1998-03-12 L - 94/97

Swedish Civil Aviation
Administration

601 79 NORRKÖPING

Report C 1998:7e

The Swedish Board of Accident Investigation (Statens haverikommission, SHK) has investigated an incident which occurred on 16 October 1997 in the airspace above Stockholm/Bromma airport, AB county, Sweden, with aircraft registered N 70RR and G-BNWY.

In accordance with section 14 of the Ordinance on the Investigation of Accidents (1990:717) the Board submits herewith a final report of the investigation.

This report is translated from Swedish. If there are differences caused by translation, the Swedish version will be valid.

Olle Lundström

Rune Lundin Monica J Wismar

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Aircraft; registration and type		**A. N 70RR,** Aero Commander, AC 6T **B. G-BNWY,** Boeing 767
Owner		**A.** Nauta Inc. Holland/Skyline Aviation **B.** British Airways
Time of incident		16-10-1997, 1703 hours in daylight *Note:* All times in the report are given in Swedish normal time (SNT) = UTC +1 hour
Place		In the airspace above Stockholm/Bromma airport, AB county, Sweden (pos 5921N 1757E; around 4 000 ft/1 220 m above sea level
Type of flight		**A.** Private **B.** Scheduled traffic
Weather		Bromma 1656 hrs: Wind NE/5 kts, visibility 25 km, clouds 4-8/8 at 1 500 - 3 000 ft, temp./dewpoint +4/+2°C, QNH 1019 hPa
Numbers on board:	*crew*	**A.** 2 **B.** 10
	passengers	**A.** 2 **B.** 86
Personal injuries		None
Damage to aircraft		None
Other damage		None
Pilots´ age, license		**A.** Pilot 55 yrs; Private with instrument rating (American) Co-pilot 31 yrs; Commercial with instrument rating (Dutch)
Pilots´ total flying hours		**A.** Pilot 500 hrs, of which 60 hrs on the type Co-pilot 1 100 hrs, of which 9 hrs on the type

The incident has been investigated by SHK represented by Olle Lundström, chairman, and Rune Lundin and Monica J Wismar, chief investigators flight operations. SHK has been assisted by Richard Jörgensen, Air Traffic Control expert.

The investigation was followed by Max Danielsson representing the Swedish Civil Aviation Administration.

The purpose of the investigations performed by SHK is solely to prevent accidents and incidents in the future.

Course of events etc.

The aircraft **A** on 16 October 1997 at 1650 hours received clearance to taxi to runway 30 at Stockholm/Bromma airport and shortly thereafter an IFR clearance to Den Helder airport in Holland. The departure route was given as ”Dunker 1Y” with initial climb to 4 000 ft (see Encl. #1) and transponder code 7327. The procedure for **A** at 4 NM[1] after take-off calls for a left turn of approximately 60° towards the VOR Dunker (position 10 km NE of Malmköping).

At 1656 hrs, after a prolonged engine check brought about by service actions, the pilot reported ready for take-off. He received take-off clearance and was further instructed by the air traffic controller in Bromma tower to contact Stockholm control (APP-S) on frequency 120.15 when airborne. The clearance was correctly read back by the co-pilot.

After take-off the APP-S controller was unable to see the echo of **A** on his radar screen. He contacted Bromma tower but there they could only confirm that **A** had taken off and climbed into clouds. Both APP-S and Bromma tower then called the aircraft. At 1701 hrs Bromma tower got contact with **A** who reported turning for Dunker. The controller ordered the pilot to switch on the transponder and change frequency to 120.15. On the APP-S frequency the pilot reported at 4 000 ft heading for Dunker. APP-S asked the pilot to confirm the heading for Dunker whereupon he reported heading 050°. As this heading was opposite to the heading for Dunker, **A** was ordered to reverse heading to 240° and to maintain 4 000 ft. The pilot of **A** admitted that they had come off course but that they were now steering according to the clearance.

A reconstruction of **A:s** flightpath shows that the pilot after take-off turned left about 250° passing almost overhead Bromma and remained on a north-easterly heading.

A came close to **B** overhead Solna. **B** was under radar vectoring for runway 01 at Stockholm/Arlanda, in a shallow right turn heading 210° and at 5 000 ft. On board **B** two TCAS-warnings were received (TCAS is an airborne anticollision warning system); first a conflict ”at two o’clock”, distance 2 NM, 800 ft below own altitude and then, when on final to runway 01, warning ”to the left”, distance 1-2 NM, 700 ft below. After the first TCAS-warning the aircraft retreated from each other later to close in on each other again whereupon the second TCAS-warning occurred.

From incident reports to the Civil Aviation Authorities is evident that also a Blue Scandinavia MD 83, trailing **B**, had a TCAS warning at the same time in the same airspace. It is not certain, though, that that warning originated from **A**.

The pilot, also owner of aircraft **A**, has stated that he flew the one-pilot concept, for which the aircraft type is approved, but for safety reasons had hired a co-pilot with commercial rating. The pilot himself planned the flight and upon engine start he gave the planning forms and the Jeppesen charts and plates to the co-pilot. During the take-off from runway 30 the co-pilot insisted upon a right turn for Dunker which puzzled the pilot as he had earlier made left turns in ”Dunker 1 Y” departure. During the ensuing confusion the pilots forgot to switch on the transponder, change to assigned radio frequency, report on that frequency and to keep assigned altitude. The co-pilot has told SHK that he reversed the procedure and tuned the wrong departure beacon and thus confused the pilot.

The military recordings of the flight paths (see Encl. #2) show that the assigned altitude of 4 000 ft was exceeded by 300 - 400 ft. The two aircraft were nearest each other at 1703.18 hrs when the lateral distance was around 2 km. The minimum altitude difference was then 690 ft (210 m). The incident is therefore regarded as an air

[1] Nautical Mile = 1 852 m

miss as the minimum allowed separation is 3 NM (5.5 km) laterally or 1 000 ft (300 m) vertically.

Conclusions

The investigation shows that the crew of aircraft **A**, in congested airspace, departed from given clearance both regarding route and altitude, forgot the transponder and thereby the aircraft became invisible on the radar and finally not reported to the Air traffic controller.

Based on the information given by the pilots SHK finds that the preparations before and co-operation during the flight had serious shortcomings. The fact that the transponder was not switched on before take-off indicates that the crew did not follow the checklist.

The co-pilot had served in this capacity earlier together with the pilot. Therefore it may be assumed that a certain confidence had developed between them, but the lack of a functioning two-pilot concept together with the reversing of the departure procedure seems to have created such great confusion that most things went wrong during the take-off and climb-out.

Both have stated that the pilot himself had assigned the roles. He always piloted and used the co-pilot as an assistant and supervisor.

Within the established air transport industry a double set of navigation charts and landing plates is most often used. A thorough briefing of a procedure is performed beforehand. This is done partly to ensure that the right procedure will be used and executed correctly and partly to ensure that both pilots fully agree on the procedure to be used. The lack of such a method can lead to serious flight safety deficiencies, which this case is an example of.

Recommendations

None.