

**INCIDENT**

<b>Aircraft Type and Registration:</b>	Fokker 100, G-UKFA	
<b>No &amp; Type of Engines:</b>	2 Rolls-Royce Tay 620-15 turbofan engines	
<b>Year of Manufacture:</b>	1989	
<b>Date &amp; Time (UTC):</b>	12 October 1995 at 0945 hours	
<b>Location:</b>	London Stansted Airport	
<b>Type of Flight:</b>	Public Transport	
<b>Persons on Board:</b>	Crew - Not known	Passengers - Not known
<b>Injuries:</b>	Crew - None	Passengers - None
<b>Nature of Damage:</b>	Minor damage around centre hinge cover, No 5 lift dumper, left-hand side	
<b>Commander's Licence:</b>	Not applicable	
<b>Commander's Age:</b>	Not applicable	
<b>Commander's Flying Experience:</b>	Not applicable	
<b>Information Source:</b>	AAIB Field Investigation	

On 12 October the aircraft had arrived at Stansted from Amsterdam Schipol Airport and was being prepared for its next passenger service. During the ground inspections it was noticed that, at the No 5 left-hand lift dumper, the edge of the cover plate on the wing surface had been forced upwards. Further inspection showed that this had occurred due to loads applied to the lift dumper panel itself by its hydraulic actuator, which had caused 'bowing' of the lift dumper panel due to the absence of the hinge bolt in the centre hinge position.

Figures 1 and 2 show the correct configuration for the No 5 lift dumper on another Fokker 100.

An internal inquiry was initiated by the operator's maintenance organisation. This inquiry determined that the bolt had been missing since the maintenance actions which had been undertaken over the previous weekend.

## **Maintenance over the weekend of 7 to 8 October 1995**

Over the weekend of 7 to 8 October 1995 G-UKFA was brought into the operator's base maintenance hangar. The purpose was a routine 'B' check (every 550 hours) and, in addition, a special inspection ('MSI 0938') was scheduled for detailed inspection of the lift dumper mechanical controls, looking for excessive play in the bearings. These bearings, which are Teflon-lined, had been the subject of the airframe manufacturer's Service Experience Digest (SED 27-66/001): various Fokker 100 operators had reported rapid wear of the bearings and the operator of G-UKFA had recently discovered significant wear in G-UKFG, another Fokker 100. The special inspection was, therefore, programmed for each aircraft's next scheduled maintenance.

Because of a recognised shortage of labour to perform the various maintenance tasks over the weekend of 7 to 8 October, an Engineer who was working under contract for the maintenance organisation, generally on '6-year' refurbishment checks of Fokker 100 aircraft, was tasked with performing the lift dumper special inspection on G-UKFA. This Engineer, who also carries a CAA Licence in his own right, was acting in the role of an 'Approved Engineer' (or 'Certifying Engineer') under the Maintenance Organisation's JAR-145 Maintenance Approval. He commenced this task on the lift dumpers with the 'MSI' paperwork and the corresponding Job Card: these contained specific references to pages in the Maintenance Manual, which he obtained. Over the weekend he principally worked with a fitter, also on contract.

In the course of the inspection work on the Saturday, the Engineer raised an additional Job Card for the opening of the access panels to perform the inspections; another acceptable procedure would have been "staging-out" the tasks on the existing 'MSI' Job Card. As the task progressed it became apparent that the rod ends on the vertical actuator rods were worn at both the left-hand and right-hand No. 5 lift dumper panels. The day shift (0830 to 2030 hrs) Duty Foreman agreed that these rod ends should be replaced and the spare parts were ordered. The Engineer raised two additional Job Cards for these component changes and, later, a further two Job Cards covering disconnections within the Nos 1/2 and 3/4 lift dumper systems. The inspection work had progressed reasonably smoothly but, by the time the Engineer left for his hotel that Saturday evening, it had become apparent that the bolts through the rod ends were difficult to remove. It was agreed, therefore, with the Duty Foreman that the night shift (2030 to 0630 hrs) would proceed with the removal of the rod ends.

The night shift were eventually able to remove the bolt and rod end on the right-hand No 5 lift dumper but were unable to remove the corresponding bolt at the No 5 lift dumper on the left-hand side. In addition, the damage necessary to remove the bolts necessitated new bushes in the rod end. These bushes were ordered, on AOG (aircraft on ground) priority.

On the Sunday morning the Engineer and fitter concentrated on removing the bolt from the rod end at the left-hand No 5 lift dumper. This was unsuccessful, due to distortion of the bolt, and attempts to remove it after cutting by hacksaw were also unsuccessful. The Engineer states that the decision to remove the entire No 5 lift dumper panel was taken in consultation with the Duty Foreman; the Duty Foreman had responsibilities both on the Ramp and with a BAe 146 undergoing an engine change and his recollection was less specific. The panel was eventually removed, after considerable difficulty with the removal of the bolt in the panel's centre hinge, and taken by the fitter to a workbench to remove the bolt from the vertical rod end. The Engineer states: "At this point, and this is the crucial point around which the whole incident revolves, I was so busy and concerned to get the panel serviceable again that I inexplicably forgot to record the removal on the work card".

At the workbench the bolt from the vertical rod end was successfully removed and the lift dumper panel was re-fitted to the left-hand wing. Although the bushes for the hinge and the rod end had been ordered they were not yet available and, with the initial 1530 hrs completion target for the aircraft already past, at about 1730 hrs G-UKFA was lowered from its jacks and taken from the hangar for an engine run. At this point it is agreed that there were a total of some 20 Job Cards still requiring completion and that the left-hand and right-hand No 5 lift dumper assemblies were incomplete due to the lack of the necessary bushes.

With the aircraft outside for ground runs there was no further work for the Engineer to perform. He states that, before leaving, he placed the various remaining items of hardware from the No 5 lift dumpers in plastic bags, together with the centre hinge bolt and its stores label, and that these were placed in a larger plastic bag together with a hand-written note of explanation for the night shift. He states that he handed this package to the day shift Duty Foreman, who confirmed the content of the note. The Duty Foreman's recollection differs, stating that the 'hand-over' was rather less formal.

The remaining bushes were received from the manufacturer in the Netherlands at approximately 2000 hrs that Sunday evening and the night shift completed the remaining Job Cards, including the two open cards for the left-hand and right-hand No 5 lift dumpers. The work was performed by a fitter and the Job Cards show that the duplicate inspections were performed, at 0430 hrs and 0435 hrs respectively, by another Certifying Engineer and the night shift Duty Foreman. Functional checks of the system were performed and the aircraft left the hangar at around 0600 hrs, shortly after its second revised target time of 0530 hrs on the Monday morning.

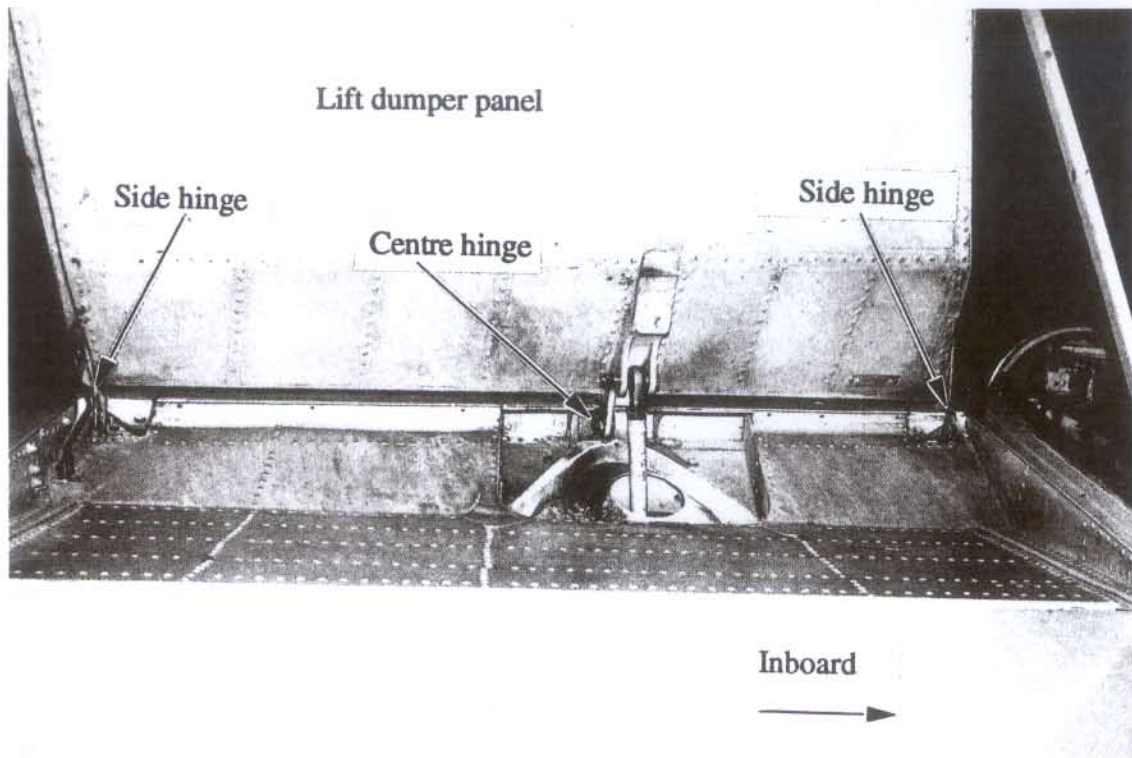
## **AAIB discussion**

The AAIB were informed of the incident a few days later and initiated a Field Investigation because of possible similarities to other 'human factors' occurrences in aircraft maintenance. A common feature

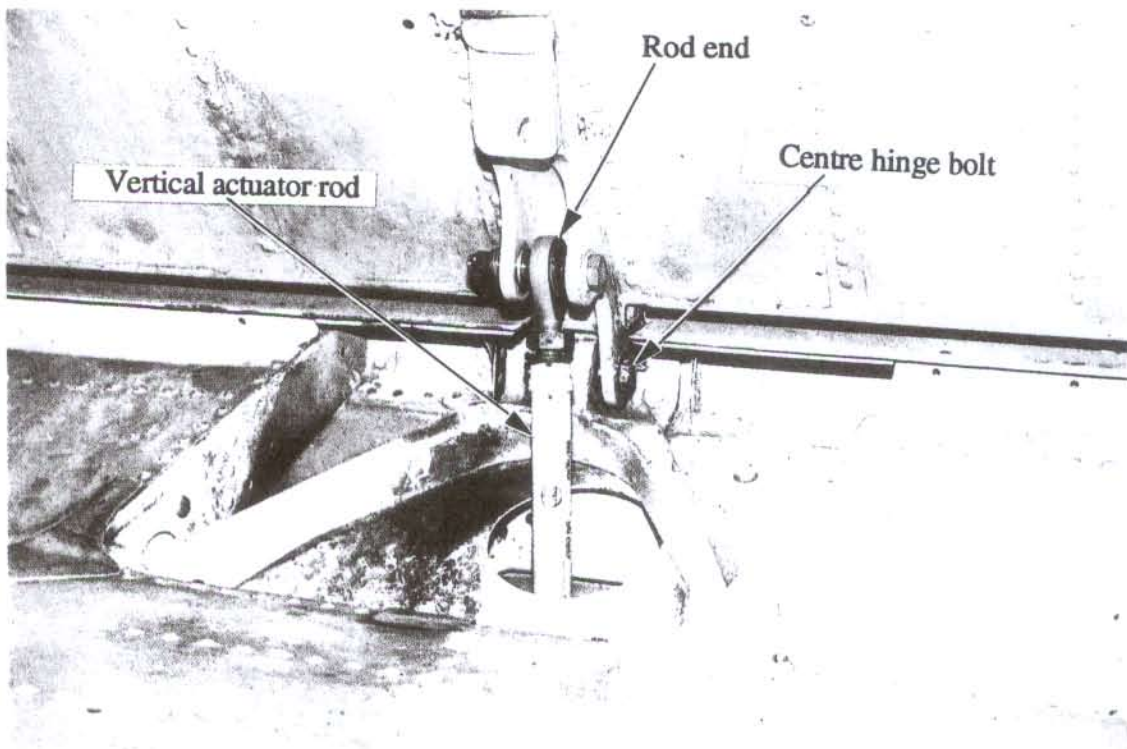
in many of these occurrences has been that the Quality procedures, such as duplicate inspections, designed to minimise the effects of a single human error are most prone to break down in those conditions of pressure on time and personnel when they are most needed.

As noted earlier, the Engineer, by all accounts an experienced and conscientious individual, willingly admitted without excuse his oversight in failing to record the removal of the left-hand No 5 lift dumper panel from the aircraft. However, it is apparent from the maintenance records, including the 'Hand-over Diary' used by this organisation for communication between shifts, that there were a number of further opportunities for this omission to be corrected. These included the hand-over itself between shifts, the fitting of the hardware to the left-hand panel and the inspection activities of both parties to the duplicate inspection.

Following the incident, the maintenance organisation concerned instigated a high-level Maintenance Standards Review to examine and understand factors directly or indirectly involved in this incident.



**Figure 1 - No. 5 lift dumper, left-hand side, Fokker 100**



**Figure 2 - Centre hinge and vertical actuating rod**