ACCIDENT

Aircraft Type and Registration:	Rockwell Commander 114B, 2-ROAM
No & Type of Engines:	Lycoming IO-540 piston engine
Year of Manufacture:	1995
Date & Time (UTC):	3 December 2015 at 0911 hrs
Location:	On approach to Blackpool Airport
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - 1 (Missing) Passengers - N/A
Nature of Damage:	Aircraft lost
Commander's Licence:	Private Pilot's Licence
Commander's Age:	73 years
Commander's Flying Experience:	in excess of 200[1] hours (of which at least 100 were on type) Last 90 days - n/k hours Last 28 days - n/k hours
Information Source:	AAIB Field Investigation

Synopsis

The aircraft was on a VFR flight from Ronaldsway to Blackpool. A bank of low cloud was moving out to sea, and analysis of the radar track found that, coincident with encountering this cloud, the aircraft descended and its speed reduced until it disappeared from radar. Intensive SAR efforts did not locate the aircraft or pilot.

The available evidence suggests that the aircraft may have stalled at a height from which recovery was not possible.

History of the flight

The aircraft took off from Isle of Man (Ronaldsway) aerodrome at 0836 hrs on a private VFR flight to Blackpool. Radar and RTF recordings were used to establish the history of the flight after departure from Ronaldsway; no other evidence was available[2]. The Blackpool TAF predicted the lowest visibility around the aircraft's time of arrival would be 1,400 m, in heavy rain, with broken cloud 300 ft above the aerodrome.

Footnote

[1] The pilot's log books were not recovered and these are estimates based upon a variety of sources of information.

[2] It was not possible to align the time bases of these recordings, and times recorded on the RTF and radar are not to the same datum.

© Crown copyright 2016

The pilot established contact with the Blackpool Approach controller (who was providing a procedural service; Blackpool does not have radar) at 0851 hrs:

Station	Spoken words
2-ROAM	ERR BLACKPOOL APPROACH GOOD MORNING TWO ROMEO OSCAR ALPHA MIKE
Blackpool Approach	TWO ROMEO OSCAR ALPHA MIKE BLACKPOOL GOOD DAY TO YOU BASIC SERVICE QNH ONE ZERO ONE SEVEN
2-ROAM	ERR BASIC SERVICE AND QNH IS ONE ZERO ONE SEVEN TWO ROMEO OSCAR ALPHA MIKE
Blackpool Approach	TWO ALPHA MIKE I'LL GIVE YOU THE FULL WEATHER BECAUSE IT'S NOT VERY NICE [brief pause] SURFACE WIND INDICATING ZERO NINER ZERO DEGREES AT FOUR KNOTS [brief pause] VISIBILITY TWO THOUSAND METRES IN SLIGHT RAIN AND MIST [brief pause] CLOUD FEW AT TWO HUNDRED FEET [brief pause] SCATTERED AT ONE THOUSAND SIX HUNDRED FEET [brief pause] BROKEN AT THREE THOUSAND SIX HUNDRED FEET [brief pause] TEMPERATURE PLUS EIGHT
2-ROAM	ERR CAN I FLY THIS [brief pause] CAN I LAND IN THIS
Blackpool Approach	THAT'S ENTIRELY UP TO YOU AND YOUR LICENCE RESTRICTIONS
2-ROAM	OF COURSE IT'S UP TO ME [brief pause] ERR I CAN ALWAYS DIVERT BACK TO THE ISLE OF MAN IF IT'S NOT SUITABLE WHICH RUNWAY IS IN USE PLEASE
Blackpool Approach	RUNWAY ONE ZERO IN USE
2-ROAM	RUNWAY ONE ZERO ERR IF I CAN LAND CAN I TAKE IT ON A LONG FINAL
Blackpool Approach	TWO ALPHA MIKE YOU CAN MAKE A STRAIGHT IN APPROACH FOR RUNWAY ONE ZERO

The aircraft tracked towards Blackpool aerodrome, through a helicopter traffic zone (airspace around oil and gas rigs in Morecambe Bay) in the Irish Sea, and exited the zone at 0858 hrs, at an altitude of 800 ft and a groundspeed of around 115 kt. As the aircraft proceeded eastwards it reached, and then tracked, the extended centreline of Runway 10. At approximately 12 nm from the aerodrome, the aircraft descended to 700 ft.

At 0902 hrs, the pilot reported at "APPROXIMATELY TEN MILES", and was instructed to report when he had the runway in sight. At 0904 the pilot enquired again about the weather:

2-ROAM	TWO ALPHA MIKE WHAT IS THE CLOUDBASE AT THE AIRFIELD
Blackpool Approach	TWO ALPHA MIKE THE ERR CURRENT CLOUDBASE IS ERR FEW AT ONE THOUSAND ONE HUNDRED ERR BUT [indistinct word] IS FEW LOWER AT ABOUT TWO HUNDRED
2-ROAM	OH [brief pause] THANK YOU

© Crown copyright 2016

When the aircraft was approximately 7 nm from the aerodrome it descended further, to 500 ft, and then at about 5 nm to 400 ft. At 0905 hrs the following exchange took place:

Blackpool Approach	TWO ALPHA MIKE REPORT YOUR RANGE
2-ROAM	ERR APPROXIMATELY FOUR FIVE MILES
Blackpool Approach	TWO ALPHA MIKE ROGER IF YOU DO NOT GET THE AIRFIELD IN SIGHT YOU CAN ERR PROCEED TO THE BRAVO PAPA LIMA AND SEE IF YOU CAN GET VISUAL REFERENCES THEN

The aircraft's groundspeed reduced progressively to less than 60 kt, and its track turned north-easterly at around 4 nm, before turning again towards the centreline, now at 300 ft.

The final RTF exchange took place at 0907 hrs:

Blackpool Approach	TWO ALPHA MIKE REPORT VISUAL WITH THE ERR AERODROME THE ERR LIGHTS ARE ON MAX ERR MAXIMUM
2-ROAM	ERR WILCO [brief pause] I HAVEN'T HAVEN'T GOT IT IN SIGHT YET
Blackpool Approach	TWO ALPHA MIKE ROGER [brief pause] I SAY AGAIN IF YOU WISH YOU CAN PROCEED TO THE BRAVO PAPA LIMA UNTIL YOU GET VISUAL REFERENCES

The lowest groundspeed shown on radar was 48 kt. The final radar return, which was slightly north of the centreline, was recorded on Warton radar at 0907 and showed the aircraft descending at 200 ft and 57 kt.

The RTF recording included two very brief sounds, one at 0908 hrs and one at 0909 hrs, which could have been momentary transmissions from 2-ROAM. In the background of the first was a high-pitched tone, suggestive of the audible stall warning fitted to many light aircraft.

At 0910 hrs, the controller asked the pilot to report his range from Blackpool. No reply was received, and following further unsuccessful attempts to contact the aircraft, the Blackpool controller initiated search and rescue action.

Several helicopters took part in search operations, and their pilots remarked upon the low cloud, poor visibility, and 'fishbowl' effect they encountered over the sea in the search area. The pilot of one, who was a military fixed and rotary-wing pilot current in both disciplines, commented to investigators that it:

> *'was not a day to be out over the sea at low level… there was a significant opportunity for* [the pilot] *to have been disorientated.'*

© Crown copyright 2016

Aerodrome information

Blackpool Aerodrome is situated on the Lancashire coast immediately inland of a beach, from which it is separated only by dunes and a public road. It has one runway, orientated 10/28, and is equipped with instrument approach aids including a non-directional beacon, with the audio identification BPL, which may be used for approaches to either runway, and an instrument landing system on Runway 28. The aerodrome is not equipped with radar.

Meteorological information

The Met Office provided an aftercast of the conditions prevailing at the time of the accident. The summary stated:

> *The weather conditions at the location of the believed crash were consistent with those to be expected as a warm front moved across the area from the south. The front was bringing large amounts of cloud and outbreaks of rain and drizzle. There was also some mist in the region, so visibilities along the coast in the Blackpool area were in the region of 2000 to 3000M.*
>
> *Broken to overcast amounts of high cloud can be seen in the satellite imagery, which obscured the details of cloud at lower levels, but the surface observations confirm the existence of various layers of cloud at lower levels.*
>
> *The 0850Z METAR at Blackpool (the closest to the crash in spatial and location terms) reported a wind of 090 at 05KT. The visibility was 2000M in light rain and mist. There were 1 to 2 oktas of stratus at 200 feet, 3 to 4 oktas of stratocumulus at 1600 feet, and 5 to 7 oktas at 3600 feet. The temperature and dew point were both plus 8 °C.*
>
> *An examination of the observations in the area confirms they were consistent with the expected forecast conditions from the F215 charts and the TAFs.*

On the *'Forecast Weather below 10,000ft'* chart (Form 215), Blackpool was near the southern edge of an area where conditions the lowest visibility forecast was 200 m over land until 1000 hrs, and the lowest cloud was forecast to be isolated scattered or broken stratus with a base between the surface and 500 ft and tops at 1,000 ft.

The cloud base recording from Blackpool Airport showed a band of low cloud, with base below 200 ft, crossing the aerodrome at about 0820 hrs. In the prevailing wind, this band of cloud would have travelled west approximately three miles, between its passing over the aerodrome and the time of the loss of the aircraft from radar.

The investigation was not able to establish what weather information the pilot had accessed.

The pilot

The pilot held a Private Pilot's Licence with Single Engine Piston rating but no qualification in instrument flying. He had obtained the PPL in late 2014, having trained mostly in 2-ROAM.

© Crown copyright 2016

Aircraft information

The Rockwell Commander 114B is a four seat, all-metal, low-wing monoplane with retractable tricycle landing gear. It is powered by a Lycoming IO-540 horizontally opposed flat six fuel-injected piston engine fitted with a three-blade variable pitch propeller. The accident aircraft was built in 1995 and held on the Guernsey register. It was kept in the Isle of Man but was maintained by a company based in Guernsey. It had a valid Certificate of Airworthiness and at the time of the accident its airworthiness review was current. The aircraft had a continuous and comprehensive maintenance history and its most recent annual inspection was carried out and certified on 27 April 2015. Although the aircraft was already fitted with a modern avionics suite with a moving map GPS and autopilot, the pilot had made arrangements for an avionics upgrade to be carried out on the aircraft in Guernsey.

The last known uplift of fuel was 133 litres at Ronaldsway on the 15 October 2015 and it is not known what the total fuel contents of 2-ROAM were at takeoff. On his flight plan for the flight, the pilot had stated the aircraft's endurance was 4 hours 36 minutes.

The Rockwell Commander typical cruise speed is between 120 and 130 KIAS and its stall speed is in the range 56 to 64 KIAS, depending upon configuration.

Location and salvage

After the aircraft had been lost from the radar a multi-agency search and rescue operation was initiated under the direction of the Maritime & Coastguard Agency (MCA). During the SAR operation a fuel or light oil slick was identified in the vicinity of the last known radar position of the aircraft. Several very small pieces of wreckage were also found in the same area. These items consisted of a small piece of insulation material and section of rubber or neoprene panel seal which had a distinctive blue paint overspray on its surface. No other items were recovered until the following morning when a member of the public reported finding a small shoulder bag containing various items including an instrument flying text book and non-aviation-related paperwork which linked the bag to the pilot. MCA staff conducted a beach search over the weekend after the accident and recovered a set of lightweight plastic aircraft wheel chocks along with an item which was likely to have been an interior light cover. Other items were also found which may have been associated with the aircraft but were not relevant to the accident.

Several hours after the accident, the regional weather conditions deteriorated into what became a prolonged period of very severe weather throughout the northwest of the UK. This prevented a search for the wreckage on the sea bed until 11 days later when, on the 14 December, a Ministry of Defence team identified an object on the sea bed in approximately 10 metres of water. The weather deteriorated again but on 19 January 2016 a police maritime search unit found an aircraft at this location on the sea bed. Although the very poor sub-sea visibility precluded positive identification or examination, the location, description and colour scheme strongly suggested the aircraft was 2-ROAM.

The aircraft was inverted on the sea bed with the tail fin and cabin area buried in the soft sand, in one piece with its landing gear extended. There appeared to be no debris field. It was not possible to assess flying control and flap positions, or to access the cabin area.

© Crown copyright 2016

On the 28 January a light aircraft nosewheel with tyre was washed up and handed to Lytham Coastguard. It was heavily corroded, with a deflated tyre still attached. The tyre markings matched those apparent on the aircraft nosewheel as shown on recent pictures of 2-ROAM.

On the 25 February a privately-funded salvage operation was attempted but could not be completed because the aircraft had become full of compacted sand and was firmly lodged within the sea bed. However, the operation did succeed in recovering the engine, propeller and part of the left wing. Immediately after recovery these items were inspected by the AAIB.

Although severe corrosion had set in, the engine showed signs of impact with the sea and had been damaged by the salvage operation. All three propeller blades were bent and twisted and the spinner had been flattened. The ancillary equipment, alternator, vacuum pump, magnetos and plugs were in place but had also suffered impact, corrosion and salvage damage.

Analysis

Engineering

The absence of detached wreckage suggests a low energy impact with the sea. This was confirmed by the police dive team who reported the aircraft was upside down and in one piece. The appearance of the shoulder bag and the chocks shortly after the accident suggest that the cabin and baggage area was compromised during the impact. The only other item of note to be washed up afterwards was the corroded nosewheel and tyre. It is possible the extended nose gear was damaged during the impact and then over time the wheel detached as rapid magnesium alloy corrosion destroyed the structure of the hub and rim.

The distortion of all three propeller blades indicates that the engine was producing power when it came into contact with the sea. The flattening of the spinner also suggests a steep angle of impact but there is not enough evidence to determine whether the aircraft was upright or inverted. Although it is not known how much fuel was on board the aircraft at takeoff, but assuming a minimum of 133 litres, the flight plan endurance, and the high power propeller distortion mean that lack of fuel or its quality are not considered to be factors in this accident.

At the time of writing the fuselage has not been recovered so a full physical inspection of its other systems has not been carried out. The landing gear was extended but the position of the flaps is not known, therefore it cannot be determined if the aircraft was in the landing configuration. However, a technical fault or an external influence, such as a bird-strike, cannot be entirely discounted.

Operations

The meteorological conditions were correctly forecast, and although it was not possible to establish what forecast information the pilot had gathered, his conversation with the

© Crown copyright 2016

other Ronaldsway pilot indicated that he was aware of the possibility of inclement weather. Although he was not inexperienced, he held a PPL without any instrument flying qualification, which would have made a flight in the prevailing conditions challenging.

The weather at Ronaldsway was better than that at Blackpool and, in the course of the flight across the Irish Sea, the aircraft encountered a lowering cloud base and reducing visibility. In particular, the band of low cloud which the cloud base recorder at Blackpool identified at around 0820 hrs would have drifted west by about three miles between that time and the time at which the aircraft disappeared from radar.

The pilot's enquiry to the Blackpool Approach controller, "ERR CAN I FLY THIS [BRIEF PAUSE] CAN I LAND IN THIS" suggests that he was dubious about carrying on and his remark that returning to Ronaldsway was an option suggests that he considered doing so. A prompt reversal of his course, back towards the better weather at Ronaldsway, might have prevented the accident.

The gradual descent and then reduction in speed suggest efforts to remain in visual conditions below lowering cloud, and to reduce speed as visibility became less favourable. The 'fishbowl' effect referred to by helicopter pilots engaged in the search would have made accurate control of the aircraft difficult for a pilot not experienced in instrument flight, and would have made any recovery from a loss of control such as a stall more difficult than usual. These conditions would also have led to increased workload for the pilot, in the context of which the suggestion by the controller, "IF YOU DO NOT GET THE AIRFIELD IN SIGHT YOU CAN ERR PROCEED TO THE BRAVO PAPA LIMA AND SEE IF YOU CAN GET VISUAL REFERENCES THEN", may have added to confusion in his mind about the legitimacy and practicality of continuing.

The ground speed recorded by radar was a result of the aircraft's airspeed less the wind, which was very light and from the east, more or less directly against the aircraft's progress. The lowest recorded ground speed was below the range of stall speeds for the aircraft, and it is possible that the aircraft stalled at a low height from which recovery was not possible. The brief transmission, during which a stall warning may have been sounding, and the steep impact attitude found by the engineering investigation, are consistent with this hypothesis.

Conclusion

The aircraft was operating in weather conditions that would have been challenging for the pilot, who held no instrument flying qualification. The available evidence suggests that the aircraft may have stalled at a height from which recovery was not possible. The engine was producing power at the point of impact with the sea but a technical fault or failure, or some external influence, cannot be entirely discounted.

© Crown copyright 2016