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In this issue

Editorial

We hope you enjoyed reading the January issue and liked the new format.

In this issue, we look into the crash of a B737-300 in Greece, which was an outcome of a lapse in pre-flight, before flight and after takeoff checklist. The consequence of this was the cabin pressurization mode was left in manual resulting in cabin pressure drop, incapacitation of the crew due to Hypoxia and finally the aircraft crashing after flying for sometime on autopilot and FMS.

We discuss Hypoxia and its effects. This is followed by the traits of accident-prone pilots.

Bird strike continues to be an important safety hazard and this is discussed next. Finally we look at the statistics of fatal accidents during 2006 and their causes.

As always, we look forward to your feedback, suggestions and contributions in the form of articles, anecdotes, pictures, etc. which can be sent to our office address given in this page.

Happy reading and many more safe landings.

NEWSLETTER TEAM

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The Crash of Helios Airways B737-300

Based on the Hellenic Air Accident Investigation and Aviation Safety board accident report 11/2006, " Helios Airways flight HCY522 BOEING 737-31S at Grammatiko , Hellas, on 14 August 2005"

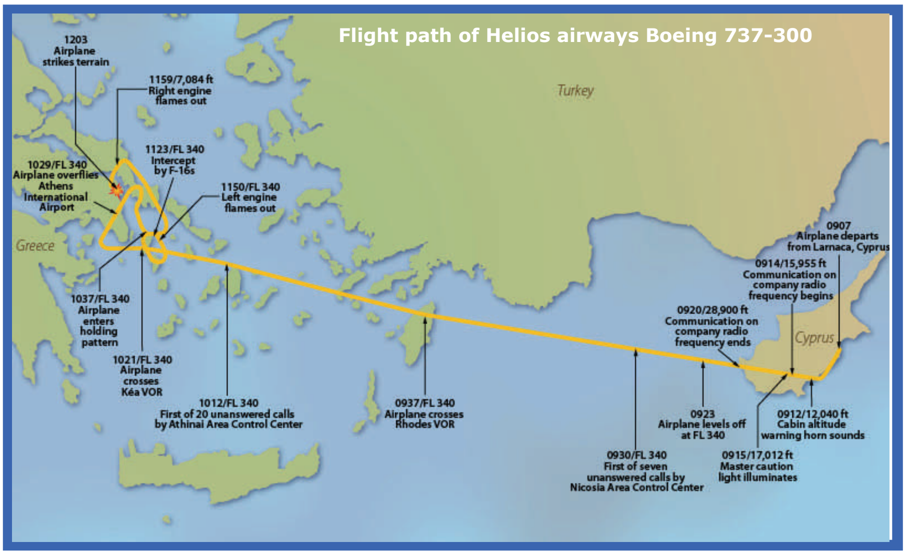
On 14 August 2005, a Boeing 737-300 aircraft, registration number 5B-DBY, operated by Helios Airways, departed Larnaca, Cyprus at 06:07 h for Prague, Czech Republic, via Athens, Hellas. The aircraft was cleared to climb to FL340 and to proceed direct to RDS VOR. As the aircraft climbed through 16 000 ft, the Captain contacted the company Operations Centre and reported a Take-off Configuration Warning and an Equipment Cooling system problem. Several communications between the Captain and the Operations Centre took place in the next eight minutes concerning the above problems and ended as the aircraft climbed through 28 900 ft. Thereafter, there was no response to radio calls to the aircraft. During the climb, at an aircraft altitude of 18 200 ft, the passenger oxygen masks deployed in the cabin. The aircraft leveled off at FL340 and continued on its programmed route.

At 07:21 h, the aircraft flew over the KEA VOR, then over the Athens International Airport, and subsequently entered the KEA VOR holding pattern at 07:38 h. At 08:24 h, during the sixth holding pattern, the Boeing 737 was intercepted by two F-16 aircraft of the Hellenic Air Force. One of the F-16 pilots observed the aircraft at close range and reported at 08:32 h that the Captain's seat was vacant, the First Officer's seat was occupied by someone who was slumped over the controls, passenger oxygen masks were seen dangling and three motionless passengers were seen seated wearing oxygen masks in the cabin. No external damage or fire was noted and the aircraft was not responding to radio calls. At 08:49 h, he reported a person not wearing an oxygen mask entering the cockpit and occupying the Captain's seat. The F-16 pilot tried to attract his attention without success. At 08:50 h, the left engine flamed out due to fuel depletion and the aircraft started descending. At 08:54 h, two MAYDAY messages were recorded on the CVR. At 09:00 h, the right engine also flamed out at an altitude of approximately 7 100 ft. The aircraft continued descending rapidly and impacted hilly terrain at 09:03 h in the vicinity of Grammatiko village, Hellas, approximately 33 km northwest of the Athens International Airport. The 115 passengers and 6 crew members on board were fatally injured. The aircraft was destroyed.

The Air Accident Investigation and Aviation Safety Board (AAIASB) of the Hellenic Ministry of Transport & Communications investigated the accident following ICAO practices and determined that the accident resulted from direct and latent causes.

The direct causes were:

- Non-recognition that the cabin pressurization mode selector was in the MAN (manual) position during the performance of the Preflight procedure, the Before Start checklist and the After Takeoff checklist.
- Non-identification of the warnings and the reasons for the activation of the warnings (Cabin Altitude Warning Horn, Passenger Oxygen Masks Deployment indication, Master Caution).
- Incapacitation of the flight crew due to hypoxia, resulting in the continuation of the



flight via the flight management computer and the autopilot, depletion of the fuel and engine flameout, and the impact of the aircraft with the ground.

The latent causes were:

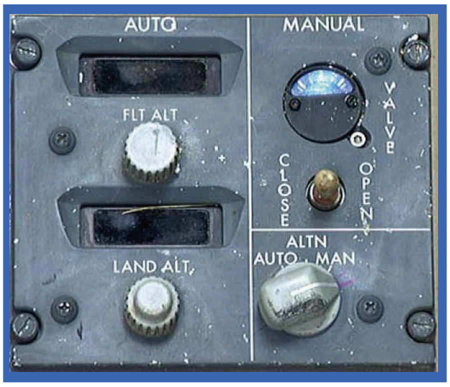
• Operator's deficiencies in the organization, quality management, and safety culture.

• Regulatory Authority's diachronic inadequate execution of its safety oversight responsibilities.

• Inadequate application of Crew Resource Management principles.

• Ineffectiveness of measures taken by the manufacturer in response to previous pressurization incidents in the particular type of aircraft.

The AAIASB further concluded that



Cabin pressurization panel

the following factors could have contributed to the accident: omission of returning the cabin pressurization mode selector to the AUTO position after non-scheduled maintenance on the aircraft; lack of cabin crew procedures (at an international level) to address events involving loss of pressurization and continuation of the climb despite passenger oxygen masks deployment; and ineffectiveness of international aviation authorities to enforce implementation of actions plans resulting from deficiencies documented in audits.

HYPOXIA— AN INVISIBLE ENEMY

Adopted from the same titled article by Hartwig Asshauer in Dec.2006 issue of SAFETY FIRST-The Airbus Safety magazine

In the previous article, we saw the effect of cabin depressurization, onset of hypoxia leading to deck crew incapacitation and finally the crash leading to fatalities.

In the February 2006 issue of Flight Safety we had discussed the threat of Hypoxia in some detail. Let us revisit this invisible enemy who can silently kill.

Hypoxia is defined as oxygen starvation severe enough to cause impairment. Pilots typically experience "Hypoxic Hypoxia" caused by reduced barometric pressure due to high altitude, gradual or rapid depressurization, affecting the body's ability to transfer oxygen from the lungs to the blood stream.

During quick depressurization the partial pressure of oxygen in the lungs/alveolae reduces rapidly with the effect of reverse diffusion. i.e. once the oxygen partial pressure in the alveolae has reached a level that is below the level in the blood, the blood oxygen moves out of the body back into the ambient air. This reverse effect unfortunately further reduces the already very limited Oxygen storing capacity and further supports hypoxia. Holding a breath cannot stop the reverse flow since the pulmonary gas expansion would lead to serious lung injury.

Severe hypoxia caused by a significant reduction in the cabin pressure is very dangerous for flight crew because:

- The victims of hypoxia rarely notice that they are about to pass out.
- There is a quick loss of critical judgment
- Most victims often experience mild euphoria
- Thinking is slow and muscular coordination is impaired.

The only effective means of protection is the quick donning of Oxygen masks as the first action—before troubleshooting!

Time of Useful Unconsciousness (TUC)

In conditions of Hypoxia, the Time of Useful Consciousness (TUC) is a very important parameter. For low ambient pressure conditions it indicates the time available to perform purposeful activities, such as oxygen mask donning or aircraft control. Beyond this time frame mental and physical capabilities are dangerously impaired and finally result in unconsciousness and potentially death.

As shown in the table on the right, TUC reduces drastically with altitude. It is important to note that even if activities are performed within the TUC time frame there is a significant deterioration of work rate and mental capability, which is correlated with the time spent at low pressure conditions (at the end of the TUC time frame, performance is much lower than at the beginning).

The TUC is the *'Window of Opportunity'* for donning an oxygen mask and can be very limited so must take overriding precedence over any other activities.

TIME OF USEFUL CONSCIOUSNESS	
20,000 ft	all un-acclimatized persons lose useful consciousness in 10 min.
25,000 ft	useful consciousness is lost after 2.5 minutes or less
30,000 ft	TUC approximately 30 seconds
37,000 ft	TUC approximately 18 seconds
45,000 ft	TUC approximately 15 seconds

Time of Safe Unconsciousness (TSU)

Unconsciousness is a clear indication of insufficient Oxygen supply to the brain and it is obvious that this time can only be very short before permanent brain damage occurs. So far it has not been possible to associate a specific time frame for the safe time for unconsciousness. It is believed that a safe time of unconsciousness is somewhere between 90 seconds and 4 minutes.

Transport aircraft have been equipped with oxygen systems for flight crew and passengers for protection against hypoxia.

For the flight crew there are quick donning oxygen masks which can be donned with one hand in les than 5 seconds. The mask straps are combined with elastic tubes that inflate and stiffen when the mask is taken from its stowage, allowing the mask to be put easily over head with one hand. Once the grip on the mask is released, the tubes deflate and their elastic characteristics ensure a perfect fit. The required oxygen concentration of the breathing air is automatically adapted to the cabin pressure.

The first step for any flight crew member faced with cabin depressurization is to immediately wear the oxygen mask. Any delay in donning the mask will significantly increase the risk of losing consciousness before cabin pressure is regained. As mentioned earlier severe hypoxia leads to loss of critical judgement combined with a mildly euphoric state, which makes hypoxia very dangerous for the flight

crew. Moreover, in case of rapid depressurization a quickly accomplished emergency decent is often the only means of fast re-oxygenation of passengers who were unable to protect themselves against hypoxia by using the passenger oxygen masks provided. Severe hypoxia is dangerous for unprotected passengers and require quick return to an adequate cabin pressure or where it is not possible (above high terrain), it requires a check by the flight attendants that the passengers oxygen masks are correctly used. This alone ensures protection against this invisible enemy.

Accident-prone Pilots

Based on Dr.Patrick.R.Veillette's article of the same title in Sept.2006 issue of Business and Commercial aviation

"There are bold pilots and bald pilots, but there are no bold, bald pilots" – this old statement has relevance even today.

Not withstanding the progress in technology, flying requires a high level of skills and coordination. The ability to concentrate, manage workloads, monitor and perform several simultaneous tasks are necessary traits for the successful pilot.

Attention to detail and the ability to focus despite distractions have traditionally been traits that military training instilled in aviation cadets. Those who couldn't exhibit these traits are usually weeded out.

There was this career military aviator whose flying escapades are recollected here.

- Once he was flight instructing in a retractable gear aircraft whose warning horn would sound each time the throttle was retarded to idle. Accordingly, he pulled the circuit breaker to silence the horn during the lesson. Upon returning to the airport, he and his student forgot to reset the circuit breaker and subsequently forgot to move the landing gear lever, resulting in a surprisingly short, noisy and expensive gear-up arrival.
- On another occasion, while taxiing a Beech 58P Baron out of the ramp, his fuel cross-feed check was interrupted by a radio call from a dispatcher. Once the exchange was completed, our aviator, who was solo, neglected to complete the fuel check and left the right fuel selector in the cross-feed position. Once aloft and cruising, he noticed a right roll tendency and corrected with aileron trim; it did not occur to him that both engines were feeding off of the left wing's reserve tank, lightening that wing.

After two hours of flight, the right engine quit at an inopportune moment since he was coursing along a deep canyon gorge surrounded by steep escarpments. While he was trying to troubleshoot the cause of the right engine's failure, the left quit as well. Now piloting a glider in a rapid descent toward a raging river below, our aviator bellied into a sand bar and promptly sank into 10 feet of water. He survived the dunking far better than the Baron.

- Several years later our aviator was flying a de Havilland Twin Otter. After delivering supplies to a remote location, he returned to the home base. Upon touching down, the aircraft immediately veered sharply to the left, departed the runway and ran into a marsh 375 feet from the runway at which point it stopped all progress, having sustained considerable damage to its airframe and engines. Inspection of the wreckage revealed that the nose wheel steering tiller was in the fully deflected position. The aircraft's after-takeoff and before-landing checklists required that the tiller be placed in the neutral position. Apparently this item had been overlooked.

What do we infer about this aviator who busted airplanes not once or twice but thrice - unlucky or accident prone?! In each case, he did not adhere to the checklists. It was simply his disdain towards rules that led to the accidents and he was lucky to survive.

Research in aviation psychology and surveys conducted on the similarities and dissimilarities of accident free pilots and accident prone pilots have revealed a number of traits.

- <u>The first trait of an accident prone pilot is his disdain towards rules.</u> Research at John Hopkins School of Public health, USA has shown that there is a very high correlation between pilots with accidents on their flying records and safety violations on their driving records. It is highly unlikely for someone who drives with a disregard of the driving rules and regulations to climb into an airplane and become a role model pilot? Maybe a few will. Johns Hopkins research shows a very consistent trend, and this has received serious attention from large carriers whose screening process of pilot applicants includes a close review of the person's driving record to help illuminate any propensity for ignoring the rules of the road.

- <u>The second trait that correlated frequently with accident-prone pilots is "thrill and adventure seeking."</u> By nature all pilots are adventurous; controlling an airplane through the vast and vagarious heavens is not an activity for couch potatoes. But thrills come in degrees and it is those who seek the extreme that often come to grief.

For professional pilots the financial and career consequences of deviating from standard procedures can be disastrous and serve as strong motivators for natural-born thrill-seekers to keep such temptations in check. In general, our personalities tend to remain quite constant throughout life, and many classic texts on the subject reiterate that personalities rarely change in our adulthood, except through extraordinary circumstances. Thankfully, for those inclined toward the wild side, there are many other factors that influence our decision making besides our personality, not the least of which is our attitude.

According to the Air Line Pilots Association, "Actions, conduct, performance, demeanor & deportment are terms that most pilots would agree are relevant, not only to safe flight operations, but also in gaining and maintaining respect for the profession." Accordingly, the union's Professional Standards Committees offer counseling and a not-so-subtle form of peer pressure on pilots with persistent personal behavioral problems and or attitudes regarded as unprofessional and that could be detrimental to flight safety. The net effect is the establishment of a set of professional conduct "norms" within the pilot group that help to encourage positive pilot conduct.

- <u>A third interesting trait is that accident-prone pilots are impulsive rather than methodical and disciplined</u>, both in their information gathering and in the speed and selection of actions to be taken. In short, they took action quickly and without fully understanding and analyzing the pros and cons of that decision.

- <u>A fourth trait of accident-prone pilots that appeared in the study was their disregard for or underutilization of outside sources of information, including copilots, flight attendants, flight service personnel, flight instructors, air traffic controllers.</u> We've all flown with these types of individuals. They think they have all the answers and don't listen much to others. These are exactly the individuals who need CRM most, and of course are the ones who "just don't get it".

Unfortunately, there is no guarantee of positive results just because someone has attended a CRM program since they're not equipped to deal with long-term and deeply ingrained behavioral issues. While 90 percent of the pilot population has embraced the CRM concept, the truth is that they are most likely the pilots predisposed to the concept in the first place. As for the rest, they can't be convinced on the concept's merit no matter how many courses they sit through.

For those of pilots who "fly the line," the research results are worth definite pause and reflection since every pilot has varying degrees of some of the above traits. Some of these traits are innate and won't easily change with time. Luckily some will dampen as we mature, and some will be countered by the expectations of our profession, management policies, corporate culture, peer pressure and training.

A sincere reflection on the traits discussed here should make us better pilots!

Bird Strike risks

Based on Linda Werfelman's article "Risks on feathered wings" in the Jan.2007 issue of Aviation Safety world and KAC data.

According to a 2006 FAA report wildlife strikes at airports around the world destroyed 163 aircraft and killed 194 people during 1988-2005.

These strikes mostly by birds cost the US civil aviation industry alone US $ 557 million a year coupled with an aircraft downtime of 580,029 hours.

The number of strikes is increasing steadily. Number of reported strikes increased from around 6000 in 2003 to more than 7000 in 2005.

The report warns of an increase in the "risk. frequency and severity of wildlife-aircraft collisions" during the next decade. The three primary factors attributed are

1. The replacement of three or four engine old aircraft with quieter two engine aircraft increasing the probability of life threatening situations resulting from the collision with wild life, especially birds" because of reduction in engine redundancy. In addition, research has shown that birds are less able to detect and avoid modern jet aircraft with quieter engines". As a result the bird strikes damage engines more often than any other aircraft component.
2. The population of many species have increased particularly those involved in strikes and those with large body weights. For example, the Canadian geese population has increased by 7.9% a year from 1980 through 2005.
3. The increase in air traffic which is around 30 million aircraft movement in US alone in 2005, compared with around 18 million in 1980. The growth is expected to increase by at least 2 percent.

The report observed that aircraft engines were the most often damaged by bird strikes, accounting for 32% of all the damaged components. The cost of the engine damage also could be phenomenal as this example shows: An A310 that had multiple bird strikes to an engine during an attempted take off from Subic Bay, Philippines had the engine and cowling replaced at a cost of $9.5 million. The birds were identified as Philippine ducks.

To rid of the airport and surrounding areas with birds new technologies are being tried. A laser bird repellant is a new technology that is being tested at Montpellier Airport in France. This device developed by Lord Ingenierie for the French DGCA uses green laser beam (safe for the human eye) to scan runways and frighten away birds. Several months after installation of this system, birds no longer appeared in the runway area; no bird strikes have occurred at the airport with the device in operation.

Another new system being tested is the DeTect's Merlin radar System, being tested at Dallas/fort Worth International airport in Texas and JFK New York. This system detects birds but does not scare them away.

During 2005-2006, Kuwait Airways had 38 bird strike incidents (20 in 2005 and 18 in 2006). Of these, 15 bird strikes occurred in Kuwait, and 7 in Dhaka. Three bird strikes resulted in structural damage. In one case the left wind shield cracked and in the other engine fan blades were damaged. The third one resulted in a dent on the fuselage.

Readers should consult our April 2006 and July 2006 issues for additional information and pictures related to bird strike.

Fatal airliner accidents during 2006

Based on Aviation Safety Network's report for 2006

Airliner accident statistics released by the Aviation Safety Network for the year 2006, shows a total of 888 airliner accident fatalities, as a result of 27 accidents. This is significantly lower than the ten-year average of 1005 fatalities and 36 accidents. All regions have recorded a steadily decreasing accident rate over the past seven years, except for Africa.

Africa still is the most unsafe region. In 2006, 18,5% of all fatal airliner accidents happened in Africa, while the continent only accounts for approximately 3 percent of all world aircraft departures.

The moving 10-year average trends show a decrease in the average number of fatal accidents for all continents. Fifteen fatal passenger flight accidents was below the five-year average of 17 accidents. Where in 2004 cargo planes were reason for concern, 2006 showed a continuing decrease in cargo plane crashes to six.

There were five major accidents which accounted for 659 fatalities. The aircrafts involved in these were A310, A320, Boeing 737-200, 737-800 and TU154. The Boeing 737-800 was involved in a mid-air collision over Amazon.

A noteworthy figure in 2006 was the high number of 'loss of control' accidents. Seventeen aircraft crashed as a result of a loss of control, killing over 800. Six accidents were attributed to loss of control on landing or takeoff. The in-flight 'loss of control' accidents (eleven) were, amongst others, attributed to midair collisions, loss of situational awareness, weather and mechanical problems. This underscores the most pressing safety problems as identified by the Flight Safety Foundation (FSF), of which loss of control accidents is one. Controlled flight into terrain (CFIT) accidents which is another critical safety problem remained relatively low at five.

Web Watch

http://aviation-safety.net/pubs/asn - a full report on Aviation Safety Net -Statistical Summary of airline accidents in 2006

The Confidential Aviation Hazard Reporting System (CAHRS) provides a means of reporting hazards and risks in the aviation system before there is loss of life, injury or damage. It is open to anyone who wishes to submit a hazard report or safety deficiencies confidentially and non-punitively. Reports help to identify deficiencies and provide safety enhancement in areas of aviation. CAHRS forms can be collected at different location of KAC (i.e. Flight Dispatch) Premises. Completed forms can be dropped in FS&QA allocated box at Flight Dispatch or e-mailed to kwioeku@kuwaitairways.com or faxed to 00965-4749823 or mail to Flight Safety and Quality Assurance office, Operations Department, P.O. Box 394, Safat 13004, Kuwait Airways –Kuwait.