BULLETIN

AIRCRAFT ACCIDENT INVESTIGATION BOARD/NORWAY
(TRANSLATED FROM NORWEGIAN)

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BUL 12/97
Date 9. april1997

Aircraft	
- type & reg.:	B-737, D-ABFM / DC-9-51, OH-LYV
Radio call sign:	DLH 3101 / FIN 423
Date and time:	7 September 1996 at 1314 hours
Location:	Fornebu sector in Oslo TMA
Type of occurance:	Air traffic incident, separation between flights below minimum
Type of flight:	Commercial, line flights for both aircraft
Weather cond.:	Oslo/Fornebu METAR at 1320: Wind 140°/03 kts - CAVOK - Temp. +16 °C, dew point +03 °C - QNH 1024 hPa - NOSIG
Flight cond.:	VMC
Flight plan:	IFR, both flights
Information sources:	Reports from ATS, from both Pilots in Command and AAIB/N's own investigation

All times given in this report is local time (UTC + 2 hours), if not otherwise stated.

SUMMARY

This occurrence took place when the prescribed separation minimum between the two flights was violated. The flights were a Finnair aircraft, en route from Helsinki and Stockholm, descending towards the Grønnsand (GRS) radio beacon for an approach to Oslo Airport Fornebu and a departing Lufthansa aircraft climbing out from RWY 06. The traffic in the TMA was controlled by Oslo Approach (APP), with both the APP and Departure (DEP) sectors combined, operating on the DEP frequency, 119.65 MHz. Parachute jumping was i progress over Ski Airfield, a GA airfield south-east of Oslo Airport Fornebu. This initially restricted the FIN 423's descent to FL 100 until the parachute aircraft reported leaving flight levels below, after releasing the jumpers. See Appendix, SID RWY 06/24 Oslo, Norway, Fornebu, (Jeppesen).

At time 1312:55 the combined APP/DEP Controller called DLH 3101 to check if they were listening in on the DEP frequency since they had not reported after take-off as expected. At time 1313:00 DLH 3101 confirmed being on the frequency and reported maintaining 4 000 ft. The following clearance was then given from DEP:

"DLH 3101, climb FL 140 and follow radial 130 until advised, radar contact."

This was a re-clearance and a change from the original, standard departure clearance, given by clearance delivery before start up: SID RWY 06, ABDEM 1A, which DLH 3101 had received before start/departure from Fornebu. The crew confirmed the re-clearance in the following way:

"Climbing level 140 and follow radial ..(eh..) intercepting radial 130 and following until advised, DLH 3101."

FIN 423 was after this instructed to continue the descent to FL 50. Approximately one minute later, the following instruction was given to DLH 3101:

"DLH 3101 turn left 090."

To this instruction DLH 3101 answered:

"Left turn heading 090, DLH 3102 ..(eh..) and to clarify this, the DLH 3101, we were cleared for the normal departure, that means after 6 miles a right turn, to GRS, not as cleared radial 130."

The reason for giving DLH 3101 this new re-clearance was that the flight was not stabilized on radial 130 as expected, but either drifted off southwards, or turned southwards deliberately, (as indicated on the radar picture). The Air Traffic Controller has in his report explained that he with this new instruction would be able to establish horizontal separation between the two flights. Because DLH 3101 did not adhere to this instruction or the next instruction to turn to the west, to 270°, the flight was finally instructed to stop its ascend at FL 90. FIN 423 was at this time aproaching FL 100 at a moderate sink rate, and was immediately instructed to maintain or climb to FL 100 if they should have descended through that level. In this way vertical separation could be maintained. Traffic information was given to both flights.

According to the recorded radar data, the two flights passed each other at a horizontal distance of approximately 0.2 NM, as calculated from Oslo ATCC's Radar Data Processing System, (RDPS). According to the mode C readings, DLH 3101 levelled off at FL 90, and FIN 423 gave a short reading at FL 98 before climbing back and levelling at FL 100. The FIN 423 Flight Data Recorder printout indicates 9 700 ft (standard = FL 97) as its lowest altitude. This gives a vertical separation of 700 ft as a minimum. Further, the radar recordings show the DLH 3101 after take off and in initial climb, stabilized on radial 130 until passing FL 56, when a right turn towards a track of 190° was initiated. This heading/track was kept until passing FL 76 when a left turn was started and ended on a heading of 090° when DLH 3101 passed below FIN 423. FIN 423 was maintaining a steady, westerly (265°) track. The radar recording further indicates that DLH 3101 increased its ground speed up to 290 - 300 kts, which is a moderate speed exceedance. The speed limit below FL 100 is 250 IAS (Indicated Air Speed).

The Air Traffic Controller has in his report explained that parachute jumping took place over Ski Airfield. FIN 423 was therefore initially given descent to FL 100. When R/T communication was established with DLH 3101, this flight was instructed to climb to FL 140 and to follow radial 130 until new instructions were given. FIN 423 was then instructed to descend to FL 50 as the parachute exercise was no longer conflicting. DLH 3101's radar picture was observed closely as this flight's adherence to the clearance and following radial 130 was essential in maintaining horizontal separation between the flights. But DLH 3101, as observed on radar, gradually initiated a right turn, southwards of the expected track. To begin with, the Air Traffic Controller thought the discrepancy was caused by inaccurate navigation or that the crew was late in establishing on radial 130. To prevent the two flights to close in even more, DLH 3101 was immediately instructed to turn further left, to heading 090°. DLH 3101's right turn was neither stopped nor reduced in rate, and no left turn was observed. Because the crew started an argument, the DEP controller was not convinced that the flight would initiate this turn, and as time and distance began to run out, he chose to instruct the flight to turn to a westerly heading of 270° as an evasive action and a last effort to keep an adequate horizontal sepatation from FIN 423. This would have been achieved, irrespective of which direction DLH 3101 should turn westwards.

The Air Traffic Controller further states in his report, that the answer the crew gave to this last instruction, contributed to more uncertainty about the outcome. A vertical separation was now the only safe solution. DLH 3101 was observed with a high climb rate, probably because it had accumulated speed as it maintained level flight at a lower altitude. DLH 3101 passed FL 76 when the instruction about levelling off at FL 90 was given. FIN 423 had, according to the radar, a moderate descent through FL 102 when the instruction about levelling off was given. The probability of FIN 423 passing through FL 100 before levelling off was high, and the Controller therefore used the phraseology "climb to and maintain FL 100".

The speed limit below FL 100 is 250 kts IAS. DLH 3101 did not adhere to this. The speed (ground speed) recorded on radar, increased into the range of 290 - 300 kts when 4 000 ft was maintained and during the climb from 4 000 ft to FL 90. The speed limit is according to the Norwegian Civil Aviation Requirements (BSL) F 1-3 para. 3.8.1 and is also published i AIP Norway, RAC 1-5 and 1-18. This information is not found in the AIP RAC 4-FB-1 (SID = Standard Instrument Separture) and not in the Jeppesen Route Manual pages for Oslo/- Fornebu (SID, departures RWYS 06, 24).

The Pilot in Command of DLH 3101 states in his report that the first clearance from DEP was understood by him as: "Climb FL 140, maintain radial 130 as *cleared.*"

He further states that he understood the co-pilot a little later to be in doubt about his understanding of the clearance, in-spite of his correct read back, which was also accepted by DEP. The PiC therefore continued on his original departure clearance while the co-pilot tried to have the new instructions confirmed. The frequency was busy and the crew had difficulty in getting through. They then received the instructions about heading 090°, and later 270°. The co-pilot also confirmed these headings but wanted to clarify whether a left or right turn was required for the last heading. Since they were already close to heading 090°, the left turn was continued and FL 90 was maintained.

At this time, DLH 3101 reported another aircraft passing a little to the right and above them, estimated to about 1 000 ft above. The crew of DLH 3101 reported that they had this traffic in sight for about ½ a minute and did not consider the passing as a collision risk.

COMMENTS FROM THE ACCIDENT BOARD

This incident was caused by the DLH 3101 not adhering to the re-clearance to follow radial 130 until advised. The level limit of FL140 and new instructions was given by Oslo DEP in order to expedite the climb and not keep DLH 3101 unnecessary at a low altitude. The way the Air Traffic Controller expressed the re-clearance was clear and not to be misunderstood. The crew member handling the R/T obviously understood the clearance correct, since the read back was almost a copy of the clearance. If, however, there was doubt between the crew members about the meaning of the new clearance, it was the PiC's duty to have the uncertainty clarified. The company report, referring to the PiC's explanation, reveals also some internal communication problems between the pilots. The PiC stated in the report that he understood the clearance as: "maintain radial 130 *as cleared*, while the clearance actually was: "... *until advised*". With both pilots listening to the clearance, this possible misunderstanding should have been clarified between the pilots before the co-pilot read back the clearance. The later initiated discussion with the DEP controller, by referring to the standard instrument departure (SID), given before start from Fornebu, is in the opinion of AAIB/N not appropriate.

The PiC also complained about poor readability of the DEP transmissions. The readability is not possible to verify by listening to the R/T recordings, as the recording is taken directly, before the transmission leaves the antenna. There was no other complaints about readability at this time. The DEP frequency was busy, but not overloaded. It must be emphasised that in terminal areas, where the traffic often is dense, it is of utmost importance that given instructions are being adhered to without delay, and that possible protests and arguments are taken afterwards. Changes to an already given clearance is given only when deemed necessary for traffic or safety reasons.

DLH 3101 did not call DEP after take off as instructed in the SID procedures. Only after the DEP controller called the flight after it was reaching and maintaining 4 000 ft altitude, two way R/T communication was established. Another matter in the crew's inability to follow instructions and clearances is that they allowed the speed to build up to more than 250 kts IAS before reaching FL 100. Ground speed did build up into the range of 290 - 300 kts during the climb to FL 90. This speed rule is common in most European countries and was implemented also in Norway many years back and should be known to airline crews operating regularly in Norway and within Europe, even if not published in Jeppesen or AIP Norway RAC 4-FB-1. This latter problem will also be formulated as a recommendation to the Civil Aviation Administration (CAA-N).

RECOMMENDATIONS

AIP-Norway, RAC 4-FB-1, does not contain information about speed limit 250 kts IAS below FL 100. As a consequence, neither does the corresponding page in the Jeppesen Route Manual. CAA-N is recommended to bring the Oslo/Fornebu pages in line with the information for other Norwegian airports with SID/STARs and speed limitation implemented.

APPENDIX