

ACCIDENT

Aircraft Type and Registration:	Piper PA-30 Twin Comanche, G-ATEW	
No & Type of Engines:	2 Lycoming IO-320-B1A piston engines	
Year of Manufacture:	1965	
Date & Time (UTC):	30 May 2009 at 1340 hrs	
Location:	Sturgate Airfield, Lincolnshire	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - 1
Injuries:	Crew - None	Passengers - None
Nature of Damage:	Damage to both propellers and damage to fuselage and wing underside (beyond economic repair)	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	66 years	
Commander's Flying Experience:	711 hours (of which 475 were on type) Last 90 days - 0.6 hours Last 28 days - 0 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot and further enquiries by the AAIB	

Synopsis

During the ground roll following a firm landing, all three landing gear legs retracted. The aircraft slid along the runway on its belly before coming to rest. There was insufficient information available to determine what had caused the gear to retract.

History of the flight

The aircraft had departed from Newcastle Airport for a flight to Sturgate airfield. The weather at Sturgate was CAVOK with a south-easterly wind of 8 to 10 kt. The pilot manoeuvred the aircraft to join overhead the airfield at 2,000 feet and then descended to join a downwind leg for Runway 09. He decided to carry out

a flaps-up approach to the paved runway which had an unlicensed length of 820 metres. During final approach he made a "Finals gear down" radio call and checked that the single green (gear down and locked) light was illuminated. He did not visually check the gear position using the mirror on the left engine cowling. His passenger, who was also a pilot, also noted seeing the green light. The pilot reported that the aircraft arrived over the runway threshold at 100 KIAS and then he reduced the power and flared slightly. He stated that the aircraft made a harder landing than normal but not "over-hard" and then rolled normally along the runway. After a ground roll of about 300 feet the pilot looked

to his right and then moved his hand to turn off the fuel pumps. At about the same time he became aware of a sinking feeling which continued until the aircraft was sliding along the runway on its belly. When the aircraft came to rest, his passenger opened the main door and exited the aircraft. The pilot turned off the fuel selectors and the electrical switches before exiting as well. Shortly thereafter the airfield's fire service arrived at the scene but there was no fire.

Landing gear system description

The landing gear retraction and extension system of the Piper PA-30 consists of an electric motor and transmission assembly, torque tube assembly, push-pull cables to each main gear leg and a push-pull tube to the nose gear leg. Limit switches are installed which shut off the motor when the gear is either fully extended or fully retracted. The limit switches also operate the gear indicator lights in the cabin. The gear is held in the down position by an over-centre geometric locking mechanism. To prevent the gear from being inadvertently retracted on the ground there is an anti-retraction safety switch located on the left main gear leg which will prevent the gear from retracting until sufficient weight is lifted from the gear to enable the strut to extend to within 0.75 inches of full extension. A gear warning horn sounds if the engine manifold pressure is reduced below 10 to 12 inches while the landing gear is not selected down.

Examination of the aircraft

The aircraft was examined by the chief engineer from the maintenance organisation based at the airfield. When he entered the cabin of the aircraft he found that the gear selector was in the DOWN position and the electrical master switch was off. He reported that after he turned the master switch on he could hear the 'whirring' noise of the landing gear electric motor, but

with no movement of the gear it was clear to him that the motor's drive had sheared. The aircraft was raised and supported with the combination of a crane and jacks. When the aircraft was lifted, the nose gear and right main gear dropped down, but the left main gear only came down to a 45° angle. He pulled the nose gear leg forward which appeared to cause the right main gear leg to lock down, but the left main gear leg did not move. When he tried to pull the left main gear leg down he noticed that there was a bend in the push-pull cable. After cutting this cable the left gear dropped down to the extended position. The engineer assessed that there was no internal wing damage which he would have expected to see if the aircraft had suffered a heavy landing.

The aircraft was later determined to be beyond economic repair so no further examination of the aircraft was carried out and the anti-retraction safety switch was not checked.

The position of the fuel pump switches in relation to the position of the gear switch is shown in Figure 1.

Pilot's assessment of the cause

The pilot considered that either the landing gear had collapsed or retracted. He thought that a retraction might have been caused by the landing gear switch not latching down or perhaps his arm catching it when he moved his hand to turn off the fuel pumps. Since it was a flaps-up landing he did not believe he had made the mistake of reaching for the gear lever instead of the flap lever.

Analysis

According to the pilot the aircraft made a harder than normal landing and then had a ground roll of about 300 feet. If the gear had not been locked down prior to

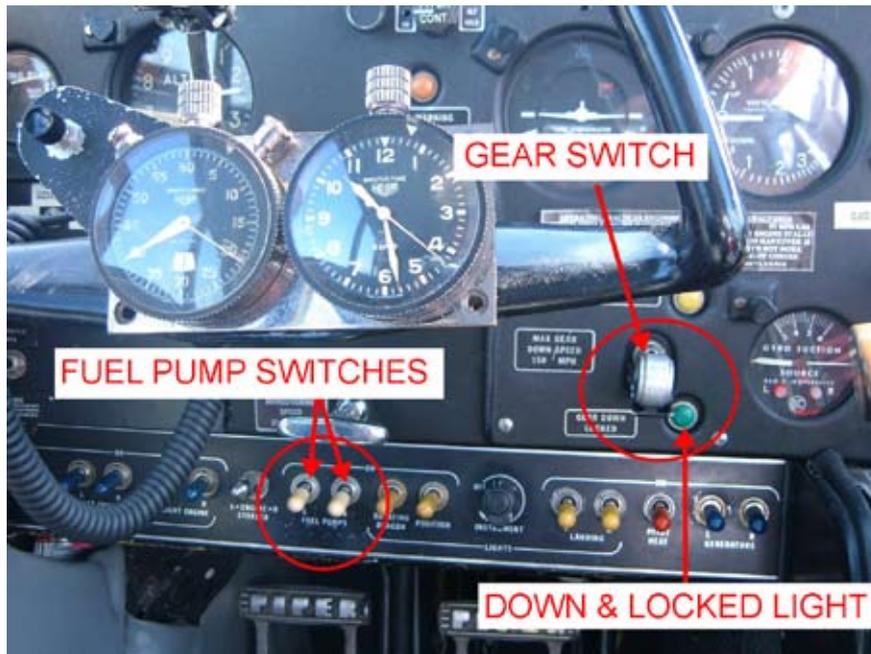


Figure 1

Location of gear switch and fuel pump switches on G-ATEW

landing, the gear would have collapsed at touchdown. The 300-foot ground roll indicates that the gear was down and locked during the initial part of the landing which is also consistent with the pilot's and passenger's reports of seeing the green 'down and locked' light during final approach. After the ground roll all three landing gear legs either collapsed or retracted. Apart from the bent push-pull cable to the left main gear leg, there was no damage that would explain all three gear legs collapsing simultaneously. If only one gear leg had collapsed then a heavy landing or a misrigging would be suspected. However, since the aircraft sank on all three gear legs simultaneously a gear retraction was the most probable cause. The bent push-pull cable to the left main gear leg could have been the result of the motor trying to re-extend the landing gear leg while the weight of the aircraft was trying to retract it. This would also explain why the drive from the motor had sheared.

It is possible that the gear switch was inadvertently and briefly selected up when the pilot decided to turn the fuel pump switches off. However, the action to turn the fuel pump switches off would have been to move the switches down, whereas the action to raise the gear would have been to move the gear switch up. Furthermore, the anti-retraction switch should have prevented a commanded gear retraction when there was weight on the left main gear leg. The aircraft had landed with its flaps up and following a 300-foot ground roll there would probably have been sufficient weight on the gear leg to trip the switch. However, since the anti-retraction switch was not tested, a fault with the switch or its rigging could not be ruled out.

In summary, the landing gear probably retracted during the ground roll but there was insufficient information available to determine why this had happened.