

ACCIDENT

Aircraft Type and Registration:	Piper PA-24-250 Comanche, G-TALF	
No & Type of Engines:	1 Lycoming O-540-A1B5 piston engine	
Year of Manufacture:	1959	
Date & Time (UTC):	12 January 2008 at 1130 hrs	
Location:	Tatenhill Airfield, Staffordshire	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - 1
Injuries:	Crew - None	Passengers - None
Nature of Damage:	Damage to landing gear, underside of fuselage, exhaust and propeller	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	56 years	
Commander's Flying Experience:	430 hours (of which 60 were on type) Last 90 days - 5 hours Last 28 days - 1 hour	
Information Source:	Aircraft Accident Report Form submitted by the pilot and AAIB inquiries	

Synopsis

The aircraft suffered an electrical problem shortly after takeoff and the pilot decided to return to the airfield. When he selected the landing gear down, all the electrical power was lost. He did not have any indications to confirm that the landing gear was fully down, so he operated the emergency lowering mechanism. Believing that the landing gear was now down and locked he attempted a landing, but during the subsequent ground roll the landing gear collapsed. The investigation established that the electric motor was still connected to the gear operating mechanism, and that this prevented the landing gear from being fully lowered.

History of the flight

The pilot planned to fly with a friend to Caernarfon in fine weather conditions. The previous night had been cold so the pilot de-iced the aircraft before refuelling. The start-up, taxi and power checks were uneventful, and the pilot noted that all the aircraft instruments, including the ammeter, were indicating normally.

The takeoff was described as normal and the landing gear was retracted. After flying for a short distance, the pilot noticed that the aircraft's electronic horizontal situation indicator (HSI) had failed. He recycled the avionics master switch, and the HSI recovered briefly before failing again. He then noticed that the red low-voltage light was illuminated and that the ammeter showed

that the battery was not charging. He switched off the non-essential electrical items and advised the tower at Tatenhill that he had an electrical problem and would be returning to the airfield.

The aircraft joined downwind for Runway 26. All the avionics, other than the HSI, were working normally. The pilot reduced the airspeed to below the landing gear limiting speed and selected the landing gear down. The pilot heard a 'clunk' as the gear appeared to lower; at the same time, all the avionics and electrical gauges and indicators in the aircraft failed. The pilot recycled the avionics master switch but was unable to recover any electrical power. He was now unsure whether or not the landing gear was down and locked. The green landing gear down indicator light was not illuminated, and as he had no electrical power to operate the radios he was unable to ask air traffic control (ATC) for a visual inspection. The pilot decelerated the aircraft to below 100 mph and selected the landing gear electrical selector switch to the centre position, in accordance with the emergency gear lowering instructions. He then attempted to lower the gear using the emergency system. He operated the locking release system but when he tried to move the emergency extension lever he found that it would not move and that it already appeared to be in a fully forward position. The pilot interpreted this to indicate that the landing gear was fully down.

The pilot flew the aircraft low and slow along the runway, in the hope that ATC would realise that he had a problem and perhaps give him a steady green light, indicating that he was clear to land. He received no acknowledgement from the tower and continued with a low level circuit. He considered that the landing gear was fully down, but as a precaution he briefed his passenger on what might happen if the landing gear was to collapse on landing.

The aircraft touchdown was normal, but shortly afterwards the landing gear collapsed and the aircraft travelled on its lower fuselage for about 100 metres before it slid off the left edge of the runway, destroying a runway edge light. The aircraft came to rest on soft ground a few metres south of the runway. The pilot instructed his passenger to leave the aircraft through the normal door, whilst he switched off the fuel and the master switch, before vacating the aircraft normally. The pilot and his passenger were uninjured.

Eyewitnesses confirmed that the aircraft landing gear appeared to be down prior to the accident.

Emergency landing gear lowering

The emergency lowering of the landing gear requires the pilot to carry out three actions: to move the landing gear electrical selector switch to the centre position; to position the electrical release arm fully forward; and to operate the emergency extension handle.

The electrical selector is moved to a neutral position so that the motor does not oppose the motion of the gear mechanism when the gear is manually lowered.

The electrical release arm disconnects the electric motor from the gear operating mechanism. If this does not occur then it is not possible to lower the gear manually.

The emergency extension lever is permanently connected to the landing gear operating mechanism and moves backwards and forwards as the gear is raised and lowered. It can therefore be used as a broad indicator as to the position of the gear. The lever has a telescopic handle which is extended in order to lower the gear manually. However, the pilot will not be able to move this lever until the electrical motor has been disengaged by the operation of the electrical release arm.

Aircraft examination

A maintenance engineer, who examined the aircraft immediately after the accident, found that the aircraft's alternator circuit breaker had tripped. This circuit breaker is positioned such that it would be difficult for the pilot to see it in flight. With the alternator circuit breaker tripped the aircraft electrical systems are powered by the battery. The maintenance engineer checked the aircraft battery voltage and considered that the battery was effectively flat.

An AAIB engineering inspector later examined the aircraft and found that the rear mounting of the bracket, in which the gear lowering jack is positioned, had been pulled out of the structure. This failure could only have occurred if the electrical motor release arm had still been engaged when the aircraft touched down with the gear in an unlocked condition. The electrical motor release arm operated satisfactorily. It was noted that the release arm had to be moved fully forward in order to disconnect the electric motor from the gear operating mechanism.

Analysis

It appears that the aircraft suffered an electrical problem which caused the alternator circuit breaker to trip and the aircraft's electrical loads were then supplied by the battery. When the pilot completed the landing checks there was only sufficient electrical power remaining in the battery to partially lower the gear, and with no electrical power the gear indication lights were inoperative. Damage to the aircraft indicates that the electrical motor was still attached to the gear operating mechanism when the landing gear collapsed. It seems likely that whilst conducting the procedure for the emergency lowering of the landing gear the electrical motor release arm had not been moved far enough forward to allow the motor to be fully disengaged from the gear operating mechanism. Consequently, the pilot would have been unable to move the emergency extension lever fully forward. The landing gear was therefore not down and locked and it collapsed during the landing roll.