

ACCIDENT

Aircraft Type and Registration:	Taylor Titch, G-MISS	
No & Type of Engines:	1 Walter Minor 4-3 piston engine	
Year of Manufacture:	2009	
Date & Time (UTC):	8 November 2009 at 1508 hrs	
Location:	Eldernell Lane, Coates, Whittlesey, Cambridgeshire	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - 1 (Fatal)	Passengers - N/A
Nature of Damage:	Aircraft destroyed	
Commander's Licence:	National Private Pilots Licence (Aeroplanes)	
Commander's Age:	70	
Commander's Flying Experience:	856 hours (of which 0 were on type) Last 90 days - 14 hours Last 28 days - 4 hours	
Information Source:	AAIB Field Investigation	

Synopsis

The aircraft had been built from plans and was flying on a Permit to Fly. The owner lent the aircraft to a friend who, for his first trip in this type of aircraft, was briefed to fly a few stalling exercises followed by a few circuits back at the airstrip. The weather conditions were good and the aircraft departed from grass Runway 36. It was last seen by the owner at a height of approximately 2,000 ft, several miles to the north of the airstrip in a left turn. Witnesses saw a small aircraft enter a steep spiral dive, complete several revolutions, then crash into a bank on the edge of the River Nene. The investigation found no mechanical cause for the accident. The spin characteristics of the aircraft were assessed by an aerodynamicist, who considered that the aircraft would

probably recover from a spin should the pilot make the correct control inputs.

The postmortem revealed that the pilot's cause of death was multiple injuries, although, given his medical history, it was considered possible that he had suffered from an incapacitating cardiac event just prior to the accident.

History of the aircraft

G-MISS was a modified Taylor Titch which had been built from plans by its first owner. Instead of the suggested Volkswagen or Continental horizontally-opposed engines, he had decided to install a Walter inverted in-line

four cylinder powerplant. This considerably altered the profile of the aircraft nose. The original builder died before the aircraft was completed. The final stages of build were completed by another enthusiast on behalf of the original builder's widow. The aircraft accrued some 12 hours of flight testing (carried out by another pilot) before being sold to its current owner in 2007. The new owner, a Light Aircraft Association (LAA) inspector, examined the aircraft closely, rectifying a number of defects and making several changes where he felt that there were deficiencies in the original design or build. This took some time and in August 2009, having completed 16 hours 30 minutes of flight testing, the aircraft was granted its Permit to Fly. The flight test report concluded that G-MISS:

'performs well and is pleasant and easy to fly'.

History of the flight

The aircraft had flown just over 14 hours since the issue of its Permit to Fly, when the owner noticed that fuel was weeping from the fuel tank. He removed the tank, had it rebuilt and during the morning of 8 November 2009 refitted the fuel tank into the aircraft. A duplicate check of the work carried out was performed by the owner's friend, a pilot who lived nearby. Once the tank was properly installed the owner refuelled his aircraft to full using Avgas 80/87 from a barrel; this gave the aircraft around 150 minutes endurance. At approximately 1410 hrs he took off for a 25 minute local check flight. As he was taxiing out, his friend, who had gone home after the tank fitting, returned to the airfield in his own aircraft, an Isaacs Fury biplane. The owner's friend decided to follow the Taylor Titch in his biplane, to compare the aircraft's climb performance and to observe the flight. During the flight, which included the use of high power settings and stalling, G-MISS performed normally, and as it was returning to

the airfield, its owner, using the radio, offered to let his friend fly it. His friend accepted and, after they both landed at White Fen Farm Airstrip and shut down, they conducted a brief.

This would be the owner's friend's first flight in a Taylor Titch, so the owner gave him an extensive brief on the handling characteristics of the aircraft. He briefed him to climb to height in the airfield overhead, carry out some general handling, to include stalling, and then to return to the circuit for a few touch-and-gos. The flight was expected to last approximately 20 minutes.

The aircraft was a little difficult to start, as the engine was still warm from the previous flight, but after starting the pilot carried out his normal checks, including the magneto checks, and taxied out to Runway 36. The departure, at around 1500 hrs, was described by the owner as "a bit messy" as the pilot seemed to have some difficulty in controlling the heading as the aircraft progressed down the runway. This may have been due to the fact that the propeller rotated in the opposite direction on G-MISS to that on the pilot's own Isaacs Fury. After takeoff the aircraft continued climbing to the north, reaching a height that the owner estimated was 2,000 ft. The owner commented that the aircraft's climb angle was not as steep as he was expecting and he wondered whether the pilot had left the carburettor heat selected, as he had taxied out with it on. The owner saw the aircraft turning left, assumed it was returning to the airfield but then he lost sight of it. After 30 minutes, when the aircraft had not returned, the owner became concerned and initiated 'overdue' action.

Witnesses

A witness was walking with her husband along the flood dyke to the south of the River Nene near the village of Eldernell. She described hearing the noise of an

aircraft suddenly reduce. This attracted their attention to a small white aircraft which they both estimated was at a normal height for a light aircraft. They then heard the engine noise increase and, shortly afterwards, saw the aircraft enter a descending spiral turn. The spiral turn became very steep after several rotations, the aircraft losing height rapidly, and the witness became concerned that the aircraft would not recover. The aircraft remained in a descending spiral, with no apparent change in its rate of rotation, until it hit the ground approximately 200 m from them, on the bank of the river. This witness called the emergency services at 1509 hrs and her husband went to the accident site. It was immediately apparent that nothing could be done to assist the pilot.

Another witness, who was located to the west of Eldernell, was watching birds to the east of his position, through binoculars, when a small aircraft came into his field of view. The aircraft was in a steep spiral dive, rotating to the right but descending almost vertically. He had previously flown gliders and considered that he was witnessing a spiral dive, not a spin. He initially thought that the aircraft was performing aerobatics but became concerned as the aircraft continued to descend. The aircraft hit the ground about a mile from his position and he heard a noise which he described as a thump. He called the emergency services and proceeded to the aircraft.

Weather

An aftercast provided by the Met Office indicated that a moderate and unstable north-easterly flow covered the Cambridgeshire area, with good visibility and a small amount of convective cloud. In the area of the accident site the 2,000 ft wind was estimated to be from the north-east at 20 kt, reducing to 10 kt from a more northerly direction at the surface. Whilst the aftercast

did suggest the possibility of turbulence in the area, the weather was not thought to have been significant in this accident.

Taylor Titch spin characteristics

In 1973, the Ministry of Technology, at the Royal Aircraft Establishment (RAE) Bedford, conducted a flight test on a Taylor Titch fitted with the Continental O-200 engine. The flight test included spinning and the report commented that the aircraft both entered and recovered quickly from the spin.

G-MISS was fitted with a Walter Minor engine and had a slightly longer and narrower engine compartment and a larger tail fin to aid its directional stability see Figure 1). This caused an increase in pitch inertia. No spinning trials had been conducted on such a modified Taylor Titch, and neither standard nor modified aircraft of this type were cleared for spinning.

Examination of the aircraft and accident site

The aircraft had struck very soft mud on the bank of the river and come to rest partially in the water. The front fuselage wooden structure had almost entirely fragmented as far back as the rear of the cockpit: the pilot had been thrown into the water since all the wooden members securing his seat harness had disintegrated. Aft of the cockpit, the fuselage was basically intact with the empennage in situ, although the right tailplane detached during recovery. The left wing had fragmented whilst the right wing, albeit almost detached, was still essentially intact outboard of the flap. A distinct impression of the left wing leading edge was discernible in the river bank, indicating a steep nose-down attitude at impact. This was further reinforced by the angle at which the engine had buried itself in the mud: it was estimated to be in the order of 50° or more nose-down.

Despite the degree of disruption, it was not felt that the aircraft's speed had been particularly high, since metal items such as the fuel tank showed very little longitudinal compression and it had only one, relatively small, split. In the absence of hard evidence, speed estimation becomes subjective, based on experience of damage inflicted following other accidents involving similar structures. Such an assessment suggested that G-MISS had struck the ground at a speed of less than 100 kt.

After recovering the aircraft to the AAIB facility at Farnborough, a detailed inspection was carried out of its structure and flying controls. It was concluded that the aircraft was structurally intact at impact and there had been no pre-impact disconnection or failure of the flying control mechanisms. No foreign objects were recovered which could have caused jamming of the flying controls.

The engine, which was remarkably intact due to the relatively slow impact speed and extremely soft ground, was partially dismantled and all the internal components were found to be in good condition. The wooden

propeller had largely fragmented and was considered to have been rotating at medium to high speed.

Empirical analysis of the spin characteristics of G-MISS

The LAA conducted an analysis of the spin characteristics of G-MISS using the methods of NACA (National Advisory Committee for Aeronautics) report TN (Technical Note) 1329 and TN D (Technical Note Design) 6575. The results predict that the aircraft would have been able to recover from a spin.

The AAIB investigation also commissioned a report by an aerodynamicist to identify how the spin characteristics of G-MISS differed from those of the standard Taylor Titch. The aerodynamicist used the method stipulated in the Defence Standard 00-970 Leaflet 18, *Spinning and spin criteria for spin resistance and recovery*, published by the UK Ministry of Defence in 1999. His report concluded that G-MISS would have been no more prone to enter a spin than a standard Taylor Titch. He also concluded that G-MISS would probably have recovered from a fully developed spin following the application of the normal spin recovery control

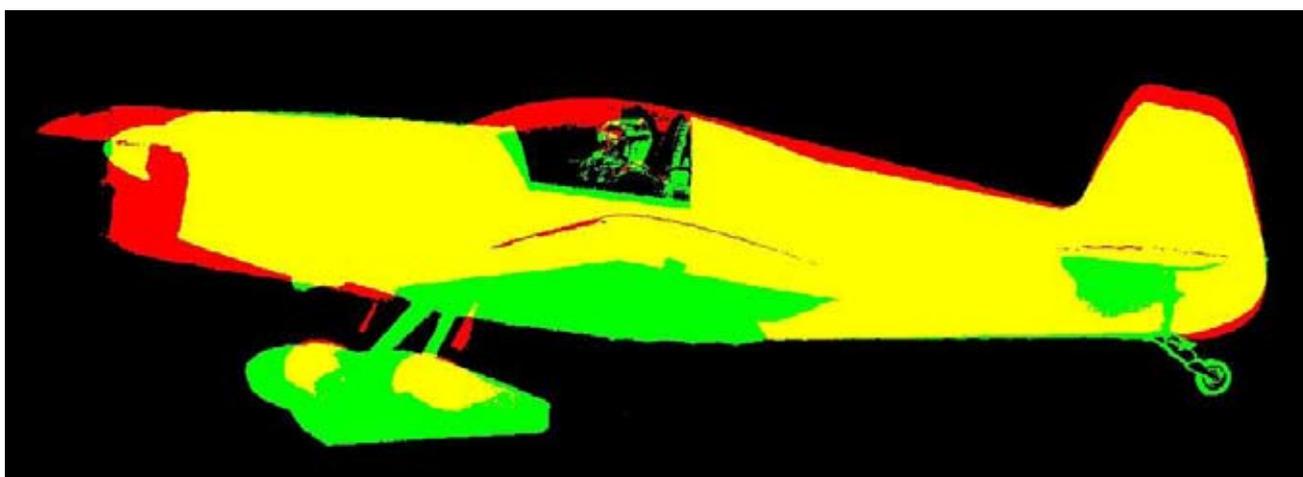


Figure 1

Comparison of the profile of a 'standard' Taylor Titch aircraft (green) with G-MISS (red), overlap region in yellow

inputs. However, the aerodynamicist noted that, due to the increase in pitch inertia, if the ailerons had been applied against the spin, this may have delayed or even prevented G-MISS from recovering from a spin.

Medical and pathology

The pilot had a medical condition, known as atrial fibrillation, which had necessitated admission to hospital in 2008. He was treated with a variety of drugs including the anticoagulant warfarin, which is acceptable for NPPL Medical certification. At the time of the accident the pilot was flying on a valid NPPL medical declaration, countersigned by his general practitioner.

A postmortem examination revealed that the pilot had suffered multiple severe injuries, which were consistent with being caused by the aircraft striking the ground. The toxicology tests revealed no evidence of alcohol or drugs in the pilot. A specialist aviation pathologist reviewed the pilot's medical history and the postmortem results, and considered that it was possible that the pilot had suffered an incapacitating cardiac event just prior to the accident. The cause of death was given as multiple injuries.

Analysis

Witnesses observed the aircraft in a manoeuvre, which they described as a spiral dive, which did not seem to change significantly during its descent. The investigation considered reasons why the aircraft might follow the flight path observed.

The pilot had briefed that he would be carrying out stalling exercises but he was not familiar with the aircraft, so the investigation considered the possibility that the aircraft had unintentionally entered a spin from which the pilot could not recover. To some witnesses a spin might appear similar to a spiral and a theoretical

evaluation of G-MISS's spin characteristics was carried out. The investigation concluded that G-MISS was no more prone to enter a spin than the standard Taylor Titch and should have recovered from an inadvertent spin with the application of normal spin recovery controls.

The aircraft could have entered a spiral manoeuvre if it had suffered from a control restriction or failure. However, the engineering investigation concluded that the aircraft was structurally intact at impact and that there had been no pre-impact disconnection or failure of the flying control mechanisms. No foreign objects were recovered which could have caused jamming of the flying controls. Consequently, the aircraft ought to have been recoverable from either a spin or a spiral dive if the correct control inputs had been made.

Another reason for a spiral dive, or spin, could have been pilot incapacitation. The investigation noted that the cause of death given by the pathologist was multiple injuries but that it was possible that the pilot had suffered an incapacitating cardiac event just prior to the accident.

In summary, there was insufficient evidence to determine the cause of the accident. However, given the pilot's medical history and that no attempt appears to have been made to recover a flyable aircraft from a spin or spiral dive, it was possible that the pilot became incapacitated in the final stages of the flight.