Investigation report

D16/2007L

Infringement of radar separation minima in Helsinki TMA on September 5, 2007

Translation of the Finnish original report

FIN166 and SAS1712

A319 and MD82

INVESTIGATION NUMBER: D16/2007L **INVESTIGATORS:** Pekka Orava
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COMPLETED: June 3, 2008

Date of incident:	September 5, 2007	
Place of incident:	Helsinki Terminal Control Area (TMA)	
Aircraft types:	A319	MD82
Aircraft call signs:	FIN166	SAS1712
Damage:	No damage	
Weather:	METAR EFHK: 050850z 26004KT 210V300 9999 FEW022 14/08 Q1019 NOSIG	

Translation by Leila Iikkanen

SYNOPSIS

On Wednesday 5 September 2007 at 09.10 UTC (12.10 Finnish time), an infringement of radar separation minima occurred within Helsinki terminal control area (TMA) on final for Helsinki-Vantaa airport runway 15. The incident involved an Airbus A319 (call sign FIN166), operated by Finnair Oyj and inbound from St.Petersburg to Helsinki, and an MD82 (call sign SAS1712) operated by SAS and arriving from Copenhagen to Helsinki. The shortest horizontal distance between the aircraft, conducting a visual approach for the same runway, was less than 1.5 NM (nautical miles) while the minimum allowed separation was 3.0 NM.

The statements and comments received on the draft final report have been partly incorporated in this report.

1 FACTUAL INFORMATION

1.1 Incident

Runway 15 was in use for landings at Helsinki-Vantaa airport. Air traffic control took advantage of the good weather by also allowing visual approaches for inbound traffic. The approach controller working at the Helsinki radar control position (119.100 MHZ) cleared FIN166 directly to waypoint NURMI at runway 15 final for visual approach and exempted it from speed restrictions (”free speed”). After FIN166 changed over to the Helsinki arrival (119,900 MHZ) frequency, the controller cleared it for visual approach for runway 15 as number one in sequence. When FIN166 was on downwind leg, before crossing the final for runway 22L, the radar controller transferred it to the tower frequency (118.600 MHZ). The tower controller cleared FIN166 to land immediately after the initial contact.

Helsinki radar controller exempted SAS1712 from speed restrictions (”free speed”) and vectored it towards right-hand base leg for runway 15 for visual approach. When SAS1712 was, according to radar recordings, at a distance of about 25 NM from runway 15, Helsinki radar released it to the arrival frequency. During initial contact, SAS1712 reported flying in visual meteorological conditions.

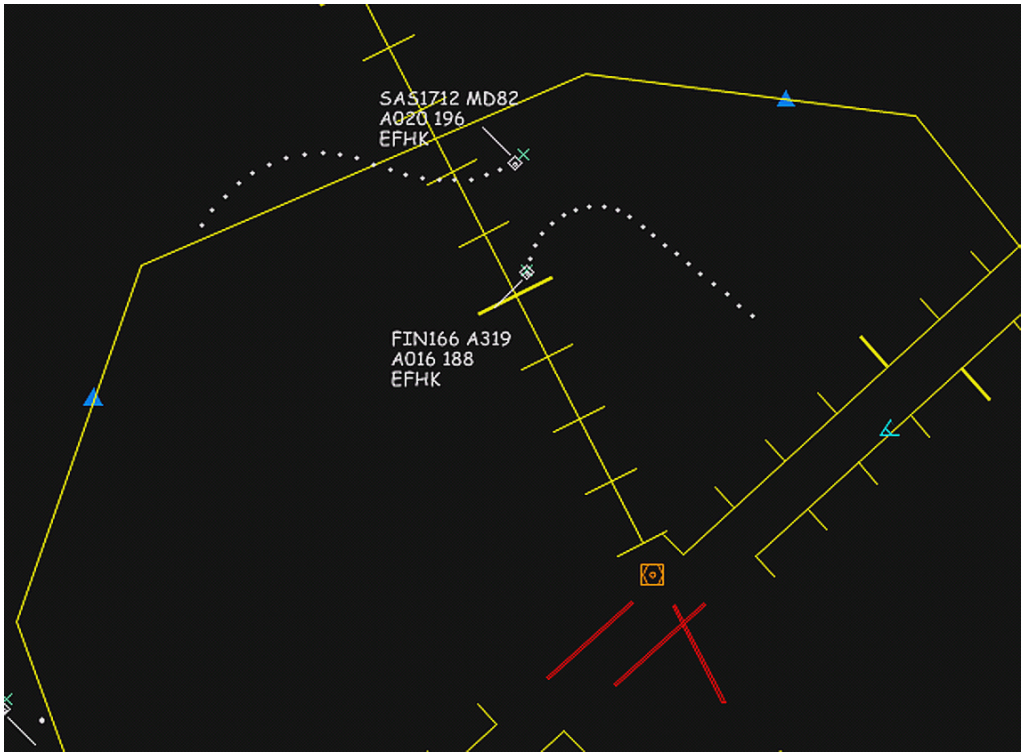
When SAS1712 was about 16 NM from runway, the radar controller gave it a permission to reduce airspeed (”you may reduce…”) below 240 KT (knots), and about 40 seconds later instructed it to reduce airspeed below 220 KT. The controller cleared SAS1712 for visual approach when it was on long right-hand base leg, according to radar recordings, and had approximately 11 NM to go. At that time, FIN166 was on the tower control frequency, on left downwind leg abeam runway 15 threshold, and it had already been cleared to land.

When SAS1712 was on right base leg about 8 NM from runway 15 threshold and FIN166 on left base leg about 5 NM from threshold, Helsinki arrival controller informed SAS1712 about the position of FIN166. SAS1712 reported having FIN166 in sight and asked if FIN166 was number one in sequence. The controller confirmed this and asked whether SAS1712 was able to continue visual approach and maintain own separation to the aircraft flying ahead. SAS1712 reported that they were too close and would turn slightly left (”…in that case we turn a little

left…this is too close"), which the controller accepted. After a while SAS1712 announced that they would have to fly a circle to the left to gain sufficient distance from the aircraft ahead ("we are gonna have to make a three sixty…this is less than half a mile…"), which the controller also accepted. While SAS1712 continued turning to the left, safe separation was re-established. The shortest horizontal distance between FIN166 and SAS1712 was less than 1.5 NM, while the minimum allowed separation is 3.0 NM. At the time when the separation was lost, the airspeed of SAS1712 was about 230 KT.

At the time of the incident, FIN166 was turning to the left base leg for runway 15 at 1900 FT (feet), and SAS1712 was turning to final for the same runway at 2100 FT. The vertical distance between the aircraft was about 200 FT, which means that the minimum vertical separation of 1000 FT was not maintained either.

The tower controller informed FIN166 of SAS1712 which was turning away, and FIN166 reported having it in sight. Both FIN166 and SAS1712 received a Traffic Advisory (TA) from the TCAS (Traffic Collision Avoidance System), but no Resolution Advisory (RA). The pilots of both FIN166 and SAS1712 flew the approach in accordance with the instructions and ATC clearances.



Picture 1. Recorded radar image of FIN166 and SAS1712 flight tracks on final for runway 15.

At the time of the incident, all control positions necessary for the prevailing traffic density were manned at Helsinki-Vantaa ATC, both in approach control and aerodrome control tower. Traffic density was not particularly high when the loss of separation occurred, but was becoming higher and emphasizing on inbound traffic. The routes of FIN166 and SAS1712 were straightened and the planes were cleared for visual approaches for runway 15. This procedure aimed to expedite their landings and to make room for momentarily increasing inbound traffic.

FIN166 and SAS1712 were on different radio frequencies when the incident occurred. The tower controller does not usually listen to the Helsinki arrival frequency, since it causes interference. Radio communications related to the incident were mainly conducted on the Helsinki arrival frequency, and no other controllers were involved in the situation.

The operative supervisor at Helsinki-Vantaa ATC undertook the analysis of the incident immediately. The ATC estimated that there was no risk of collision, since the pilots of SAS1712 had FIN166 in sight.

Helsinki approach radar is equipped with a conflict alert function (Short Term Conflict Alert, STCA), but it has not been taken into operative use because of the large amount of nuisance warnings created.

1.2 Reporting of the incident

The controller at Helsinki arrival position made an ATC anomaly and observation report immediately after the incident, and also marked it as a flight safety report for authorities in accordance with Aviation Regulation GEN M1-4. However, the report was not faxed to the Finnish Civil Aviation Authority and Finavia's Safety and Quality Unit as instructed, nor was the incident entered in the ATC log or reported to the area control centre as required in case of serious incidents. Finavia's Safety and Quality Unit received the mailed flight safety report on Friday, September 7, 2007 and forwarded it on Monday, September 10. The Accident Investigation Board received the report about five days after the incident.

The pilots of FIN166 made a flight safety report of the incident in accordance with Aviation Regulation GEN M1-4, and it was received by the Accident Investigation Board on the next day. This report did not show that the incident was serious. The pilots of SAS1712 told ATC that they would file a report, but no report was actually submitted. SAS delivered the captain's statement on the incident later at the investigators' request.

2 ANALYSIS

2.1 Helsinki arrival control position

ATC tried to expedite the landing of FIN166 and SAS1712 to make room for other inbound traffic. The Helsinki arrival controller told having first estimated that FIN166 and SAS1712 would not affect each other. For this reason, the aircraft were not provided traffic information about each other in sufficient time. The required separation was not maintained merely by adjusting the airspeed of SAS1712, and the controller did not interfere in the situation with sufficient initiative so as to avoid the infringement of separation minima. SAS1712 was cleared for visual approach, but it had not received nor acknowledged a clearance to continue visual approach maintaining own separation to the aircraft ahead. To avoid getting too close to FIN166, SAS1712 had to make an avoiding manoeuvre to the left, and to gain sufficient distance to the aircraft ahead it also had to fly a circle on final for runway 15. The controller did not vector SAS1712 for a new approach after the incident, but only accepted the actions suggested by the pilots.

The Helsinki arrival controller told having focused on sequencing the upcoming heavier traffic together with the Helsinki radar controller before the incident. One factor probably affecting the sequence of events was that the Helsinki arrival controller did not pay enough attention to the aircraft conducting visual approaches.

Another factor contributing to the separation minima infringement was the earlier decision about the arrival sequence of FIN166 and SAS1712. Based on the recorded radar data, considering the approach direction, airspeed and distance of SAS1712, it would have been more flexible to allow SAS1712 to land as number one and to vector FIN166 to runway 15 final as number two. Since no traffic information was given and the aircraft were on different frequencies, the pilots did not form a mental image of essential traffic. The SAS1712 pilots stated that when they first saw FIN166, they thought that it was departing traffic from Helsinki.

2.2 ATC instructions

According to Helsinki ATC operational manual, responsibility for the separation of inbound aircraft lies with Helsinki arrival control until landing. One exception to this main rule is mentioned in the instructions, but it was not applied to the case under investigation. Aircraft are only released to the aerodrome control tower for landing or go-around.

Helsinki-Vantaa airport has a rule concerning visual approaches (AIP EFHK AD 2:4:10), according to which: ”Due to the VFR traffic flying below IFR traffic an aircraft carrying out visual approach shall maintain an altitude of at least 600 M (2000 FT) MSL until DME 7 HEL and established on the final. The final stage of a visual approach shall be performed at descent profile equivalent to at least 3 degrees.” This rule makes it easier for controllers to anticipate the flight path of an aircraft conducting a visual approach.

The instructions available to the ATC can, if correctly followed, be considered sufficient to prevent this kind of incidents.

2.3 Reporting procedure and classification of the incident

Instructions for reporting accidents, serious incidents and occurrences are given in Finnish aviation regulation GEN M1-4. Air traffic controllers and flight information service officers also use form ILL-3801, anomaly and observation report for air navigation services, which also contains instructions for using the form to make a report in accordance with regulation GEN M1-4. The form states that in case of an aviation accident, Finavia’s ATS instruction and order (IAM) SAR ”Instructions for ATC on alerting procedures in case of an aviation accident” must also be complied with. The form does not, however, mention that the IAM SAR instruction should also be followed when reporting serious incidents. During the investigation, Finavia issued a new ATS instruction and order SAR 19 ”Instructions for ATC and flight information services on reporting aviation accidents and serious incidents”, which has replaced the above-mentioned IAM SAR instruction.

In paragraph 1 of its statement on the draft of this investigation report, the Finnish Civil Aviation Authority states that it has, in November 2006, made a remark to Finavia about the shortcomings of form ILL-3801. In November 2007, Finavia made a satisfactory proposal for a corrected form to be used by air navigation services,

which the CAA approved. In the new approved version of form ILL-3801, the deficiencies mentioned in this investigation report have been corrected.

ATC is required to send the flight safety report in accordance with GEN M1-4, including any attachments, by fax both to the Finnish Civil Aviation Authority and Finavia's Safety and Quality Unit within the time limits set in the regulation, but in this case the report was not faxed. It took about five days before the CAA and Accident Investigation Board received the information. Helsinki ATC operational manual lists the duties of a shift supervisor, which include e.g. *monitoring and ensuring, as far as possible, that the ATC logs and reports have been properly filled in.* The fact that the front page of GEN M1-4 report form was not faxed at all caused significant delay in the flow of information.

Aviation regulation GEN M1-4 requires that in case of an accident or serious incident, the air traffic controller or flight information service officer shall immediately report it to the area control unit of his/her own area, which in turn shall report it to the Accident Investigation Board and Finnish Civil Aviation Authority without delay. The area control unit shall ensure that the Civil Aviation Authority also receives a written report of the incident.

Severity classification of aviation incidents is largely based on the following documents: ICAO Annex 13, ICAO Doc 4444, European Council Directive 94/56/EC, Eurocontrol ESARR-2 and national aviation regulation GEN M1-4. Eurocontrol has, by the ESARR 2 regulation, issued a recommended classification scheme for ANS-related safety occurrences, according to which an infringement of separation minima so that the distance between the aircraft is less than half of the prescribed minimum is considered as a serious incident. Also when a near collision has required an avoiding manoeuvre to avoid a collision or an unsafe situation, ICAO Annex 13, European Council Directive 94/56/EC, Eurocontrol ESARR-2 recommended classification scheme and national aviation regulation GEN M1-4 define the situation as a serious incident.

In the ATC initial analysis, the infringement of separation minima under investigation had been classified as B/A (incident / serious incident). The classification was justified by explaining that although the separation was less than half of the prescribed minimum, ATC considered that there was no risk of collision since SAS1712 had FIN166 in sight. Because of this severity classification, ATC did not follow the procedure established for serious incidents.

The fact that the separation minima infringement was, contrary to applicable instructions, interpreted as an incident and not a serious incident, also delayed the provision of information to authorities. Because of this delay, the flight data recorder and cockpit voice recorder recordings could not be obtained for investigation purposes.

In their Air Safety Report, the pilots of FIN166 estimated the level of risk associated with the incident as ”low”. According to the SAS1712 captain's statement, they had no difficulty in preventing the situation from getting worse, since they noticed FIN166 in time.

3 CONCLUSIONS

3.1 Findings

1. The air traffic controllers had the required licences and ratings, and they were valid.
2. The aircraft followed the instructions given by ATC.
3. The weather enabled visual approaches.
4. The controller's workload was normal.
5. Runway 15 was in use for landings.
6. FIN166 was making a visual approach via left downwind leg and SAS1712 via right base leg, both for the same runway.
7. At the time of the incident, FIN166 was on the tower frequency and SAS1712 on Helsinki arrival frequency.
8. Radar separation minima were not maintained between SAS1712 and FIN166.
9. The shortest distance between FIN166 and SAS1712 was less than half of the prescribed radar separation minima.
10. The pilots of SAS1712 saw FIN166, but thought first that it was departing traffic from Helsinki.
11. The controller informed SAS1712 of FIN166, which was approaching as number one in sequence, so late that an infringement of separation minima was almost inevitable.
12. The controller asked SAS1712 if it was able to continue visual approach maintaining own separation to FIN166.
13. SAS1712 told that they were too close to FIN166, reported turning left and, a moment later, reported having to fly a circle to the left to be able to continue the approach.
14. FIN166 saw SAS1712, which was turning away, after the tower controller informed them of the situation.
15. Both aircraft received a TCAS Traffic Advisory, but no Resolution Advisory.
16. FIN166 and ATC made a flight safety report of the incident.
17. ATC did not submit the flight safety report to the authorities as required in their instructions.
18. SAS1712 crew did not file a flight safety report, but the captain's statement on the incident was received later from the airline.
19. ATC handled the case as an incident, although it was a serious incident by definition.
20. ATC instructions or published working procedures did not contribute to the incident.

21. According to the ESARR 2 severity classification scheme, the separation minima infringement was of severity level A, i.e. serious incident.

3.2 Probable cause

The serious incident occurred because the air traffic controller cleared two aircraft for visual approach for the same runway without verifying their flight paths and ensuring that the prescribed separation minima would be maintained.

Contributing factors were the late traffic information provided by the controller to the aircraft, the aircraft being on different radio frequencies, and the respective approach sequence chosen for the aircraft.

4 RECOMMENDATIONS

The investigation showed that:

a. ATC did not report the serious incident as required by national aviation regulation GEN M1-4. During the investigation, Finavia issued new instructions to ATC and flight information services on reporting aviation accidents and serious incidents.

b. ATC deviated from the recommended severity classification scheme when determining the severity of the incident.

c. The ANS anomaly and observation report form ILL-3801 did not directly indicate how serious incidents should be reported. The deficiencies found have been corrected in the new report form, approved by the Finnish Civil Aviation Authority and taken into use during the investigation.

1. Based on the investigation, it is recommended that Finavia should ensure that its personnel will report any serious incidents related to air navigation services in accordance with the applicable regulations.