ACCIDENTS INVESTIGATION BRANCH
Department of Trade

Rollason Condor D62B G-ATSK
Report on the accident near Fairoaks Aerodrome, on 20 July 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	January 1975
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	January 1975
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

List of Civil Aircraft Accident Reports issued by AIB in 1974

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
20/74	Jodel D117 G-ZFK at Doncaster Aerodrome, April 1973	December 1974
21/74	Societe Aeronautique Normande Jodel D117 G-AVEI at Brixham, Devon, September 1973	January 1975

ISBN 0 11 511389 4

Department of Trade
Accidents Investigation Branch
Shell Mex House
Strand
London WC2R 0DP

17 December 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 Rollason Condor D62B G-ATSK which occurred near Fairoaks Aerodrome, Surrey on 20 July 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. 22/74
(EW/C 456)

Aircraft:	Rollason Condor D62B G-ATSK
Engine:	Continental 0-200A
Registered Owner:	Universal Flying Services Ltd
Operator:	Universal Flying Services Ltd (Fair Oaks Aero Club Division)
Crew:	Mr H K Mohamed Sabir – Assistant Instructor – Killed
	Mr J H Beazleigh – Student Pilot – Died of injuries
Place of Accident:	near Fairoaks Aerodrome, Surrey
Date and Time:	20 July 1973 at 1503 hrs
	All times in this report are GMT

The pilot's intention was to carry out a local air experience flight with his pupil who wished to learn to fly. With a wind from the southwest at 8-10 knots and the longer eastwest grass runways obstructed, he elected to use the runway heading approximately northeast. He abandoned his first take-off from a point about two-thirds along the runway and taxied back to the threshold. He then took off with flaps extended and climbed his aircraft in a pronounced tail-down attitude over trees which border the northern side of the aerodrome. Shortly afterwards the aircraft's right wing dipped, followed by the left wing. The aircraft went into an incipient spin to the left and hit the ground in a steep nose-down attitude, immediately catching fire. The pilot was killed and his pupil died later from injuries received.

1. Investigation

1.1 History of the flight

The purpose of the flight was to give air experience to an ab initio pupil, who was commencing his flying training with the Fair Oaks Aero Club. Before going out to the aircraft, the instructor telephoned the control tower to ascertain the runway in use and was advised that, because a damaged aircraft was blocking both runways 24 and 25, which were into wind, runway 33 to the northwest was being used. (See Appendix 1). All runways at Fairoaks are grass surfaced.

With his pupil in the left hand seat, the instructor taxied the aircraft out to the threshold of runway 33 and commenced the take-off run. From the evidence available, it is probable that the flaps were in the normal position for take-off, that is fully retracted. After a ground run of approximately two-thirds the length of the runway, the take-off was abandoned and the aircraft was brought to rest on the grass over-run.

The aircraft then taxied back for a further attempt. The controller was concerned about this, having seen the first attempt, but was unable to communicate with the aircraft as it was not in radio contact with the tower. Had it been so, the controller could have advised the pilot that a Cessna 172 which was in radio contact, had just successfully taken off from the unobstructed western portion of runway 25.

G-ATSK was next seen standing near the damaged aircraft having its engine restarted. It is not known why the engine had been stopped in the first instance or when this had occurred. The aircraft then continued to taxy the remaining distance to the threshold of 33 where it commenced another take-off run, this time with the flaps down. It became airborne in about two-thirds of the runway length and climbed away in a marked tail-down attitude, with its wings rocking and with pronounced starboard drift. It passed low over the trees bordering the northern boundary of the aerodrome after which its right wing was seen to drop, followed immediately by the left. The aircraft then entered a left hand spin. A partial recovery had been made before the aircraft struck the ground right wing low in a steep nose-down attitude, 525 m from the end of the runway.

The impact with the ground ruptured the fuel tank and an intense fire developed with great rapidity. A helicopter from the aerodrome was on the scene in approximately one minute, followed within two minutes by the aerodrome crash vehicles, but due to the severity of the fire it proved impossible to extricate the instructor until the flames had been brought under control. The pupil was able to roll clear of the flames but died of burns the following day.

1.2 Injuries to persons

Injuries	*Crew*	*Passengers*	*Others*
Fatal	2	–	–
Non-fatal	–	–	–
None	–	–	–

1.3 Damage to aircraft

Destroyed.

1.4 Other damage

Slight damage to fencing by rescue vehicles.

1.5 Crew information

(i) Mr Hassan Khalil Mohamed Sabir – Instructor.

Age:	27.
Nationality:	Sudanese.
Pilot training:	United Kingdom.
Licences:	Commercial Pilot's licence, valid until 17 February 1976.
	Flight Radio-Telephony Operator's licence, valid until 17 February 1976.
Aircraft ratings:	Group I: Cessna 150/210, 310/310 Series.
Private pilot privileges:	Groups 'A', 'B' and 'C'.
Assistant flying instructor's rating:	Issued 11 December 1972, valid until 10 January 1974 for Cherokee 140, 150, 160, 180. Also for Rollason Condor (private privileges only).
Endorsements:	No night flying instruction.
	No instrument flying instruction.
	No aerobatic instruction except spinning.
Medical certificate:	Valid until 31 November 1973.

Recorded flying hours:	Total – 567 hours.
Pilot in command:	386 hours.
On Condor:	190 hours.
In previous 28 days:	79 hours.

Mr Sabir joined the Fair Oaks Aero Club as an assistant flying instructor in March 1973. As such, he was allowed under the 'private privileges' of his licence to give instruction on Condor aircraft but only under the supervision of a fully qualified instructor who must be present on the aerodrome during take-offs and landings.

(ii) Mr John Henry Beazleigh

Age:	28.
Licence:	Student Pilot's licence, valid until 15 July 1975.
Medical certificate:	Valid until 10 July 1975.
Flying hours:	Nil.

Mr Beazleigh's intention was to take a course of flying lessons at the Fair Oaks Aero Club with a view to obtaining his Private Pilot's Licence.

1.6 Aircraft information

Rollason Condor D62B G-ATSK

(a) *Airframe*

Manufacturer:	Rollason Aircraft and Engines Ltd.
Year of manufacture:	1966.
Registered Owner:	N H Jones.
Certificate of airworthiness: (C of A)	General Purpose Category. Renewed March 1973 and valid at the time of accident.
Total airframe hours:	2,850.
Hours since C of A renewal:	263.
Maximum weight authorised:	1,475 lb.
Accident weight:	1,430 lb (estimated).
C of G range:	16.6″ – 23.0″ aft of datum.

Accident C of G position:	21.6" aft of datum (estimated).
Fuel remaining on impact:	14.5 gallons (Imp) (estimated).

(b) *Engine*

Type:	One Continental 0-200A; 4 cylinder; 100 bhp.
Manufacturer:	Rolls-Royce Motors Ltd.
Date of manufacture:	1967. Installed in G-ATSK in October 1972.
Total hours:	2,120 (approximately).
Hours since last overhaul:	318.
Fuel type:	Petrol (AVGAS) – 80 Octane.

(c) *Other relevant information*

The aircraft had been maintained in accordance with the approved schedules. It had been flown twice on the day of the accident; on the second occasion by Mr Sabir. No unserviceability had been reported.

A stall warning device was fitted, consisting of a vane type detector on the port wing leading edge which operated a red warning light and a buzzer mounted on the instrument panel at between five and ten knots above the stall.

The 15 Imp gallon fuel tank was situated in the fuselage, between the engine and the cockpit.

This particular aircraft had wing flaps with two positions, UP and DOWN (30^0).

1.7 Meteorological information

According to a weather appreciation prepared subsequently by Air Traffic Control, and endorsed by the Meteorological Office, conditions at Fairoaks Aerodrome at the time of the accident were estimated to have been as follows:

Surface wind:	Averaging 220^0 8-10 knots.
Visibility:	8 kilometres.
Weather:	Light rain in the vicinity.
Cloud:	6/8 at 2000 feet.
Temperature:	Plus 16^0 C.

The relative humidity is estimated by the Meteorological Office to have been above 80 per cent.

1.8 Aids to navigation

Not applicable.

1.9 Communications

Radio communication with the Fairoaks control tower was available on 130.45 MHz. Condor G-ATSK was fitted with a VHF trans-receiver which was not used during the accident flight. Although Rule 36 of the Rules of the Air and Air Traffic Control Regulations, 1972, requires that pilots in an aerodrome traffic zone shall if possible maintain a watch on the appropriate frequency, this was not normally enforced. Thus it was not the practice at the Fair Oaks Aero Club to maintain a listening watch during routine local flights.

A signalling lamp was kept in the control tower for contact with non-radio aircraft and vehicles but on the morning of the accident the lamp had been reported unserviceable by the controller and it was still unserviceable at the time of the accident.

1.10 Aerodrome and ground facilities (see Appendix 1)

Fairoaks is a licensed grass aerodrome situated about two miles north of Woking at an elevation of approximately 100 feet above mean sea level. At the time of the accident three grass runways outlined by orange and white markers were normally available for take-off and landing. Their dimensions were as follows:

Magnetic Heading	*Length (M)*	*Width (M)*
070°/250°	732	91
150°/330°	548	91
060°/240°	732	91 – infrequently used, to allow grass to grow.

Until very shortly before the accident, runways 24 and 25 were obstructed by vehicles attending a damaged aircraft. After the departure of the vehicles, approximately 500 m of runway 25 remained unobstructed. Runway 24 was also left clear by the vehicles' departure, although this was unknown to the controller at the time the pilot telephoned the control tower to ascertain the runway in use. Due to the extra workload caused by this incident, the controller had not given the customary telephone warning to flying schools on the aerodrome of a change of runway. Thus the chief flying instructor of the Aero Club, whose presence was required under the regulations whilst supervising an assistant flying instructor, was not alerted to the change.

Runway 33 has an average uphill gradient of 1.2 per cent. At the time of the accident the surface was firm and the grass short though wet. At the northern end of the runway there is a clearway 180 m in length, 80 m beyond which grows a narrow belt of trees approximately 50 feet high. Beyond this the ground continues to rise gradually to a ridge topped by further tall trees, some 440 m beyond the clearway.

The Regulations state that aerodromes with two way radio situated in a control zone require licensed and rated controllers, but in common with certain other aerodromes Fairoaks has been granted exemption from these Regulations by the Civil Aviation Authority. Notwithstanding this, the controller on duty at the time of the accident had the necessary experience to qualify for an Air Traffic Controller's Licence and an Aerodrome Controller's Rating. However, he had not yet applied for either of them.

1.11 Flight recorder

Not required and not fitted.

1.12 Wreckage

The wreckage lay in a grass field just to the west of the extended centre line of runway 33, and 525 m beyond its northern end, that is 345 m beyond the end of the clearway. The aircraft appears to have struck the ground on a heading of about 345° (M) in a steep nose-down and right wing low attitude with little forward speed. The nose and right wing started to break away as the aircraft pivoted clockwise through 90°. The aircraft slid about 8 m along the ground before coming to rest. Fire broke out after the initial impact and spread rapidly.

Detailed examination of the wreckage disclosed no evidence of pre-crash failure or malfunction. The examination established the following:

(a) Propeller:		rotating but not under power at time of impact.
(b) Engine controls:	Ignition;	On.
	Fuel;	Off, but with indications that it had been moved to this position by impact.
	Throttle;	Closed.
	Carburettor air selector;	Cold.
(c) Flap lever and flaps:		Fully down.
(d) VHF trnsmitter-receiver:		Off. Selected to 130.45 MHz.

The attachment fittings of the two shoulder harnesses had been pulled out of the wooden structure at the rear of the cockpit.

There was no evidence of carburettor icing.

1.13 Medical and pathological information

A post mortem was carried out but no indications of any medical cause as being contributory to the accident were found.

1.14 Fire

Fire broke out after the first impact and before the aircraft came to rest. It was intensified by fuel spillage from the tank which was nearly full. The seat of the fire was the cockpit area itself. The crew of a helicopter, which landed nearby approximately one minute after the crash, had only a hand extinguisher available to use on the flames. Two minutes later the two aerodrome fire-fighting vehicles arrived and quickly succeeded in extinguishing the fire, using the following equipment:

One 20 lb dry powder extinguisher.
One 15½ lb CO_2 bottle.
Six 2 gal air foam extinguishers.
One 30 gal foam extinguisher.

At 1508 hrs three fire appliances from Woking arrived but by this time the fire was under control, though not yet fully extinguished.

1.15 Survival aspects

The attachment fitting of the two shoulder harnesses had been pulled out of the wooden structure at the rear of the cockpit, indicating that both occupants had been fully strapped in. Both crew members died from burns, and the accident is considered non-survivable because of the rapid onset of the post crash fire.

1.16 Tests and research

As there is no published performance data for Condor aircraft, a flight test programme was carried out using an aircraft of similar age and condition to that of G-ATSK. The analysed results of these tests were employed to construct a mathematical model of the aircraft for use on a computer. In turn the computer was programmed to estimate the aircraft's performance under the accident conditions, with the following results:

(a) A take-off on runway 33 with flaps up would have required a ground run of approximately 580 m. This would have resulted in lift-off just beyond the end of the runway in the vicinity of the perimeter road. However, having become airborne it would have been possible by climbing at a reduced airspeed of 50-55 knots (normal climbing speed is 60 knots) to clear the first row of trees by a narrow margin and the second row by some 40 to 50 feet.

(b) A take-off with flaps down would have resulted in a lift-off point approximately 415 m from the runway threshold. A subsequent climb using the normal technique of accelerating to the recommended speed of 55 knots would have resulted in the aircraft failing to clear the first row of trees.

(c) In the flaps down configuration the only method by which the first row of trees could have been cleared (by a small margin) was by climbing throughout at very low speed, or 'zooming' so that in either case the airspeed was less than 45 knots when overflying the first obstruction. Continuing from this situation it would have been almost impossible, owing to lack of speed and altitude, and with a reduced rate of climb, to clear the trees on the ridge ahead. Alternatively, if an avoiding turn had been attempted, the aircraft would almost certainly have stalled due to an insufficient speed margin.

The accident aircraft's power off stalling speeds in level flight, as recorded during the most recent C of A renewal air test and reproduced below, were 3 – 4 knots higher than the average for similar Condors at the same weight. The reason for this could not be ascertained.

Weight:	1430 lb
Stalling speed (IAS) flaps up:	41 knots
flaps down:	37 knots

The indicated stalling speeds with power on were estimated to be 1 - 2 knots lower than the power off values in each case.

1.17 Other information

Availability of Performance Data for the Condor Aircraft

At the time the Condor was first certificated in France, there was no requirement for its performance to be scheduled. This was in accordance with national practice at the time for the certification of light aircraft.

Subsequently when the aircraft was granted a Certificate of Airworthiness in the United Kingdom, there was likewise no requirement for it to have a peformance category.

In 1971 the General Purpose Category C of A was introduced to cater for certain types of operation, including club flying. Since that date, all new types of aircraft certificated under this category are required to have their performance scheduled. However, on the grounds of cost, it was considered impracticable at the time to schedule the performance of existing types of light aircraft retrospectively. Therefore all light aircraft types (including the Condor), which had already been certificated in the public transport (club) category prior to 1971, were exempted by the Civil Aviation Authority from the requirement for their performance to be scheduled.

2. Analysis and Conclusions

2.1 Analysis

The controller made the decision in favour of the use of runway 33 because he believed that runways 24 and 25 were obstructed. He could however have chosen Runway 15, which was more into wind than 33. It also sloped downhill and had an unobstructed climb-out path. However it was the controller's opinion, based on the limited view of the area that he had from the tower, that an aircraft taking off in this direction would have passed rather too close to the damaged machine on runway 25. In retrospect, it can be seen that the risk to aircraft of veering off a runway into an obstruction 32 m to one side must on balance have been less than that incurred by taking off uphill and downwind with obstructions on the climb-out flight path.

It is felt that Mr Sabir should have been aware of the implications of using 33 in these circumstances as he had been based at Fairoaks for the four months preceding the accident. Also he was in a better position than the controller to assess the feasibility of using 15, having taxied his aircraft on two occasions near to where the damaged aircraft was resting. It can only be assumed that he felt obliged to use 33 having been informed that this was the runway being used. He may have overlooked the fact that the responsibility for the conduct of the flight, including the suitability of the runway for take-off, was ultimately his. As the *United Kingdom Air Pilot* states: 'The pilot has the final decision as to which runway he uses. The runway in use will normally be the best for general purposes but special circumstances may make another preferable. Pilots wishing to use a runway other than the runway in use should inform ATC'. It was unfortunate nevertheless that the Aero Club's chief flying instructor did not immediately learn of the change of runway, as he might then have queried the advisability of using 33.

Mr Sabir had gained 190 hours experience flying the Condor aircraft during the period and should have been reasonably conversant with the aircraft's performance, even though no relevant data is given in the Pilot's Notes or the aircraft's Flight Manual. Had he been maintaining radio contact he might well have heard the decision of the Cessna pilot to take off on the unobstructed western end of runway 25 and followed his example. The lack of radio contact also prevented the controller, whose signalling lamp was unserviceable, from being able to caution Mr Sabir when he saw him taxying towards the beginning of runway 33 for a second take-off attempt. Although it was not possible to establish why the aircraft halted during its return to runway 33, no significance is attached to this. It is possible that the engine had run down whilst the aircraft was taxying.

The analysis of flight tests carried out on a similar aircraft shows that in the conditions obtaining at the time of the accident a Condor taking off on runway 33 with flaps retracted, which is the normal setting, would have had an excessively long ground run. This almost certainly accounted for the abandoned take-off of G-ATSK, and for the pilot's decision to use flaps 30° – the only alternative setting on this aircraft – for his second attempt. This ensured an earlier lift-off point but, inevitably, a lower rate of climb.

The analysis confirms that the use of flaps on the second take-off resulted in there being insufficient distance available in which to clear the first row of trees using the normal technique of accelerating to the recommended climbing speed. The pilot therefore had little alternative but to raise the nose in an attempt to climb over the trees at a dangerously low airspeed. Having cleared this obstruction he then had insufficient height, airspeed or rate of climb to surmount the ridge beyond. There is little doubt that whilst attempting an avoiding turn commenced with inadequate speed margin over the stall, the aircraft entered an incipient spin at such an altitude as to make a full recovery impossible. Any turbulence which may have been present would have only added to the pilot's low speed control and performance problems.

During the climb at low speed the aircraft's stall warning system should have been operating. Assuming it was noticed by the pilot under conditions of considerable stress, there was little he could do to alleviate the situation as he had no excess height which could be exchanged for an increase in speed.

2.2 Conclusions

(a) *Findings*

(i) The pilot and his pupil were properly licensed.

(ii) The documentation of the aircraft was in order and the aircraft had been properly maintained.

(iii) The take-off weight was less than the authorised maximum and the centre of gravity was within the prescribed limits.

(iv) The pilot elected to use a take-off direction advised by Air Traffic Control which was unsuited to the aircraft's performance in the conditions prevailing.

(v) The pilot's use of flap and an abnormally low airspeed in order to clear the first obstruction on his flight path placed him in a position such that he had insufficient height, airspeed or rate or climb to clear a succeeding obstacle.

(vi) The pilot subsequently attempted an avoiding turn whilst flying with insufficient airspeed.

(vii) The aircraft stalled and entered an incipient spin to the left at too low an altitude for recovery.

(b) *Cause*

The accident was caused by the pilot attempting to take off from a runway which was too short in the conditions prevailing to allow adequate clearance of all obstacles at a safe flying speed. The pilot apparently did not appreciate that the aerodrome air traffic control service was advisory and that he was not obliged to use the runway offered to him if he considered it to be unsuitable.

3. Recommendations

(a) It is recommended that consideration be given to scheduling the performance of those types of light aircraft previously granted exemption in 1971 but which are still widely used.

(b) It is recommended that the attention of all those concerned be drawn to the fact that there is no obligation on the part of pilots to accept a runway for take off or landing as advised by ATC if it is considered that the runway is in any way unsuitable.

P J Bardon
Inspector of Accidents

Accidents Investigation Branch
Department of Trade

December 1974

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

R 79428/R92 K6 2/75 C