by that unit instead of in accordance with the Instrument Flight Rules and in the course of which flight the aircraft complies with any instructions given by that unit and remains clear of cloud and in sight of the surface.

‘VFR flight’ means a flight conducted in accordance with the Visual Flight Rules in Section V of the Rules of the Air Regulations.

The following extract is taken from the RULES OF THE AIR REGULATIONS 1996. The extract uses the same paragraph numbers, words and basic formatting as the original document. The paragraph numbers in the following section are referred to as "Rule 22" etc.

Choice of VFR or IFR

- 22 (1) Subject to paragraph (2) and to the provisions of rule 21 an aircraft shall always be flown in accordance with the Visual Flight Rules or the Instrument Flight Rules.
- (2) In the United Kingdom an aircraft flying at night:
- (a) outside a control zone shall be flown in accordance with the Instrument Flight Rules; or
- (b) in a control zone shall be flown in accordance with the Instrument Flight Rules unless it is flying on a special VFR flight.

Speed Limitation

- 23 (Rule 23 was not applicable to this helicopter flight and the rule has been omitted in the interests of brevity)

SECTION V VISUAL FLIGHT RULES

Visual flight and reported visibility

- 24 (1) In relation to flights within controlled airspace rules 25 and 27 shall be the Visual Flight Rules.
- (2) In relation to flights outside controlled airspace rule 26 shall be the Visual Flight Rules.
- (3) For the purposes of an aeroplane taking off from or approaching to land at an aerodrome within Class B, C or D airspace, the visibility, if any, communicated to the commander of an aeroplane by the appropriate air traffic control unit shall be taken to be the flight visibility for the time being.

Flight within controlled airspace

- 25 (1) Within Class B airspace:
- (a) an aircraft flying within Class B airspace at or above flight level 100 shall remain clear of cloud and in a flight visibility of at least 8 km;
 - (b) an aircraft flying within Class B airspace below flight level 100 shall remain clear of cloud and in a flight visibility of at least 5 km.
- (2) Within Class C, Class D or Class E airspace:
- (a) an aircraft flying within Class C, Class D or Class E airspace at or above flight level 100 shall remain at least 1500 metres horizontally and 1000 feet vertically away from cloud and in a flight visibility of at least 8 km;
 - (b) subject to sub-paragraph (c), an aircraft flying within Class C, Class D or Class E airspace below flight level 100 shall remain at least 1500 metres horizontally and 1000 feet vertically away from cloud and in a flight visibility of at least 5 km;
 - (c) sub-paragraph (b) shall be deemed to be complied with if:
 - (i) the aircraft is not a helicopter and is flying at or below 3000 feet above mean sea level at a speed which, according to its airspeed indicator, is 140 knots or less and it remains clear of cloud, in sight of the surface and in a flight visibility of at least 5 km; or
 - (ii) the aircraft is a helicopter flying at or below 3000 feet above mean sea level and it remains clear of cloud and in sight of the surface.

Flight outside controlled airspace

- 26 (1) An aircraft flying outside controlled airspace at or above flight level 100 shall remain at least 1500 metres horizontally and 1000 feet vertically away from cloud and in a flight visibility of at least 8 km.
- (2) (a) Subject to sub-paragraph (b), an aircraft flying outside controlled airspace below flight level 100 shall remain at least 1500 metres horizontally and 1000 feet vertically away from cloud and in a flight visibility of at least 5 km.
- (b) Sub-paragraph (a) shall be deemed to be complied with if:
- (i) the aircraft is flying at or below 3000 feet above mean sea level and remains clear of cloud and in sight of the surface and in a flight visibility of at least 5 km;
 - (ii) the aircraft, other than a helicopter, is flying at or below 3000 feet above mean sea level at a speed which according to its air speed indicator is 140 knots or less and remains clear of cloud and in sight of the surface and in flight visibility of at least 1500 metres; or
 - (iii) in the case of a helicopter the helicopter is flying at or below 3000 feet above mean sea level flying at a speed, which having regard to the visibility is reasonable, and remains clear of cloud and in sight of the surface.

VFR flight plan and air traffic control clearance

- 27 (Rule 27 was not applicable to this helicopter flight and has been omitted in the interests of brevity)

SECTION VI INSTRUMENT FLIGHT RULES

Instrument Flight Rules

- 28 (1) In relation to flights within controlled airspace rules 29, 31 and 32 shall be the Instrument Flight Rules.
- (2) In relation to flights outside controlled airspace rules 29 and 30 shall be the Instrument Flight Rules.

Minimum height

- 29 Without prejudice to the provisions of rule 5, in order to comply with the Instrument Flight Rules an aircraft shall not fly at a height of less than 1000 feet above the highest obstacle within a distance of 5 nautical miles of the aircraft unless:
- (a) it is necessary for the aircraft to do so in order to take off or land;
 - (b) the aircraft is flying on a route notified for the purposes of this rule;
 - (c) the aircraft has been otherwise authorised by the competent authority; or
 - (d) the aircraft is flying at an altitude not exceeding 3000 feet above mean sea level and remains clear of cloud and in sight of the surface.

Quadrantal rule and semi-circular rule

- 30 (1) Subject to paragraph (2), in order to comply with the Instrument Flight Rules, an aircraft when in level flight above 3000 feet above mean sea level or above the appropriate transition altitude, whichever is the higher, shall be flown at a level appropriate to its magnetic track, in accordance with the appropriate Table set forth in this rule. The level of flight shall be measured by an altimeter set:
- (a) in the case of a flight over the United Kingdom, to a pressure setting of 1013.2 hectopascals; or
 - (b) in the case of any other flight, according to the system published by the competent authority in relation to the area over which the aircraft is flying.
- (2) An aircraft may be flown at a level other than the level required by paragraph (1) if it is flying in conformity with instructions given by an air traffic control unit or in accordance with notified en-route holding patterns or in accordance with holding procedures notified in relation to an aerodrome.
- (3) For the purposes of this rule 'transition altitude' means the altitude so notified in relation to flight over such area or areas as may be notified.

TABLE I - Flights at levels below 24 500 feet

<i>Magnetic Track</i>	<i>Cruising Level</i>
Less than 90°	Odd thousands of feet
90° but less than 180°	Odd thousands of feet + 500 feet
180° but less than 270°	Even thousands of feet
270° but less than 360°	Even thousands of feet + 500 feet

TABLE II - Flights at levels above 24 500 feet

(This table is not generally applicable to helicopter flights and has been omitted)

The following extract is taken from Schedule 8 to Article 22 (*Grant, renewal and effect of flight crew licences*) of the AIR NAVIGATION ORDER JUNE 1996.

The extract uses the same words and basic formatting as the original document. The privileges of licences other than the ATPL and CPL for helicopter pilots have been omitted.

Airline Transport Pilot's Licence (Helicopters and Gyroplanes)

Minimum Age - 21 years

Maximum period of validity - 10 years

Privileges:

The holder of the licence shall be entitled to exercise the privileges of a Commercial Pilot's Licence (Helicopters and Gyroplanes) except that sub-paragraph (2)(b)(ii) of those privileges shall not apply and the holder of the licence shall not at any time after he attains the age of 60 years act as pilot in command or co-pilot of any helicopter or gyroplane for the purpose of public transport if its maximum total weight authorised exceeds 20 000 kg.

Commercial Pilot's Licence (Helicopters and Gyroplanes)

Minimum Age - 18 years

Maximum period of validity - 10 years

Privileges:

- (1) The holder of the licence shall be entitled to exercise the privileges of a Private Pilot's Licence (Helicopters and Gyroplanes) which includes a night rating (helicopters and gyroplanes).
- (2)
 - (a) Subject to sub-paragraph (b), he shall be entitled to fly as pilot in command of any helicopter or gyroplane specified in Part 1 of the aircraft rating included in the licence when the helicopter or gyroplane is engaged on a flight for any purpose whatsoever.
 - (b)
 - (i) He shall not, unless his licence includes an instrument rating (helicopters) fly such a helicopter on any scheduled journey or on any flight for the purpose of public transport other than in visual meteorological conditions.
 - (ii) He shall not fly such a helicopter or gyroplane on a flight for the purpose of public transport unless it is certificated for single pilot operation.

- (iii) He shall not fly such a gyroplane at night unless he has within the immediately preceding 13 months carried out as pilot in command not less than 5 take-offs and 5 landings at a time when the depression of the centre of the sun was not less than 12° below the horizon.
 - (iv) He shall not fly such a helicopter at night unless his licence includes an instrument rating (helicopters) or he has within the immediately preceding 13 months carried out as pilot in command not less than 5 flights, each consisting of a take-off, a transition from hover to forward flight, a climb to at least 500 ft and a landing, at a time when the depression of the centre of the sun was not less than 12° below the horizon.
 - (v) He shall not fly such a helicopter or gyroplane on any flight for the purpose of public transport after he attains the age of 60 years unless the helicopter or gyroplane is fitted with dual controls and carries a second pilot who has not attained the age of 60 years and who holds an appropriate licence under this Order entitling him to act as pilot in command or co-pilot of that helicopter or gyroplane.
 - (vi) He shall not unless his licence includes an instrument rating (helicopters) fly as pilot in command or co-pilot of such a helicopter flying in Class A, B or C airspace in circumstances which require compliance with the Instrument Flight Rules.
- (3) (a) Subject to sub-paragraph (b), he shall be entitled to fly as co-pilot of any helicopter or gyroplane specified in the aircraft rating included in the licence when the helicopter or gyroplane is engaged on a flight for any purpose whatsoever.
 - (b) He shall not act as co-pilot of any helicopter or gyroplane whose maximum total weight authorised exceeds 20 000 kg on any flight for the purpose of public transport after he attains the age of 60 years.
- (4) He shall not at any time after he attains the age of 65 years act as pilot in command or co-pilot of any helicopter or gyroplane on a flight for the purpose of public transport.

APPENDIX F

EXTRACT FROM JAR-OPS 3 COMMERCIAL AIR TRANSPORTATION (HELICOPTERS)

SECTION 1

JAR-OPS 3 Subpart K

SUBPART K—INSTRUMENTS AND EQUIPMENT

JAR-OPS 3.652 IFR or night operations - Flight and navigational instruments and associated equipment

(See AMC OPS 3.650/3.652)

(See IEM OPS 3.650/3.652)

An operator shall not operate a helicopter in accordance with Instrument Flight Rules (IFR) or by night in accordance with Visual Flight Rules (VFR) unless it is equipped with the flight and navigational instruments and associated equipment and, where applicable, under the conditions stated in the following sub-paragraphs:

- (a) A magnetic compass;
- (b) An accurate timepiece showing the time in hours, minutes and seconds;
- (c) Two sensitive pressure altimeters calibrated in feet with sub-scale settings, calibrated in hectopascals/millibars, adjustable for any barometric pressure likely to be set during flight;
- (d) An airspeed indicating system with heated pitot tube or equivalent means for preventing malfunctioning due to either condensation or icing including a warning indication of pitot heater failure. The pitot heater failure warning indication requirement does not apply to those helicopters with a maximum approved passenger seating configuration of 9 or less or a maximum certificated take-off mass of 2730 kg or less and issued with an individual Certificate of Airworthiness prior to 1 April 1998 (see AMC OPS 3.652(d) & (m)(2));

Note: Applicability Date 1 April 1999 (for the pitot heater failure warning indication).

- (e) A vertical speed indicator;
- (f) A slip indicator;
- (g) An attitude indicator;
- (h) A single standby attitude indicator (artificial horizon) capable of being used from either pilot's station that:
 - (1) Provides reliable operation for a minimum of 30 minutes or the time required to fly to a suitable alternate landing site when operating over hostile terrain or offshore, whichever is the greater, after total failure of the normal electrical generating system, taking into account other loads on the emergency power supply and operational procedures;

(2) Operates independently of any other attitude indicating system;

(3) Is operative automatically after total failure of the normal electrical generating system; and

(4) Is appropriately illuminated during all phases of operation;

(i) In complying with sub-paragraph (h) above, it must be clearly evident to the flight crew when the standby attitude indicator, required by that paragraph, is being operated by emergency power. Where the standby attitude indicator has its own dedicated power supply there shall be an associated indication clearly visible when this supply is in use.

(j) A stabilised direction indicator;

(k) A means of indicating in the flight crew compartment the outside air temperature calibrated in degrees celsius (see AMC OPS 3.650 (g) & 3.652(k)); and

(l) An alternate source of static pressure for the altimeter and the airspeed and vertical speed indicators; and

(m) Whenever two pilots are required the second pilot's station shall have separate instruments as follows:

(1) A sensitive pressure altimeter calibrated in feet with a sub-scale setting, calibrated in hectopascals/millibars, adjustable for any barometric pressure setting likely to be encountered during flight which may be one of the two altimeters required by sub-paragraph (c) above;

(2) An airspeed indicating system with heated pitot tube or equivalent means for preventing malfunctioning due to either condensation or icing including a warning indication of pitot heater failure. The pitot heater failure warning indication requirement does not apply to those helicopters with a maximum approved passenger seating configuration of 9 or less or a MCTOM of 2730 kg or less and issued with an individual Certificate of Airworthiness prior to 1 April 1998 (see AMC OPS 3.652(d) and (m)(2));

Note: Applicability Date 1 April 1999 (for the pitot heater failure warning indication).

(3) A vertical speed indicator;

(4) A turn and slip indicator;

(5) An attitude indicator; and

(6) A stabilised direction indicator.

(n) Whenever two pilots are required the following equipment must be installed:

(1) A headset with microphone or equivalent and a transmit button on the flight controls; and

(2) A chart holder in an easily readable position which can be illuminated for night operations.

(o) Whenever duplicate instruments are required, the requirement embraces separate displays for each pilot and separate selectors or other associated equipment where appropriate; and

(p) All helicopters must be equipped with means for indicating when power is not adequately supplied to the required flight instruments.

**JAR-OPS 3.655 Additional equipment for
single pilot operation under
IFR or at night**

(a) An operator shall not conduct single pilot IFR operations unless the following equipment is installed:

(1) An autopilot with at least altitude hold and heading mode; and

(2) A headset with microphone or equivalent and a transmit button on the flight controls. (See IEM OPS 3.655(a)(2).)

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SECTION 1

JAR-OPS 3 Subpart N

SUBPART N - FLIGHT CREW

JAR-OPS 3.940 Composition of Flight Crew

(See Appendix 1 to JAR-OPS 3.940)

(a) An operator shall ensure that:

(1) The composition of the flight crew and the number of flight crew members at designated crew stations are both in compliance with, and no less than the minimum specified in, the Helicopter Flight Manual;

(2) The flight crew includes additional flight crew members when required by the type of operation, and is not reduced below the number specified in the Operations Manual;

(3) All flight crew members hold an applicable and valid licence acceptable to the Authority and are suitably qualified and competent to conduct the duties assigned to them;

(4) Procedures are established, acceptable to the Authority, to prevent the crewing together of inexperienced flight crew members; and

(5) One pilot amongst the flight crew is designated as the commander who may delegate the conduct of the flight to another suitably qualified pilot.

(b) *Pilots.* An operator shall ensure that:

(1) Commanders and co-pilots on an IFR flight hold a valid instrument rating;

(2) For IFR operations using helicopters with a maximum approved passenger seating configuration of more than 19:

(i) The minimum flight crew is two qualified pilots; and

(ii) The commander holds a valid Airline Transport Pilot's Licence (Helicopter) (ATPL(H));

(3) For operations using helicopters with a maximum approved passenger seating configuration of more than 19:

(i) The minimum flight crew is two qualified pilots;

(ii) The commander holds a valid Airline Transport Pilot's Licence (Helicopter) (ATPL(H)).

(c) Helicopters not covered by sub-paragraph (b)(2) above may be operated by a single pilot provided that the requirements of Appendix I to JAR-OPS 3.940 are satisfied.

JAR-OPS 3.945 Conversion Training and checking

(See AMC OPS 3.945)

(See IEM OPS 3.945)

(a) An operator shall ensure that:

(1) A flight crew member completes a Type Rating course which satisfies the applicable requirements of JAR-FCL when changing from one type of helicopter to another type for which a new type rating is required;

(2) A flight crew member completes an operator's conversion course before commencing unsupervised line flying;

(i) When changing to a helicopter for which a new type rating is required; or

(ii) When changing operator;

(3) Conversion training is conducted by suitably qualified persons in accordance with a detailed course syllabus included in the Operations Manual acceptable to the Authority;

(4) The amount of training required by the operator's conversion course is determined after due note has been taken of the flight crew member's previous training as recorded in his training records prescribed in JAR-OPS 3.985;

(5) The minimum standards of qualification and experience required of flight crew members before undertaking conversion training are specified in the Operations Manual;

(6) Each flight crew member undergoes the checks required by JAR-OPS 3.965(b) and the training and checks required by JAR-OPS 3.965(d) before commencing line flying under supervision;

(7) Upon completion of line flying under supervision, the check required by JAR-OPS 3.965(c) is undertaken;

(8) Once an operator's conversion course has been commenced, a flight crew member does not undertake flying duties on another type until the course is completed or terminated; and

(9) Crew Resource Management training is incorporated in the conversion course.

(b) In the case of changing helicopter type, the check required by 3.965(b) may be combined with the type rating skill test required by JAR-FCL.

(c) The operator's conversion course and the Type Rating course required by JAR-FCL may be combined.

JAR-OPS 3.950 Differences Training and Familiarisation training

(a) An operator shall ensure that a flight crew member completes:

(1) *Differences training*

- (i) When operating another variant of a helicopter of the same type currently operated; or
- (ii) When a change of equipment and/or procedures on types or variants currently operated, requires additional knowledge and training on an appropriate training device.

(2) *Familiarisation training*

- (i) When operating another helicopter of the same type or variant; or
- (ii) When a change of equipment and/or procedures on the type or variant currently operated, requires the acquisition of additional knowledge.

(b) The operator shall specify in the Operations Manual when such differences training or familiarisation training is required.

JAR-OPS 3.960 Commanders-Minimum Qualification Requirements

(a) The minimum qualification requirements for a commander are either:

(1) An Airline Transport Pilot Licence (Helicopter) (ATPL(H)); or

(2) A Commercial Pilot's Licence (Helicopter) (CPL(H)), provided that when conducting operations under instrument flight rules (IFR) as commander, the commander has a minimum of 700 hours total flight time on helicopters which includes 300 hours as pilot-in-command and 100 hours under IFR. The 300 hours as pilot-in-command may be substituted by co-pilot hours on a 2 for 1 basis provided those hours were gained within an established two pilot crew concept system described in the Operations Manual.

JAR-OPS 3.965 Recurrent Training and Checking

(See Appendix 1 to JAR-OPS 3.965)

(See AMC OPS 3.965)

(See IEM OPS 3.965)

(a) *General* - An operator shall ensure that:

(1) Each flight crew member undergoes recurrent training and checking and that all such training and checking is relevant to the type or variant of helicopter on which the crew member is certificated to operate;

(2) A recurrent training and checking programme is established in the Operations Manual and approved by the Authority;

(3) Recurrent training is conducted by the following personnel:

- (i) *Ground and refresher training* - by a suitably qualified person;
- (ii) *Helicopter/flight simulator training* - by a Type Rating Instructor/ Examiner or by a Type Rating Instructor (synthetic flight instruction);
- (iii) *Emergency and safety equipment training and checking* - by suitably qualified personnel; and
- (iv) *Crew Resource Management (CRM) training* - by suitably qualified personnel.

(4) Recurrent checking is conducted by the following personnel:

- (i) Operator proficiency checks by a Type Rating Examiner; and
- (ii) Line checks - by commanders nominated by the operator and acceptable to the Authority.

(5) Each flight crew member undergoes operator proficiency checks as part of a normal flight crew complement.

(b) *Operator Proficiency Check*

(1) An operator shall ensure that:

- (i) Each flight crew member undergoes operator proficiency checks to demonstrate his competence in carrying out normal, abnormal and emergency procedures; and
- (ii) The check must be conducted without external visual references, as appropriate, when it is likely that the crew member will be required to operate under IFR.

(2) The period of validity of an operator proficiency check shall be 6 calendar months in addition to the remainder of the month of issue. If issued within the final 3 calendar months of validity of a previous operator proficiency check, the period of validity shall extend from the date of issue until 6 calendar months from the expiry date of that previous operator proficiency check.

(c) *Line Check*. An operator shall ensure that each flight crew member undergoes a line check on the helicopter to demonstrate his competence in carrying out normal line operations described in the Operations Manual. The period of validity of a line check shall be 12 calendar months, in addition to the remainder of the month of issue. If issued within the final 3 calendar months of validity of a previous line check the period of validity shall extend from the date of issue until 12 calendar months from the expiry date of that previous line check.

(d) *Emergency and Safety Equipment training and checking.* An operator shall ensure that each flight crew member undergoes training and checking on the location and use of all emergency and safety equipment carried. The period of validity of an emergency and safety equipment check shall be 12 calendar months in addition to the remainder of the month of issue. If issued within the final 3 calendar months of validity of a previous emergency and safety check, the period of validity shall extend from the date of issue until 12 calendar months from the expiry date of that previous emergency and safety equipment check.

(e) *Crew Resource Management.* An operator shall ensure that each flight crew member undergoes Crew Resource Management training as part of recurrent training.

(f) *Ground and Refresher training.* An operator shall ensure that each flight crew member undergoes ground and refresher training every 12 calendar months.

JAR-OPS 3.970 Recent experience

(a) An operator shall ensure that, except as permitted in sub-paragraph (b) below, a pilot does not operate a helicopter unless he has carried out at least three take-offs, three circuits and three landings as handling pilot, in a helicopter or an approved flight simulator of the type to be used, in the preceding 90 days.

(b) The period in sub-paragraph (a) above may be extended up to a maximum of 120 days by flying on the line under the supervision of a nominated commander.

JAR-OPS3.975 Pilot in command- Route/ Role/Area Competence Qualification

(See AMC OPS 3.975)

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(a) An operator shall ensure that, prior to being assigned as pilot-in-command on a route, in a role or an area, the pilot has obtained adequate knowledge of the route to be flown and of the heliports (including alternates), facilities and procedures to be used.

(b) The period of validity of the route/role/area competence qualification shall be 12 calendar months in addition to the remainder of:

(1) The month of qualification; or

(2) The month of the latest operation on the route, in the role or area.

(c) The route/role/area competence qualification shall be revalidated by operating on the route, in the role or area within the period of validity prescribed in sub-paragraph (b) above.

(d) If revalidated within the final 3 calendar months of validity of previous route/role area competence qualification, the period of validity shall extend from the date of revalidation until 12 calendar months from the expiry date of that previous route/role/area competence qualification.

Appendix 1 to JAR-OPS 3.940
Single pilot operations under IFR or at night

(a) Helicopters referred to in JAR-OPS 3.940(c) may be operated by a single pilot under IFR or at night when the following requirements are satisfied:

(1) The operator shall include in the Operations Manual a pilot's conversion and recurrent training programme which includes the additional requirements for a single pilot operation;

(2) Training and Recency. Attention shall be given to cockpit procedures, especially in respect of:

(i) Engine management and emergency handling;

(ii) Use of normal, abnormal and emergency checklist;

(iii) ATC communication;

(iv) Cockpit procedures in respect of departure and approach;

(v) Autopilot management; and

(vi) Simplified in-flight documentation;

(3) The recurrent checks required by JAR-OPS 3.965 shall be performed in the single-pilot role on the particular helicopter type in an environment representative of the operation;

(4) The pilot shall have experience of IFR operations and on the type of helicopter concerned as follows:

(i) 25 hours total IFR flight experience in the relevant operating environment.

(ii) 25 hours flight experience on the specific type of helicopter, approved for single pilot IFR, of which 10 hours is as pilot-in-command or pilot-in-command under supervision, including 5 sectors of IFR line flying under supervision using the single pilot procedures.

(iii) Meet the Commanders minimum qualification requirements of JAR-OPS 3.960.

(5) The minimum required recent experience for a pilot engaged in a single-pilot operation under IFR or at night shall be 5 IFR flights, including 3 instrument approaches, carried out during the preceding 90 days on the helicopter type in the single-pilot role. This requirement may be replaced by an IFR instrument approach check on the helicopter type.

Note: Additional equipment requirements for alleviating pilot workload are prescribed in JAR-OPS 3.655.

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Appendix 1 to JAR-OPS 3.965
Recurrent training and checking

(a) Pilot proficiency checks. An operator shall ensure that:

(1) Where applicable, proficiency checks include the following abnormal/ emergency procedures:

- (i) Engine fire;
- (ii) Fuselage fire;
- (iii) Emergency operation of undercarriage;
- (iv) Fuel dumping;
- (v) Engine failure and relight;
- (vi) Hydraulic failure;
- (vii) Electrical failure;
- (viii) Engine failure during take-off before decision point;
- (ix) Engine failure during take-off after decision point;
- (x) Engine failure during landing before decision point;
- (xi) Engine failure during landing after decision point;
- (xii) Flight and engine control system malfunctions;
- (xiii) Recovery from unusual attitudes;
- (xiv) Landing with one or more engine(s) inoperative;
- (xv) IMC auto-rotation techniques;
- (xvi) Auto-rotation to a designated area;
- (xvii) Pilot incapacitation; and
- (xviii) Directional control failures and malfunctions.

(2) For pilots required to engage in IFR operations proficiency checks include the following additional abnormal/emergency procedures:

- (i) Precision instrument approach to minima with, in the case of multiengine helicopters, one engine inoperative;
- (ii) Go-around on instruments from minima with, in the case of multiengine helicopters with a simulated failure of one engine;
- (iii) Non precision approach to minima;
- (iv) Landing with a simulated failure of one or more engines; and
- (v) Where appropriate to the helicopter type, approach with flight control system/flight director system

malfunctions, flight instrument and navigation equipment failures.

(b) *Emergency and Safety Equipment*

(1) Every year the programme of practical training must include the following:

- (i) Donning of a lifejacket;
- (ii) Donning of smoke protection equipment if carried;
- (iii) Handling of fire extinguishers;
- (iv) Regular instruction on the location and use of all emergency and safety equipment carried on the helicopter;
- (v) Security procedures; and
- (vi) Dangerous goods transportation procedures.

(2) Every 3 years the programme of practical training must include the following:

- (i) Operation of all types of exits;
- (ii) Actual firefighting using equipment representative of that carried in the helicopter;
- (iii) Practical training and demonstration of the effects of smoke in an enclosed area;
- (iv) Handling of pyrotechnics where fitted;
- (v) Where fitted, demonstration in the use of the life-raft; and
- (vi) First aid.

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APPENDIX G

LETTERS ISSUED BY THE CIVIL AVIATION AUTHORITY IN RESPONSE TO THE AAIB's INTERIM RECOMMENDATIONS

The following two letters were issued by the CAA Safety Regulation Group on the dates shown at the head of each letter. The contents of the letters have been reproduced with the intention of using the same paragraph numbers, words, spelling and formatting as the original documents. Superfluous text and graphics at the head and foot of each letter have been omitted in the interests of brevity.

FIRST LETTER

Ref 10A/Z/2029

20 December 1996

To All Helicopter AOC Holders

Dear Sir

PUBLIC TRANSPORT FLIGHT AT NIGHT BY NON-INSTRUMENT RATED HELICOPTER PILOTS

Following recent post-accident discussions with the Aircraft Accidents Investigation Branch, the need to introduce more specific requirements for non-instrument rated pilots engaged in Public Transport flights by night has been agreed. This covers training requirements and operational procedures contained within Operations Manuals. The purpose of this letter is to bring the attention of Operators to these requirements, in order for them to be implemented.

CAP 360 Part One Chapter 5 requires that for helicopter pilots not in possession of an Instrument Rating and required to operate at night, line checks should include a night section and appropriate certification to that effect. Operators should ensure that non instrument rated helicopter pilots used for public transport flying at night, have received appropriate line checking that has been certified. In the event of non-compliance, such pilots should not be used on public transport night flights until the relevant section of the line check has been completed.

Operations Manuals currently address weather minima and en-route terrain clearance requirements, however, it is apparent that these need amplification. It is essential Operators specify weather minima that ensures flights cleared only for VMC remain clear of cloud at all

times. To this end, weather minima for VMC only aircraft and crews should be higher than if the aircraft and crew combination is fully IFR capable.

Operations Manuals should specify the following:-

1. That the minimum height for any flight at night shall be not less than 1,000 feet above the highest obstacle within 10 nms each side of track.
2. In the case of flights at night unable to operate under IMC, that the latest forecast and actual weather conditions for the route to be flown, indicate that no cloud will be present below a height of 500 feet above the minimum en-route altitude, including any temporary or intermittent deterioration.
3. In the case of a VMC-only flight at night encountering en-route weather conditions below those specified above, instructions for commanders to terminate the flight with guidance as to how this should be achieved.
4. For non instrument rated pilots operating public transport flights by night, the 6 monthly base checks should include training and testing in recovery from unusual attitudes. This shall be conducted by an IRE or a TRE under conditions of VMC and the pilot under test shall be under simulated instrument flight conditions. These conditions may be simulated by appropriate screens, goggles, or hood.

Operators are requested to enact the above requirements as soon as possible and in any case to ensure they are contained in Operations Manuals by the end of January 1997.

Yours sincerely

Acting Head Flight Operations Inspectorate (Helicopters)

SECOND LETTER

10A/F/AOC No

12 February 1997

Dear Sir

PUBLIC TRANSPORT HELICOPTER FLIGHTS AT NIGHT

On 20 December 1996, the acting Head of Flight Operations Inspectorate wrote to all addressees following a night public transport helicopter accident. The letter was entitled PUBLIC TRANSPORT AT NIGHT BY NON-INSTRUMENT RATED HELICOPTER PILOTS. Feedback from industry has prompted this letter, to expand on and clarify certain aspects of the previous letter, which was intended to be actioned only by the industry sector operating at night with non-instrument rated pilots.

It is important for industry to recognise that, in regulating night visual contact flights the Authority only provides a regulatory framework within which safe operations are possible. Individual operators have a responsibility not to despatch such flights in circumstances which might lead to safety margins being eroded. To some extent the responsibility can be discharged through operations manual requirements but, additionally, all operators must manage their operations actively and responsibly. For this type of flight the regulations encompass a broad range of aircraft equipment fit; pilot experience, competency and recency; and visual cueing availability ranging from better than that available in daytime VMC flight in poor conditions to a complete absence of such cues. It is therefore incumbent on operators to despatch flights only in circumstances which safely match their operating capabilities and the prevailing conditions.

When the helicopter can be flown with good visual surface reference obtained by natural (moon) and/or surface artificial lighting, over terrain without rapidly changing contours, it can be appropriate for flights to be operated with reduced clearance from obstacles. With suitably qualified crews and appropriately equipped aircraft, it is acceptable for visual contact flights to be operated with a reduction in clearance from forecast cloud. The following therefore, will apply to all operators, in addition to the basic requirements contained in the 20 December 1996 letter intended for those using non-instrument rated pilots, and should be incorporated in operations manuals.

Definitions

Basic Night Qualification ... Case A

A pilot, with a current night line check and who has received unusual attitudes training on the most recent base check.

Additional Night Qualification ...Case B

A pilot who has a current instrument rating; or a two pilot crew with basic night qualification; or a pilot with a basic night qualification and who has recent experience of the type of night flight to be operated which has included three night take-offs and landings in the last 90 days.

A Preferred Route ...Case C

A route over terrain which has significant ground features which are sufficiently illuminated to enable visual navigation (ie lit motorways, conurbations etc) or, in favourable weather and moonlight conditions, where visual navigation should be possible using ambient natural lighting, and in both cases over which the position of the helicopter can be fixed with reference to a navigation aid approved for use in controlled airspace (DECCA, GPS, VOR/DME etc).

An Instrument Equipped Aircraft and Crew ...Case D

A pilot or crew with current instrument ratings and an aircraft that is equipped to fly in IMC in controlled airspace.

Planning Minima Night Visual Contact Flight (Table A refers)

A pilot with ***basic night qualification (Case A)*** may use the following planning minima:

- Forecast cloud base ***1,500 ft*** above the highest obstacle within ***10 nm*** of the route.

A pilot with a current instrument rating flying an instrument equipped aircraft (***Case D***) may use the following planning minima:

- Forecast cloud ceiling ***1,200 ft*** above the highest obstacle within ***10 nm*** of the route, provided that the forecast weather conditions and the topography along the intended route would permit a diversion in IMC to a suitable alternate should that become necessary.

A crew with ***additional night qualification (Case B)*** flying over a ***preferred route (Case C)*** may use the following planning minima:

- Forecast cloud ceiling ***1,500 ft*** above the highest obstacle within ***5 nm*** of the route.

En-Route Deterioration

It is expected that a visual contact flight at night will be conducted at a minimum transit altitude which gives a clearance of at least 1,000 ft above ground level (AGL). With the exception of a pilot with the ***Basic Qualification (Case A)***, if Commanders encounter reductions in the

cloud base which oblige them to reduce their altitude to a clearance of not less than 500 ft AGL, they may accept such reductions provided that they are temporary and no requirements of Rule 5 of the Rules of the Air and Air Traffic Control are breached.

Table A

Conditions	Forecast Cloud Base/Ceiling	Distance from Obstacles En-Route	En-Route Deterioration
Case A	1,500 ft	10 nm	No
Case B+C	1,500 ft	5 nm	Yes
Case D	1,200 ft	10 nm	Yes

There have been queries from operators concerning the conduct of the unusual attitudes training specified in the earlier letter. Such training may, for safety reasons, need to be conducted by day, and when it is given by examiners who are not also Instrument Rating Renewal Examiners, they must have received instruction on and been assessed as being competent to conduct such training, by an IRE or TRE with current experience in giving such training.

Operators should note that the foregoing requirements are less onerous than those contained in JAR OPS 3, and that because of the impending implementation of the latter, CAP 360 will not be amended.

The contents of this letter will apply mainly to onshore operators of helicopters of less than 5700 kg although it is intended to also apply to larger aircraft operated onshore in visual contact conditions. Operators should produce suitable operations manual amendments by 15 March 1997.

Yours faithfully

Head of Flight Operations Inspectorate (Helicopters)