

Aircraft type and registration: Cessna 310D G—ARCI

No & Type of engines: 2 Continental 10-470-D piston engines

Year of Manufacture: 1960

Date and time (UTC): 22 August 1986 at 1855 hrs

Location: Sandtoft airfield, Nr Doncaster, Yorks

Type of flight: C of A Test Flight

Persons on board: Crew — 2 Passengers — None

Injuries: Crew — None Passengers — N/A

Nature of damage: Damage to left propeller and underside of aircraft

Commander's Licence: Private Pilot's Licence

Commander's Age: 33 years

Commander's Total Flying Experience: 267 hours (of which 7½ were on type)

Information Source: Aircraft Accident Report Form submitted by the pilot and AIB examination of the aircraft

The aircraft was in the process of being returned to service after a period of some 17 months, having flown for a total of only 4 hours 14 minutes since May 1983. It was being test flown for the purpose of regaining a Certificate of Airworthiness. Prior to this flight the electrically actuated landing gear, including the mechanical manual lowering system, had been functioned satisfactorily with the aircraft on jacks in the hangar. After several high speed taxi runs the pilot briefed his observer/assistant and the aircraft took off. The pilot reports that after selecting the landing gear up, no red 'landing gear up' light indication was seen and that when the system was re-cycled none of the three green landing gear down lights appeared. He reported that he could not hear or feel the system operating at this time. As all the landing gear electrics appeared to have failed, including the low power landing gear up warning horn, the relevant circuit breakers were checked but were found not to have popped.

Whilst concentrating on flying the aircraft, the pilot asked his observer to operate the manual landing gear lowering system whilst he selected the neutral position on the selector lever. After winding the handle the full 60 turns the observer reported that he could feel no resistance to his action and, as there were still no green lights showing, the pilot decided to carry out several low passes by the airfield's control tower. It was reported to him that only the nose gear appeared to have released, but that it had not deployed.

After turning the master switch off for a period, in case the circuit breakers needed to cool off, and following continued unsuccessful operation of the manual system, a wheels up landing was made on the grass to the side of the runway. The pilot managed to stop and feather the right propeller before touchdown and both occupants subsequently made their escape

without injury. There was no fire. Damage to the aircraft was to the left propeller and underside of the fuselage and engine cowlings. Also, the left nose landing gear door had been torn off.

Subsequent examination of the aircraft showed that, on repeated occasions, normal and manual operation of the landing gear system was satisfactory. The manual lowering system consists of a hand crank, which is connected to the landing gear actuator gearbox by a system of chain, sprockets, bevel gears and push/pull rods. The hand crank, positioned to the lower right side of the pilot's seat, is provided with a spring loaded release button which unlocks the crank so that it can be folded into the stowed position. When it is folded it disengages the manual lowering system; when unfolded it disengages the normal lowering system. During the examination no position of this crank was found where it was possible to rotate it whilst it was disengaged from the system without the operators hand fouling the surrounding aircraft structure. It was noted, however, that the chain drive between this manual lowering handle in the cockpit and the main gearbox was slack and that occasionally the chain would jump teeth on the drive sprocket. This, however, would be apparent to the operator.

During the examination of the landing gear system abnormal operation was experienced with the landing gear indication lights. Initially, with the landing gear down and locked, no green light was showing for the right landing gear, although the press to test function operated normally. Later, all green and red landing gear lights failed to illuminate. Examination of the wiring in this system showed one position where a wire had become disconnected from the back of the right landing gear indicator at a soldered connection, but held in place by the insulation sleeve. There were also two positions where wires were loosely held into connectors. One of these wires was associated with the common earth system to the indication lights.

It was apparent that at some time this indication system had been modified from the single green light arrangement, as detailed in the maintenance manual for the aircraft, to the three light system. Evidence was found of solder spatter on the floor of the cockpit directly beneath this area of the instrument panel.