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Aircraft Accident Investigation Bureau AAIB

Final Report No. 2092

by the Aircraft Accident

Investigation Bureau

concerning the serious incident (AIRPROX)

involving the Airbus A321 aircraft, registration F-GTAE

operated by Air France flight no. 1242 / callsign AFR 1242

and the Airbus A320 aircraft, registration CS-TNG

operated by Air Portugal flight no. 945B / callsign TAP 945B

on 1 July 2008

in the Geneva CTR control zone

General information on this report

This report contains the AAIB's conclusions on the circumstances and causes of the accident/serious incident which is the subject of the investigation.

In accordance with art 3.1 of the 9th edition, applicable from 1 November 2001, of Annex 13 to the Convention on International Civil Aviation of 7 December 1944 and article 24 of the Federal Air Navigation Act, the sole purpose of the investigation of an aircraft accident or serious incident is to prevent accidents or serious incidents. The legal assessment of accident/incident causes and circumstances is expressly no concern of the incident investigation. It is therefore not the purpose of this investigation to determine blame or clarify questions of liability.

If this report is used for purposes other than accident prevention, due consideration shall be given to this circumstance.

The definitive version of this report is the original in the French language.

All times in this report, unless otherwise indicated, are stated in local time (LT). At the time of the accident, Central European Summer Time (CEST) applied as local time in Switzerland. The relation between LT, CEST and UTC is: $LT = CEST = UTC + 2 \text{ hours}$

Final report

Aircraft

AFR 1242, F-GTAE, A321
Operator: Air France
Owner: Air France

From Paris - Charles-de-Gaulle LFPG to Geneva LSGG

Type of use: Scheduled commercial flight under IFR flight rules

TAP 945B, CS-TNG, A320
Operator: Air Portugal
Owner: Air Portugal

From Geneva LSGG to Lisbon LPPT

Type of use: Scheduled commercial flight under IFR flight rules

Crews

AFR 1242
CMDR: not specified
FO: not specified

TAP 945B
CMDR: not specified
FO: not specified

Location

Geneva airport, in the CTR control zone

Date and time

1 July 2008, 19:01 UTC

ATS unit

TCG Geneva, Control Tower, Aerodrome Control, Approach Control Bureau, Departure Control.

Controllers

Aerodrome controller, Swiss national, born 1956

Approach controller, Swiss national, born 1981

Airspace

D (CTR)

1 Factual information

1.1 History of the flight

On Tuesday 1 July 2008 at 18:58:00 UTC, an Airbus A321 aircraft, registration AFR 1242, en route from Paris Charles-de-Gaulle to Geneva, called Geneva TWR on the 118.70 MHz frequency. The Airbus A321 was established on the ILS extended centreline of runway 23, at a distance of approximately 9 NM. Aerodrome control asked it to call back when it was 2 NM on final approach.

At 18:59:14 UTC the aerodrome controller cleared aircraft TAP 945B, an Airbus A320 scheduled from Geneva to Lisbon, to line up and wait on runway 23.

Visibility was 10 kilometres and the runway was dry.

Communications between aerodrome control and the crew of aircraft AFR 1242 took place in French, whilst they took place in English with flight TAP 945B.

At 19:00:09, the aerodrome controller cleared aircraft TAP 945B to take off from runway 23. Aircraft AFR 1242 was 3 NM distant on final approach.

At 19:00:57 UTC, the aerodrome controller called aircraft AFR 1242 to transmit to it the wind speed on the ground and the runway in use, runway 23 with the evident intention to clear it for landing but the pilot of aircraft AFR 1242 replied that he was going around because of wind shear. According the SAMAX recording, the aircraft was nearby the threshold of the runway.

The general conditions of application of reduced separations on the runway were fulfilled.

The aircraft TAP 945B which was on the roll for take-off had not yet reached the distance of 2400m from the beginning of runway 23, minimum distance required between two aircraft, in application of reduced runway separations.

AFR 1242 was 0.5 NM from the threshold of runway 23 at an altitude of 1600 ft. The controller instructed it to climb near the threshold of the runway to 7,000 ft on the centreline and instructed aircraft TAP 945B to halt its climb at 5,000 ft. (Annex 1)

In his report – air safety report (ASR) - the pilot of aircraft AFR 1242 stated that he had received a windshear alert on final approach, at about 300 ft above ground. Characterised as fairly severe, this windshear resulted in a sudden loss of indicated airspeed, despite the pilot applying strong thrust, a discernable plunge of the aircraft on its trajectory and, simultaneously, the "windshear" alert. Again according to his statements, he immediately applied the emergency manoeuvre required by the circumstances by going around.

The Control Tower received no windshear notification or forecast of the phenomenon from MeteoSwiss. No crew reported any windshear before or after the incident.

At 19:01:19 UTC, according to the radar recordings, i.e. 17 seconds after the pilot had reported that he was going around, aircraft AFR 1242 was passing 2300 ft in a climb at a speed of 187 kt and aircraft TAP 945B, which was 1.4 NM ahead of it, was passing 1800 ft in a climb at a speed of 178 kt.

At 19:01:27 UTC, the controller carried out a telephone coordination with approach control – PRE, which was the next control sector with which AFR 1242 would continue its flight. He clearly informed the PRE controller of the situation, the latter then asked him to turn aircraft AFR 1242 immediately left, specifying the heading of 180° to be adopted.

The ADC controller did not issue any essential local traffic information to the pilot of aircraft AFR 1242; according to his statements it did not seem to him to be useful to do so, considering the evidence of visual acquisition of the aircraft which was ahead of it.

At 19:01:49, the aerodrome controller instructed aircraft AFR 1242 to turn left onto a heading of 180° for a radar climb. At 19:02:25 UTC, aircraft AFR 1242 received the instruction to continue its left climb onto heading 050° and at 19:02:32 UTC the controller transferred the aircraft to the 136.25 MHz Arrival frequency (radar recording Annex).

In his report – air safety report (ASR) the crew of flight AFR 1242 stated that they had seen the aircraft which had taken off in front of them and that the convergence had been disturbing. Their second approach proved to be just as turbulent, but with no windshear alert.

The minimum separation between the two aircraft, measured on the radar plots, was a lateral distance of 1.3 NM and an altitude difference of 300 ft.

1.2 Other similar cases

Report no. 1866 IBE3483/SWR353 dated 28 June 2003

The aerodrome controller instructed the crew of SWR353 to turn left onto a heading of 020°.

Convergence: vertical 0 ft, lateral 0.6 NM

Report no. 1983, KLM 57W/ EZY 2076 29 December 2006

The aerodrome controller instructed aircraft KLM 57W to turn left immediately and to follow heading 050° and climb to an altitude of 7,000 ft.

Convergence: vertical 300 ft, lateral 1 NM

Report no. 1977, PTI747/ESY9VM 11 May 2006

Aerodrome control instructed aircraft EZY 9VM to turn left immediately onto heading 010 degrees because of the traffic which was going around behind it. It instructed the aircraft to climb at a lower rate.

Convergence: vertical 100 ft, lateral 0.9 NM

1.3 Meteorological conditions

MeteoSwiss reference

LSGG GVA GENEVA 01.07.2008 18:50 METAR

011850Z 14007KT 060V200 9999 FEW050 BKN200 26/13 Q1015 NOSIG

LSGG GVA GENEVA 01.07.2008 19:20 METAR

011920Z 07004KT 350V150 9999 FEW040 BKN200 25/14 Q1015 NOSIG

Skyguide Infonet Data

01.07.2008 19:01:35 ATIS GENEVA

INFO DELTA RWY IN USE 23 D 0300 N 2008

GRASS RWY IS IN OPERATION FOR VFR TRAFFIC

QAM LSGG 1850z 01.07.2008

140 DEG 7 KT VARYING BTN 060 AND 200 DEG

VIS 10 KM

CLOUD FEW 5000 FT. BKN 20000 FT

+26 / +13

QNH 1015 ONE FIVE

NOSIG

General meteorological situation

A shallow depression prevailed over central Europe.

The moderately humid air from the troposphere favoured the formation of isolated storms over high ground in the course of the afternoon.

In the air masses close to the ground in the western part of Switzerland, a light variable wind was blowing, mainly from the south-east.

GAMET (extract)

GAMET VALID 011800/012400 WESTERN SWITZERLAND SECN 1 SIGWX: ISOL TS

Isolated storms forecast over western Switzerland between 18:00 and 24:00 UTC.

AIRMET

AIRMET 4 VALID 011700/012000 LSZH- LSAS SWITZERLAND FIR/UIR OCNL TS OBS ALPS AND N OF ALPS STNR NC=

Isolated storms observed over the Alps and north of the Alps in the FIR/UIR SWITZERLAND between 17:00 and 20:00 UTC. The storms were hardly moving. Their intensity was stable.

Wind measured at the automatic stations:

	<u>Direction</u>	<u>10-minute average</u>	<u>Peak value</u>
18:50 UTC Prangins	330 degrees	3 kt	5 kt
19:00 UTC Prangins	010 degrees	4 kt	7 kt
19:10 UTC Prangins	020 degrees	4 kt	5 kt
18:50 UTC La Dôle	140 degrees	6 kt	8 kt
19:00 UTC La Dôle	170 degrees	5 kt	8 kt
19:10 UTC La Dôle	190 degrees	7 kt	10 kt

SYNOP report Geneva-Cointrin 18:00 UTC (Extract)

Cloud:

Lower cloud stratum:	1 eighth cumulus congestus
Middle cloud stratum:	5 eighths altocumulus cumulonimbogenitus
Upper cloud stratum:	5 eighths cirrus
Current weather:	No storm

SYNOP report Payerne 18:00 UTC (Extract)

Current weather: Storm, no precipitation

1.4 Additional information

Interrupted approach (cf.: ATMM TCG APP IFR Arrivals C.1.4)

The go-around procedures are described on the IAC charts 23. (Annexe 3)

"For an approach to runway 23, the controller may clear a flight making a go-around to make a right turn under the conditions that apply to the KONIL xC/D SIDs."

1.4.1 Ordinance on aeronautical infrastructure (cf. OOAI CC 748. 131. 1)

Art. 27 Temporary exemptions from the regulations

The air traffic control unit or the aerodrome manager may give instructions for temporary exemptions from the published operational procedures when particular circumstances, such as the traffic situation or aviation safety, require."

- *According to the AIG, such derogations must remain exceptional.*

1.4.2 Reduction of separation in the vicinity of aerodromes (cf. ATMM CH Section 9 Aerodrome control 4.6.1)

Separation minima may be reduced if:

a) adequate separation can be provided by the aerodrome ATCO when each aircraft is continuously visible to this ATCO;

each aircraft is continuously visible to flight crews of the other aircraft concerned and the crews thereof report that they can maintain their own separation; or

in the case of one aircraft following another, the flight crew of the succeeding aircraft report that the other aircraft is in sight and separation can be maintained.

In the case of a) above, apply, according to your own judgement, such visual separation as is adequate for traffic separation.

Provide sufficient separation between aircraft in the traffic circuit to allow the spacing of arriving and departing aircraft.

Aircraft in formation are exempted from the separation minima with respect to other aircraft of that formation.

1.4.3 Reduced separation between aircraft on the same runway (cf. ATMM CH Section 9 Aerodrome control 4.11)

Separate a succeeding landing aircraft (cf 4.11.4.)

the preceding aircraft is airborne and has passed a point at least 2 400 m from the threshold of the RWY (Figure 9-11).

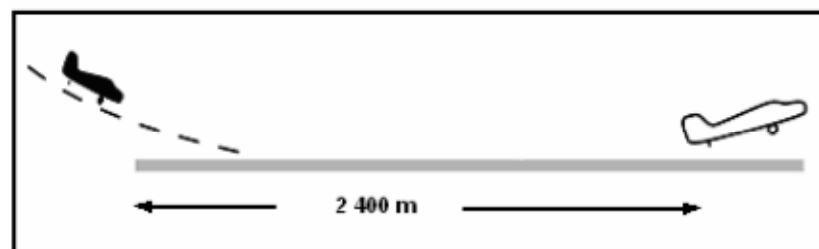


Fig. 9-11

1.4.4 Applicability (cf. ATMM TCG TWR B 3.2.2)

In respect of aircraft categories in § B.3.2.1 above, reduced runway separation may be applied under the following conditions:

- a. Reduced RWY separation minima shall only be applied during hours of daylight from 1 hour after the beginning of the morning civil twilight ($HR^* + 1$) to 1 hour before the end of the evening civil twilight ($HR^* - 1$), HR^* being the day/night limits indicated in the AIP and INCH ;*
- b. appropriate wake turbulence separation minimum is applied ;*
- c. visibility is at least 5 km and the ceiling not less than 1000 ft ;*
- d. the tailwind component does not exceed 5 kts ;*
- e. minimum separation continues to exist between two departing aircraft immediately after take-off of the second aircraft ;*
- f. traffic information is issued to the flight crew of the succeeding aircraft; and*
- g. the braking action is not adversely affected by runway contaminants such as ice, slush, snow, water, etc.*

1.4.5 Essential local traffic information (cf. ATMM CH Section 9 Aerodrome Control)

Transmit, without delay, information on known essential local traffic to departing and arriving aircraft.

Require APP to issue direct information to aircraft on essential local traffic under its responsibility when, in your judgment, such information is necessary in the interest of safety, or when requested by the flight crew.

Describe essential local traffic in a clear, concise and complete manner so as to facilitate recognition.

1.4.6 Missed Approach

Procedure (ref. AIP LSGG AD 2.24.10 -1 GENEVA ILS RWY 23)

Climb on R226 GVA. At D9.5 GVA past the station, turn left to intercept R040 CBY. Proceed to SPR. Initial climb 4,000 ft. When passing D4.0 GVA past the station (D3.5 ISW past the station), continue climb to 7,000 ft. Max IAS 185 kt during turn. For turns below 5,000 ft, MNM bank angle 25°.

GO-AROUNDS (INTERRUPTED APPROACHES) VFR OVERFLIGHT ALTITUDE VFR (Ref: ATMM TCG TWR/Arrivals IFR D. 2)

Note 1: The limitation of the missed approach procedure at 4,000ft initially is intended to mitigate an unacceptable risk existing when two events would occur simultaneously: an IFR flight going around AND a VFR flight overflying at 5,000ft

If no such transits have been reported, ADC clears flights going around to climb directly to 7,000ft.

2 Analysis

2.1 General

In the case of a late go-around by an aircraft in final approach phase in conjunction with a take-off from the same runway, aerodrome control must re-establish the standard separation of 1,000 ft or 3 NM.

Moreover, when applying reduced runway separations, aerodrome control has to implement, in a state of emergency, an avoiding manoeuvre of the aircraft which is going around. It must make sure that the separation between two departing aircraft still exists. It will assign a route which diverges from that of the traffic which is taking off and in the direction of a sector which is free from obstacles.

2.2 ATC aspects

Management of the traffic situation caused by a go-around within the CTR control zone is the responsibility of aerodrome control (ADC).

Given that an aircraft in the go-around phase will leave the CTR control zone and enter the APP sector, aerodrome control must initiate coordination with APP sector PRE control.

This procedure requires some time, during which the aircraft continues on its heading according to the published go-around procedure or, where applicable, in accordance with the last instructions received.

The only alternative to the current go-around procedure published in the ATMM, cited under section 1.3.1 of the present report, suggests a right turn in accordance with the conditions applicable to the standard departure route KONIL xC/D. This procedure could not be applied at the time of this serious incident in order to ensure separation between the two aircraft because it does not authorise a right turn less than 3 NM from VOR/GVA.

However, an early right turn, in favourable meteorological conditions, may also be considered as an appropriate solution.

The solution applied in an urgent situation by ATC consisting in re-establishment of the standard separation by assigning different altitudes and furthermore, by ordering a left turn, was an appropriate solution.

However, this procedure had to be accompanied with a rate of climb limitation on the followed track and an essential traffic information to the crew of AFR 1242. The crew should also have informed ATC whether they had the conflicting traffic in sight. These elements are a part of the conditions for application of the reduced separation in the vicinity of aerodromes.

At present, the form of resolution of a conflict between a departure and a go-around at a small distance is left to the controller's discretion. Hence the decisions resulting from this breadth of choice may be both manifold and different.

It is also important to note that the instructions given by aerodrome control in terms of heading, altitude and possible speed restriction are the result of a decision taken in an urgent situation.

Aerodrome control, in its usual traffic management concept, should have management directives by means of a standard alternative go-around procedure. This emergency solution, which should ensure separation between an aircraft going around nearby the threshold of the runway and an aircraft taking off, should be instructed and trained.

2.3 Analysis of the meteorological situation

1 July 2008 was a typical day in a shallow depression situation. As the air was only moderately humid, isolated storms developed in the course of the afternoon, mainly over high ground.

At 15:00 UTC, storm clouds were observed at some distance from Geneva airport, although no storm reached it directly. At 18:00 UTC, in this typical meteorological situation, storm clouds changed into altocumulus cumulonimbogenitus and cirrus. A few isolated cumulus congestus continued to be observed.

The wind blowing in the low strata over western Switzerland was light. In these conditions, no noticeable windshear should have occurred in the final approach sector.

In a shallow depression situation during a summer afternoon, the vertical air currents are stronger than the lateral currents. Some strong rising air currents are created under the burgeoning clouds, and the air returns back to lower levels in the spaces between the clouds, thereby compensating the up-currents, though not with the same force. As the temperature falls, late in the afternoon and evening, these vertical currents get progressively weaker.

At 19:00 UTC, large and developing clouds were still being observed from Geneva; however, the storm clouds had disappeared. It cannot be excluded that a few isolated vortices of air caused by the formation of clouds over high ground moved towards the approach sector and caused perceptible windshear.

Otherwise, the approach did not present any problems from a meteorological viewpoint.

2.4 Reduced separations and go-around

The regulation makes no provision for the application of reduced runway separation between a departing aircraft and an aircraft which is going around nearby the threshold of the runway. The application of this procedure is similar to the procedure for two following departures.

A go-around initiated nearby the threshold of the runway 23 which creates a loss of separation with the preceding departure requires ATC to re-establish standard separation. This may prove to be problematic because of the topographical environment, which necessitates rapid acquisition of the minimum altitude of radar guidance.

This matter of fact is amplified when applying reduced runway separations.

The significant difference consists in the fact that, the departing aircraft assimilated to the following departure, has already the same speed, or even a greater one than that of the preceding aircraft.

3 Conclusions

3.1 Findings

- The runway in service was runway 23.
- The aerodrome controller (ADC) was in possession of an appropriate licence.
- At 19:00:09 UTC, the aerodrome controller cleared aircraft TAP 945B for take-off from runway 23.
- At 19:01:02 UTC, the pilot of aircraft AFR 1242 informed the ADC controller that he was going around, according to his statements because of windshear.
- At 19:01:06 UTC, the ADC controller cleared AFR 1242 to climb to 7,000 ft towards Passeiry – PAS/VOR.
- At 19:01:14 UTC, the aerodrome controller instructed the pilot of aircraft TAP 945B to halt his climb at 5,000 ft.
- At 19:01:49 UTC, the aerodrome controller instructed the pilot of aircraft AFR 1242 to turn left onto a heading of 180° for a radar climb.
- At 19:02:25 UTC, the aerodrome controller instructed the pilot of aircraft AFR 1242 to continue his left turn onto a heading of 050°.
- According to the radar recordings, the minimum separation between the two aircraft was a lateral distance of 1.3 NM and an altitude difference of 300 ft.

3.2 Cause

The serious incident is due to a critical convergence between an aircraft in go-around phase and an aircraft taking off, in consequence of an inadequate separation.

Contributive factor

Windshear alert which caused a go-around initiated nearby the threshold of the runway.

4 Safety recommendations and measures taken after the incident

4.1 Safety deficit

On Tuesday 1 July 2008 at 18:58:00 UTC, aircraft AFR 1242, an Airbus A321, was established on the ILS centreline for runway 23, at a distance of approximately 9 NM. Aerodrome control requested it to call back when it was at 2 NM on final approach.

Geneva ADC aerodrome control cleared an Airbus A320 aircraft, callsign TAP945B, to take off on runway 23. AFR 2142 was at 3 NM. ADC cleared this aircraft to land but the pilot informed him that he was going around because of windshear.

The aircraft was ½ NM from the runway threshold an altitude of 1600 ft. ADC instructed it to climb to 7,000 ft on the runway centreline and instructed the aircraft which was taking off to halt its climb at 5,000 ft.

Convergence: vertical 300 ft, lateral 1.3 NM

4.2 Safety recommendation No. 425

The Federal Office of Civil Aviation should require that ATC establishes management directives by means of a standard alternative go-around procedure.

Payerne, 26 January 2011

Aircraft Accident Investigation Bureau

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