

AAIB Bulletin No: 12/93

Ref: EW/C93/3/4

Category: 1.3

Aircraft Type and Registration: AS202/18A4 Bravo, G-BNTG

No & Type of Engines: 1 Lycoming AEIO-360-B1F piston engine

Year of Manufacture: 1987

Date & Time (UTC): 18 March 1993 at 1602 hrs

Location: Birniehill Farm, near Maybole, Ayr, Scotland

Type of Flight: Training

Persons on Board: Crew - 2 Passengers - None

Injuries: Crew - Fatal Passengers - N/A

Nature of Damage: Aircraft destroyed

Commander's Licence: Commercial Pilot's Licence

Commander's Age: 55 years

Commander's Flying Experience: 9,322 hours (of which about 500 were on type)
Last 90 days - 71 hours
Last 28 days - 15 hours

Student Pilot: Licence not required - Class I Medical Certificate

Student Pilot's Age: 36 years

Student Pilot's Flying Experience: 157 hours (of which 17 hours were on type)
Last 90 days - 20 hours
Last 28 days - 12 hours

Information Source: AAIB Field Investigation

The aircraft, using the radio callsign 'Cygnet 33', was being flown on a dual instruction training flight from Prestwick International Airport. The student pilot had reached the intermediate stage of a flying course towards qualifying for a Commercial Pilot's Licence. The purpose of this flight was for the student pilot to receive instruction in general aircraft handling including spinning and aerobatics before returning to Prestwick for further practice in circuits and landings. Prior to the flight the flying instructor was overheard to give the student pilot a full briefing on the exercises to be carried out. It is not known if this briefing included a reminder that a practice forced landing might also be required.

At 1517 hrs 'Cygnet 33' contacted Prestwick Tower, requesting engine start clearance and reporting that they had copied the Automatic Terminal Information Service (ATIS) 'Mike'. (Full details of the meteorological conditions are included in a later paragraph). Engine start was approved and 'Cygnet 33' was cleared for a VFR departure via the Culzean Bay exit and they were also informed

that the flight crew of a landing DC10 had reported wind shear and a 10 kt loss in airspeed on the approach to Runway 31. This information was acknowledged. As the greater part of the flight appears to have been carried out over the sea and below recorded radar coverage, full details could not be established. The following information is therefore derived from recorded RTF messages and eye-witness reports.

At 1521 hrs 'Cygnet 33' was cleared to taxi to Runway 31 and take off clearance followed at 1528 hrs. The take off and initial climb out were observed to be normal and, at 1532 hrs, 'Cygnet 33' reported its position to be over Ayr harbour outbound and the radio frequency for position reporting was transferred to Prestwick radar. At 1537 hrs 'Cygnet 33' reported that "there is a nasty looking storm over the sea" and requested clearance to operate over Culzean Bay up to 5,000 feet. The Prestwick radar controller approved this request, except that he stipulated a maximum altitude of 4,000 feet due to other traffic flying in the Turnberry VOR holding pattern. At 1550 hrs 'Cygnet 33' requested a further clearance to climb to 5,000 feet in order to carry out a spinning manoeuvre. The Prestwick radar controller approved this request and asked that he be informed when the aircraft was back below 4,000 feet. At 1556 hrs 'Cygnet 33' reported that the spinning exercise was complete and the aircraft was below 4,000 feet. This was the last radio transmission recorded from 'Cygnet 33'.

A witness who resided in a mobile home at Birniehill Farm, which is situated 11½ nm south south west of Prestwick Airport, reports that some time after 1530 hrs on 18 March 1993 he became aware of a light aircraft flying in the area. His description of the changes in engine noise that he heard is consistent with those associated with an aircraft carrying out aerobatic manoeuvres. At about 1600 hrs he first observed the aircraft flying at low level on an easterly heading crossing north of the farm. Calculations show that for the witness to have observed the aircraft through the windows of his mobile home, the aircraft at that point was flying at less than 300 feet above ground level. At that stage it appeared to be in level flight and the engine sound was normal.

The witness continued to observe the aircraft as it crossed his field of vision when he reports that it entered a bank to the left and the engine sound died away. Suddenly the nose dropped and it descended steeply to the ground and a considerable amount of debris was observed rising from the impact with the ground. The witness immediately ran to the main farm building and the emergency services were alerted. This telephone call was logged at 1603 hrs. Personnel at the farm then ran to the accident site to render assistance.

Immediately the emergency call was received, units from the Strathclyde fire and ambulance service and a Royal Navy Sea King Search and Rescue helicopter were alerted. The response from the emergency services was rapid, but both pilots had received fatal injuries at the impact which is considered to have been non-survivable.

Engineering Investigation

Examination of the aircraft wreckage and ground witness marks showed that the aircraft had struck the ground on a heading of about 320°M but that it was travelling relative to the surface along a track of about 050°M whilst yawing excessively to the left. At impact it had been rolled to the left, probably near to the vertical with the nose well down. When related to the eyewitness evidence this indicates that the aircraft had rolled onto its back as the nose was seen to drop. The damage was consistent with a ground speed of about 100 kt. The direction of impact was from a downwind flight path and this is consistent with flight at or near stalling speed combined with initial entry into a spin to the left.

At impact the aircraft was structurally complete. In particular all the airframe surfaces, control surfaces, tabs, access panels and the canopy were complete and properly attached. The rudder and elevator trims were within the normal range. The windscreen fragments were reconstructed and this showed that it had been complete at impact and there was no evidence of a bird strike. The pilots' seats together with occupants had been ejected from the aircraft during the impact sequence and this was due to the almost complete break up of the centre fuselage section in the initial impact. The crew's 5-point restraint harnesses had held. It was established that at impact the flaps were up, the tachometer was indicating at least 600 RPM and the vacuum gauge showed about 3 inches of vacuum. There was little fuel in the aircraft but this was considered to be due to disruption of the fuel tanks in the extensive break up. Some fuel was found within the system and manifold lines; grass staining around the accident site was caused by the spillage of a significant quantity of fuel. These indications together with the damage to the propeller, which was complete, although at initial impact the entire propeller assembly had separated from the engine at the crankshaft flange, are consistent with an engine running at low power at the moment of impact.

The flying controls were examined and no evidence of any in flight disconnection or jamming was found. It was possible to account for the correct routing of almost all the flying control cables. The flap control system was complete from the motor to the flaps, which were locked up on both sides. There was no evidence such as structural failure or control malfunction to indicate that there had been any uncommanded roll or yaw. During the impact sequence the ailerons had sustained four witness marks, two on each aileron, however it must be considered likely that these marks were produced at different times during the impact sequence. Three of these marks were consistent with a roll demand to the right.

Strip examination of the engine showed no evidence of any mechanical disruption in flight. The magnetos were bench tested satisfactorily. The fuel system was choked with soil but there was no evidence of any failure or deficiency before impact. No other abnormality was found.

Meteorological Information

When, at 1517 hrs the pilots of 'Cygnet 33' requested engine start clearance they reported that they had copied the Prestwick ATIS information Mike. The weather details on this recording were as follows:

'PRESTWICK WEATHER TIME 1450 HRS; 280/20 KTS VARIABLE BETWEEN 250 & 310 DEGREES MINIMUM 10 KTS MAXIMUM 32 KTS; 15 KMS IN SHOWERS; 2 OKTAS CB 1500 FEET, 2 OKTAS AT 2000 FEET, 5 OKTAS 3,500 FEET; TEMPERATURE PLUS 7, DEWPOINT MINUS 1; QNH 1021 MB.'

An aftercast provided by the Meteorological Office, Bracknell describes the actual weather conditions in the area of the accident site as follows:

'Situation At 1600 hrs UTC an unstable west to north west airstream established over the Maybole area with strong surface winds.
Weather: Scattered showers.
Visibility: At worst 15 km but generally more than 30 km.
Cloud: Scattered occasionally broken Cumulus/Stratocumulus, base of Cumulus around 2,000 feet and Stratocumulus around 3500 feet with isolated Cumulonimbus base 1,500 feet.'

The pilots of the Royal Navy Search and Rescue helicopter, which landed at the site about 30 minutes after the accident occurred, reported that the weather in the immediate area was good with the surface wind gusting to about 25 kt.

Medical and Pathological information

Post mortem examination of both pilots revealed that death was the result of multiple injuries sustained in the impact. There was no evidence of any medical condition that could have contributed to the causes of the accident.