AIRCRAFT ACCIDENT REPORT No 4/2008

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REPORT ON THE INCIDENT TO AIRBUS A320-214, G-BXKD AT RUNWAY 09, BRISTOL AIRPORT ON 15 NOVEMBER 2006

Registered Owner and Operator:	Thomas Cook Airlines UK Ltd
Aircraft Type:	Airbus A320-214
Serial No:	735
Nationality:	British
Registration:	G-BXKD
Place of Incident:	Runway 09, Bristol Airport
Date and Time:	15 November 2006 at 1932 hrs

Synopsis

The Air Accidents Investigation Branch (AAIB) was notified by the Bristol Tower ATC watch supervisor on 16 November 2006 of an incident involving a diversion of an A320 aircraft, G-BXKD, to Manchester Airport. The diversion resulted from a landing gear malfunction after takeoff from Bristol Airport. Subsequent enquiries revealed that the landing gear had been damaged during the previous landing at Bristol on 15 November. The following Inspectors participated in the investigation:

Mr R J Tydeman	Investigator-in-Charge
Mr R W Shimmons	Operations
Mr P A Sleight	Engineering
Mr A Burrows	Flight Data Recorders

The A320 aircraft had landed at Bristol Airport in a strong crosswind, with associated turbulence. During the shutdown procedure the crew were presented with an automatically generated aircraft warning indicating that certain parameters had been exceeded during the landing. The crew recorded the exceedence in the Technical Log. A type-qualified engineer met the aircraft on arrival and complied with his understanding of the technical checks required after the generation of such a warning. Substantial damage had occurred to the landing gear, but this damage was not detected before the aircraft was cleared for a further flight. On that flight the crew experienced landing gear problems after takeoff, together with other warnings, and diverted to Manchester Airport. Following further engineering activity, the aircraft was again released for flight without the damage being detected; this resulted in a repeat of the gear problems and other warnings after takeoff. The damage to the landing gear was eventually discovered after the subsequent landing at Manchester.

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The investigation identified the following contributory factors:

1. The A320 aircraft landed at Bristol Airport in a strong crosswind with associated turbulence; the landing was classified as 'hard' because specified parameters were exceeded at touchdown.

2. The autopilots were disconnected about 100 ft above the runway threshold. In the prevailing turbulent conditions, this allowed insufficient time to separate the piloting tasks of taking control of the aircraft and flaring the aircraft to land.

3. The engineers maintaining the aircraft at Bristol had not received adequate training in the use of the computer software supporting the operator's aircraft manuals.

4. The Airbus aircraft manuals did not differentiate, in their effectivity coding, how the implementation of Service Bulletins affected specific aircraft.

5. No connection was made between the previous LOAD <15> report and the subsequent 20GA sensor failure, indicating the internal damage to the landing gear.

6. Guidance provided in the aircraft manuals required to interpret the LOAD<15> report was unclear and differences existed between sections, particularly with regards to corrective action.

Four Safety Recommendations have been made.

Findings

3.1.1 Flight operations

1. The flight crew that landed the aircraft at Bristol were licenced, qualified to operate the flight, and were in compliance with applicable flight and duty time limitations.

2. The aircraft's weight and centre of gravity were within limits for the landing at Bristol.

3. The landing at Bristol Airport was conducted in significant turbulence.

4. Both autopilots were disconnected at about 208 ft radio altitude, which corresponds to about 102 ft above the runway threshold.

5. When the autopilots were disconnected the crosswind was recorded to be 38 and 40 kt, whereas the maximum demonstrated crosswind for landing is 33 kt, gusting to 38 kt.

6. The crosswind just prior to touchdown was approximately 30 kt.

7. The pitch attitude at touchdown was approximately 5.5º. A maximum pitch attitude of 6.7º was recorded just after, together with a peak normal acceleration of 2.9g as both right and left main gear oleos compressed within a second of each other (right main first).

8. After the LOAD <15> report had been generated, indicating a hard landing, the aircraft commander entered the report activation into the Technical Log and passed a copy of the report to the engineer; the commander then filed an Air Safety Report.

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9. After completing his inspection the engineer released the aircraft into service.

10. After the subsequent takeoff, the flight crew experienced problems in raising the landing gear, together with a number of ECAM warnings: they then diverted to Manchester Airport.

11. The landing gear problems, together with the ECAM warnings, were repeated after takeoff on the following flight; the flight crew returned to land at Manchester Airport.

3.1.2 Engineering aspects

1. The aircraft was certified, equipped and maintained in accordance with existing regulations and approved procedures. There was no evidence of any pre-existing defect with the aircrafts landing gear.

2. The right main landing gear suffered a rupture of the upper diaphragm tube following the heavy landing at Bristol.

3. Whilst the aircraft was on the ground the damage to the landing gear was not visible externally, and only became evident following the jacking of the aircraft.

4. There was no other damage to the aircraft.

5. A LOAD <15> report was generated following the heavy landing.

6. The engineer at Bristol had not seen a LOAD <15> before.

7. The aircraft manuals for G-BXKD were on a computer based system known as AirN@V.

8. The engineer at Bristol had only used AirN@V once before and had not received any formal training on the system.

9. The engineer had previously used the manuals in PDF format.

10. The engineer attempted to interpret the LOAD <15> report and used the flow chart in AMM 31-37-00, which directed him to the heavy landing check.

11. Using the AirN@V navigation menus the engineer selected '*05-51-11 PB 601 – INSPECTIONS AFTER HARD/ OVERWEIGHT LANDING – INSPECTION/ CHECK*'.

12. When using AirN@V the selection of the Page Block gave the first check in that section.

13. The engineer thought that he had the correct check, and printed it out using the 'print job card' selection on the print menu.

14. The inspection he carried out was as described in AMM 05-51-11-200-004; this did not require, nor lead to, jacking of the aircraft.

15. The engineer was not made aware of a later task AMM 05-11-200-004A.

16. AMM 05-51-11-200-004A was a more up to date check, which would have called for the jacking of the aircraft.

17. AMM 05-51-11-200-004A is available on AirN@V by either expanding the menu, scrolling through the pages or using search and hot links.

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18. Scrolling through jobs is not easy to do in AirN@V, in comparison to PDF.

19. The engineer at Bristol did not consult the operator's Maintrol at Manchester.

20. The effectivity coding of AMM 05-51-200-004 indicated that it was effective for G-BXKD, there was no mention of any SBs.

21. AMM 05-51-200-004A was also effective for G-BXKD, but only POST SB 32-1124.

22. SB 32-1124 had been accomplished on G-BXKD, in November 2001.

23. Airbus manuals do not state if a section is for PRE SB aircraft in their effectivity coding.

24. The operator's Maintrol were not aware of the LOAD <15> report prior to G-BXKD's arrival at Manchester.

25. Following the aircraft's arrival at Manchester, troubleshooting led the engineers to a fault with sensor 20GA.

26. The apparent fault with 20GA was due to the overextension of the landing gear oleo after take off from Bristol.

27. During the troubleshooting no link was made between the sensor fault and the LOAD <15> report.

28. Although the engineers were aware of the LOAD <15> report for the landing at Bristol, the technical log had been cleared following the inspection so they did not pursue this further.

29. The AirN@V troubleshooting manual, for the faults described on the PFR and LGCIU BITE, would have required the aircraft to be jacked.

30. There was no mention in the AMM that a landing gear sensor fault, following a LOAD <15> report, could indicate internal damage to the landing gear.

31. Interpretation of the LOAD <15> report is not easy without the use of the AMM.

32. The flow chart in AMM 31-37-00, page block 201, does not provide the same categories, for the various events, as those in AMM 05-51-11-200-004A

33. The LOAD <15> report presents various figures that require decoding and is not in plain text.

Safety Recommendations

The following safety recommendations were made:

Safety Recommendation 2007-105

Airbus amend their maintenance documentation effectivity coding to clearly state if the relevant section is only applicable to 'PRE SB' aircraft, as well as those that are already marked as being 'POST SB'.

Safety Recommendation 2007-106

Airbus amend the A319/A320/A321 AMM to highlight the possibility of internal damage to the landing gear and to recommend the jacking of an aircraft following a fault of sensor 20GA or 21GA on a subsequent flight, after the generation of a LOAD <15> report.

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Safety Recommendation 2007-107

Airbus amend the A319/A320/A321 AMM ATA 31-37-00 to incorporate the classifications of landings quoted in AMM 05-51-11-200-004A into the text and the flow chart and to directly reference 05-51-11-200-004A as the more comprehensive check.

Safety Recommendation 2007-108

Airbus amend the LOAD <15> report to describe clearly the classification of the event that generated the report, similar to those defined in AMM 05-51-11-200-004A.

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