AAIB Bulletin No: 3/95 **Ref: EW/C94/12/5** **Category: 1.3**

Aircraft Type and Registration:	Pierre Robin HR100/210 Safari II, G-TCAR	
No & Type of Engines:	1 Continental IO-360-D piston engine	
Year of Manufacture:	1973	
Date & Time (UTC):	26 December 1994 at 1240 hrs	
Location:	Near Stapleford Tawney Airfield, Essex	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - 3
Injuries:	Crew - Fatal	Passengers - 3 Fatal
Nature of Damage:	Aircraft destroyed	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	45 years	
Commander's Flying Experience:	161 hours (of which 56 were on type) Last 90 days - 2 hours Last 28 days - 1 hour	
Information Source:	AAIB Field Investigation	

History of the flight

Prior to the accident the pilot and his three passengers had taken part in a club rally which involved a short navigation exercise to the Kent coast followed by a return to Stapleford. The rally was organised on a handicap basis so that the competing aircraft, some 20 in all, would all return to the airfield at about the same time. The weather was fine with more than 20 km visibility, no significant cloud and a surface wind of 220°/ 15 kt. During the rally G-TCAR was seen by another pilot taking part in the rally to be flying steadily at its planned altitude. On returning to Stapleford the pilot of G-TCAR called joining overhead but made no further radio transmissions. The circuit, which was being flown at 1,200 feet on the QNH of 1007 mb, was crowded with both rally and non-rally aircraft and pilots were extending the downwind leg of the circuit pattern in order to fit in with other landing traffic. The pilot of an aircraft on base leg saw G-TCAR outside him at an altitude of about 900 feet and at a range of about 2.5 nm from the runway threshold. G-TCAR was next seen on finals by other pilots and a witness on the ground. All agreed that by now it was low on the approach but flying steadily in a constant attitude descent. A witness located on the airfield had a nearly head on view of the aircraft's

approach and stated that the approach was stable but low and that he thought that it may pass under the power cables. The aircraft struck the power cables at an elevation of 338 feet and 30 metres to the left of a lattice pylon which rose to an elevation of 348 feet. After striking the cables, the aircraft rotated two or three times before striking the ground and breaking up. A witness located near the crash site stated that the engine was making a steady, unchanging noise.

The pilot had completed his training for the award of his pilot's licence at Stapleford in 1991. At that time, the airfield had grass runways but, in November 1994, Runway 22 was partially surfaced with asphalt. The new surface was applied to the northern end of the runway and was 600 metres long with a mean up-slope of 2.0°. Approaches to this runway are flown on a 4° approach slope because of the obstruction caused by high voltage power lines located 1.2 nm from the displaced threshold and rising to 228 feet above the touchdown point. The runway is equipped with an Abbreviated Precision Approach Path Indicator set at 4.25° but this aid was not switched on at the time of the accident.

Factors affecting the approach

Common practice at Stapleford is that pilots should turn onto base leg for Runway 22 about 500 metres beyond the power cables ie 1.5 nm beyond the displaced threshold. Using standard configurations and power settings, this technique will result in a 4.0° glideslope to the runway and aircraft will pass over the power lines at an elevation of 600 feet giving a clearance of 252 feet. From its reported position on base leg, the accident aircraft would have subtended an approach angle of 3° and cleared the cables by 132 feet. An approach angle of 4° from the same position would have resulted in the aircraft striking the cables. The approach angle from the point of impact with the cables to the displaced threshold is 1.7° (see Figure 1).

Runway 22 has an up-slope of 2.0° which, from a 1.7° approach, would give the same runway perspective as a 3.7° approach to a level runway (see Figure 2).

At the time of the accident, the elevation of the sun was 14° above the horizon and its azimuth was 9.0° to the left of the pilot's final approach track. The pilot had used the paved area of Runway 22 on only two previous occasions. On one occasion the weather was cloudy and on the other the sun was well to the right of his approach track. Several pilots flying at the time remarked that the bright winter sun made it difficult to see the runway. This problem would have been exacerbated by a lower than normal approach.

Survival and medical

There was no fire but all four occupants received fatal injuries on impact. The impact forces were sufficient to cause an overload tensile fracture of one of the rear left seat belt attachments. The belt of the other rear seat occupant remained intact. The rear seat restraints were lap belts, the front restraints were four-point harnesses with a rotating single action release buckle. The pilot's harness was intact, however the front right seat harness had opened. Both were in good condition, no significant wear or damage being evident. No evidence of any impact with the buckle release could be seen, however the buckle releases were found to be fairly easy to turn in either direction, and it is probable that the passenger's buckle opened due to relatively gentle lateral impact during the impact sequence.

On ground impact the fuselage broke up and the cabin structure was severely distorted. The accident was not survivable either from this aspect or from the impact forces generated. A post-mortem examination of the pilot failed to identify any existing or pre-existing medical condition that could have caused or contributed to the cause of the accident.

Engineering investigation

Inspection of the pylon and cables showed that the aircraft had passed below the earth cable and over two cables before striking two further cables on the upwind side of the pylon. Following the wirestrike the aircraft had tracked approximately 250°(magnetic) for about 65 yards until it struck the ground. Of the two cables struck by the aircraft, one was partially severed and the other did not have any severed strands, however the dampers on the pylon were distorted, indicating that the cables had been struck.

Examination of the aircraft wreckage showed that the aircraft had struck the ground at a relatively low speed, possibly the normal approach speed, in a nose down attitude with the right wing low. The wirestrike appeared to have induced a right roll and some right yaw. There was no evidence of electrical arcing on the aircraft. At impact the aircraft was configured with the flaps almost fully deployed. The fuel and both magnetos were selected 'ON', and significant quantities of fuel were evident in both wings. The right wing had separated in the ground impact, but the leading edge carried evidence of a wirestrike near the tip and the non-metallic tip assembly had been separated from the aircraft before ground contact. The propeller was probably not rotating at ground impact and showed no evidence of power on one blade, which was buried deep in the soft ground. The other blade was clean and had not struck the ground due to the lack of rotation, however it showed clear evidence of impact with the cables and also clear evidence of considerable rotational energy during that impact. Wirestrike evidence was later found on the nose landing gear strut. No evidence was found of any defect which might have reduced the power available. The damage to the propeller suggested normal engine operation when the aircraft struck the cables.

APPROACH ANGLES

1. Diagramatic only (not to scale)
2. All heights above mean sea level (msl)
3. Pilot's altimeter was set to read heights above msl

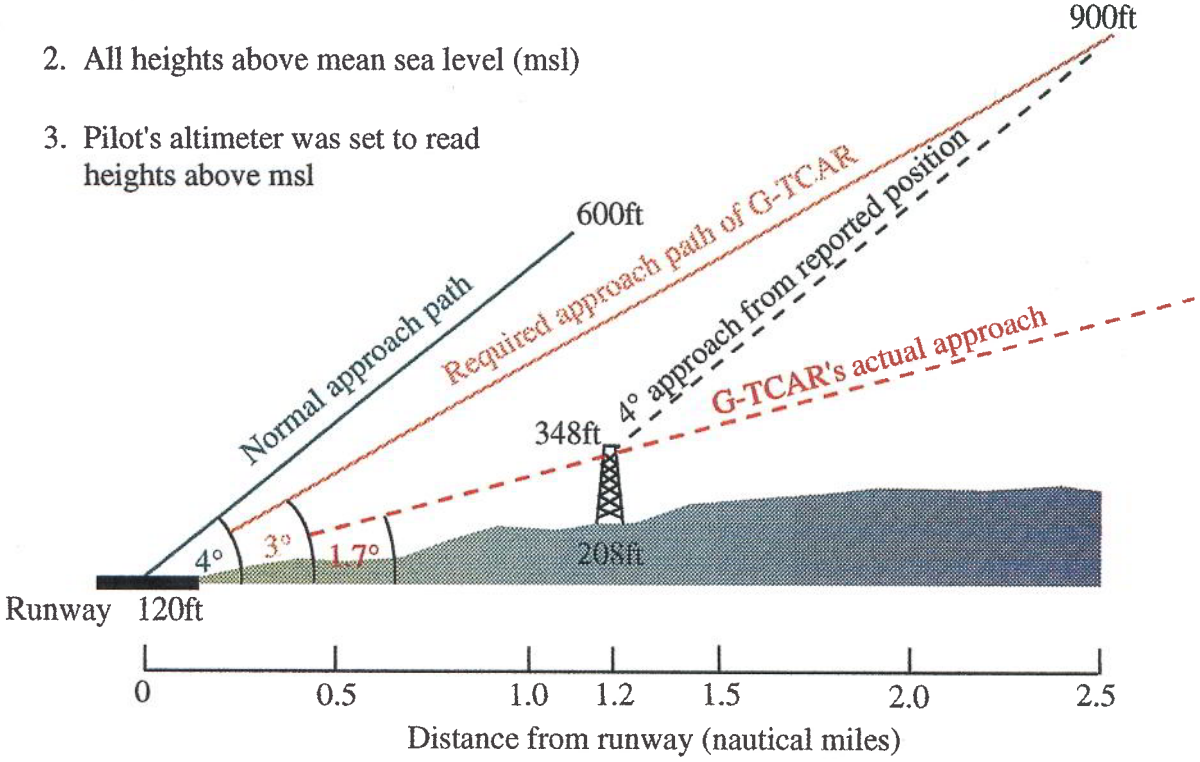

Figure 1

EFFECT OF SLOPING RUNWAY ON VISUAL PERCEPTION

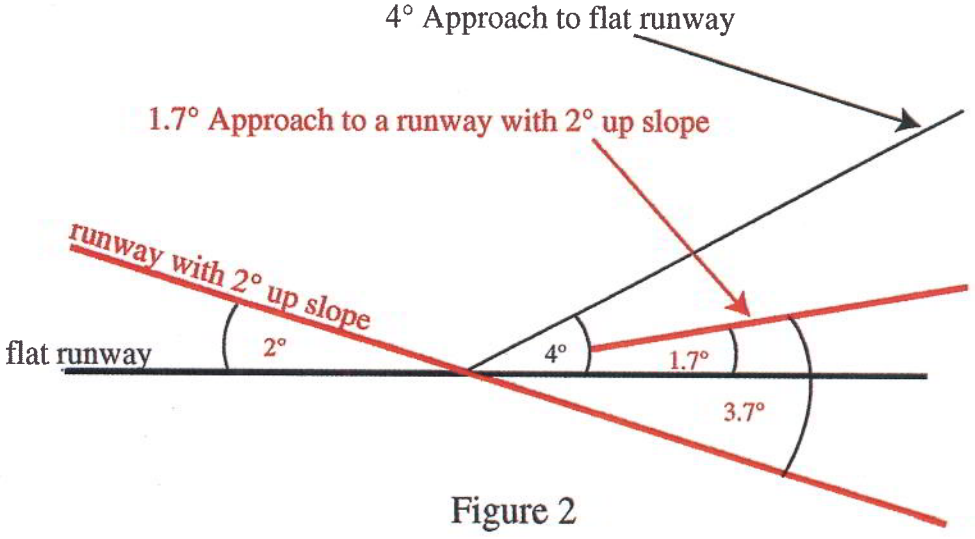

Figure 2