Department of Trade

ACCIDENTS INVESTIGATION BRANCH

Cessna 337A (Skymaster) G-ATNY Report on the accident at Moel Siabod, North Wales, on 8 June 1979

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ISBN 0 11 512454 3

Department of Trade
Accidents Investigation Branch
Kingsgate House
66–74 Victoria Street
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5 December 1979

The Rt Honourable John Nott 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 Cessna 337A (Skymaster) G–ATNY which occurred at Moel Siabod, North Wales, on 8 June 1979.

I have the honour to be
Sir
Your obedient Servant

W H TENCH
Chief Inspector of Accidents

Accidents Investigation Branch
Aircraft Accident Report No. 5/79
(EW/C667)

Owner and Operator:	Ron Webster (Midlands) Ltd
Aircraft: Type:	Cessna 337A (Skymaster)
Nationality:	United Kingdom
Registration:	G–ATNY
Place of Accident:	Moel Siabod, North Wales
	Latitude 53° 04′ North Longitude 03° 56′ West
Date and Time:	8 June 1979, at an estimated time of 0817 hrs
	All times in this report are GMT.

Synopsis

The accident was notified by the North Wales police at 1805 hrs on 9 June 1979, and personnel from the Accidents Investigation Branch began an investigation the following day.

The aircraft was engaged on a private flight from Coventry Airport to Ronaldsway, Isle of Man, under Visual Flight Rules (VFR). The planned route was via Droitwich and Great Ormes Head on the coast of North Wales, but the aircraft followed a track some 12° to the left of this route. In thick mist and cloud it struck a peak 2800 feet above mean sea level, approximately 5 nautical miles east of Snowdon. The aircraft was destroyed and all six occupants were killed. It is concluded that the accident was caused by a navigational error and failure to climb to a safe height once the aircraft had entered cloud.

1. Factual Information

1.1 History of the flight

The aircraft, with six people on board, was engaged on a private flight between Coventry Airport and Ronaldsway Airport, Isle of Man. After the pilot had booked out for a VFR flight, the aircraft left Coventry at 0732 hrs in good weather, crossed the Honiley VHF Omni–range (VOR) station, and turned towards Droitwich. At 0744 hrs the aircraft passed overhead Droitwich on a north–westerly heading, and shortly afterwards called Shawbury Zone for traffic separation under the Trial Lower Airspace Advisory Service. The pilot told Shawbury that his route lay from Droitwich to Great Ormes Head on the north coast of Wales, and thence to Ronaldsway. He gave his altitude as 3000 feet and his heading as 310°. After requesting a turn for identification at 0750 hrs Shawbury gave the aircraft a fix which placed it ten nautical miles north-west of Kidderminster, and asked the pilot to resume his original heading. This message was acknowledged, and after a few moments the pilot reported that he was again steering 310°. Since there was no conflicting traffic the aircraft remained on this heading until at 0800 hrs the pilot was told that the aircraft was fading from Shawbury's radar cover in a position approximately 13 nautical miles south–west of Shawbury.

At 0803 hrs the aircraft changed frequency to London Information, and the pilot advised that if he found himself unable to maintain radio contact as he crossed the coast he would change frequency to Ronaldsway. Another routine exchange with London Information at 0806 hrs to establish the aircraft's point of departure was the last transmission heard from G–ATNY. When London Information later tried to contact the aircraft without success, it was assumed that it had changed to the Ronaldsway frequency.

Since the pilot had not filed a Flight Plan, nor requested that a check be made to confirm his arrival at Ronaldsway, ATC was not required to confirm that the flight had been completed as planned. It was known that the aircraft might not return to Coventry until the next day, and accordingly it was not missed until 1100 hrs on 9 June. Distress action was then initiated and an extensive search took place over land and over the Irish Sea. During the afternoon of 9 June a hill walker found the wreckage of the aircraft. It had struck the south–western face of a peak known as Moel Siabod, 5 nautical miles east of Snowdon, at approximately 2800 feet above sea level, instantly killing all six occupants. Although there were no eyewitnesses, engine noise and a sound which can be attributed to the impact had been heard on the mountainside at approximately 0815 hrs on 8 June. The mountains at that time were covered in thick mist and cloud.

1.2 Injuries to Persons

Injuries	Crew	Passengers	Others
Fatal	1	5	–
Serious	–	–	–
Minor/None	–	–	–

1.3 Damage to Aircraft

The aircraft was destroyed.

1.4 Other Damage

None.

1.5 Personnel Information

Commander:	Male aged 49 years
Licence:	Permanent United Kingdom Private Pilot's Licence, first issued on 30 December 1965, with valid medical certificate expiring on 28 February 1980.
Ratings:	Groups A and B (Single and twin engined aircraft). The pilot did not possess an Instrument Rating or an Instrument Meteorological Conditions Rating.
Experience:	675 hours (estimated) with an estimated 5 hours on type.

1.6 Aircraft Information

(a) Type:	Cessna 337A (Skymaster)
Date and manufacture:	1966
Engines:	Two Continental IO–360–C
Certificate of Airworthiness:	General Purpose Category, valid until March 1980.
Maintenance:	The aircraft had been maintained in accordance with an approved maintenance schedule.
Total hours flown:	2351
(b) Maximum weight authorised:	4200 lbs
	Since it was not possible to establish the exact fuel load at the time of take-off, or the weights of the occupants, neither the take-off weight nor the centre of gravity could be determined.
(c) Type of fuel:	Avgas 100L

1.7 Meteorological Information

At Coventry there is a direct telephone line from the briefing room to Birmingham Airport, so that pilots may consult the forecaster. The local area forecast for Birmingham is displayed in the briefing room at Coventry. There is no record of the pilot having consulted the Birmingham forecaster on the morning of the accident, although it is possible that information was obtained from the Automatic Telephone Answering Service. Two telephone calls were received by the Ronaldsway (IOM) Meteorological Office early in the morning of 8 June, one of which could possibly have been from the pilot. Only the actual weather at Ronaldsway together with a terminal forecast was provided. No en route weather information was given or requested.

An aftercast prepared by the UK Meteorological Office for the period of the flight shows that there was a weak ridge of high pressure from the Isle of Wight to Central Wales, with a slack south-westerly to westerley flow of rather moist air over North Wales. The wind between 2–3000 feet was from 250 degrees at 12 knots.

Cloud was variable, with base 2000 feet and tops 4000 feet above mean sea-level. The Midlands were estimated to have 4/8 cover or less, North Wales to have 6/8 or possibly more. Low stratus was also variable, with small quantities over the West Midlands, and up to 8/8 at times over the hills in North Wales.

Visibility was generally 5 to 12 kilometres, but 3 to 5 kilometres over North Wales and down to 100 metres in hill fog. Witnesses reported that at the presumed time of the accident the mountain was covered with thick mist and cloud.

1.8 Aids to Navigation

The aircraft was fitted with two VHF Omni-Range (VOR) receivers, two Automatic Direction Finding (ADF) receivers, one Distance Measuring Equipment (DME), and one ATC transponder. An autopilot was also installed.

All ground aids to navigation, which the aircraft might have been using at the time of the accident, were serviceable.

1.9 Communications

During the course of the flight routine communications were established with Birmingham Approach on 120.5 MHz, London Information on 124.75 MHz, and Shawbury Zone on 124.15 MHz. Shawbury Zone provided a Radar Advisory Service, but this was limited because of poor cover in the area of the aircraft at its cruising altitude. This limited service ceased at 0800 hrs, when the aircraft began to fade from radar cover. The last transmission received from the aircraft was a routine exchange with London Information at 0806 hrs.

1.10 Aerodrome Information

Not applicable.

1.11 Flight Recorders

None required and none fitted.

1.12 Examination of Wreckage

The aircraft had struck the rock face of the southern side of Moel Siabod at a point approximately 30 feet below the ridge. The degree of damage sustained in the impact was extreme and compatible with a high speed at impact, estimated to be in the region of 150 knots. Following the impact a severe ground fire broke out in and around the point of impact which consumed the greater portion of the lower cabin area, the forward engine and the instrument panels. The fire was fed primarily by fuel from the aircraft's fuel tanks which had burst on impact. Examination of the wreckage at the site, together with impact witness marks on the rock face, indicated that at the time of impact, the aircraft was level both with respect to bank and pitch. It was not possible to establish accurately the aircraft's track and heading, but the approximate track was 350 degrees magnetic.

The aircraft's extremities, the control surface balances and both the doors were found at the accident site. Their location in the accident area and the damage each had sustained indicated that the aircraft was complete at the time of impact.

Detailed examination of the aircraft's systems was restricted by the circumstances prevailing at the accident site, but there was clear evidence that the undercarriage was retracted and that both engines were delivering power with each propeller within the normal operating pitch range. There were indications that the flaps were retracted and that the pitch trim was neutral.

The burnt-out remains of two altimeters were recovered from the wreckage, one of which was found to be set to 1020 mbs with the instrument mechanism loose. The other altimeter, which was found in debris from the left side of the panel, was found to be set to 1016 mbs with the 'Hundreds' and 'Thousands' pointers present and reading approximately 2700 feet. The height of the impact point was approximately 2750 feet amsl.

1.13 Medical and Pathological Information

Post mortem examination of the occupants revealed no evidence of any medical condition which could have contributed to the cause of the accident.

1.14 Fire

There was an extensive post-impact fire.

1.15 Survival Aspects

1.15.1 Search and Rescue (SAR)

The accident was non-survivable and the Search and Rescue operation which followed had no chance of saving life. However in a less severe impact the speed of the SAR response, and the information available to the Rescue Co-ordination Centre (RCC) might have meant the difference between survival and death. Because the pilot had not filed a flight plan but had merely 'booked out' on leaving Coventry, ATC procedures did not require a check that the aircraft had reached its destination. The owner of the aircraft, and relatives of the passengers, knew that the occupants might decide to spend the night in the Isle of Man, and return to Coventry the following day. Consequently nobody realised that the aircraft was missing until late the next morning, 9 June 1979. Edinburgh Rescue Co-ordination Centre received information that the aircraft was missing at 1205 hrs, and immediately dispatched two Royal Air Force (RAF) Wessex helicopters to search the Irish Sea between Wallasey and the Isle of Man, and an RAF Nimrod aircraft to cover the presumed land route. When the wreckage was eventually discovered the RCC was informed (at 1706 hrs). A Wessex then carried police and a civil Mountain Rescue Team to the site, where the wreckage was identified as G–ATNY. The helicopter finally returned to base at 1950 hrs on 9 June. SAR activity, through no fault of the appropriate authorities, was thus late in starting, and uncertain where to concentrate its efforts.

The alternative to 'booking-out' would have been to file a flight plan, an option which is open to all pilots on all flights. The procedures for filing flight plans and 'booking-out' are contained in the United Kingdom Air Pilot, RAC 1.3, and are repeated in Aeronautical Information Circular No 65/1976. Both documents remind pilots of the advantages of filing a flight plan, the Information Circular expressing itself in the following terms:

> 'Pilots are reminded, however, that they may file a flight plan for any flight if they so wish, and they are particularly advised to do so if they intend to fly further than ten miles from the coast or over sparsely populated or mountainous areas, especially if the aircraft is not equipped with radio. Information contained in a flight plan can greatly assist search and rescue should the aircraft be reported overdue'.

1.16 Tests and Research

None

1.17 Additional Information

Further evidence as to the aircraft's track was obtained from a routine recording made at the relevant time of Clee Hill radar, which is situated 5 nm north-east of Ludlow. The recording, when replayed on a display, showed a primary return which in every particular corresponded with the timings and the route flown by G–ATNY as deduced from the RTF

transcript. In particular, the return corresponded with the radar fix by Shawbury at 0750 hrs from whence the aircraft could be seen on the recording to fly steadily towards a position some 8 nm short of the accident site, when the return faded. The time at which this occurred, according to the recording, was 0814 hrs. The aircraft's track at that stage was such that if extended beyond the point where the return faded, it intercepted the position of the accident site.

It has to be emphasised that Clee Hill radar supplies information only to London Air Traffic Control Centre (LATCC), which was not involved with the flight of G–ATNY and had no knowledge of it.

2. Analysis

2.1 General

The position where the accident occurred was substantially off the direct track from Droitwich to Great Ormes Head along which, according to the evidence of the RTF transcript, it was the pilot's intention to fly. It is highly unlikely that the diversion towards the Snowdonia area was deliberate. Therefore the assumption upon which this analysis is based is that the pilot intended to fly the direct track from Droitwich to Great Ormes Head, but for some reason, failed to do so and was unaware of the fact.

2.2 Navigational Aspects

The direct track from Droitwich to Great Ormes Head is 324 degrees magnetic. The track flown by the aircraft, as deduced from the RTF transcript and as observed on the Clee Hill radar recording, was 312 degrees magnetic. It was known that the pilot was flying a heading of 310 degrees, which was presumably magnetic. It is clear therefore that the pilot had made some computations in order to derive this heading and that in so doing introduced an error of some kind. The first possibility is that he applied an incorrect wind velocity. It is known from the Clee Hill radar recording that the aircraft's ground speed was approximately 160 knots, which equates to a True Air Speed (TAS) of 172 knots. This is just within the cruising capability of the aircraft type. In order to derive a heading of 310 degrees magnetic at that TAS to maintain a track of 324 degrees magnetic, the pilot would have had to apply a wind velocity of approximately 230 degrees/20 knots. Since this bears no close relationship to the actual wind, the possibility that the pilot made this error is considered to be the least likely.

The second possibility is that the pilot either incorrectly measured the track from Droitwich to Great Ormes Head or forgot to apply the magnetic variation (9 degrees West). The true track is 315 degrees. Applying to that the actual wind velocity of 280°/12 knots, as provided by the Meteorological Office's aftercast, and using a TAS of 172 knots, a true heading of 313 degrees results. This is sufficiently close to the heading steered by the pilot to suggest strongly that he may well have omitted to apply magnetic variation, especially if due allowance is made for slight variations in track measurement and computation. Also, of course, it is not known what wind velocity was used by the pilot for his calculations.

If he did indeed fail to apply magnetic variation to both true track and true heading this might also explain his failure to discover that the aircraft was off track. There is evidence that in referring to 'Droitwich' he meant the Droitwich Broadcasting Station, over which the aircraft was seen to turn on the radar recording. Whilst there is no record of the pilot having received formal instruction in the use of navigation aids, there is some evidence that he knew how to operate the ADF equipment, and thus how to use the Droitwich transmitter as a tracking aid. After the aircraft had made its identifying turn for the benefit of Shawbury Radar it was displaced slightly north of the direct track from the Droitwich transmitter to the site of the accident. Once it had returned to its original heading of 310° (M), with the associated track of 312° (M), the aircraft would thus have ADF indications of a track of approximately 315° (M) from Droitwich. It is possible that the weather over the Shropshire plain made it difficult to map-read; in these circumstances a pilot who had indeed omitted to allow for magnetic variation might be persuaded that his ADF indications showed him to be on track for Great Ormes Head.

2.3 Minimum Safe Altitude

The incorrect heading should not, on its own, have led to the accident. A basic rule of airmanship for a pilot who is not qualified to fly on instruments and finds himself flying towards deteriorating weather is to turn back. In this case, if the pilot felt himself

competent to fly on instruments despite his apparent lack of formal training, and decided to continue the flight in spite of his lack of an appropriate rating on his licence, the Rules of the Air required him to fly under Instrument Flight Rules (IFR). Under IFR one requirement is that the aircraft shall not fly at a height of less than 1000 feet above any obstruction within 5 nm of track. Provided that the aircraft was on track from Droitwich to Great Ormes Head, compliance with IFR would have required an altitude of at least 3066 feet to be flown as it passed abeam the Welsh mountains. This was close to the altitude that was in fact flown by the aircraft, so it is possible that the pilot believed that he was conforming to IFR. However IFR flight *above* 3000 feet requires an aircraft to be flown at the nearest appropriate quadrantal flight level, in this case. 45. Therefore, once the pilot was no longer able to maintain VFR, this is the altitude to which he should have climbed to have conformed strictly to IFR, since he could not properly fly at 3066 feet.

Notwithstanding that however, it is usually the case that more generous margins for error are applied when calculating a minimum safe altitude. In commercial aviation, substantial margins are applied, but one simple method, recommended for use in private aviation, is to add at least 1000 feet to the highest obstruction within 10 nm of track. Had the pilot adopted this criterion, the appropriate minimum safe altitude for his intended route would have been 4485 feet. Again, the nearest appropriate flight level would have been 45 under IFR and this would have left the aircraft well clear of high ground, even allowing for the substantial divergence from track that it made. In conclusion, therefore, it must be stated that the fundamental error made by the pilot was not the deviation from his intended track but that he failed to climb to the appropriate safe altitude for the area once he had entered cloud.

The possibility was considered that the aircraft may have been forced down to an unsafe height by downdraughts or curl over effects which are not uncommon in the Snowdonia area. However since the aircraft was not flying on the lee side of the mountains where these effects occur and that the meterological conditions were not favourable to their formation, the possibility of an unintentional descent was discounted.

3. Conclusions

(a) *Findings*

(i) The aircraft had been maintained in accordance with an approved maintenance schedule and its documentation was in order.

(ii) No technical defect or mechanical malfunction was found in the aircraft, its engines, or equipment.

(iii) The pilot held a valid licence but did not possess a rating which qualified him to fly in the weather encountered en route.

(iv) On encountering unfavourable meteorological conditions the pilot did not climb to a safe altitude, or alternatively turn back along his track to regain visual flight.

(v) The reason for the aircraft's divergence from its intended track could not be established though it remains a possibility that the pilot omitted to apply magnetic variation.

(vi) If the pilot had filed a flight plan, as was appropriate and advisable in the circumstances, the long delay in mounting the Search and Rescue operation would not have occurred. As it was, the appropriate authorities were hampered by their lack of detailed knowledge regarding the pilot's intentions.

(b) *Cause*

The accident was caused by the pilot not climbing to the appropriate minimum safe flight level for the area over which he was flying once he had encountered instrument meteorological conditions. The incorrect heading flown by the pilot was a contributory factor.

P J BARDON
Inspector of Accidents

Accidents Investigation Branch
Department of Trade

December 1979

Produced in England by Her Majesty's Stationery Office, Reprographic Centre, Basildon

Bas 72946/R143