

ACCIDENTS INVESTIGATION BRANCH
Department of Trade and Industry

**Piper PA 30-160 Twin Comanche
G-AVFV. Report on the accident at
Crib-y-Ddysgl, Snowdonia on 22 October 1972**

List of Civil Aircraft Accident Reports issued by AIB in 1973

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8/73	Nipper T66 Mark 3 G-AVKT at Burton Constable Hall, Yorkshire, August 1972	August 1973
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Department of Trade and Industry
Accidents Investigation Branch
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18 June 1973

*The Rt Honourable the Lord Carrington
Secretary of State for Defence*

*The Rt Honourable Peter Walker MBE MP
Secretary of State for Trade and Industry*

Sirs,

I have the honour to submit the report by Mr G M Kelly, an Inspector of Accidents, on the circumstances of the accident to Piper PA 30-160 Twin Comanche G-AVFV which occurred at Crib-y-Ddysgl, Snowdonia on 22 October 1972.

I have the honour to be
Sirs
Your obedient Servant

V A M Hunt
Chief Inspector of Accidents

Accidents Investigation Branch
Civil Aircraft Accident Report No 9/73
(EW/E15)

Aircraft: Piper PA 30-160 Twin Comanche G--AVFV
Engines: Two Lycoming 10-320 BIA
Owner and Operator: Mr R G Powl
Pilot: Mr R G Powl – Killed
Passengers: Four – Killed
Place of Accident: Crib-y-Ddysgl, Snowdonia
Date and Time: 22 October 1972 at 0950 hrs

All times in this report are GMT

Summary

The aircraft was making a private flight from Southend-on-Sea to Valley. When approximately 25 nm due east of Valley, the pilot turned on to a southerly track and commenced a descent through cloud to below the minimum sector safe flight level. Nine minutes later the pilot was given a bearing from Valley which indicated that the aircraft was in the region of high ground and he was instructed to climb to flight level 55, which was the minimum safe flight level. Shortly afterwards the aircraft hit high ground in the Snowdon area. All five occupants of the aircraft were killed. The weather in the area was overcast with cloud covering the mountains, across which a strong northwesterly wind was blowing. The report concludes that the accident was due to a navigational error that led the pilot to descend through cloud below the minimum safe altitude in mountainous terrain over which there were strong and sustained downdraughts.

1. Investigation

1.1 History of the flight

The aircraft was making a private flight from Southend-on-Sea to Royal Air Force Valley in Anglesey. It had taken off from Southend at 0726 hrs on 22 October 1972 on an instrument flight rules (IFR) flight plan and had flown via airways at flight level (FL) 80 to just beyond the Wallasey VOR. The flight as far as Wallasey was apparently uneventful although the aircraft arrived over each en route reporting point a few minutes after the estimated time of arrival (ETA) given by the pilot. At 0850 hrs, when the aircraft was between Lichfield and Wallasey, the pilot asked Preston Airways to confirm that Valley would still accept the aircraft at '1050 hrs', (an inadvertent lapse into BST) which was his ETA. Preston gave this confirmation at 0852 hrs. At 0926 hrs, the aircraft reported over the Wallasey VOR and requested either descent clearance to a lower flight level or for permission to proceed under visual flight rules (VFR). Preston cleared the aircraft to descend initially to FL 50, making no reference to the request for VFR clearance. Two minutes later, Preston amended the descent clearance to FL 55, which they advised was 'the minimum sector altitude' for Valley. This was acknowledged by the pilot. At 0930 hrs, the pilot requested clearance to leave airways and route direct to Valley. This was approved and the aircraft was instructed to call Valley on 122.1 MHz. However at 0934 hrs, the aircraft called Preston again, stating that it was at FL 55 and requested descent clearance down to 2,500 feet. Preston replied that this was at the pilot's discretion and that the aircraft was cleared to the Valley approach frequency.

Six minutes later at 0940 hrs, the aircraft contacted Valley on 122.1 MHz and passed on ETA of 0950 hrs. Valley advised that its magnetic course to steer (QDM) was 270° and shortly afterwards passed to the aircraft the airfield weather information. This included the airfield altimeter setting (QNH) of 1024 mb, which the pilot repeated back. Shortly afterwards the pilot asked which runway was in use and was told that it was 32. Valley then requested the aircraft to call when it was 15 nm from the airfield and this request was acknowledged.

At 0950 hrs the pilot asked for a QDM and was given 310° , which he acknowledged. Thinking this bearing to be unusual, the Valley radar controller checked his screen and noticed a contact at a range of $19\frac{3}{4}$ nm on a bearing of 131° magnetic. However the contact faded after only two paints of the radar sweep and could not positively be identified. Valley asked the pilot to report his height and when he replied that he was at 4,000 feet the controller

advised him that the minimum safe flight level was 55. The pilot did not appear to understand this message and asked for it to be repeated. However, instead of repeating the message, the controller asked the pilot if he was flying VMC (ie in visual flight). Receiving the reply 'Negative', the controller instructed the aircraft to climb to FL 55 and the pilot acknowledged this message with the words 'Roger, we're climbing to five five'. This call was made at 0951 hrs. At 0952 hrs a very weak and unintelligible transmission was heard which was identified later during the playback of the recording tape as coming from G-AVFV. No further transmissions were heard from the aircraft.

At about this time, an aircraft was heard flying in cloud on a southerly heading east of Snowdon and to the west of the town of Capel Curig. A short while later, campers on the shore of Llyn Llydaw, a lake near Snowdon and to the southeast of it, heard an aircraft approaching from the east at low altitude. As it passed over the lake it was still in cloud, the base of which was estimated to be about 2,000 feet. The aircraft's engines were heard to hesitate momentarily and then to 'roar suddenly'. Several climbers on the south side of the Snowdon area also heard the aircraft engines at about this time followed a few seconds later by the sound of impact. Despite poor visibility, variously estimated as being between 30 and 50 yards, the wreckage of the aircraft was located soon afterwards on the south face of Crib-y-Ddysgl. The aircraft was on fire and there were no survivors.

1.2 Injuries to persons

<i>Injuries</i>	<i>Crew</i>	<i>Passengers</i>	<i>Others</i>
Fatal	1	4	—
Non-fatal	—	—	—
None	—	—	—

1.3 Damage to aircraft

Destroyed.

1.4 Other damage

Nil.

1.5 Crew information

Mr Robert George Powl, aged 47, held a valid Private Pilot's Licence with the following endorsements and ratings:

Certificate of Test for the PA 30 aircraft dated 11 November 1971
Group A and B aircraft.

Instrument Rating – valid until 14 April 1973.

Night Rating.

R/T Licence.

Medical Certificate -- valid until 14 February 1973 with no restrictions.

Mr Powl learnt to fly at Southend in 1963 and since that time he had flown regularly as a private pilot. During the period January-March 1972, Mr Powl received 30 hours of instrument flying training at the end of which he passed a full instrument rating test.

The last entry in Mr Powl's log book was for a flight made on 5 October 1972, up to which time he had flown a total of 972 hours (791 in command). His total flying hours on the PA 30 were 126 hours (111 in command).

According to his log book, the only previous occasion Mr Powl had flown to Valley was on 28 April 1972. However Mr Powl had flown into a large number of airfields, both in the United Kingdom and overseas.

1.6 Aircraft information

The aircraft was manufactured by the Piper Aircraft Corporation in March 1967 and flown to the United Kingdom shortly afterwards. It remained in the ownership of CSE (Aircraft Services) Ltd until October 1971 when it was sold to Mr Powl.

Maintenance records show that the aircraft had been maintained in accordance with an approved maintenance schedule until 25 July 1972, when a Check 1 had been carried out. This check was valid for 3 months or 50 flying hours, whichever occurred sooner. There was no record of flying times in the aircraft log books after 25 July. However there was a record in the pilot's flying log book, which showed that up to 5 October 1972, the date of the last entry, the aircraft had flown 56 hours with Mr Powl in charge. It was not possible to ascertain how much flying the aircraft had done after 5 October, though it is known that it had flown at least once in the charge of another pilot. Therefore at the time of the aircraft's departure from Southend on 22 October, it was overdue for an inspection by at least six hours and probably more. This had no bearing on the accident though but for this omission the certificate of airworthiness would have been valid until 6 April 1973. The total number of hours flown by the aircraft could not be established for the same reason, but it was not less than 3,160 hours.

The aircraft's fuel tanks were full when it took off from Southend and calculations show that with five persons on board (using actual weights in three cases) the take-off weight of the aircraft was approximately 111 lb in excess of the authorised maximum of 3,600 lb. However, assuming normal fuel consumption, the weight of the aircraft at the time of the accident would have been 3,481 lb which was within limits and thus the overweight condition at take-off had no bearing on the accident. The centre of gravity was within the prescribed limits throughout the flight.

1.7 Meteorological information

The pilot and one of the passengers, also a licensed pilot, visited the Flight Planning Office at Southend before departure but neither was seen to take note of the en route weather information displayed on the self briefing board. There is no record of any en route weather information being obtained by the pilot from any other source.

A weather appreciation prepared by the Meteorological Office for the North Wales area at about the time of the accident contained the following information:

Weather	Scattered outbreaks of light rain or drizzle.
Cloud	Total cloud cover with the base varying between 1,000 and 2,500 feet above mean sea level (amsl). Layered cloud extended up to 12,000 feet.
Visibility	Generally in excess of 5 km, below cloud.
Wind	3,000 feet – 300° 40 knots 5,000 feet – 310° 50 knots
Turbulence	Possibly severe locally in the vicinity of Snowdonia.

Witnesses stated that in the area where the aircraft crashed there was total cloud cover, the base of which was between 1,500 and 2,000 feet above ground. The wind was strong and gusting violently.

1.8 Aids to navigation

The aircraft was equipped with two VOR receivers. Both were destroyed by impact and fire damage. It was therefore not possible to ascertain to which en route aids the VOR equipment had been tuned. The only evidence that this equipment had been functioning correctly before impact was that the aircraft had flown along airways from Southend to beyond Wallasey without the pilot having reported any defect or difficulties. The aircraft also carried ADF of which the tuning dial survived. It was set to 350 KHz but this is unlikely to have been the pre-impact setting. The closest frequencies in the area to this setting were Wallasey NDB (331 KHz) and Whitegates (368.5 KHz), both of which the aircraft had recently flown over.

1.9 Communications

The aircraft made contact on six different frequencies during its flight from Southend, the last being with Valley on 122.1 MHz. The tape recording for each of these frequencies was played back for the relevant period and transcribed. With the exception of the aircraft's last message, which was badly distorted and very brief, normal two way communication had been established with the various en route control centres throughout the flight. It is considered that the distortion of the aircraft's last message at 0952 hrs was due to terrain interference.

Both the aircraft's VHF transceivers were totally destroyed on impact.

1.10 Aerodrome and ground facilities

Valley is an RAF Master Division airfield situated on Anglesey. It is open at all times to emergency traffic, but prior permission is required for normal charter or private flights into the airfield. The *UK Air Pilot* states that when arrival times are stipulated these times must be strictly adhered to. Mr Powl was informed by Valley the day before the accident that landings after 1000 hrs on Sunday 22 October would not be permitted in order to avoid disturbance to a local church service.

Valley is listed in *Aeronautical Information Circular 120/1971* (later amended by 135/1972) as one of the airfields providing a Lower Airspace Radar Service. The *Circular* states, amongst other things, that the service is on request and that it is advisory. At no time did the pilot of G-AVFV request a radar service from Valley and none was given.

Valley's radar was selected to 25 nm and the aircraft was within range only for the last few minutes of flight.

A contact which may have been G-AVFV was briefly observed on a bearing of 131° at a range of 19¾ miles at 0952 hrs but as this faded after only two 'paints', it was not possible to establish positive contact.

1.11 Flight recorder

There was no requirement for a flight recorder and none was fitted.

1.12 Wreckage

An examination of the wreckage and its distribution indicated that the aircraft had been making a climbing turn to the right when, on a heading of about 350°(M), it struck the steep southeast face of the mountainside at a height of 3,040 feet amsl.

The fuselage had disintegrated completely on impact and the remnants of the cockpit and centre section had been burnt out during the subsequent fire.

The port wing had broken off at the root and had folded back into the fuselage, and the port engine had rolled some 200 feet down the slope. The starboard wing and engine had become detached and were separated from the main wreckage. Further examination of the wreckage was restricted by the conditions prevailing at the site and by the amount of fire damage to the cockpit area. It was therefore only possible to establish the following:

- | | |
|----------------------------|---|
| (a) Configuration | Landing gear up.
Flaps up. |
| (b) Engines and propellers | Both engines were under high power at impact. There was no evidence of either pre-crash failure or malfunction. |
| (c) Aircraft clock | Stopped by impact damage with the hands at 1053. |

- (d) Vertical speed indicator The needle of this instrument was jammed by impact damage at a reading of just over 2,000 feet per minute climb.
- (e) Airspeed indicator A portion of the needle of this instrument had been in a molten state and indicated a speed of approximately 130 knots.
- (f) Altimeters The port altimeter subscale was set to approximately 1026 mb. The starboard altimeter was set to 1029 mb. These settings are thought to be reliable to within ± 2 mb although both instruments were severely damaged by impact and fire.

1.13 Fire

Fire occurred on impact but was limited to the cabin area, which was burnt out.

1.14 Survival aspects

Analysis of the injuries of those on board suggested that the aircraft was in a nose-up attitude at the time of impact. Death was instantaneous in all cases; the accident is therefore classified as not survivable.

1.15 Tests and research

None.

1.16 Medical and pathological information

Post mortem examination revealed no evidence of disease in either the pilot or the passenger occupying the starboard front seat. Tests for alcohol were negative and there was no evidence of cockpit contamination by carbon monoxide before the crash.

1.17 Other information

Effect of strong winds over mountainous regions

- (a) The *Owners' Handbook* for the Twin Comanche, a copy of which was found in the wreckage contained the following information in Section 3:

In mountainous terrain, maintain proper distance from the mountains, especially in strong winds, which may cause downdraughts and turbulence.

- (b) The following extract from report MO 621B *Airflow over Mountains* published by the Meteorological Office, is relevant.

The greatest need for action (ie when flying over hills across which a wind is blowing) will arise when strong effects are encountered at a height which does not provide any special margin for large height changes, as, for example, if an aircraft starts to experience vertical currents of several hundred feet per minute or more when at 5,000 feet over North Wales. If the particular region merely comprises a number of hills of no great horizontal extent, namely distinct individual hills, then any down current should not last for more than a mile or two at the most and should be followed by rising air. Most hilly regions, however, contain some long ridges of high ground or series of individual features which together make up what are effectively ridges. If the wind is flowing transversely across such a ridge it is important to realise that an aircraft flying more or less parallel to it might remain in a down current continuously until the whole length of the ridge has been transversed. In such circumstances catastrophic loss of height could occur.

- (b) Topographical description of the accident site

Crib-y-Ddysgl is part of the Snowdon complex which takes the form of a curved ridge, the axis of which lies roughly northeast, southwest. At the time of the accident the wind was blowing at 40 knots from the northwest, that is at right angles to the ridge. It therefore follows that to the southeast of the Snowdon area severe downcurrents and turbulence were probable.

2. Analysis and Conclusions

2.1 Analysis

Consideration of the evidence indicates that the pilot did not intentionally fly into the region of Snowdonia and that he was probably unaware of his exact position until a minute or two before the accident. As there was total cloud over the whole of North Wales at the time of the accident, it is unlikely that he would have seen the ground at any stage of the latter part of the flight.

The aircraft's departure from the planned track was probably because the pilot wished to make sure of arriving at Valley before the deadline of 1000 hrs since his original ETA of 0950 did not allow much margin. He seems, however, to have made insufficient allowance for the strong northwesterly wind that was blowing at the time. This wind had been forecast for the period of the flight and the forecast had been on display in the Southend Airport Flight Planning Office when the pilot and one of the passengers were briefing themselves. However according to the Flight Planning Staff, neither of them was seen to check the en route weather information provided although the passenger (himself a qualified pilot) did ask for airfield weather information in the North Wales area.

A study of the aircraft's track from Southend to its position at 0940 hrs (when contact was first made with Valley) confirms the view that the pilot did not have accurate wind information available to him in the air. It shows that during the flight to Wallasey the aircraft arrived over each airway reporting point a few minutes after the time estimated by the pilot, indicating that insufficient allowance was being made for the wind, which for this portion of the flight was coming from dead ahead.

After passing over Wallasey, the aircraft flew a track of 270° for the next 14 minutes. This was deduced from the fact that the bearing of the aircraft from Valley at the end of that period was the same as the bearing of Wallasey from Valley, namely 090° magnetic. To have achieved a track of 270° , the aircraft heading would have to have been 285° , that is, within 2° of the QDM of the centre line of Airway Blue One from Wallasey to Point Lynas. This suggests that the pilot intended to remain on the airway at least until he had been cleared direct to Valley. But again he appears not to have made any correction for wind, which at this stage was drifting the aircraft to port. Calculations show that at 0940 hrs its position was 1 nm north of the town of Colwyn Bay. In the prevailing conditions this would have been approximately 18 minutes flying time from Valley. However at 0941 hrs, the pilot indicated that there was only 9 minutes flying time from Valley, which suggests that he believed himself to be further along track and nearer to the northeastern end of the Menai Strait than was actually the case. If this were so it would explain the pilot's next action, which was apparently to turn some 45° to port.

This is deduced from the fact that after passing Colwyn Bay, the aircraft flew a track of 220° for 9 minutes to a point just east of Snowdon. To achieve this track the aircraft's heading would have been 240° magnetic. By flying this course it seems possible that the pilot may have intended to position the aircraft for a right hand base leg to Runway 32 at Valley thereby hoping to ensure his arrival there before 1000 hrs. This possibility is supported by the fact that at about the same time as he turned on to a heading of 240°, the pilot also commenced his descent. The consequence of this action was that the aircraft descended through cloud towards high ground which the pilot clearly believed lay well to the east of his position.

By 0950 hrs the position of the aircraft, as given by the QDM of 310° together with the evidence of the witness who heard the aircraft and also the brief radar contact seen at that time, was just east of Snowdon, some 25 nm from Valley. The air traffic controller at Valley immediately realised that a QDM of 310° placed the aircraft in the high ground sector. He therefore promptly advised the pilot that the minimum safe height was 5,500 feet and then, when the pilot reported that he was at 4,000 feet and not in VMC, instructed him to climb immediately. The pilot acknowledged this instruction and presumably attempted to comply with it.

The aircraft was then heard to turn on to a westerly heading, and this is consistent with the pilot responding to the QDM given by Valley. The manoeuvre took the aircraft round the lee side of Snowdon and approximately 2 nm south of it.

Within a minute or two of the pilot reporting his height as 4,000 feet and that he was climbing to FL 55 the aircraft crashed into the mountain side at 3,000 feet. The inference must be that when the aircraft flew into the lee of the Snowdon complex, it was subjected to sustained downcurrents of exceptional severity which resulted in a catastrophic loss of height.

The pilot gave no indication that he was experiencing any difficulty at this stage, unless the brief distorted transmission at about the time of the accident was to this effect. It is highly probable however that the aircraft was flying in severe turbulence that may well have caused control difficulties. The aircraft did in fact turn further than the 310° called for by the QDM, on to a heading at impact of about 350°. In the circumstances this would not have been unusual. But, unfortunately overshooting the turn to this extent brought the aircraft on to a collision course with the high ground.

2.2 Conclusions

(a) Findings

- (i) The weight of the aircraft exceeded the authorised maximum limit by approximately 111 lb at the time of take-off, although this had no bearing on the accident as at the time of occurrence the weight was within limits. The centre of gravity was within the prescribed range throughout the flight.

- (ii) The aircraft had been maintained in accordance with an approved maintenance schedule but was overdue for an inspection when the flight to Valley was commenced. This also had no bearing on the accident as no pre-crash technical or mechanical defect was found.
- (iii) The pilot was properly licensed and adequately experienced for the flight.
- (iv) The pilot was apparently unaware that over his proposed route a strong northwesterly wind prevailed. This had been correctly forecast and the information was available to the pilot before his departure from Southend.
- (v) The pilot appears to have made insufficient allowance for wind effect in consequence of which he inadvertently flew well to the south of his intended track and towards high ground.
- (vi) The pilot descended in cloud below the minimum sector safe flight level for the area in which he was flying.
- (vii) The aircraft experienced a considerable loss of height in sustained downcurrents in the lee of high ground over which a strong wind was blowing.
- (viii) The aircraft flew into high ground which was obscured by cloud.
- (ix) The air traffic control services at Valley provided proper assistance in accordance with the appropriate procedures.

(b) *Cause*

The accident was due to an error in navigation that led the pilot to descend in cloud below a safe height in mountainous terrain and experience a severe loss of height in sustained draughts, which led in turn to a collision with high ground.

G M Kelly
Inspector of Accidents

Accidents Investigation Branch
Department of Trade and Industry
June 1973