

Cessna 210 Centurion, EI-CGH

AAIB Bulletin No:	1/2003Ref: EW/G2002/08/11	Category: 1.3
Aircraft Type and Registration:	Cessna 210 Centurion, EI-CGH	
No & Type of Engines:	1 Continental IO-520-L piston engine	
Year of Manufacture:	1979	
Date & Time (UTC):	13 August 2002 at 1140 hrs	
Location:	Belfast, Aldergrove	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Superficial to the aircrafts underside and propeller	
Commander's Licence:	Private Pilots Licence	
Commander's Age:	69 years	
Commander's Flying Experience:	2,200 hours (of which 650 were on type) Last 90 days - 11 hours Last 28 days - 11 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot and telephone enquiries to the repair organisation	

History of the flight

The aircraft had been taken to Belfast for an avionics check to be carried out by a maintenance organisation based there. When these checks had been completed, the owner boarded the aircraft with the intention of returning to the airfield where his normal maintenance organisation was located. After refuelling, the aircraft took off without any abnormalities. After takeoff, however, the

pilot observed that he had an electrical problem and that the autopilot was not working. He requested a return to Aldergrove to go back to the maintenance organisation he had been visiting.

On approach to land, the pilot selected 10° flap and landing gear DOWN and believed that he saw the green landing gear indicator light. Late during the approach, the pilot also glanced out of the left side window and saw the main landing gear wheel on that side. He closed the throttle and touched down, as he thought, very softly, but almost immediately the aircraft's belly contacted the runway and it slid to a stop within about 50 yards; there had been no sound from the landing gear warning horn when he had closed the throttle. The aircraft remained upright after sliding to a halt and the pilot was able to get out unassisted and uninjured.

Initial Examination

Examination by the Belfast maintenance organisation, at the time that the aircraft was recovered from the runway, showed that although the landing gear had not been locked down, it had been hanging in the airstream at touchdown and the selector was in the DOWN position.

Description of landing gear systems operation

The landing gear is raised and lowered by hydraulic actuators, one for each leg, hydraulic pressure being generated by an electrically powered and controlled pump assembly with an integral reservoir. The pump motor is activated by a pressure switch in the pump delivery line; this switch should close, to start the pump, when the pressure in this line falls to about 1,000 psi and open, to stop the pump, when the pressure rises above 1,500 psi.

The electrical power to the system is supplied through two circuit breakers, one for the indication and control circuits (5 Amp) and the other for the pump motor (30 Amp). Whenever the Battery Master Switch is ON and these two circuit breakers are made, the pump unit operates automatically, controlled by the pressure switch and the landing gear position selector; if either circuit breaker is open the pump unit will not operate.

The landing gear position selector, in the cockpit, is an hydraulic changeover valve and selecting landing gear UP or DOWN connects the pressure delivery line from the pump unit to the appropriate side of each of the three landing gear actuators and the two main landing gear downlock actuators; the noseleg downlock is incorporated into its retraction actuator. The gear is held in the retracted position by residual hydraulic pressure when the gear is selected UP. Whichever position the gear is selected to, the pump will start to drive the gear towards that position whenever the hydraulic pressure drops below 1,000 psi.

The landing gear indication system on aircraft of this build standard consists of a single green light to indicate that all landing gears are locked down and an amber light to indicate all gears fully up. These lights illuminate when the appropriate microswitches on all three legs are made. When the gear is in transit or at least one leg is not at a limit position, there is no indication light. There is also a warning horn which should sound if the landing gear is not fully locked down and the throttle is retarded beyond a pre-determined low-power position.

Further examination and testing

Further examination of the aircraft, after it had been recovered to a hangar, showed that the circuit breaker for the hydraulic pump motor had tripped, thereby disabling the means by which the

landing gear could be powered into the locked down position. The indication system circuit breaker, however, was still made and the system was operating.

Tests on the operation of the landing gear on this aircraft showed that the pressure switch would activate the pump unit when the system pressure fell to 1,200 psi. The switch was also found to be malfunctioning in that it did not break the electrical supply to the gear pump motor on every occasion when the pressure reached 1500 psi. As a result, when the pressure switch did not open, the motor continued to run until the pressure rose to 1,800 psi and the pressure relief valve opened and maintained that pressure. The high continuous current demand of the motor, sustaining this pressure, caused the breaker to trip about 18 seconds after the gear had reached its limit position. This behaviour was repeated on several occasions.

The throttle position at which the landing gear warning horn sounded was checked. It was found that, although the horn would sound, the throttle had to be retarded almost to the idle stop before this occurred. The layout of the throttle microswitch system was such, however, that the propeller strike on the runway, which occurred during the landing at Belfast, may have altered its apparent setting considerably.

The correct position of the horn microswitch on the throttle quadrant has to be ascertained in flight.

The reason for the non-functioning of the autopilot has not yet been determined.

Discussion

The pilot stated that he believed that he had selected the landing gear DOWN and the position of the selector and landing gear itself, as found after landing, supported this belief.

On the approach to land at Belfast, because the selector was an hydraulic changeover valve, when the landing gear was selected to DOWN it would have released the gear from the up position, where it had been held by locked-in hydraulic pressure. Because the hydraulic unit pump motor circuit breaker had tripped and, as a result, the hydraulic system could not be pressurised, the main landing gear legs would have trailed at a position of equilibrium in the airstream. It is almost certain that, in this trailing position, the main wheels would have been far enough forward for the left one to be visible from the pilots position. It is considered unlikely that the nose landing gear would have locked without the actuator being pressurised into the down position.

With the landing gear in a partially extended position, the indicating system would, by design, have shown no lights to indicate an unsafe condition.