No:12/88 **Ref: EW/G88/07/13** **Category: 1b**

Aircraft Type and Registration:	Cessna 310G, G-XITD
No & Type of Engines:	2 Continental Motors Corp IO-470-D piston engines
Year of Manufacture:	1962
Date and Time	14 July 1988 at 1630 hrs
Location:	Leavesden Airport, near Watford, Herts
Type of Flight:	Flight test for Certificate of Airworthiness
Persons on Board:	Crew - 2 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	Extensive scraping damage to underside. Mechanical failure in port landing gear
Commander's Licence	Private Pilot's Licence with Instrument and Full Instructor's Ratings (plus concurrent IMC and night ratings)
Commander's Age:	34 years
Commander's Total Flying Experience:	5000 hours (of which 45 were on type)
Information Source:	Aircraft Accident Report Form submitted by the pilot and examination of aircraft by AAIB

The accident flight was the aircraft's second flight following major rework. On the first flight, when the "LANDING GEAR DOWN" selection was made, the landing gear, having previously retracted normally, failed to operate. The emergency hand cranking procedure was employed and the "DOWN AND LOCKED" condition was successfully achieved with the single green indicator light illuminated. A normal landing was carried out.

Two days later the maintenance organisation reported that the undercarriage problem had been rectified and the aircraft was prepared for a full Certificate of Airworthiness airtest. During the flight the landing gear was successfully cycled twice using the normal procedure. The airtest was discontinued because of poor weather and on approach to land the gear appeared to lock down successfully when

the single green light illuminated. At touchdown the pilot immediately felt vibration from the left side and found extreme difficulty in keeping the aircraft straight. He managed to apply power and take off, establishing the aircraft in a climb to circuit height.

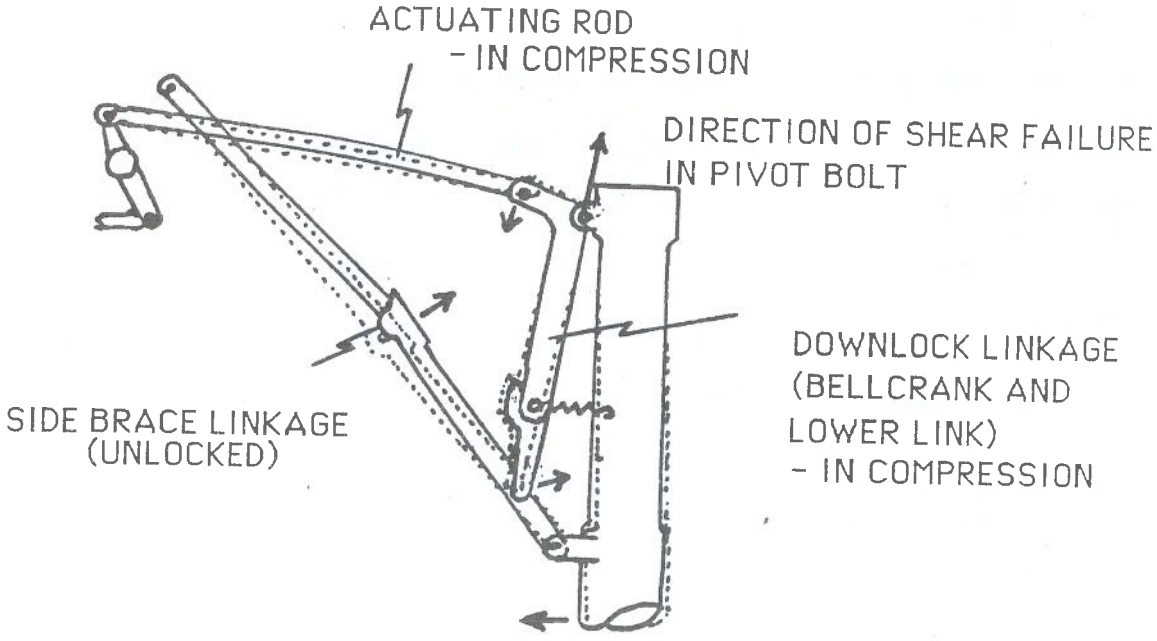
When the landing gear was then selected "UP" a correct indication (single red light) was not achieved and similarly the correct "DOWN AND LOCKED" indication could not be achieved by either normal or emergency procedures. From tower reports it appeared that when the gear was selected "DOWN" the port leg was approximately in the normal down position but when the gear was selection "UP" the leg was dangling at about 45°. A successful emergency landing was made with the undercarriage selected "UP".

AAIB carried out a visual inspection of the landing gear. The downlock bellcrank (See Fig) had become detached at its pivot point on the mainleg and at its connection to the lower link of the over-centring downlock assembly.

The bolt at the bellcrank pivot had been sheared at two locations by transverse loads between the bellcrank and its attachment lugs on the mainleg. One of these failures was in pure shear and the other in combined shear and bending with some secondary surface damage on the fracture face. Neither fracture showed any sign of there having been a pre-existing defect. This evidence is typical of overload failure in shear, the bolt failing at the first location in pure shear and then at the second location, once the bolt has been partially liberated, in combined bending and shear. The bolt from the lower end of the bellcrank was not recovered but damage in the bellcrank hole showed that the bolt had been present when subjected to violent twisting and off-centre loads. Again, there was secondary damage to the lugs on the lower link but no evidence of any pre-existing metallurgical defect was found. Given the amount of distortion associated with the lower link failures it would appear that this area of failure was secondary to the pivot failures.

The actuating rod attached to the top end of the bellcrank had bent in a fashion typical of compressive collapse. The actuating rod damage and pivot bolt failures were consistent with the system having sustained landing loads without the main side brace being over-centred and locked while the downlock itself was in a locked condition.

CESSNA 310G, G-XITD
PORT LANDING GEAR COLLAPSE



KEY:-

→ DIRECTION OF MOVEMENT DURING COLLAPSE