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## Flight Management Concerns, Ryanair Boeing 737-800, EI-CSA, July 21, 2004

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**Micro-summary: This Boeing 737-800 was operated in an unusual manner.**

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**Event Date: 2004-07-21 at 1340 UTC**

**Investigative Body: Air Accident Investigation Unit (AAIU), Ireland**

**Investigative Body's Web Site: <http://www.aaiu.ie/>**

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# FINAL REPORT

AAIU Synoptic Report No: 2005-018

AAIU File No: 2004/0040

Published: 19/09/05

**In accordance with the provisions of SI 205 of 1997, the Chief Inspector of Accidents, on 30 July 2004, appointed Mr Frank Russell as the Investigator-in-Charge to carry out a Field Investigation into this occurrence and prepare a Synoptic Report. The Swedish Accident Investigation Board nominated Mr. Sakari Havbrandt as their Accredited Representative.**

<b>Aircraft Type and Registration:</b>	B737-800, EI-CSA
<b>No. and Type of Engines:</b>	2 x CFM 56-7B
<b>Aircraft Serial Number:</b>	29916
<b>Year of Manufacture:</b>	1999
<b>Date and Time (UTC):</b>	21 July 2004 @ 13.40 hrs
<b>Location:</b>	Approach to Skavsta Airport, Sweden
<b>Type of Flight:</b>	Public Transport
<b>Persons on Board:</b>	Crew - 6      Passengers - 184
<b>Injuries:</b>	Crew - Nil      Passengers - Nil
<b>Nature of Damage:</b>	None
<b>Commander's Licence:</b>	Airline Transport Pilot's Licence
<b>Commander's Details:</b>	Male, aged 38 years
<b>Commander's Flying Experience:</b>	5,000 hours approximately (of which 1,500 were on type)
<b>First Officer's flying Experience:</b>	700 hours (of which 400 were on type)
<b>Information Source:</b>	Reports received from the Operator and Pilots. AAIU Field Investigation.

## **NOTIFICATION**

The Air Accident Investigation Unit (AAIU) was notified of this incident by the Operator.

## **SYNOPSIS**

The aircraft was on a scheduled passenger service between London Stansted Airport and Stockholm/Skavsta Airport, Sweden. From the passengers point of view the flight was uneventful. The Captain, who was the Pilot Flying (PF), reported that the aircraft was cleared by Air Traffic Control (ATC) for a visual approach to Runway (RWY) 08, where the weather conditions were good with visibility of more than 10 Kilometres, a light wind from the Southeast, and the runway was dry.

# FINAL REPORT

From the commencement of descent to touchdown, the aircraft was operated at times outside normal Operator and Manufacturer's parameters. While the landing was carried out with excessive speed and an incorrect flap configuration, the aircraft stopped within the landing distance available. The aircraft taxied to the ramp area where the passengers disembarked. The flight crew later completed the return leg to Stansted.

## 1. FACTUAL INFORMATION

### 1.1 History of the Flight

On departure from Stansted the aircraft climbed to its allotted cruising level, with the Captain as the Pilot Flying (PF) and the First Officer as the Pilot Not Flying (PNF). This was the PF's last day of duty for the Operator. He would be returning to his native Australia within days, as planned.

The flight continued normally as programmed in the Flight Management Computer (FMC) until Top of Descent (TOD) was reached. This is the point where the cruise phase changes to the descent phase. The Mode Control Panel (MCP) attitude selector would normally be set to Descent, but the PF inexplicably maintained ALT HOLD, which effectively kept the aircraft at its cruise level. The PNF was aware of passing TOD but did not comment on it at the time. The weather was generally fine with scattered cloud and good visibility. Air Traffic Control (ATC) cleared the aircraft for a visual approach to RWY 08 at Skavsta. The PF commenced his descent sometime after TOD. The approach checklist was accomplished at or before Flight Level (FL) 100 and it was about this point that the PNF became concerned as the runway was becoming more visual. He recalled that the runway profile did not look normal to him, it did not look as if it was at the proper angle from his perspective. The PF, in his written statement, said that the aircraft "*was high above the standard profile*" at this time. He was now flying with the Auto Pilot (AP) disengaged. Autothrust was disengaged at 6,050 ft. He called the PNF to start extending flaps. He gave Flap 1 at about 235 kt, he recalled, and then selected landing gear down at about 5,700 ft. The PF called for more flaps while he "*increased the rate of descent to establish on the glide profile dictated by the PAPI's*" (Precision Approach Path Indicators) on RWY 08. The PNF recalled that this nose pitch down angle may have exceeded 10° with an accompanying increase in airspeed, up to 270 kt was reached, with Flap 5 selected. Concurrently, the Ground Proximity Warning System (GPWS) alarm sounded once and later a second time during the latter part of the approach.

The PF recalled that the PNF "*brought the excess in speed to his attention several times*", but that "*his call was to continue thinking at the time he would be able to rescue the approach*". The PNF made the comment that the PF was "*fixated on trying to fly the aircraft on to the runway*". Because of the high speeds, he recalled, he could only select Flap 10 for the landing, at about 210 kt (standard landing flap setting is Flaps 30). At no time did he call for a Go-Around (GA). His inputs of "too high" or "too fast" were effectively being ignored. Consequently, he said, a stabilized approach was not achieved, as is required by SOP's. In the event, a relatively smooth landing was effected in the correct touchdown zone of the dry runway at a speed of 178/180 kt, which is some 30/40 kt above the normal touchdown speed. The aircraft stopped at the end of the 2,878 metre long runway using manual braking and normal reverse thrust.

The PNF recalled there was silence in the cockpit while taxiing to their parking stand. Once there, when the PNF said that there was a need to get the flaps inspected or checked, the PF responded "No, I'll look at them".

## FINAL REPORT

No verbal or written message was given to the ground engineers. However, engineers were called to re-set the Proximity Switch Electrical Unit (PSEU) indicator light which had illuminated on the ground. The aircraft could not be dispatched unless this light was extinguished. The PSEU monitors take off configuration warnings/landing configuration warnings/landing gear and air/ground sensing. The PNF felt that this was another distraction during their 25 minute turnaround at Skavsta. No questions were asked as to why the PSEU might have illuminated. The pilots did not make any technical log book entry for any reason.

The last flight of the PF for the Operator was the return leg to Stansted, which he also flew as PF. The PNF recalled that this was a normal flight which complied with the Operators Standard Operating Procedures (SOPs), including a Flaps 30 landing at Stansted.

### 1.2 ATC tapes

On 2 September 2004, the Swedish Accident Investigation Board was formally notified of this serious incident by the AAIU, in compliance with the provisions of the International Civil Aviation Organisation (ICAO), Annex 13 (Aircraft Accident and Incident Investigation). Following earlier consultation with the Swedish AIB it was agreed that the AAIU would undertake the investigation.

To assist with the investigation, a routine request was made to the Swedish AIB to retrieve the Radar and ATC Audio Tapes pertinent to this incident. The Accredited Representative (ACCREP) subsequently advised that he had ordered the required tapes from the Skavsta Airport Authorities. On 28 September 2004, Radar derived data (**Appendix A**) showing the last 3,000 feet of the approach was received from the ACCREP. Later, on 3 December 2004, a message was received from the ACCREP informing the AAIU that the ATC Audio tape was destroyed when the Skavsta Airport Authorities tried to copy it for the Swedish AIB. Thus, a potentially valuable source of primary information was lost to the investigation. This is regrettable.

### 1.3 Pilot Response

The PF made a voluntary written Report to the Operator after he resigned from his position in July 2004 and before his return to his native Australia. Following numerous requests the PF responded in May 2005 to the Investigation with additional clarification and expansion of his original Report to the Operator. Fundamentally, he states, he made an incorrect decision to commence and continue an approach as, at the time, he *“did not have the excess mental capacity to timely correct the error”* and that this lack of concentration *“was directly attributable to physiological and psychological fatigue”*.

By way of further explanation, he added that he was having marital difficulties during the previous six months and his family had returned to Australia. He was based in the UK at the time and this separation event played heavily on his mind during this period, affecting, as it did, his ability to eat and sleep normally. It was for all these reasons he decided to resign from his position with the Operator. Two days before the incident flight a further marital disagreement occurred which did not help matters, he recalled. He now knows that he *“should have called ill for the flight, but at the time I didn’t want to let down the company and on the day “you” always think you will be fine”*. He apologised to the Operator and PNF over mistakes made. They were not deliberate, he stressed. He concluded by saying that, in his four and a half years with the Operator, he never had a report, never mind an incident, up to that time.

# FINAL REPORT

## 2. ANALYSIS

The year 2004, according to recently published ICAO statistics, was the safest year in global commercial aviation since 1945. Millions of hours are flown annually and it is a tribute to the aviation industry that this is done safely. Industrially, airline pilots are among the world's most checked employees, in that they must undergo at least one annual medical examination (two, if over forty years of age) to maintain their State issued flight Licence, are subject to aircraft Simulator and Line checks at least twice a year and undertake other Flight Checks and related Courses as required by the operating company. All of these are carried out in the interest of flight safety whose fundamental objective is the prevention of accidents. In addition, all operators issue various manuals to pilots that relate to the specific operational and technical requirements of their aircraft. The B737-800 Airplane Flight Manual (AFM) is one such manual. It is written with this specific aircraft in mind and it contains the necessary operating limitations, procedures, performance, and systems information the flight crew need to safely and efficiently operate the 737 aircraft during all anticipated airline operations. Also, to enhance safety, pilots undergo Crew Resource Management (CRM) Courses.

As the title suggests, the aim of these courses is to maximise cockpit and cabin crew cooperation in the interests of safety and efficient operations. Team work is stressed and, above all, open communications in the cockpit between the PF and the PNF. The Course lays much emphasis on the need for a more questioning attitude to cockpit and other external factors (e.g. ATC), particularly by younger less experienced pilots. Also, the Course reminds more experienced pilots to be receptive to inputs from their Co-pilots and, indeed, Cabin Crew. It also draws attention to the insidious nature of modern personal lifestyles and work environment, the impact of which can lead to physiological and psychological strain, which in turn, can cause a sudden failure or gradual breakdown of intrinsic training and judgement of highly trained and highly skilled professionals. The Course examines the Human Factors involved in air accidents and seeks to learn lessons from past mistakes. These Courses are largely credited with the marked improvement in global aviation safety and are undertaken by commercial pilots in most major airlines.

The greater part of the flight from Stansted was uneventful except for some fifteen minutes of the descent phase to Skavsta Airport. During this time normal Operator procedures were not followed and CRM requirements were so ignored as to be non-existent.

Nose down pitch reached  $12.3^\circ$  which, in turn, with the use of side slip contributed to excessive Rates of Descent (ROD), up to 6,200 fpm were recorded, and excessive speeds for flap deployment (**Appendix B and Appendix C**). These, in turn, led to GPWS alarms sounding which were ignored by the PF, as were the speed and height warning inputs from the PNF. All of the foregoing led to an unnecessarily high speed landing. In his written statement the PF attempted to address his behaviour over that fifteen minute period. He stated, inter alia *"I cannot understand what possessed me to continue the approach, I have replayed these events in my mind hundreds of times and, at no instance, do I arrive at the decision I took. I became fixated and lost sight of the big picture. It was only at such a late stage that the events taking place around me actually penetrated my mind; but by then I found myself in the landing roll"* and *"I cannot understand myself how it was possible for me to show such poor judgement. I can only imagine that certain personal stresses and tiredness affected my ability to think rationally. I do not offer this as an excuse but merely an insight into my deficiency for logical thought"*.

## FINAL REPORT

At the request of the Investigation, the PF was invited to expand on his candid written report to the Operator (partly quoted above). This reply is referred to in Para 1.3 and throws further light on what were clearly man-made events that have no origin in either aircraft technical, ATC or weather related causes. The “Cross Cockpit Gradient” of experience, as it is referred to in CRM Courses, was relatively steep between the pilots. The PNF, while fully qualified in all respects, had less than six months operational flying with the Operator. Thus, in calling out normal checks and later indicating speed excesses to the PF, he was behaving as he was expected to do in normal CRM circumstances. However, as the PF’s more recent response shows, the PNF was in a truly unique work experience situation which he had never encountered before in his career nor was he ever briefed to expect. The PF, in turn, was also experiencing a unique mental over-load situation which, in his and medical opinion, was the culmination of months of cumulative build-up of personal stress and fatigue. This cumulative pressure came to a head on the PF’s last day with the Operator, on the approach to Skavsta Airport.

It was fortuitous that the landing was carried out safely. In retrospect, as is clear from events, the PF’s first mistake was in not calling in sick on the morning of the flight, or, indeed, earlier in his monthly roster. However, as he explained, this can be a difficult thing to do, a matter of “*not letting the side down*” and, even more so, when it is for a very personal matter. This derives from the fact that, in aviation safety matters, heavy reliance is placed on pilots to be judge of their own day to day fitness to fly. However, this attitude can have significant consequences in ‘life event’ induced circumstances where personal judgement calls may not be sufficient to rectify a given situation. Clearly, such a situation is a difficult call to make and one that is not restricted to the pilots’ profession only.

In summary, the behaviour of the PF on the descent to Skavsta Airport was irrational, contrary to all his Flight and CRM training and inexplicable, even to himself at the time. Yet, as the subsequent return flight to Stansted showed, he quickly recovered his professionalism and safely carried out his last flight for the Operator.

### 3. CONCLUSIONS

#### (a) Findings

1. The Captain and First Officer were properly licensed in accordance with Joint Aviation Authorities (JAA) requirements.
2. The aircraft was serviceable in accordance with JAA requirements.
3. ATC communications were normal.
4. Weather was not a factor.
5. On engines shutdown neither the Captain nor the First Officer made techlog entries that might have called up investigation of any structural limit exceedances during the latter phase of the flight to Skavsta. This is contrary to the Operator’s SOP’s.
6. No verbal or written report was made to the Operator’s Operations Department by either pilot. This is contrary to the Operator’s SOP’s.
7. The unavailability of ATC audio tapes from Skavsta Airport is not in conformity with ICAO Annex 11 (Air Traffic Services) and ICAO DOC 9426, Air Traffic Services

## FINAL REPORT

Planning Manual (ATSPM), requirements. This technical lapse needs to be urgently addressed by the Swedish Authorities.

*The SHK/Swedish AIB advised the investigation that as a result of this incident, new modern recording equipment has been installed at Skavsta.*

8. The continuation of the flight in ALT HOLD by the PF led to the delayed commencement of the descent, which led to the use of non-normal procedures by the PF to recover the situation.
9. What occurred in the cockpit, over a period of some fifteen minutes in the descent phase to Skavsta Airport, did not conform with the Operators Standard Operating Procedures (SOPs) and CRM requirements.
10. The Captain, by his frank admission, was so concentrated on flying the airplane that he lost his situational awareness of the evolving scenario.
11. This serious incident highlights the need for pilots to take decisive steps where necessary to ensure their own physical and mental well being before undertaking any flying duties.
12. This Investigation was hampered as the full DFDR data set was not available to it.

### **(b) Cause**

This serious incident was precipitated by the temporary aberrant behaviour of the PF in disregarding the Operator's SOP's/CRM requirements and compounded by the inability of the PNF to counteract this behaviour in the unusual circumstances of the approach to Skavsta.

## **4. Safety Recommendations**

It is recommended that:

1. The Operator develop a CRM training module, emphasising the insidious nature of stress as it affects the performance of a pilot's flying capabilities. This should also include the recognition of pilot subtle incapacitation and intervention, to highlight the necessary level of assertiveness required, particularly on the part of first officers when the captain is the pilot flying. **(SR No. 014 of 2005)**

*Response: Immediately after this event the Operator began this process.*

2. The Operator reinforces to aircrew the necessity of a comprehensive briefing for all approaches, including visual approaches. **(SR No. 015 of 2005)**
3. The Operator reinforces to aircrew the requirement to re-brief where the type of approach is changed, e.g. from ILS to Visual Approach, or other. **(SR No. 016 of 2005)**
4. The Operator reinforces to aircrew the necessity of reporting possible structural limit exceedances to ensure the continued airworthiness of an aircraft, regardless of how the exceedances may have occurred. **(SR No. 017 of 2005)**

# FINAL REPORT

## Appendix A SKAVSTA Radar Data







