

ACCIDENT

Aircraft Type and Registration:	Robinson R44 II Raven, G-OSSI	
No & Type of Engines:	1 Lycoming IO-540-AE1A5 piston engine	
Year of Manufacture:	2004	
Date & Time (UTC):	3 August 2007 at 1836 hrs	
Location:	4 miles SSE of Kendal, Cumbria	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - 3
Injuries:	Crew - 1 (Fatal)	Passengers - 3 (Fatal)
Nature of Damage:	Aircraft destroyed	
Licence:	Pilot 1: Private Pilot's Licence Pilot 2: Private Pilot's Licence	
Age:	Pilot 1: 39 years Pilot 2: 37 years	
Flying Experience:	Pilot 1: 100 hours (of which 45 were on type) Last 90 days - 8 hours Last 28 days - 2 hours Pilot 2: 91 hours (of which 8 were on type) Last 90 days - 4 hours Last 28 days - 2 hours	
Information Source:	AAIB Field Investigation	

Synopsis

The helicopter, with two PPL(H) qualified pilots seated in the front and with one passenger in the rear, flew from Leeds Bradford Airport to a private site near Arkholme, between Carnforth and Kirkby Lonsdale, where they picked up a second passenger. The aircraft departed from this site but failed to arrive at the intended destination near Lockerbie. Search and Rescue (SAR) activities commenced the next day when people became concerned as to the whereabouts of the aircraft and its occupants. The accident site was located approximately 4 km NNE of Junction 36 of the M6 motorway and witnesses in

the area reported that the local weather, around the time of the accident, was poor. All four occupants received fatal injuries in the accident. No significant pre-accident defects were found during examination of the helicopter wreckage.

History of the flight

The two pilots¹ were friends who regularly flew together. They hired the helicopter from the flying school at Leeds

Footnote

¹ Referred to in this report as Pilot 1 and Pilot 2.

Bradford Airport where they had both trained for their flying licences. They planned to take two passengers on the flight; one would accompany them from the airport at Leeds, the other they planned to pick up from a private site between Kirby Lonsdale and Carnforth. They then planned to fly to Corncockle, a private landing site near Lockerbie, to spend the night and return to Leeds Bradford Airport by 1300 hrs the following day.

They arrived at the flying school at around 1700 hrs and completed their pre-flight procedures, which included checking the helicopter's technical log, the weather and signing the flight authorisation sheet. The flight school's flying order book contains the rules and regulations applicable for the operation of the aircraft, including weather limitations. There is a requirement for all pilots who fly with the school to sign as having read, understood, and agreed to abide by the rules contained within the flying order book. Both pilots had complied with this requirement.

Pilot 2 signed the authorisation sheets for that day's planned flight, but did not mention that they were taking passengers with them, so no details were entered into the school's Passenger Details log.

The flying school provides an internet based self briefing facility for weather, which the pilots used. One of the pilots called ATC to book out the flight and reported that the helicopter, with three persons on board (POB), would be flying from Leeds, via the VRP at Keighley, to a private site at Arkholme, near Kirby Lonsdale. He made no mention to ATC of the planned flight beyond Kirby Lonsdale.

At around 1730 hrs the Chief Flying Instructor (CFI) of the school, who had just landed, spoke to Pilot 2 and checked his intended routing. The CFI then witnessed

the aircraft take off, with Pilot 2 flying from the right seat and Pilot 1 in the left; a passenger was seated in the rear of the helicopter who was unknown to him. The CFI then checked the actual and forecast weather for Blackpool and Leeds, and was satisfied that it was suitable for the planned trip. He tried to get weather for Carlisle but this was not available.

At 1741 hrs, the helicopter took off and, having departed the Leeds Bradford control zone, changed frequency to London Information North. The pilots were given the appropriate transponder code for aircraft receiving a Flight Information Service and, shortly after 1800 hrs, when approaching Kirby Lonsdale, they reported to London that they were letting down to the landing site.

The landing site near Carnforth was a large field approximately 100 ft amsl. The weather conditions at the landing site were described by witnesses as reasonable, with good visibility.

Once on the ground, the helicopter was shut down and the two pilots changed seats. Witnesses recall that Pilot 1 was now in the right seat, Pilot 2 in the left. The additional passenger boarded and with four POB, the helicopter took off again at around 1827 hrs. It flew initially towards the west prior to turning onto a northerly heading to follow the M6 motorway, towards rising ground. A witness reported seeing it in the vicinity of Sill Field Farm, Kendal, just to the east of the M6 motorway, at around 1835 hrs.

The people on the ground at the planned landing site, Corncockle, near Lockerbie, assumed that the aircraft had not arrived because of the bad weather. The families, when unable to contact the personnel on the helicopter, initially assumed that they were in an area of poor telephone reception or that they were socialising.

The next morning, at 0710 hrs, a family member of one of the pilots was able to confirm that the helicopter had not arrived at its intended destination near Lockerbie and that the mobile telephones of several of the aircraft's occupants, would ring, but were not being answered. The family contacted the flight school, who in turn began to make inquiries and contacted ATC at Leeds Bradford Airport. ATC contacted the Distress and Diversion (D&D) cell at the London Air Control Centre (LACC) who, in turn, contacted the Airborne Rescue Co-ordination Centre (ARCC) at RAF Kinloss. In an attempt to locate the helicopter, the ARCC requested that the police ring the mobile phones of the aircraft occupants; the D&D cell checked recordings of the Radar displays. At 0927 hrs, the ARCC scrambled a SAR helicopter to search the area around the M6 motorway, near Kendal.

At 1017 hrs, the police received reports from a farmer that a helicopter crash site had been located just north of Sill Field Farm, close to the M6 motorway and some 4 km to the NNE of Junction 36. The site was at an elevation of 600 ft amsl.

Witness information

At approximately 1835 hrs on the day of the accident, a pilot who owned a R44 helicopter and who lives approximately 1,400 m from the crash site, heard a noise that he recognised as an R44. He had been flying his own R44 earlier that evening in what he described as deteriorating weather conditions, and he was curious as to who might be flying in such conditions. He saw a blue R44 helicopter flying at low level in a northerly direction alongside the M6 motorway and estimated its speed to be around 100 kt. He considered the weather conditions at the time to be a cloudbase of approximately 300 ft agl, with a visibility of about 1,500 m in drizzle and light rain. The helicopter disappeared from his

view and he heard the rotor blades slapping loudly, as though the aircraft was manoeuvring. He considered that the helicopter had probably landed because of the weather, so got in to his car and spent 20 minutes looking for where it had put down, in order to offer assistance. However, he was unable to locate it.

At approximately 1830 hrs, a worker at Sill Field Farm witnessed a helicopter flying low level orbits, in bad weather, around the woods adjacent to some farm buildings. This witness described the weather as very bad with fog and rain. After about three orbits, the helicopter flew out of sight, to the north of the farm, and he assumed it had continued flying to its destination. At around 0920 hrs next morning, when the farm worker was performing his normal check on the livestock, he discovered the wreckage of a helicopter and recognised it as the one he had seen the previous evening.

Weather

At the time of the weather briefing at Leeds Bradford Airport, there were no valid weather reports available for Carlisle airport. The TAF's and METARS for Blackpool and Leeds Bradford Airports at that time showed the weather in those respective locations was suitable for the planned flight.

Blackpool Forecast

EGNH 031504Z 031623 20014KT 9999 BKN025
TEMPO 2123 8000 -RA BKN012=

Blackpool Actual

EGNH 031750Z 19013KT 9999 VCSH FEW015
BKN020 19/15 Q1016=

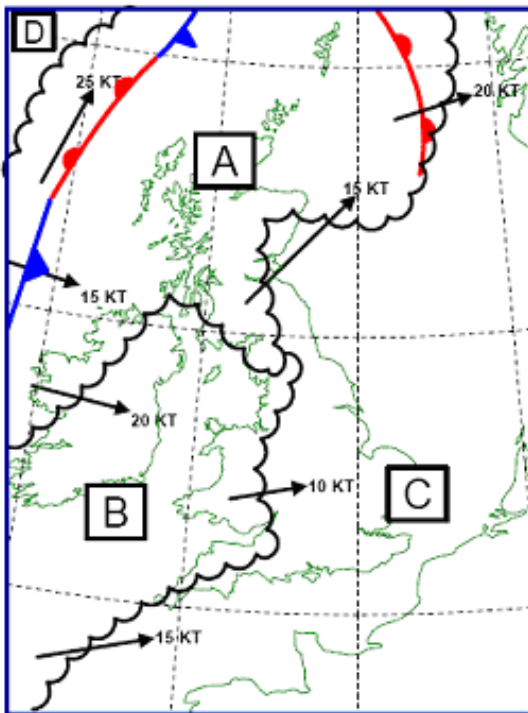
Leeds Forecast

EGNM 031504z 031601 22013KT 9999 SCT030
TEMPO 1601 23015G25KT TEMPO 2201 8000
-RA BKN010=

Leeds Actual
 EGNM03172022012KT150V2709999BKN030
 19/13 Q1017=

unlikely to be suitable for VFR flying from where the helicopter entered the Lake District up into the Lockerbie area. It is not known whether the pilots involved in this flight were aware of the contents of the F215 or the Airmet, but it was not normal practice at the flying school for pilots to check these forecasts.

The Met Office Form 215, and the Airmet forecast, reproduced below, provided the area forecast for the whole of the UK. This indicated that the weather was



All heights in 100's of feet above mean sea level
 XXX means above chart upper limit
 Cloud amount (Cikts) MOD / SEV ICE $\frac{1}{2}$ Speed of movement in KT
 FEW: 1-2 SCT: 3-4 MOD / SEV TURB $\frac{1}{2}$ Temperatures in DEG C
 BKN: 6-7 OVC: 8 TS / CB implies GR $\frac{1}{2}$ Hill FG implies VIS <200 M

This forecast may be amended at any time.
 Issued by Met Office Exeter at 030935 Z
 Forecaster: Duty Forecaster
 Contact telephone 0870 900 0100
 © Crown Copyright 2007

F215

Forecast Weather below 10000 FT



Valid 031400 to 032300 Z AUG 07. Fronts/zones valid at 031800 Z

AREA	SURFACE VIS AND WX	CLOUD	0 C
A	25 KM NIL/-RA OCNL 7 KM RA ISOL 3000 M +RA MAINLY FRONTS AND UPSLOPES OCNL 2000 M BR/DZ MAINLY SEA COT W AND FRONTS MTW MAX VSP 650 FPM AT 060 A (ISOL A W) OCNL HILL FG	BKN/OVC AC AS A 080 / XXX MAINLY W AND FRONTS BKN/OVC (LOC SCT LEE HILLS) CU SC A 015-030 / 050-080 AREAS BKN/OVC ST 004-007 / 015 MAINLY SEA COT N AND W (AND LAN W FM 21 Z)	XXX
B	15 KM NIL/-RA OCNL 2000 M BR/DZ SEA COT (AND ISOL LAN FM 20 Z) MTW MAX VSP 600 FPM AT 050 ISOL A NW OCNL HILL FG	BKN/OVC CU SC A 015-030 / 050-080 AREAS BKN/OVC ST 002-006 / 015 MAINLY SEA COT (AND LAN FM 20 Z)	XXX
C	30 KM NIL OCNL 7 KM HZ LAN FM 20 Z MTW MAX VSP 500 FPM AT 050 UK N ISOL HILL FG	AREAS SCT CU SC A 030-050 / 050-070	XXX
D	10 KM NIL OCNL 3000 M BR/-DZ ISOL A	BKN CU SC A 015 / 035-060 AREAS BKN ST 002-006 / 015	090

Outlook Until: 040800 Z
 AREA B EXTENDING ACROSS MIDLANDS AND PARTS OF SE. LITTLE CHANGE ELSEWHERE.

Form F215

*AIRMET AREA FORECAST, NORTHERN REGION,
VALID AUG 03/1700Z TO 04/0100Z.*

*MET-SITUATION: A STABLE BUT STRENGTHENING SOUTHWESTERLY FLOW AFFECTS THE AREA.
STRONG WIND WRNG: OCNL GUSTS OF 20-25KT, ISOL 30KT.*

WINDS:

1000FT: 230/25-30KT W. 220/20-25KT E. PS15.

3000FT: 230/35-40KT W. 230/25-30KT E. PS12.

6000FT: 240/35-40KT W 240/20-25KT E. PS09.

FREEZING LEVEL: 12000FT.

WEATHER-CONDITIONS: 3 ZONES AT 18Z:

*ZONE 1: W OF A LINE LYING FROM 54N 07W TO MULL OF KINTYRE TO WINDERMERE TO EDINBURGH,
MOVING NE AT 15KT.*

GEN 15KM IN OCNL RA WITH 6-8/8CUSC 3000FT/6000 AND 6-8/8ACAS 8000FT/18000.

OCNL 7KM IN RA WITH 7/8SC 2000FT/8000 AND 7-8/8ACAS 8000FT/18000.

ISOL MAINLY W, 3000M IN HVY RA, WITH 6/8ST 500FT/1500 AND 8/8SCACAS 2000FT/20000.

CLD ON HILLS. MOD ICE AND MOD TURB IN CLD.

MTW, MAX VSP 650FPM AT 6000FT. MOD TURB BLW 6000FT.

ZONE 2: S OF ZONE 1 AND W OF A LINE 54N 02W TO BIRMINGHAM TO BRISTOL, MOVING E AT 10KT:

Airmet

A Met Office aftercast gave the actual weather conditions in the area at the time of the accident. It concluded that the cloud would have been broken or overcast stratus at 800 ft amsl, but with the possibility that the cloudbase was broken or overcast at 600 ft amsl. The visibility was about 2,000 m in rain below cloud, likely reducing to less than 200 m in cloud. The wind at 500 ft agl was 230°/20 kt, and the surface wind 210°/15 kt.

CCTV footage taken at the farm contained no images of the helicopter, but it did show that at the time of the accident, the weather in the area of the farm was poor with the cloudbase intermittently on the tree tops.

Pilot training

The R44 is a single pilot helicopter fitted with dual controls. Two collective levers may be installed (the left is removable) but the cyclic control is not of a conventional nature. This comprises a central stick terminating in a pivoting T bar, which only allows one of the pilots at any one time to control the cyclic with the handgrip in the 'normal' position. With two pilots on board, the R44 is normally flown from the right seat; it is possible to fly from the left seat and instructors regularly do so. Students and low experience pilots would normally only fly from the right seat, and are discouraged from flying from the left seat when with friends. This is because of the unusual cyclic control configuration and, to some

extent, the different instrument scan and visual references for hovering when flying from the left seat.

Pilot 1 commenced his PPL(H) training in March 2004 which he completed in 59 hours, by May 2005. The PPL(H) syllabus includes a requirement for five hours of instrument flying under simulated IMC. He actually underwent five and a half hours of instrument flying training, with his last flight on instruments taking place in May 2005. The instructor's comments in his training record shows him to have performed well on his PPL(H) course.

Pilot 2 commenced his PPL(H) training in January 2005, which he completed in 60 hours by January 2006. This included the required five hours of instrument flying, with his last flight on instruments occurring in November 2005. His training record shows satisfactory progress throughout the PPL(H) course.

Relevant regulations

The CAA rules require that a helicopter operating under VFR must remain clear of cloud and keep the surface in sight. There is a further requirement that the minimum visibility for VFR flight is 1,500 m. If the weather conditions change such that a pilot cannot meet these requirements, then the flight may continue under IFR but, in this case, neither the pilots nor the helicopter were approved for IFR operations.

The flight school's flying order book contains its own weather limitations, with advice that the stated limits may be more restrictive than the legal minima. The flight centre weather limits applicable to a navigation exercise, for pilots with less than 100 hours experience since achieving a PPL(H), were a minimum cloudbase of 2,000 ft and an in-flight visibility of not less than 5 km. It also states that:

'Occasionally a pilot may encounter worse conditions in which case he is to consider whether to continue with the flight, return to base, or carry out a diversion.'

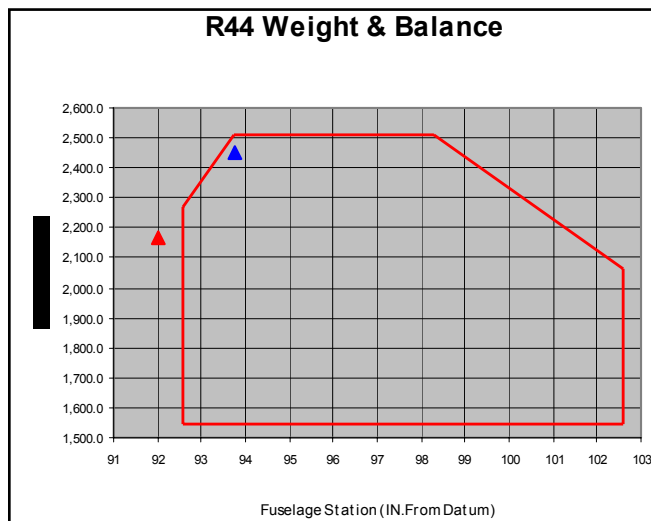
For a VFR flight, the order book also states:

'Pilots should not plan to fly lower than 500 ft above the highest ground within 3 nm of the aircraft.'

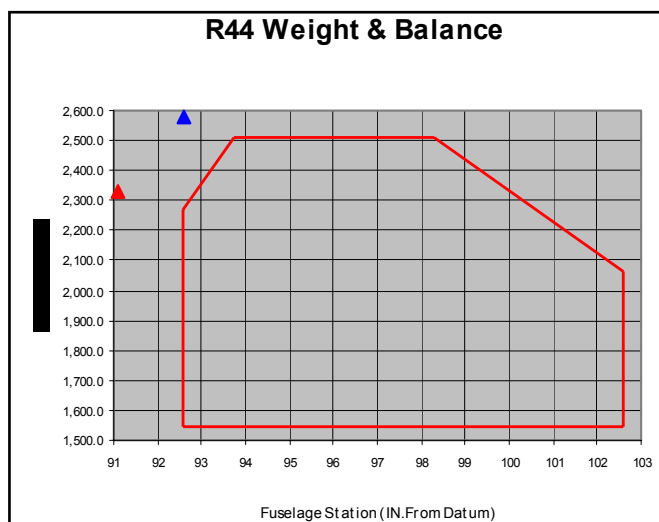
Weight and Balance

Weight and balance calculations were completed by Pilot 2, using estimated weights for the occupants. These calculations underestimated the weight of the pilots, and no allowance was made for the overnight bags which were carried by all of the occupants. The following calculations were made by the AAIB using accurate occupant weights.

Takeoff from Leeds



- ▲ Centre of Gravity at takeoff with takeoff fuel
- ▲ Centre of Gravity with zero fuel

Takeoff from Arkholme

- ▲ Centre of Gravity at takeoff with takeoff fuel
- ▲ Centre of Gravity with zero fuel

CAA Paper 2007/03: 'Helicopter Flight in Degraded Visual Conditions'

In September 2007, the CAA published a paper giving the results of research they had commissioned about helicopter flight in degraded visual conditions. Two test pilots were used to assess the problems associated with flying helicopters in such degraded visual conditions.

The research involved simulations, based on a basic unstabilised helicopter, such as the Robinson R22 or R44, and a stabilised helicopter. The paper commented that:

'Helicopters are difficult to fly at the best of times, ie, even in good visual conditions with plenty of outside world references and with stability augmentation.'

The report found that, as visual conditions degrade, control becomes complicated (workload increases). With the basic aircraft, if speed was lost inadvertently, or a moderate manoeuvre was attempted, the helicopters inherent lack of stability gave rise to very high pilot workload and potential loss of control.

In its summarising discussion, the report stated that:

'it was very likely that a less experienced 'average' pilot would become disorientated and lose control under such conditions [degraded visual cues] with the basic configuration [helicopter].'

Pathology

The post-mortem reports concluded that all four occupants of G-OSSI had received multiple injuries consistent with having been sustained at the time of the accident, and that the forces involved were such that the accident was not survivable. No evidence was found of natural disease in either of the pilots which could have contributed to the crash. Toxicological analysis of the blood from both pilots concluded that there were no traces of alcohol or drugs.

Recorded data

A Skymap IIIC GPS receiver was recovered from the helicopter. This had recorded two flights on the day of the accident with positional information being recorded every 30 seconds. Radar data for the accident flight, identifying the helicopter's position every 3.6 seconds, was also analysed. The following description is based on a combination of both data sets.

The first flight recorded (GPS data) was that which departed from Leeds Bradford Airport, at 1741 hrs, to a field approximately 3 miles south of Carnforth, where it arrived at 1811 hrs. The recording of the accident flight started from the same location at 1828 hrs. After takeoff, the helicopter climbed to approximately 850 ft amsl and tracked northwest until it reached the M6, which it followed northwards at approximately 650 ft amsl. For this period, the height of the terrain beneath the helicopter varied between 60 ft and 250 ft.

The terrain along the M6 increased in elevation as the helicopter progressed northwards and its separation from the ground reduced to less than 200 ft. It then climbed and carried out circling manoeuvres; the radar recording ended just to the south of the accident site and the subsequent final GPS track point, recorded at 1836:46 hrs, was just to the west of the site. Figure 1 shows the last part of the accident flight as recorded by radar.

Accident site

The helicopter wreckage was located on the eastern side of the M6, about 4 km NNE of Junction 36, approximately 400 m east of the motorway, on a small hill.

The wreckage site was surveyed by the Cumbria Constabulary Collision Support Unit and from this it was determined that the majority of the wreckage had

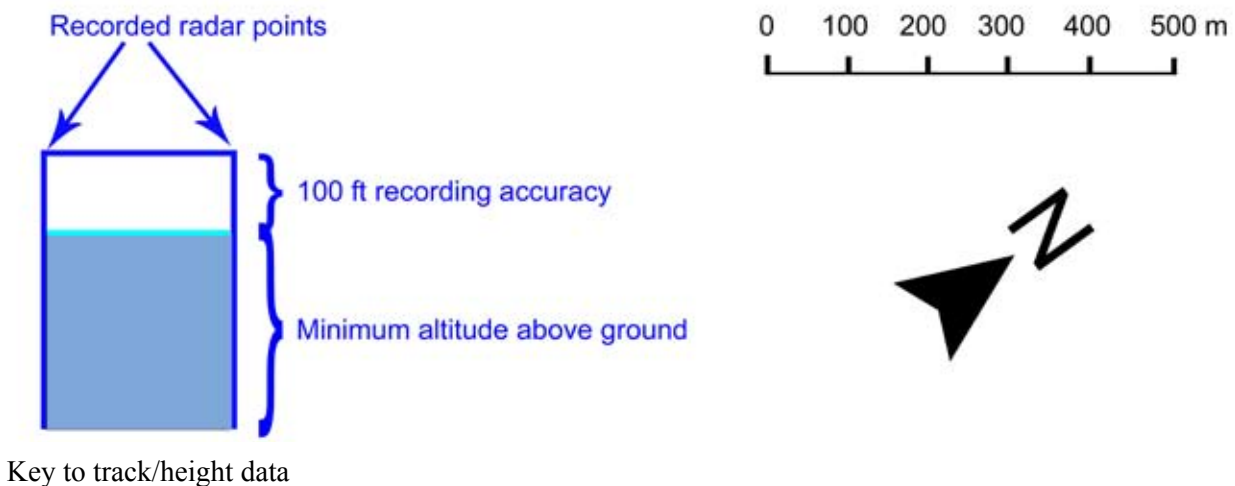
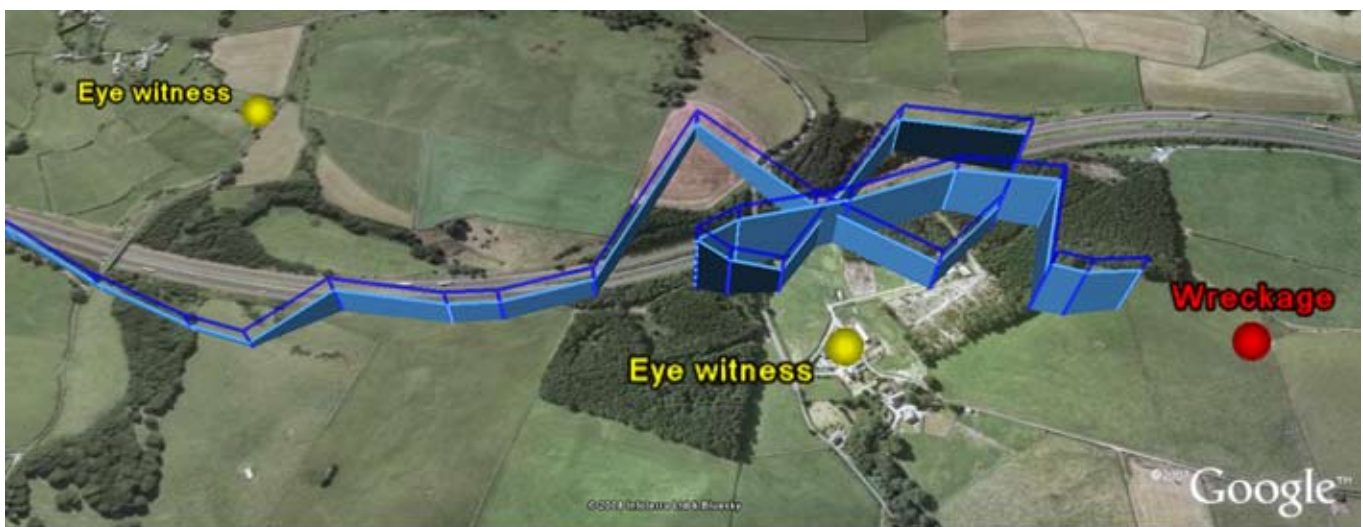


Figure 1
G-OSSI - Track/height plot prior to the accident (Radar Data)

travelled in a direction of approximately 140°M after the initial impact. A ground mark, measuring some 3.1 m x 1.7 m, identified where the fuselage had struck the ground. This was located between a barbed wire fence that separated two grass fields and the brow of the hill. There was a distinctive shallow, curved, ground mark, 7 m before the large ground mark, and this was consistent with a rotating main rotor blade striking the ground.

The forward part of the right skid, together with its forward support leg, had detached and had snagged the barbed wire fence. Whilst this was indicative that the skid struck the fence, such were the ground marks and the nature of the terrain, that the helicopter would very probably still have struck the ground had the fence not been there.

The main wreckage of the helicopter, including most of the fuselage, was 52 m from the initial impact and had been disrupted significantly. The furthest piece of wreckage was the reserve fuel tank, which was 85 m from where the helicopter first struck the ground. The majority of the wreckage had travelled beyond the brow of the hill and came to rest on the downward slope of the hill, contributing to the length of the wreckage trail.

A couple of days after the accident, two areas of stained grass could be seen close to the location of the two fuel tanks. Such staining typically occurs from aviation fuel and the size of the stained areas was consistent with both fuel tanks having contained a significant quantity of fuel at the time of the accident.

It was assessed that just before the helicopter struck the ground:

- it was travelling at a modest ground speed, probably between 50 kt and 80 kt
- it was in a modest dive, probably around 20° to the horizontal
- it had not suffered an in-flight break-up
- it was possibly banked slightly to the right
- the main rotor was turning with significant energy

Aircraft information



Robinson R44 II Raven, G-OSSI

The R44 II Raven is a four-seat helicopter constructed primarily of metal, and powered by a single fuel-injected six-cylinder piston engine. It is normally flown from the right seat, but operation from the left seat is possible if the removable left cyclic control stick is fitted; this was the case for G-OSSI at the time of the accident. The controls are actuated by a conventional system of push-pull rods and bellcranks. Power is transmitted from the engine to the main rotor gearbox by four rubber V belts.

Two fuel tanks, a main tank (120 litres) and an auxiliary tank (70 litres), are located on either side of the fuselage above the engine.

The aircraft was constructed in August 2004 and had flown for a total of 827 hours. It possessed a valid Certificate of Airworthiness and had been maintained in accordance with a CAA approved maintenance programme. The most recent maintenance action was a 50-hour engine inspection on 8 June 2007, at 794 hours.

Engineering investigation

General

Examination of the wreckage revealed that all damage to the airframe had resulted from the impact with the ground, with no evidence to suggest that the helicopter had not been complete and structurally intact prior to the accident. There was good evidence to indicate that all the occupants had been wearing their harnesses correctly.

Flight controls

The continuity and integrity of the collective, cyclic and throttle control linkages were checked. Whilst there was significant disruption to these control runs, all appeared to have been intact prior to impact, and all damage seen was consistent with being sustained during the impact.

Fuel

Both fuel tanks ruptured in the impact and it was not possible to obtain a fuel sample from the wreckage. A fuel sample taken from the aircraft's refuelling source at Leeds Bradford Airport was subsequently analysed; the results showed that the fuel was fit for purpose.

Engine

The engine had sustained only minor damage as a result of the ground impact, most notably to the accessories, particularly so on the helicopter's left side. It was removed from the wreckage and strip examined at a suitable engineering facility. There had been no pre-accident failure of any part and it showed all the signs of being lubricated normally, with no evidence of overheating.

The condition of all the spark plugs was consistent with normal operation.

The gears that drive the cam shaft and magnetos were inspected. There was damage to the left magneto gear and this was consistent with it having made two to three revolutions after the magneto was damaged, but before the crankshaft stopped turning. With a 2:1 gear ratio between crankshaft and magneto drive, this indicates that the engine made approximately four to six revolutions after the magneto was damaged, but before the crankshaft stopped turning, and is consistent with the engine stopping abruptly as a result of the impact.

The right magneto was bench tested at a range of speeds and functioned satisfactorily. It was not possible to test the left magneto due to damage to the contact points. This damage was consistent with occurring during the impact. It was, however, possible to test the coil and the capacitor from the left magneto, and these operated satisfactorily.

Light bulbs

The light bulbs were removed from both the upper and lower instrument consoles and their filaments analysed. All filaments examined were intact and exhibited no evidence of stretching or fragmenting. Either impact loads were insufficient to cause any hot (illuminated) filament to distort or fragment, or none were illuminated at the time of the impact. Given the severe nature of the impact, it is more likely that none were illuminated.

Instruments

The instrument dials were examined under a microscope for evidence of any witness marks made by the indicating needles. Nothing significant was found.

Cockpit heat/windscreen demist

The cockpit heat selector which, when pulled to ON, provides warm air to the cockpit and the windscreen, was found in the OFF position. The valve, which the selector activates, was found in the ON position. However, the disruption to the instrument panel where the selector is located, as well as to the cable and to the valve assembly, precluded the determination with any confidence of whether the heater was ON or OFF at the time of the accident.

Analysis

Engineering

Analysis of the wreckage trail, the ground impact marks and the examination of the wreckage, all indicate that the helicopter was complete, structurally intact and functioning normally prior to the accident. Evidence from the engine examination and the main rotor blade ground mark in particular, indicates that the engine was delivering significant power at the time of the accident and it was only after the impact that it stopped abruptly. It is therefore concluded that no technical issues were causal or contributory factors in the accident.

Operational issues

From the reports of the eyewitness a few miles south of the accident site, the helicopter was travelling at a low height and at a speed which appeared to be inappropriately high in the poor weather conditions. Although the pilots had around 100 hrs flying experience each, they probably had relatively little experience of flying in poor weather conditions and, probably, had not flown into deteriorating weather conditions before. Given that there was evidence of Pilot 1 being in the right seat some eight minutes before the accident, and as it was normal for both pilots to fly the helicopter only from the right seat, it seems most likely that Pilot 1 was manipulating the controls at the time of the accident.

That the aircraft was flying orbits around farm buildings just prior to the accident, suggests that the pilot(s) had realised that the situation was deteriorating. There were suitable areas for a precautionary landing around the farm buildings but they appeared to have chosen not to attempt to land in one. However, it is likely that the pilots would have discussed the situation in which they found themselves and were, possibly, trying to formulate a plan. It is probable that they planned to return to the M6, with a view to heading back to their last landing site near Carnforth.

In the very poor weather conditions, control of the helicopter appears to have been lost. It seems likely that the pilots either inadvertently allowed it to enter cloud, or that the pilot lost his external references. It could not be established whether the cabin heating/windscreen demisting system was selected on at the time. Should the cabin conditions have been conducive to windscreen misting, then this most likely occurred shortly after the second passenger boarded. That passenger's clothing may have been damp, requiring heating/demisting to be selected, once warm air was available from the engine. Nevertheless, this, the possibility could not be fully dismissed that a misted windscreen might have been a factor in the accident.

The helicopter entered a descending turn but flew into the ground in a level attitude. It could not be determined with certainty, but it is considered that the pilot was either attempting to recover to controlled flight using the instruments, or had become visual with the ground at a low height and was attempting to recover from a dive. As can be seen from the load and balance sheets, when the aircraft lifted from Arkholme, it was overweight by approximately 80 lbs, and the centre of gravity was outside the limits. This would have the affect of making the aircraft slightly more difficult to fly, particularly at low speeds.

Conclusions

Control was lost after the helicopter entered an area of poor weather conditions, during which the pilots were probably unable to maintain VMC. This resulted in the helicopter striking the ground in a near level attitude laterally and approximately 20° nose-down, and at a

speed of between 50 kt and 80 kt. Whilst the occupants were all wearing three-point harnesses, the impact was such that the accident was not survivable.

No technical causal factors were identified to explain this accident.