N° 1

HindSight

January 2005

Putting Safety First in Air Traffic Management

HINDSIGHT IS A WONDERFUL THING

By Tzvetomir Blajev
Coordinator - Safety Improvement Initiatives, and Editor in Chief of HindSight.

"Hindsight"
The ability or opportunity to understand and judge an event or experience after it has occured.

"With the benefit of hindsight I would have done it differently".

How often do we hear responsible people saying these words? Often, it is an attempt to disguise the fact that they had not prepared themselves for some unusual situation. Yet hindsight is a wonderful thing and can be of great benefit if used intelligently to prepare ourselves for the unexpected. There is much to be learnt from a study of other peoples' actions - good and bad.

If we learn the right lessons we will stand a much better chance of reacting correctly when we are faced with new situations where a quick, correct decision is essential. This magazine is intended for you, the controller on the front line, to make you know of these lessons. It contains many examples of actual incidents which raise some interesting questions for discussion. Read them carefully - talk about them with your colleagues - think what you would do if you had a similar experience. We hope that you too will join in this information sharing experience. Let us know about any unusual experiences you have had – we promise to preserve your confidentiality if that is what you wish. Working together with the benefit of HindSight we can make a real contribution to improved aviation safety.

European Air Traffic Management - EATM

EUROCONTROL

EUROCONTROL SAFETY ENHANCEMENT BUSINESS DIVISION

By Tzvetomir Blajev, Coordinator - Safety Improvement Initiatives, and Editor in Chief of HindSight.

The Safety Enhancement Business Division

Within the EUROCONTROL Directorate of ATM Systems (DAP), the role of the Safety Enhancement Business Division (SAF) is to lead the implementation of safety management in the Air Navigation Service Providers (ANSPs) of the ECAC states as well as in the EUROCONTROL Agency.

This purpose is achieved by means of Safety enhancement programmes such as the European Strategic Safety Action Plan (SSAP). The SSAP aims to provide a common minimum level of Safety Regulation and Safety Management throughout the ECAC area.
This is achieved through collaborative actions between State ATM Regulators, ANSPs and EUROCONTROL.

Consensus is essential to achieve harmonised implementation. Consultation is achieved at all levels through Working Groups, the EATM Safety Team, the Safety Regulation Commission (SRC) and ultimately the Provisional Council of EUROCONTROL. In addition to State Regulators and ANSPs, the operators (airlines, general aviation, etc.), equipment and software suppliers are also involved.

The SSAP covers a range of high priority safety requirements and is a joint Safety Management/Safety Regulation programme, which ensures that there is close coordination between the regulatory requirements and the implementation of safety management systems. In the emerging environment of the Single European Sky the European Commission plays an increasingly important role in providing a legal framework for safety enhancements.

The SAForum

Safety information exchange is a key enabler for safety improvements.
Safety information, notably on cause, lessons learned and remedial actions must be shared.

To facilitate this sharring the Safety Enhancement Business Division, has launched a web-based Safety Forum called "SAForum". The SAForum is available via One Sky Online.

Web portal: www.eurocontrol.int

ABOUT HINDSIGHT

*The main function of the **HindSight** magazine is to help operational air traffic controllers to share in the experiences of other controllers who have been involved in ATM-related safety occurrences. In this way, they will have an opportunity to broaden their experience of the problems that may be encountered; to consider the available solutions; and so to be better prepared should they meet similar occurrences themselves.*

Material contained in **HindSight** falls into three distinct classes:

- Editorial;
- 121.5 - Safety Alerts; and
- The Briefing Room - Learning from Experience.

On page 1, you will find a table of contents listing articles under these three headings. Editorial material, such as this article, needs no explanation but a few words on the other two classes may prevent any misunderstanding.

121.5 Safety Alerts

From time to time EUROCONTROL issues Early Warning Messages and Safety Reminder Messages to draw the attention of the ATM community to emerging safety issues. The messages are intended to encourage discussion on the prevalence and seriousness of the issue and on the most appropriate reaction to them. A summary of recent messages are included, coded to reflect the subject material.

The Briefing Room Learning From Experience

The majority of **HindSight** is taken up with articles concentrating on specific safety issues. These usually comprise a study of an actual accident or incident together with a summary of lessons learned. Again, these articles are coded to reflect the subject material.

Some incidents relate to the performance of ATCOs or the ATM system, while others illustrate pilot errors which can arise from incorrect interpretation of ATC instructions.

The incidents fall into several categories:

- Summaries of accident and serious incident reports
  The full report usually runs to many pages, so these reports must be summarised and simplified, concentrating on the ATM-related aspects and passing quickly over other issues which have no direct relevance to ATCOs. A reference to the original report is always supplied.

- Dis-identified accounts of other ATM-related incidents
  Typically, the original reports are not in the public domain; however there are important lessons to be learned from them. The identifying features of the reports are altered without changing the substance of the reports in order to preserve the confidentiality of the reporter.

- Feedback
  Edition 1 contains a number of items taken from recent editions of **Feedback**, the journal of the UK Confidential Human Factors Incident Reporting Programme (CHIRP). These items consist of incident reports and comments by ATCOs and pilots. We hope that in future editions we may be able to produce a similar feature based on letters and reports received from readers of **HindSight**.

Knowledge Base

We intend to compile a Knowledge Base of all types of ATM-related safety reports, which may be accessed by persons carrying out research on particular subjects. This is a long-term project but we plan that the **HindSight** magazine should be integrated with it from the outset.

Coding of Subject Matter

To aid identification of subject matter, each article is coded as follows:

Each article is marked by a coloured icon which appears on the contents list and also at the head of each item.

121.5
SAFETY ALERTS

EARLY WARNING MESSAGE SUMMARY

AVOIDING ACTION PHRASEOLOGY

Origin: EUROCONTROL Agency
Issued: 16 October 2004

The Problem

Recent safety occurrences have shown that the correct Avoiding Action Phraseology is not always used by controllers.

The BFU Uberlingen Investigation Report emphasised the importance of the proper use of the avoiding action phraseology.

ICAO Procedure

ICAO PANS ATM provides two formats for the avoiding action message which specify manoeuvres in the horizontal plane:

"TURN LEFT (or RIGHT) IMMEDIATELY HEADING (three digits) TO AVOID [UNIDENTIFIED] TRAFFIC (bearing by clock-reference and distance)"; and, "TURN LEFT (or RIGHT) (number of degrees) DEGREES IMMEDIATELY TO AVOID [UNIDENTIFIED] TRAFFIC AT (bearing by clock-reference and distance)".

PANS-ATM also states that when a pilot reports a manoeuvre induced by an ACAS Resolution Advisory (RA), the controller shall not attempt to modify the aircraft flight path until the pilot reports returning to the terms of the current air traffic control instruction or clearance but shall provide traffic information as appropriate.

The tone of transmitting the avoiding action message contributes to conveying to the pilot the urgency of the situation.

No doubt, the importance of this subject will be reflected in increased emphasis on avoiding action messages during training.

EARLY WARNING MESSAGE SUMMARY

NEW CLEARANCE RELATED TO LEVELS

Origin: EUROCONTROL Level Bust Safety Improvement Initiative
Issued: 13 February 2004

The Problem

Climbing through a previously restricted level, and particularly through the First Stop Altitude (FSA), has been identified as a causal factor for level busts. If a new clearance is issued relating to levels, the pilot may assume that the previous restriction no longer applies.

For example, an aircraft on a Standard Instrument Departure (SID) has a height restriction of 3,000ft until passing way-point ABC. If the controller clears the aircraft to FL240 after passing point ABC without repeating the SID height restriction the pilot may assume he is clear to climb immediately to FL240.

ICAO Procedures

In response to a request for clarification, ICAO confirmed that "A level restriction will need to be repeated in order to continue to be in effect after a new clearance related to levels has been issued.....this issue will be addressed in an amendment proposal to PANS-ATM which is currently being prepared...."

SAFETY REMINDER MESSAGE SUMMARY

AIRCRAFT TURN PERFORMANCE - EARLY TURNS

Origin: EUROCONTROL Agency
Issued: 8 September 2004

The Problem

En-route operations now demand the use of RNAV. These systems initiate the turning manoeuvre without over-flying the prescribed waypoint or VOR. For example, for a medium turning manoeuvre, at least 5/8 nm before the waypoint, and even more in case of a wide angle. However, in some circumstances turns are commenced earlier than is strictly necessary in order to provide a safe and comfortable transition.

The way in which the Flight Management System (FMS) calculates the turn point depends on the expected altitude when the aircraft passes the waypoint. If the expected altitude is below FL 200, a higher bank angle is assumed than if the aircraft is above FL 200. Above FL 200 the lower permitted bank angle results in an increase in the turn anticipation distance up to as maximum of 20 nm. However, an aircraft below FL 200 may start the turn at up to 20 nm before the waypoint as though it were above FL 200, and the increased bank angle below FL 200 will give rise to the early turn phenomenon that has been reported. The effect is most noticeable where the track change is considerable, e.g. greater than 40°.
This behaviour depends in part on the design of FMS in use, so the performance of two aircraft of the same type will not necessarily be the same.

Circumstances can also cause aircraft to turn late, e.g. if the groundspeed at the start of the turn is low and increases as the turn proceeds, or if the FMS is inaccurately programmed.

In extreme cases this early turn behaviour can result in penetration of restricted airspace.

ATCOs operating in such areas should be aware of this possibility and if necessary, issue instructions to the pilot to overfly the designated waypoint or issue vectors.

EARLY WARNING MESSAGE SUMMARY

UNDETECTED SIMULTANEOUS TRANSMISSIONS

Origin: ANSP
Issued 12 December 2003

The Problem

Several cases of AIRPROX have been reported by an ANSP due to pilots reading back a clearance not intended for them at the same time as the pilot for whom the clearance was intended. The ATCO did not detect the error because the transmission was hidden (technical systems transmitting best signal only).

Other agencies have reported similar occurrences.

The following Safety Recommendations are made to reduce the risk of (Undetected) Simultaneous Transmis-sions:

- ANSPs, Regulators, Aircraft Operators and the EUROCONTROL Agency should continue the work on reducing the risk associated with similar callsigns;
- ANSPs should provide their controllers with detailed information on RTF cross-coupling and Best Signal Selection functionality if used, including the process itself, how it should be used and the problems inherent in the system;
- When multiple RTF channels are coupled, priority should be given to duplex coupling (allowing audible simultaneous transmission) rather than simplex coupling
- ANSPs, Aircraft Operators and Regulators should continue to promote strict RTF discipline, including rigorous read back - hear back process;
- Third parties on a communication channel should be encouraged to call out “blocked” if they detect simultaneous transmission;
- ANSPs and Regulators should monitor the incidence of (Undetected) Simultaneous Transmissions Events;
- The originator ANSP, and the EUROCONTROL Agency will investigate further the operational and technical aspects of the Swiss occurrences;
- ANSPs, Regulators, Equipment Manufacturers and the EUROCONTROL Agency will investigate the possibility of a technological solution.

SAFETY REMINDER MESSAGE SUMMARY

HAND-OVER / TAKE-OVER OF OPERATIONAL POSITION

Origin: EUROCONTROL Agency
Issued: 15 October 2003

The Problem

A number of ANSPs have expressed concerns about safety occurrences associated with the hand-over/take-over process of operational ATC positions.

It is acknowledged that the vast majority of hand-overs take place without any problems, and only a very small proportion are flawed. Therefore, **the level of normal human reliability has already been reached** and potential mitigations should be targeted at the other system elements procedures (checklists) and/or equipment.

The SISG secretariat has investigated, analysed and summarised the existing good practice approaches used by some ANSPs. Some recommendations are provided below:

Before Hand-over:

- A hand-over produces a workload of its own. Careful consideration to the timing should be given;
- If it is likely that the sector will be split shortly after the hand-over consider splitting it before the hand-over;
- Simultaneous take-over of all the sector positions (for example both radar and planner) should be avoided;
- Do not short cut the existing good practice during low vigilance periods;
- The handing-over controller should tidy up the working position prior to the hand-over;
- A hand-over should be commenced only after all the initiated actions for resolving the potential conflicts or recoverings from actual conflicts are accomplished

During Hand-over:

- Avoid distracting controllers during hand-over;
- Use checklists with the sequence of actions to be performed by both handing-over and taking-over controllers;
- The taking-over controller should ensure that he/she has been able to assimilate all information relevant to a safe hand-over and should accept responsibility only after he/she is completely satisfied that he/she has a total awareness of the situation;
- Use mnemonic reminders within the checklist like "check REST before going to rest". (See table below.)
- Please, note that there is an important logic behind the REST sequence, building consecutively the situational awareness for (1) environment framework (2) environment of operations (3) operations.

After a Hand-over:

- It is specifically important that **the handing-over controller should remain available for few minutes following the hand-over**, particularly in dynamic traffic situations, to provide clarifications / assistance regarding any points which may subsequently arise;
- Other controllers on the sector should only impart additional information after a hand-over is complete.

R	**Restrictions**	Examples: Flow restrictions, TSA, Danger, Prohibited and other special status airspace.
E	**Equipment**	Examples: Status, maintenance, ground-ground communications, air-ground communications, navigation, surveillance, radar filters, radar source, type of surveillance sources integration if multiple, strip printers, workstations, information systems.
S	**Situation**	Examples: Weather (fog, snow, hail, visibility, low/high pressure, CB, turbulence, CAT, winds etc.), Staffing, Configurations (Sectors, Runways, Taxiways, Adjacent sectors etc.), Strips, Holding.
T	**Traffic**	Examples: All under control, expected, military, VIP, Aerial activity, non compliant with ATM regulations (RVSM, RNAV, 8.33, ACAS etc.), VFR flights, Clearances and instructions given

RUNWAY INCURSION

The crew of the Shorts 3-30 aircraft believed they had been cleared to line up for take-off from an intermediate point on Runway 27 at Paris-Charles de Gaulle Airport. As they entered the runway the aircraft was struck by the wing of an MD 83 aircraft which was taking off, using the full runway length. A recent survey of pilots involved in Runway Incursion incidents revealed that 50% believed they had permission to be on the runway when the incident took place.

Important Notice

The complex factors relating to this accident are difficult to summarise in the space available. The Probable Causes, and Recommendations listed below use the precise wording employed in the English language version of the final report.
In some cases, the precise meaning is not clear without reference to the full text. It is therefore recommended that readers refer to the full text of the report, published in French and in English translation at the web-site of the Bureau Enquêtes-Accidents (BEA) www.bea-fr.org

Factual Information

Ilt was dark and rain was falling when Air Liberté MD 83, "IJ8807" began to taxi from Terminal 1 to the holding point of RWY 27 at 02:12:40 local time. The aircraft stopped on the way to the runway to deal with a technical problem.

At 02:38:25, Streamline Shorts 330, "SSW200", was cleared to taxi from the cargo ramp to RWY 27. At this point both aircraft were under control of the Ground Controller (GRD).

At 02:44:25 SSW200 was offered departure from an intermediate point on RWY 27 and proceeded towards this point via Taxiway 16. Shortly afterwards, IJ8807 resumed taxiing for RWY 27 and then changed frequency to the Local Controller (TWR).

At 02:48:37 IJ8807 was told to line-up and wait on RWY 27 after a landing B737.

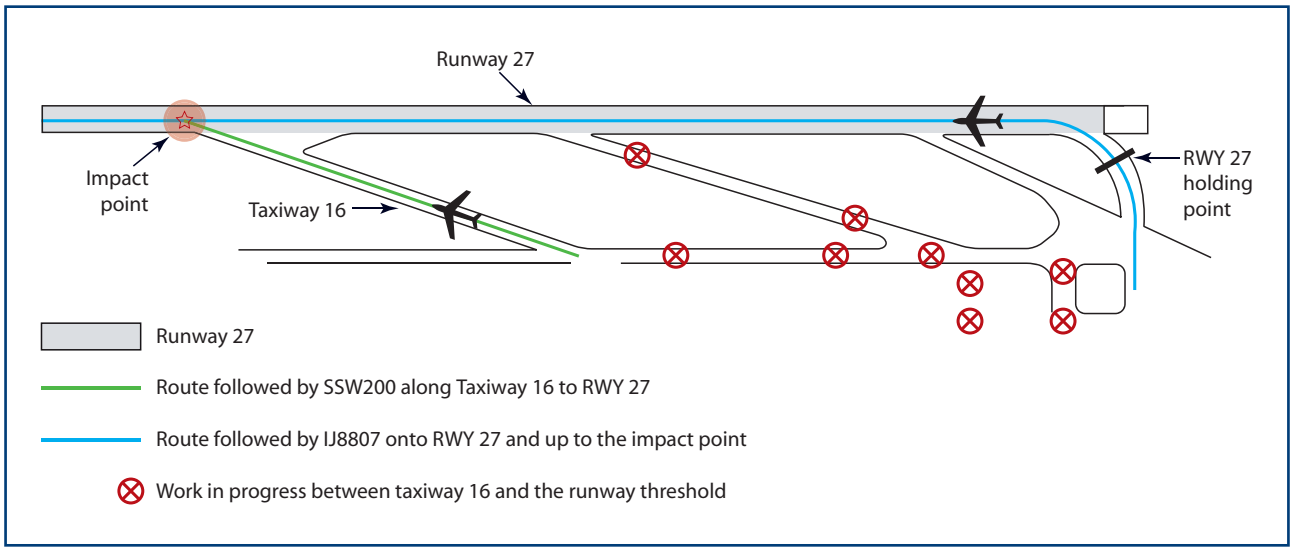
Three seconds later, SSW200 was instructed to go to Local frequency.

At 02:50:45 the B737 vacated RWY 27, having passed in front of SSW200. IJ8807 was then cleared for take off.

Five seconds later at 02:50:50 SSW200 was cleared to "line up runway 27 and wait, number two." SSW200 taxied forward and entered the runway, all the time looking for the No 1.

Shortly before impact, the Shorts 330 Captain noticed the MD 83 beacon lights and braked. About the same time, the MD 83 crew noticed the Shorts 330 on the edge of the runway. The aircraft had by then passed V1.

At 02:52:01 the left wing of the MD 83 collided with the right propeller and cut through the Shorts 330 cockpit.



Analysis

All the exchanges between ATC and IJ8807 were conducted in French while all communication with SSW200 were in English.

There was work in progress at various points between taxiway 16 and the runway threshold involving some 10 vehicles equipped with orange flashing lights, while the work itself was illuminated by halogen lamps (see diagram).

There were no fixed obstacles blocking the view of the runway threshold from the cockpit of SSW200. The field of view from the Shorts 330 right hand pilots seat extended 120° to the right of the aircraft axis; however, the pilot was unable to see the threshold of RWY 27 while the aircraft was on taxiway 16 because of the extremely acute angle between taxiway and runway.

It was normal practice for the Streamline aircraft to depart RWY 27 from a runway intersection; however on the night in question the TWR position was manned by an instructor who was re-familiarising himself with the airport and had formed the erroneous perception that all traffic departing RWY 27 did so via the runway threshold.

The aircraft strips were passed from GRD to TWR by a third party. In doing so, no mention was made of the position of the Shorts, although this was indicated on the strip. As he had not noticed the indication of the taxiway on the strip and nothing had drawn his attention to the peculiarities of the Shorts' situation, TWR believed that the aircraft was taxiing behind the MD 83.

A direct visual check was difficult to perform because of the works and the light pollution, and radar verification was difficult because of the screen's characteristics. In radio communication with SSW200, there was no reference to the aircraft's position.

The crew of the Shorts had not understood the clearance given to IJ 8807, which was in French. They could not see the MD83 on the runway, and assumed that the landing B737 which passed in front of them was the aircraft taking off before them. Therefore they taxied onto the runway, as they thought, in accordance with their clearance.

The MD83 crew understood the clearance given to the Shorts but were unaware that it was at the intersection. As they commenced their takeoff there were no obstacles visible ahead of them.

Probable Causes

The investigation determined that the accident was caused:

- Firstly, by the TWR controller's erroneous perception of the position of the aircraft, this being reinforced by the context and the working methods, which led him to clear the Shorts to line up,
- Secondly, by the inadequacy of systematic verification procedures in ATC which made it impossible for the error to be corrected,
- Finally, by the Shorts' crew not dispelling any doubts they had as to the position of the "number one" aircraft before entering the runway.

Contributory factors include:

- Light pollution in the area of RWY 27, which made a direct view difficult for the TWR controller.
- Difficulty for the TWR controller in accessing radar information: the ASTRE* image was difficult to read and the AVISO* image was not displayed at his control position.
- The use of two languages for radio communications, which meant that the Shorts crew were not conscious that the MD 83 was going to take off.
- The angle between access taxiway 16 and the runway which made it impossible for the Shorts crew to perform a visual check before entering the runway.
- The lack of co-ordination between the GRD and TWR controllers when managing the Shorts, exacerbated by the presence of a third party whose role was not defined.
- A feedback system which was recent and still underdeveloped.

The UK Representative to the investigation commented that the report would more accurately reflect the true position as represented by the evidence if the third causal factor was deleted because the Shorts 330 crew complied with their clearance which they read back to ATC.

**ASTRE and AVISO are radar systems used to identify the location of aircraft on the airfield .*

Recommendations

The investigation showed the importance for safety of great precision in runway usage and the grave risks created by any misunderstanding, especially when the aerodrome's procedures allow for the occasional presence of more than one aircraft on the runway. Accordingly the investigation made recommendations to guarantee in all circumstances the same level of safety when such procedures are in force.

Several recommendations were also made concerning the organisation of Air Traffic Control.

In addition, the investigation recommended in the light of the analysis of this accident and previously acquired experience, that the DGAC study the expediency and methods of implementation for the systematic use of the English language for air traffic control at Paris Charles de Gaulle aerodrome, as well as the extension of this measure to other aerodromes with significant international traffic. In making this recommendation, it was stressed that the investigation did not aim to evaluate the advantages and disadvantages of the systematic use of a single language.

Lessons Learned

RUNWAY INCURSION - From several safety occurrances we recommend:

Recommendations contained in this and other runway collision accident reports, and data obtained following the analysis of many runway incursions were fully taken into account when developing the recommendations for the European Action Plan for the Prevention of Runway Incursions*.

The recommendations appropriate to ATC are as follows:

- Use a clear and unambiguous method to indicate that a runway is temporarily obstructed;
- Do not instruct or imply that an aircraft should cross an illuminated red stop bar when entering or crossing a runway. For situations where the stop bars or controls are unserviceable contingency procedures should be used to guide the aircraft across the stop bars. Stop bars that protect the runway must be controllable by the runway controller;
- Ensure that ATC communication messages are not over long or complex;
- Ensure that ATC procedures contain a requirement for an explicit clearance to cross any runway. This includes non-active runways;
- Use standard taxi routes when practical to minimise the potential for pilot confusion and allow preplanning by aircrew;
- In situations where a long and complex taxi route is required, the use of progressive taxi instructions is recommended to reduce pilot workload and the potential for any confusion. Each element of the taxi clearance should contain a clearance limit;
- Assess any existing visibility restrictions from the tower which have a potential impact on the ability to see the runway, and disseminate this information as appropriate;
- Ensure that runway safety issues are included in training and briefing for ATC staff especially at shift hand over;
- When using multiple line-ups, do not use oblique or angled taxiways that limit the ability of the flight crew to see the runway threshold or the final approach area;
- To avoid the possibility of call sign confusion, use the full aircraft or vehicle call signs for all communictions associated with runway opertions;
- Use only standard ICAO RTF phraseology;
- Always use the ICAO read-back procedure (including Drivers and other personnel who operate on the manoeuvring area);
- Improve situational awareness by conducting all communications associated with runway operations on a common frequency;
  (note - aerodromes with multiple runways may use a different frequency for each runway.)

**A copy of the European Action Plan for the Prevention of Runway Incursions can be obtained from the following e-mail address: runway.safety@eurocontrol.int.*

LOSS OF SEPARATION

The incident which is described below took place in the middle of the day in the terminal area near a major European airport. The three aircraft involved were operated by major European airlines. The details of the incident have been changed to protect confidentiality but the facts are very much as they happened.

Factual Information

AirB123 is a Boeing 737 which is intending to land at the airport and is descending to FL100 under control of the Initial Approach Controller (INI). At 1200.00, INI instructs the pilot of AirB123 to "proceed PQR, for radar to ILS RWY 25R".

Two minutes later at 1202, the pilot of CAir035, an Airbus A340 departing from the airport, informs Departure Control (DEP) that he is climbing to FL90 and proceeding to LMN. DEP instructs him to continue towards LMN and report reaching FL90.

CAir3365 is an Airbus A320 at FL90 on the same route as CD035 but 10 miles ahead, also under control of DEP.

At 1205.00, CAir035 advises levelling at FL90 and requests further climb. Unfortunately, the callsign is corrupt and DEP believes the message came from CAir 3365. He issues the instruction: "CAir 3365 climb report level FL200".

CAir 035 does not notice the incorrect call sign and replies: "Climbing to 200, 035".

DEP does not notice that the wrong aircraft has responded to the clearance.

A few seconds later, INI detects the conflict and instructs AirB 123 to turn left heading 300. He advises AirB 123 that he has "traffic at 11 o'clock 5 miles same level, climbing". He then instructs AirB 123 to "descend immediately to FL70".

At 1205.50, DEP issues the instruction: "CAir035 maintain FL90, traffic crossing right to left, turn left heading 120."

But CAir035 had already passed FL90. Five seconds later he reports "We have a TCAS TA. Traffic is in sight."

DEP responds: "CAir035 descend immediately FL90, turn immediately left heading 090."

At the same time, CAir035 receives a TCAS "climb" RA. He replies: "Descending FL90, left 150 degrees, following TCAS."

In fact the pilot continued to descend, contrary to his "climb" RA.

At 1206.30, AirB123 informs INI that he has the traffic in sight on his right hand side. The aircraft pass 1.5nm apart, both at FL096, descending.

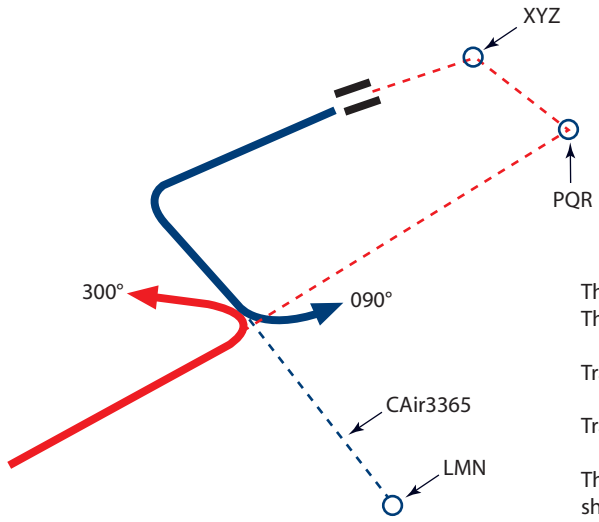
Analysis

Two aircraft with callsigns CAir035 and CAir3365 departed from the same airfield on similar initial tracks within a few minutes of each other. The potential for call sign confusion (same prefix, two digits in each suffix the same, final digit in each suffix the same) was apparently not detected by the airline callsign deconfliction programme nor was it noticed by the controllers or the pilots of either aircraft.

The request from CAir035 for further climb was corrupt and the call sign was unclear. The DEP controller was expecting a climb request from CAir3365 and so assumed the call was from that aircraft and issued it with a clearance to climb to FL200 without first checking the call sign.

The pilots of CAir035 were expecting further climb clearance and accepted the clearance as being intended for them.
The DEP controller did not detect the error on readback. The fact that the pilot of CAir035 abbreviated his callsign at 1205.16 may have contributed to this error.

The pilot of CAir035 received a TCAS "climb" RA and reported to ATC that he was following it however he apparently continued to descend in accordance with ATC avoiding instructions.



This schematic diagram shows the approximate relationship of the aircraft. The diagram is not drawn to scale.

Track of AirB123

Track of CAir035

The position of CAir3365 at the time of the incidant is also shown on the diagram

Lessons Learned

LOSS OF SEPARATION - From several safety occurrances we recommend:

Communication & Similar Callsigns

- Use correct RTF phraseology, procedures and discipline at all times;
- Insist on readback. Listen carefully to readback. Always correct errors and insist on correct readback following an error for as many times as is necessary to ensure that the correct clearance has been understood;
- Monitor flight crew compliance with RTF callsign use;
- Take extra care when language difficulties may exist;
- Recognise and understand the pilots' working environments and constraints;
- Warn the pilots of aircraft on the same RTF frequency having similar callsigns that callsignconfusion may occur. If necessary, instruct one or both aircraft to use alternative callsigns while they are on the frequency;
- A transmission could be blocked when two or more aircraft are responding to the same clearance. Typically the controller would hear a partial or garbled readback.
  If a blocked transmission is suspected, ensure that both aircraft retransmit their messages and confirm that a clearance has not been taken by an aircraft for which it was not intended;
- Where an actual or potential callsign confusion incident is observed, file a report using the national mandatory incident reporting system or voluntary incident reporting system as appropriate;
- Advise adjacent sectors/airports if it is felt that potential confusion may exist between aircraft likely to enter their airspace;
- Ensure that aircraft operators are made aware of any actual or potential callsign confusion reported by air traffic controllers.

TCAS

- Where a collision risk exists, ACAS provides the most effective means of collision avoidance.
- When a controller is informed that a pilot is following an RA, he should not attempt to modify the aircraft flight path until the pilot reports returning to the clearance. He should provide traffic information as appropriate.

The EUROCONTROL Level Bust Toolkit contains further information to reduce the potential for loss of separation.
See page 20.

CONTROLLED FLIGHT INTO TERRAIN

In spite of concerted action throughout the industry, Controlled Flight Into Terrain (CFIT) remains a major accident cause.

According to the IATA Safety Report for 2003 there were eight fatal Controlled Flight Into Terrain (CFIT) accidents worldwide during 2003, which accounted for 136 fatalities.

Sadly, it would appear that three of these accidents involved European operators and took place within the European geographical area - two in Turkey and one in France.

It will be some time before the full details of the accident investigations are available and it is possible that the initial classification as CFIT proves to be inappropriate. The known facts of the three European accidents are summarised briefly on page 13.

CFIT occurs when an airworthy aircraft under the control of the flight crew is flown unintentionally into terrain, obstacles or water, usually with no prior awareness by the crew.

Pilots and controllers are involved equally in the ATC system, and their responsibilities overlap in many areas and provide backup.

The pilot-controller confirmation/correction process is a loop that ensures effective communication.

Whenever adverse factors are likely to affect communication, adherence to the confirmation/correction process is a line of defence against communication errors.

Controllers and pilots must work together, but there is a gap in their understanding of each other's challenges. The pilot is focused on a very complex aeroplane in the demanding environment of approach and landing. The controller is focused on traffic flow. Both are balancing safety and efficiency.

Airline operators sometimes push flight crews with schedule pressures, shortening turn-around times and demanding greater productivity of aircraft and flight crews. They also push the ATC system to increase capacity of landing/takeoff runways, reduce landing intervals, reduce radar separation minimums, and use complex multiple-runway combinations. In this demanding environment, flight safety depends on spoken communication.

Although pilots and controllers work together, sometimes they don't understand each other's problems.

A programme on pilot-controller communication should involve pilots and controllers in joint meetings and in joint flight/ATC simulator sessions to promote a mutual understanding of each other's working environment.

Discussions, for example, could include problems caused by late clearances and last-minute runway changes. In the end, these are problems for pilots AND controllers.

An example of a successful programme that provided real-world experience and proved the value of mutual understanding between pilots and controllers was that between KLM and Amsterdam ATC.

Controllers participated in Flight Simulator sessions, acting as co-pilot and reading the check-list; on the command of the pilot they operated the flaps, landing gear and other systems; they conducted communications with ATC; and they contributed to decision making in emergency and non-standard situations.

The results of these sessions were very encouraging and resulted in positive advances in mutual understanding being reported by pilots and controllers.

During the 1990s, international collaboration led by the Flight Safety Foundation (FSF) resulted in the development of the FSF Approach and Landing Accident Reduction (ALAR) Toolkit.

For more information, refer to www.flightsafety.org.

Date: 8 January 2003
Location: Diyarbakir, Turkey
Operator: THY Turkish Airlines
Aircraft Type: Avro RJ100 Regional Jet
Fatalities: Passengers - 70 / Crew - 5

The aircraft undershot during the final stage of a VOR/DME approach to RWY 34 at Diyarbakir, impacting the ground slightly to the side of the extended centreline of the runway, about 500m short of the runway threshold and 100ft below the airfield elevation. The aircraft broke up during the crash sequence and was destroyed by fire after eventually coming to rest. It is understood that, at the MDA, the pilots did not have visual contact with the runway.

The accident happened in darkness (2020L) and in poor weather. The reported weather at 1950L was: wind calm, visibility 3.5km, RWY 34 RVR 3,500m and falling, and scattered cloud at 4,000ft. However, at the accident location there is a small stream and it is reported that the fog was considerably thicker in this region.

The Turkish authorities recently ruled that the probable cause of this accident was pilot error. More specifically, they stated that 'the crew was insistent on landing despite the fact that neither the approach lights nor the runway was visible.'

Date: 26 May 2003
Location: near Macka, Turkey
Operator: UM Air (Ukraine)
Aircraft Type: Yakolev YAK-42
Fatalities: Passengers 62 / Crew 13

The aircraft was destroyed when it flew into a steep hillside near Macka during its second approach to RWY 29 at Trabzon. The accident happened shortly after the crew advised ATC that they were 'inbound' towards the Trabzon VOR.
The point of impact was at the 4,300ft level some 25km. south of the Trabzon VOR, which is located on Trabzon Airport. The accident happened in darkness (0413L). The reported weather was: wind 270°/11kt variable between 230° and 300°, visibility better than 10km in light rain showers, and scattered cloud at 1,200ft. However, it is thought likely that the mountains where the accident happened would have been shrouded in cloud.

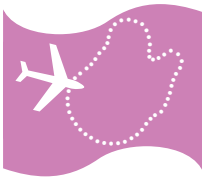
Date: 22 June 2003
Location: Brest, France
Operator: Brit Air
Aircraft Type: Canadair Regional Jet CRJ-100
Fatalities: Passengers nil / Crew 1

The aircraft undershot during the final stage of an ILS approach to RWY 26L at Brest, touching down about 2,300m before the threshold of the runway and about 450m. to the left of the extended centreline. After coming to rest the aircraft caught fire and was destroyed.

The accident happened in darkness (2351L) and in poor weather: wind 320°/9kts variable between 280° and 360°, visibility 800m in fog, RWY 26 RVR variable between 1,400m and 1,500m, and cloud broken at 200ft and scattered at 2,000ft. The aircraft was operating a flight (AF5672) from Nantes.

The aircraft was cleared to descend to 2,000ft and reached that altitude by about 7DME, continuing at 2,000ft until reaching the Outer Marker (4DME).
A further descent was then made to intercept the Glide Slope. However, this descent was continued, through the Glide Slope, which was crossed at a height of above 1,000ft, and seems to have continued at more or less the same rate until shortly before impact. The GPWS warning 'Glide Slope' had commenced, as the aircraft descended below it, 23 seconds before impact. The 'Glide Slope' and 'Sink Rate' warnings continued for the rest of the approach. Meanwhile, the aircraft had been slightly left of the localiser and continued to diverge, steadily, further to the left during most of the rest of the approach.

The earlier part of the approach had appeared normal but it is reported that the captain, who was handling the aircraft, apparently failed to respond to the warnings or noticeably react as the aircraft descended through the Glide Slope and continued below it. The co-pilot is reported as saying that, following the first 'Glide Slope' warning, he had looked at the captain who appeared to be sitting in a normal position, looking towards his instruments, with both hands on the control column. The co-pilot appears not to have commented on the aircraft's continued deviation below the Glide Slope but, reportedly, he put his hand on the TOGA button. The captain apparently still did not respond. The co-pilot then reportedly increased power and attempted to pull back on the control column, which 'felt as if it was blocked.' A few seconds later, the aircraft impacted the ground.



UNAUTHORISED PENETRATION OF AIRSPACE

Airspace Infringements are a potentially serious aviation hazard and occur when an aircraft enters Controlled Airspace (CAS) without clearance. This article summarises the findings of the recent "On Track" project conducted by the UK CAA. The full report may be viewed at the UK CAA website at www.caa.co.uk/docs/33/CAPAP2003_5.pdf

The "On Track" project was established in 2001: 'To identify the causal factors behind airspace infringements, and to make recommendations for safety improvements.' A non-CAA project team was appointed to collect detailed confidential data on why infringements occurred and to make recommendations based on comments and suggestions from pilots and controllers.

"On Track" represented a completely fresh approach to the infringement problem, by directly inviting Pilots and Controllers to give their individual views. The General Aviation (GA) community, Aviation Press and many controllers welcomed this approach as long overdue, but cautioned that its success would be judged solely on tangible results, and that the follow-up process would be closely monitored.

During the 18 month data collection period, 165 infringement reports were researched by the project. Of these, 144 were 'infringements' and 21 were 'almost infringements'. In addition, the project team gathered further detail from pilots who had no infringement to discuss but wished to contribute their views.

Airspace Issues & Lower Airspace Radar Service

Infringements often occur in areas where the amount of free airspace available to GA aircraft is restricted. Airspace constrictions or "choke points" are particularly prone to infringement.

GA pilots should be invited to participate in review of CAS allocation, taking into account the actual utilisation of the airspace concerned. Minor adjustments to CAS would produce significant benefits for all users.

There is overwhelming support for Lower Airspace Radar Service (LARS), especially in the most congested areas, which should receive priority allocation of a specific GA radar facility, and early action should be taken to achieve this aim.

Pilots reported difficulty in understanding why zone crossing clearances were so often refused without explanation. A formal procedure for pilots to register a refusal of service would quantify this problem, and provide feedback.

An additional level of service - Flight Following or Listening Out/Monitoring - based on the US model, would enhance safety when a full LARS may not be required by the pilot or available from ATC. This would employ nominated transponder codes matched to RTF frequencies.

There is a perceived attitude of mistrust between GA pilots and controllers. Airspace policy and procedures are not well understood by GA pilots who would benefit from a focussed education programme and improved publicity.

Maps and Charts

GA pilots were generally very satisfied with the current Maps and Charts following recent improvements, although problems still arise from misreading CAS boundaries.

The advances of modern technology now being employed in the production of downloadable on-line charts for the more congested areas was very impressive. Further opportunities are available to produce low cost interactive CD-ROM based charts, which could be marketed for individual printing of selectable data on a home PC.

AICs and NOTAMS

Infringements in this category were the result of misunderstanding or failing to read an Aeronautical Information Circular (AIC) or NOTAM, particularly where a Temporary Restricted Area (TRA) is established.

Emphasis should be placed on the use of common English and clarity of presentation, avoiding the use of abbreviations where plain language would be more easily understood.

On-line versions should be widely publicised and make full use of the improved graphics and presentation available. Downloadable full colour maps and publicity material should be available on-line where applicable.

Global Positioning Systems (GPS)

GPS is used by a large number of GA pilots who report that its accuracy, performance and reliability are excellent. Unfortunately there is little official recognition of GPS use by GA within UK Airspace, and no compliance requirements exist.

A wide-ranging formal compliance procedure would reduce infringements by improving the effectiveness and application of GPS.

Formal recognition of GPS use would further enhance the benefits for GA pilots, for example, by including GPS co-ordinates whenever possible in navigation information.

Training

Poor training contributes to infringements, and the specific areas of Navigation, GPS and RTF training attracted particular criticism.

A comprehensive review of all aspects of navigation training is required to produce a well-structured syllabus, detailed instructor guidance and an effective standardisation scheme.

There is currently no formal guidance or training in the use of GPS, and many pilots are unaware of the most effective GPS navigation techniques.

Although controllers reported that a high standard of pilot RTF was more likely to produce a service, it was noticeable that RTF training had a low priority.

Some pilots operate their radios with no RTF licence at all. They view the RTF Manual as too complex for their basic VFR flying requirement, and choose to opt out of the licence altogether.

Transponders

Pre-allocated squawks associated with assigned frequencies, especially in known "hot-spots", in support of a varied LARS or Flight Following/Monitoring service should be introduced. As a minimum benefit, controllers would then be able to contact an aircraft on the listening out frequency allied with its squawk.

An education and publicity programme should issue clear guidance on the most effective use of transponders in the modern ATC environment.

Licensing Issues

Infringements would be reduced if more pilots had some form of Instrument Rating (I/R). The more comprehensive use of radio navaids would confer a higher level of navigation accuracy.

A modular I/R should be introduced to focus on GA requirements.

Greater credit for foreign I/R training and qualification should be given to encourage participation and increase levels of expertise.

Communication

Lack of knowledge and poor understanding of procedures contributes to infringements. More resources and ingenuity are required to identify and implement practical means of disseminating useful, relevant safety information, which could help reduce infringements.

The use of an independent "open forum " style website by "On Track " was universally viewed as a very significant, inclusive move forward. The clear GA view was in favour of widening the forum.

CAA Investigation and Follow-up Procedure

A more constructive attitude towards the GA community would facilitate the free exchange of information and ideas required to reduce infringements.

Paradoxically, the most serious infringements that should attract the highest level of safety scrutiny and comment are lost to any safety follow up system when they are passed for investigation. Historically, all details of an infringement have been withheld where prosecution is likely, due to legal constraints. However, it is unlikely that such secrecy is necessary after the event.

Safety expertise should be included at the earliest stage of every investigation, with the specific aim of identifying infringement safety issues. Only limited infringement data is currently available. Whenever possible, causal factors should be identified and effectively recorded to promote safety analysis. 'Infringers' should be encouraged to contribute preventative suggestions as part of a "no blame " culture when closing reports.

There was strong support for heavy fines where blatant, irresponsible infringements had occurred; publicity should be given to all such awards.

Periodic detailed feedback should be available to promote infringement awareness and 'lessons learned' with appropriate expert discussion and comment.

WAKE VORTEX TURBULENCE

With the world airline fleet expected to double in size over the next 15 years and the giant A380 entering service in 2006, solutions to the wake-vortex problem cannot come too soon for the European aerospace industry.

Crash follows encounter with Boing 757 Wake Vortex

On 15 December 1993 a Boeing 757 & an Israel Aircraft Industries Westwind (WW) were vectored for landings on RWY 19R at Santa Ana—John Wayne Airport, USA. The 757 & WW were sequenced for visual approaches. Before being cleared for visual approach, the WW was closing 3.5nm behind the 757 on a converging course.

The 757 & WW crews were told to slow to 170kt due to a preceding aircraft. The 757 slowed below 150kt and was high on final approach with a 5.6° descent. The WW continued to converge to about 2.1nm behind the 757 on a 3° approach.

ATC did not specifically advise, nor was it required to advise the WW pilots that they were behind a Boeing 757. The WW captain discussed possible wake turbulence, flew the ILS one dot high, noted their closeness to the 757 & indicated there should be no problem. While descending through approximately 1,100ft AMSL the WW encountered wake turbulence from the 757, rolled into a steep descent & crashed.

The National Transportation Safety Board determined the probable causes of this accident as follows:

The pilot-in-command's failure to maintain adequate separation behind the Boeing 757 and/or remain above its flight path during the approach, which resulted in an encounter with wake vortices from the 757. Factors related to the accident were: an inadequacy in the ATC procedure related to visual approaches and VFR operations behind heavier airplanes, and the resultant lack of information to the Westwind pilots for them to determine the relative flight path of their airplane with respect to the Boeing 757's flight path.

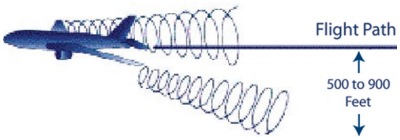
Wake vortices are normally invisible and pilots have no warning that they are flying into one. For this reason, the International Civil Aviation Organisation (ICAO) lays down strict rules about the permitted spacing between aircraft, based on their size. In instrument flying conditions aircraft may follow no closer than three nautical miles (5.56km) [Between medium aircraft]*, and a small aircraft must follow at least six nautical miles (11.12km) behind a heavy jet such as a Boeing 747.

These separations are conservative: they do not completely avoid the effects of wake vortices, but they are sufficient to be safe in most meteorological conditions.

Nearly all airline pilots will have had encounters with vortices, usually on the final approach to airports.

They are experienced as a buffeting of the aircraft. While of little concern to passengers and crew who are wearing seat belts at this stage, pilots regularly report minor injuries to crew members standing up or moving around the cabin. However, thanks to ICAO regulations on separations, there have been no serious accidents reported with passenger airliners.

The above statement was made in the European Commission on-line research magazine "Growth" dated 14th July 2000*.



* http://europa.eu.int/comm/research/growth/gcc/projects/in actionvortex.html

* Editorial remark

While this statement is true, there have been a number of fatal accidents involving smaller aircraft, and the example quoted bellow serves to demonstrate the power of wake vortices.

A number of research projects have been undertaken on both sides of the Atlantic ever since the problem of Wake Vortex Turbulence was identified. Indeed, the passage quoted above comes from an article which refers to the work done to date and emphasises the need for more research.

To quote again from "Growth":

The impetus for further study of wake vortices, now a major concern in North America as well as in Europe, is twofold:

1. A new generation of very large aircraft (VLA), such as the A380, is due to come into operation from 2007. These are expected to generate even larger wake vortices and if no action is taken will cause severe problems for ATM.

2. Many busy airports in the USA and Europe are already working near capacity limits, at least during peak hours. A better understanding of the wake-vortex phenomenon would permit aircraft to fly closer together when local weather conditions were suitable and so ease congestion. Increasing capacity in this way would be a better solution than building new runways.

A third potential area for concern is RVSM airspace, and several studies of wake vortex incidents have been carried out on behalf of EUROCONTROL. These indicate that the majority of wake vortex encounters occur with climbing or descending aircraft. It is too early to tell if the introduction of RVSM has had an impact on the probability of wake vortex encounter and so there is a continuing need to keep up the momentum of reporting so that any significant trends can be identified.

Finally, it has been observed that the wake vortex characteristics of certain aircraft types, particularly the Boeing 757, seem to differ from what would be expected based on their size. Because of this, some national authorities specify greater separation for aircraft following these aircraft types.

While there have been rare instances where wake turbulence caused structural damage, the greatest hazard is induced roll and yaw. This is especially dangerous during takeoff and landing when there is little altitude for recovery.

During takeoff and landing, the vortices sink toward the ground and move laterally away from the runway centreline, when the wind is calm. A 3kt—5kt crosswind will tend to keep the upwind vortex in the runway area and may cause the downwind vortex to drift toward another runway.

Minimum separation distances are specified in ICAO Doc 4444 (PANS-ATM). This may be supplemented by national regulations. The heavier the aircraft and the slower it is flying, the stronger the vortex.

Aircraft should be spaced so that aircraft of a lower weight category do not fly through the wake of aircraft of a higher category within the area of maximum vortices. Therefore, different separation distances are applied depending on the runway configuration (single, parallel, crossing or diverging runways) and the departure route being flown.

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Lessons Learned

WAKE VORTEX TURBULENCE - From several safety occurrances we recommend:

- Departing aircraft must be separated by at least the minimum spacing specified in ICAO or national regulations.
- Arriving aircraft must be separated from preceding aircraft by at least the minimum spacing specified in ICAO or national regulations and must be routed so as to avoid the wake vortex turbulence from departing aircraft.
- In light or calm wind conditions, pilots of aircraft following other aircraft at near the minimum specified spacing should be warned that turbulent conditions may persist.
- Pilots of aircraft reporting wake vortex turbulence should be encouraged to submit a formal report using the standard Wake Vortex Reporting form.
- ATCOs controlling aircraft operating under VFR should remain alert to the danger of wake vortex turbulence and warn pilots if they approach the minimum recommended separation.

RUNWAY EXCURSION SOUTHWEST AIRLINES - BOEING 737 OVERRUN

This article contains a brief summary of the full accident report, which may be viewed on the US National Transportation Safety Board (NTSB) web-site: http://www.ntsb.gov/publictn/publictn.htm

Factual Information

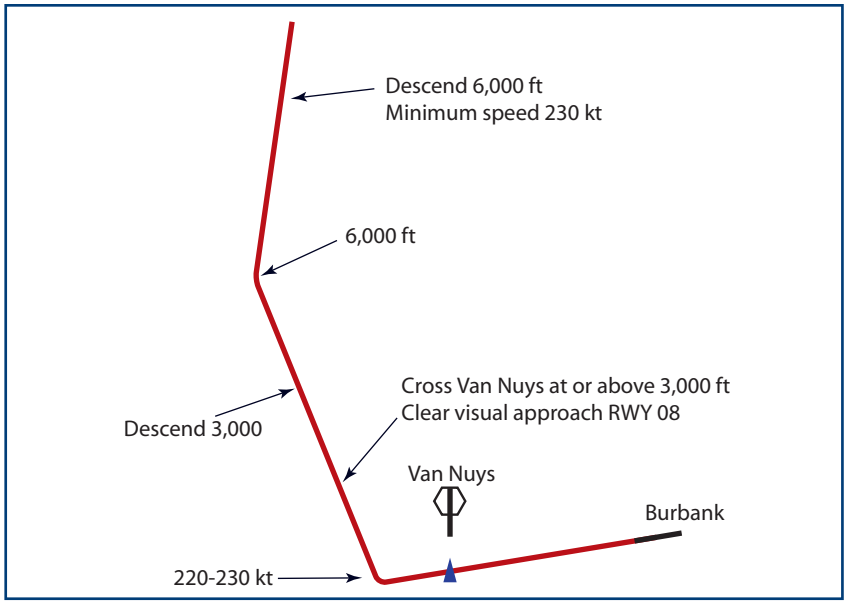
On 5th March 2000, at about 1811 local time, Southwest Airlines flight 1455, a Boeing 737-300, overran the departure end of RWY 8 after landing at Burbank Airport, California (BUR). The aircraft touched down at approximately 182 kt and about 20 seconds later, at approximately 32 kt, collided with a metal blast fence and an airport perimeter wall. The aircraft came to rest on a city street near a petrol station. 44 of the 142 persons on board were injured and the aircraft was extensively damaged.

Apparently the takeoff and en route portions of the flight to BUR were normal and uneventful. The flight crew was advised by the terminal radar approach control controller that the current ATIS was information Papa and that they should expect an ILS landing on RWY 8.

When the aircraft was about 20 miles north of the outer marker at an altitude of about 8,000 ft, the controller instructed the flight to turn left to a heading of 190° and to descend to 6,000 ft. At 18:04:02, the controller imposed a minimum speed restriction of 230 kt, apparently in order to sequence the flight between two other flights.

The first officer obtained information Papa, and informed the captain that the target airspeed for the approach would be 138 kt.

Vectoring for the approach continued with progressive descent clearances until 18:07:43 when the aircraft was cleared to 3,000 ft.



At 18:08:19 the flight was cleared to "cross Van Nuys at or above three thousand, cleared visual approach runway eight." This clearance effectively removed the speed restriction and the captain then commenced reducing speed. After the accident the captain stated that as the flight passed about 2 miles west of Van Nuys at 3,000 ft at approximately 220 kt to 230 kt, he deployed the speed brakes.

Van Nuys VOR is north of the Outer Marker and about 6nm from touchdown. At 18:08:36, as the aircraft was descending through about 3,800ft, the captain began turning to the left for the final approach.

The captain thereafter called for flaps and landing gear to be lowered progressively as he attempted to reduce the aircraft speed and establish the aircraft on the ILS glide path. The first officer stated later that the captain asked for 40° flap when the speed was 180kt even though the limit speed for this setting is 158kt.

For the last 35 seconds of the flight GPWS alerts were continuously broadcast, first as "sink rate" and later switching to "whoop, whoop, pull up."

The aircraft touched down with flaps extended to 30° at about 182kt. Thrusts reversers were deployed about 4 seconds later and the captain braked hard before the aircraft had decelerated to 80kt. As the aircraft neared the end of the runway, the captain initiated a right turn.

The aircraft departed the right side of the runway, penetrated a metal blast fence and an airport perimeter wall, and came to a stop on a city street off the airport property. An emergency evacuation ensued, and all crewmembers and passengers successfully exited the aircraft.

Analysis

The speed throughout the approach was high and was 182kt at touch down, compared with a target speed of 138kt. The flight path angle during the approach was 7°, more than twice the standard flight path angle of 3°. The first officer did not make any altitude callouts nor did he draw the captain's attention to the high speed and sink rate, as required by Southwest Airlines SOPs. If he had made these callouts, both he and the captain and might have been further alerted to the fact that the aircraft's airspeed and sink rate were excessive.

Because of the high speed and sink rate the approach was unstabilised and the aircraft was not in the proper position to land; therefore, in accordance with Southwest Airlines SOPs, a go-around manoeuvre should have been performed. Furthermore, the Flight Operations Manual indicates that touchdown should occur between 1,000ft and 1,500ft from the landing threshold. The aircraft landed about 2,150ft from the threshold, further indicating that it was not in the proper position to land.

At 1804:02 the controller instructed the flight to "maintain two thirty or greater 'till advised". At 1808:19, the controller issued a clearance to commence the approach, thereby cancelling the earlier speed assignment. At 1807:43, traffic conditions no longer warranted the speed limitation; cancelling the speed limitation then would have permitted the captain to begin to reduce his speed about 37 seconds sooner, thereby giving him more time to properly execute his approach to land.

The flight was given vectors that resulted in interception of the final approach course about 8 nm west of the runway threshold. This vector put the aircraft in an unfavourable position for final approach, complicated the flight crew's approach planning and execution, and contributed to the unstabilised approach.

Further, the controller's instruction to "cross Van Nuys at or above three thousand" was ambiguous because the Van Nuys VOR is not on the aircraft's flight path. This ambiguous clearance may have caused the flight crew to delay descent longer than necessary.

In summary, the NTSB concluded that the actions of the controller positioned the aircraft too fast, too high, and too close to the runway threshold to leave any safe options other than a go-around manoeuvre.

The NTSB determines the probable causes of this accident as follows:

"… the flight crew's excessive airspeed and flight path angle during the approach and landing and its failure to abort the approach when stabilized approach criteria were not met.

Contributing to the accident was the controller's positioning of the aircraft in such a manner as to leave no safe options for the flight crew other than a go-around manoeuvre."

Lessons Learned

RUNWAY EXCURSION - From several safety occurrances we recommend:

- Controllers must recognise and understand the pilots' working envi ronments and constraints;
- Controllers have a primary responsibility for safety, therefore the requirment to position aircraft so that a safe approach and landing is possible is overriding;
- Altitude or speed restrictions should be clear and unambiguous and must be removed as soon as they cease to be necessary.

LEVEL BUST

The EUROCONTROL level Bust Toolkit contains much advice to help reduce the threat of level busts

The Eurocontrol HEIDI* definition of a Level Bust is "any unauthorised deviation of more than 300 ft from an ATC flight clearance". In RVSM airspace this limit is reduced to 200 ft.

Level busts occur frequently throughout the world, and may result in serious harm, either from a mid-air collision or from collision with the ground (controlled flight into terrain [CFIT]). Occasionally, a rapid avoidance manoeuvre may be necessary, which may result in injuries to passengers, flight crewmembers, and particularly to cabin crewmembers.

By definition, level busts are always the result of pilot action or incorrect action. However, the actions of ATCOs, and of ATM in general, can reduce or increase the chances of a level bust occurring and can have an important effect on the outcome.

The EUROCONTROL Level Bust Toolkit† has been developed as a result of the EUROCONTROL Level Bust Initiative.
It contains much important information and advice to help combat the level bust threat. The following is a brief summary of advice for ATCOs.

** HEIDI—Harmonisation of European Incident Definitions Initiative for ATM*

† The EUROCONTROL Level Bust Toolkit may be obtained on CD ROM by contacting the Coordinator Safety Improvements Initiative, Mr Tzvetomir Blajev, on tel: +32 (02) 729 3965 fax: +32 (02) 729 9082 tzvetomir.blajev@eurocontrol.int

Lessons Learned

LEVEL BUST - From several safety occurrances we recommend:

- Issue clearances in good time, if possible avoiding periods of high pilot workload;
- Control the speed of transmission especially when pilots are unfamiliar with the area or may have language difficulties;
- Take care not to clip transmissions;
- Use standard phraseology to ensure clear and unambiguous pilot-controller communications;
- Limit the number of items of information in a clearance to a maximum of three;
- Never combine a frequency change with any other clearance;
- Take care to avoid confusion between different items of information, especially heading, speed and flight level;
- Never omit call-signs in a transmission;
- Use of full call-signs reduces the potential for call-sign confusion;
- Take particular care when issuing a clearance to FL 100 or FL 110;
- When two different languages are in use on the same frequency, pilots who do not understand one language may lose situational awareness;
- Insist on full readback after issuing a clearance - "Roger" is not a satisfactory alternative;
- Listen carefully to the read-back and correct any error or apparent misunderstanding of an instruction;
- Do not use readback time to carry out other tasks;
- When circumstances permit, monitor the actions of aircraft after a clearance has been passed, especially if there is reason to believe the clearance may have been misunderstood;
- Notify the pilots involved whenever two aircraft with similar call-signs are on frequency—always report such occurrences and any confusion that results;
- If a blocked transmission is suspected, ensure that both aircraft retransmit their messages and confirm carefully that a clearance has not been taken by an aircraft for which it was not intended;
- Do not issue avoiding action following notification that an aircraft is responding to a TCAS RA;
- In an emergency, use clear and concise communications, allow the pilots time and airspace to deal with the emergency, and when possible, reduce distraction by clearing other aircraft from the frequency.

FEEDBACK

The following reports were made by pilots and air traffic controllers and were published in recent editions of Feedback, the journal of the UK Confidential Human Factors Incident Reporting Programme (CHIRP). Back numbers of Feedback may be viewed at http://www.chirp.co.uk. Where applicable, the editorial response that appeared in Feedback is shown after the incident report.
The items themselves are self-explanatory and require no additional editorial comment from HindSight. But ask yourself, "What action do we take to prevent similar incidents happening at my location?" Pilots are certainly fallible but it is our job to help them avoid error. Are we doing our best?

ATIS - BEWARE

Changes to ATIS information are normally broadcast or passed to aircraft in the approach sequence as a matter of course. However, this is not always the case at some European destinations:

Pilot's Report

Arriving at ### (N. European International Airport), weather CAVOK, at about midnight UTC, the ATIS says Runway ## Left is in use for Landing, Runway ## Right for take-off.

We set up for ## Left. Air Traffic barely speak to us, just a couple of vectors from the STAR and then the instruction to: 'Report fully established on the ILS' (no confirmation of runway included). ATC adds that we are 'following a heavy at 7 miles'. We see the lights of the heavy and confirm we have him in sight, and a little later confirm fully established on approach. Then we notice that the jumbo we are following is on approach to the Right runway.

We make an RTF call to check it is the Left Runway for Landing: 'Negative, Runway ##Right' (!!) I reply we will be repositioning for ## Right, adding that the ATIS reported landing Left, take off Right.

We reposition visually on to the approach to the other runway, quickly re-setting the navaids in case of a go-round (the controller helps by passing the ILS frequency).

I think to myself, what would have happened if the weather had been such that we couldn't have seen the other aircraft ahead...??

Feedback Issue 67 – Summer 2003

FEWER AIRLINES - MORE CALL SIGN CONFUSION

ATCO's Comment

Unfortunately this is not the first time I've felt the need to report on the occurrence of similar callsigns. Within the space of several days we've not only had several similar callsign incidents but now a multiple of similar callsigns together!

I work at LTCC providing radar services for the London TMA airfields. The problem would seem to have arisen from the merger of the "low cost" airlines into two big companies AAA and BBB.

Just this week we've seen AAA123/ BBB123 together, AAA5AB/BBB9AB also. My colleague had four inbound aircraft at the same time all displaying worryingly similar callsigns, again from the same companies.

With the increasing levels of traffic, coupled with the complexity of airspace around the airfields, there is very little margin of error in providing air traffic services to the airport.

It is my belief that careful and particular attention must be given to the callsigns that companies allocate at this airfield, otherwise it would easily become a factor in any future incident that may occur!

Editorial response

More than 100 Mandatory Occurrence Reports relating to callsign confusion have been submitted this year. It is important that all incidents of this type that are assessed as being potentially dangerous are reported to permit follow up action to be taken, where this is deemed to be appropriate.

Feedback Issue 67 – Summer 2003

WEATHER AVOIDANCE

Comment by Air Traffic Controller

The incidence of weather avoidance appears to be on the increase and this is highlighting a concern that many of us working in the London TMA have started to see.

The "problem" is occurring AFTER aircraft are clear of weather. Many flight crews are now taking it as their right to return to whatever heading or navigation route they were on before they requested a turn for weather avoidance. Quite often this occurs without telling ATC of the change of course.

It is the considered view of the controller that any heading given for weather avoidance is a radar heading i.e. an instruction to turn.

In many cases there are two or more aircraft in close proximity turning towards the same piece of "blue" sky, hence any unexpected turn by an aircraft could have serious separation consequences.

I wonder whether the higher authorities should clarify this to the flying community - weather avoidance is an extreme situation for BOTH ATC and crew and uncertainty like this needs to be removed.

Editorial Response

There appears to be no 'best practice' guidance to either pilots or ATCOs for the communication of weather avoidance manoeuvres and, given the multiplicity of circumstances faced by flight crews when in the vicinity of adverse weather, simple guidelines might not be possible.

Notwithstanding this, the matter has been referred to CAA (SRG) for consideration, as the reporter suggests.

In the absence of formal advice, the following might be of assistance in addressing the reporter's concern.

- Pilots to notify ATC as early as possible of the need to turn and to request a heading, rather than "Request turn left/right twenty degrees" to assist the ATCO's tactical planning.
- ATCOs to consider including the phrase "Report when clear" when issuing the subsequent clearance to change heading.
- Pilots to report "Clear" and maintain heading until further cleared by ATC.

Feedback Issue 71 – Summer 2004

MISHEARD CLEARANCE – LEVEL BUST

Pilot's Report

On arrival at AAA (a major UK airport), we entered a hold at FL150 with approx 30mins delay due to strong winds. Stepped down in the holding pattern 1000ft each hold (approx) i.e., 150, 140, 130, 120, 110, 100, 90.

We transferred to AAA Director at around FL100. Next clearance understood as descend FL80 (next lower level). At or near FL80 ATC ask if we have TURNED onto heading 080!

Need I describe that dreadful feeling? Mortified! I apologised on the RTF, ATC responded, "No problem", gave updated heading and further descent. However, AAA is not the place to be at the wrong level and heading on a busy, rough Sunday night!

Having given the incident much thought in the days following the incident, I believe that a major contributing factor was the expectation, quite reasonably, of further descent to FL80 and hearing what we thought we should hear, thus confusing heading and cleared level.

As vulnerable as one can be on a new type, it could have happened on my previous type (23 years 13,000hrs)
.
Also, I had a good First Officer.

Editorial Response

This is a good example of how easily an ATC instruction can be misinterpreted, when it sounds similar to one that you are expecting.

In an attempt to reduce errors of this type, NATS has mandated that when an ATC heading instruction ending in a zero is given the word "DEGREES" is to be added. Interestingly, current evidence is that many pilots do not include this term in their readback; it is recommended that this be done.

In a situation like that reported, the importance of both pilots listening to ATC, and also the clearance being read back to the ATCO to close the information loop is obvious.

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ACRONYMS USED IN THIS ISSUE

ACAS	Airborne Collision Avoidance Systems
AIC	Aeronautical Information Circular
AIRPROX	Aircraft Proximity
ALAR	Approach and Landing Accident Reduction
AMSL	Above Mean Sea Level
ANSP	Air Navigation Service Provider
ATC	Air Traffic Control
ATCO	Air Traffic Control Officer
ATIS	Automated Terminal Information Service
ATM	Air Transport Management
ATSU	Air Traffic Service Unit
BEA	French Accident Investigation Bureau
CAA(SRG)	Civil Aviation Authority (Safety Regulation Group) (UK)
CAS	Controlled Airspace
CAT	Clear Air Turbulence
CAVOK	Cloud and Visibility OK
CB	Cumulonimbus (cloud)
CFIT	Controlled Flight Into Terrain
CHIRP	Confidential Human Factors Incident Reporting Programme (UK)
DAP	EUROCONTROL Directorate of ATM Programmes
DEP	Departure Controller
DGAC	French Civil Aviation Authority
DME	Distance Measuring Equipment
EATM	European Air Traffic Management
ECAC	European Civil Aviation Conference
FAA	Federal Aviation Administration (US)
FL	Flight Level
FMS	Flight Management System
FSA	First Stop Altitude
FSF	Flight Safety Foundation
ft	Feet
GA	General Aviation
GPS	Global Positioning System
GPWS	Ground Proximity Warning System
GRD	Aerodrome Ground Controller
HEIDI	Harmonisation of European Incident Definitions Initiative for ATM
I/R	Instrument Rating
IATA	International Air Transport Association
ICAO	International Civil Aviation Organisation
ILS	Instrument Landing System
INI	Initial Approach Controller
JAA	Joint Aviation Authorities

km	.....	Kilometre
kt	.....	Knot(s)
LARS	.....	Lower Airspace Radar Service
LTCC	.....	London Terminal Control Centre
m	.....	Metre
MDA	.....	Minimum Descent Altitude
NATS	.....	National Air Traffic Service (UK)
NOTAM	.....	Notice to Airmen
Nm	.....	Nautical Mile
NTSB	.....	National Transportation Safety Board (US)
PANS	.....	Procedures for Air Navigation Services
RA	.....	Resolution Advisory (ACAS)
RNAV	.....	Area Navigation
RTF	.....	Radio Telephony
RVR	.....	Runway Visual Range
RVSM	.....	Reduced Vertical Separation Minima
RWY	.....	Runway
SAF	.....	Safety Enhancement Business Division—a division of DAP
SID	.....	Standard Instrument Departure (Route)
SRC	.....	Safety Regulation Commission
SSAP	.....	Strategic Safety Action Plan
STAR	.....	Standard Terminal Arrival Route
TA	.....	Traffic Advisory (ACAS)
TCAS	.....	Traffic Alert and Collision Avoidance System
TOGA	.....	Take-Off/Go-Around
TMA	.....	Terminal Control Area
TRA	.....	Temporary Restricted Airspace
TSA	.....	Temporary Segregated Area
TWR	.....	Aerodrome Local (Tower) Controller
UTC	.....	Coordinated Universal Time
V1	.....	Take-off Decision Speed
VFR	.....	Visual Flight Rules
VIP	.....	Very Important Person
VLA	.....	Very Large Aircraft
VOR	.....	Very High Frequency Omni-Range

The Southwest Airlines Boeing 737 which overran the runway at Burbank California. *See page 18*

EDITORIAL TEAM

CONTACT US

The success of this publication depends very much on you. We need to know what you think of HindSight. Do you find the contents interesting or boring? Are the incident descriptions easy to follow or hard to understand? Did they make you think about something you hadn't thought of before? Are you looking forward to the next edition? Are there some improvements you would like to see in its content or layout?

Please tell us what you think - and even more important, please share your difficult experiences with us!

We hope that you will join us in this exciting new venture. Please send your message - rude or polite - to:

tzvetomir.blajev@eurocontrol.int

Messages will not be published in HindSight or communicated to others without your permission.

DISCLAIMER

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