No: 10/90 **Ref: EW/C1163** **Category: 1c**

Aircraft Type and Registration:	Socata TB10, G-BHID	
No & Type of Engines:	1 Lycoming O-360-A1AD piston engine	
Year of Manufacture:	1980	
Date and Time (UTC):	27 May 1990 at about 0955 hrs	
Location:	Barnchallock Glen, Stoneykirk, Wigtown, Scotland	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - 3
Injuries:	Crew - 1 (fatal)	Passengers - 3 (fatal)
Nature of Damage:	Aircraft destroyed	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	53 years	
Commander's Total Flying Experience:	1,372 hours (of which 1,100 were on type)	
Information Source:	AAIB Field Investigation	

On the morning of the 27 May, the aircraft left Wellesbourne Airfield, Warwickshire, at about 0535 hrs and flew to Barnchalloch Farm where it arrived at about 0745 hrs. There were two people on board.

An aftercast obtained from the Meteorological Office at Bracknell indicated that, over the period of the accident, there was an anticyclone over the east of Scotland and that, in the area of the accident, the visibility was good and there was little or no cloud. The automatic weather station at West Freugh recorded the wind as calm, the temperature 17°C, dew point 8°C and pressure 1029.6 mb. In the immediate vicinity of the site the wind was reported, by a witness to the accident, as light from the north-east.

The airfield at Barnchalloch Farm was orientated approximately south-north and sloped steeply downwards in that direction; the difference in height between the southern and northern edge was of the order of 100 feet. The slope varied from one part of the field to another. There was no defined runway, consequently it was not possible to determine a take-off distance available, however, in the direction of the initial take-off roll of the accident flight the field was about 1750 feet long. The hard, dry surface was covered with short grass which was grazed by livestock.

The aircraft was not refuelled at the farm and, shortly before 0955 hrs, the pilot and three passengers boarded with the intention of flying to the Isle of Mull. The aircraft started the take-off roll, from the

south-east corner of the field. The take-off was in a northerly direction and the wheel tracks in the grass faded after about 510 feet although this may not have been the full extent of the aircraft's initial ground roll. The weight would, by this stage, have been partially supported aerodynamically and, having had less pressure applied to it, the grass may have recovered by the time the observation was made. The tracks became evident again shortly before the apex of a small hillock. A ground scrape between the two wheel tracks was made by the tail of the aircraft, which indicated that it was in a high nose-up attitude. The ground dropped away steeply on the northern edge of the hillock and the aircraft became airborne again for a short time. The next time it struck the ground the tracks were orientated on about 035°(M) and there was evidence that the right wing had contacted the ground and that the tail had contacted sufficiently hard to detach the tail navigation light which was found in this area. The wheel tracks were about 39 feet long and finished 441 feet from the northern perimeter fence, in the direction of travel. The indications were that the aircraft had again become airborne in a steep nose-up attitude. None of the wheel tracks showed any evidence of the brakes having been applied.

There was a short tail scrape, orientated 040°(M), a few feet from the fence on the northern edge of the field. This fence consisted of wooden poles linked by barbed wire aligned at approximately 45° to the track of the aircraft such that the left wing struck two of the poles with a further two being dragged down, and a fifth, to the right of the others, being struck by the propeller. The positions of the left wing leading edge imprints on the two poles, plus the lack of any contact between the fence and the right wing indicated that the aircraft was banked slightly to the left as it went through the fence. Beyond the fence the aircraft had descended into a steep sided glen which bordered the field. The aircraft had then flown through a hawthorn tree and struck the northern bank of the glen. The orientation of the swathe through the trees indicated that the aircraft was rolled approximately 45° to the left at the instant before it struck the bank on which the trees grew. Shortly after impact the aircraft had burst into flames.

The ground impact marks plus the disposition of the wreckage showed that the aircraft had performed a cartwheel manoeuvre before coming to rest upright, facing approximately in the direction from which it had come and with the left wing pointing down the slope of the bank. The tail surfaces had become lodged in a tail-up attitude in another clump of small hawthorn trees to the rear of the main wreckage with the intervening fuselage together with the fin having been consumed by the post impact fire. The tail had suffered little mechanical damage in the impact although it had been blackened by the fire. The tie-down ring on the underside was covered in grass; this was thought to have been picked up from the tail scrape mark on the south side of the glen. It was evident that the initial impact with the trees had been made by the left wing, as pieces of tip fairing and the landing/taxi light in the leading edge were found in and below the branches. A length of barbed wire from the field primeter fence was also found in the branches, with another piece found wrapped round the nose leg in the main wreckage.

The only large piece of airframe that had not been affected by the fire was a 4 feet section of the outboard left wing forward of the spar that was found close to the heavily disturbed earth where the engine and propeller had struck the ground. The leading edge bore the imprint of one of the fence posts. The intensity of the fire was such that little remained of the fuselage, cabin or flying control operating system. This plus the structural disruption that had occurred in the impact meant that it was not possible to identify each occupant with a seat position in the aircraft. In particular, as it was found that two of the passengers also possessed Private Pilot's Licences, it was not even possible to verify that the owner was the one flying the aircraft.

Following an on-site examination the wreckage was recovered to AAIB Farnborough for a more detailed analysis.

The fire damage meant that little meaningful information could be extracted from the cockpit instruments or flying controls. However it was considered that the presence of the tail scrape at the northern edge of the field suggested that the aircraft was in all probability reacting to an up-elevator input. The flaps on this aircraft were operated by an electric motor. The actuating shaft on the latter was discovered to be fully retracted, showing that the flaps were retracted at the time of impact.

The engine was subjected to a strip examination, with no evidence of any component failure or malfunction being found. The aircraft was equipped with a variable pitch propeller. The blades were considerably damaged around the tip areas which indicated that the engine was developing a high degree of power at the time of impact. The propeller hub was stripped and it was found that the pitch change pin of one blade had made an imprint in the preload plate of the other blade. The imprint took the form of a smear made in a fine-to-coarse direction and measurement showed that it started at a blade angle of around 17°, the fine and coarse stops being at 11.5° and 31° respectively. Thus the blade must have been at some point below 17° before it started to twist in a coarsening direction under impact forces. Reference to the propeller manufacturer confirmed that the pitch angle would normally be a few degrees off the fine stop during take-off.

Post mortem examination of the pilot revealed no pre-existing medical condition which could have contributed to the accident.

Performance data was obtained from the aircraft manufacturer. The following conditions were assumed for the calculation;

Aircraft weight	1,050 kg
Runway surface	Hard, dry, short grass
Initial runway slope	2% down
Temperature	17° C
Pressure(QNH)	1029.6 mb
Start of roll elevation	425 ft amsl
Pressure altitude	approximately sea level

The following data is for take-off with flap settings of 10° and 0°;

Flap 10°

Vs	54 kt
VR	56 kt
Ground roll	286 metres (938 feet)

Flap 0°

Vs	57 kt
VR	59 kt
Ground roll	339 metres (1,112 feet)

Take-off performance for the Socata TB10 is defined for 10° flap and the Flight Manual gives performance data only for this configuration at the MTOW of 1150 kg.