AIR PROXIMITY BETWEEN AN AIRBUS A318 AND A BOEING 737-900

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GENERAL INFORMATION

Occurrence:	2007112
Classification:	Serious incident
Date and time[1] :	6 December 2007, 19.39
Location of occurrence:	Amsterdam Schiphol Airport

Aircraft 1

Aircraft registration:	F-GUGI (AF3484)
Aircraft model:	Airbus A318
Type of aircraft:	Public transport aircraft
Type of flight:	Scheduled passenger flight
Phase of operation:	Missed approach
Damage to aircraft:	None
Flight crew:	6
Passengers:	98
Injuries:	None

Aircraft 2

Aircraft registration:	PH-BXS (KLM1027)
Aircraft model:	Boeing 737-900
Type of aircraft:	Public transport aircraft
Type of flight:	Scheduled passenger flight
Phase of operation:	Takeoff
Damage to aircraft:	None
Flight crew:	6
Passengers:	189
Injuries:	None

[1] All times in this report are local times, unless otherwise specified.

Other damage: None
Lighting conditions: Night

SYNOPSIS

On 6 December 2007, an Airbus 318, flight number AF3484, with 104 persons on board, executed a go-around on approach to Runway 18C at Amsterdam Schiphol Airport. Shortly before, a Boeing 737-900, flight number KLM1027, with 195 persons on board, had received clearance from Air Traffic Control for takeoff on Runway 24. The resulting conflicting paths caused an Air Proximity to occur. The Airbus passed close behind the Boeing with only a minor difference in altitude.

When crossing each other's flight path, AF3484 and KLM1027 were flying at almost the same altitude. As their flight paths intersected there were only about seven seconds between them. When they were flying at identical altitudes, the distance between them was 460 metres.

Both aircraft were equipped with an anti-collision warning system, TCAS2, and both were activated during the occurrence.. For KLM1027, the TCAS system generated a command to maintain a climb of at least 1500 feet per minute. AF3484 received a command to change the climb into a descent of at least 1000 feet per minute. These TCAS commands were aimed at increasing the altitude difference between both aircraft when crossing each other's flight path. Both flight crew responded to their respective TCAS commands. After the occurrence, KLM1027 continued the flight to its destination and AF3484 received instructions for a landing on Runway 27.

[2] Traffic alert and Collision Avoidance System.

CONSIDERATION

On 6 December 2007, an Airbus 318, flight number AF3484, with 104 persons on board, executed a go-around on approach to Runway 18C at Schiphol Airport. Shortly before, a Boeing 737-900, flight number KLM1027, with 195 persons on board, had received clearance from Air Traffic Control for takeoff on Runway 24. The resulting conflicting paths caused an Air Proximity to occur. The Airbus passed close behind the Boeing with only a minor difference in altitude.

Air Traffic Control the Netherlands (LVNL) initiated an internal investigation immediately after the occurrence. The investigation's report was finalised on 5 June 2008. One of its important conclusions was that the LVNL procedure applicable to the runway combination in use at the time, (takeoff from 24 and landing on 18C) was not complied with. According to that procedure, outside the uniform daylight period an aircraft is , not allowed to takeoff from Runway 24, if an approaching aircraft is within 3 NM distance of the threshold of Runway 18C, until it has completed its landing manoeuvre. The purpose of this procedure is to prevent an aircraft that is abandoning an approach to Runway 18C, from crossing the flight path of an aircraft taking off from Runway 24. But the LVNL report also states that following that procedure would not have prevented this incident from occurring. Furthermore. the report said that deviations from established internal procedures, due to over-capacity, occur on a regular basis. The internal investigation of LVNL came to the conclusion that the cause of the Air Proximity was the late reporting of the missed approach by the pilots involved. Therefore, LVNL proposed to the Inspection of Transport and Public Works incorporating a revision in the Aeronautical Information Publication (AIP), (aimed at flight crew), so that missed approaches must be reported at an earlier stage.

The internal investigation report was presented to IVW in June 2008. However, in its review of the investigation IVW considered that the conclusion of LVNL, (that following established procedures would not have prevented the incident from occurring), is incorrect. Similarly, the Dutch Safety Board concluded that the incident would not have occurred if the internal procedures, as laid down in the rules and regulations for Air Traffic Services (VDV), had been complied with. Even though IVW knew that the incident was the result of non-compliance with established procedures, the revision of the AIP, as proposed by LVNL, was adopted. Therefore, the Board queried the quality of the review process conducted by IVW. The Board found that within the LVNL, Air Traffic Controllers attach significant value to their individual independence during the discharge of their professional duties. According to the management, an Air Traffic Controller follows the established procedures but there must be room for independence and personal assessment within the operational context. The Safety Board felt that an individual and independent discharge of duty by Air Traffic Controllers can be reached within a clearly indicated framework without jeopardizing safety. At the time of the incident, this clarity was lacking. When the investigation of the Board was finalised, a similar framework, indicating which provisions of the VDV leave room for independent assessment and interpretation, and which provisions are to be strictly adhered to, was still not in place.

In the course of the investigation conducted by the Board, LVNL recognised the absence of a clear distinction between strict directives and a general framework. Partly in response to previous investigations by the Safety Board, where the LVNL was involved, LVNL is in the process of replacing the VDV.

Furthermore LVNL implemented a new incident reporting and feedback system within its own Safety Management System. As the internal investigation procedures are adapted, there should be an increase in quality and a quicker publication. The purpose of the new system is to enhance the efficiency and timing of the process of learning lessons from incidents.

Finally, it may be noted that the LVNL management declared that it was in favour of a transparent safety structure, enabling the LVNL to implement necessary improvements on its own initiative, without external organisations indicating the need to do so. The Board believes LVNL's intention to create a pro-active attitude, already partly applied, to be a positive development.

A point of concern that appeared during the investigation of the Air Proximity, is the practice of offering and allowing 'break-off' landings to Runway 24, whilst this runway is in use as a takeoff runway, in combination with Runway 18C as a landing runway. The Board is aware of the fact that this kind of operation is still carried out. As far as the Board is aware, unequivocal rules for this practice are absent, and assessment of the relevant safety risks has been inadequate. This point of the Board's concern would be removed if the LVNL approaches this issue pro-actively, before a further incident occurs. The Board's concern has been put forward in a letter to the LVNL management.

FACTUAL INFORMATION

The incident occurred during the 'inbound peak', during darkness, outside the so-called uniform daylight period (UDP). Two runways were in use for landing traffic (Runways 27 and 18C) and one for departing traffic (Runway 24). According to the LVNL procedure for this runway combination, as laid down in the rules and instructions for Air Traffic Services (VDV), departures on Runway 24 (outside UDP) are not allowed, from the moment an aircraft on approach to Runway 18C is within 3 NM distance of the runway threshold until it has actually landed. Both landing runways were controlled by Runway Traffic Controller 1 and the departure runway by Runway Controller 2. Runway Controller 1 also operated as Tower Supervisor.

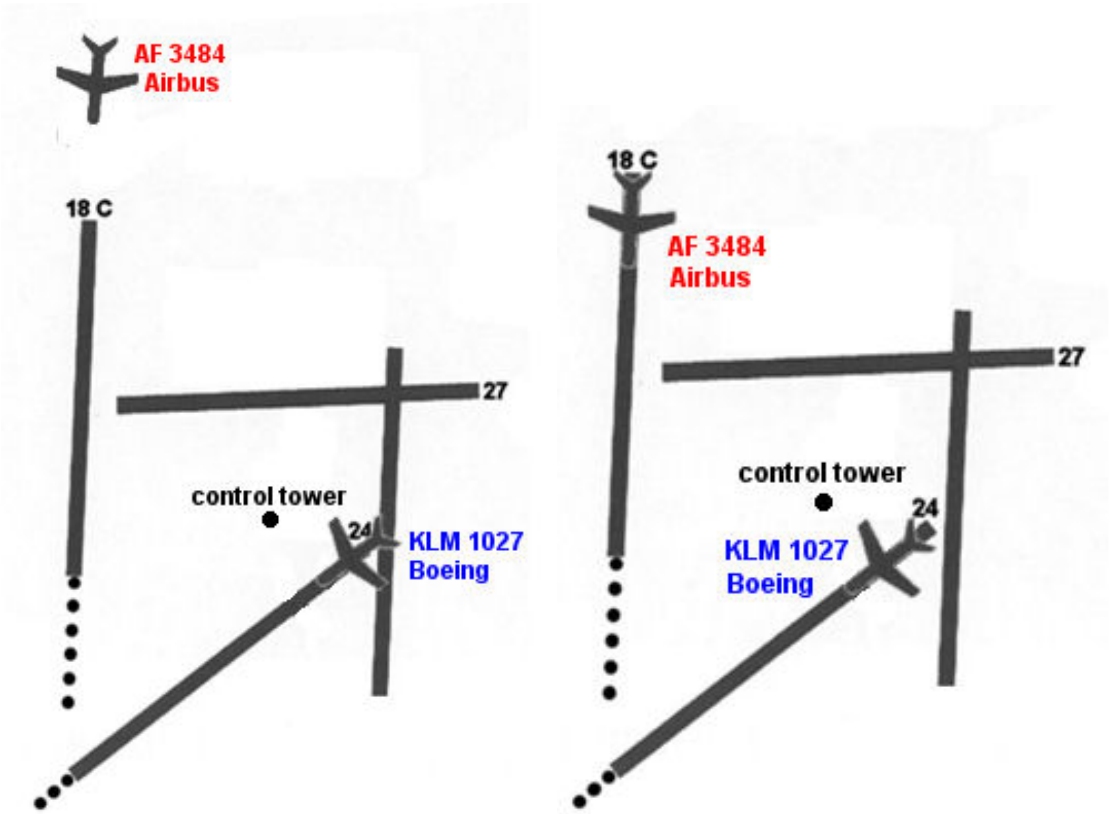
After the crew of an Air France Airbus A318 (flight number AF3484) had reported to Runway Controller 1 that they were on approach to Runway 18C, a landing clearance was received at 19.36:35, with the information that the surface wind was 240 degrees at 20 knots, gusting to 29 knots. The AF3484 crew stated that on final approach, the wind indication on the aircraft indicated gusts up to 35 knots. The commander of AF3484 stated that this was why the aircraft had drifted to the right of centreline to such an extent that at a low height over the runway, a go-around had to be initiated.

Previously a KLM Boeing 737-900 (flight number KLM1027) had received the instruction from Runway Controller 2, to taxi to Runway 24 and hold. Subsequently, considering the approaching AF3484, Runway Controller 2 instructed KLM1027, which was ready for takeoff, to hold for another one minute. At 19.37:15 another aircraft (KL1366, Fokker100) reported on the frequency, being on approach to Runway 27 with a request for a 'break-off' and permission to land on Runway 24. Runway Controller 1 indicated that this might be possible, but that some time was needed before he was able to give a decisive answer.

At 19.37:59 Runway Controller 2 provided KLM1027 with a takeoff clearance for Runway 24. According to the radar data, this happened as the AF3484 was at a distance of 0.7 NM (app. 1,3 km) from the threshold of Runway 18C. The Boeing, a few metres over the landing runway and in its final stage of the approach, initiated a go-around instead of executing a landing manoeuvre, (see Figure 1). The flight recorder data shows that the go-around was initiated when the aircraft had descended to approximately 15 feet above the runway. At that time KLM1027 had already commenced its takeoff run and had reached a speed of 79 knots[3]. Both runway controllers expected AF3484 to land, or assumed that it actually had landed, and turned their attention to the remaining traffic.

According to the Runway 18C procedures, an aircraft executing a missed approach must climb to an altitude of 1500 feet. Shortly before reaching that altitude during the missed-approach manoeuvre, the TCAS system provided AF3484 with a traffic warning. A few seconds afterwards the system generated a command to descend at least 1000 feet per minute, to increase the vertical separation with conflicting traffic. The AF3484 flight crew responded to this instruction.

[3] Source: Ground radar LVNL.



Point in time: 19.37:59
Moment takeoff clearance KLM1027

Point in time: 19.38:25
Moment go-around AF3484

Figure 1: schematic of runway layout with direction of flight of Airbus and Boeing

At the same time, the KLM1027, received a TCAS warning as it was taking off. The KLM crew received the command to climb at least 1500 feet per minute. The aircraft was already climbing to its cleared flight level 60, with a rate of climb by far exceeding 1500 feet per minute. During the telephone conversation between Air Traffic Control and the crews of the aircraft involved after the occurrence, it became apparent that the respective crews had sighted one another after the TCAS warning in both cockpits had been activated. The radiotelephony recordings indicate that, after the TCAS systems in both aircraft had announced the aircraft to be clear of traffic, the crews had informed Air Traffic Control accordingly.

The Airbus contacted ATC in on its approach to Runway 18C and although Runway Controller 1 tried to establish its position, he was unable to do so. Almost at the same moment the AF3484 crew reported the missed approach and indicated that they were clear of conflicting traffic and climbing again to 1500 feet. According to the flight recorder data, the minimum altitude of the AF3484 during compliance of the TCAS instruction had been 1300 feet. Runway Controller 1 checked his radar screen and observed AF3484 passing just behind KLM1027 at practically the same altitude. This was also observed by Runway Controller 2. The crew of KLM1027 reported to Air Traffic Control that they were clear of the conflicting traffic that had generated a TCAS warning. Subsequently the KLM1027 crew were instructed to contact Schiphol Departure, after which it continued its flight to London. The AF3484 crew received some consecutive heading instructions from Runway Controller 1, after which they were instructed to switch over to Schiphol Arrival for an

approach to Runway 27. Both runway controllers indicated they would probably have been able to prevent the conflict if the AF3484 crew had reported the missed approach at an earlier stage.

Landing on Runway 24

At 19.37:15 the crew of a Fokker 100, flight number KL1366, were on the approach to Runway 27 and requested to land on Runway 24. Runway Controller 1 indicated that this might be possible, but that some time was needed before he could give a decisive answer. At 19.38:45, 46 seconds after KLM1027 was provided with its takeoff clearance for Runway 24, the next aircraft in sequence, IBE3249, received takeoff clearance for Runway 24 (see Figure 2). At 19.39:05, 20 seconds after IB3249 received its takeoff clearance, KLM1366 was approaching Runway 27 and received clearance for a so-called 'break off' for a final approach to Runway 24. At 19.40:14 KLM1366 received landing clearance for Runway 24. This landing required co-ordination between both runway controllers and had to fit in between the sequence of air traffic taking off.

Simultaneous use of a runway for takeoff as well as landing is called 'mixed mode configuration'. The VDV does not have procedures for simultaneous use of Runways 27 and 18C for landing and Runway 24 for takeoff with additional landings on Runway 24.

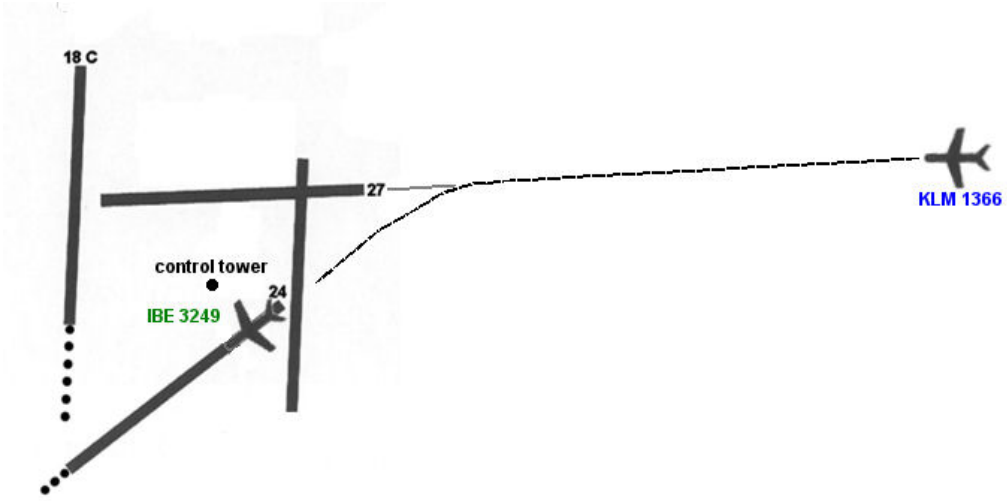


Figure 2: schematic of position of KL1366 at moment of takeoff clearance for IBE3249. Point in time 19.38:45

Weather conditions at the time of the occurrence

According to the information received from the Royal Dutch Meteorological Institute (KNMI) the observation of 19.33 indicated: wind 240 degrees at 19 knots, visibility more than 10 kilometres, few clouds at 700 feet, partly cloudy at 4200 feet, temperature 13 degrees Centigrade, QNH (altimeter setting) 1000 hPa and a temporary change to partly cloudy at 700 feet.

Furthermore the report received from the KNMI indicated the next wind values for the different altitudes:

Surface wind:	240 degrees 18 to 22 knots
1000 feet:	250 degrees 45 knots
2000 feet:	260 degrees 50 knots

Turbulence was described as moderate.

INVESTIGATION AND ANALYSIS

INTRODUCTION

This chapter is sub-divided into three main parts as indicated below:
The occurrence
Air Traffic Control aspects
Investigation report LVNL and supervision

Under *The occurrence,* the combined runway operation being used at the time, the relevant provisions as laid down in the regulations for Air Traffic Services (VDV), the effect of the TCAS operation, and the timing of the crew reporting the missed approach will be considered.

In *Air Traffic Control aspects,* the regulations for a missed approach, the opportunities for Air Traffic Control to take corrective action, and the effect of the 'break-off' to Runway 24 on the takeoff clearance of KLM1027 will be considered. The cause of the occurrence will also be discussed, followed by examples of investigations of previous incidents where deviation from the rules and regulations for Air Traffic Services (VDV) were considered to have been a factor. Possible causal factors will be analysed.

Finally, *Investigation report LVNL and supervision,* contains some observations regarding the internal investigation report by the LVNL, as well as the supervision conducted by IVW (the Civil Aviation Authority).

THE OCCURRENCE

In order to maintain an overview of arriving traffic, the ARTAS[4]-radar system was in use. It appears from the radar picture at LVNL's disposal, and the radiotelephony recordings, that the takeoff clearance[5] for Runway 24 issued to KLM1027, was given when AF3484 was at a position of 0,7 NM (approximately 1,3km) from the threshold of Runway 18C at an altitude of approximately 200 feet. Furthermore, the radar data indicates that the go-around, executed by AF3484, was initiated at an altitude of approximately15 feet at a position near the touchdown zone[6], and that it almost coincided with the moment that the aircraft would have completed its landing. It appears from the data that KLM1027 received takeoff clearance 26 seconds before the go-around was initiated. Therefore, by the time the takeoff clearance was issued, it had not been confirmed that AF3484 had actually completed its landing; the controllers assumed that the execution of the approach and subsequent landing would be successful. LVNL indicates that after KLM1027 was given takeoff clearance, the flight had been monitored and that it would have been discontinued by Air Traffic Control if the takeoff had commenced, i.e., before AF3484 had landed. The available

[4] ARTAS: ATM (Air Traffic Management) suRveillance Tracker And Server.
[5] A clearance is a formal approval of Air Traffic Control.
[6] Touch down zone: area of runway where, during the landing manoeuvre, the landing gear normally touches the runway surface.

data, however, indicates that KLM1027 commenced its takeoff before AF3484 crossed the runway threshold.

The Rules and Instructions for Air Traffic Services (VDV)

The operational procedures as utilized by LVNL are laid down in the 'Rules and Instructions for Air Traffic Services' (Voorschriften Dienst Verkeersleiding, VDV): *'The VDV contains the operational rules for providing Air Traffic Control in The Netherlands'. It contains working arrangements, operational procedures, laws, regulations and instructions required for the safe and efficient discharge of duty by the operational staff.*

The VDV is a users' manual, intended as a book of reference, to be used for instructions and for job assignment. The information is based on ICAO regulations and recommended practices, Dutch law and regulations, Euro-control regulations, and arrangements made between AIS units and centres.

Runway combination in use

At the time of the occurrence the runway combination 'landing 18C and 27, takeoff 24' was in use. By the positive decision on the request of the crew of KLM1366, while on the approach to Runway 27, to execute a 'break-off' and a subsequent landing on Runway 24, this runway was also being used for landing traffic on approach to Runway 27.

According to the VDV, during the 'inbound' peak, outside the uniform daylight period, the use of two landing runways and one takeoff runway is allowed. The VDV does not mention the combination: 'landing on 18C and 27 and takeoff as well as landing on 24'. According to the LVNL, however, operation of this runway combination is possible within the framework of the VDV, even though this actual combination is not mentioned.

The Dutch Safety Board considers the operation of this runway combination not being mentioned as a deviation of the VDV to be indicative of a lack of clarity on the part of the VDV.

Dependent runway operation

The VDV describes the combination 'landing on 18C and 27 and takeoff on 24' and indicates several dependent conditions when using this runway combination. Dependent runway operation means that flight operations conducted on one runway may affect operations on the other. To allow for simultaneous operations on the same runway, further conditions should be established, such as visibility and/or cloud base minima, and time separation between aircraft following a possible conflicting flight path. Certain dependent runway combinations require adoption of increased landing and/or takeoff intervals.

The VDV indicates the following dependent conditions (amongst others):
'A missed approach at Runway 18C and a takeoff on 24, will result in the aircrafts' flight paths crossing each other.'

In order to manage a similar dependence (outside UDP) safely, the VDV states:

'Commencement of a takeoff roll on 24 is not allowed once a landing aircraft's position is within 3 NM distance of Runway 18C and until the landing has been completed.'

This implies that the VDV ensures that after coming within 3 NM on final the aircraft must have completed its landing on 18C successfully before a clearance for a takeoff on Runway 24 may be issued. It must be realised that an aircraft may commence its takeoff roll immediately after it receives clearance. LVNL indicates that in actual practice the minimum time is 3 seconds, whilst the average time is 18 seconds. In the case under consideration, the takeoff roll was commenced after 19 seconds, which is close to the average as indicated by the LVNL. Compliance with the prescribed procedure will prevent an aircraft executing a missed approach procedure on Runway 18C intersecting the flight path of an aircraft taking off from Runway 24. The procedure as laid down in the VDV is an essential safety protection for the operation of the runway combination.

It is concluded that by giving KLM1027 takeoff clearance and allowing it to commence its takeoff roll, before AF3484 actually had completed its landing successfully, the VDV procedure was not adhered to. By doing so, there was no compliance with an essential safety condition regarding the operation of the runway combination.

It is the opinion of the Dutch Safety Board that the incident would not have occurred if the procedure in the VDV had been complied with.

Effect of landing on Runway 24

During the investigation, apart from the findings above, an additional dependence was found to have been created by the operation of Runway 24 as a takeoff, as well as a landing runway. This was in relation to the situation where two aircraft execute a missed approach simultaneously on Runways 24 and 18C. The VDV do not include a procedure regarding the safe separation of air traffic during such a situation.

Effect of TCAS

The Traffic alert and Collision Avoidance System (TCAS) provides for a picture of air traffic within a certain distance from the aircraft and generates a warning (Traffic Advisory) if a conflicting situation arises. The system provides an instruction for an evasive manoeuvre in the vertical plane (Resolution Advisory) if required. The existing vertical speed of the aircraft involved is accounted for. By design, the TCAS system does not affect separation in the horizontal plane (lateral separation).

According to international regulations, response to a TCAS command overrules the instructions provided by Air Traffic Control.[7] Furthermore, international regulations with regard to radiotelephony procedures indicate that, during compliance with a TCAS command aircrew must '*communicate with the applicable Air Traffic Control Centre as soon as practicable after responding to the Resolution Advisory'.*[8]

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[7] ICAO doc 8168 Aircraft operations.

[8] ICAO doc 8168 Aircraft operations: *Communicate with ATC as soon as practicable after responding to the resolution Advisory (RA).*

TCAS will generate control directions only above a radio altimeter indication of 900 feet in both aircraft. Consequently, in the case under consideration, the system became active only 11 seconds before KLM1027 crossed the AF3484 flight path. Total duration of the TCAS warning amounted to 24 seconds.

The flight recorder data of KLM1027 indicated that the average rate of climb was 3500 feet per minute. The maximum commanded rate of climb during a TCAS resolution advisory is 1500 feet per minute. A higher rate of climb than that required by TCAS is permitted but a lower rate of climb is not. This also applies for the rate of descent instructions provided by TCAS.

The crew reaction time TCAS allows for is 5 seconds. This is required in order to enable the crew to take the actions required by responding to a TCAS instruction, namely to observe the TCAS event indicated by the system, disconnect the auto pilot and auto throttle systems, and initiate and maintain manual control input following the instructed control directions.

At 19.39:11 the TCAS aboard KLM1027 generated a Resolution Advisory whilst at 1107 feet. The rate of climb of the aircraft already exceeded the rate of 1500 feet per minute commanded by the TCAS system, so no further actions were required to be taken by the crew. Although the rate of climb of KLM1027 was high, it received an instruction to climb, because of its position during the warning being below the AF3484.

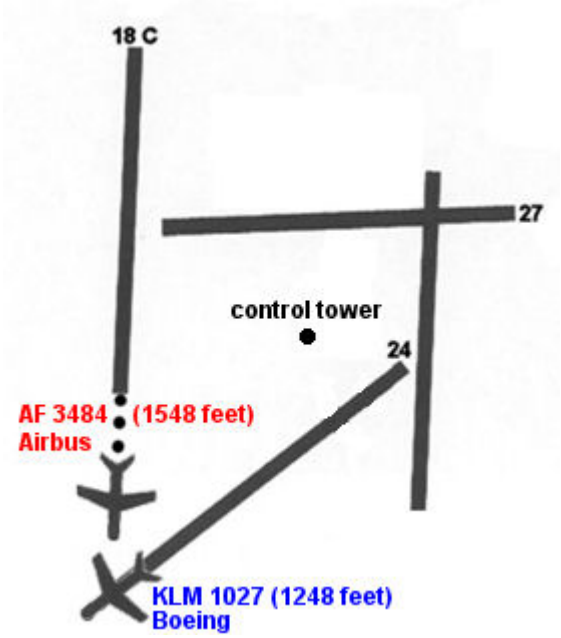

Figure 3: schematic of KLM1027 crossing in front of AF3484. Time 19.39:17 (source LVNL)

AF3484 had just reached the altitude of 1500 feet and, at this relatively low altitude, the crew had to direct the aircraft into a descent of 1000 feet per minute as instructed by TCAS. They responded to the TCAS instruction almost immediately.

At the crossing point of the aircrafts' flight paths, KLM1027 had an altitude of 1248 feet. Six seconds afterwards, AF3484 passed the crossing point at an altitude of approximately 1300 feet. See Figure 3.

The fact that a collision did not occur was due to the lateral separation of both aircraft at the moment KLM1027 crossed in front of AF3484 at the same altitude. At that moment the distance between both aircraft was 460 metres.[9] After KLM1027 had passed, the vertical separation increased with approximately 50 - 100 feet, compared to the situation without TCAS commands.

It was concluded that the response of the crew of both aircraft in responding to the TCAS commands was adequate, and that the TCAS system had operated in accordance with its design.

Timing of reporting the missed approach by AF3483 crew

With regard to the reporting of a missed approach to Air Traffic Control, the Aeronautical Information Publication (AIP), valid at the time of the occurrence, contained the following provisions:

'2.3.2 Dependent landing runways
When dependent runways are in use for landing, flight crews will receive information from Air Traffic Control regarding simultaneous approaches. In case of a missed approach, flight crew must immediately inform Air Traffic Control accordingly and be prepared to receive additional missed approach instructions. If no instructions are received, a strict adherence to the published missed approach procedure is required.'

It must be noted that this text as shown in the AIP does not concern the dependence of landing and takeoff runways as detailed in the VDV, but dependent landing runways only. The instruction to report a missed approach immediately applied for the combination 'landing 18C and landing 27', which was in use at the time of the occurrence.

The approach charts as published in the AIP at the time of the occurrence, showed the following missed approach procedure: *'Maintain a track of 184 MAG[10] and climb to 1500 feet AMSL (above mean sea level). Inform Air Traffic Control. Climb to 2000 feet AMSL 5.3 NM south of SPL.'*[11]

According to the statements of the AF3484 crew, the go-around had to be executed because the aircraft's position did not allow for the execution of a safe landing. Subsequently, several actions to direct the aircraft along the required flight path had to be taken in a short period of time. The crew indicated that because the go-around was initiated at a low altitude and that, according to the missed approach procedure, the aircraft had to be flying level at 1500 feet, they did not have time to inform Air Traffic Control accordingly. From the flight data recorder of the AF3484 and the radiotelephony recordings, it was found that the period of time between the initiation of the missed approach and the start of the TCAS warning amounted to 36 seconds. The crew reported the missed approach 24 seconds after the start of the TCAS warning. The radiotelephony recordings indicate that the call of the AF3484 crew coincided with the TCAS message 'clear of conflict'. Since the international regulations regarding radio communication procedures during TCAS commands indicate that, after response to the TCAS instruction, Air Traffic Control must be informed as soon as practicable, the AF3484 crew did comply with these procedures.[12]

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9 Distance calculated using Radar-, TCAS- and Flight Data Recorder data. Margin 50 metres.
10 Magnetic, in relation to magnetic north.
11 Radio navigation beacon SPL.
12 ICAO doc 8168 Aircraft operations: *Communicate with ATC as soon as practicable after responding to the Resolution Advisory (RA).*

In view of the existing gusty crosswind, the altitude at which the go-around had to be initiated, the actions to be taken to direct the aircraft into a stabilized climb and the subsequent TCAS warning, the timing of the missed approach call to Air Traffic Control is considered appropriate.

AIR TRAFFIC CONTROL ASPECTS

LVNL-regulations regarding a missed approach

With regard to a missed approach, the following provisions are laid down in the VDV:
'A missed approach may be initiated by ATC[13] or by the pilot'. The pilot will subsequently follow the published missed approach procedure. ATC can confirm this and provide guidance or correction regarding heading and altitude, if required. One missed approach procedure has been published for each runway, ref. 4.01, page 3, 'Operational aspects per runway'. Corrective or additional instructions may be required to maintain separation.
During a missed approach the RC[14], the FDR[15]/DCO[16], and the ARR[17], are each partly responsible for traffic separation. The RC is responsible for the initial separation during a missed approach. However, when a (double) missed approach occurs outside UDP[18], and two converging runways are in use, the RC's duty is exclusively to monitor the execution of the missed approach(es). The RC may provide additional instructions to avoid a collision.'

Maintaining adequate separation during a missed approach is a duty of ATC. The controller should always bear in mind that a go-around could be initiated and should observe the initiation of such a manoeuvre in good time. It may be obvious that a timely call of the flight crew may enhance the 'awareness' of the Air Traffic Control. That is why the instruction has been incorporated in the AIP, dictating that during dependent runway operations, the flight crew should report the initiation of a missed approach to ATC immediately, in order to avoid a conflict of traffic.

Opportunity of ATC to intervene

The takeoff clearance for KLM1027 was issued as AF3484 was 0,7 NM (approximately 1,3 km) from the runway threshold. KLM1027 commenced its takeoff roll whilst AF3484 had not yet crossed the runway threshold. As AF3484 initiated the go-around and, at an altitude of 15 feet above the runway, started to climb again (19.38:25), KLM1027 had reached a ground speed of approximately 80 knots. LVNL indicates that a takeoff may be discontinued when instructed by ATC, before the aircraft has reached a groundspeed of approximately 80 knots. Even if the go-around was observed immediately, the speed of KLM1027 (approximately 80 knots and accelerating) would have been too high for an instruction to discontinue the takeoff to be justified.

The TCAS Traffic Advisory to aircraft in the proximity was generated at 19.39:01 which was 36 seconds after initiation of the go-around. Ten seconds afterwards, the TCAS Resolution Advisory

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[13] Air Traffic Control.
[14] Runway Controller, controller being responsible for operation of a specific runway.
[15] Feeder Controller, controller managing the traffic outside the area being under control of the DC and AC.
[16] Departure Controller, controller responsible for managing departing traffic.
[17] Arrival Controller, Controller managing the traffic approaching the landing runway.
[18] Uniform Daylight Period.

followed. If the initiation of the go-around had been reported before the TCAS warning sounded, or if ATC had observed AF3484 initiating its go-around visually, then they might possibly have been able to provide KLM 1027 or AF3484 with additional altitude and/or heading instructions.
The opportunities mentioned by LVNL are: provide AF3484 or (above 500 feet) KLM1027 with a heading instruction, or provide one of the two aircraft with an altitude instruction. The controller could, for instance, have tried to increase separation by instructing AF3484 to turn left immediately, to pass behind KLM 1027. In view of the heavy workload during the execution of the go-around, however, it would have been uncertain whether the flight crew would have been able to understand and comply with the instruction immediately. This would create a safety risk. A heading instruction could have been given to KLM1027 (above 500 feet) which would create an identical risk. Furthermore, altitude instructions, such as 'expedite climb' and 'expedite descent' could have been issued. It is perhaps doubtful, however, whether ATC would be able to assess the situation in such a short time and be able to give considered instructions which would increase safety without creating extra risk. As an example, the instruction 'expedite descent' at a similar altitude near ground level, would not have been a realistic option.

In addition, both aircraft were controlled by different Air Traffic Controllers, working on different frequencies. The flight crews did not receive each other's transmissions. Consequently, before being able to provide effective instructions, co-ordination between the respective Air Traffic Controllers is essential in order to avoid the risk of providing contradictory instructions.

The opportunities for ATC to take corrective action were limited and measures must be put in place to avoid similar situations from occurring. That is why the VDV's regulations must be complied with in order to minimise the possibility of a similar conflict occurring. It should also be noted that immediate reporting of the go-around does not necessarily mean that ATC can take effective corrective action.

It is concluded that an occurrence became unavoidable from the moment AF3484 initiated a go-around.

Effect of 'break-off 24' on takeoff clearance KLM1027

Around the time the incident occurred, aircraft also landed on Runway 24. During the hour preceding the incident, three landings had been executed on Runway 24, after conducting an approach to Runway 27, a so-called 'break-off 24'. On two of the occasions this 'break-off' was proposed by the Runway Controller and on the third it was at the request of the pilot.

It appears from the radio communication that during its approach to Runway 27, the pilot of KLM1366 requested Approach Control for permission to land on Runway 24 ('request break-off 24'). It is clear from the intercom conversation between Approach Control and Tower Control that this request was granted. At 19.37:15 the request was submitted and at 19.39:05 KLM1366 was cleared for the 'break-off'. Within the framework of this investigation no further investigation has been conducted regarding the reason for this request.

The request was submitted 1 minute and 10 seconds prior to the initiation of the go-around of AF3484, and the clearance for the 'break-off' was provided 40 seconds afterwards. Even before the second aircraft in sequence for departure from Runway 24 (IBE3249) had taken off from this runway, the approaching aircraft (KLM1366) received the clearance to start its final visual approach

to Runway 24. The aircraft landed 59 seconds after the second departing aircraft was actually airborne.

Runway Controller 2 having control over Runway 24 indicated that the 'break-off' did not affect the time that KLM1027 was issued with a clearance for takeoff. This timing was affected by the aircraft behind the AF3484 being in sequence for a landing on Runway 18C. Runway Controller 2 had aimed at having the second departing aircraft from Runway 24 (IBE3249) to take off before the next aircraft in sequence for Runway 18C was within 3NM final of the threshold. If KLM1027 was provided with a takeoff clearance at the moment AF3484 completed its landing, he would have missed the opportunity to have the next departing aircraft for Runway 24 (IBE3249) to take off, before KLM1366 landed at Runway 24.

Therefore, from the information above and from analysis of the radar data and radio communication recordings, it can be seen that the consecutive aircraft movements occurred in a very short period of time. It also can be concluded that the aircraft movements on Runway 24, and consequently the clearances provided, had to be geared to one another, requiring extra attention from both controllers, for co-ordination and monitoring purposes.

Cause of the occurrence

It is the opinion of the Dutch Safety Board that the incident occurred because of deviation from the prescribed operational procedures as laid down by the VDV. As AF3484 initiated the go-around on Runway 18C, KLM1027 had already commenced its takeoff roll and the opportunities for ATC to take safe corrective actions were negligible. This would also have been the case even if the missed approach had been observed or been reported immediately.

It must be noted that the course of action of the controllers involved was not unusual. The investigation report issued by LVNL (discussed later in this report) concludes that for capacity reasons, deviations from prescribed operational procedures occur on a regular basis.

Previous investigations

The Dutch Safety Board published various investigation reports about occurrences at Amsterdam Schiphol Airport where non-compliance of established operational procedures were a contributing factor.
These concern the following investigations:[19]

- 2004115, Runway incursion, Boeing 747 on 24 July 2004
- 2007015, Runway incursion, Airbus A319 on 5 March 2007
- M2009LV0225_01, crashed during approach, Boeing 737-800 (TC-JGE) on 25 February 2009

[19] These reports can be found under the following internet links;
http://www.onderzoeksraad.nl/docs/rapporten/2004115_PH-BFU_PH-BDC.pdf
http://www.onderzoeksraad.nl/docs/rapporten/2007015_G-EZIP.pdf
http://www.onderzoeksraad.nl/docs/rapporten/Rapport_TA_NL_aangepast.pdf

Underlying causes

The question arises why, in general, Air Traffic Controllers deviate from established operational procedures. In practice it appears that, apart from incidental safety reasons, two factors play a role: Achievement of a certain capacity (which was not a factor in the case under consideration) and service to flight crews, which occurs when crews are allowed to execute the 'break-off' to Runway 24.

The LVNL management indicates that '*individual independence is encouraged when Air Traffic Controllers are engaged in their professional duties; significant value is attached to this. According to the management, it is assumed that of course an Air Traffic Controller abides by the rules but within those rules, there must be room for latitude and flexibility within the operational context.* In addition, the management indicates that in the case of unclear regulations, improvement is required. *Consistency and unambiguous operational procedures with clear courses of action for the individual Air Traffic Controller should be established.*[20]

The VDV is often used as an 'optional' guideline rather than as a compulsory regulation. This seems in line with the LVNL management's statement above. In the occurrence under consideration, takeoff clearance was given when the landing aircraft was well within the zone in which such clearance was not allowed. When an unexpected event occurs under similar circumstances, or an event is observed too late, such as a go-around initiated at a low altitude, the risk of too much latitude becomes obvious.

In the opinion of the LVNL management, '*the individual Air Traffic Controller should be enabled to operate independently within the frameworks as established*'.[21] As a result, the responsibility for balancing out over-capacity against safety is transferred to the individual Air Traffic Controller. This should be prevented because the Controller might feel pressure to choose capacity, thus putting safety at risk.

The Dutch Safety Board feels that an independent latitude in the discharge of duty only can occur within a clear distinct framework. Therefore, it must be established which VDV rules are to be binding regulations, and which may be considered as guidelines. Until this is established unequivocally, the required level of safety can only be reached by operating strictly within the VDV rules, unless an unsafe situation arises.

Therefore, it appears that the VDV rules are inadequate in several areas. Similarly, the LVNL feels that within the regulations, there is no clear distinction between strictly binding rules and the general framework outlining the operational discharge of duty. For this reason, LVNL is in the process of replacing the VDV with an unambiguous 'Operations Manual'. In the meantime, LVNL's management demands that its controllers adhere strictly to the framework of the VDV. However, even in this connection, the exact meaning of the term framework is not clear.

A request or proposal to use an alternative runway, late into the final stage of a flight, requires extra co-ordination and creates an additional workload for both the flight crew as well as the Air Traffic Controller. 'Break-off' landings are still requested and proposed on a regular basis, even up

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[20] Safety@LVNL.nl, volume 2, page 4 and 5. According to LVNL, Safety@LVNL.nl is a magazine, published internally by and for Air Traffic Controllers, with an aim to reflect the controllers opinions.

[21] Safety@LVNL.nl, volume 2, pg. 4 and 5.

to the time of this report (2011). The Safety Board feels that allowing 'break-off' landings for non-safety-related reasons is undesirable.

In summary, the Dutch Safety Board considers that an Air Traffic Controller is a professional who, apart from his duty to follow the applicable guidelines, should be able to have some latitude in his professional judgement in the discharge of his professional duty. This should, however, be achieved within an unambiguous framework, which is established in advance and is respected by all those to whom it applies.

INVESTIGATION REPORT LVNL AND SUPERVISION

Introduction

The LVNL produced an investigation report regarding this occurrence internally. Shortly afterwards the IVW received a copy of the report which prompted the Inspection Unit of Airports and Airspace of IVW to produce a review report. In this part, several conclusions in the internal investigation report of LVNL will be subjected to further consideration. Attention is also focussed on the review report of IVW, as well as the consultations that have taken place between IVW and LVNL.

Internal investigation report of LVNL

The LVNL report, which had been completed on 5 June 2008, indicates that '*providing KLM 1027 with a clearance, and allowing it to commence the takeoff roll before AF3484 had completed the landing, was a deviation of the established operational procedure*'. The report also concludes that '*if the established operational procedure had been followed, and KLM 1027 had commenced its takeoff roll after AF3484 had completed its landing as expected about 10 seconds later, and with all other factors identical, then AF3484 would have crossed below KLM1027 or very closely in front of it. Following the procedure would have failed to prevent the incident from occurring*'.

In its review, IVW considers that the conclusion of LVNL, that following the procedure would have failed to prevent occurrence of the incident, is incorrect. If the takeoff clearance had been issued at the moment AF3484 had landed, with all other circumstances being identical, a near collision would not have occurred. Similarly, the Safety Board concludes that the incident would not have occurred if LVNL had adhered to its procedures. The Safety Board also considers that the conclusion reached in the internal investigation report of LVNL does not pinpoint the real cause of the incident. Consequently, the assessment by LVNL of this infringement of its own regulations is incorrect.

Actions taken

The internal LVNL report concludes that the missed approach had been reported very late. This conclusion is linked to the recommendation to bring the immediate reporting of a go-around and its significance for the Air Traffic Control process to the attention of other airlines. The LVNL management decided to adopt this recommendation. At the request of LVNL, the missed approach procedure of Runway 18C on the approach charts in the AIP has been revised. The revised procedure begins with the instruction that flight crews must inform ATC immediately.

The AIP is issued by the Ministry of Infrastructure and Environment. As from 2 July 2009, the relevant approach charts are revised as follows: *Inform Air Traffic Control immediately. Maintain a track of 184 MAG and climb to 1500 feet above mean sea level. Climb to 2000 feet above mean sea level, 5.3 NM south of SPL.* The revision infers that informing ATC has priority.

Although at the time of the occurrence the AIP indicated that, in the case of converging runways, ATC must be informed immediately, this instruction was not printed on the approach charts. After the occurrence, the text on the approach charts was revised.

The Board feels that the revision as mentioned above does not result in an increase in safety, for the following reasons:

- The general rule in aviation is (and this is also indicated in the VDV) that ATC has an independent responsibility for air traffic separation, regardless of the reporting of flight crews. Furthermore, it has been found that as a result of the course of action followed in this incident, the opportunity to take corrective action between the moment of go-around and the occurrence, was very limited. Immediate reporting would not have had an increased effect on safety.
- In addition, giving priority to informing of ATC immediately is directly contrary to the basic rule in aviation, namely '*aviate, navigate, communicate*' (in that order). It is bad practice and of no use to start communicating or navigating if a safe operation of the aircraft is jeopardized or rendered impossible. The first priority of the flight crew is to fly the aircraft and at the same time follow the prescribed flight path. As soon as these activities are under control, ATC can be informed accordingly.
- This basic rule is important because of the need for both flight crew members to concentrate fully while conducting a missed approach. During a go-around, several actions have to be completed on the flight deck, in sequence and within a short period of time. Also, unfavourable circumstances could exist, such as technical problems or weather conditions. Both air crew have their specific cockpit duty to fulfil. The cockpit workload increases to a large extent, particularly if, as in the case under consideration, a level-off at a relatively low altitude is required. Communication with ATC is made as soon as the flight crew have spare capacity to do so.
- Additionally, the reliability of transmitting a radio call must be considered. It is not inconceivable, for example, that, at the moment of the go-around, the radio equipment fails or radio traffic is disrupted, perhaps, by radio transmissions of other aircraft, rendering communication between the aircraft and ATC impossible.
- Finally, given the circumstances of the occurrence, the requirement to report to ATC immediately was not a decisive factor because the requirement was not included in the procedure as laid down in the VDV.

Having said all that, the Dutch Safety Board is of the opinion that the revision regarding the immediate reporting of a go-around, as incorporated on the approach charts in the AIP, does not result in an increase in aviation safety. With the recommended revision of the missed approach procedure, it is suggested that a similar occurrence can be avoided by flight crew action.

It is concluded that minimizing the possibility of a recurrence is primarily the responsibility of LVNL. Observing that the AIP has been revised by IVW (as requested by the LVNL) the Board queries the quality of IVW's review process.

Review IVW and follow-up

On 18 July 2008, IVW forwarded a letter to LVNL including a review of the internal LVNL investigation report and some additional questions.

On 5 September 2008, a consultation meeting between LVNL and IVW was held about the review conducted by IVW. Minutes of this meeting are absent. Two weeks afterwards, the progress of the consultation process was an agenda item during a 'regular supervisory consultations' meeting.

On 24 September 2008, the matter was discussed during a meeting of the 'LVNL-IVW management consultations', which had been especially convened for this purpose. During this meeting, IVW requested, amongst other things, information from the LVNL about actions that had been taken as a result of the occurrence. According to the minutes of that meeting, LVNL reported having taken the following actions:

- Air Traffic Controllers had been made more aware that compliance with established procedures during converging runway operation is essential.
- Pilots had been made more aware of the significance of timely reporting of a missed approach; assessment of the procedure in use had been carried out, including a review of the validity of the 3 NM limit.[22]
- A feasibility study had been undertaken on the operation of runway combination 18R/24 instead of 18C/24. (This study has now been on-going for five years.)

LVNL provided the explanation that, with regard to the operation of the runway combination '18C/27 landing and 24 takeoff', a VEM-analysis[23] was absent, because the procedure had been in place before the system of conducting a VEM analysis was implemented. The LVNL management also stated that the procedures are assessed on a regular basis. IVW did not request a further explanation regarding the follow-up of the action items above.

The Dutch Safety Board asked the LVNL for further information about the actions referred to during the management consultations meeting of 24 September 2008 with IVW. This resulted in the following:

- Increase the awareness by Air Traffic Controllers that compliance with established procedures during converging runway operation is essential.

  A systematic implementation of these follow-up actions had not been accomplished. The controllers were not provided with written information on this subject. LVNL maintains that the information has been passed on, on an aural basis, via the managers and supervisors, but no records are kept regarding this. This is in spite of the statement of LVNL in its investigation report that deviations occur on a regular basis. Furthermore the VEM analysis completed in 2010 also indicates that deviations of procedures occur on a regular basis. These deviations are qualified as non-nominal procedures.

- Increase the awareness of pilots that timely reporting of a missed approach is significant.

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[22] Distance of approaching aircraft to threshold of runway 18C, after which takeoff clearance for 24 is not allowed

[23] VEM analysis: safety, efficiency and environment analysis

This has been discussed above.

- In 2010 LVNL completed a VEM analysis which includes the conclusion that the 3 NM limit can be reduced to 2 NM.

  This risk assessment does not include the missed approach call from the flight crew as a factor. As indicated above, maintaining adequate separation during a missed approach is the responsibility of ATC. The effect of a flight crew report not being included in the risk analysis, therefore, is appropriate.
  For the time being IVW does not concur with alteration of the limit as proposed (3 NM to 2 NM).

- The feasibility study regarding runway combination 18R/24 (as mentioned above) should have been finalised in 2002.

- Despite the indication of the management that the procedures are assessed on a regular basis, a formal assessment of the procedure '18C/27 landing and 24 takeoff' has not yet been accomplished.

On 5 November 2008, a further consultation meeting between IVW and LVNL was arranged. Minutes of this meeting are absent. On 16 March 2009, LVNL provided the IVW with an answer to its letter of 18 July 2008. LVNL indicated that, following various consultation meetings on the subject, it had been established that there was no need for LVNL nor IVW to take actions with an immediate mitigating effect. Furthermore LVNL promised IVW access to the follow-up of the recommendations in the investigation report.

Finally, on 21 October 2009 a letter from IVW was forwarded to LVNL requesting them to indicate, amongst other things, which modification of the procedure of the runway combination had been chosen in order to prevent a recurrence of the incident. No response has yet been received.

Subsequently no further actions were taken by IVW, although the subject was not formally concluded. The Board feels that IVW, as a supervisory agency, should query some conclusions of the LVNL's internal report. Also, IVW feels that LVNL should have taken corrective actions to prevent a recurrence. IVW, however, did not indicate the conditions with which the corrective actions should comply, nor did they specify a date for completion. It was also noted that IVW did not verify if LVNL had actually implemented the actions or whether actions still had to be taken.

After 2009 no further action had been taken by IVW, although the consultations with LVNL have not been formally concluded. Consequently, IVW was provided with inadequate assurance that LVNL actually has removed the risk of a recurrence. IVW indicates that as of December 2010, follow-up actions had been taken - this after the Board had asked IVW additional questions with regard to the occurrence.
It is concluded that IVW has not completely fulfilled its task as a supervisory agency in dealing with this occurrence.

CONCLUSIONS

Concerning Air Traffic Control the Netherlands (LVNL)

1 The non-compliance with the rules and regulations for VDV and the consequent breaching of essential safety protections were a causal factor in the occurrence.

The non-compliance was as follows:

- Issuing takeoff clearance and allowing an aircraft to commence the takeoff from Runway 24 whilst an aircraft was on approach to Runway 18C and within 3 NM distance of the runway threshold.
- Inadequate monitoring of air traffic, resulting in inadequate assurance of traffic separation.

2 According to the rules and instructions for Air Traffic Services, maintaining adequate separation during a missed approach should be accomplished regardless of reporting from flight crew. Insisting that flight crew report a missed approach at an earlier stage of the procedure adds unnecessarily to their workload. Maintaining adequate separation is the duty of Air Traffic Control. This is recognised in the risk analysis on the runway combination in force at the time which was completed by LVNL after the occurrence.

3 Operation of Runway 24 as a landing runway, coupled with the runway combination in force, creates an extra dependence which is not included in an established operational procedure, and is one where relevant safety risks have not been analysed.

4 Allowing 'break-off' approaches for non-safety purposes is undesirable.

5 The rules and instructions for air traffic services are lacking a clear distinction between strict regulations and general guidelines; for that reason they are ambiguous.

6 The stated internal remedial measures, such as emphasising to Air Traffic Controllers that compliance with established procedures during converging runway operation is essential, have not been accomplished systematically.

Concerning Inspection Transport and Public Works (IVW)

7 On this occasion the IVW did not completely fulfil its task as the supervisory agency.

- Initial response of IVW to this occurrence was an active approach but that response was not followed through.
- It was known to IVW that the cause of the occurrence concerned LVNL. The action taken by IVW, at LVNL's request, requiring air crews to report a missed approach at an earlier stage, was addressed instead to flight crew.

APPENDIX A: JUSTIFICATION OF INVESTIGATION

The incident was reported to the Dutch Safety Board on the day it occurred. Shortly afterwards the Air Traffic Controllers were interviewed and the relevant radar data and radio communication records were secured. LVNL initiated an investigation immediately. The purpose of such investigations is to analyse the incident and to make recommendations to prevent a recurrence. After the LVNL report was completed, the Safety Board decided to continue the investigation. This was an effective approach because the relevant facts are mentioned and elaborated in the LVNL report and the report as completed, could be assessed as part of the Safety Board's investigation. After the LVNL report became available, it appeared that it would be subject to an assessment by IVW. LVNL would be informed of its findings. It was decided to wait for this interaction between IVW and LVNL to occur, and to include it in the Board's investigation.

Due to the ongoing investigation into the accident with the Turkish Airlines Boeing on 25 February 2009, capacity for the investigation of this occurrence was not available. After publication of the Turkish Airlines report in May 2010, the investigation was continued.

Finally, the request of LVNL to adapt the procedure for the runway combination in force during the incident, and IVW's reaction to this request, were included in the investigation.

APPENDIX B: COMMENTS ON DRAFT REPORT

The draft report (without consideration) has been forwarded to the following parties:

- Air Traffic Control the Netherlands (LVNL)
- The Air Traffic Controllers involved
- Air France-KLM
- Amsterdam Airport Schiphol
- Ministry of Infrastructure and Environment
- Inspection of Transport and Public Works
- National Supervisory Authority Netherlands

These parties are given, by law, a four-week response time. This period commences the day after dispatch of the draft report. The Dutch Safety Board took notice of the comments as received. The reactions that were not adopted and the reasons are indicated below.

Air Traffic Control the Netherlands

Page 15
'It is concluded that an incident became unavoidable at the moment the Airbus initiated a go-around'. LVNL disagrees entirely.

Response of Board:
LVNL interprets 'incident' here as being *the* incident, in other words, the Air Proximity. *An* incident was unavoidable, because even if corrective actions had been taken (for instance a heading instruction at low altitude) *an* incident was unavoidable.

Page 15
The Safety Board refers to three other investigation reports of the Board 'that included deviation of the LVNL of its own procedures being a factor.' The report referred to, regarding the Turkish Airlines accident, does not demonstrate that LVNL failed to adhere to its procedures.

Response of Board:
This conclusion has been established in a previous investigation by the Board and therefore is not a subject for discussion in this investigation.

Page 17
LVNL indicates that it is incorrect to state that the balancing out of safety against capacity is just left to the individual controller. The perception of the LVNL management would be that deviations of the VDV on a structural basis are acceptable, is incorrect. The argument that allowing deviations from the VDV on a structural basis has resulted in various incidents, is also incorrect.

Response of Board:
In the internal LVNL report on the incident, it is concluded that deviations from the VDV occur on a regular basis in an effort to accommodate a certain capacity. This concurs with the conclusion of the Board that, as a result, the balancing out of safety against capacity is left to the individual controller. In previous investigations it had been concluded that deviations by LVNL from its own procedures was a factor. Previous conclusions of the Board are not subject to discussion in this investigation.

Page 17
The Board looks for underlying reasons why Air Traffic Controllers deviate from established procedures. The Board then concludes that occasionally the regulations are not totally unambiguous and they acknowledge that this is understood by the LVNL. Having established this, however, it is not then correct to assume that an Air Traffic Controller intentionally deviates from the procedures or is knowingly lax in his interpretation of the rules. The Board appears to be of the opinion that Air Traffic Controllers intentionally violate the rules; it mentions this in its conclusions. This is contrary to the previous text.

Response of Board:
LVNL refers to intentional violation of the rules. The report mentions that deviations of established regulations occur.

Page 20
“Despite the indication of the management that the procedures are assessed on a regular basis, a formal assessment of the procedure has not yet been accomplished”.

With this statement, the Board ignores the overall operation of the safety management system. During the past decades that the runway combination under consideration has been in operation, the safety detection and reporting system never indicated that this operation presented an unacceptable safety risk. Establishing that this runway combination is potentially hazardous with the benefit of hindsight (where no regular assessments had previously been made) is all too easy. An assessment of the runway combination used before this incident would probably have concluded that the combination and the corresponding procedures would be adequate. There is no argument to suggest otherwise.

Response of Board:
The Board observes that the notification of the LVNL management to the IVW (that assessment was conducted on a regular basis) is not supported by documentation.

Page 21
”the inadequate monitoring of traffic’’

It is a fact that monitoring conducted by the Air Traffic Controllers failed to observe the execution of a missed approach. The subsequent conclusion that monitoring duties were not discharged according to the regulations is not correct. The Board did not indicate the reason for failing to observe the go-around, which was that the Airbus continued its flight over the runway at a very low altitude. Tests conducted using the tower simulator demonstrate that a go-around of an aircraft, executed after flying over the runway at a low altitude for some time, can hardly be distinguished by the naked eye in darkness from an aircraft taking off, (not to mention at a distance of 3 kilometres). To describe this as a failure of the Air Traffic Controller to comply with the rules, (especially with the benefit of hindsight) is incorrect.

Response of Board:
Traffic monitoring is a duty of ATC. The controllers involved had turned their attention to the remaining traffic. Monitoring the progress of the Air France aircraft was discontinued.

Page 21
The stated internal remedial measures, such as emphasising to Air Traffic Controllers that compliance with the established procedures during the operation of converging runways is essential, have not been accomplished systematically.
This enhancement of awareness is well under way. During the so-called spring courses, held at various dates, all Air Traffic Controllers are briefed regarding this and similar subjects. No records are kept of these meetings. The fact that it was not possible to show any records has been incorrectly interpreted by the Board as not being systematic.

Response of Board:
The fact that the carrying out of remedial action has not been recorded in writing leads the Board to the conclusion that action has not been taken systematically.

Note: This report has been published in Dutch and English. If there are differences in interpretation the Dutch text prevails.