## AIRCRAFT ACCIDENT REPORT 2/95

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# INCIDENT TO AIRBUS A320-212, G-KMAM AT LONDON GATWICK AIRPORT ON 26 AUGUST 1993

## SUMMARY

The incident occurred when, during its first flight after a flap change, the aircraft exhibited an undemanded roll to the right on takeoff, a condition which persisted until the aircraft landed back at Gatwick Airport 37 minutes later. Control of the aircraft required significant left side stick at all times and the flight control system was degraded by the loss of spoiler control.

The investigation identified the following causal factors:

(i) During the flap change compliance with the requirements of the Maintenance Manual was not achieved in a number of directly relevant areas:

During the flap removal the spoilers were placed in maintenance mode and moved using an incomplete procedure, specifically the collars and flags were not fitted.

The re-instatement and functional check of the spoilers after flap fitment were not carried out.

(ii) A rigorously procedural approach to working practices and total compliance with the Maintenance Manual was not enforced by local line management.

(iii) The purpose of the collars and the way in which the spoilers functioned was not fully understood by the engineers. This misunderstanding was due in part to familiarity with other aircraft and contributed to a lack of adequate briefing on the status of the spoilers during the shift handovers.

(iv) During the independent functional check of the flying controls the failure of spoilers 2 to 5 on the right wing to respond to right roll demands was not noticed by the pilots.

(v) The operator had not specified to its pilots an appropriate procedure for checking the flight controls.

Fourteen Safety Recommendations were made during the course of the investigation. It was recommended that:

The Civil Aviation Authority should formally remind engineers of their responsibility to ensure that all work is carried out using the correct tooling and procedures, and that they are not at liberty to deviate from the Maintenance Manual but must use all available channels to consult with a design authority where problems arise; if full compliance cannot be achieved the engineer is not empowered to certify the work. [Recommendation 94-41]

The Civil Aviation Authority should review the requirements for the conduct of duplicate inspections and consider the practicality of requiring the engineer conducting the duplicate inspection to review the task as detailed in the Maintenance Manual so as to come to an independent assessment of the scope of the duplicate inspection. [Recommendation 94-42]

The Civil Aviation Authority should require a review of non-Approved Maintenance Schedule tasks which are likely to be encountered several times during the service life of a fleet so as to determine when pre-planned stage sheets should be required. The stage sheet for a task should call up all the relevant requirements of the Maintenance Manual and in particular should include stages for all re-instatements, inspections and function checks. Each such document would include boxes for an authorised signatory at each stage and would also include the Certificate of Release to Service. [Recommendation 94-43]

The Civil Aviation Authority, in consultation with operators, should review the procedures for advising engineers of technical information such as Service Bulletins, Airworthiness Directives and other manufacturers' publications. [Recommendation 94-44]

Airbus Industrie should amend the A320 maintenance manuals in the flap removal, flap re-fitting and spoiler de-activation chapters, to include specific, clear warnings of the need to re-instate and function the spoilers after deactivation. Similar amendments should be considered for Airbus A330 and A340 aircraft. [Recommendation 94-45]

Airbus Industrie should introduce an additional flag and attachment to clip over the hexagon of the maintenance device, to provide clear and independent visual indication of the need to reset the maintenance device, and to amend the maintenance manual procedures accordingly. These actions should be made mandatory by the Civil Aviation Authority for UK operators.
[Recommendation 94-46]

Airbus Industrie should advise all operators of its 'fly-by-wire' aircraft of the requirement to hold full control deflection for the appropriate period during the flight control checks to allow fault warning computers to inform flight crews of any defects detected, and publish in the A320 Flight Crew Operating Manuals the time taken for a fault warning to be triggered following the failure of a flight control surface to respond correctly to a computer demand.
[Recommendation 94-47]

Excalibur Airways should review their after-start procedures to ensure that both pilots are simultaneously involved in the first check of the flight controls and should specify the detailed content of the flight control check procedures in their Flight Crew Operating Manuals. [Recommendation 94-48]

The Civil Aviation Authority should ensure that A320 type conversion training includes demonstrations of the approved procedures for aircrew checks of the flight controls and the limitations of the fault warning computer with respect to spoiler faults.
[Recommendation 94-49]

Airbus Industrie should amend the Flight Crew Operating Manuals:

To make the contents of page 3.02.80 more conspicuous in the index of 'ABNORMAL AND EMERGENCY PROCEDURES' and that the contents of this page should be duplicated in the QRH.

To make the note to page 3.02.80 which explains the need to take account of multiple failures by multiplying the factors more conspicuous and that it should precede the table of increments.

To include operating techniques for intentional FLAP 1 and FLAP 2 approaches in the 'OPERATING TECHNIQUES' sub-section of the 'ABNORMAL and EMER PROCEDURES' of the FCOM 3.
[Recommendation 94-50]

The Civil Aviation Authority should require that all A320 aircraft equipped with the Loral model F800 Digital Flight Data Recorder should be fitted with an approved tray, which provides compliance with the appropriate edition of RTCA DO160, as soon as possible.
[Recommendation 94-51]

The Civil Aviation Authority should ensure that data quality on other aircraft equipped with the F800 Digital Flight Data Recorder is acceptable during all phases of flight, and that the mounting system is approved. [Recommendation 94-52]

The Civil Aviation Authority should ensure that the problems of the F800 Digital Flight Data Recorder when fitted to the A320 are made known to other national regulatory bodies.
[Recommendation 94-53]

The Civil Aviation Authority should introduce procedures in respect of flight recorder replay and maintenance that:

Will enable the serviceability of the flight recorder installation to be determined,

Will ensure that organisations which undertake the replay, repair and maintenance of flight recorders have formal procedures so as to ensure that they have up to date knowledge of the correct techniques to be employed in such work,

Will ensure that sufficient records are kept to alert the Civil Aviation Authority and/or the recorder manufacturer of any short-comings in particular flight recorders.
[Recommendation 94-54]