

**SERIOUS INCIDENT**

<b>Aircraft Type and Registration:</b>	Agusta A109E, G-ETPJ	
<b>No &amp; Type of Engines:</b>	2 Pratt & Whitney Canada PW206C turboshaft engines	
<b>Year of Manufacture:</b>	2004 (Serial no: 11173)	
<b>Date &amp; Time (UTC):</b>	2 July 2020 at 1510 hrs	
<b>Location:</b>	Boscombe Down Airfield, Wiltshire	
<b>Type of Flight:</b>	N/A	
<b>Persons on Board:</b>	Crew - None	Passengers - None
<b>Injuries:</b>	Crew - N/A	Passengers - N/A
<b>Nature of Damage:</b>	Localised overheating and burning	
<b>Commander's Licence:</b>	N/A	
<b>Commander's Age:</b>	N/A	
<b>Commander's Flying Experience:</b>	N/A	
<b>Information Source:</b>	Aircraft Accident Report Form and further enquiries by the AAIB	

**Synopsis**

The helicopter landed after a routine flight during which a circuit breaker (CB) tripped. While an engineer was investigating the cause, the next flight crew noted a burning smell in the rear baggage bay during their walk-around checks. The operator's investigation found evidence of a fire in the aft equipment bay<sup>1</sup>, and a chaffed electrical cable. The cable was part of a design change that was made whilst the helicopter was on the UK military register operated as Military Registered Civil Owned Aircraft (MRCOA) subject to oversight by the UK CAA. A protective strip should have been installed as part of the design change, but this was missing when the helicopter was examined after the incident. The strip would have prevented the cable from chaffing against the adjacent structure.

**History of the flight**

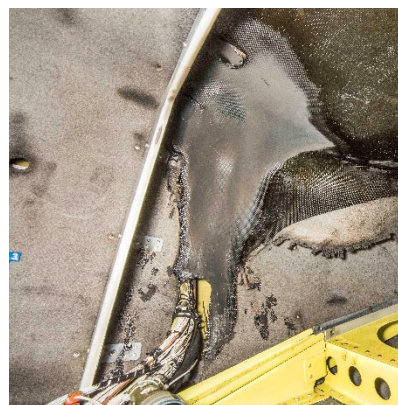
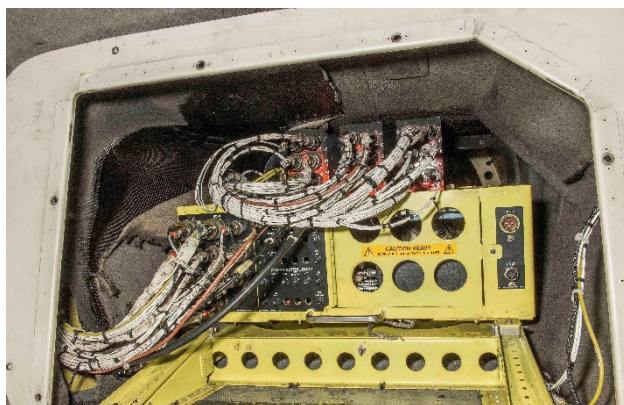
The helicopter was on a routine flight when the main Flight Test Instrumentation (FTI) circuit breaker (CB) tripped. The crew did not reset the CB and the flight continued as normal with the helicopter landing after approximately 20 minutes.

A ground engineer attended the helicopter and with the batteries on, reset the CB, which tripped again almost immediately. Whilst the engineer investigated the fault, the next flight crew commenced a walk-around check of the helicopter in preparation for the next flight.

**Footnote**

<sup>1</sup> The aft equipment bay is behind the baggage bay. It is accessed by removing a lightweight panel between the two bays.

Upon opening the baggage bay the crew noticed a burning smell and, with the assistance of the engineer, they removed the panel to access the rear equipment bay. They found a '*smouldering fire*', which self-extinguished before the arrival of the airfield fire service (Figures 1 and 2).



(Images courtesy of the operator)

**Figures 1 and 2**

Overheat damage before and after FTI crate removal  
(Note: the panel between the baggage bay and rear equipment bay has been removed)

## Investigation

### *Cabling*

The damage was most severe where electrical cables entered the equipment bay through an aperture in the adjacent structure. A single cable was found to be chafed and it was apparent that the exposed conductor had been arcing with the equipment bay liner, which was manufactured from a composite material. The cable connected the battery and FTI busbars and the circuit was protected by a 10 Amp CB. This was the CB that tripped in-flight.

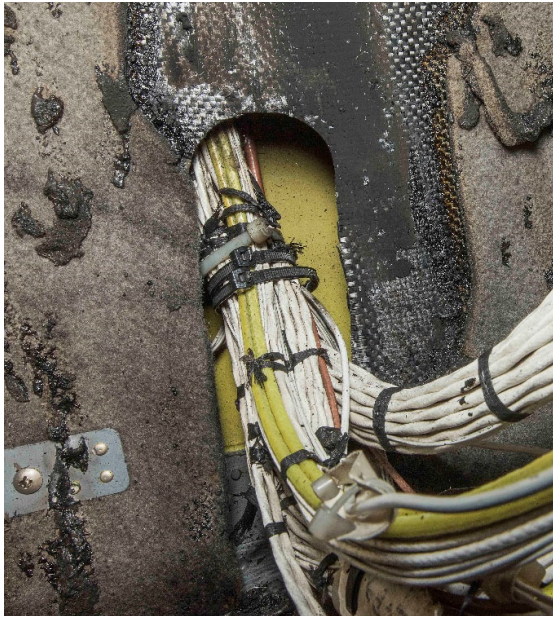
### *Flight Test Instrumentation*

The FTI was designed and installed several years before the incident when the helicopter was on the UK military register. When the helicopter moved onto the civil register the design was reviewed by an approved organisation and a STC was issued by the EASA.

The installation drawings depicted a protective strip around the periphery of the aperture to ensure that the cables did not chafe against the adjacent structure. When the helicopter was examined after the incident it was apparent that the protective strip was missing.

### *Operator's fleet check*

The operator owned another Agusta 109 (G-ETPI), which was equipped with a similar FTI installation. This helicopter was checked, and the protective strip was found correctly embodied (Figures 3 and 4).



(Images courtesy of the operator)

**Figures 3 and 4**

Note: lack of protective strip on G-ETPJ (left image)  
and protective strip as fitted to G-ETPI (right image)

## Conclusion

The investigation established that the electrical power supply cable between the battery busbar and the FTI busbar chafed against the equipment bay liner causing a short-circuit, arcing, and the CB to trip.

The equipment bay liner was melted and burned, and the operator concluded that it was probable that fire damage occurred in-flight, assisted by airflow entering the bay through the cable aperture. If a protective strip had been installed, as required by the design change, this should have prevented the cable damage.

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## BULLETIN CORRECTION

Following publication the following corrections were made to the report.

The fourth sentence in the synopsis on should read:

The cable was part of a design change that was made whilst the helicopter was on the UK military register operated as Military Registered Civil Owned Aircraft (MRCOA) subject to oversight by the UK CAA.

The last sentence of the first paragraph of the Flight Test Instrumentation section on page 50 should read:

When the helicopter moved onto the civil register the design was reviewed by an approved organisation and a STC was issued by the EASA.

Full details of the corrections can be found online and will be in the March 2021 Bulletin. The online version of the report was corrected 11 February 2021.