ACCIDENT

Aircraft Type and Registration:	Reims Cessna F172N Skyhawk, G-BGSV	
No & Type of Engines:	1 Lycoming O-320-H2AD piston engine	
Year of Manufacture:	1979 (Serial no: 1830)	
Date & Time (UTC):	10 October 2018 at 1825 hrs	
Location:	Wilfholme, East Yorkshire	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - 1
Injuries:	Crew - 1 (Fatal)	Passengers - 1 (Fatal)
Nature of Damage:	Aircraft destroyed	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	76 years	
Commander's Flying Experience:	586 hours (of which 546 were on type) Last 90 days - 8 hours Last 28 days - 3 hours	
Information Source:	AAIB Field Investigation	

Synopsis

The pilot and passenger were returning to Beverley Airfield, Yorkshire, after a day trip to Midlem Airfield, Scotland. Their departure from Midlem was delayed and consequently it was dark when the aircraft arrived at Beverley. The pilot did not hold a night rating. The pilot telephoned another member of the flying club and arranged for him to illuminate the touchdown area of the grass runway with the headlights of his car. The aircraft was manoeuvring in the final approach area when it was seen to descend rapidly to the ground. Both occupants were fatally injured.

History of the flight

Background

The pilot had arranged to fly with a passenger to visit a relative in Scotland. He planned the flight the previous day and prepared a Visual Flight Rules (VFR) flight log with the en route waypoints, tracks, distances, true airspeed and flight altitudes for both sectors. Heading, groundspeed and time information were not completed on the flight log.

The aircraft took off from Beverley Airfield at 1026 hrs and landed at Midlem at around 1140 hrs. The pilot and his passenger left the airfield some time afterwards. They returned to the aircraft later in the afternoon, but after starting the engine the pilot noted an unusual engine noise and shut down to investigate. He removed the upper

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and lower engine cowlings and determined that the source of the noise was due to the exhaust pipe becoming detached from the No 3 cylinder[1].

The pilot called his maintenance provider at 1452 hrs to discuss the problem and seek assistance. He described that one of the two threaded exhaust studs in the cylinder was missing and that the nut and washer from the remaining stud were also missing, although the exhaust gasket was still present. His maintenance provider was unable to provide immediate assistance and advised the pilot to seek local assistance. The pilot contacted an LAA Inspector who was present at the airfield and had the required repair hardware. The LAA Inspector provided the parts to the pilot but explained that, as G-BGSV was not an LAA Permit aircraft, he was unable to sign a Certificate of Release to Service (CRS) for the repair[2].

The pilot was observed to reattach the exhaust pipe and refit the engine cowlings. There was no further contact between the pilot and his maintenance provider.

At some time during the afternoon, the pilot also contacted a club member friend at Beverley to discuss the problem with him. The friend texted the pilot at 1542 hrs to ask whether the problem was resolved and at 1601 hrs he received an answer from the pilot to say he was just leaving. The aircraft departed Midlem Airfield around 1610 hrs.

The accident flight

The aircraft climbed to and maintained 5,000 ft for the flight. It flew in a generally south-easterly direction until 1638 hrs, when the pilot contacted Newcastle Radar and requested a transit through their airspace. He was asked to route in a southerly direction initially and subsequently in a south-easterly direction (Figure 1).

At 1710 hrs Newcastle Radar requested the pilot set a transponder code of 7000, advised that Durham Tees Valley was closed until 1730 hrs and suggested he should continue with London Information on frequency 125.475 Mhz.

The pilot contacted London Information at 1711 hrs. The communications following the initial contact are shown at Table 1.

Recorded radar shows the aircraft squawk changing from 7000 to 1177 at 1712:52 hrs and then back to 7000 at 1714:51 hrs.

Footnote

[1] The No 3 cylinder is the rear cylinder on the right side of the engine.

[2] As G-BGSV had an EASA Certificate of Airworthiness, only an appropriately-rated EASA Part 66 Licenced Engineer or a person authorised by the aircraft's Continued Airworthiness Management Organisation could have signed the CRS.

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Station	Time	Transmission
G-BGSV	1711:30	UM GOLF BRAVO GOLF SIERRA VICTOR IS A ONE SEVEN TWO FROM MIDLEM IN THE SCOTTISH BORDERS WE'RE JUST WE'VE JUST LEFT NEWCASTLE WE'RE HEADING TOWARDS BEVERLEY IN EAST YORKSHIRE WE'D LIKE TO TO CROSS THE ER DURHAM TEES VALLEY AIRSPACE WE UNDERSTAND ITS CLOSED WE'D LIKE A BASIC SERVICE PLEASE
LONDON INFORMATION	1711:50	GOLF SIERRA VICTOR ROGER REMAIN OUTSIDE CONTROLLED AIRSPACE DURHAM TEES VALLEY I'LL GIVE THEM A CALL SQUAWK ONE ONE SEVEN SEVEN MODE CHARLIE BASIC SERVICE WHAT IS YOUR ALTITUDE AND YOUR EVENTUAL ESTIMATION FOR BEVERLEY
G-BGSV	1712:10	ER AND WE ARE AT FLIGHT LEVEL FIVE ZERO UM AND WE'RE GOING TO BE ABOUT AN HOUR TWENTY MINUTES TO BEVERLEY
LONDON INFORMATION	1712:20	GOLF SIERRA VICTOR ROGER
G-BGSV		COULD YOU REPEAT THE SQUAWK PLEASE
LONDON INFORMATION	1712:30	SQUAWK ONE ONE SEVEN SEVEN MODE CHARLIE BASIC SERVICE
G-BGSV		I GOT THE ONE ONE THEN WHAT
LONDON INFORMATION		ONE ONE SEVEN SEVEN ELEVEN SEVENTY SEVEN
G-BGSV		ELEVEN SEVENTY SEVEN
LONDON INFORMATION	1713:40	GOLF SIERRA VICTOR LONDON INFORMATION
G-BGSV		GOLF SIERRA VICTOR
LONDON INFORMATION	1713:50	GOLF SIERRA VICTOR DURHAM TEES VALLEY ARE OFFICIALLY CLOSED UNTIL TIME ONE SEVEN THREE ZERO FIFTEEN MINUTES TIME
G-BGSV	1714:00	FIFTEEN MINUTES TIME I'LL BE THERE THERE ABOUT THEN
LONDON INFORMATION		ROGER IN THAT CASE THEN SUGGEST YOU MAINTAIN A LISTENING WATCH ON DURHAM TEES VALLEY ONE ONE EIGHT DECIMAL EIGHT FIVE ZERO AND CALL BEFORE ENTERING
G-BGSV	1714:20	ER ONE ONE EIGHT EIGHT FIVE
LONDON INFORMATION		AFFIRM SIR ONE ONE EIGHT EIGHT FIVE ZERO SQUAWK SEVEN THOUSAND
G-BGSV	1714:30	EIGHT FIVE AND SQUAWK SEVEN THOUSAND THANKS FOR YOUR HELP
LONDON INFORMATION		NO PROBLEM I WILL SPEAK TO DURHAM TEES VALLEY AND LET THEM KNOW THERE'S A GOOD CHANCE YOU'LL BE IN THE CENTRE OF THEIR AIRSPACE IF THEY REOPEN IN FIFTEEN MINUTES
G-BGSV	1714:40	THAT'S VERY KIND THANK YOU GOLF SIERRA VICTOR

Table 1

Communications between London Information and G-BGSV

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At 1717 hrs the aircraft turned from its south-easterly track to a south-westerly track and continued in that direction for 11 minutes before turning south and then south-east onto a direct track to Beverley. This routeing took the aircraft some 15 nm further to the west of the outbound track and clear of Durham Tees Valley airspace.

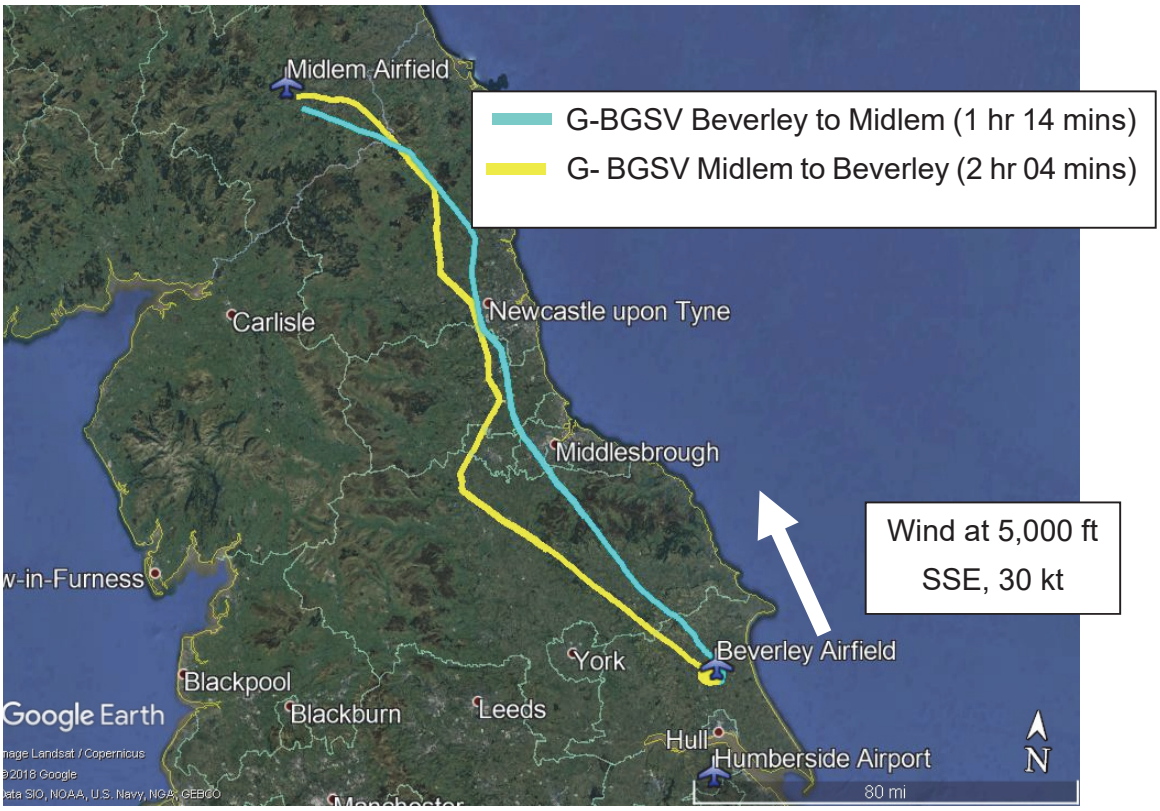

Figure 1

G-BGSV flights of 10 October 2018 from radar recordings

The aircraft arrived overhead Beverley Airfield at 1814 hrs and started to circle in the vicinity at a height of around 1,000 ft amsl. Sunset on 10 October was at 1715 hrs, it was dark and there was no moon. The pilot telephoned one friend from Beverley Airfield and then, being unable to reach him, telephoned the club member friend who he had texted just before he left Midlem. The club member friend answered the call and agreed, at the pilot's request, to drive to the airstrip and shine his car headlights on the runway. He also reported having asked the pilot what his intentions were if he was not able to land. The pilot advised him that he had sufficient fuel for Humberside but would land at Beverley if he could.

The club member friend arrived at the airfield soon afterwards and parked at the western end of Runway 12 with his headlights shining along the arrow indicating the threshold, Figure 2. He was not able to enter the clubhouse and turn the building lights on because, in the rush, he had left the keys at home. On arrival at the airfield, he tried to telephone the pilot again but did not make contact.

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Figure 2

Displaced threshold area Runway 12

The club member friend stood by his car and watched the aircraft manoeuvring overhead; he could follow its progress by the position lights which were lit. He could see it circling to the west of the airfield and descending, then it suddenly descended vertically and disappeared from his view. He felt certain it had crashed and alerted the emergency services by telephone; the call was logged at 1825:20 hrs. He continued to try and call the pilot's telephone without success. He alerted other members of the club and a local search was initiated.

The police informed the Aeronautical Rescue Coordination Centre (ARCC), who contacted the Distress and Diversion Cell (D&D) at 1845 hrs. The D&D log shows that they requested a radar replay of the event and were provided the aircraft's last known position, which was passed to the ARCC and the Yorkshire Air Ambulance at 1909 hrs. This position was confirmed to D&D by Humberside Airport at 2000 hrs.

A significant ground and air search commenced. The aircraft was located at 2247 hrs in a small copse 1.2 nm to the northwest of Beverley Airfield. Both occupants had been fatally injured in the impact.

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Accident site and wreckage examination

The accident site was located in a copse adjacent to a stream (Figure 3). The aircraft had struck the ground in a nose-low, left bank attitude and the impact heading was approximately 065°M. Following the initial impact, the aircraft had travelled a further 20 m, coming to rest against a tree. Due to its severity, the initial impact was not survivable for the aircraft occupants.

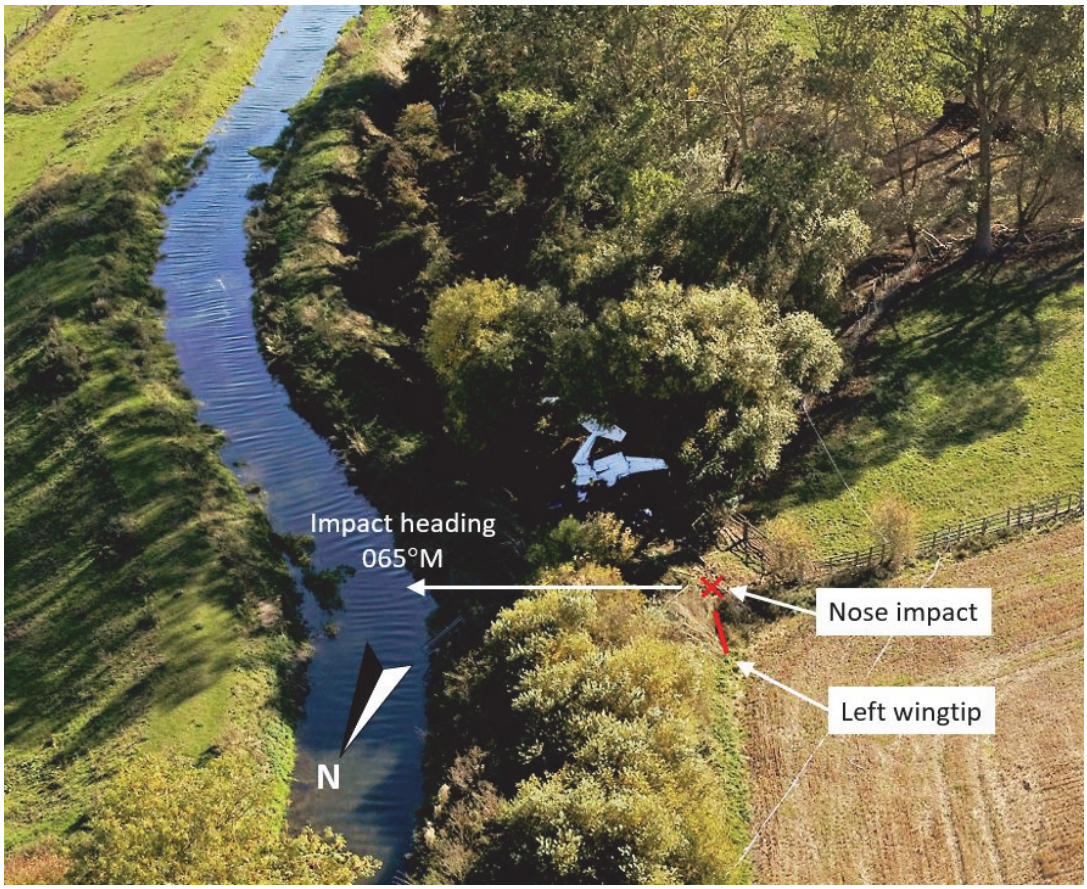

Figure 3
Accident site

Examination of the aircraft at the accident site showed that it was structurally intact at impact and that all major components of the aircraft were present within the wreckage trail. The left wing was considerably more damaged than the right wing, consistent with the left bank impact attitude.

The aircraft's flying controls were examined and determined to be continuous between the cockpit controls and the control surfaces apart from a tensile overload failure of the aileron control cable sustained during the accident. The flaps were fully retracted. The elevator trim tab was set close to its neutral position.

The aircraft's propeller had detached during the initial impact; the blades were bent rearwards and the outer 20 cm of the tips had broken off, consistent with the propeller being

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driven under significant power by the engine when the accident occurred. This finding was further confirmed by the engine tachometer instrument needle, which was observed to be embedded against the instrument dial at a reading of 2,500 rpm.

The aircraft's primary altimeter was recovered and the subscale was set to 1013 hPa. The aircraft's secondary altimeter, located at the bottom of the instrument panel, was also recovered and its subscale was set to 1015 hPa.

The fuel selector valve was set to the left wing tank. No fuel remained in the left wing tank due to leakage from a fracture of the wing fuel line. Approximately seven litres of fuel were recovered from the right wing tank; this fuel had the appearance and odour of 100 LL AVGAS aviation fuel.

The engine was visually examined, and no pre-accident abnormalities were noted, although it was not possible to rotate the engine's crankshaft due to accident damage. Both exhaust pipes on the right side of the engine had been bent rearwards in the initial impact, pulling out the inner exhaust studs, which had been released. The No 3 cylinder outer exhaust stud, washer and nut were present, and the exhaust pipe and gasket were securely attached to the cylinder. There was no evidence of any exhaust gas leakage from the joint with the No 3 cylinder.

Recorded information

A GPS with a moving map display and a mobile phone were recovered from the aircraft wreckage. Both devices were damaged in the accident and attempts to recover data were unsuccessful.

The aircraft's position and Mode S altitude[3] were recorded by several radar heads throughout both flights of 10 October. This data was provided to the AAIB by NATS with good coverage of both flights apart from the last few miles around Midlem Airfield. The Claxby radar head is positioned 27 nm to the south of Beverley Airfield at 670 ft amsl with good coverage of the area, recording the aircraft as low as 100 ft amsl[4] during the departure to Midlem.

Recorded radar altitude received from the aircraft's transponder uses a pressure datum of 1013 hPa which has been corrected to the reported QNH on the day of 1010 hPa. All altitudes quoted in this report are amsl.

Mobile phone records were recovered for the pilot's phone which revealed at 1808:08 hrs, while 8.5 nm north-west of the airfield, the pilot made a phone call to a friend. The call was unanswered and went to the friend's voicemail. Figure 4 shows the radar track from 1809:30 hrs and when the phone call ended, the aircraft was 3 nm north-west of Beverley Airfield. A second call was made between 1812:45 and 1813:50 hrs; this was the answered call to the club member friend.

Footnote

[3] Mode S altitude was recorded to the nearest 100 ft (ie ±50 ft).
[4] Beverley Airfield elevation is 5 ft amsl.

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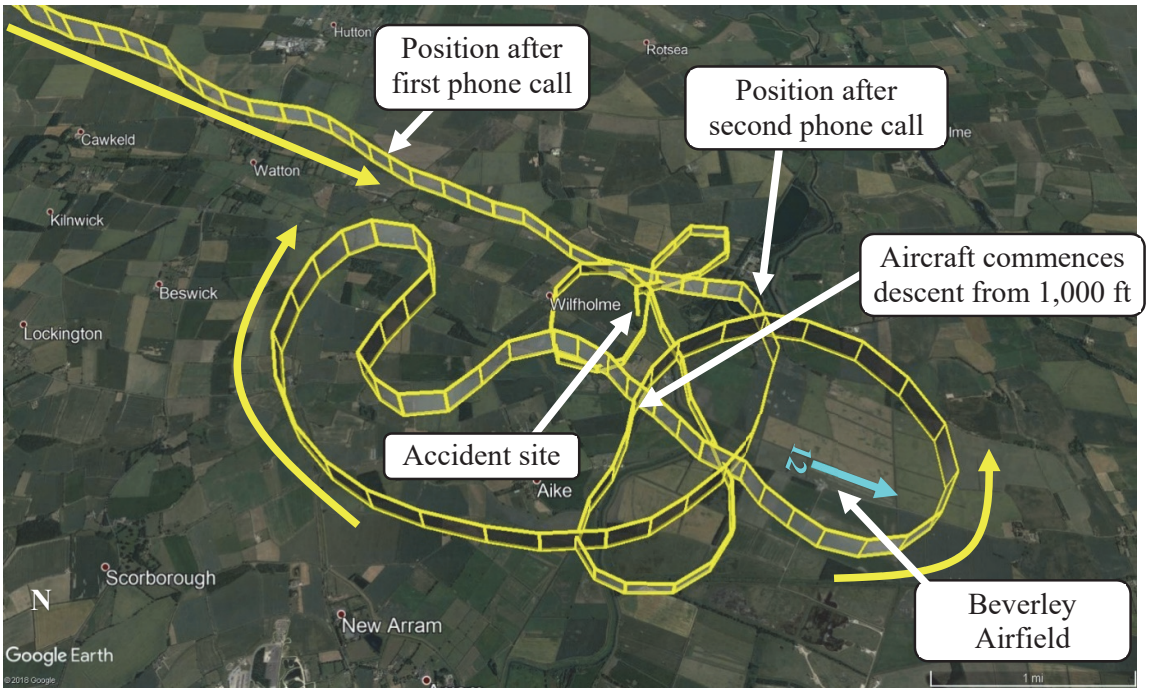

Figure 4

G-BGSV radar track showing arrival overhead Beverley Airfield

The aircraft did not overfly the runway but at 1814:10 hrs turned to the right approximately 650 m from the end of Runway 12 at 1,000 ft. It then turned north-west, tracking out 2.8 nm and then back towards the airfield, reaching the south-east end at 1819:44 hrs. The aircraft then turned to the left and after passing the extended centreline of Runway 12, commenced a descent from 1,000 ft at 1820:31 hrs.

After levelling at 500 ft, the aircraft then performed a left-hand orbit at between 300 and 500 ft over a period of approximately[5] 1 minute 12 seconds; a turn rate of approximately 5° per sec. (Figure 5). At the end of this orbit, the radar recorded a single return with the aircraft at 100 ft. The subsequent recorded altitude eight seconds later was 400 ft representing a vertical speed of 2,250 ± 750 ft/min.

The aircraft then performed a turn to the right through 223° over approximately 40 seconds at between 200 and 400 ft. Radar position is of limited accuracy[6] so an accurate groundspeed could not be calculated at the end of the flight. However, throughout this 40 second turn to the right, the average groundspeed was calculated as 82 kt.

Footnote

[5] Claxby radar is recorded every 8 seconds.

[6] NATS have stated that they work to Eurocontrol standards and performance for random errors is usually within ±140 m for slant range and ± 0.16° for azimuth for 98% of cases.

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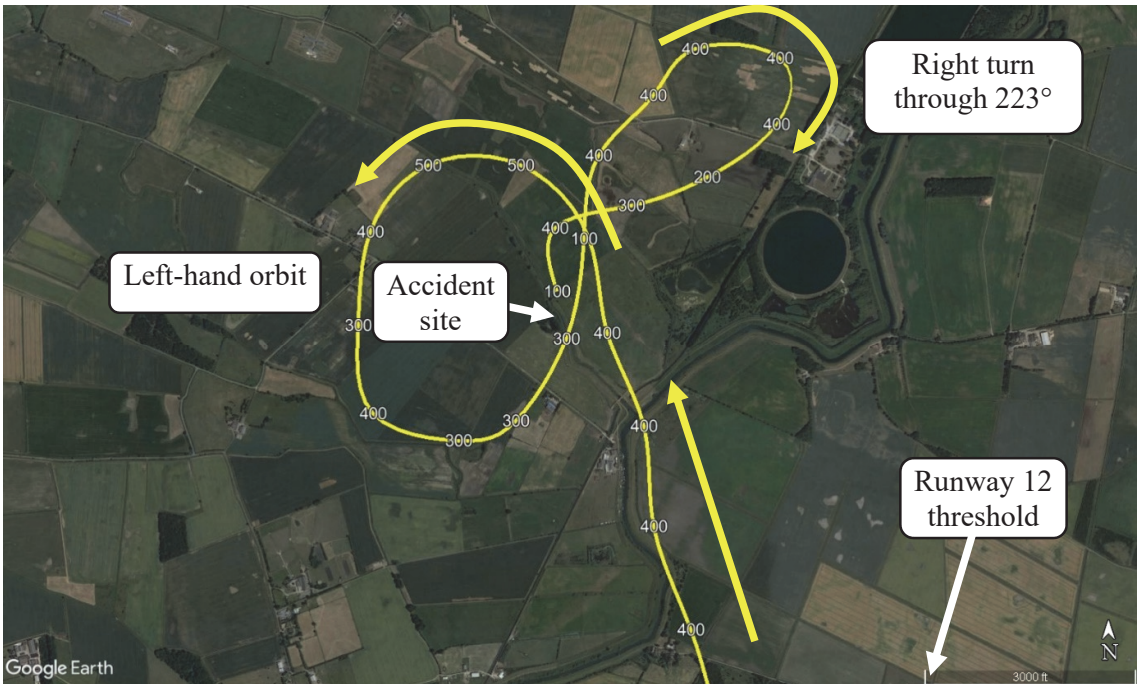

Figure 5

G-BGSV radar track from 1822:37 hrs showing altitudes amsl (± 50 ft)
(Note that the earlier position information has been removed for clarity and track has been smoothed).

The final recorded position was at 1825:14 hrs with the aircraft at 100 ft, having descended from 400 ft over the 8 second radar sweep. Considering the radar altitude accuracy, this represented a vertical speed of -2,250 ±750 ft/min. The final recorded radar position was approximately 90 m from the accident site and 1.2 nm north-west of the Runway 12 threshold. The aircraft had been circling in the region of Beverley Airfield for 11 minutes 14 seconds.

Aircraft information

The Cessna F172N is a high-wing, four seat light aircraft powered by a Lycoming O-320 piston engine. It has a fixed tricycle landing gear and a two-bladed, fixed pitch aluminium alloy propeller. G-BGSV had accumulated 3,695 flying hours from new at the time of the accident. The annual inspection and airworthiness review had taken place on 22 March 2018 and the aircraft had completed 36 flying hours following this inspection.

The aircraft has a fuel capacity of 152 litres (40 USG). It was flown on 29 September 2018 by a co-owner who advised he had started a flight with full fuel tanks and flown for one hour. The Cessna 172 aircraft typically burns around 32 litres/hr. The refuelling records at Beverley Airfield show that on the morning of the accident the pilot refuelled the aircraft with 35.88 litres of Avgas. It is likely therefore that the aircraft was full of fuel on departure, giving an endurance of around 4 hrs 45 mins.

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The Pilot's Operating Handbook provides stall speeds for the aircraft at maximum weight, power off, shown in Table 2:

Power Off	Stall indicated airspeed		
	Angle of bank 0°	Angle of bank 30°	Angle of bank 45°
Flap 0°	47 kt	51 kt	56 kt
Flap 10°	44 kt	47 kt	52 kt

Table 2

Stall speeds at selected Angle of Bank and Flap positions

Meteorology

At 0950 hrs the pressure recorded at Humberside Airport (20 nm to the south of Beverley Airfield) was 1015 hPa. The 1820 hrs METAR at Humberside was: surface wind from 100°M at 8 kt, visibility 6,000 m, no significant cloud, temperature +15°C, dewpoint +13°C and pressure 1010 hPa. The former RAF Leconfield (3 nm south-west of Beverley Airfield) retains a meteorological recording station and the 1750 hrs report indicated: surface wind from 090 °M at 5 kt, visibility 4,500 m, haze, temperature +14°C, dewpoint +12°C and pressure 1010 hPa.

The local time of sunset at Beverley Airfield was 1715 hrs and local moonset was at 1718 hrs.

An aftercast provided by the Met Office indicated that the wind at 5,000 ft along the flight route would have been south-south-east at around 30 kt.

The forecast weather at Newcastle Airport for the morning of 11 October 2018 was fine with southerly winds, becoming strong winds and rain later in the day.

Airfield information

Beverley Airfield is an unlicensed grass airfield. It is home to a general aviation flying club which offers training on light aeroplanes and microlights. The single grass runway is orientated 12/30. Runway 12 is 710 m in length and 30 m in width; a displaced landing threshold gives a landing distance available of 627 m.

The runway is not lit and the airfield is located in a rural area with a lack of cultural lighting. Wind turbines to the south are illuminated with red lights and a telephone mast 1,500 m south-east of the airfield is also lit. A power line 102 ft aal crosses the approach to Runway 12, 1,170 m from the threshold.

Humberside Airport is 20 nm to the south of Beverley Airfield. It is an international airport providing services for general aviation, commercial helicopter and airline flights. The published operating hours are from 0510 hrs to 2015 hrs, during which time aerodrome lighting and Air Traffic Control services are available.

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Pilot information

The pilot had held a Private Pilot's Licence (PPL) for 25 years and possessed a valid Class 2 medical certificate.

He acquired a share of G-BGSV in 1993, after qualifying for his licence, and nearly all his subsequent flying was in this aircraft. He carried out a course of Instrument Meteorological Conditions (IMC) training in G-BGSV, qualifying for the rating in April 1994. The most recent renewal of this rating was in August 2001, valid for 25 months. No night flying was recorded in his logbook and he did not hold a night rating. The pilot's last recorded flight into Humberside was on 23 August 1995.

For the five years prior to the accident the pilot had flown 12 hours per year on average, nearly all from and to Beverley Airfield, with occasional landings away at other airfields. The pilot was very familiar with Beverley and contributed a lot of his time to maintenance and upkeep of the airfield.

The passenger was not qualified as a pilot, although he had flown with the pilot on a few occasions. He was a long-standing friend and had agreed to accompany the pilot on the flight but had told him that he needed to be back home that evening.

Search and rescue

A significant ground and air search was launched after the pilot's friend called the emergency services. The search took just over 4 hours and 20 minutes to find the aircraft. This search was a challenging operation in the dark, with a number stretches of water to cross and limited road access to the area. In addition, the aircraft wreckage was located under trees in a copse, with a limited wreckage trail visible from the air (Figure 3). The aerial assets tasked with this search reported that they overflew the accident site twice during the search but were unable to locate it.

Radar data for AAIB analysis

Radar data provided by NATS to the AAIB as part of this investigation is provided by a dedicated analysis team who work office hours on a different site to D&D. This team has access to recordings of raw radar data which is that as read by the radar head, which NATS refer to as 'sensor derived coordinates'. This is position of a return as sensed by the radar head with no additional processing. The last known position provided was approximately 90 m from the accident site.

D&D response

D&D is the UK emergency centre. It forms part of an RAF Unit co-located within the London Area Control Centre, which is operated by NATS. It is a 24/7 operation with a number of roles which include the monitoring of frequency 121.5 Mhz to provide assistance to pilots flying within UK airspace who are in distress, in urgent need of assistance, or experiencing difficulties. The unit also undertakes tracing action for missing/lost aircraft.

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Once informed of this event, D&D sourced coordinates of the last known aircraft position from radar and passed them to the ARCC who coordinated the search. The position passed to ARCC was 53° 54.3'N, 000° 23.13'W. This is shown on Figure 6, along with the final radar position provided to the AAIB by NATS and the accident site.

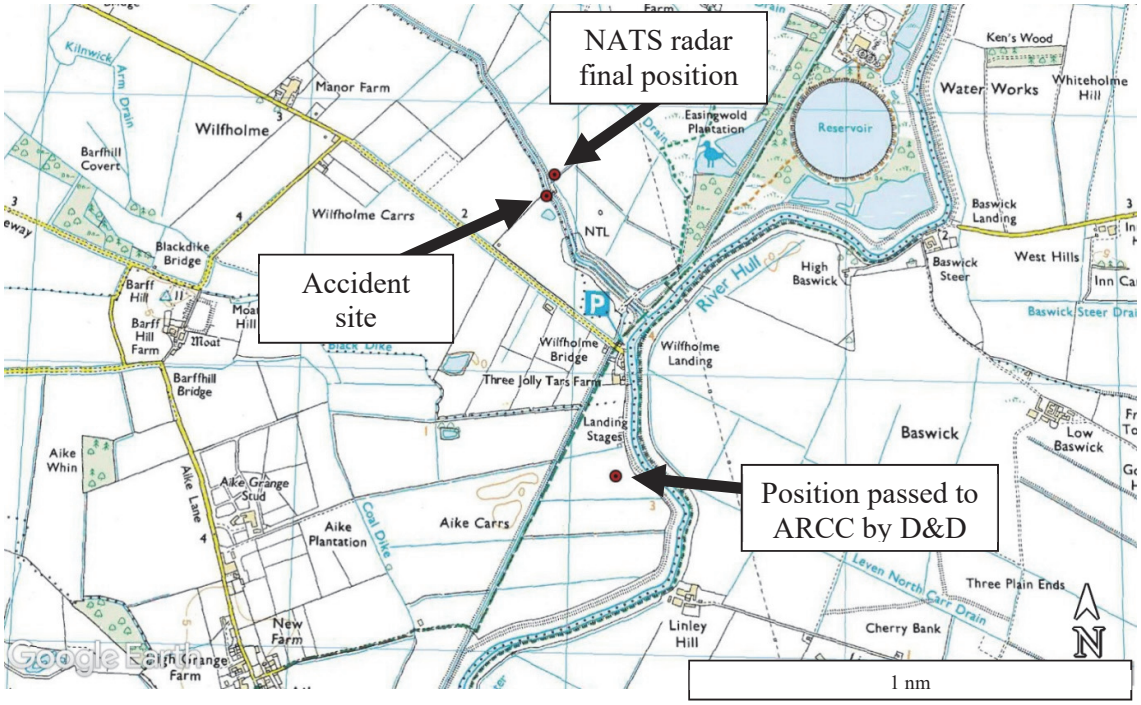

Figure 6

Final radar positions and G-BGSV accident site location

Radar data provided to D&D is required at short notice, so is provided by a team in NATS who are on the same site as D&D. This NATS team upload the requested data to a laptop, usually within 10 minutes, and then physically pass it to D&D. The radar data provided is referred to as the 'Node' or 'Multi-Radar Tracker (MRT)' data which is the information as displayed to the radar controllers. The MRT contains an algorithm that can combine positions sourced from multiple radar heads into one which improves the position accuracy and integrity.

The MRT can also account for instances when the radar signal from an aircraft is lost. In this case, the MRT will 'coast' the track onwards to a predicted position, based on the aircraft's flightpath prior to the radar position being lost. This is referred to as 'coasting'.

For G-BGSV, the last known position acquired by D&D was from the Claxby radar head which was 'coasted' a further 1 km to the south of the accident site. D&D confirmed that they corroborated this position with Humberside Airport who were using the same data.

D&D were not aware at the time of the accident of the concept of coasted radar or that uncoasted position information was also available from NATS.

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Analysis

Engineering

Assessment of the aircraft's wreckage showed that the aircraft was structurally intact at impact and that there had been no pre-impact disconnection or failure of the flying controls. Damage to the propeller combined with evidence obtained from the aircraft's engine tachometer showed that the engine had been producing significant power at the point of impact. There was no evidence of any exhaust gas leakage from any of the exhaust pipe joints to the engine's four cylinders, including the joint that was repaired at Midlem Airfield.

Witness evidence of the aircraft's illuminated position lights, combined with Mode S transponder data received from the aircraft, showed that power was available to the aircraft's electrical system in the moments before the accident occurred.

Operational aspects

The pilot had held an IMC rating, which lapsed in 2003. He did not have a night rating and no night flying time had been recorded in his logbook. Therefore, flying in the dark would have been an unfamiliar and a demanding task for the pilot. There were several opportunities during the afternoon for the pilot to have cancelled or diverted the flight but he continued with his original plan despite the onset of darkness.

When the departure was delayed from Midlem, it should have been apparent that the aircraft would arrive at Beverley Airfield after dark, where no lighting was available. The pilot's first option was to abandon the plan to return the same day and stay locally at Midlem.

It is not known what information he had obtained about the weather conditions but the forecast for the next morning was fine. However, the flight to Midlem had taken only 1 hour and 14 minutes, and if he had not allowed for the effects of wind on the flight time he may have thought the return flight would be similar. Heading, groundspeed and time information had not been completed on his flight log. Alternatively, he may not have been aware of the time of sunset or was over-optimistic about how long it would remain light enough to see after sunset.

At 1712 hrs, the pilot reported to London Information that he was about 1 hour and 20 minutes from Beverley; it is not clear whether he realised that it would be dark at that time. The pilot altered course to the west, apparently to avoid Durham Tees Valley airspace which was unexpectedly closed, but this did not materially affect the arrival time at Beverley. Once he was south of the Durham airspace there were not many airfields available en route or nearby for a diversion.

As the flight continued the pilot would have realised that it was growing dark and at some point, he must have recognised that it would be night flying conditions on arrival at Beverley Airfield. However, the weather was fine and ambient light after sunset would have been reasonable for a while, which may have delayed recognition of his predicament. A logical course of action would have been to divert the flight before the onset of darkness, but if this opportunity was missed, then he still had the option to divert to an airfield with lighting. The

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pilot could have sought assistance in this situation from D&D who would have been able to direct him to an airfield with lighting.

Sometime during the flight the pilot is likely to have formulated his plan to attempt to land at Beverley by the lights of a car. There was no evidence that he had ever flown at night before. When he arrived overhead Beverley Airfield, he contacted another club member by telephone, who agreed to drive his car to the airfield and light the runway. The pilot did have the option of diverting to Humberside, as evidenced by his response that he had enough fuel to go there in the event he wasn't able to land.

It remains unexplained why the pilot did not decide to divert to Humberside, but there are reasons why it may have appeared a daunting prospect. He last flew to Humberside in 1995. Since then, the airport has grown and is now a busy international airport, so he would have been unfamiliar with the airport procedures and environment, as well as being unqualified to fly at night. These factors may have made Humberside appear to be a more difficult option than landing at Beverley, where he was very familiar with the airfield.

There were some indications that the pilot was fully focussed on flying the aircraft and finding the airfield, perhaps to the detriment other flying tasks. The primary altimeter was found set at 1013 hPa, and not to the local QNH of 1010 hPa as would be expected. This would add approximately 100 ft to the indicated altitude and could make the pilot think that he was higher than he actually was. Also, it appears the aircraft was descending and manouevring towards a final approach when the accident occurred. By this stage of the flight it would be expected that some flap would have been deployed, but the flaps were found in the fully retracted position.

In the final stages of the flight, the aircraft completed an 360° orbit to the left, followed by a steeper turn to the right. Between the two turns there was a period of height instability when the aircraft first descended rapidly and then climbed rapidly, suggesting a possible temporary loss of control. On completion of the turn to the right the aircraft flew approximately straight and level before entering a descending turn to the left, in the vicinity of the final approach course.

The evidence from the eyewitness, and the aircraft wreckage, suggest that there was a sudden loss of control and then an impact in a nose-down, left-wing-low attitude. The radar data indicated that during the last forty seconds of flight, prior to the final left turn, the aircraft was flying at an average speed which should have given a comfortable margin above the stall, even in a turn with flaps retracted. It is likely therefore that the pilot became disorientated when in a descending turn near the final approach and allowed the nose to pitch down too steeply.

Final radar position

Analysis of radar data after the accident showed the final radar position as 90 m from the accident site. The position passed to the ARCC by D&D was 1 km to the south of this site; a position which was confirmed by D&D with Humberside Airport. The difference in position was due to information being sourced from different sources within NATS and that the D&D

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information was affected by coasting. D&D were unaware of this at the time but have since discussed this with NATS. Search conditions were challenging, and the accident site was not seen from the air due to the tree coverage at night. As a result, uncoasted position information was unlikely to have reduced the search time for the aerial assets. D&D have commenced a review to consider the use and the feasibility of uncoasted data and whether it is available at short notice.

Conclusion

The takeoff for the return flight to Beverley was delayed for technical reasons and, as a result, the aircraft arrived overhead the airfield after dark. The pilot, who did not have a night rating, was aware there was an option of diverting to nearby Humberside but, perhaps because of his unfamiliarity with Humberside, he decided to attempt to land at his home airfield Beverley. He positioned to land on grass Runway 12 which was unlit, except for the headlights of a car pointing at the threshold. While manoeuvring in the final approach area at low level the pilot became disorientated, leading to a steep turning descent into a small area of woodland.

Published: 18 July 2019.

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