

## ACCIDENT

<b>Aircraft Type and Registration:</b>	Tecnam P2002-JF, G-CDTE	
<b>No &amp; Type of Engines:</b>	1 Rotax 912-S2 piston engine	
<b>Year of Manufacture:</b>	2005	
<b>Date &amp; Time (UTC):</b>	15 October 2009 at 1250 hrs	
<b>Location:</b>	Old Sarum Airfield, Wiltshire	
<b>Type of Flight:</b>	Training	
<b>Persons on Board:</b>	Crew - 1	Passengers - None
<b>Injuries:</b>	Crew - None	Passengers - N/A
<b>Nature of Damage:</b>	Wings, cowling, propeller, nosewheel	
<b>Commander's Licence:</b>	Student	
<b>Commander's Age:</b>	37 years	
<b>Commander's Flying Experience:</b>	34 hours (of which 7 were on type) Last 90 days - 7 hours Last 28 days - 7 hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot and further enquiries by the AAIB	

## Synopsis

During takeoff from the grass airfield, the aircraft swung left despite the application of full right rudder. It left the runway, crossed a road and collided with two parked vehicles.

## History of the flight

The student was undertaking circuit consolidation training and had completed several circuits with his instructor. The instructor briefed the student for a solo circuit consolidation detail, left the aircraft and the student taxied to the holding point for grass Runway 06. The wind was calm, the visibility was over 10 km and there was no cloud. The student reported later that the ground felt very bumpy and that he was "conscious to

protect the nosewheel". He lined up on the left side of the runway because the right side was out of use. He applied power and "significant right rudder" but the aircraft pulled slightly left. He recalled applying full right rudder but the aircraft began a "violent left turn" and passed from the marked runway onto the grass beyond. He closed the throttle while maintaining full right rudder and the aircraft straightened but still did not turn right. The aircraft was travelling at "significant speed" as it passed over a kerb and onto the perimeter road.

A car was parked behind a lorry on the far side of the road. The left wing of the aircraft hit the driver's door of the car just before the nose hit the rear right corner of the

lorry. Following the impact sequence, the aircraft had rotated 90° to the left, the nose gear leg had collapsed through deformation of the yoke, and the right wing had wedged itself underneath the side of the lorry (see Figure 1). The student was unhurt and vacated the aircraft over the left wing in the normal manner.

### Information from the pilot

The pilot thought that the rudder was ineffective during the takeoff run despite the application of “maximum pressure” to the rudder pedal. He stated that the aircraft was travelling at “a speed where rudder input would have certainly caused movement to the right”. Consequently, he believed that there must have been a mechanical failure such that the rudder pedal did not control the rudder. This might have been due to the nose gear collapsing, either while taxiing or at the start of the takeoff roll, or might have been because of a failure in the rudder control system.

The pilot reported that he normally held the control column slightly aft of neutral during takeoff to protect

the nose gear and recalled using exactly the same technique on the accident takeoff as during his previous takeoffs from the same runway. He believed that the “violent” onset of the swing to the left was consistent with component failure rather than a progressive increase in yaw. Subsequently, he felt the nose wheel “bouncing and skidding” on the grass and thought that the aircraft was “close to being airborne”.

The pilot looked subsequently at markings left by the nose wheel just as the aircraft began its rapid swing and thought that they suggested the nose wheel was skidding. Figure 2 shows the tracks left later by the aircraft as it approached the road.

### Information about the aircraft

The owner stated that a feature of this aircraft type is that with full power selected and the control column aft of neutral, the nose wheel can lift from the runway before the rudder is capable of controlling the tendency of the aircraft to yaw left. He reported that the nose gear leg had been replaced approximately five months before the



Figure 1



**Figure 2**

accident. The rudder pedals were connected to the nose wheel for steering on the ground.

### **Information from the loss adjuster**

The AAIB discussed the damage to the aircraft with the loss adjuster who inspected the aircraft on behalf of the insurance company. He considered that had the nose gear failed early in the takeoff through deformation of the yoke, the tyre was likely to have tried to dig itself into the grass surface rather than roll over it. Any yawing tendency due to the damage was likely to have been to the right if the nose wheel was still able to turn. The deformation of the yoke was consistent with an aircraft rotating left.

### **Analysis**

The tyre marks shown in Figure 2 were left by the aircraft shortly before the impact and, had the nose gear already collapsed, the marks would be consistent with the damage already done. The marks left by the

nosewheel were intermittent and more pronounced than those left by the main wheels. The intermittent nature of the marks supported the possibility that the pilot held the control column slightly aft of neutral during the takeoff run, in accordance with his normal technique, thereby causing the nosewheel to lift intermittently from the ground during the takeoff.

There were two possibilities as to why the nosewheel marks were more pronounced: the nose gear had already collapsed or the nosewheel was pointing right, due to the application of full right rudder, and was skidding on the grass. The pilot reported that the violent nature of the swing was consistent with failure of the nose gear, suggesting that the failure caused the swing. However, the nature of the deformation to the yoke would have tended to turn the nose to the right had the nosewheel still been free to rotate. If it was not free to rotate, it seemed likely that the nose would have tried to dig itself into the runway surface, which would probably have left more

significant marks in the grass than were observed. The deformation to the yoke was consistent with an aircraft rotating left and it was possible that the damage was caused by the rapid swing to the left while the nosewheel was pointing to the right. However, if this was the case it was the swing that caused the failure rather than the other way around. On balance, the evidence did not tend to support the possibility that nose gear failure caused the aircraft to swing uncontrollably.

If the nosewheel had lifted intermittently during the early stages of the takeoff run, it would explain the lack of directional control because neither the nose wheel nor the rudder would have been effective at controlling the yaw. With full rudder applied, each time the nosewheel contacted the grass it would have skidded and the marks on the ground seemed consistent with a skidding

nosewheel. Had the nose gear been undamaged before the collision, the damage to the yoke observed afterwards was consistent with the impact sequence.

The pilot believed that the rudder pedals were not controlling the rudder because the aircraft did not turn right in response to pressure applied to the right pedal. The AAIB did not inspect the aircraft and it was not possible to establish the integrity of the rudder control system after the collision. It was also not possible to determine the actual speed achieved by the aircraft during the attempted takeoff and, therefore, whether the rudder should have been effective. Consequently, the investigation was unable to eliminate the possibility that the rudder did not move in response to the pressure applied at the rudder pedal.