

**INCIDENT**

<b>Aircraft Type and Registration:</b>	Airbus A340-311, 4R-ADB	
<b>No &amp; Type of Engines:</b>	4 CFM56-5C2 turbofan engines	
<b>Category:</b>	1.1	
<b>Year of Manufacture:</b>	1994	
<b>Date &amp; Time (UTC):</b>	26 June 2005 at 0913 hrs	
<b>Location:</b>	School Hill Lane, Wargrave, Berkshire	
<b>Type of Flight:</b>	Public Transport (Passenger)	
<b>Persons on Board:</b>	Crew - 14	Passengers - 304
<b>Injuries:</b>	Crew - None	Passengers - None
<b>Nature of Damage:</b>	Damage to right inboard flap, No 3 flap fairing and No 3 engine exhaust nozzle	
<b>Commander's Licence:</b>	Air Transport Pilot's Licence	
<b>Commander's Age:</b>	54 years	
<b>Commander's Flying Experience:</b>	17,000 hours (of which 5,760 were on type) Last 90 days - 223 hours Last 28 days - 48 hours	
<b>Information Source:</b>	AAIB Field Investigation	

**Synopsis**

A member of the public informed the AAIB that an item, which they thought may have fallen from an aircraft, had been found in their wooden outbuilding. After lengthy investigation it was discovered that the item was the number three flap track fairing lower attachment fitting from a Sri Lankan Airbus A340-311. The reason for its separation from the aircraft was due to its attachment inserts pulling out of the fairing honeycomb structure, which allowed the fitting to rotate and unscrew from the eye end of the rod connecting it to the flap.

**Background**

The AAIB were informed by a member of the public that an item had been found in their wooden outbuilding on the morning of 26 June 2005, and that it appeared to have entered through the building's roof. The outbuilding was in a garden in Wargrave, Berkshire, which is overflowed by many types of aircraft, including airliners which operate in and out of London Heathrow Airport (LHR). As this item appeared to be a component from such an aircraft, it was collected by the AAIB for examination.



**Figure 1**

The object, shown in Figure 1, had little distinguishing features except for part numbers on the bolt heads and the threaded eye end; it weighed approximately 1.5 kg. After a lengthy investigative process, it was established that the object had come from an Airbus A330, A340-200 or A340-300, and in fact was a flap fairing lower attachment fitting, see Figure 3.

With this knowledge, an organisation based at LHR which maintain Airbus A340 aircraft was contacted. This revealed that a Sri Lankan Airbus A340-311, registration 4R-ADB, had been in their facility on 27 June 2005 for 'ad hoc' maintenance as one of its lower flap fairing attachment fittings was missing and required replacement. Repair of damage to the right wing inboard flap, the No 3 flap track fairing and No 3 engine was also required.

### **History of the flight**

The flight had started at Colombo, Sri Lanka, and was destined for LHR. After departure, two pieces of metal were found on Runway 22 and these were later discovered to be exhaust nozzle lower half tab fairings from the No 3 engine. The flight crew were aware that metal pieces had been found on the runway at Colombo and that they may have come from their aircraft but, as all the flight and engine parameters were normal, they elected to continue to LHR.

The aircraft was due to land on Runway 09L and the aircraft had been positioned to fly out to the west, to the north of the airport, before being turned back onto the extended centre line of 09L. Radar data for 4R-ADB at

this time showed that the aircraft passed over Wargrave, and directly over the location of the wooden outbuilding, at 0913 hrs. It was about this point in the approach that flaps would have been lowered in preparation for landing. The aircraft made an uneventful landing at LHR and it was only later that it was discovered that there was a problem with the No 3 flap fairing on the right wing, as it was hanging abnormally.

### Description of flap system, Figure 3

On each wing of the Airbus A340-300 there are two trailing edge flaps, inboard and outboard. The flaps are mounted on flap carriages which are driven along flap tracks attached to the lower wing surface. To protect the flap tracks and reduce drag, each track is enclosed in a fairing. The rear section of the fairing is pivoted at the flap track and is allowed to move in sympathy with

the flap by the use of a connecting rod attached to the underside of the flap at one end, and to a fork fitting on the flap fairing lower attachment fitting, at the other. As the flap moves aft and downward, the connecting rod transfers this motion to the flap track fairing lower attachment fitting, and pushes the rear section of the fairing downward.

Adjustment of the clearance between the fairing and flap is accomplished at the lower fairing attachment fitting. An access hole on the underside of the fairing gives access to a bolt that, in turn, alters the height of the fork fitting to which the connecting rod is attached. This changes the distance between the flap and the fitting. This means of adjustment is designed to preclude the need to perform any adjustment on either of the eye ends on the connecting rod.



Wargrave

Figure 2

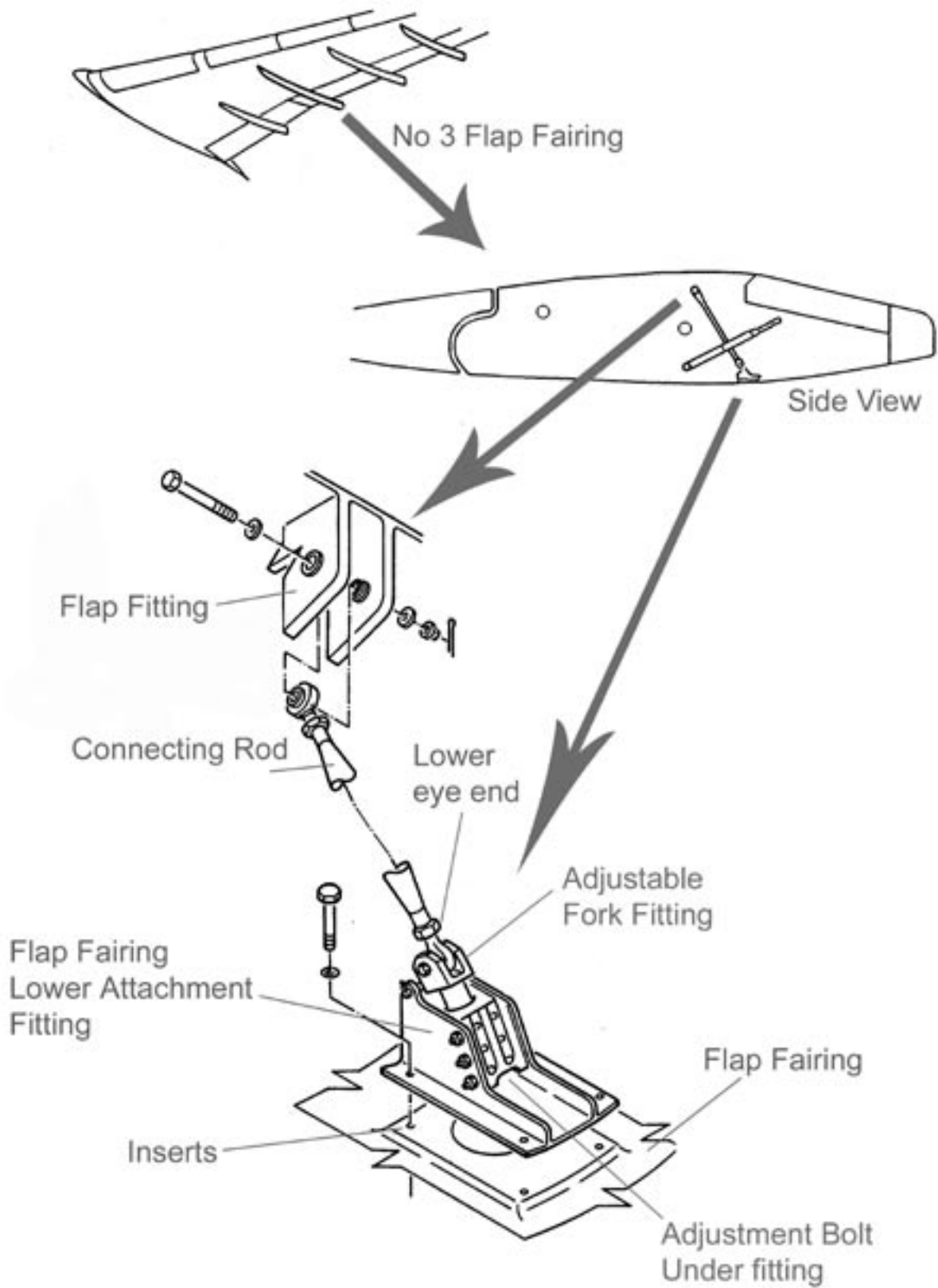


Figure 3

### **Aircraft examination**

The damage to the No 3 engine, due to the loss of the lower exhaust nozzle half tab fairings, was wrinkling and cracking of its exhaust nozzle, with additional damage where the attaching screws of the missing tab fairings had pulled out.

The No 3 flap track fairing exhibited damage where the inserts that locate the attachment fitting had pulled out of the fairing honeycomb structure. In addition, there was damage to the trailing edge of the inboard flap directly aft of the flap track fairing. Inspection of the fairing attachment fitting revealed that the nut of the lower eye end of the connecting rod was close to the end of the thread. In addition, a bar located behind the connecting rod attachment point was bent downward, consistent with contact with the eye end; this could only have occurred once the eye end had become detached from the connecting rod. The four fasteners which normally secure the attachment fitting to the fairing were still locked in place, but the inserts into which the fasteners locate, which are normally bonded into the honeycomb structure of the fairing, had been pulled out of the fairing together with some honeycomb material, and remained attached to the fitting.

### **Maintenance**

The last maintenance carried out on the No 3 flap track fairing was during a Major 8C check in March 2005; this was to repair damage to its inner surface. This work on the fairing required its removal and would have involved disturbance of the connecting rod and readjustment of the fairing when re-fitted to the aircraft.

### **Previous occurrences**

There have been several occurrences of the flap fairing lower attachment fitting coming loose and damaging

the inside of the fairing. As a result, the manufacturer issued Service Bulletin A340-57-4070 which introduced improved locking of the bolts that attach the fitting to the fairing structure. This was accomplished on 4R-ADB on 30 November 2003.

In April 2005, a pre-modification Airbus A340-300 suffered a loss of the flap track fairing attachment fitting and connecting rod, the cause of which was thought to have been due to loosening of the attachment bolts.

### **Discussion**

From the nature of the damage it was evident that the No 3 flap track fairing attachment fitting had departed the aircraft via the rear of the fairing and, in the process, made contact with the trailing edge of the inboard flap. Fortunately, it landed in an unoccupied wooden outbuilding albeit in a relatively highly populated area.

The reason for the detachment of this fitting from the flap fairing was not established. The four attachment bolts had remained with the fitting and did not appear to have come loose, as their locking tabs were intact, and they were still engaged with the inserts. This, together with the fact that the inserts had been pulled from the honeycomb structure, suggested that the fitting had either experienced higher than intended loading or, possibly, had not been manufactured or repaired properly. However, had the fairing been defective since manufacture, then it might be expected that a failure would have occurred earlier in its life. Excessive loading on a serviceable fairing is not likely to be generated by normal 'operational' loads, otherwise detachment of the fitting from any fairing would likely be a fairly common event. Therefore, the possibility remains that excessive loads could have been generated by a combination of in-service loading, defective repair and/or incorrect rigging of the fairing to the flap upon its last fitment.

The departure of the fitting from the aircraft, once free from the fairing, was likely due to the airflow through the fairing having caused the unattached fitting to rotate and eventually unscrew from the lower eye end of the connecting rod. With the fitting now totally detached, it then departed the aircraft rearwards hitting the inboard flap in the process. Had the lower eye end not been able to unscrew, then the fitting would have remained with the aircraft, albeit with some damage being caused to the fairing and flap assembly.

**Safety action**

The manufacturer has been made aware of this incident and has already changed the design of the connecting rod such that the lower eye end always remains attached to the connecting rod. A Service Bulletin will be introduced to rework or replace existing connecting rods.