ACCIDENTS INVESTIGATION BRANCH
Department of Trade

Jodel D 117 G-AZFK

Report on the accident at Doncaster Aerodrome on 14 April 1973

LONDON: HER MAJESTY'S STATIONERY OFFICE
1974

List of Civil Aircraft Accident Reports issued by AIB in 1974

No	*Short title*	*Date of publication*
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
2/74	Piper PA-30 Twin Comanche G-AXRW at Shipdham Aerodrome, Norfolk, January 1973	April 1974
3/74	Slingsby T61A G-AYUO near Wycombe Air Park, Bucks, February 1973	May 1974
4/74	Viscount 802 G-AOHI at Ben More, Perthshire, Scotland, January 1973	May 1974
5/74	Owl Racer 65-2 G-AYMS at Greenwich Reach, River Thames, London, May 1971	May 1974
6/74	British Caledonian Airways BAC 1-11 at Corfu Airport, Greece, July 1972	May 1974
7/74	Wallis WA-117 Autogyro G-AXAR at Farnborough, Hants, September 1970	*(forthcoming)*
8/74	AA-1 Yankee G-AYHD at Beverley Nursery, near Uxbridge, Middlesex, April 1973	July 1974
9/74	Cessna F172H G-AYDC near Humphrey Head, Lancashire, December 1972	June 1974
10/74	Beagle A.61 Series 2 (Terrier) G-ARZT near Tonbridge, Kent, August 1973	July 1974
11/74	Beagle A.61 Series 2 (Terrier) G-ATMS near Saltby, Leicestershire, August 1973	July 1974
12/74	Piper PA-30 Twin Comanche G-ASLD at Newchurch, Isle of Wight, May 1972	August 1974
13/74	Tiger Moth G-APVT and Rollason Beta G-ATLY at Nottingham Airport, September 1973	*(forthcoming)*
14/74	Cessna F172H G-AVHI in the sea 44 nm east of Wick, Scotland, December 1973	October 1974
15/74	AESL Airtourer T6/24 G-AYMF near Lands End, Cornwall, June 1972	September 1974
16/74	Piper PA 28-140 G-AVBM near Dursley, Gloucestershire, August 1973	September 1974
17/74	Avions Pierre Robin DR 360, Robin Knight G-AZOX at Biggin Hill Aerodrome, Kent, July 1973	November 1974

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No	*Short title*	*Date of Publication*
18/74	Piper PA 23-250E Aztec G-AZIF near Great Sampford, Essex, January 1972	November 1974
19/74	Chipmunk DH C1 Series 22A G-ARCR at Windlesham, Surrey, September 1973	November 1974

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Department of Trade
Accidents Investigation Branch
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16 August 1974

The Rt Honourable Peter Shore MP
Secretary of State for Trade

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 Jodel D 117 G-AZFK which occurred at Doncaster Aerodrome on 14 April 1973.

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 20/74
(EW/C443)

Aircraft:	Jodel D 117 G-AZFK
Engine:	Continental C 90
Registered Owner and Operator:	Mr F Ferguson
Crew and Commander:	Mr F Ferguson – Seriously injured
Instructor:	Mr J Watson – Killed
Place of Accident:	Doncaster Aerodrome
Date and Time:	14 April 1973 at 1000 hrs
	All times in this report are GMT

Summary

At approximately 200 feet, while making an approach to land on 'Runway' 05 at Doncaster Aerodrome, the aircraft was seen to turn to the right and enter a spin from which it did not recover. The aircraft was destroyed by ground impact; the commander was seriously injured and the instructor was killed. There was no fire.

It is concluded that the accident was due to loss of control during a turn made with insufficient speed, the aircraft being too low for recovery from the ensuing spin.

1. Investigation

1.1 History of the flight

The aircraft took-off from 'Runway' 23 (see 1.10) at Doncaster Aerodrome at approximately 0910 hrs to carry out a local training flight away from the circuit during which the instrument meteorological conditions (IMC) rating of its owner, Mr Ferguson, was to be renewed. Mr Ferguson occupied the left hand seat and Mr Watson, who was the aerodrome manager and the chief flying instructor of Doncaster Aero Club, was in the right hand seat. Apart from the setting up of unusual attitudes and the final short period immediately preceding the accident, Mr Ferguson was the pilot during the entire flight. Mr Watson had not previously flown in this aircraft and prior to take-off he was briefed that the airspeed indicator was graduated in kilometres per hour (km/h).

Whilst the aircraft was airborne members of the Doncaster Gliding Club set up their launch point to make use of 'Runway' 33 and commenced gliding. Their programme was temporarily suspended when the duty gliding instructor became aware that powered aircraft were using 'Runway' 23 but at about 0955 hrs, when it appeared to him that the use of 'Runway' 23 had been discontinued, gliding activity was resumed adjacent to 'Runway' 33.

When G-AZFK returned to the aerodrome after completing the IMC rating renewal exercise it was seen passing overhead on southerly heading. Witnesses described it as flying at a normal speed in a gradual descent with wings level and its engine running slowly but apparently normally.

Mr Ferguson stated subsequently that as they approached the aerodrome Mr Watson had instructed him to land on 'Runway' 05 and intimated that they should keep a look-out for gliders since he was not sure what they were doing.

The aircraft remained within sight of the aerodrome and was next observed approaching, and near to, the threshold of 'Runway' 05. According to Mr Ferguson, it was at this point that Mr Watson, having said 'I'll take over control', assumed control of the aircraft and put it into a right hand turn. Comparison with the glider flying record shows that this must have been at about the same time that a glider was landing adjacent to 'Runway' 33 near the threshold of 'Runway' 05 and from right to left of G-AZFK's path of approach (see Appendix 1). Mr Ferguson stated that he thought that the speed of the aircraft was 60 km/h when Mr Watson took over control; however, apart from recalling a stall buffet, his recollection of subsequent events is not clear. Witnesses on the ground saw the aircraft turn to the right through about 90° flying slowly, then waver slightly and enter a spin. Estimates of the height at which the turn was initiated vary considerably but on balance it appears likely that it was less than 200 feet.

The aircraft did not recover from the spin and struck the ground starboard wing first and cartwheeled to the right, breaking up as it did so. Although there was no fire, the aircraft was destroyed; Mr Watson was killed and Mr Ferguson was seriously injured in the accident.

1.2 **Injuries to persons**

Injuries	*Crew*	*Passengers*	*Others*
Fatal	1	–	–
Non-fatal	1	–	–
None	–	–	–

1.3 **Damage to aircraft**

Destroyed.

1.4 **Other damage**

None.

1.5 **Crew information**

1.5.1 Commander: Mr F Ferguson, aged 47.

Licence: Valid Private Pilot's Licence with IMC rating.

Last Medical Examination: 9 March 1973.

Total Flying Experience: 852 hours (161.35 hours on type).

Further information on Mr Ferguson is not considered relevant to this accident.

1.5.2 Instructor: Mr J Watson aged 43.

Licence: Valid Commercial Pilot's Licence with full instructor's and instrument ratings.

Last Medical Examination: 31 October 1972. No restrictions.

Total Flying Experience: 9,741 hours (7.840 hours in command).

Mr Watson had carried out most of his flying with the Royal Air Force and had been Chief Flying Instructor at the Doncaster Aero Club for about 6 years. On the day of the accident, prior to the accident flight, he had flown for 1.40 hours in a Condor aircraft and a number of witnesses stated that he appeared to be in good health and spirits although giving the impression that he was busy.

1.5 **Aircraft information**

(a) Airframe: Jodel D117. Side by side, two-seater, low-wing monoplane with dual controls and central instrument panel.

Total flying since new – 1,680 hours.

(b) Engine: Continental 090 14F

Total operating time since new – 2,168 hours.

Time since last overhaul	–	1,042.35 hours.
Time since last top overhaul	–	130.10 hours.
Certificate of Airworthiness	–	Special category.
Valid until	–	31 May 1973.

Maintenance: The aircraft did not require a certificate of maintenance and appeared to have been maintained to a satisfactory standard.

Loading and Centre of Gravity:

Maximum weight authorised:	617 kgs.
Estimated weight at time of accident:	510 kgs.
Centre of gravity limits:	11.4" to 22.8" aft of datum.
Estimated centre of gravity at time of accident:	16.0" aft of datum.

G-AZFK was built and previously operated in France, and was bought by Mr Ferguson in December 1972. Although it was then transferred to the British register a number of the aircraft instruments retained their metric graduations. The airspeed indicator was clearly marked km/h and had a red mark to indicate the stalling speed of 50 km/h: there was also a placard in the cockpit indicating that the stalling speed was 50 km/h.

1.7 Meteorological information

No meteorological observations were made at Doncaster but at RAF Finningley, 4 nm ESE of Doncaster, the observation recorded was:

Surface Wind:	300-310° 5 to 10 knots
Visibility:	6-12 km
Weather:	Cloudy
Cloud:	2/8-4/8 Cumulus 1,800 feet 2/8-6/8 Stratocumulus 2,000 feet-3,000 feet 7/8-8/8 Stratocumulus 5,000 feet
Air Temperature:	10° C

The accident happened in daylight.

1.8 Aids to navigation

Not applicable.

1.9 Communications

Although the appropriate radio-telephone (R/T) equipment was installed in the control tower no qualified watch was maintained and, consequently, air traffic was not controlled by radio.

During the latter part of the flight three calls were made on VHF from G-AZFK to the tower but there was no answer, and attempts to use the radio were abandoned.

1.10 Aerodrome and ground facilities

Doncaster Aerodrome is grass-surfaced and has two marked strips which are used for take-off and landing and which are locally referred to as runways. 'Runway' 05-23 is 2,500 feet long inclusive of overshoot and 'Runway' 33-15 is 2,200 feet long inclusive of overshoot. The layout is approximately in the form of a 'T' with 'Runway' 33 crossing the threshold of 05 and extending either side of it.

The Doncaster Aero Club operates the powered aircraft from the control building on the north side of the aerodrome. The launching point for the gliding club's operations near 'Runway' 33 was near the south boundary (See Appendix 1). There is no air traffic control at the aerodrome.

1.11 Flight recorder

Not required and not fitted.

1.12 Wreckage

The aircraft had struck the ground, starboard wing tip first, in the south-southwest sector of the aerodrome, just short and to the right of the landing threshold of 'Runway' 05. The main wreckage lay in the direction 141° M from the first point of contact. The wreckage trail extended for 103 feet, thus indicating a slow forward speed at impact. There were indications that the engine had been developing some degree of power at impact.

Examination of the wreckage did not reveal evidence of any pre-crash defect in the airframe, the flying controls or the engine. Mr Ferguson was handling the controls for most of the flight and stated subsequently that he considered the aircraft's performance was satisfactory throughout.

A post crash calibration check of the airspeed indicator proved it to be accurate within 3 per cent of its indications up to 200 km/h.

1.13 Medical and pathological information

Post mortem examination revealed no pre-existing disease, nor was there any evidence of intoxication by ethanol, carbon monoxide or drugs. There was no medical evidence to suggest a cause of the accident.

1.14 Fire

There was no fire.

1.15 Survival aspects

The accident was witnessed from the control tower, and the aerodrome rescue tender and other personnel immediately went to the scene. Two ambulances from

the Doncaster Ambulance Service and two appliances from the Doncaster County Borough Fire Brigade also attended; the first of these was at the scene approximately six minutes after the accident occured.

Both pilots were wearing lap-straps. The nature of the impact was such that the accident must be considered non-survivable despite the fact that the survivor was fortuitously thrown clear of the aircraft at impact and escaped with serious injuries.

1.16 Tests and research

None.

1.17 Other information

1.17.1 *Operations at Doncaster Aerodrome*

General

Doncaster Gliding Club has operated from Doncaster aerodrome since 1959 and powered aircraft have operated there since 1968. Powered aircraft and gliders normally use parallel directions for take-off and landing, separating into left-handed and right-handed circuits to minimise traffic conflict in the air.

In addition to the normal performance criteria and related matters such as aerodrome surface, crosswind limitations etc, the decision as to which direction should be used for take-off and landing at Doncaster was further complicated by the need to avoid traffic conflict with nearby RAF aerodromes, and by the need to minimise powered aircraft flight over built-up areas in response to pressure from local residents. The determination of day-to-day take-off and landing directions was made during informal discussions between representatives of the aero club and the gliding club. The formal responsibility for such decisions presumably lay with Mr Watson in his capacity as Aerodrome Manager; there is no evidence that he had delegated this responsibility to any other individual.

1.17.2 *Operations on the day of the accident*

Prior to the commencement of gliding operations the duty gliding instructor made the customary visit to the aero club to ascertain the direction to be used. He discussed the matter with an assistant instructor of the aero club, expressing the views that, with the reported wind conditions, the gliders would prefer to use 'Runway' 33. The aero club instructor pointed out that a 'non-radio' powered aircraft was currently using 'Runway' 23 but that after it had landed, in his opinion, the use of 'Runway' 33 would be in order. It was as a result of this conversation that the Gliding Club set up their launching facilities for 'Runway' 33.

When subsequently, Mr Watson visited the aero club's office in the control tower shortly before 0900 hrs the assistant instructor told him that gliding operations were being set up for the use of 'Runway' 33 and that a powered aircraft was using 'Runway' 23. Mr Watson is reported to have ordered that the powered aircraft were to use 'Runway' 05 but does not appear to have given any order concerning the gliders. He left shortly afterwards to take-off for the training exercise in G-AZFK and used 'Runway' 23 for the take-off.

In the meantime the duty gliding instructor had set up his launching facilities for 'Runway' 33 and, being unaware of any contrary flying activity, commenced operations. However when, after the second launch, he saw an aircraft take-off on 'Runway' 23 he immediately suspended gliding and despatched a pupil to the aero club to confirm his use of 'Runway' 33. The information relayed to him was taken as confirmation that his use of 'Runway' 33 would be in order after the aircraft using 'Runway' 23 had landed. Thus, when shortly afterwards he saw an aircraft taxi in to the apron after landing on 'Runway' 23, and there was no other apparent activity, he recommenced flying and was personally launched on the 0955 hrs glider flight. He was not aware that there was any intention to use 'Runway' 05 for powered aircraft until after the accident had occurred.

1.17.3 *Comparative aircraft handling speeds*

On the day of the accident Mr Watson had previously flown in a Condor aircraft which has broadly similar handling characteristics and airspeeds to the Jodel. Their comparative speeds, relevant to this accident, are approximately as follows:

	Condor (mph)	Jodel (mph)	Jodel (km/h)
Minimum approach speed (handbook)	49	40	65
Stalling speed (level) (handbook)	38	32	50
Stalling speed (45° bank)	46	38	60

2. Analysis and Conclusions

2.1 Analysis

Examination of the wreckage did not reveal evidence of any pre-crash defect or malfunction of the aircraft or its engine. The evidence of the surviving pilot provides further confirmation of the aircraft's pre-crash integrity. On this basis it is considered that, save possibly in relation to the fact that the airspeed indicator was graduated in kilometres per hour, the aircraft can be excluded as a causal factor in the accident.

The apparent relationship between the landing of a glider near to 'Runway' 33, close to the threshold of 'Runway' 05, and Mr Watson's sudden take-over of control and turn to the right is significant. During the last stages of G-AZFK's approach the glider would have been outside Mr Ferguson's field of view but almost certainly within Mr Watson's view from the right hand seat. It therefore appears probable that Mr Watson noticed this glider moving on the ground and, in the belief that it was being launched, decided that a quick right turn was the safest action he could take.

The discussion between the aero club instructor and the glider instructor did not prevent a conflict in the take-off and landing directions being used by the powered aircraft and the gliders. That conflict was not resolved by Mr Watson nor did he ensure that his decision to use 'Runway' 05 was extended to include the gliders and made known to the gliding instructor. It is understood that since the accident the aero club nominates duty flying instructors who have the responsibility, in consultation with the duty gliding instructor, for establishing the take-off and landing directions to be used.

Nevertheless, although obviously undesirable, the traffic conflict cannot reasonably be considered the primary cause of the accident since avoiding action of the type taken, if indeed the turn was made for this purpose, need not of itself in a loss of control. The aircraft's speed was adequate for initiating the manoeuvre and there was power available to maintain it. In view of Mr Watson's very considerable experience it is difficult to explain the loss of control except possibly in terms of a momentary over-sight that the airspeed indicator was graduated in kilometres per hour rather than miles per hour. It is possible that this occured during pre-occupation with the sudden apparent need for avoiding action on catching sight of the glider. A quick glance at the airspeed indicator, which was on the left side of the central instrument panel, would have shown a kilometres per.hour value just sufficient for entry into the right turn manoeuvre. However, if it had been momentarily construed as the miles per hour units to which he was accustomed in Condor aircraft, it may also have suggested a reserve of speed sufficient to make a power application less urgent than was actually the case. The foregoing is necessarily a hypothesis and cannot be put forward as a firm cause; whatever the reason, the loss of control and the ensuing spin took place too low to permit recovery.

2.2 Conclusions

(a) *Findings*

(i) The documentation of the aircraft was in order and there was no evidence of any pre-crash defect or malfunction.

(ii) The pilots were properly licensed and adequately experienced for the flight.

(iii) For some time prior to the accident the powered aircraft and the gliders were using conflicting take-off and landing directions.

(iv) The traffic conflict was not resolved by the Airport Manager nor did he ensure that his decision as to which 'runway' was to be used was made known to the duty gliding instructor.

(v) Since the accident an improved procedure has been implemented to ensure there is no traffic conflict between powered aircraft and gliders.

(vi) G-AZFK was making an approach to land on 'Runway' 05 at Doncaster Aerodrome at about the same time that a glider was landing close to 'Runway' 33.

(vii) The instructor took over control of the aircraft at a height of approximately 200 feet on the approach and made an immediate turn to the right.

(viii) During the turn the aircraft lost speed and entered a spin from which it did not recover.

(ix) The airspeed indicator was calibrated in kilometres per hour; the instructor pilot had been briefed on this prior to the flight.

(b) *Cause*

The accident was caused by a loss of control during a turn made with insufficient air speed, the aircraft being too low for recovery from the ensuing spin.

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Accidents Investigation Branch
Department of Trade

August 1974

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