Piper PA-25-235 Pawnee, G-ASKV

AAIB Bulletin No: 9/2004	Ref: EW/C2004/02/04	Category: 1.3
Aircraft Type and Registration:	Piper PA-25-235 Pawnee, G-ASKV	
No & Type of Engines:	1 Lycoming O-540-B2C5 piston engine	
Year of Manufacture:	1963	
Date & Time (UTC):	29 February 2004 at 1455 hrs	
Location:	West Chiltington, West Sussex	
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:	Commercial Pilot's Licence	
Commander's Age:	71 years	
Commander's Flying Experience:	3,434 hours (of which 453 were on type)	
	Last 90 days - 10 hours	
	Last 28 days - 6 hours	
Information Source:	AAIB Field Investigation	

Synopsis

The aircraft took off towing a glider and shortly after takeoff the pilot became incapacitated. As the aircraft deviated from its expected departure track the glider pilots released from the tow and carried out a successful landing on the airfield. The aircraft subsequently entered a gentle descent, began to roll to the right and impacted with some trees. Although the aircraft remained substantially intact there was a severe post impact fire. A post mortem examination indicated that the pilot had probably become incapacitated and died in flight.

History of flight

The pilot was a member of a gliding club located at Parham Airfield, West Sussex and regularly operated from there as a pilot flying the club's tug aircraft. The pilot arrived at the gliding club a little after 1350 hrs on the day of the accident whereupon he was asked by the duty tug pilot if he would mind taking over from him. The pilot readily agreed and the aircraft was handed over to him with ten gallons of fuel on board. Weather conditions were good with an approximate surface wind of 045°/10 kt and a surface temperature of +4ºC.

The pilot carried out three uneventful aero-tows from Runway 04 at 1424 hrs, 1434 hrs and 1440 hrs respectively. At 1505 hrs he commenced the fourth aero-tow with an ASK13 glider (Tail No 'DVC'). A student, undergoing a pre-solo check flight, was seated in the front of the glider with an instructor

seated behind. The takeoff and initial climb appeared normal and as the combination crossed the airfield boundary the aircraft started a turn to the left in accordance with normal club practice. During the left turn however, at approximately 200 feet above aerodrome level, the glider crew noticed the aircraft ahead return to a wings level attitude and fly in an unanticipated direction. They then saw the aircraft start to turn gently to the right and descend. The aircraft's engine was still at full power and as the airspeed increased towards 80 kt the instructor became very concerned. He took over control from the student, pulled his cable release handle and, using the glider's excess energy, gained height and turned back towards the airfield. With sufficient height in hand the instructor carried out a turn in an attempt to locate the aircraft. Unable to see it, he turned back towards the airfield, completed a successful downwind landing and, believing that the aircraft had crashed, raised the alarm immediately.

The aircraft meanwhile, continued a gentle descent and began to roll to the right. It flew over a line of tall trees and crossed the fairway of a golf course before colliding with more trees beyond. The aircraft's forward momentum was significantly reduced in the initial impact and it descended through the trees coming to rest inverted. Three people on the golf course, who had witnessed the accident, went to assist. They were able to open the cockpit hatch and attempted to pull the pilot clear. Unfortunately, before they could do so, they were driven back by flames and a number of small explosions resulting from a fire that had started in the engine bay area and progressed rearwards along the fuselage. Unable to remain nearby they retreated to a safe distance whereupon there was a further explosion, presumably as the remaining fuel in the tank ignited.

Witness evidence

There were a number of witnesses to the accident flight. The evidence from each of them indicated that the flight progressed uneventfully until soon after takeoff when the aircraft appeared to go gently out of control. The engine was heard to have been running at high power throughout.

The aircraft caught fire almost immediately after the accident; the fire starting near the engine and progressing rearwards. A number of witnesses close by also reported hearing some small explosions. The bystanders who attempted to rescue the pilot were able to open the cockpit hatch and reach inside to unfasten his harness buckle. They attempted to pull him clear but as the fire moved aft along the fuselage engulfing the pilot they were forced to withdraw. There was no sign of the pilot being conscious at any time during the attempted rescue.

Pathological information

The post mortem investigation showed that although the pilot had sustained injuries in the accident these were considered not to be life threatening. Furthermore, there was no evidence found of smoke inhalation. The conclusion therefore was that the pilot had died before the post crash fire started, and that he had most likely died in flight.

There was evidence found of an abnormality in the pilot's heart, which suggested that heart failure was the probable cause of death. There were no significant factors apparent in his previous medical history and no indication that he had experienced any abnormal symptoms in the period leading up to the accident.

Pilot information

The pilot held a Commercial Pilot's Licence (CPL) with a valid Joint Aviation Authorities (JAA) Class 2 medical certificate. His most recent medical examination was carried out on 12 June 2003. The Class 2 medical certificate in association with a CPL allows a pilot to exercise the privileges of a Private Pilot's Licence (PPL). The medical is valid for a period of one year (dependent upon age) and an Electrocardiogram (ECG) has to be conducted at each renewal.

The pilot was experienced on type and familiar with glider towing operations. On the morning of the accident he had breakfast at home before visiting a friend. After arriving at the gliding club he completed three aero-tows, one of which was up to three thousand feet, without incident. There had been no apparent sign of his being unwell during the day.

Glider towing operations

The aircraft, purchased by the gliding club for gliding towing some years previously, was fitted with a radio for air/ground communications. The glider however, was not fitted with a radio. A system of pre-arranged signals between glider and tug aircraft was therefore required to cater for abnormal situations. In the event of a tug problem the pilot would waggle the wings, signalling the glider to release at once. The aircraft was fitted with mirrors so that the pilot could maintain a view of the glider without turning his head. If he saw a problem with the glider, he would move the rudder from side to side. The tow cable is attached at the rear of the aircraft close to the tail wheel. In an emergency it can also be released from the aircraft by the pilot using a release handle in the cockpit. Neither of the aforementioned signals nor activation of the tow cable release by the pilot were observed on the accident flight.

It was usual practice for this aircraft/glider combination, after becoming airborne, to climb at a speed of around 70 kt and, to avoid causing a noise nuisance in the area, turn left soon after takeoff from Runway 04 and continue to climb to the west.

The pilot took over the aircraft with ten gallons of fuel aboard. The club had a requirement for there to be a minimum of five gallons on board before commencing an aero-tow. Having already performed three aero-tows, it is likely therefore that the aircraft fuel quantity had reduced to this amount by the accident flight.

Engineering examination

The aircraft had made initial contact with trees on the edge of the golf course at a height of approximately 15 metres agl. The swathe through the trees indicated that the aircraft's initial attitude was about 20º right-wing-low rapidly increasing to the inverted as it struck and was slowed by more substantial branches. The nose struck such a branch, shattering the 4-bladed wooden propeller into small fragments. The aircraft finally struck the ground, close to an outhouse of a residence bordering the golf course, approximately in a 45º nose-down inverted attitude whereupon it progressively burned-out. The tow cable was found hanging from branches at a point where the aircraft had made first contact with the trees.

Examination revealed that virtually all the aircraft's fabric covering had burnt away, both wings had crumpled (the right wing being more substantially damaged) but the fuselage aft of the engine firewall was remarkably intact. In particular, the cockpit area was free from distortion and the metal parts of the pilot's restraint system showed no signs of failure. From this it was concluded that the impact would probably have been survivable and this appears to be corroborated by the post mortem findings.

The Piper Pawnee was designed for its original role as a 'crop duster' to minimise pilot injury from low-speed accidents and this appears to have been the case in this accident. An impact involving similar forces would almost certainly have resulted in the pilot receiving fatal injuries had he been flying a 'conventionally' constructed light aircraft.

With the fabric covering burnt away and the relatively intact structure, it was possible to verify the integrity of the flying controls on site. The fragmentation of the propeller blades was indicative of a high power condition, thus it was considered unnecessary to conduct an in-depth examination of the engine.

Analysis

The glider crew became concerned as soon as they realised the aircraft was not going in the direction they expected and, as there was no signal given by the pilot, they released from the aero-tow (early release from an aero-tow is an exercise that is practised in training) and managed to make a successful recovery to the airfield.

The gradual departure from controlled flight and the lack of observed control movements, combined with the post mortem indications that the pilot had not inhaled smoke from the post impact fire despite evidence that the impact was probably survivable, indicate the that the pilot almost certainly died in flight.

The pilot had undergone all the required examinations for a Class II medical certificate and no indications of a heart problem or any other problem had been detected. This illustrates that prior detection of certain medical problems may not always be possible. The abnormalities in his heart, observed at post mortem, probably developed in the five month period since his previous medical examination. He completed several tows immediately prior to the accident flight during which he gave no indication that the he was feeling unwell. The final takeoff appeared normal, so it therefore seems that incapacitation was sudden and occurred soon after takeoff.

The aircraft, although substantially intact after impact, was in an inverted position and the fuel lines or the fuel tank itself were probably ruptured. The bystanders who attended the scene and attempted to extricate the pilot from the wreckage did so at considerable risk to themselves. They were not aware at the time that the pilot had probably died before the impact yet they persevered with their rescue attempt, disregarding the minor explosions occurring around them and the ever present risk of a more substantial explosion, until they were finally beaten back by flames. Their actions are to be commended.