

ACCIDENTS INVESTIGATION BRANCH  
Department of Trade

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Piper PA-30 (Twin Comanche) G-ASLD  
Report on the accident at Newchurch,  
Isle of Wight on 5 May 1972

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List of Civil Aircraft Accident Reports issued by AIB in 1974

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3/74	Slingsby T61A G-AYUO near Wycombe Air Park, Bucks., February 1973	May 1974
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10/74	Beagle A.61 Series 2 (Terrier) G-ARZT near Tonbridge, Kent, August 1973	July 1974
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Department of Trade  
Accidents Investigation Branch  
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23 May 1974

*The Rt Honourable Peter Shore 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 PA-30 (Twin Comanche) G-ASLD which occurred at Newchurch, Isle of Wight on 5 May 1972.

I have the honour to be  
Sir  
Your obedient Servant

W H Tench  
*Chief Inspector of Accidents*



Accidents Investigation Branch  
Civil Aircraft Accident Report No 12/74  
(EW/C409)

*Aircraft:* Piper PA-30 (Twin Comanche) G-ASLD  
*Engines:* 2 Lycoming 10-320-B1A  
*Registered Owner and Operator:* Mr S G Nicholson  
*Pilot:* Mr S G Nicholson - Killed  
*Passengers:* Two - Killed  
*Place of Accident:* Newchurch, Isle of Wight  
*Date and Time:* 5 May 1972 at 1604 hrs  
All times in this report are GMT

## Summary

The aircraft took off from Bembridge aerodrome, Isle of Wight and climbed into cloud at about 300 feet. A little later it was seen approaching Newchurch, flying very low in a shallow dive. It then pulled up sharply into a climb and a loud crack was heard after which the outer portion of both wings became detached and the aircraft crashed into a field. Examination showed that the wings had failed under excessive upload but there was no evidence that the material was not up to its specified strength. Examination of the aircraft's flight instruments showed that the artificial horizon and turn and slip indicators had been defective prior to the crash.

It is concluded that the sudden pull-up was made by the pilot and imposed aerodynamic loads on the aircraft which exceeded its design strength.

# 1. Investigation

## 1.1 History of the flight

On the morning of 5 May 1972, the pilot and his two passengers who were later involved in the accident, left White Waltham aerodrome and flew to Goodwood where they landed at 1154 hrs. At that time the cloudbase was about 1,500 feet. At Goodwood, the passengers were met by a friend and taken by car to Chichester from where they sailed by boat to Bembridge, on the Isle of Wight.

The pilot stayed at Goodwood for about two hours and during this time he called at the control tower and asked the controller to obtain the latest weather report for Bembridge. The controller telephoned RAF Thorney Island and was told the cloudbase at Bembridge was about 800 feet: he believed that the weather was 'much the same all along the south coast'. This information was passed to the pilot. During the course of a conversation with one of the aerodrome fireman about the bad weather the pilot remarked 'what a day for the artificial horizon to go on the blink'.

The aircraft took off for Bembridge at 1401 hrs and by that time the cloudbase at Goodwood was down to about 600 feet. After obtaining radar assistance from Thorney Island, the pilot called Bembridge and reported that he was two miles to the north and required landing instructions. These were passed to him and in addition he was informed that the cloudbase there was estimated as 600 feet. The pilot did not contact Bembridge again, but changed back to the Thorney Island frequency and requested further radar assistance. This was given and the aircraft finally landed at Bembridge at 1440 hrs, which was approximately 30 minutes after the pilot made his initial call.

After he had booked in the pilot was asked if he had had radio trouble. He replied that the radio had not failed but after his initial call he had lost sight of the aerodrome and it had taken time to find it again.

Shortly before 1600 hrs the two passengers arrived at the aerodrome with the friend who had met them at Goodwood and who now wished to return there. However, the pilot would not agree to take him because he considered the cloudbase was too low for landing at Goodwood and he therefore intended to fly direct to White Waltham.

The pilot and his two passengers boarded the aircraft and it taxied out to Runway 30. Bembridge called the aircraft on R/T to inform the pilot that an aircraft which had taken off about 20 minutes earlier had reported a cloud base of about 300 feet; this message was not acknowledged. The aircraft was seen to take up a position on the runway at about 90° to the take-off direction and it seems likely that the pilot carried out engine power and cockpit checks. It then turned sharply on to the runway and took off: the time was 1557 hrs.

The take-off was normal and the aircraft disappeared into cloud at about 300 feet. Some few minutes later it was heard circling at a low height to the west of the aerodrome. A witness at Sandown aerodrome heard the aircraft just before it crashed and has stated that the engine noise reminded him of an aircraft making a loop but as he realised this was unlikely in the weather conditions, he thought the aircraft might have been in trouble.

There were two sightings of the aircraft prior to the accident. The first was over Sandown, when it was seen flying slowly, in and out of the base of the low cloud heading in a north westerly direction. The second was at Newchurch which it approached on a westerly heading from a position just north of Sandown aerodrome. It was at a very low height in a shallow dive. It then turned about 90° to the right followed by a turn to the left and then pulled up into an almost vertical climb to avoid a farmhouse. At the same time the engine noise increased as if the pilot had applied full throttle. Then, a noise described by witnesses as a 'crack, or engine backfire', was heard. Following this the aircraft banked steeply to the left and then the right, diving steeply towards the ground and it finally crashed at an angle of about 45° into a field about 275 m east of the village of Newchurch.

## 1.2 Injuries to persons

<i>Injuries</i>	<i>Crew</i>	<i>Passengers</i>	<i>Others</i>
Fatal	1	2	—
Non-fatal	—	—	—
None	—	—	—

## 1.3 Damage to aircraft

The aircraft was destroyed by impact.

## 1.4 Other damage

Nil.

## 1.5 Crew information

The pilot, Mr Stanley George Nicholson, aged 59, was the holder of a Private Pilot's Licence. Although the licence included a Group 'B' rating, first issued in June 1953, which entitled the holder to fly multi-engined aircraft below a maximum total weight authorised of 12,500 lb, this privilege was no longer valid since his licence did not contain a current certificate of test or certificate of experience. Since he had not flown a multi-engine aircraft for over 13 months a certificate of test was required before commencing to fly G-ASLD in November 1971. The licence also included an IMC rating, first issued in May 1968. This rating had not been renewed since the date of issue, consequently this also had lapsed.

Mr Nicholson passed a medical check on 21 January 1972. He commenced flying in 1947 and had a total experience as pilot-in-command of 1,441 hours of which 686 hours were on twin-engine aircraft; his experience on Piper PA-30 aircraft amounted to 37 hours.

Several pilots who had flown recently with Mr Nicholson have expressed the opinion that he was competent to fly on instruments.

## 1.6 Aircraft information

The aircraft was manufactured by the Piper Aircraft Corporation in 1963 and registered in the United Kingdom in that year. At the time of the accident its total flying time amounted to 1,600 hours. The engines had each completed 499 hours since their complete overhaul in October 1971. The two Hartzell propellers had completed 370 hours (port) and 626 hours (starboard) since complete overhaul. The aircraft was equipped with two vacuum driven instruments (an artificial horizon and a directional gyro) and an electrically powered turn and slip indicator.

The aircraft's current Certificate of Airworthiness, in the General Purpose Category, was issued on 12 January 1972 to run until 26 September 1973. A condition of this certificate was that the aircraft should be regularly maintained in accordance with an approved maintenance schedule. No evidence has been found that the required maintenance had been carried out since it was issued. The maintenance required was a check 1 inspection, due on 12 April 1972, ie 23 days prior to the date of the accident. The check 1 inspection would have included the examination of vacuum and electrically operated gyro systems with, as far as possible, a check of their correct operation during engine runs.

The artificial horizon found in the aircraft wreckage, serial number AF42-28027 had been made by the Ternsteft Manufacturing Division of the General Motors Corporation, Detroit, either during the period 1942-1946 or in the early 1950's. All pertinent manufacturing records related to this instrument had been destroyed in a fire. The aircraft's maintenance log contained no mention of the instrument having been fitted. According to the documentation the artificial horizon supposedly fitted was a Sperry manufactured instrument, serial number 5518/44. The maintenance log indicated that the Ternsteft instrument must have been fitted at some time after completion of an overhaul of the aircraft which was carried out overseas on 30 April 1970.

Following a landing accident in Rhodesia, a major repair was made to the port outer wing of the aircraft between November 1969 and April 1970. This involved replacement of front and rear spars and the leading edge and bottom skins outboard of station 120.

For the subject flight the weight and centre of gravity of the aircraft were within the prescribed limits. From fuelling records it is calculated that the tanks contained approximately 47 gallons of 100/130 octane Avgas when the aircraft took off from Bembridge.



## 1.7 Meteorological information

No official meteorological observations are taken at Bembridge Aerodrome. Observation from the two nearest stations to the scene of the accident were as follows:

*St Catherine's Point* (about 12 kilometres southwest of the accident site)

Time:	1600 hrs.
Surface wind:	020°/01 knots.
Visibility:	1.6 kilometres.
Cloud:	8/8 at 1,200 feet, 4/8 at 500 feet.
Present weather:	rain and drizzle.

*Thorney Island* (about 27 kilometres northeast of the accident site)

Time:	1600 hrs.
Surface wind:	060°/02 knots.
Visibility:	1.4 kilometres.
Cloud:	5/8 at 300 feet, 2/8 at 200 feet, 8/8 at 700 feet.
Present weather:	rain and drizzle.

The pilot who took off from Bembridge 20 minutes before the departure of G-ASLD reported the cloudbase as 300 feet. At the time G-ASLD took off the visibility was estimated as 800 to 1,400 metres.

Various witnesses in the area of the accident have stated that the visibility was approximately half a mile in mist and drizzle with a very low cloudbase.

## 1.8 Aids to navigation

Bembridge Aerodrome has no radio navigational aids. The nearest station which could give navigational assistance was Thorney Island RAF Aerodrome, which, among other aids, had surveillance radar. This service was used by the aircraft during its flight from Goodwood to Bembridge but no contact was made after its take-off from Bembridge on the accident flight.

## 1.9 Communications

Normal radio contact was made by the aircraft on its departure from White Waltham and on landing and leaving Goodwood; it also made contact with Thorney Island during its flight from Goodwood to Bembridge. However, during this flight, communication with the aircraft was lost after an initial call to Bembridge despite repeated attempts by Bembridge to re-establish contact. Communication was not established on the aircraft's departure from Bembridge.

## 1.10 Aerodrome and ground facilities

Bembridge Aerodrome is situated 2½ miles northeast of the town of Sandown at an elevation of 69 feet. The main grass surfaced Runway 13/31, from which the aircraft departed to the northwest, has a length of 823 m. The aerodrome is owned and operated by Britten-Norman Limited and is only manned during normal office hours. The service then provided is purely advisory and consists of advice regarding landing conditions and local weather. Weather advice is passed after taking visual observations without the aid of instruments.

## 1.11 Flight recorders

No recorder was required or fitted.

## 1.12 Wreckage

### 1.12.1 *Main wreckage examination*

Examination at the scene of the accident showed that the aircraft had come to rest in two distinct areas.

The main section, consisting of fuselage, tail, engines and inner wings had struck the ground at a steep angle with sufficient speed to bury the engines some three feet into the earth. The remainder of the aircraft, comprising the outer wings and tip tanks, fell at various points in an area 180 m by 140 m, centred approximately 550 m southeast of the main wreckage.

Subsequent examination of the wing structure showed that both wings had failed in almost symmetrical up-load. In both cases the failures appeared to have begun with shear buckling of the main spar web in the region of station 120, where there is a change in spar section from the discrete boom and web structure of the inner wing spar to the plain channel section of the outer spar. Examination of the remains of the port wing of the aircraft indicated that the repair mentioned in paragraph 1.6 had been correctly carried out and was in no way contributory to the failure of that wing.

All the evidence indicated that both wings had been overloaded beyond their design ultimate strength by abnormal positive 'g' loading. There was no evidence of corrosion or fatigue.

Further examination of the main wreckage showed that at impact the undercarriage was retracted and the flaps were up. No defect or failure of the aircraft flying controls which could have occurred prior to the wing failure was found. Examination of the engines and propellers indicated that both engines were operating at the time of impact. No precrash mechanical defects were found.

### 1.12.2 *Flight instruments*

#### (i) Vacuum system:

Although the aircraft's vacuum system was extensively damaged by the accident, there was no evidence that either of the two vacuum pumps

were not capable of performing correctly; no evidence was found in the pipework of the vacuum system that indicated pre-crash unserviceability. Additionally, the rotor of the directional gyro showed evidence of high rev/min at the time of impact indicating that the vacuum system was operating satisfactorily.

(ii) Artificial horizon:

Examination of the artificial horizon revealed that it was defective; its rotor was either stationary or turning very slowly at the moment of impact. Detailed examination of the rotor pivots and ball races showed that one bearing had failed. Consequently the rotor could not have reached optimum running conditions during the accident flight. Indeed there was no evidence, eg whirl score marks, that the rotor was turning at all at the time of impact. From the general condition of the instrument it appeared that it had been overhauled some 300 to 500 hours earlier. There were indications that the overhaul company had replaced six bearings (four gimbal and two rotor) and that 'lapping' had been carried out in an attempt to renovate the ball tracks of the rotor pivots, which is a normal procedure in overhaul of this type of instrument. It was evident that the attempt was not successful in completely removing the ball track wear. It was further noted that the instrument case bore no overhaul company identification label or case sealing on any screw head. From this evidence it seems likely that the instrument had been overhauled by an unskilled and unapproved agency between 300 and 500 flying hours before the accident. There is no documentary record of this work.

According to an expert instrument overhaul organisation, their examination of the instrument showed that its general condition was poor and that warning of its pending failure, as would be indicated by excessive noise, vibration and poor performance, should have been evident over several preceding flights.

(iii) Turn and slip indicator:

Examination of the turn and slip indicator showed that the centrifugal contacts which govern rotor speed were in the open position. These are normally closed with the rotor stationary or in an underspeed condition and open only under centrifugal forces to govern rotor speed. It is considered by the organisation which conducted the examination that the open position of the contacts may have been due to incorrect setting during overhaul or repair. It was also found that the brush electrical contact had not been in good adjustment before the impact. The effect of the open contacts would have been a loss of rotor rev/min. The rotor bearings showed evidence that the rotor was either stationary at impact or rotating slowly, consequently the instrument would not have been capable of showing correct rates of turn. This situation must have existed at least during the latter stage of the accident flight and for some time before that the instrument's performance must have been such as to give rise to some doubt.

(iv) Directional gyro:

Apart from considerable impact damage, the directional gyro was found to be in good condition. Examination of the air driven gyro rotor showed that it had been rotating at high rev/min when the instrument was damaged. There was no evidence to indicate that it was other than serviceable at the time of the accident.

### 1.13 Medical and pathological information

Full autopsy examinations were carried out on all three occupants who were found to have died from multiple injuries consistent with steep impact at moderately high speed.

### 1.14 Fire

There was no fire.

### 1.15 Survival aspects

The accident was not survivable; the fatal outcome would not have been affected by the provision of either shoulder harness or protective helmets.

### 1.16 Tests and research

- (a) Material tests of sections cut from the wing spars were carried out in a metallurgical laboratory. The purpose of these tests was to establish the mechanical properties of the material of the wing spar against its specification (Alclad 2024 – T3 aluminium). The results obtained were satisfactory and showed that the strength of the material was above the minimum acceptable figures laid down in the specification. There was no evidence of corrosion or fatigue.
- (b) Both engines and propellers were subjected to a full strip inspection and rig tests of components and accessories were carried out. These examinations and tests revealed that both engines and their propellers were mechanically sound. Both propellers were in the fine pitch setting. All the evidence indicated that both engines and propellers were operating prior to the impact with the ground.

### 1.17 Other information

The Piper PA-30 aircraft was designed to comply with the USA Federal Airworthiness Regulations. The wing structure was built to withstand, without permanent deformation, a positive acceleration of 3.8 g when the aircraft is loaded to a weight of 3,600 lb. This is defined as the 'limit load' which should not be exceeded. A safety factor 1.5 times the limit load, is designed into the aircraft structure to achieve the ultimate load at which the wings can be expected to break.

This would give an ultimate positive 'g' loading of 5.7.

In order to obtain this high 'g' loading, ie 5.7, it would be necessary for a pilot to apply a very rapid nose-up manoeuvre whilst flying at a speed of at least 176 mph.

## 2. Analysis and Conclusions

### 2.1 Analysis

From the distribution of the wreckage at the accident site it was clear that the aircraft had suffered a structural failure and the evidence of witnesses indicate that this had followed a rapid pull up from a high speed shallow dive.

The examination of the wreckage showed that up to the time of the failure the engines, controls and other services of the aircraft, apart from two flight instruments – the artificial horizon, and turn and slip indicator – were operating normally. Laboratory examination and tests of sections of the wing spars established that the strength of the material was above the minimum laid down and there was no evidence of corrosion or fatigue.

The evidence of witnesses near to the scene of the accident is that the rapid pull-up by the pilot was to avoid a collision with a farm house. Therefore, it is concluded that this manoeuvre caused the pilot inadvertently to impose a load on the aircraft's structure which was greater than it was designed to withstand. This brought about the failure of both outer wings in upload.

Whilst the overstressing of the aircraft is the cause of the structural failure, it is necessary to consider the events which led to it. It is inconceivable that a pilot, particularly of Mr Nicholson's experience, would have deliberately taken off into the prevailing bad weather conditions, knowing that both his attitude reference instruments were completely unserviceable. It follows therefore that he was mistaken either about the weather or the state of his instruments. The first alternative is a possibility in that he did not hear the message passed by radio from Bembridge that the cloud base was 300 feet. He may have assumed therefore that it was still at 600 to 800 feet as it was when he had arrived. If he knew that both his artificial horizon and turn indicator were unserviceable, he might have reasoned that with a cloud base of 600 to 800 feet he could fly back to White Waltham without entering cloud. It is unlikely that the pilot believed this to be a serious possibility. His reason for not returning to Goodwood, as he had been asked to do, was because he considered the cloud base there was too low. Therefore even though he may not have been aware of the actual weather conditions, he knew that they were not good. It is most unlikely therefore that the pilot would have planned on remaining clear of cloud for the whole flight, particularly over the Downs to the west of Goodwood.

This leads inevitably to the alternative theory that the pilot was mistaken as to the true serviceability state of his artificial horizon and turn indicator. There is no evidence to show precisely at what stage these instruments failed. They may both have been completely unserviceable before take-off, and unnoticed by the pilot. Alternatively they may both have failed after the aircraft took off. The latter is a remote possibility which presupposes a rare instance of double failure occurring almost simultaneously for quite unconnected reasons. The only other alternative is therefore that one of the instruments was unserviceable before take-off and that the other failed in the air. Unless specific checks were carried out

whilst taxiing, it would be easier for a pilot to overlook a failure of the turn indicator than one affecting the artificial horizon. Apart from the fact that the artificial horizon is more prominent, a failure of the horizon bar to erect to the level position attracts the attention more readily than does a lack of movement of the turn needle. Although the artificial horizon must have been functioning to some extent during the flight from Goodwood to Bembridge the pilot would still have had special reason to check the instrument again before take-off if, as appears most probable, the remark he made to the fireman at Goodwood is correctly interpreted as a specific reference to it being defective.

Though it is not possible to reach any firm conclusions about the time or the sequence of the failure of the two instruments the most probable explanation is that when the aircraft took off only the artificial horizon was working and that none too well. The pilot was probably unaware that his turn indicator had already failed. Thus when the aircraft entered cloud and the artificial horizon also failed, the pilot rapidly became disorientated.

What followed can only be a matter for conjecture. When the aircraft emerged below cloud shortly before the accident occurred it was in a shallow dive and flying at a relatively high airspeed. It then banked sharply to the right and left before pulling up suddenly to avoid the farmhouse. It has been calculated this sequence took less than half a minute. It is impossible to know the extent to which the pilot was in control of the situation at this stage. He had just been through a frightening and confusing experience in cloud and it is hardly likely that during the short period he was in sight of the ground that he was able to bring the flight fully under control. It is most likely that he was only able to react to events as they occurred and the erratic behaviour of the aircraft culminating in the sudden pull up would seem to support this contention. Had the visibility been better than half a mile, it is possible that the pilot could have orientated himself more quickly and regained full control. But with the visibility as it was, he was deprived of a natural horizon and the limited view he had of the ground would have been scarcely sufficient to establish the attitude of the aircraft.

It has to be said in the interest of preventing further occurrences of this nature that the accident could most probably have been avoided if in the first instance the instruments in question had been maintained to the approved standard and subsequently the normal pre-flight instrument checks had been rigorously carried out.

## 2.2 Conclusions

### (a) Findings

- (i) The documentation of the aircraft was not in order. Check 1 inspections, required by its Certificate of Airworthiness had not been carried out.
- (ii) Although suitably experienced for the flight the pilot did not hold a current Certificate of Test for aircraft in Group B or a current IMC rating.

- (iii) The artificial horizon and turn and slip indicator were defective and the evidence obtained from them indicates that they had been defective for some time prior to this flight.
- (iv) After take-off from Bembridge the aircraft entered cloud at about 300 feet above aerodrome level.
- (v) After entering cloud the pilot had no accurate attitude information and became disorientated because of the defective flight instruments.
- (vi) The pilot was not in full control of the flight when the aircraft broke cloud at a very low height and a relatively high speed.
- (vii) During a pull up manoeuvre in order to avoid a farmhouse, the aircraft was subjected to flight loads which exceeded its design strength and the outer wings failed in upload.

(b) *Cause*

The accident was caused by the pilot inadvertently applying control forces during a high speed shallow dive and this manoeuvre overstressed the aircraft and brought about the failure of both outer wings in upload. The high speed dive resulted from disorientation because of defective flight instruments.

P J Bardon  
*Inspector of Accidents*

Accidents Investigation Branch  
Department of Trade

May 1974