

ACCIDENTS INVESTIGATION BRANCH  
Department of Trade and Industry

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**Piper Cherokee Arrow PA 28R-200 D—EHBR**  
**Report on the accident at Saron near Ammanford**  
**Carmarthenshire, South Wales on 1 May 1971**

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List of Civil Aircraft Accident Reports issued by AIB in 1972

<i>No.</i>	<i>Short title</i>	<i>Date of publication</i>
1/72	Comet 4 G—APDN in the Sierra del Montseny near Barcelona, Spain, July 1970	February 1972
2/72	Bristow Helicopter Agusta Bell 206A Jet Ranger G—AVSV near Fetteh Gomoah, July 1970	February 1972
3/72	Piper PA 23-235 G—ASKW in the sea off Southwold, Suffolk, February 1971	February 1972
4/72	Trident 3B G—AWZA and Comet 3BXP915 at Thurleigh Aerodrome, Bedford, January 1971	March 1972
5/72	Brookland Hornet Gyrocopter G—AWTZ at Woodford Aerodrome, Cheshire, June 1970	March 1972
6/72	Bensen Gyrocopter G—AWBO near Mount Kerrin, Isle of Man, September 1969	March 1972
7/72	Auster 5 Series J I Autocrat G—AIRB at English Bicknor, Gloucestershire, April 1971	March 1972
8/72	Piper PA 23-250 Aztec G—APXN at Gleneagles, Perthshire, June 1971	March 1972
9/72	HS 125 Series 3B G—AXPS at Turnhouse Airport, Edinburgh, July 1970	May 1972
10/72	Piper PA-28 Series 180—G—AVBI Piper PA-28 Series 180—G—AVBD at Hamble, February 1970	<i>(forthcoming)</i>
11/72	Beagle 206 Series G—AVAM at Jersey Airport, Channel Isles, August 1970	June 1972
12/72	Piper PA 22 Series 150 Tri-Pacer G—APXS at Kingsdown, Kent, June 1971	July 1972
13/72	Piper PA 19 G—AYPN at Ditcham Woods, Hampshire, August 1971	October 1972
14/72	Piper Cherokee Arrow PA 28R-200 D—EHBR at Saron, Carmarthenshire, May 1971	November 1972

Department of Trade and Industry  
Accidents Investigation Branch  
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25 September 1972

*The Rt Honourable John Davies MBE MP*  
*Secretary of State for Trade and Industry*

Sir

I have the honour to submit the report by Mr R D Westlake, an Inspector of Accidents, on the circumstances of the accident to Piper Cherokee Arrow PA 28R-200 D—EHBR which occurred at Saron, near Ammanford, Carmarthenshire, South Wales on 1 May 1971.

I have the honour to be  
Sir  
Your obedient Servant

V A M Hunt  
*Chief Inspector of Accidents*



Accidents Investigation Branch  
Civil Accident Report No EW/C 378

*Aircraft:* Piper Cherokee Arrow PA 28R-200 D--EHBR  
Federal Republic of Germany

*Engine:* Lycoming 10-360-CIC

*Owner:* Herr U Hellmuth, Humboldttring, Federal  
Republic of Germany

*Pilot:* Herr W G Klohoker – Killed

*Passengers:* Three – Killed

*Place of Accident:* Saron, near Ammanford, Carmarthenshire,  
South Wales

*Date and Time:* 1 May 1971 at approximately 1417 hrs

All times in this report are GMT

## Summary

Whilst at an en-route cruising altitude of about 6,000 feet during an international private flight, the aircraft was seen to make a shallow dive and a shallow climb before entering a steep dive from which it recovered very abruptly. After climbing steeply for a few seconds the left mainplane and tail assembly broke away. The aircraft crashed in a field and the four occupants were killed.

It has been concluded that the left wing failed as a result of overstressing from the application of excessive stabilator control; the failure of the tail assembly was secondary to the wing failure. The investigation has not been able to determine why the aircraft deviated from level flight into the manoeuvres which led to the wing failure but the possibility that it was the consequence of unintentional interference with the right-hand control column, perhaps as the result of the collapse of the passenger in the right-hand seat, cannot be ruled out.

# 1. Investigation

## 1.1 History of the flight

The aircraft was on an international private flight from Frankfurt to Shannon. On the day of the accident it took off from Egelsbach near Frankfurt with four occupants at about 0820 hrs; it landed at Ashford at 1101 hrs where it was refuelled and a visual flight rules (VFR) flight plan filed for the onward journey to Shannon. During the approach to land at Ashford some difficulty was experienced by air traffic control (ATC) when trying to establish radio contact with D-EHBR although the aircraft's transmitter appeared to be functioning. Because of this difficulty the aircraft's take-off from Ashford was delayed until 1240 hrs awaiting Shannon ATC Centre acceptance of the flight without radio communication.

No messages were received from the aircraft after it took off from Ashford and the precise route followed after it left Ashford is not known. However, from track lines on a map recovered from the wreckage, from a sequence of photographs taken by one of the passengers in the aircraft and from a piece of paper on which altitudes and flight levels had been noted, it appears that the aircraft flew south of the Gatwick Control Zone at or below 2,000 feet, via Midhurst, to a point below Airway Green 1 west of Filton. The final three photographs of the sequence indicate that the aircraft was flying above clouds in the latter stages of its flight.

At about 1415 hrs the aircraft was seen approaching Ammanford in level flight on a north-westerly heading, flying above broken cloud at an estimated height of 6,000 feet. The attention of a witness was first attracted by the noise of an aircraft engine which sounded as though it was operating steadily at high RPM. When the aircraft came into view it seemed to be travelling faster and higher than other light aircraft which the witness had seen in this area; as it approached Ammanford the engine spluttered or faltered and then recovered power. The aircraft then went into a shallow dive followed by a shallow climb during which time it flew through broken cloud, altered course to the left and then resumed its original heading. A few moments later, when near to or over Ammanford, the engine spluttered again and then died away and the aircraft then entered a steep dive of about 40° from which it recovered very sharply into a steep climb for a few seconds. At this time a 'crunch' noise was heard by the witness who was about 1½ miles downwind and the aircraft turned about 180° to the left as the left wing and other parts became detached; the remainder of the aircraft crashed into a field. The four occupants were killed instantly but there was no fire.

## 1.2 Injuries to persons

<i>Injuries</i>	<i>Crew</i>	<i>Passengers</i>	<i>Others</i>
Fatal	1	3	—
Non-fatal	—	—	—
None	—	—	—

## 1.3 Damage to aircraft

The aircraft was destroyed.

## 1.4 Other damage

There was minor damage to grazing land.

## 1.5 Aircraft occupants

The pilot, Herr Wilhelm Gottfried Klohoker, was aged 35 and held a private pilot's licence issued in the Federal Republic of Germany. He learned to fly on gliders in 1966 and, after a course of instruction, qualified as a pilot of powered aircraft in April 1970. According to his log book Herr Klohoker had flown 57 hours 47 minutes up to 9 September 1970, 25 hours of this being as pilot-in-command since having qualified for his private pilot's licence. There were no further entries in the log book but according to his wife he had flown a total of about 170 hours between January and December of 1970. A post mortem examination showed that death resulted from severe multiple injuries; no pre-crash incapacity was revealed and there was no evidence of alcohol, carbon monoxide or drugs.

The three passengers, none of whom had any piloting experience, were Herr Anton Block who occupied the right-hand pilot's seat, and Herr Peters and Herr Lewicki who occupied the two rear seats. In each case death was attributed to severe multiple injuries. Post mortem examination and extensive pathology showed that Herr Block had significant and active coronary disease and that at some previous time he had suffered a heart attack; there was also evidence of a more recent arterial thrombosis. It was established that Herr Block was under medical treatment for coronary insufficiency and hypertension and tablets which had been prescribed for him were found in the wreckage.

## 1.6 Aircraft information

D—EHBR was a four seat low-wing monoplane with retractable landing gear and a 200 HP fuel injection engine driving a constant speed propeller; it was fitted with dual controls and equipped for flight in instrument meteorological conditions.

The aircraft was exported from the United States of America and assembled in Switzerland in May 1970 by the Piper approved agency at Geneva Airport. It was sold and delivered to the German Piper agency Henschel Flugzeug-Werk AG, at Kassel in August 1970 and was issued with a Certificate of Airworthiness in the Transport (Passenger) Category for a twelve month period commencing 4 September 1970. The aircraft had been maintained by an

approved organisation in compliance with all pertinent directives and at the time of the accident it had flown approximately 140 hours since new and approximately 40 hours since last being inspected by the Piper agency. There were no outstanding defects recorded in the log book.

A Flight Manual recovered from the wreckage showed that the aircraft had been last weighed on 7 December 1970 at which time a basic weight of 710 kg and a centre of gravity 206 cm aft of the datum were recorded. Calculations based on conservatively estimated weight of the four occupants (328 kg), the actual weight of the baggage recovered (55 kg) and a full load of fuel (137 kg) known to have been taken out of Ashford, show that the weight at take-off from Ashford was approximately 1,230 kg and the centre of gravity forward of mid-range but within permitted limits. The maximum total weight authorised was 1,179 kg. Allowing for a fuel burn-off of 45 kg during the flight of 1 hour 37 minutes to Ammanford, the weight at the time of the accident would have been 1,185 kg and the centre of gravity forward of the mid-range but within the permitted envelope.

### 1.7 Meteorological information

A post accident appraisal of the weather conditions prepared by the Meteorological Office showed that the accident area was on the southern edge of a col with a north-easterly wind gradient. There was between 3/8 and 5/8 cloud with a base from 3,000 to 4,000 feet and tops about 6,000 feet and the possibility of an isolated top up to 11,000 feet. Turbulence in cloud was estimated as light to occasionally moderate above 4,000 feet. Visibility was 10 to 15 kilometres with the possibility of a brief reduction to 5 kilometres in any isolated shower. The wind at 2,000 to 4,000 feet was 040° at 14 knots and the temperature +3°C.

There were no warnings of moderate or severe clear air turbulence in force except between 20,000 and 45,000 feet and there is little indication that mechanical turbulence from wind and terrain effects would have been other than slight at 6,000 feet. The pilot of a light aircraft flying in the accident area about two hours after the accident reported that smooth flying conditions existed between 1,000 and 2,000 feet.

Eye-witnesses of the accident said that the weather was fine and sunny with some heat haze but that cloud amounts appeared to be greater than the 5/8 assessed by the Meteorological Office in their appraisal. Winds at the surface were light north-easterly at about 5 knots and light conditions were excellent.

### 1.8 Aids to navigation

A VHF navigation receiver in the aircraft was found tuned to the Strumble VOR frequency of 113.1 MHz with the omni-bearing selector set at 297° which is within 5° of the airways centreline. The accident occurred within three miles of the airway centreline and it is evident that the pilot was successfully following the appropriate track overhead Strumble to Shannon. In view of the nature of this accident further information under this section is not considered relevant to the investigation.



## 1.9 Communications

The two communication transceivers in the aircraft were found selected to a frequency of 121.7 MHz, this frequency is not used by airborne traffic in the United Kingdom although it is used for ground control movement planning at London (Heathrow) Airport and also sometimes used for radio maintenance and testing purposes. A transcript of transmissions between the aircraft and Ashford on frequency 119.1 MHz showed that communication had not been satisfactorily established. A typewritten list of German/English R/T phraseology was recovered from the wreckage.

## 1.10 Aerodrome and ground facilities

Not relevant to this investigation.

## 1.11 Flight recorder

A flight recorder was not required and none was fitted in the aircraft.

## 1.12 Wreckage

### 1.12.1 *Distribution*

The fuselage, with the engine and right wing still attached, struck the ground (elevation 400 feet above mean sea level (amsl)) on its left side in a steep nose-down attitude and a high rate of descent. The left wing, with the left landing gear attached and extended, fell approximately 400 metres to the north of the main wreckage. The left wing flap and parts of the tail assembly fell within 450 metres to the north and west of the fuselage. Fragmented parts of the empennage and perspex from the cabin were spread over an area of 500 metres by 1,700 metres along a track of 210°(M) downwind of the point where the left wing fell. Subsequent calculations and a ballistic plot of the wreckage showed that the aircraft broke up at about 4,000 feet amsl when travelling in a southerly direction. Except for the stabilator trim jack, parts of its mounting bracket, connecting rod and part of the underside of the anti-servo tab to which the rod is connected, all of the structure was recovered. Extensive search operations failed to locate the missing items which probably fell attached to each other in a densely wooded and overgrown marshy area about 400 metres from the fuselage.

### 1.12.2 *General examination*

The propeller had been embedded in the ground but was still attached to the engine and its condition indicated that there had been little or no rotation at impact. The fuel selector was found set to the left tank and consequently the fuel supply to the engine would have been cut off at the time the left wing separated from the aircraft. This would account for the engine being stopped by the time of ground impact. A strip examination of the engine revealed no pre-crash defects nor was there any evidence of overspeeding.

The cockpit, associated control panels, instruments and equipment were badly smashed and the following readings and settings which were noted should be treated with some reserve:

Left altimeter sub-scale set to 1013 mb

Right altimeter set to 1019 mb

Throttle lever	mid range	Pitot heater	off
Mixture control	mid range	Rotating beacon	on
Landing gear switch up		Battery and alternator switches	on
Flap lever	flaps up	Fuel pump	off
		Ignition	on

None of these settings is considered to be of significance in the context of this accident. The apparent discrepancy between the up-selection of the landing gear and the fact that it was found in the extended position is accounted for by the severing of the hydraulic lines at separation of the left wing. The landing gear is held in the retracted position by hydraulic pressure and loss of this pressure would result in the gear becoming extended.

The auto-pilot control panel and components were completely demolished and no valid settings of switches or of the system could be established. Examination of the remains of the artificial horizon and the turn and slip indicator confirmed that their rotors had been running at impact.

### 1.12.3 *Structure and fracture examination*

The wreckage was removed to the Royal Aircraft Establishment where it was subjected to a detailed examination. The significant features of that examination are given in the following paragraphs.

The left wing became detached by the breaking of the main spar at the root end close to the fuselage. The spar had separated in tension at the lower boom, by the upwards tearing of the web and by upwards and rearwards bending of the top boom. There was no evidence of any previous damage or corrosion in the area of the separation. The wing had then moved upwards and over the fuselage tearing away the left side fuselage skin but there was no evidence that the wing had struck the tail assembly.

When the wing separated the aircraft rolled to the left and yawed to the right resulting in a torsional failure of the rear fuselage which in turn led to the separation and fragmentation of the empennage. The lower portion of the fin and rudder remained loosely attached to the fuselage by the rudder cables and were driven through the side of the rear fuselage at ground impact.

There was no evidence of malfunction in the electrical stabiliser trimmer, the trim motor gears had not been rotating at the time of break-up and no defect was found in the actuating switch.

The stabilator trim jack and associated linkage were not recovered but examination of the wreckage showed that they had been in place at the time the rear fuselage separated because the jack mounting members had been pulled against the rear frame and the stabilator spar. This damage also showed

that the trimming cables were then intact and that the rod connecting the trim jack to the anti-servo tab then had pulled out from the tab. Damage to the tab itself indicated that the linkage was intact at the time of rear fuselage separation but it was not possible to determine the setting of the tab prior to the failure of the structure.

#### 1.13 Fire

There was no fire.

#### 1.14 Survival aspects

The accident was not survivable.

#### 1.15 Tests and research

Flight tests were carried out on a similar type of aircraft which was approximately the same age as D-EHBR and fitted with an electric stabilator trimmer. A simulated stabilator trim runaway to fully nose-down at a cruising speed of 150 mph in level flight resulted in full nose-down trim being applied in 7 seconds and a nose-down attitude of about 30°. VNE (never exceed speed) 223 mph was reached in about 10 seconds from the commencement of the 'runaway' and in this condition a pull force of about 30 lb had to be exerted on the control column to avoid exceeding VNE. A propeller setting of 2,400 rpm and 25 inches of engine manifold pressure was used throughout the tests.

Throughout the tests there was no sign of flutter or vibration; longitudinal control was good and the 'stick' (control column) force per g at VNE was reasonably high, even at aft cg; approximately 30 lb at aft cg and 32 lb at forward cg. Fore and aft stick movements were approximately 1 inch per g throughout the normal speed range with a small progressive decrease of about 0.2 of an inch towards VNE.

In an untrimmed dive to VNE from a trimmed level cruising speed of 150 mph it was found that a push force ranging between 30 and 40 lb, according to cg position, had to be applied to the control column in order to maintain VNE and to prevent the aircraft recovering from the dive. It was also established that when the control column was suddenly released at VNE in a similar dive from 150 mph the aircraft recovered with maximum accelerations of 2.1 g at forward cg and 2.2 g with an aft cg. Tests at aft cg were conducted at the maximum total weight authorised of 1,170 kg; for tests at the forward cg the weight was 1,020 kg.

## 2. Analysis and Conclusions

### 2.1 Analysis

From a detailed examination of the wreckage it was established that the left wing had been the first part of the structure to fail and that it had failed from overstressing in up-load. There was no evidence of any previous damage to the wing. The failure and disintegration of the empennage was secondary to the wing failure and consistent with the probable loading during the abnormal movement of the aircraft after that failure.

From consideration of eye-witness evidence it is apparent that the overstressing of the wing resulted from an excessive application of up-elevator (stabilator) during the abrupt recovery from a steep dive but it has not been possible to establish any positive reason for the aircraft's sudden divergence from straight and level cruising flight into the manoeuvres which culminated in the wing separation.

Part of the anti-balance tab, the actuating rod, trim jack and part of the attachment bracket were not recovered but witness marks on the rear frame and stabilator spar showed that this assembly was undoubtedly in situ at the time the aircraft broke up. There is therefore no justification for attributing the unusual manoeuvre to over-controlling such as could well occur following a tab failure. There was no evidence of a defect in the stabilator trim motor and post accident flight tests established that runaway trim is relatively slow acting and is controllable even after a full nose-down runaway has occurred. There was no evidence of any such runaway.

There was no apparent deficiency of material nor any shortcomings in the servicing of the aircraft. A considerable number of possible reasons for the abnormal manoeuvring was examined, including evasive action to avoid collision or bird strike, atmospheric or wake turbulence, and incorrect loading. However, detailed consideration of the evidence for and against each possibility led to its elimination as a cause which could be reasonably substantiated.

The aircraft was fitted with dual controls and a possibility which cannot be so decisively eliminated relates to unintentional interference with the right-hand control column by the passenger occupying the right-hand seat. Such interference was thought to have been the possible cause of a serious accident in the UK some years ago.

Herr Block, the passenger in the right-hand seat of D-EHBR, had previously suffered a heart attack and was under medical treatment for this condition. Post mortem pathology produced evidence strongly indicative of a further and more recent attack and although it is not possible to decide precisely how recently this had occurred it is conceivable that it had taken place in the aircraft.

The passenger was not wearing a shoulder harness and consequently such an attack could have resulted in him collapsing forward and partially blocking or interfering with the right-hand control column. Detailed speculation on subsequent events in the cockpit would be pointless but with such interference the pilot would certainly have experienced considerable difficulty in retaining control of the aircraft. He may also have been compelled into making unintentionally abrupt or forceful movements of his own control column resulting finally in the overstressing of the wing structure during the abrupt recovery from the final steep dive.

It must be stressed that there is no direct evidence of interference with the right-hand control column and the foregoing possible sequence of events must therefore be treated with considerable reserve. On the evidence available it has not been possible to establish a positive cause of this accident but there is no evidence that any defect or malfunction of the aircraft or its engine was a causal factor.

## 2.2 Conclusions

### (a) Findings

- (i) The pilot was properly licensed and was in good health.
- (ii) The aircraft was airworthy and had been properly maintained.
- (iii) There was no evidence of any pre-crash defect or malfunction which could have caused the aircraft to deviate from level flight into the dive and recovery sequence during which the left wing failed.
- (iv) It is not considered that meteorological conditions or other factors external to the aircraft were factors in the deviation from level flight.
- (v) The left wing failed in upwards loading as the result of overstressing by the application of excessive up-stabilator during abrupt recovery from a steep dive.
- (vi) The passenger in the right-hand pilot's seat had a significant and active coronary disease. Post mortem pathology indicated that he had recently suffered a heart attack although it could not be established that this had occurred in the aircraft.

### (b) Cause

The left wing failed as a result of the application of excessive up-stabilator during abrupt recovery from a steep dive. The investigation was unable to determine why the aircraft deviated from level flight into the manoeuvres which terminated in the wing failure.

R D Westlake  
*Inspector of Accidents*

Accidents Investigation Branch  
Department of Trade and Industry  
September 1972

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