
Loss of Separation East of Turku Airport on 23.10.2002

Micro-summary: Departing Gulfstream busts a clearance and violated separation minimums with an arriving ATR-72.

Event Date: 2002-10-23 at 1410 UTC

Investigative Body: Finland Accident Investigation Board (AIB), Finland

Investigative Body's Web Site: <http://www.onnettomuustutkinta.fi/>

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Investigation report

C 10a/2002 L

Translation of the original Finnish report

Loss of Separation East of Turku Airport on 23.10.2002

HB-VNF Gulfstream G100

OH-KRA ATR-72-201

According to Annex 13 of the Convention on International Civil Aviation, paragraph 3.1, the purpose of aircraft accident and incident investigation is the prevention of accidents. It is not the purpose of aircraft accident investigation or the investigation report to apportion blame or to assign responsibility. This basic rule is also contained in the Investigation of Accidents Act, 3 May 1985 (373/85) and European Union Directive 94/56/EC. Use of the report for reasons other than improvement of safety should be avoided.



SUMMARY

On Wednesday, October 23, 2002, at 14.10.35 UTC an incident took place east of Turku Airport, on runway 08 extension at an altitude of 4200 ft above sea level when a Gulfstream G100 (HB-VNF), a corporate aircraft on a non-commercial flight from Turku to Bern, during climb passed through the altitude of an ATR-72-201 (FIN229) on a scheduled flight, operated by Finnair Oyj, at a horizontal distance of about 1.8 NM. The aircraft were on IFR flights under visual meteorological conditions. The Accident Investigation Board Finland appointed an investigation commission on November 11, 2002, to investigate the incident. Airline transport pilot Jussi Haila was appointed chairman of the commission and air traffic controller Erkki Lepola and MSc Ville Hämäläinen were appointed members of the commission.

HB-VNF received takeoff clearance from runway 08 at Turku Airport with initial climb restriction 3200 ft on the altimeter setting of QNH 1003. HB-VNF was cleared to continue climb after established radial 236 from Turku VOR/DME RUSKO via right turn. At the same time FIN229, approaching the left down-wind leg of runway 08 from east, followed its clearance to descend to 4200 ft on QNH. HB-VNF did not comply with its initial climb restriction, but continued the climb passing through the FIN229 altitude of 4200 ft. At the passing-through time the horizontal distance between the two aircraft was about 1.8 NM, and HB-VNF had initiated its right turn. The pilots of both aircraft saw the other aircraft on their TCAS displays. The pilots of FIN229 also obtained visual contact to HB-VNF.

The investigation indicated that the pilots of HB-VNF had not understood the initial climb restriction of 3200 ft in their clearance, but continued their climb and passed through the altitude of FIN229 approaching Turku resulting in a loss of required separation between the two aircraft. According to the commander's statement, they had understood that they had to climb on runway heading to 3200 ft and turn on course thereafter. The first officer had, however, correctly read back the air traffic control clearance. A contributing factor to the incident was that FIN229 flying in accordance with its visual approach clearance was not given any traffic information. Traffic information is not required for two separated aircraft, but in the investigation commission's opinion the traffic information would have implied provision of good air traffic service in this case.

The investigation commission recommended that the Finnish Civil Aviation Administration together with Turku Airport would develop and apply standard instrument departure and arrival routes with mandatory separation between them at Turku Airport. Such standard instrument departure routes would better outline the traffic and improve its control. The pilots of aircraft equipped with modern cockpit technology would benefit more from their cockpit equipment if assisted by standard instrument routes.



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The source material is stored at the Accident Investigation Board Finland.



ABBREVIATIONS

CAVOK	Visibility, cloud and present weather better than prescribed values or conditions
DME	Distance measuring equipment
FL	Flight level
hPa	Hectopascal
IFR	Instrument flight rules
METAR	Aviation routine weather report
MHz	Megahertz
NDB	Non-directional radio beacon
NM	Nautical mile
PF	Pilot flying
PHI	Confidential reporting system
PNF	Pilot not flying
QNH	Altimeter sub-scale setting to obtain elevation above sea level
RA	Resolution advisory
TA	Traffic advisory
TAF	Aerodrome forecast
TCAS	Traffic collision avoidance system
UTC	Co-ordinated universal time
VMC	Visual meteorological conditions
VHF	Very high frequency
VOR	VHF omnidirectional radio range



1 FACTUAL INFORMATION

1.1 History of the flights

1.1.1 Flights involved in the incident

The incident took place on Wednesday 23.10.2002 at 14.10.35 UTC on Turku runway 08 extension at an altitude of 4200 ft above sea level when the corporate aircraft HB-VNF during climb passed through the FIN229 altitude at a horizontal distance of about 1.8 NM.

The Swiss HB-VNF was a twin-engine corporate jet Gulfstream G100 with an eight passenger seat configuration. The aircraft was departing on a non-commercial flight from Turku to Bern, Switzerland, and there were four passengers and two crew members on board. The commander of the aircraft acted as pilot flying (PF) and the first officer as pilot not flying (PNF).

FIN229 (OH-KRA) was a twin-turboprop airliner ATR-72-201 with a 68 passenger seat configuration. The aircraft was on a scheduled flight from Helsinki to Turku, and there were 33 passengers and four crew members on board. The first officer of the aircraft was PF and the commander PNF.

The sun set in Turku at 14.59. At the time of the incident daylight prevailed. The weather was clear and the aircraft flew in accordance with IFR rules under Visual Meteorological Conditions (VMC). In the entire report all times are given in co-ordinated universal time (UTC), Finnish time minus 3 hours.

1.1.1 Initial situation

The air traffic controller had started her work shift in the Turku combined tower/approach unit on Wednesday 23.10.2002, at 10.30 UTC. She was alone in the air traffic control. She gave start-up clearance to HB-VNF at 14.00. HB-VNF requested taxi clearance at 14.03, and the air traffic control cleared it to taxi to the holding position runway 08.

FIN229 contacted the Turku air traffic control at 14.03: *"Turun torni, iltapäivää, Finnair 229, pinta 80, 36 DME."* (Turku tower, good afternoon, Finnair 229, FL 80, 36 DME.) The air traffic controller gave to FIN229 clearance in English: *"Iltapäivää, Finnair 229, after MEDOT cleared direct LIE, when ready descent 4200 feet on QNH 1003, transition level 55, no delay, expect visual approach runway 08, left circuit"*. The FIN229 crew read back the clearance correctly and continued its flight accordingly.

Immediately thereafter at 14.04 HB-VNF informed to be ready to copy the airway clearance. The controller gave to the aircraft the following clearance: *"HNF, cleared to Bern via KORPO, UT81, RUNGA, flight level 380, after departure maintain 3200 feet until on radial 236, squawk 2020"*. The first officer read back the clearance as follows: *"So we*

are cleared to destination via KORPO, flight level 380, initially climb 3500 feet, until on radial 236, and squawk 2020, HNF". The controller corrected: "HNF, after departure 3200 feet until on radial 236". HB-VNF read back the clearance: "Correction, 3200 feet until on radial 236". The controller approved the read-back and asked the aircraft to report when it was ready for takeoff.

Thereafter the HB-VNF crew confirmed at 14.06: "HNF, confirm we can proceed on the radial via departure via right hand". The controller replied: "Confirming right turn after departure".

At 14.06 FIN229 reported in English to leave FL 80 initiating descent to 4200 ft. The radar recording indicates that the aircraft flew towards LIETO at that moment.

The radar recording of South Finland Air Navigation Centre (EFES) was available for use in the investigation. The altitude data are based on the standard air pressure of 1013 hPa. The current sea level pressure (QNH) was 1003 hPa at Turku Airport. Due to the difference between these pressures, the radar recording indicates about 300 ft higher altitudes than the altitudes at the altimeter setting of Turku QNH.

1.1.2 Aircraft passing each other

The controller asked HB-VNF at 14.07.13 whether it was ready for takeoff, and HB-VNF replied affirmatively. The controller gave take-off clearance: "HNF line up runway 08, wind 100 degrees 13 knots, cleared for takeoff runway 08, right turn". The crew acknowledged: "Cleared for line up, takeoff runway 08, right turn, HNF".

FIN229 reported in English to be ready for visual approach at 14.08.18. The radar recording indicates that it was descending through FL 57 at about 15 NM from the airport at that moment. The controller cleared FIN229 to the left down-wind leg of runway 08 and instructed it to maintain 4200 ft after reaching the altitude.

The radar recording indicates that HB-VNF passed through the initial clearance altitude of 3200 ft at a distance of 3.0 NM from the airport at 14.10.00. The aircraft had climbed following the runway 08 direction. The distance to FIN229 was 5.0 NM at that time.

FIN229 reported in English at 14.10.17 to have reached 4200 ft and immediately thereafter enquired about the opposite traffic in Finnish. The controller replied in Finnish that the opposite aircraft had been cleared to 3200 ft until on radial leading to KORPO. The radar recording indicates that FIN229 was then at 6.9 NM from RUSKO direct over the runway 08 extension at the altitude of 4500 ft at the standard altimeter setting of 1013 hPa (4200 ft on QNH) shown on the radar recording. At the same time HB-VNF climbed through 4100 ft at standard altimeter setting (3800 ft on QNH) and initiated its right turn. The distance between the two aircraft was then 2.9 NM. FIN229 flew towards the left down-wind leg according its clearance.

In the interview the FIN229 first officer told that he saw HB-VNF on his TCAS display (Traffic Collision Avoidance System) when the aircraft was still on ground. According to



the pilots the FIN229 TCAS display was set at 10 NM range in this phase. After HB-VNF had become airborne, the FIN229 TCAS generated a traffic advisory (TA). TCAS did not generate a resolution advisory (RA). The sun was shining low into the FIN229 pilots' eyes preventing them from obtaining visual contact with the opposite traffic before it had climbed above the horizon. At that time the opposite aircraft was already making its right turn. The FIN229 pilots' visual contact to HB-VNF also confirmed their decision not to make any avoiding action.

The HB-VNF commander reported that he had seen the opposite FIN229 immediately after takeoff on his TCAS display which was set at 10 NM range. According to the commander he flew at the best rate of climb with the intention of reaching 3200 ft as quickly as possible. He maintained the runway direction until he reached the altitude of 3200 ft which after he initiated a right-hand climbing turn. According to the commander the minimum distance to FIN229 was slightly under 5 NM. He stated that the HB-VNF TCAS generated a TA, but not an RA.

The radar recording indicates that HB-VNF continued its right-hand climbing turn. FIN229 continued at the altitude of 4500 ft (4200 ft on QNH) towards the left down-wind leg of runway 08. HB-VNF passed through the FIN229 altitude at 14.10.35, at which time the horizontal distance was 1.8 NM according to the radar recording. This was also the minimum distance between the two aircraft. Figure 1 illustrates the aircrafts' flight tracks based on the radar recording.

The air traffic controller transmitted to HB-VNF in English that she had assumed the aircraft to maintain the altitude of 3200 ft until reaching radial 236. HB-VNF replied that it had understood that it had to maintain runway direction to 3200 ft and then make a turn to heading 236. The controller reverted to the matter again about one minute later repeating how she had given her clearance and how HB-VNF had read it back correctly. The commander told her that to avoid misunderstanding the clearance should have been given as follows: *"Climb 3200 feet, intercept radial 236, and when established, climb to level 380"*. If given in this way, the crew would have understood the clearance correctly.

1.1.3 Events after the aircraft had passed each other

After the aircraft had passed each other, the controller cleared FIN229 for visual approach via left circuit to runway 08. HB-VNF continued its climb and after reaching radial 236 from RUSKO VOR/DME continued towards KORPO.

After FIN229 had landed the controller asked in Finnish how its pilots understood the clearance given to HB-VNF. The pilots replied that they would come over to the air traffic control to fill an incident report and to discuss the matter.

After HB-VNF had arrived in Bern, the commander phoned the Turku air traffic control at 17.25 and expressed his personal opinion of the incident and of his TCAS observations.

The air traffic controller filled out an incident report according to the Aviation Regulation GEN M1-4 and a confidential report of the Finnish Civil Aviation Administration. Also the FIN229 commander filled out an incident report according to the GEN M1-4 and a company in-house air safety report.

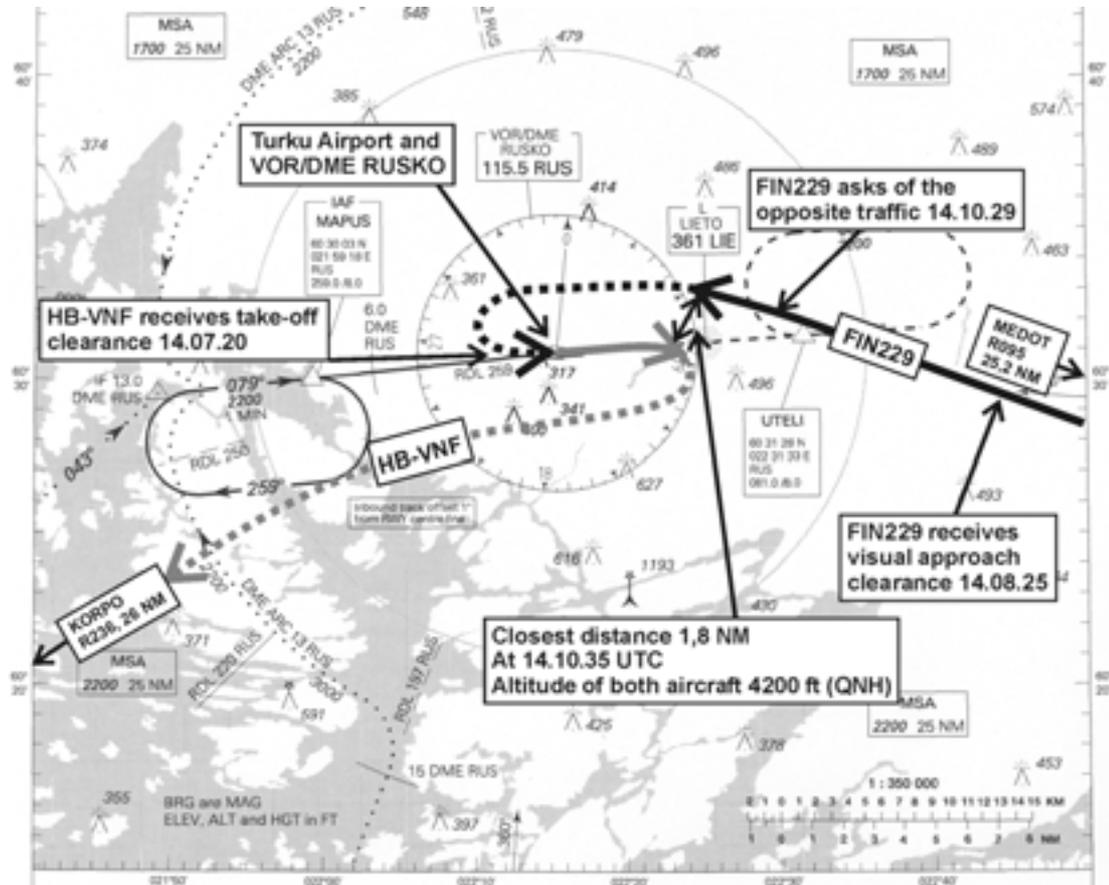


Figure 1. Flight tracks

1.2 Injuries to persons

No injuries. There were four passengers and a crew of two on board HB-VNF. FIN229 had 33 passengers and a crew of four.

1.3 Damage to aircraft

No damage.

1.4 Other damage

No other damage.



1.5 Personnel information

1.5.1 HB-VNF crew

Commander: Male, 36 years
Licence: Airline transport pilot, valid until 21.10.2007
Medical certificate: Class 1, valid until 4.1.2003
Ratings: All required ratings were valid.
Flight experience: 713 h on Gulfstream G100 and 7555 h in total on all aircraft types

First officer: Male, 40 years
Licence: Airline transport pilot, valid until 25.9.2007
Medical certificate: Class 1, valid until 20.3.2003
Ratings: All required ratings were valid.
Flight experience: 821 h on Gulfstream G100 and 3064 h in total on all aircraft types.

1.5.2 FIN229 crew

Commander: Male, 28 years
Licence: Airline transport pilot, valid until 31.7.2007
Medical certificate: Class 1, valid until 4.4.2003
Ratings: All required ratings were valid.
Flight experience: About 700 h on ATR-72 and about 3500 h in total on all aircraft types.

First officer: Male, 29 years
Licence: Commercial pilot, valid until 22.1.2007
Medical certificate: Class 1, valid until 20.9.2003
Ratings: All required ratings were valid.
Flight experience: About 500 h on ATR-72 and about 1500 h in total on all aircraft types

1.5.3 Air traffic controller

Air traffic controller: Female, 38 years
Licence: Air traffic controller, valid until 28.5.2004
Medical certificate: Air traffic controller's medical certificate valid until 28.5.2004
Ratings: All required ratings were valid.



1.6 Aircraft information

HB-VNF, Gulfstream G100, twin-engine corporate jet with an 8 passenger seat configuration, operator Diamair SA, max takeoff weight 11181 kg.

FIN229, ATR-72-201, OH-KRA, twin-turboprop airliner with a 68 passenger seat configuration, operator Finnair Oyj, max takeoff weight 21500 kg.

1.7 Meteorological information

A weak high-pressure ridge was over Southern Finland. The weather was clear and winds were light.

The weather at Turku Airport was on 23.10.2002:

Terminal area forecast (TAF), valid between 12.00 and 21.00 UTC:

Wind 100°/14 kt, visibility over 10 km, clouds 1-2/8 2000 ft, 5-7/8 9000 ft.

Weather observations, METAR:

13.50 UTC: wind 100°/15 kt, weather CAVOK, temperature 0 °C, dew point -4 °C, QNH 1003

14.20 UTC: wind 100°/15 kt, weather CAVOK, temperature 0 °C, dew point -4 °C, QNH 1002

The sun set at 14.59. Daylight conditions prevailed.

1.8 Aids to navigation

VOR/DME RUSKO was the basis for the departure route of HB-VNF. The beacon is located north of the runway within the Turku Airport area. It uses the frequency of 115.500 MHz, is 187 ft above sea level and its coordinates are 60°30'54.69" N, 022°15'23.50" E.

The NDB beacon LIETO was also used in issuing clearances. It is located on runway 08 extension at a distance of 4.8 NM from VOR/DME RUSKO.

In addition the following reporting points were used in issuing clearances: MEDOT located on radial 095 from VOR/DME RUSKO at a distance of 25.2 NM, KORPO on radial 236 at a distance of 26 NM and RUNGA on radial 235 at a distance of 89 NM.

1.9 Communications

The radio traffic used the Turku Airport frequency of 118.300 MHz. The quality of radio transmissions was good. HB-VNF used English as radio traffic language. FIN229 used Finnish in its initial call, but the controller gave her clearance in English to FIN229. FIN229 enquired in Finnish from the controller as to the opposite traffic displayed on its



TCAS. To this the controller replied in Finnish. After FIN229 had landed, she again asked the pilots in Finnish how they understood the route clearance given to HB-VNF.

The commander of HB-VNF stated in his report to the investigation commission that he considered it bad practice to use Finnish in the radio traffic in Turku because in his opinion it is important to understand the radio traffic to improve the pilot's traffic situation awareness and to prevent eventual problems. In his opinion English should be used immediately when a foreign aircraft is on the frequency.

In this case the use of Finnish did not contribute to the incident, and the clearances prior to the incident were given in English.

1.10 Aerodrome information

The incident took place on the runway 08 extension at Turku Airport (EFTU). The airport is located at 60°30'53" N, 022°15'42" E and it is at 161 ft above sea level. The magnetic direction of runway 08/26 is 080°. The runway has asphalt coating and it is 2500 m long and 60 m wide.

1.11 Flight recorders

Data of the flight recorders of the aircraft was not available during the investigation.

1.12 Organisational and management information

DiaMed Ltd, a Swiss international medical research company, has a flight unit called Diamair SA, which started its operations in 1999. The purpose of the unit is to transport the company's own personnel. Diamair SA has its own operations manuals and flight procedures. The HB-VNF commander was also the chief pilot in the unit. The first officer was responsible for the operator's technical operations and aircraft maintenance. Both pilots also flew smaller piston engine and turboprop aircraft.

Finnair Oyj is a national airline company established in 1923 which operates domestic and international scheduled air traffic with passenger turboprop and jet airliners.



2 ANALYSIS

2.1 Air traffic control operations

The air traffic controller gave HB-VNF an air traffic control clearance to maintain 3200 ft after departure until the aircraft is established on radial 236. The HB-VNF first officer read back the initial climbing altitude as 3500 ft. The air traffic controller corrected the altitude to 3200 ft which the first officer read back correctly.

FIN229 flew following its arrival clearance and reported to be ready for visual approach. The air traffic controller gave to it onward clearance to maintain the altitude of 4200 ft and to continue visual approach via left circuit to runway 08. The air traffic controller's solution to control the traffic situation was right, appropriate under the prevailing conditions and in accordance with the principles of combined terminal and approach control but the arrival clearance did not guarantee separation for the entire approach route of FIN229 if it had not reached VMC. The intention of the clearance was to maintain the vertical separation between the two aircraft. The Finnish air traffic controller's handbook (LJJK) states that in the vicinity of airport the reduced vertical separation may be applied when the air traffic controller is able to continuously see the two aircraft and there is no collision risk. During the interview the air traffic controller told that it was her intention to apply this method. LJJK states that always when omitting of separation between aircraft is intended, traffic information has to be given to the involved aircraft including affecting traffic when applicable.

If the air traffic controller had given to FIN229 traffic information about the departing HB-VNF, the pilots on board the two aircraft would have had a better understanding of the traffic situation. Traffic information is not required for aircraft with separation between them, but the investigation commission considers that in this case it would have provided better air traffic service.

The radar display monitor located in the air traffic control could have been used to control how the aircraft complied with their clearances. In this case it would have been possible to notice on the display how HB-VNF passed through the altitude of 3200 ft. After having noticed the passing through, the air traffic controller should have requested the aircraft to give its altitude on radio. She did not enquire from HB-VNF as to its altitude until FIN229 had reported its observation to her. Taking into account the vertical speed of HB-VNF, the air traffic controller could not have prevented the loss of separation in this case.

After the incident the air traffic controller told HB-VNF twice how they should have understood the clearance and how the aircraft had read it back. Furthermore, she asked the FIN229 pilots in Finnish how they understood the given clearance. This kind of discussion on a radio frequency is unnecessary and against good radio traffic practice.

2.2 Aircraft pilots' actions

HB-VNF climbed in runway direction to 3200 ft and thereafter entered a right climbing turn. In accordance with its air traffic clearance it should have maintained 3200 ft until on radial 236. The pilots had not understood the initial climb restriction of 3200 ft in their clearance. According to the commander they understood that they should climb in the runway direction to 3200 ft and then turn on course. The first officer had, however, read back the air traffic clearance correctly.

HB-VNF requested start-up clearance from the Turku tower and received it immediately. It requested taxi clearance 2 minutes 46 seconds later and received taxi clearance to holding position runway 08 including information on air pressure QNH 1003. The notes on the flight log about the taxi clearance are visible on the uppermost row in Figure 2.

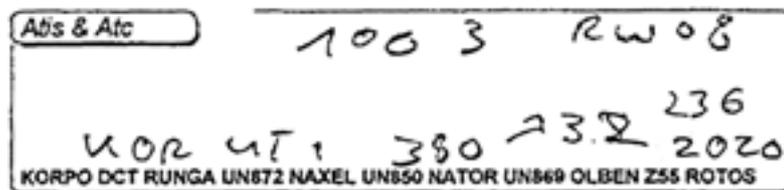


Figure 2. Notes in the upper corner on the HB-VNF operative flight plan

HB-VNF called the Turku tower one minute after starting to taxi and reported to be ready to copy the route clearance. The pilots requested the clearance because the aircraft was equipped with a flight management system (FMS), into which the departure route data have to be entered manually prior to takeoff when the departure airport does not have any designated standard instrument departure route. The air traffic controller gave the clearance immediately: "HNF, cleared to Bern via KORPO, UT81, RUNGA, flight level 380, after departure maintain 3200 feet until radial 236, squawk 2020". The first officer read back the clearance correctly except for the altitude of 3200 ft which he read as 3500 ft. The air traffic controller corrected the altitude to 3200 ft, after which the first officer read it back correctly. The note on the log about the clearance is visible on the second row in Figure 2. Also the altitude correction can be seen.

Although the first officer read back the clearance correctly, it is possible that the crew in carrying out takeoff briefing and setting the cockpit navigation aids for takeoff, misinterpreted the up arrow in front of the altitude marking 3.2 in the log. The commander stated in his report that they understood the clearance so that they would climb directly to 3200 ft and thereafter home to radial 236. Therefore they also set the aircraft altitude alerter at FL 380. Had they understood the first restrictive altitude to be 3200 ft in the route clearance, they would have set altitude alerter at 3200 ft. In manual controlling the altitude alert function would have informed about the approach of the set altitude and about reaching it, whereas in autopilot mode it would have stopped the climb and levelled the aircraft at this altitude.

Next HB-VNF enquired the direction of the turn after departure. The FMS also needs the direction of the turn so that it can calculate and project the planned flight path on the



cockpit navigation display. The flight path display is always used in aircraft equipped with an FMS independent from aircraft controlling mode, i.e. manually or autopilot engaged. For this reason giving the turn direction in connection with the take off clearance is too late from the pilots' point of view. This procedure slows down the runway use because the aircraft computer must calculate the flight path and the pilots have to check its correctness prior to takeoff. The procedure could be significantly improved by giving the route clearance prior to engine start-up enabling the pilots to enter the data into the aircraft computer and to check the planned departure route in good time. The Turku air traffic control has to request the route clearance from the Tampere area control centre in accordance with the letter of co-operation with taxi function of the Pommery system. The letter of co-operation agreement between Turku Airport and the area control centre does not contain any obstructions why the clearance could not be requested before the aircraft engines are started.

If standard instrument departure routes are designated to Turku Airport, they would facilitate the cockpit crews' work in aircraft equipped with modern cockpit technology. The FMS revision system would guarantee that up-to-date routes are available for pilots. The cockpit work would become easier if the pilots did not need to enter the departure route data into the system each time prior to takeoff, but the data could be selected and their compliance with the standard instrument departure route issued in the route manuals could be checked. The aircraft daily operating from Turku Airport would benefit from the standard instrument departure routes.

The standard instrument departure routes would also ease the air traffic controllers' work because it would not be necessary to individually prepare route clearances based on the traffic situation to each IFR aircraft. The separation between the standard instrument departure route and standard instrument arrival route would increase safety because their use would minimize risks related to insufficiently prepared route clearances.

The FIN229 crew flew complying with its air traffic clearance and descended to 4200 ft on QNH. They followed the departing aircraft on their TCAS display. The sun was shining into their eyes and they did not see the departing HB-VNF until it had climbed above the horizon. The FIN229 commander enquired from the air traffic control in Finnish as to the clearance altitude of the opposite aircraft. He was replied in Finnish that the clearance was to 3200 ft. The commander told that the opposite was climbing through 4200 ft. As the involved aircraft was foreign, this radio traffic should have taken place in English. After the two aircraft had passed each other, FIN229 received its visual approach clearance and landed on runway 08.



3 CONCLUSIONS

3.1 Findings

1. The pilots of the aircraft held valid licences and ratings required by their duties.
2. The air traffic controller held valid licences and ratings.
3. The airworthiness certificates of the aircraft were valid.
4. The HB-VNF first officer first read back the initial climbing altitude in the clearance incorrectly, but corrected it after the air traffic controller's correction.
5. FIN229 contacted the Turku air traffic control in Finnish. The air traffic controller changed into English and gave to FIN229 arrival clearance to Turku.
6. The HB-VNF pilots did not understand the route clearance correctly, but climbed above their initial clearance altitude of 3200 ft and further through 4200 ft at which altitude FIN229 was approaching Turku from east.
7. The radar recording shows that HB-VNF passed through its initial clearance altitude of 3200 ft at a distance of 3.0 NM from the airport, at a distance of 5.0 NM to FIN229.
8. At the time when HB-VNF passed through the FIN229 altitude, the radar recording indicates that the distance between the two aircraft was 1.8 NM which was also the minimum distance between them.
9. The sun was shining low into the eyes of the FIN229 pilots preventing them from obtaining visual contact with HB-VNF until it had climbed above the horizon.
10. The FIN229 pilots followed the climb of HB-VNF on their TCAS display. TCAS generated a traffic advisory (TA), but not a resolution advisory (RA).
11. The air traffic controller had intended to apply the reduced vertical separation after having made visual contact with the two aircraft and being sure that there was no collision hazard.
12. The FIN229 commander enquired from the air traffic control in Finnish as to the opposite traffic and received the reply in Finnish.
13. After the incident the air traffic controller explained twice to HB-VNF on radio how they should have understood her clearance.
14. The HB-VNF commander complained about the use of Finnish on the air traffic frequency of Turku because he did not understand the language and could not form a image of other aircraft on the basis of radio traffic. In this case the use of Finnish did not contribute to creating the incident, and the clearances prior to the incident were given in English.



3.2 Cause of the incident

The cause of the incident was the fact that HB-VNF did not comply with its initial climb clearance altitude, but continued its climb and passed through the altitude of FIN229 approaching Turku Airport, which then resulted in the loss of required separation between the aircraft.

A contributing factor was that no traffic information was given to FIN229 which was complying with its visual approach clearance. Traffic information is not required for aircraft with separation between them, but the investigation commission considers that giving one would have implied provision of good air traffic service in this case.



4 SAFETY RECOMMENDATIONS

The majority of the IFR traffic at Turku Airport is in two directions, east and southwest. The departing and arriving aircraft daily pass each other when flying in these directions. Planning separate standard instrument departure and arrival routes to Turku Airport would ensure that the traffic runs smooth and that it can be managed with more ease. With standard instrument routes the users of aircraft equipped with modern cockpit technology would benefit more from their cockpit equipment.

1. The investigation commission recommends that the Finnish Civil Aviation Administration together with Turku Airport would determine and take into use standard instrument departure and arrival routes with the required separation between them in Turku Airport.

Helsinki, August 27, 2003

Jussi Haila

Erkki Lepola

Ville Hämäläinen