**ACCIDENT**

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| **Aircraft Type and Registration:** | Cessna Citation 560XL, SE-RHJ |
| **No & Type of Engines:** | 2 Pratt & Whitney PW545A turbofan engines |
| **Year of Manufacture:** | 2000 |
| **Date & Time (UTC):** | 29 November 2015 at 1350 hrs |
| **Location:** | On descent into Farnborough Airport, Hampshire |
| **Type of Flight:** | Commercial Air Transport (Passenger) |
| **Persons on Board:** | Crew - 2 Passengers - 9 |
| **Injuries:** | Crew - None Passengers - None |
| **Nature of Damage:** | Right engine upper cowling detached in flight, impact damage to horizontal and vertical stabilisers |
| **Commander's Licence:** | Airline Transport Pilot's Licence |
| **Commander's Age:** | 41 years |
| **Commander's Flying Experience:** | 3,700 hours (of which 2,200 were on type)<br>Last 90 days - 4 hours<br>Last 28 days - 4 hours |
| **Information Source:** | AAIB Field Investigation |

## Synopsis

During the descent into Farnborough Airport the majority of the right engine upper cowling detached, damaging the leading edges of the vertical and horizontal stabilisers. The investigation concluded that the cowling probably detached because a number of the fasteners had not been secured during maintenance.

## History of the flight

The aircraft had departed Göteborg City Airport, Sweden, bound for Farnborough, Hampshire. During the descent, at approximately FL200, there was a sudden bang and the aircraft started to vibrate. The crew reduced speed and disengaged the autopilot; the engine parameters were normal and the aircraft remained in trim. They were concerned that something at the rear of the aircraft was damaged but nothing untoward could be seen through the cabin windows. They configured the aircraft for landing and decided not to use thrust reverse. The landing was uneventful.

## Investigation

The aircraft was recovered to a local maintenance organisation where the majority of the right engine upper cowling was observed to be missing, Figure 1. Damage on the leading edges of the vertical and horizontal stabilisers was consistent with them being struck by debris.


**Figure 1**

Right engine cowlings following recovery of the aircraft to the hangar

The upper cowling is attached to the engine by 19 quick release fasteners; 10 on the leading edge and 9 on the trailing edge. The fasteners are locked by turning them clockwise approximately ¼ turn, moving a cross pin up a cam until a mechanical stop where the cross pin drops into a locking detent. A spring within the fastener assembly governs the preload and prevents the fastener coming loose due to vibration.

The remnants of the upper cowling that remained with the aircraft had been pulled from the fasteners, which, with the exception of four, remained securely locked, Figure 2. Three fasteners were missing from the inboard leading edge and one was missing from the inboard trailing edge. The empty locking receptacles were confirmed to be serviceable using a representative fastener and the surrounding structure showed no evidence of damage.

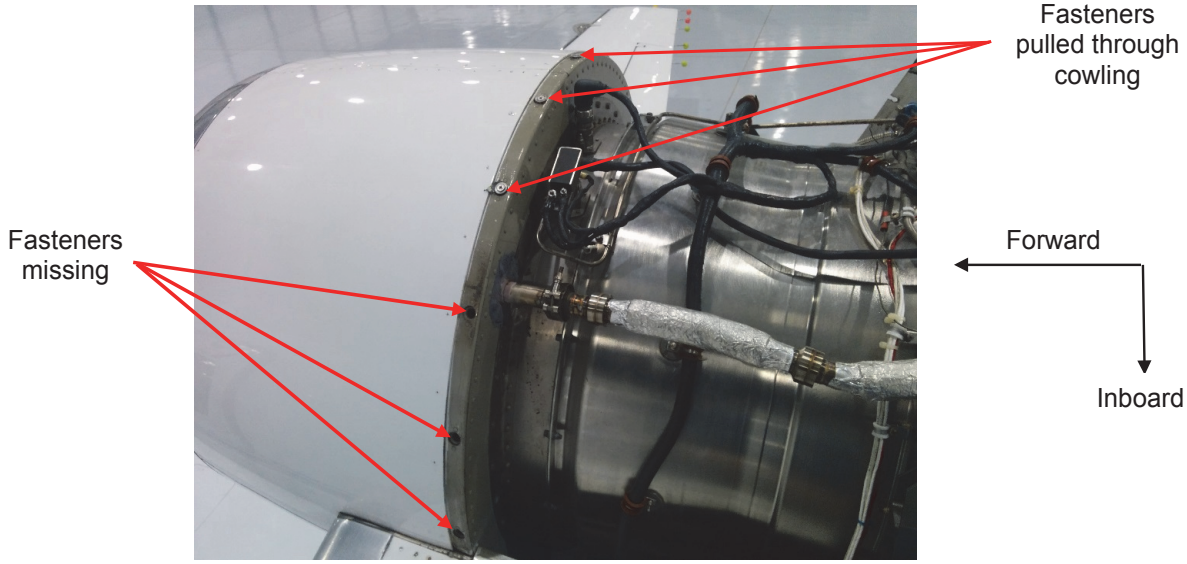


**Figure 2**

Upper cowling inboard leading edge attachment fasteners

## Aircraft history

The aircraft had been leased to the operator six days prior to the occurrence and was on its fourth flight following maintenance. The total flight time since maintenance was approximately five hours.

An investigation carried out by the maintenance organisation established that the engine cowlings had been removed and refitted several times to allow engine troubleshooting. Records showed that the fasteners had been removed from the cowlings as part of a periodic inspection for retention hole wear. No anomalies were identified and the original fasteners were refitted when the check was complete.

Two mechanics installed the cowlings approximately two weeks prior to the occurrence. The cowlings were installed without difficulty and one of the mechanics signed the post maintenance inspection records to confirm '*Engine cowlings closed and attachments tightened*'. The cowlings were not disturbed after the aircraft left the maintenance organisation.

## Previous occurrences

In April 2008, Cessna Citation 560XL SE-RCL was flying from Bromma to Geneva when the left engine cowlings detached as the aircraft was on final approach. Investigation identified that the cowlings had not been fastened securely and the maintenance organisation introduced a number of changes to prevent recurrence.

In June 2008, Cessna Citation 560XL G-OROO[1] was on a post-maintenance flight when the crew heard a rumble and felt a 'thud' in the rear of the aircraft. Inspection after landing revealed approximately 75% of the left engine upper cowling had detached in flight, damaging the leading edge of the vertical stabiliser and left elevator. The AAIB concluded that a number of fasteners on the inboard leading edge of the cowling had not been secured and investigation at the maintenance organisation established that the mechanic installing the cowlings had been interrupted and had not completed the task. The maintenance organisation introduced a number of changes to prevent recurrence including enhanced inspections.

The aircraft manufacturer reviewed their service records and advised that the only known occurrences of cowling loss on Cessna Citation 560XL series aircraft were the occurrences highlighted within this report. Furthermore, they analysed data for aircraft in service and confirmed that there was no evidence of any emergent trends relating to the upper cowlings.

## Conclusion

It is unlikely that the fasteners were the wrong size or had failed in flight and investigation concluded that the cowling probably detached because a number of fasteners had not been securely fastened during maintenance.

**Footnote**

[1] https://assets.digital.cabinet-office.gov.uk/media/5422f9fce5274a13170007c7/Cessna_560XL_Citation_XLS__G-OROO_03-09.pdf

**Safety action**

The maintenance organisation has changed their inspection procedures to ensure that, following installation, the security of engine cowlings is checked by an independent mechanic.

The manufacturer highlighted the three events to their Continued Operational Safety group to assess possible options to minimise occurrences in the future. This includes a proposed video for maintenance agencies to emphasise the importance of ensuring that the quick release fasteners are secure.