

# Cessna 310R, G-BGTT

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|---------------------------------|------------------------------------------------------|-------------------|
| AAIB Bulletin No: 12/2001       | Ref: EW/G2001/06/07                                  | Category: 1.2     |
| Aircraft Type and Registration: | Cessna 310R, G-BGTT                                  |                   |
| No & Type of Engines:           | 2 Continental IO-520-MB piston engines               |                   |
| Year of Manufacture:            | 1979                                                 |                   |
| Date & Time (UTC):              | 6 June 2001 at 0551 hrs                              |                   |
| Location:                       | Bournemouth International Airport, Dorset            |                   |
| Type of Flight:                 | Public Transport (Cargo)                             |                   |
| Persons on Board:               | Crew - 1                                             | Passengers - None |
| Injuries:                       | Crew - None                                          | Passengers - N/A  |
| Nature of Damage:               | Starboard wingtip, propeller and landing gear        |                   |
| Commander's Licence:            | Airline Transport Pilot's Licence                    |                   |
| Commander's Age:                | 37 years                                             |                   |
| Commander's Flying Experience:  | 2,727 hours (all on type)                            |                   |
|                                 | Last 90 days - 110 hours                             |                   |
|                                 | Last 28 days - 40 hours                              |                   |
| Information Source:             | Aircraft Accident Report Form submitted by the pilot |                   |
|                                 | and further investigation by the AAIB                |                   |

## History of flight

Whilst taxiing from the A3 hold at Bournemouth International Airport (BIA) and backtracking the runway for take off for a routine cargo flight to Guernsey, the pilot felt what he described as a tyre deflation. He radioed the tower, who sent someone to investigate the problem. After what the pilot described as a thorough look, the observer confirmed that all appeared to be normal. The pilot therefore assumed that the sensation he had felt must have been caused by the aircraft running over a runway centreline marker. He carried out a 240° turn to line up on Runway 08 and then took off without noticing anything unusual.

Once a positive rate of climb was established, the pilot selected the landing gear up. It was at this point that the first indication of a problem occurred, when the red "in transit" light would not go out to confirm that the landing gear was up and locked. The pilot then selected the landing gear down, but obtained green lights for only the nose and port main landing gears. The pilot cycled the landing gear up and down several times in an attempt to get the starboard main landing gear to lock down but this proved unsuccessful.

The pilot rejoined the BIA holding pattern to prepare for an emergency landing. He remained airborne for approximately 1 hour, during which time he carried out 2 flypasts of the control tower for a visual inspection. The tower reported that the starboard main wheel was at 90° to the fore/aft direction and that the starboard main landing gear was not locked down.

The pilot elected to carry out an emergency landing on Runway 26 as this was the longest available runway and the approach would place the sun behind him. The approach was made with the landing gear selected down and the flaps and lights selected up to minimise the damage and reduce any adverse effects these might have had on the landing roll/slide. Once over the threshold, with no chance of undershooting, the pilot shut down the starboard engine. The port engine was shut down immediately after touchdown. After touchdown, the starboard wing dropped and hit the runway as the starboard main landing gear collapsed. The pilot initially kept the aircraft straight using the left brake and then decided to swerve onto the grass, where the aircraft came to a stop. The pilot evacuated the aircraft unharmed.

## **Engineering Investigation**

When the aircraft was inspected, it was evident that the starboard landing gear upper and lower torque links had become disconnected at the centre hinge point, which had allowed the main wheel to rotate laterally. When the landing gear was retracted, the misaligned wheel came into contact with the structure in the landing gear bay, introducing excessive loads into the landing gear retraction mechanism. This caused the landing gear actuating bellcrank to fracture. Failure of the bellcrank prevented the landing gear from being raised or lowered and there would have been no means of locking it in the down position. During the emergency landing the starboard main landing gear collapsed, causing damage to the landing gear inner door. Tyre marks were found on the outside of the door which were consistent with the door having stopped whatever motion the tyre may have had.

The bolt part number AN175-20 which connects the upper and lower torque links had pulled through the upper torque link and was found still attached to the lower torque link. The bolt was undamaged and the nut and split pin were still in place. The part number 5041013-2 bushing had also pulled out of the upper torque link and was found on the bolt. A washer was found under the nut, but the washer under the head of the bolt was missing. It was apparent that the absence of the washer had allowed the head of the bolt to pull through the hole in the upper torque link, pressing out the bushing in the torque link in the process and allowing the torque links to separate.

Inspection of the washer found under the nut revealed an indentation corresponding to the diameter of the land under the head of the bolt. This suggested that the washer had been installed under the head of the bolt at some time. From the aircraft's maintenance records it was established that the starboard main landing gear torque links had been disconnected on 21 February 2000 for replacement of worn components. The washer may have been inadvertently transferred from under the head of the bolt to under the nut at this time, leaving no washer under the head of the bolt. A visual inspection of the torque links was completed on 22 May 2001 during the aircraft's Annual

Inspection, which was seven flying hours prior to the accident. No defects were found during this inspection.

It was established that the washer found under the nut was the incorrect size. The outside diameter of the washer was 9/16" (0.5625"), whereas the correct part number 5045018-1 washer has an outside diameter of 0.75". (Item 66 in Section 04-00 [Figure 2](#) of the Cessna 310R Illustrated Parts Catalogue refers). According to the Illustrated Parts Catalogue (IPC), a part number 5045018-1 washer should be installed under the head of the bolt and under the nut. Although the washer found under the nut was incorrect, had it been installed under the head of the bolt it would have most likely prevented the bolt and bushing from pulling through the torque link, due to the diameter of the washer being slightly larger than the nominal diameter of the hole in the torque link (0.5622" - 0.0000/+0.0010"). Had the washer pulled through the torque link, there would have been tell-tale scoring of the hole in the torque link, but this was not seen, providing further confirmation that there had been no washer under the head of the bolt.

Examination of the port landing gear revealed that this had been assembled incorrectly using 9/16" O.D. washers under the head of the bolt and under the nut instead of 0.75" washers. Although incorrect, this had provided protection from the bolt pulling out of the upper torque link.

A replacement starboard landing gear was obtained from an approved supplier in the United States to replace the damaged landing gear on G-BGTT. It was discovered that incorrect 9/16" O.D. washers had also been installed under the head of the bolt and under the nut on the torque link centre hinge bolt. The washers were replaced with the correct part number 5045018-1 washers prior to installing the landing gear on the aircraft.

The Cessna 310/310R IPC clearly lists the correct part numbers of the washers to be used in the table of part numbers. However the diagrams of the torque link centre hinge joint in the IPC and the Maintenance Manual do not clearly show where the washers are to be installed and neither is it explained in the written instructions in the Maintenance Manual, providing scope for misinterpretation. Had the diagrams and written instructions been clearer it may have prevented the incorrect assembly of the torque links on G-BGTT and its replacement landing gear.

## **Safety Recommendations**

In the light of the fact that there have been two unrelated cases of incorrect assembly of the torque links on Cessna 310 main landing gear, the following Safety Recommendations are made:-

### **Safety Recommendation 2001-71**

The aircraft manufacturer should as soon as possible issue an All Operators Letter, or similar, to all Cessna 310 operators to inspect the main landing gear torque link assemblies on their aircraft to ensure that they have been assembled with the correct washers.

### **Safety Recommendation 2001-72**

The aircraft manufacturer should amend the Cessna 310 IPC and Maintenance Manual to clearly identify the locations of the part number 5045018-1 washers to reduce the possibility of incorrect assembly of the torque links.



**Figure 1:**  
Incorrect 9/16" Washer



**Figure 2:**  
Correct P/N 5045018-1 0.75" washer