

ACCIDENTS INVESTIGATION BRANCH
Department of Trade and Industry

Piper PA 30 Twin Comanche G-AXRW
Report on the accident at Shipdham
Aerodrome, Norfolk, on 23 January 1973

List of Civil Aircraft Accident Reports issued by AIB in 1974

<i>No.</i>	<i>Short title</i>	<i>Date of publication</i>
1/74	McDonnell-Douglas DC8 - 63 CF N 801 WA and Aerospatial Caravelle 6 N 00-SRG approximately 10 nautical miles southeast of Lands End VOR, March 1973	April 1974

Department of Trade and Industry
Accidents Investigation Branch
Shell Mex House
Strand
London WC2R ODP

12 December 1973

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

Sir,

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 Twin Comanche G-AXRW which occurred at Shipdham Aerodrome, Norfolk on 23 January 1973.

I have the honour to be
Sir
Your obedient Servant

V A M Hunt
Chief Inspector of Accidents

Accidents Investigation Branch
Civil Aircraft Accident Report No 2/74
(EW/C 436)

Aircraft: Piper PA 30 Twin Comanche G-AXRW
Engines: Two Lycoming 10 - 320 - BIA
*Registered Owner
and Operator:* Arrow Air Services (Charter) Ltd
Pilot: Captain R V Snook – Killed
Passengers: Five Four – Killed
One – Seriously injured
Place of Accident: Shipdham Aerodrome, Norfolk
Date and Time: 23 January 1973 at approximately 1909 hrs
All times in this report are GMT

Summary

The aircraft was on a charter flight from Aberdeen to Shipdham, where the pilot attempted to make a visual night landing. The weather was overcast with patches of low stratus and ground mist. The aircraft passed over the aerodrome twice and was returning to it from the north when it collided with trees on the northern boundary of the aerodrome.

The report concludes that the most probable cause of the accident was that the pilot inadvertently lost height when he was pre-occupied with locating the runway lights in poor visibility.

1. Investigation

1.1 History of the flight

The aircraft took off from Aberdeen Airport at 1708 hrs on the return leg of a round charter flight between Shipdham and Aberdeen. The flight was uneventful until 1835 hrs when the pilot called Norwich approach and two minutes later received their latest weather report. Shortly afterwards, having lost radio contact with Norwich because of a temporary fault at the ground station, he established radio contact with the zone controller at the Royal Air Force Station, Honington, and obtained weather reports for the aerodromes at Mildenhall and Marham, and the latest Chatham regional altimeter setting. He was then given radar guidance to Shipdham aerodrome. As the aircraft approached Shipdham the pilot reported that he was descending to 1,800 feet, the local area safety height.

At 1902½ hrs the Honington controller told the pilot that he was losing radar contact with G-AXRW but that he estimated that it was nearly overhead at Shipdham. A minute later the pilot said he had the surface in sight and would make a 180° turn. The controller replied that he had a faint radar indication to the south east of Shipdham and suggested a left turn on to a heading of 270°. At 1905½ hrs the pilot reported that he had no visual contact with Shipdham but that he would probably fly to East Dereham and pick up the 'Toftwood' (a housing estate on the southern outskirts of East Dereham) approach lights. At 1907 hrs the pilot reported passing over Shipdham and the controller asked him whether he intended to change to the Shipdham frequency. The next transmission from G-AXRW was indistinct but it ended with the words ' at the moment so we'll stay with you'. There was no further communication between the ground and the aircraft. At 1910 hrs the controller called the aircraft, but in spite of repeated attempts received no reply.

When G-AXRW failed to land at Shipdham overdue action was taken by both the Honington controller and a company representative at the aerodrome, which resulted in a ground search being undertaken by the local police who were considerably hampered by bad weather conditions. It was not until some seven hours later that the aircraft, which had hit some trees on the northern perimeter of the aerodrome and come to rest in a marshy field, was discovered. The only occupant to survive the impact with the trees was seriously injured and trapped in the wreckage. There was no fire.

The survivor stated that there had been nothing to suggest any emergency on board the aircraft, which appeared to be climbing and descending and turning as though the pilot were looking for the aerodrome. The weather had been generally cloudy but there had been clear patches. He recalled on one occasion having seen a house. A row of blue lights had appeared below the aircraft just before the crash but he did not know whether these were runway lights or street lights.

1.2 Injuries to persons

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

1.3 Damage to aircraft

Destroyed.

1.4 Other damage

The top branches of two large chestnut trees were broken off about 40 feet above the ground.

1.5 Crew information

Captain R V Snook, aged 36, held a valid Commercial Pilot's Licence and Instrument Rating. His last medical examination for the renewal of his licence was in June 1972. At the time of the accident he had accumulated about 2,587 hours' flying and had flown approximately 31 hours in the previous 28 days.

He was Chief Pilot and Managing Director of Arrow Air Services (Charter) Ltd, and had been flying from Shipdham aerodrome, by both day and night, for some three years. During this time he had acquired considerable knowledge of the local countryside and was well known for his ability to find his exact position by reference to local landmarks.

1.6 Aircraft information

The aircraft was a twin-engined low wing monoplane fitted with six seats, and equipped with wing tip fuel tanks giving it a total fuel capacity of 100 imperial gallons. At the time of the accident it had flown 1,730 hours. Its two-year certificate of airworthiness, in the general purpose category, was valid until 7 June 1973 and there was a certificate of maintenance current at the time of the accident.

The aircraft's main and wing tip tanks, but not the auxiliary tanks, were filled at Aberdeen and the total of fuel on board at departure was 75 imperial gallons, of which approximately 45 gallons remained when the aircraft arrived over Shipdham. Calculations show that the aircraft's weight at the time of the accident was 3,774 lb and its centre of gravity 93.12 inches aft of the datum. The maximum authorised take off and landing weight for the aircraft with wing tip fuel tanks was 3,725 lb and the aft limit of the centre of gravity associated with this weight was 91.3 inches aft of the datum.

1.7 Meteorological information

Captain Snook telephoned Shipdham about an hour before his departure from Aberdeen and discussed the weather with a pilot who had just landed there. He was told that the cloud base was 660 feet above aerodrome level and the visibility approximately 3½ kilometres in slight mist. He was also advised that the Norwich weather had been consistently worse than Shipdham throughout the day and that the best alternative destination appeared to be Birmingham.

At 1837 hrs Norwich approach passed the following weather report for Norwich to the pilot:

Surface wind:	Southerly generally less than 5 knots.
Visibility:	2,500m in drizzle.
Cloud:	3 oktas 250 feet; 8 oktas 300 feet.
QNH:	1028.

At 1850 hrs Honington control passed the following report:

Mildenhall:

Wind:	200°, 2 knots.
Visibility:	1.7 nm.
Cloud:	3 oktas 500 feet; 8 oktas 900 feet with rain and fog.

A weather appreciation prepared subsequently by the Meteorological Office showed that a warm front travelled eastwards across East Anglia during the day and at the time of the accident was lying along the Norfolk Coast. Behind the front was a warm sector with considerable amounts of low stratus. Visibility was generally poor.

No weather observations were taken at Shipdham but witnesses estimated that shortly after the accident the visibility was about two kilometres. The wind was calm and the sky covered with cloud, the base of which could not be estimated. Other reports from the surrounding area indicated that the weather varied from thick fog to clear visibility.

It was the pilot's practice when making an approach to Shipdham to use the Chatham regional altimeter setting. At 1901½ hrs he obtained the latest Chatham setting from Honington.

1.8 Aids to navigation

Shipdham aerodrome was not equipped with radio, approach, or landing aids. Company pilots used bearings from the Clacton very high frequency omnidirectional radio beacon (VOR) and from the non-directional radio beacons (NDBs) at Norwich and Hethal to position themselves over the aerodrome. Radar assistance was available from Norwich and Honington but could not be used for precision approach as radar contact was normally lost when the aircraft descended to circuit height.

1.9 Communications

It was the pilot's practice when approaching Shipdham from the northwest to call Norwich approach requesting their weather and information on other aircraft that might conflict with his own descent. He would then call the controller at either Royal Air Force Marham or Royal Air Force Honington to get radar assistance in positioning over Shipdham. Since there was no communications station at Shipdham, he would remain with that controller until he was absolutely certain of landing in case further assistance was required.

This was the procedure followed on the day of the accident. When communications with Norwich were interrupted because of a temporary fault at the ground station, the pilot changed to the Honington frequency, the aerodrome at Marham being closed at that time.

1.10 Aerodrome and ground facilities

Shipdham aerodrome was operated by Arrow Air Services and at the time of the accident was not licensed. It was 215 feet above mean sea level (amsl) and lay in flat country. The highest ground within 4 nm was 310 feet amsl. A line of electricity pylons, 165 feet high, ran east and west approximately 1½ miles north of the aerodrome. There were two concrete runways but only Runway 03/21 was equipped for night flying. This runway was 2,500 feet long and 150 feet wide. At the time of the accident the lighting consisted of a row of omni-directional electric lights, 300 feet apart, on each side of the runway, and a triangle of three brighter lights on each side of the threshold. The northern end of the runway was connected to the hangar apron by a short taxiway delineated by blue lights. A red navigational warning light on top of a silo just beyond the southwestern end of the runway was the only other light in the vicinity of the aerodrome. At the time of the accident the aerodrome lighting was on and fully serviceable.

Section xi of The Rules of the Air and Air Traffic Control Regulations 1972 deals with the minimum ground lighting required at an aerodrome whenever an aircraft is being flown at night for the purpose of the public transport of passengers. One requirement is for lighting which will give approach guidance to the runway. This can be met either by approach lighting extending for a minimum distance of 180 m from the runway threshold in the direction of approach or by angle of approach indicators. At the time of the accident neither type of lighting was available at Shipdham; angle of approach indicators have since been provided.

1.11 Flight recorders

Not required and none fitted.

1.12 Wreckage

The wreckage lay on the northern boundary of the aerodrome approximately 500 yards to the east of the threshold of Runway 21. The aircraft had collided almost head on with two large chestnut trees in succession while it was flying laterally level about 30-40 feet above the ground. It came to rest in a marshy field about 50 yards further on having turned 90° to the right. The direction of the wreckage trail indicated that at the time of the initial impact the aircraft's heading was approximately 180° (M).

Both front seats and their occupants had been thrown from the aircraft. The belt attachments for five of the seats had failed, mainly as the result of failure of the structure to which they were attached. The attachments of the other seat, the right hand seat of the middle row, were unbroken, a circumstance consistent with the belt not having been fastened at the time of the accident.

Subsequent examination of the wreckage revealed that the flaps were about half way down when the aircraft hit the trees and that the undercarriage was down and locked. No evidence was found of a pre-crash malfunction or failure in the flying control systems. A complete strip examination was carried out on both engines and propellers but no mechanical failure or defect was found. Both propellers showed evidence of rotation at the time of impact with the trees.

1.13 Medical and pathological information

Post mortem examination of the pilot and the passengers who were killed revealed no evidence of any disease or condition that could have had a bearing on the cause of the accident.

1.14 Fire

There was no fire.

1.15 Survival aspects

One passenger survived the accident and although injured and trapped in the wreckage he was conscious when the rescuers arrived.

This sort of accident to an aircraft in which the occupants are secured by lap-straps is normally expected to be non-survivable. In this case the survivor was sitting in the rear left hand seat, the one furthest from the part of the structure that took the main impact with the tree.

The injuries to the other occupants would have been markedly altered by the use of shoulder harness, and particularly by protective helmets, but it cannot be said that such equipment would have guaranteed their survival.

Finding the wreckage took several hours. A flight plan for the flight was filed at Aberdeen and the aircraft's estimated time of arrival (ETA) of 1900 hrs was telephoned to Shipdham. A company representative there heard the aircraft fly across the aerodrome on two occasions but when he heard nothing more he telephoned Norwich Airport to ask if it had diverted there. At the same time the Honington controller, having lost radio contact with the aircraft, also began making enquiries. Thus the appropriate air traffic control authorities were immediately alerted to the disappearance of the aircraft. As a result of these enquiries the local police force commenced a ground search of the area; the mounting of an aerial search had to be deferred until daylight because of the weather conditions.

The ground search was of necessity commenced with no positive indication of the whereabouts of the wreckage and had little success at first because of the heavy mist. However an appeal to the public for information was broadcast on the local radio and television stations and resulted in a contact which eventually led to the discovery of the wreckage at about 0200 hrs on 24 January 1973.

1.16 Tests and research

Not applicable.

2. Analysis and Conclusions

2.1 Analysis

2.1.1 *The circumstances of the accident*

Although most of East Anglia was covered in very low cloud and mist, there was no question of the pilot of G-AXRW being obliged to land at Shipdham by a shortage of fuel. It seems likely that the pilot decided to descend to the minimum safe altitude for the area to assess the weather conditions for himself. The aircraft in fact broke through into clear weather to the southeast of the aerodrome, and once the pilot was able to see the ground he probably considered that he would be able to find the aerodrome and land there. The evidence points to a possibility that the weather was sufficiently clear for the pilot, with his considerable local knowledge, to identify his position, but there is no evidence that he ever saw the runway lights.

A reconstruction of the aircraft's final flight path is at Appendix A. The aircraft was seen only once, at a position three miles southeast of the aerodrome at a time coincident with the pilot's radio observation that he had the surface in sight; all other reports were of the sound of aircraft engines.

After passing over Shipdham the aircraft continued on track to the southeast and then turned left on to a heading of 270° (M). It passed about one mile south of the aerodrome and then turned right and flew across the airfield for the second time in an easterly direction before proceeding towards East Dereham. The aircraft's final track of approximately 180° (M) was not in direct line with Runway 21, but would have taken it across the aerodrome for the third time had it not hit the trees approximately 500 yards to the left of the runway threshold. It seems probable therefore that the pilot was still searching for the aerodrome lights.

There was no evidence of any mechanical malfunction which would have caused a deterioration in the aircraft's performance and it is most unlikely that the flaps and undercarriage would have remained extended if there had been any difficulty in maintaining height. The aircraft's weight and centre of gravity were outside the authorised limits but there was nothing in the circumstances of this accident to suggest the sort of difficulties that spring from incorrect weight and balance. The possibility that the aircraft may have hit the trees as a result of an altimeter misreading was considered remote because the pilot had seen surface lights shortly before the accident. It was also considered unlikely that he would have set his altimeter incorrectly after the care he had taken to obtain the most up-to-date Chatham altimeter setting.

The circumstances of the accident suggest that the descent to the level of the trees was unintentional. This postulates that the pilot's normal instrument scan was interrupted and his attention distracted from his altimeters for a significant period of time before the accident. There is no evidence of any distraction within the aircraft itself. In fact it was at this time that the pilot would most likely be pre-occupied with trying to catch sight of the runway lights. A change in the aircraft's attitude may well have gone undetected in the absence of an external visual horizon. It is considered therefore that the most probable cause of the accident is that the aircraft gradually lost height

on its final tract while the pilot was concentrating on finding the runway lights in the mist and low cloud.

Although the lighting at the airfield at the time of the accident appears not to have met the standard required for public transport, it is unlikely that the provision of approach lights or angle of approach indicators would have prevented this accident.

2.1.2 *Search aspects*

The difficulty in finding lost aircraft in recent accidents has highlighted the problems facing the authorities when very little information is available. This accident was rather different. A flight plan was filed prior to departure from Aberdeen and the aircraft was identified in the Shipdham area both by radar and by witnesses who heard it pass over the aerodrome. As a result, after its disappearance, a full scale alert was put into operation with no loss of time. The problem in this instance was that the aircraft crashed unseen in an isolated area, there was no fire, and no possibility of an air search to pin-point the wreckage. An area search on the ground had to be mounted. At best this is a slow process, and in this case the difficulties were compounded by darkness and mist. In the circumstances it is to the credit of the searchers that they saved as much time as they did.

2.2 **Conclusions**

(a) *Findings*

- (i) The pilot held a valid Commercial Pilot's Licence and an Instrument Rating.
- (ii) The documentation of the aircraft was in order and it had been properly maintained.
- (iii) The aircraft was overloaded and its centre of gravity was outside the authorised aft limit. This had no bearing on the accident.
- (iv) There was sufficient fuel on board at the time of the accident for a further three hours flying.
- (v) There was no evidence of failure or malfunction of the aircraft or its engines.
- (vi) The weather was overcast with patches of low stratus and ground mist.
- (vii) The lighting at Shipdham Aerodrome did not conform with the requirements for public transport use, but this had no bearing on the accident.
- (viii) The aircraft lost height while the pilot was attempting to locate the aerodrome by visual reference and struck two large trees.

(b) *Cause*

The most probable cause of the accident was an inadvertent loss of height while the pilot was trying to locate the aerodrome by visual reference at night in poor visibility.

G M Kelly
Inspector of Accidents

Accidents Investigation Branch
Department of Trade and Industry

December 1973