
Department of Trade

**Report on the accident to
Piper Aztec PA23-250F G-BOST
near Riplingham, North Humberside,
on 21 January 1981**

List of Aircraft Accident Reports issued by AIB in 1981

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Department of Trade
Accidents Investigation Branch
Kingsgate House
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5 November 1981

The Rt Honourable John Biffen MP
Secretary of State for Trade

Sir

I have the honour to submit the report by Mr P J Bardon, an Inspector of Accidents, on the circumstances of the accident to Piper Aztec PA23-250F G-BOST which occurred near Riplingham, North Humberside, on 21 January 1981.

I have the honour to be
Sir
Your obedient Servant

G C Wilkinson
Chief Inspector of Accidents

Accidents Investigation Branch
Aircraft Accident Report No 10/81
(EW/C729)

<i>Operator:</i>	NPD Aviation Ltd
<i>Aircraft: Type:</i>	Piper Aztec
<i>Model:</i>	PA23-250 F
<i>Nationality:</i>	United Kingdom
<i>Registration:</i>	G-BOST
<i>Place of Accident:</i>	1 kilometre west of Riplingham, North Humberside Latitude 53° 46' 15" N Longitude 000° 33' 30" W
<i>Date and Time:</i>	21 January 1981 at 1020 hrs
	All times in this report are in GMT

Synopsis

The accident was notified to the Accidents Investigation Branch on the afternoon of the accident and an investigation was commenced the same day.

The accident occurred whilst the aircraft was making a positioning flight from Brough to Carnaby, an unmanned airfield on the north-east coast just south of Bridlington. The pilot was the sole occupant. Approximately three minutes after take-off, and whilst on track to Carnaby, the aircraft crashed on high ground about 4 nm to the north of Brough and was totally destroyed. The pilot received fatal injuries. The weather in the area at the time consisted of low cloud and hill fog.

No defect in the aircraft could be found to account for the accident, the cause of which remains undetermined. The pilot's choice of route in the prevailing weather conditions was a contributory factor. His medical condition may also have been a major contributory factor.

1. Factual Information

1.1 History of the flight

The pilot was briefed by his company at approximately 2000 hrs on 20 January to position G—BOST empty from Brough to Carnaby the following day in time for a departure from Carnaby at 1030 hrs for a flight to Aberdeen. He was advised that he would be staying overnight at Aberdeen and returning with his passengers to Carnaby mid-afternoon on 22 January, after which he would position the aircraft empty back into Brough. A weather forecast for a flight from Brough direct to Aberdeen was booked by the company at approximately 1620 hrs on 20 January from the Meteorological Office at Bawtry, and it was arranged that the pilot would obtain this forecast by telephone at 0830 hrs the following morning prior to leaving home. The Meteorological Office was not informed that the pilot intended to land at Carnaby.

The forecast was passed by telephone to the pilot at 0830 hrs as arranged and included the warning that low cloud or hill fog could be expected *en route*.

The pilot arrived at Brough airfield at approximately 0930 hrs and collected the aircraft keys from the Security Officer. He then arranged with a ground engineer for 50 gallons of fuel to be put aboard the aircraft, 25 gallons in each outer wing tank. The inboard tanks were reported as being already full. Both the Security Officer and the ground engineer stated that the pilot was in good spirits and appeared to be in good health. He remarked to the ground engineer that the weather was not very good and that there were no aids at Carnaby, where he would be landing before proceeding to Aberdeen. The pilot also spoke to another member of ground staff at about this time and they discussed the weather and poor visibility. The pilot is reported to have said that 'finding Carnaby would be like looking for a needle in a haystack'. In reply to the witness' question as to how he proposed to get to Carnaby the pilot replied that he might follow the coastline. The pilot did not visit ATC or the self briefing unit, which he usually did and was required to do 'without exception' by his company's operations manual. No flight plan was filed but the pilot booked out on the radio with ATC for the flight to Carnaby when he called for taxi clearance at 1002 hrs. The aircraft was cleared to taxi for a take-off on runway 30 and passed the QFE of 1020. He also asked for the height of the cloud base and was told that it was estimated as being 800 ft, to which the pilot replied 'THAT CAN'T BE BAD. THANK YOU.' After holding at the end of the runway for what seemed to ATC to be an unusually long time the pilot called for take-off clearance at 1017 hrs. This was given, together with the instructions to climb straight ahead to 500 ft before turning right. He was also advised that the surface wind was from 220° at 10 knots. The pilot replied that he would be turning right onto a track 040° after reaching 500 ft. The aircraft then took off and on being advised by ATC that he was airborne at 1017 hrs the pilot replied 'ROGER. THANKS VERY MUCH.' This was the last transmission received from the aircraft on this or any other frequency. After watching the aircraft take-off and commence its turn to the right the Controller then lost sight of it in the poor visibility.

At approximately 1020 hrs, a witness at Brantingham, a village about 2½ miles north of Brough airfield, heard an aircraft's engines to the north-west of his position and shortly afterwards saw a Piper aircraft flying in a northerly direction at a low

altitude. It disappeared almost immediately into the fog or low cloud, which was covering the tops of trees in the vicinity of the witness. At about the same time two witnesses just north of Brantingham briefly heard the noise of an aircraft's engines in the direction of Riplingham to the north-east of their position, which suddenly increased in volume momentarily before ending in the sound of a crash. Neither witness saw anything and both reported that the visibility in the area was approximately half a mile.

At approximately 1104 hrs, one of the passengers awaiting the aircraft at Carnaby phoned the company's office at Leeds/Bradford Airport to say that it had not arrived. The company then phoned Brough ATC, who in turn initiated overdue action. Airfields to the north-east of the area were contacted but none had any information about the aircraft. Manchester ATC instituted the uncertainty phase at 1130 hrs and this was upgraded to the distress phase by London ATC at 1248 hrs. A search by land and air was put into operation by the Rescue Co-ordination Centre at RAF Pitreavie which was concentrated on the coastal area between Flamborough Head and the Humber Estuary.

The wreckage of the aircraft was eventually found at 1430 hrs by a member of the public, acting on his own initiative, a half a mile west of the village of Riplingham, and about 4 miles NNE of Brough airfield. The elevation of the crash site was 450 ft amsl.

The pilot, who was the sole occupant, was found dead close to the main wreckage.

1.2 Injuries to persons

Injuries	Crew	Passengers	Others
Fatal	1	—	—
Serious	—	—	—
Minor/none	—	—	—

1.3 Damage to aircraft

The aircraft was destroyed on impact with the ground.

1.4 Other damage

An area of growing grass, approximately 135 yards in length and 30 yards wide, was contaminated and bleached by the release of fuel from the aircraft.

1.5 Personnel information

- a* Pilot: Male, aged 52
- i* Licence: Commercial pilot, valid until 5 March 1990. Aircraft ratings (pilot-in-command); PA23 Aztec; Partenavia P68B
 - ii* Instrument rating: Full, valid until February 1981
 - iii* Certificate of test: PA23 Aztec on 5 September 1980
 - iv* Medical certificate: Class one dated 25 July 1980. Required to wear spectacles to correct for near/distant vision
 - v* Flying experience: Total hours 6,450 (4,068 in command). On type 380 (379 in command or as P1 under supervision)
 - vi* Flying and duty times during previous 28 days: Duty time 110 hours 50 mins. Flying time 30 hours 20 mins.
- b* The commander qualified as a pilot in the RAF in 1945 and retired from the service in 1971, having flown 5,977 hours, most of which were on Shackleton, Britannia and Varsity aircraft. He next flew in July 1979, when he obtained employment with NPD Aviation Ltd under a company sponsorship scheme. Since his Commercial Pilot's Licence (CPL) had lapsed, he was required to complete a full course to renew it. This was carried out at Leavesden, principally on PA28 (Cherokee) and PA23 (Aztec) aircraft and the pilot regained his CPL in March 1980. Thereafter he flew fairly intensively in the company's air taxi operations, mostly over the northern areas of the United Kingdom and Europe. This level of activity was maintained up until the time of the accident.

By all accounts, the pilot was a cheerful and good humoured person, who kept himself fit. He had settled well into the work of an air taxi pilot and despite the irregular hours, seemed well content. His company had no reservations about his performance as a pilot.

The pilot had operated into Carnaby on nine occasions during his time with the company. He last flew the sector from Brough to Carnaby on 17 December 1980.

1.6 Aircraft information

- a* G-BOST was a Piper PA-23-250 Aztec 'F', a twin engined six seat low wing all metal monoplane powered by two Lycoming IO-540-C4B5 engines driving Hartzell two bladed constant speed fully feathering propellers.

Meteorological information

An aftercast prepared by the Meteorological Office for the period of the flight contained the following information:

Situation at 1000 hrs on 21 January 1981

Ill-defined surface warm front Redcar to Linton-on-Ouse to Watnall moving very slowly eastwards. Riplingham area in broad mixing zone with dewpoints plus 3°C near coast and plus 6°C just east of the Pennines. Gradient wind from 240 degrees at 25 knots.

Assessment of weather 5 km radius of Riplingham at 1030 hrs

All heights above mean sea level.

Surface wind:	210 degrees 7 knots temperature plus 5°C
1000 ft wind:	230 degrees 15 knots temperature plus 3°C
2000 ft wind:	240 degrees 25 knots temperature plus 3°C
Cloud:	8/8 stratus, base 700 feet occasionally 300 feet mainly in south-west and covering high ground; tops 1500 feet merging at times with strato-cumulus above
Visibility:	1500 to 3000 metres but less than 500 metres in hill fog
Weather:	Misty, occasional rain or drizzle, hill fog patches
Height of 0 degree isotherm:	6000 feet
Airframe icing:	Nil below 6000 feet.

The route forecast passed to the pilot by telephone at 0830 hrs on 21 January included the following information:

Situation:	Warm front moving east at 12 to 15 knots. Expected Newcastle — Leeds by 1000 hrs
Winds at 2000 ft:	230 degrees at 28 kts temperature plus 6°C
Cloud:	6/8 stratus/strato cumulus base 600 feet, top 3000 feet. Occasionally 8/8, base 300 feet near front and local breaks 3/8, base 1000 feet behind front in lee of high ground
Visibility:	4000 metres occasionally 2000 metres near front. Gradually becoming 4000 metres to 12 kms; 100 metres in hill fog
Weather:	Rain dying out behind front but local drizzle over high ground with persistent hill fog patches
Warnings:	Low cloud/hill fog.

An airline captain, who estimates that he drove within 1½ miles of the site approximately 10 minutes after the accident had happened, reports that he was in cloud as he crossed the high ground to the north of Brough. He estimates that the visibility in this area varied between 200 and 400 yards. Other eye witnesses in the area reported essentially the same conditions.

It was not possible to ascertain the weather conditions at Carnaby at the time the aircraft was due to arrive there. The airfield is unmanned and there are no weather reporting facilities. However, by arrangement with the passengers awaiting pick up at an unlicensed airfield, the company is usually advised if the weather appears to be unsuitable. No such advice was received from the passengers awaiting the aircraft's arrival at Carnaby on the morning of the accident.

At 0930 hrs, a weather observation taken at Brough recorded a surface wind from 210 degrees at 8 knots and a visibility of 3000 metres. The cloud was 8/8 stratus at 600 feet. At 1100 hrs, there was no significant change.

The accident happened in daylight.

1.8

Aids to navigation

There are no *en route* navigation aids from Brough to Carnaby, other than the non-directional beacon (NDB) at Brough itself (BV 372 kHz), which was operating at the time of the aircraft's departure. To the south east of track lay Ottringham VHF Omni Range (VOR), which the aircraft was equipped to receive. The aircraft's Area Navigation equipment (King KN 74) enabled the pilot to navigate to an offset position from a VOR within range, and had been set to 23 nm and 352°, which corresponds to the distance and bearing of Carnaby from the Ottringham VOR (113.9 MHz). Both VOR receivers were found selected to this frequency.

The aircraft's ADF, which selected OFF, was tuned to 377 kHz. This did not correspond to any NDB frequency in the area, but it is possible that the pre-impact setting had been disturbed in the accident and therefore may have been tuned to 372 kHz, the Brough NDB frequency.

A marine NDB is situated on Flamborough Head (FB 303.4) which is a short distance to the north-east of Carnaby.

1.9

Communications

The only transmissions received from the aircraft were those on 130.85 MHz, Brough Approach/Aerodrome Control, to which both VHF sets in the aircraft were tuned at the time of impact. Apart from the pilot's acknowledgement of his airborne time, all RTF exchanges between the aircraft and Brough took place before take-off, and were of a routine nature. The absence of any further transmissions from the aircraft on the Brough frequency was not considered unusual at the time by ATC since it often happens that transmissions from aircraft departing to the north are blocked by intervening high ground. Also aircraft often change frequency to Leconfield shortly after departure.

1.10 Aerodrome information – Carnaby

Carnaby lies some 23 nm to the north-east of Brough, and is situated close to the coast, just south-west of Bridlington, near Flamborough Head. The airfield is unlicensed and unmanned. No information is given in the UK Air Pilot though the company has produced a briefing sheet for the use of their pilots. There has been industrial development on the airfield, though some 800 m of the tarmac covered runway have been reserved for aircraft operation.

1.11 Flight recorders

No flight recorders were fitted to the aircraft, nor were they required to be fitted.

1.12 Wreckage and impact information

1.12.1 On-site examination

Inspection at the accident site revealed that the aircraft had struck undulating grass covered ground, just beyond a line of high tension cables that lay across its track, at a height of 450 feet above mean sea level (amsl). At the time the aircraft had been in a gentle descent on a track of 085° M and slightly banked to starboard. After this first impact the aircraft bounced to strike the ground again in a more nose-down attitude some 80 yards further on. It then cartwheeled to finish up facing back in the direction from which it came some 160 yards from the first impact point.

Ground impact had severely damaged and virtually removed both wings with the port engine being separated from its mountings. The cabin area of the fuselage was extensively damaged and the pilot's seat had become detached and thrown clear.

Midway along the wreckage trail there was evidence of a flash fire with some sustained burning having occurred around sections of wing fuel tank.

Only the port auxiliary fuel tank, despite being punctured, still contained fuel; however, the fire and dying off of the grass over fan shaped areas emanating from the wing impact points showed that a significant quantity of fuel remained on board at impact.

Damage to both propellers and 'slashes' in the ground were indicative of both engines developing power at impact. The length of the wreckage trail, damage to the airframe and spacing of the propeller slashes was consistent with the aircraft flying at typical climb speed with both engines operating at normal rpm.

The aircraft configuration at impact was established as undercarriage and flaps retracted.

1.12.2 Subsequent examinations

Detailed examination of the wreckage did not reveal any evidence of pre-crash failure or malfunction.

Analysis of fuel samples removed from the aircraft post-accident and from the last refuelling source at Brough Airfield showed both to comply with the relevant specification making allowance for the aircraft sample storage conditions.

Analysis of oil samples removed from the engines did not indicate any abnormal feature of engine wear or failure.

1.13 Medical and pathological information

Full autopsy with histology and toxicology indicated that the pilot had been killed outright at impact and positively excluded alcohol, carbon monoxide or drugs as factors in the accident. However, the autopsy revealed that the pilot had coronary artery disease which had led to a severe heart attack sometime in the past. He also had a large duodenal ulcer. Neither of these conditions had given rise to any symptoms. The pilot's heart condition was such that it might have caused pain or collapse at any time, though there is no evidence that this occurred during the accident flight. However, stress induced by difficult flight conditions might have resulted in some symptoms becoming apparent.

A review of the pilot's electro-cardiogram (ECG) records back to 1959 was undertaken but these did not show any significant changes over the years. Neither his family nor his doctor knew of any symptoms referable to either his heart condition or his duodenal ulcer.

Medical experience has shown that myocardial infarction can occur without typical symptoms and the ECG may be unaltered afterwards. At present, there is no method of examination that will detect all cases of symptomless coronary artery disease.

The pilot was considered by his family and others who knew him to be in good general health. He smoked only rarely and was not a heavy drinker.

1.14 Fire

There was evidence of a flash fire having occurred midway along the wreckage trail near sections of one of the wing fuel tanks. No fire had occurred in the main wreckage. The Humberside County Council Fire Brigade were notified at 1446 hrs and fire appliances were dispatched to the site, arriving there at 1505 hrs. No action was required and the last vehicle left the scene at 1552 hrs.

1.15 Survival aspects

The accident was non-survivable. The Humberside Area Health Authority Ambulance Service were notified at 1450 hrs that the aircraft had been found. One ambulance was dispatched to the scene, and arrived there at 1501 hrs. A British Aerospace ambulance was also sent from Brough airfield accompanied by a doctor and arrived at the scene at approximately 1510 hrs.

1.16 Tests and research

Nil.

1.17 Additional information

The company expressed the view that on a flight from Brough to Carnaby during which it was not possible to maintain Visual Meteorological Conditions (VMC), the optimum procedure would be to climb to Minimum Safe Altitude (MSA) or above and let down over Ottringham VOR to 1500 – 1700 feet and then fly VMC to Carnaby. If the cloud base was down to a minimum of 800 feet and the visibility down to 2 nm, the best procedure would be to fly VMC down the south side of the River Humber until well clear of the eastern side of Hull and thence northwards to Carnaby.

Minimum Safe Altitude is defined in the company's operations manual as being that which is 1500 feet above the highest terrain or obstacle within 20 nm of the intended track. In the case of the Brough – Carnaby sector, the MSA would therefore be 2400 feet.

2. Analysis

It is only possible to speculate as to the cause of the accident because of the absence of hard evidence concerning the events that occurred after take-off. No defect was found in the aircraft which would have affected its safe operation in the prevailing weather conditions and therefore one is forced to conclude that the accident had its origins in operational and human factors, of which stress may have been one.

Though the flight time to Carnaby would only have been of short duration, 10 to 15 minutes at the most, the weather conditions undoubtedly posed a problem to the pilot. He had three options open to him. One was to climb to Minimum Safe Altitude (MSA) and route via Ottringham VOR and let down from there. The second was to follow the line of the river until clear of Hull and then proceed north to Carnaby. The third was to proceed direct, and it appears to be this option which the pilot had elected to follow, notwithstanding his remarks to the member of ground staff about the possibility of following the coast. Other than that the pilot had left himself somewhat short of time if he wished to arrive at Carnaby at 1030 hrs, it is not clear why he should have chosen to fly direct since it must have been apparent to him immediately after take-off that he would be unable to accomplish the flight visually and in sight of the ground. Nonetheless that appears to be what he was attempting to do, since, according to eye witness evidence, he made no attempt to climb above 500 feet or so after completing his right turn onto course. It is possible that the report by ATC that the cloud base over the airfield was 800 feet influenced his decision to fly direct to Carnaby. His reply 'THAT CAN'T BE BAD' suggests that he found this report more reassuring than the weather forecast he had received from Bawtry and perhaps persuaded him that the conditions were not as bad as he had believed hitherto. In fact the forecast appears to have been accurate, particularly with respect to the risk of hill fog. Had Bawtry been aware that the pilot intended to fly first to Carnaby, before proceeding to Aberdeen, then he could have received more detailed information about the weather over that section of the route and at Carnaby itself. The pilot's uncharacteristic lack of preparation for the flight and his failure to follow his company's recommended procedures is evident though no conclusions can be drawn as to whether or not this had a bearing on the accident.

The aircraft was on track for no more than a minute or two when there occurred an event which precipitated the accident and four items of evidence have now to be considered. The first is the evidence of two witnesses of the sudden application of power immediately prior to the sound of impact. The second is the line of high tension cables that lay diagonally across track, which the aircraft must have passed very close to since it crashed only a short distance to the north of them. The third item of evidence is that the aircraft was banked to the right and on a heading of 085 degrees when it hit the ground, indicating that the turn to the right was in progress at the time. The last item of evidence, which is of the most concern, is the condition of the pilot's heart, which was such that, in the opinion of the pathologist, could have resulted in pain or collapse at any time.

These items of evidence suggest a number of possibilities, none of which can be proved. The first two, that is the application of power whilst the aircraft was very close to the high tension cables, indicate the possibility that the pilot had sighted them at the last moment in the poor visibility and took vigorous action to avoid them. Even if that was the case, such a manoeuvre need not necessarily have resulted

in the accident, unless it occurred coincidentally with some other event. The turn to the right might have been for any number of reasons. One explanation is that the pilot had decided to abandon his attempt to fly direct to Carnaby and was turning towards Ottringham. The other explanation for the right turn could have been that the pilot had begun to feel unwell and was in the process of trying to return to Brough and land when for some reason, which could have been that he collapsed or suffered a distracting pain of some severity, he lost control of the aircraft and crashed. The absence of any radio transmission from the aircraft lends some support to this theory, since otherwise, one might have expected the pilot to report to ATC that he was changing his routeing, assuming that all other conditions were normal. However, it has to be remembered that transmissions from the area of the accident can be blocked by high ground and it may well be that some transmission was made but was not received.

Though it is considered that the cause of the accident is to be found amongst the possibilities suggested in the foregoing, none of them can be preferred and it has to be concluded that the reason for the accident must remain undetermined.

3. Conclusions

(a) *Conclusions*

- (i) The aircraft had been maintained in accordance with an approved maintenance schedule and its documentation was in order.
- (ii) The aircraft was free of significant defects that could have had a bearing on the accident.
- (iii) The pilot was properly licensed and well experienced.
- (iv) Though the pilot had flown fairly intensively during his period of employment, he was within current flight time limitations, and there was no evidence that he was unduly fatigued.
- (v) The pilot had a serious heart condition, which was symptom-less and undetectable by routine licence medical examination. His condition could have resulted in his collapse at any time and may therefore have been a major contributory factor in the accident. However, this could not be positively established.
- (vi) The flight to Carnaby was not being conducted in accordance with the company's operating procedures in relation to the prevailing weather conditions.
- (vii) For reasons which could not be determined, the aircraft was being flown at a height which precluded safe terrain separation in the weather conditions prevailing at the time.
- (viii) For reasons which could not be determined, the aircraft descended inadvertently whilst flying in fog and struck the ground.

(b) *Cause*

The cause of the accident could not be determined. The pilot's choice of route in the prevailing poor weather conditions was a factor. His medical condition may also have been a major contributory factor.

4. Safety Recommendations

Nil.

P J Bardon
Inspector of Accidents
Accidents Investigation Branch
Department of Trade

November 1981