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Safety

A Corporate Safety Publication

Steady State

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Is your passenger fit to fly?

PIA

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Editorial

Perhaps the two major criteria used to assess a "good" airline are its safety& security standards. There are many aspects to ensuring a safe & secure operation from a pilot's perspective.

The need to have standardized procedures and adherence to a strict regime of consistent check list philosophy with clearly defined roles of pilot flying & pilot monitoring are perhaps first & foremost. This becomes all the more important in high tech aircraft and sophisticated automation that can lead to complacency.

Similarly a hostile environment created in the aircraft cabin can be a serious onboard security threat. A lot of regulation & legislation has been done to ensure conformity with strict security standards worldwide. This last line of defense should not be breached at any cost. The final responsibility thus lies with the flight deck crew to keep the cockpit door locked at all times and deny access to any unauthorized person without exception.

Happy Landings.

Capt. Salman Azhar
Managing Editor 'SAFETY'

COCKPIT Discipline

By Robert Baron

Nonadherence to standard operating procedures and violations of the "sterile cockpit rule" are becoming too frequent, often with tragic results.

A textbook example was the Oct. 19, 2004, crash of a Corporate Airlines Jetstream 32, which struck trees and the ground short of Runway 36 at Kirksville (Missouri, U.S.) Regional Airport after a flight from St. Louis. The airplane was destroyed: 11 passengers and both pilots were killed, and two other passengers were seriously injured.

The U.S. National Transportation Safety Board (NTSB) said, in its final report, that the probable cause of the accident was "the pilots' failure to follow established procedures and properly conduct a nonpercision instrument approach at night in IMC [instrument meteorological conditions]… and their failure to adhere to the established division of dutices between the flying and nonflying (monitoring) pilot."

Contributing factors included the pilots' failure to make standard callouts. The report also said that their "unprofessional behavior… and their fatigue likely contributed to their degraded performance."

The cockpit voice recorder (CVR) transcript reveals two pilots who were so comfortable working together that their conversations were personal and humorous – and clearly not in compliance with the U.S. Federal Aviation Administrations (FAA's) "sterile cockpit rule," which prohibits nonessential communication during critical phases of flight, including operations below 10,000 ft.

Why pilots routinely violate this rule is not difficult to figure out. First, pilots understand that a CVR records over itself every 30 minutes (longer, in the case of some new CVRs) and typically is not heard or transcribed unless there is an accident. Because the probability of an accident is low, pilots are confident that whatever is recorded on the CVR will not be heard by anyone else. Second, it is easy to forget that cockpit conversations are being recorded. A CVR is out of sight and out of mind. This "what's said in the cockpit stays in the cockpit" mentality can lead to a temptation to continue nonessential conversations below 10,000 ft. Third, the fact that no one is in the cockpit to enforce the sterile cockpit rule leaves pilots to decide for themselves whether to comply. The low probability of disciplinary action plays into the mix.

The CVR transcript of the accident flight shows that, on the accident leg, the captain was the pilot flying, and the first officer was the pilot not flying (pilot monitoring). The first officer's duties included monitoring the captain's overall performance and making proper callouts as specified by the company's standard operating procedures (SOPs). However, the crew's joking, nonessential conversations continued until just a few minutes before impact with the ground.

For example, the accident report quoted the captain — at 1910 local time, about 27 minutes before the accident — as saying, "Gotta have fun" and criticizing other first officers he had flown with for being too serious.

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Managing fatigue

Ben Cook, CASA's human factors manager, examines the importance of fatigue risk management systems (FRMS), and looks at a best-practice implementation of FRMS by the UK-based easyJet.

From personal experience of many years of flying, it has become apparent what impact extended periods of high workload such as ground-based duties (e.g. safety officer, ground instruction, preparation for training events etc); personal issues (managing and juggling family commitments), combined with long crew duty days could have on my performance. I've worked in 'cando' cultures where being able to push through long days is a sign of strength, and fatigue a sign of weakness to those less capable operators. Unfortunately, it's this type of culture which sets individuals and teams up for failure and has led to many serious fatigue-related incidents and accidents.

During one such flight at the end of a 12-hour crew duty day, I remember all too clearly flying an instrument landing system (ILS) approach into Wellington, and asking myself why I couldn't meet normal performance targets. I was flying the ILS like a novice; in fact, I think my first ILS when I completed instrument flying training was significantly better than this one. One error (too high on approach) would be over corrected and end up too low, horizontal tolerances were all over the place - from half scale left to half scale right. Even more unnerving was the lack of response from the rest of the crew. I was hand flying at the time in a medium-sized transport aircraft, and salvaged the situation by reverting to automation; we coupled the approach to the autopilot from which the aircraft flew a beautiful ILS.

This was my first significant experience of understanding how fatigue had played a significant role in reducing my performance to less-than-ideal and had degraded the normal vigilance and decision-making of the entire crew. The days leading up to this trip were busy and longer than normal. We had even covered the long crew duty day in pre-flight planning, but should have spent more time while still fresh, and prior to take-off, discussing how we were going to mitigate the effects of fatigue. For example, we could have discussed using automated systems to fly the approach right at the start of the day, which could have supported better decision making at the end of the long day. We could have formalised a significantly improved crew rest system, but as we all believed a 12-hour crew duty day was not out of the ordinary, we didn't think the risks were significant. I still don't know why I chose to hand fly the ILS, a less than optimal decision, but one of many experiences that has reminded me the role fatigue plays in degrading normally sound decision-making.

An amendment to CAO48.0 (duty time limits and fatigue risk management systems (FRMS) will soon move to the notice of proposed rule making (NPRM) phase and it's timely to reflect on duty limits and management of fatigue risk. At a recent Aviation Fatigue Management Symposium held by the Federal Aviation Administration (FAA), some of the world's leading fatigue experts, regulators, investigators and operators met under the theme of seeking 'partnerships for solutions'. Some significant points from this symposium are as follows; (there were too many to list them all):

- The National Transportation Safety Board (NTSB) has had fatigue on its 'most wanted' list since 1990.
- Individual differences in performance impairment from sleep loss are substantial. Managing fatigue becomes even more complex, as there is no 'one-size-fits-all' solution. A pattern of work hours that might be good for me may be debilitating for you.
- There is much work to be done to improve products such as biomathematical models, which currently treat individuals as being all the same, based on data 'averages'. I consider these models have a place as one (non-essential) tool in a comprehensive FRMS.

Having been involved as an investigator in a number of fatigue-related incidents, I know that good fatigue management has the potential to make big improvements to the safety of our industry. I've seen the extremes of fatigue management: some organisations, from the CEO all the way down, make a dedicated commitment to managing fatigue, breeding an organisational culture where fatigue management is taken seriously and providing the resources to support the development of a mature FRMS. At the other extreme I've seen a number of 'work-arounds', e.g. managers defaulting primarily to bio-mathematical model fatigue scores to determine whether an operator should perform duties. In a number of cases, this has led to a system that looks great on paper, but actually degrades fatigue management due to misapplication of the available tools.

The United Kingdom (UK)-based easyJet provided a presentation at the FAA Symposium and was considered one of the leaders in developing and integrating a mature FRMS into its business. An extract from an article by easyJet follows and will be one of many we hope to publish on the issue of FRMS, which draw upon industry experiences of their efforts to better manage fatigue. It provides an insight into the European and United Kingdom system and has many parallels with our own industry.

If you are operating under an FRMS, CASA would like to hear about your experiences. Has your FRMS improved the management of fatigue? What are the lessons you (and/or your organisation) could share with other operators to help them improve fatigue management?

And some final broad advice before reading the easyJet article: if someone offers you what appears to be a simple solution for what is a complex problem – it's likely to be wrong!

FATIGUE RISK MANAGEMENT AT EASYJET

Simon Stewart & Derek Brown – easyJet

In 2006, easyJet became the first European airline to implement an FRMS. The key benefit of managing fatigue risk is the prevention of accidents; however it is too simplistic to view fatigue risk management as merely a safety initiative. It is in the commercial interests of managers to understand the nature of fatigue risk. In recognising this, easyJet have incorporated the FRMS into their core business model. Knowing operational risk exposure enables managers to ensure that short-term profitability is considered simultaneously with brand protection.

PURPOSE OF EASYJET'S FRMS

'To maintain an acceptable level of safety, through the application of scientific principles, based on human physiology and knowledge, determined from data collection, risk investigation and analysis. In doing so it allows greater operational flexibility of crew scheduling, in comparison with prescriptive limitations of flight and duty time. The FRMS forms an integral part of easyJet's established safety management system (SMS).

Fatigue risk management applies standard management control principles in order to mitigate fatigue risk in airline operations, through processes based on shared responsibility amongst management and crew members acting within a just culture.

FUNCTIONING

The objective of the FRMS team is to facilitate the airline's commercial success through enhanced productivity, delivered within a risk-controlled environment. The FRMS team also add financial value to the company, based on achieving a lowered risk profile, leading to a significant reduction in insurance premiums; together with lower levels of crew attrition and sickness costs through maintaining sustainable rostering practices, whilst minimising the risk of serious incidents.

> ...leading to a significant reduction in insurance premiums; together with lower levels of crew attrition and sickness

In such a complex operating environment, focusing on simple compliance with FTL requirements (i.e. 900 hours productivity per year) cannot be justified, or assumed to provide adequate legal protection against safety risks for easyJet, as the following demonstrates.

In April 2005, easyJet became the first major airline to be granted alleviation from flight and duty time limitation (FTL) by the UK CAA, based on the results of a safety case report of a six-month roster trial. The trial roster exceeded the FTL (CAP 371) limit of three consecutive early duties. However, easyJet presented a safety case which demonstrated that, compared to the 6/3 roster (three early duties, three late duties, three days off) in operation at the time, the proposed 5/2/5/4 roster (five early duties, two days off, five late duties, four days off) was associated with a significant reduction in fatigue risk and flight deck error. The 5/2/5/4 roster is now operational network-wide at 14 bases.

A human factors monitoring program (HFMP©, Stewart and Abboud, 2005) was developed in recognition of the potential fatigue risk associated with low cost carrier operations and the limitations of simple adherence to FTL. The HFMP© assesses flight crew fatigue, rostering practices and human error, and the interactions between these. The HFMP© is multi-layered, mining data from existing safety management system (SMS) databases; for example, flight data monitoring (FDM); and also includes additional measurements, such as predictive modelling of the work-hours fatigue and objective sleep measurement.

This program was applied both to the existing 6/3 roster, and to the trial 5/2/5/4 roster (at two bases). It was predicted that the 5/2/5/4 roster would reduce fatigue by decreasing the number of days worked consecutively; and increasing the amount of time off provided for the changeover from early to late duties.

Evidence collected in the HFMP© showed, compared to the 6/3 roster, that fatigue risk was reduced during the 5/2/5/4 roster trial. Some of these HFMP© findings underpinning the safety case presented to the CAA, are:

An assessment using predictive fatigue modelling software found that while 1.8 per cent of duties on the 6/3 roster were associated with a ‘high to very high fatigue risk’, only 0.7 per cent of 5/2/5/4 roster duties fell into these categories.

Line operations safety audit (LOSA™) observers recorded crew threat and error management on both rosters, with a mean error rate of 5.2 per sector for the 6/3 roster, and a significantly reduced 2.6 on the 5/2/5/4 roster.

The implementation of the 5/2/5/4 roster, after approval by the CAA, was subject to the vote of crew who were members of the British Airline Pilots Association (BALPA). Of the members participating in the voting process, 91 per cent agreed that they felt less tired/fatigued on the 5/2/5/4 roster, with 93 per cent voting for the new roster.

In such a complex operating environment, focusing on simple compliance with FTL requirements (i.e. 900 hours productivity per year) cannot be justified, or assumed to provide adequate legal protection against safety risks for easyJet, as we have demonstrated through our previous experience.

The high levels of crew utilisation now being achieved has led to concerns that the degree of protection against fatigue offered by basic compliance with those quantitative FTL provisions specified in CAP 371 Annex A is no longer sufficient for larger companies. CAA Draft FODCOM 2008

The FRMS team must establish a full and robust safety case, supported by scientific research, incident investigations, metrics, and reporting in order to identify risk, prior to implementing each and every roster constraint to the business.

After identifying the risk, that safety case is put before the FRMS safety advisory group (SAG) made up of the relevant post-holders. It is these post-holders who own the risk and it is they who make the decision – not the FRMS team - to implement mitigating strategies in the form of roster constraints in order to maintain an acceptable level of safety.

For example, the easyJet FRMS allows our staff to report not fit for duty due to fatigue. Rather then a generic ‘sick leave’ process, this allows our organisation to gain more valuable insights into potential fatigue risks. This can only be achieved through a culture where our staff know they will be fully supported by easyJet to further investigate identified issues and to take positive action to address risks. It helps to capture when fatigue is creating problems, so we can proactively address this risk and monitor longer-term patterns related to fatigue. Furthermore, if one individual is experiencing a higher rate of fatigue-related effects, it may be due to aviation medical issues (e.g. sleep apnoea) and we can ensure those people are provided with the appropriate support to address any conditions which may be affecting their quality of sleep.

Although a fully-fledged FRMS is neither cheap nor easy, it does provides a systematic and objective process for managing fatigue risk, and can add significant value to the business. However, it must be a core part of the operator’s operational philosophy, have the full support and the visibility of senior management, and will work only if it is continually nurtured through a ‘just and open’ culture. The FRMS does not represent a ‘bolt-on’ compliance system that acts as a barrier to commercial viability. It represents operational flexibility and opportunity. It facilitates optimal performance and protection within evidenced safety criteria in pursuit of commercial opportunity. In doing so it satisfies the corporate philosophy enshrined in the five values of easyJet - safety, teamwork, pioneering, passion and integrity.

FRMS BENEFITS FOR EASYJET

The benefits of managing fatigue, as with any other risk, (within an SMS) are significant. Reasons for investing in an FRMS include not only avoiding pitfalls of FTL:

1) *Knowledge of fatigue risk exposure is a fundamental element of business* -- FRMS provides this knowledge. It is in the commercial interests of operators to understand the nature of fatigue risk and manage it effectively for continued safe operation and viability in the commercial environment. Safety links to commercial via brand protection.

- Reduction in frequency of medium and high-risk events
- Reduction in oversight from the regulating authority
- Reduction in attrition
- Reduction in lost duty days and sickness incidence due to fatigue
- Increased crew morale and CRM performance

The quantification of the benefits a reduction in fatigue associated with altered work schedules has been demonstrated in the nuclear industry by Fleishman et al (2006) with the following benefits:

- Reduction in frequency of severe accidents
- Reduction in plant shutdown risk
- Improved security
- Reduction in frequency of lost and restricted work cases

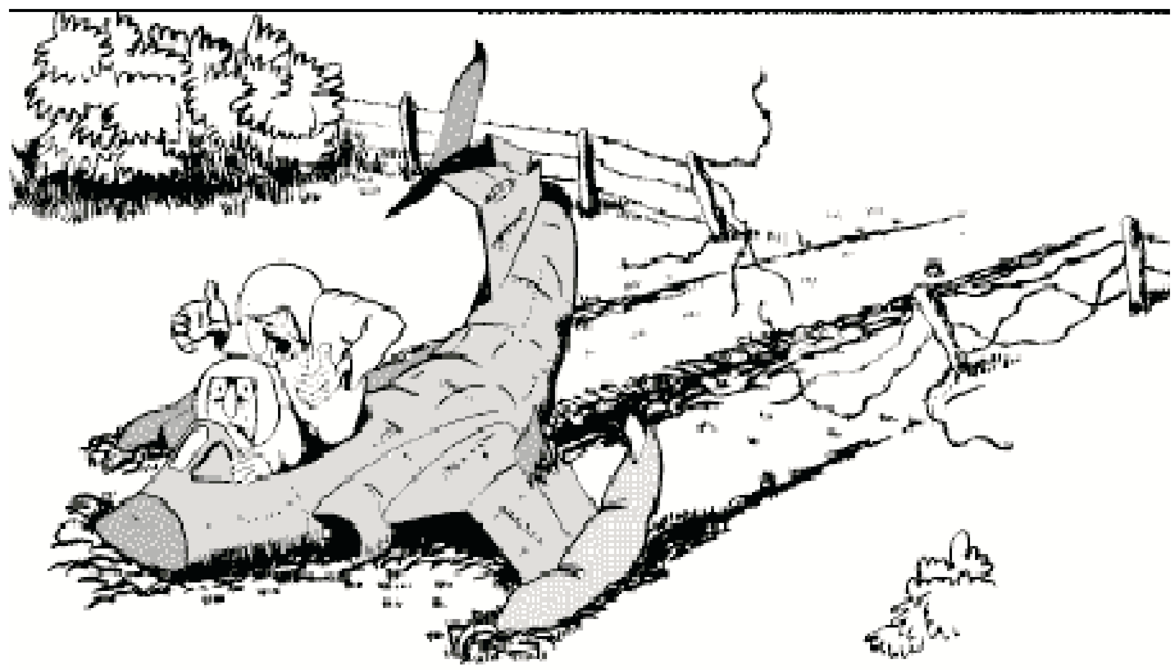
2) *New ICAO SMS legislation* (January 2009) requires airlines to implement a continuous safety monitoring program with management accountability of operational risk. EASA means that the CAA will have less oversight and airlines need internal governance (risk ownership). An internal governance program based on accountability, transparency, predictability and participation (Gardiner, 2005) supports continuous oversight of operational risk by the CAA and allows them to focus regulatory resource against audit risk areas, maximising benefit to the business.

3) *Risk signature.* Insurers and underwriters are seeking the application of proactive risk management strategies that demonstrate safety awareness and capability through mitigation of incident & accident risks. Companies which can demonstrate such risk management strategies will benefit by a decrease in airline premiums commensurate with their risk profile (Underwriter perspective-AeroSafety World, 2007).

4) *Corporate liability.* The message from the regulators is clear: legal duty hour limits do not necessarily ensure safety, and risk ownership and accountability lie squarely on the shoulders of the operator (CAA presentation Crew Management Conference, Brussels 2007). Corporate manslaughter legislation (effective UK Ministry of Justice, 2008) informs us that ignorance of risk is no defence - you are still accountable.

Unless the FRMS system is underpinned by accurate and timely information, information which can be processed and assimilated into a fatigue risk format for analysis, the program at worst will be ineffectual – a box-ticking exercise, and at best provide senior management with an inaccurate system overview of a key risk indicator on which operational decisions are based. These decisions may directly impinge on system fatigue risk.

The information sources for the FRMS system should be dynamic, in-effect 'real-time', so that a fatigue risk model can be developed which allows system projections on performance to be made. Armed with an accurate state of operational fatigue risk, senior management can be proactive. The FRMS then forms part of the company's commercial business plan accounting for fatigue risk to maintain operational integrity during projected expansion activities. The FRMS system must encompass an accurate assessment of network fatigue tolerance levels combined with work-related fatigue determined from hours and patterns of work.■



No, I did not say "I have control"

Is your passenger fit to fly?

Passenger illnesses can come in all sorts of disguises – a few clues may help cabin crew decide which of these could spell trouble.

Dr. David Newman

The International Civil Aviation Organization forecasts that 3038 billion passenger kilometres will be flown by the world's airlines by 2001.

Most of these passengers will tolerate the stresses of flight with no difficulty, but for a small minority their air travel will lead to a deterioration of their medical condition. Most of us take for granted the relatively benign nature of the airline cabin, coping well with the 6000-8000ft cabin altitude, the shirt-sleeve environment and the low humidity of 10-20 per cent. We also cope reasonably well with timezone changes. Passengers with pre-existing medical conditions may have less ability to tolerate these situations, and become increasingly unwell as the flight progresses.

The low partial pressure of oxygen in the cabin does not normally present a problem for healthy passengers. However, people with heart or lung disease or anaemia may suffer, depending on the extent of their disease and the flight duration. People with these conditions are likely to experience progressively more symptoms of hypoxia during the flight. These can range from mental confusion to complete loss of consciousness or even death, in the worst cases. Passengers with cardiac problems may attempt to compensate for their hypoxia by increasing their breathing and heart rates, which will probably be obvious to the astute observer. Such passengers may need additional oxygen for the duration of the flight to prevent them becoming seriously ill.

> **"Most of us take for granted the relatively benign nature of the airline cabin, coping well with the 6,000-8,000 cabin altitude, the shirt-sleeve environment and the low humidity."**

Most passengers with serious cardio-respiratory conditions will be very familiar with their disease, and will hopefully have taken precautions before embarking on their flight. They may have arranged to travel with their own oxygen and an attendant. However, what about those passengers whose condition isn't normally that bad, and who believe themselves to be fine and well, but will probably develop a problem inflight? Can you as a cabin attendant identify early those passengers who may have potential problems during the flight, so that you can intervene if necessary?

There are a few clues. Patients with significant heart disease may have swelling in the ankles and lower legs. A passenger with very swollen legs could have a heart condition, and would be worth keeping an eye on. So would the passenger who is obviously short of breath when boarding the aircraft, particularly if this was via an airbridge rather than stairs! If they have such difficulties at ground level, they are likely to become much worse at altitude.

Clinical clues: The passenger who looks very pale may have anaemia, with reduced oxygen carrying ability. These people are often short of breath at sea-level, and could become more so at altitude. They are also likely to suffer from dizziness and lightheadedness, and in severe cases they may lose consciousness. None of these clues are guaranteed, of course. The short of breath passenger may have just run all the way from the car park, while the pale passenger may be apprehensive about the flight (and for that reason probably still worth keeping an eye on).

Diabetes is a relatively common condition, which under most conditions does not impair an individual's ability to undertake air travel. However, with insulin-dependent diabetes, problems may be encountered during longhaul flights involving many time zone changes. The normal pattern of insulin injections and food intake may be disrupted, increasing the potential for hypoglycaemic episodes, mental impairment and even unconsciousness. Most diabetics are aware of their own particular requirements, but even the best laid plans can go awry. Cabin attendants faced with a passenger who is confused or not otherwise well should consider the possibility that the passenger may be a diabetic in trouble.

It is always worth asking the passenger or people travelling with them. With diabetes, the most likely problem in this situation is a low blood sugar level, which can be rectified fairly quickly with some food.

It is also worth taking note of passengers who have obvious mobility limitations or communication difficulties. While these are generally not a problem during flight, they may become so during an emergency ground evacuation. Sight-impaired passengers may have trouble seeing the emergency floorlights and the exit signs, while hearing-impaired passengers may have difficulty comprehending instructions.

Out quickly: What about passengers who travel with plaster casts, especially on the legs? If the cast is recent, pain may develop during flight due to swelling of the affected limb. These passengers will be slower to evacuate the aircraft cabin, and may impede the progress of others. Their seating position in the aircraft should take this possibility into account.

The ability of these passengers to get out of the aircraft quickly should be taken into consideration by the vigilant cabin attendant. Special instructions and advice may need to be given to these passengers if an emergency situation develops.

There are many medical conditions that can affect fitness to fly. Anticipating such problems may allow cabin crew to formulate a plan in advance to deal with any possible problems which may occur during the flight. An aware cabin attendant can often assist a needy passenger early and thus help to prevent a serious deterioration in their medical condition.■

Dr David Newman is an aviation medicine consultant.

...continued from page 3

"Too many of these [expletive] take themselves way too serious, in this job," he said. "I hate it, I've flown with them and it sucks. A month of [expletive] agony. ... All you wanna do is strangle the [expletive] when you get on the ground"

As the airplane descended into the clouds, the CVR recorded the captain saying, "We're going into the crap. Look, ooh, its so eerie and creepy ... get a suffocating feeling when I see that." The first officer made a barking sound followed by a groan.

About 1925, the CVR recorded a yawn from the first officer, who then said, "They have a VASI [visual approach slope indicator] on the left hand side." The captain responded, "Yeah. Wish we had an ILS [instrument landing system] on the front side."

The CVR recording showed that both accident pilots deviated numerous times from SOPs — which become increasingly critical as an aircraft gets closer to the ground, especially in IMC or at night. The following are examples from the accident report:

- The first officer did not call out "100 feet above minimums."
- As the aircraft continued its de-scent below the minimum descent altitude, the pilot flying said, "I can see ground there" and "what do you think?" Contrary to procedures and training, the pilot flying was looking for external visual references during the approach rather than leveling off and monitoring the flight instruments.
- After the pilot flying said he saw the ground, the pilot not flying said, "I can't see [expletive]." Consistent with procedures, the pilot not flying was looking for pertinent ground references. However, he did not challenge the continued descent by the pilot flying.
- Company procedures called for descent rates of no more than 900 fpm below 300 ft above ground level (AGL). The accident airplane's descent rate was consistently about 1,200 fpm until immediately before it struck the trees. The first officer failed to challenge the rate of descent.

Making standard callouts can be difficult for a first officer, even in a disciplined cockpit setting. A 1994 study found that more than 80 percent of flight-crew-involved major accidents involving U.S. air carriers occurred when the captain was the flying pilot. The study also found that a frequent factor in accidents involving pilot error was the failure of the first officer to challenge errors made by a flying captain.

Although other factors played a role in the accident, the mismanaged cockpit no doubt contributed to the inability of the crew to at least mitigate some of these factors. For example, fatigue could have been at least partially offset by compliance with SOPs.

Further, SOPs are critical to the safety of flight, and both pilots must understand what is expected of them and comply with the procedures. CRM (crew resource management) training addresses these issues with the hope that pilots will abide by the rules and procedures, and most important, use their best judgment in the practical environment. In this instance, however, the crew's behavior contradicted the principles of CRM. This was a fatal error.

QFE or QNH

Captain Chim Cheak asks: Have you ever sensed that something is not quite right? You look around and can't see anything wrong – then suddenly, you see it. It jumps right out at you

One spring night in May, I was on a scheduled Boeing 747-400 night cargo flight to Tashkent, Uzbekistan - my fourth trip to Tashkent. My first officer was rather anxious, as it was his first trip there, and he was relatively new to the fleet. To help ease his anxiety, as well as mine, I had planned to brief him thoroughly about Tashkent early in the flight, especially about QFE operations. My first officer reassured me that he had read all the relevant information, both from Jeppesen and notes from colleagues who had recently flown into Tashkent.

An hour prior to the descent, I began the landing briefing and pointed out the various key points such as the high elevation of Tashkent - 1416 ft; the conversion of altitude to feet as ATC clearances are given in metres; and the rare practice of setting QFE in our altimeters for the approach and landing. As we got within VHF range of the ATIS, the actual weather came through, and the first officer jotted down the details. We updated the information and preset the QFE setting in hectoPascals (hPa) on our primary flight display (PFD). I depressed the 'QFE select' key on the flight management computer's control display for QFE operation.

It was a relatively dark night into Tashkent, flying into the early hours of the morning, but a crescent moon illuminated the ground faintly. The descent was very quiet and smooth, conducive to sleep. But we were both wideawake: the co-pilot because it was his first trip there, and me, wary of the added risks of Tashkent's high elevation, the QFE operation, and having a new first officer. The calm night setting for the approach could easily seduce you into thinking that everything was alright; when some danger lay hidden, yet to be uncovered.

At a relatively low transition level of FL 59, the altimetry adjustment began. I pushed the barometric standard switch for QFE setting and saw the reduction in altitude. The 'approach' checklist was completed - the last checklist item. Tashkent ATC instructed, 'Descend to 600 metres on QFE 972. Cleared for the approach runway 26R. Report established on the localiser.' The selection of 2000 ft (equivalent to 600 metres) was made on the altitude window of the mode control panel, and after identifying the ILS 'IFD' code for rwy 26R, the localiser mode was armed.

From the tone of the air traffic controller and the relatively few radio transmissions on the frequency, it looked as if we were the only aircraft in the sky. We felt relieved - not too long until our job was done and we could look forward to a fresh shower at the hotel. The flight had passed its seventh hour and our duty-time was approaching its ninth hour on a two-man crew operation. All that was required now was the capture of the localiser, as the speed had already been reduced to accommodate flaps 5. I had some time to look out and catch a glimpse of the surroundings. The height of the aircraft above the terrain seemed to be low, but it didn't register at first.

I looked at my primary flight display. Again it didn't register immediately - a few seconds elapsed before I saw that the tiny green QFE letters had disappeared. A current suddenly ran up my spine. Didn't I select QFE at cruise? I was puzzled. With increasing disquiet, I quickly reselected QFE operation. I saw the reduction in altitude again, similar to the one I had seen a few minutes before. Suddenly, it dawned on me – my co-pilot had done the unthinkable – changed the setting without telling me. 'Why did he do it? Why didn't he tell me if he didn't he tell me if he had changed it?' I looked at him. He caught my eye. My body language must have conveyed my anxiety and disappointment, and his facial expression revealed his timid confession of the mistake. Luckily, we were still early in the descent. I had some altitude margin left, otherwise the enhanced ground proximity warning system (EGPWS) would have triggered. Had the mistake remained undetected for a few more seconds, the serene cockpit atmosphere would have changed to that of a simulator training session: full of activity and definitely regrettable.

I was a little rattled. I thought, 'We must be quite close to getting the EGPWS warning,' but had no time to deliberate further. I was so glad I had spotted the blunder in time. Pulling myself together, I regained my composure to focus on the approach again. The autopilot captured the localiser routinely, and later the glide slope. We made a normal landing in the quiet of the night, although the cockpit felt rather warm because of my adrenalin rush.

I guess I will never forget that night. The experience has heightened my perception of detail. In retrospect, knowing what effect an input or change can have may help to save the day, or in our case, the night. Often we pilots are not aware of the importance of such small details, but as our experience showed, these small details may be the only clue that something is not quite right.

Lessons learned

At cruise, the pilot preparation for QFE operation is to pre-select 'QFE Operation' on left line-3 of the flight management computer control display.

After this selection, the FMC indicates 'QFE LANDING'. At the same time, the primary flight display also indicates some changes, as follows:

1. The barometric portion on the right bottom corner of the PFD will annunciate 'QFE' boxed by a rectangle for 10 seconds.

2. After 10 seconds, the rectangular box alert disappears leaving the barometric corner on the PFD to show, 'STD QFE 972 HPA.' This also confirms QFE selection has taken place, in addition to the display showing 'QFE LANDING'.

3. You should see '972 HPA QFE' on the PFD, indicating that the barometric setting is referenced correctly for a QFE landing.

The Mistake

Sometime during the descent after transition level, the first officer had a look at his FMC and saw '<QNH Select'. Being new to the fleet, he misinterpreted the situation, and adopted reverse logic. He thought that 'QNH' was currently being set. Thus, wanting to change to QFE, he pushed this key without realising that this action would revert to normal 'QNH' operation. The other grave error, of course, was that he didn't communicate the change.

Barometric Altimetry

QFE barometric setting is referenced to runway field elevation, so that the altimeter on an aircraft will indicate height above the airport elevation. QNH barometric setting is referenced to mean sea level, so that the altimeter on an aircraft will indicate height above the mean sea level. Therefore, in the example above, the actual height of an aircraft on QFE barometric setting is 4000ft, and the altimeter will indicate near zero when the aircraft lands on the runway. If the QNH is, say 1023 hPa, the corresponding QFE will be 972 hPa, less 28ft per 1mbar (millibar) above mean sea level.

The danger lies when the barometric setting is for 'QFE', but mistakenly referenced for 'QNH' operation, as happened on this flight. Unwittingly, you can descend to what you think is 2000ft HAA (QFE) but in fact, you are descending to 2000ft AMSL (QNH), translating to an actual height of the aircraft above the aerodrome of only 584ft (2000ft less 1416ft). Avionics have evolved because of past controlled flight into terrain (CFIT) accidents; and we now have the EGPWS, an electronic device independent of pressure-sensing altimeters designed to provide a reasonable lead time warning pilots of hazardous terrain below so that they can take corrective action.

Closing Words

Besides practising good general callouts whenever any switch position or status is changed in the cockpit, recognising the presentations from one selection to another can help to further eliminate any chance of inadvertently selecting the wrong key, especially when flying into high altitude airports using QFE procedure. On the B-737 fleet, the FMC has incorporated a smart change: QNH or QFE or vice-versa selections are denoted by a corresponding conspicuous green, or highlighted 'QNH' or 'QFE' in large fonts replacing the ambiguous '<QNH Select' and '<QFE Select' presentation. ■

Human Performance

Managing Interruptions and Distractions

I Introduction

Interruptions and distractions are the main threat facing flight crews.

Note:
A threat is a condition that affects or complicates the performance of a task or the compliance with applicable standards.

Threats are conditions, created by the operating environment, that may induce errors (e.g., omissions, inadvertent actions, …).

The omission of an action or an inappropriate action is the most frequent causal factor in incidents and accidents, as illustrated by **Table 1**.

Interruptions (e.g., due to ATC communications) and distractions (e.g., due to a cabin attendant entering the cockpit) occur frequently; some cannot be avoided, some can be minimized or eliminated.
The following aspects should be considered to assess company exposure and personal exposure, and to develop prevention strategies and lines-of-defense to lessen the effects of interruptions and distractions in the cockpit:

- Recognize the potential sources of interruptions and distractions;
- Understand their effect on the flow of cockpit duties;
- Reduce interruptions and distractions (e.g. by adopting the Sterile Cockpit Rule);
- Develop prevention strategies and lines-of-defense to minimize the exposure to interruptions and distractions; and,
- Develop techniques to lessen the effects of interruptions and distractions.

II Statistical Data

The US Aviation Safety Action Program (ASAP) reveals that 14 % of crew reports includes reference to an interruption or distraction (Source – US ASAP – 2000-2001).

The following causal factors, frequently observed in approach-and-landing accidents, often are the result of interruptions or distractions in the cockpit:

Factor	% of Events
Omission of action or inappropriate action	72 %
Inadequate crew coordination, cross-check and back-up	63 %
Insufficient or loss of lateral or vertical situational awareness	52 %
Inadequate or insufficient understanding of prevailing conditions	48 %
Slow or delayed action	45 %
Incorrect or incomplete pilot / controller communications	33 %

Table 1
Effects of Distractions and Interruptions in Approach-and-Landing Accidnets

(Sources: Flight Safety Foundation - ALAR - 1998-1999)

III Factors Involved in Interruptions and Distractions

Interruptions and distractions in the cockpit may be subtle or be momentary, but all can be disruptive to the flight crew.

Interruptions or distractions usually result from three main causes (Sources : NASA ASRS – 1998) :

- **Communications:**
  - receiving the final weights while taxiing; or,
  - a flight attendant entering the cockpit;
- **Head-down activity:**
  - reading the approach chart; or,
  - programming the FMS;

- **Responding to an abnormal condition or to an unanticipated situation:**
  - system malfunction;
  - weather or environmental threat; or,

- **Searching for traffic following a TCAS / ACAS alert:**
  - traffic collision avoidance system (TCAS) traffic advisory (TA) or resolution advisory (RA) – search for traffic following TCAS / ACAS alert.

Successive surveys of the NASA Aviation Safety Reporting System (ASRS) data base identifies the respective contributions of the above factors :

Factor	% of Events
Communications	50 to 68 %
Head-down Activity	16 to 22 %
Response to Abnormal Condition / Unanticipated Situation	14 to 19 %
Searching for Traffic Following TCAS / ACAS Alert	8 to 11 %

Table 2
Factors Involved in Interruptions and Distractions

(Sources: NASA - ASRS)

The following contributing factors often are cited when discussing interruptions and distractions:

- Flight-deck ergonomics;
- Flight-deck noise level;
- Language proficiency (pilots and controllers);
- Airport infrastructure (e.g., unclear markings,…) ; and,
- Flightcrew fatigue.

Minor disruptions (e.g., a minor equipment malfunction) can turn a routine flight into a challenging event!

IV Effect of Interruptions or Distractions

The primary effect of interruptions or distractions is to break the flow of ongoing cockpit activities (i.e., actions or communications), this includes:

- SOPs;
- Normal checklists;
- Communications (i.e., listening, processing, responding);
- Monitoring tasks (i.e., systems monitoring, PF/PNF mutual cross-check and back-up); and,
- Problem solving activities.

The diverted attention resulting from the interruption/distraction usually leaves the flight crew with the feeling of being rushed and faced with competing/preempting tasks.

When being faced with concurrent task demands, natural human limitations result in performing one task to the detriment of another.

Unless mitigated by adequate techniques, the disruption and lapse of attention may result in:

- Not monitoring the flight path (e.g., possibly resulting in an altitude or course deviation or a controlled flight into terrain);
- Missing or misinterpreting an ATC instruction (e.g., possibly resulting in traffic conflict or runway incursion);
- Omitting an action and failing to detect and correct the resulting abnormal condition or configuration (e.g., interruption during the reading of a normal checklist); or,
- Experiencing task overload (i.e., being “behind the aircraft”).

The following types-of-event have been observed as a result of interruptions and distractions (source: Airbus and non-Airbus events operational and human factors analysis):

- Taxiway or runway incursion;
- Incorrect aircraft configuration for takeoff;
- Late landing gear retraction;
- Premature slats / flaps retraction; or, conversely,
- Flaps placard-speed (V_{FE}) exceedance;
- Late response to ATC instructions;
- Failure to select engine anti-ice, when required;
- Altitude / Flight Level bust in climb or descent;
- Inadequate fuel management (e.g., late detection of fuel imbalance,…);
- Speed below minimum speed during descent;
- Failure to reset altimeter setting;
- Altitude deviation or stall during holding pattern;
- Late aircraft configuration for landing;

- Failure to capture (or monitor capture of) localizer or glide slope;
- Descent below MDA;
- Taxiway excursion; and / or,
- Failure to set parking brake on arrival at gate or parking stand.

V Reducing Interruptions and Distractions

Acknowledging that flight crew may have control over some interruptions / distractions and not over some others is the first step in developing prevention strategies and lines-of-defense.

Actions that may be controlled (e.g. SOP's actions, initiation of normal checklists, …) should be scheduled during periods of less likely disruption, to prevent interference with actions that cannot be controlled (e.g. ATC communications or flight attendant interruptions).

Adhering to the Sterile Cockpit Rule can largely reduce interruptions and distractions.

The Sterile Cockpit Rule reflects the requirement of U.S. FAR – Part 121.542:

- "No flight crewmember may engage in, nor may any pilot in command permit any activity during a critical phase of flight which could distract any flight crewmember from the performance of his or her duties or which could interfere in any way with the proper conduct of those duties".

For the purpose of this requirement, an " activity " includes :

- "…, engaging in non-essential conversation within the cockpit and non-essential communication between the cabin and cockpit crews,…".

The term "critical phases of flight" encompasses :

- " all ground operations involving taxi, takeoff and landing, and all other flight operations below 10,000 feet, except cruise flight ".

In the FARs understanding, the 10,000 feet limit is defined as 10,000 ft MSL.

When operating to or from a high elevation airport, a definition based on 10,000 ft AGL might be considered as more appropriate.

Complying with the Sterile Cockpit Rule during taxi-out and taxi-in requires extra discipline as taxi phases often provide a relief between phases of high workload and concentration.

Interruptions / distractions during taxi is the main causal factor in takeoff accidents and runway incursions.

The sterile cockpit rule has been adopted by non-U.S. operators and is also covered (although in less explicit terms) in the JAR-OPS 1.085(d) (8).

Adhering to the **Sterile Cockpit Rule** is an integral part of Airbus Standard Operating Procedures (SOPs).

The sterile cockpit rule should be implemented with good common sense in order not to break the communication line between flight crewmembers or between cabin crew and flight crew.

Adherence to the Sterile Cockpit Rule should not affect:

- Use of good CRM practices by flight crew; and,
- Communication of emergency or safety related information by cabin crew.

The U.S. FAA acknowledges that it is better to break the Sterile Cockpit Rule than to fail to communicate!

The implementation of the Sterile Cockpit Rule by cabin crew creates two challenges:

- How to identify the 10,000 ft limit?
- How to identify occurrences that warrant breaking the Sterile Cockpit Rule?

Several methods for signaling to the cabin crew the crossing of the 10,000 feet limit have been evaluated (e.g., using the all-cabin-attendants call or a public-address announcement).

Whatever method is used, it should not create its own distraction to the flight crew.

The following occurrences are considered to warrant breaking the Sterile Cockpit Rule:

- Fire, burning smell or smoke in the cabin;
- Medical emergency;
- Unusual noise or vibration (e.g. evidence of tailstrike on takeoff);
- Engine fire (e.g., tail pipe or nacelle torching flame);
- Fuel or fluid leakage;
- Uncertainty about condition (i.e., suspected incapacitation,…);

- Emergency exit or door unsafe condition (although this condition is annunciated to the flight crew);
- Extreme local temperature changes (e.g., suspected bleed air duct leakage);
- Evidence of incorrect or incomplete deicing;
- Cart stowage difficulty;
- Suspicious, unclaimed bag or package; and,
- Any other condition, as deemed relevant by the senior cabin crewmember (purser).

This list may need to be adjusted for local regulations or to suit each individual company policy.

Cabin crewmembers may hesitate to report technical occurrences to the flight crew (e.g., because of cultural aspects, company policies and / or intimidation).

To overcome this reluctance, the implementation and interpretation of the sterile cockpit rule should be discussed during cabin crew CRM training, and recalled by the captain during the pre-flight briefing.

Analyses of aviation safety reports indicate that the most frequent violations of the Sterile Cockpit Rule are caused by the following factors :

- Non-flight-related conversations;
- Distractions by cabin crewmembers;
- Non-flight-related radio calls; and/or,
- Non-essential public-address announcements.

VI Prevention Strategies and Lines-of-defense

A high level of interaction and communication between flight crewmembers, and between flight crew and cabin crews, constitutes the first line of defense to reduce errors.

Effective communication is a two-way transfer of information, not just a mere one-way consultation or registration.

The foundations for an effective line of communication and interaction between all flight crewmembers and cabin crewmembers should be embedded in :

- Company policies;
- SOPs;
- CRM training; and,
- Leadership role of the pilot-in-command.

Strict adherence to the following operating policies provides safeguards to minimize disruptions or to lessen their effects:

- Sterile Cockpit Rule;
- Operations Golden Rules; and,
- Standard Calls.

The following lines-of-defense address the three families of cockpit disruptions and, thus, prevent or minimize the interference of competing or preempting tasks:

- **Communications :**
  - brief jump-seat rider, as applicable, regarding adherence to the Sterile Cockpit Rule;
  - don headsets during critical phases of flight (e.g. for any operations below 10,000 ft);
  - plan Public Address (PA) announcements during low-workload periods;
  - keep intra-cockpit communications brief, clear and concise; and,
  - interrupt conversations when approaching the defined next target or the next altitude restriction / constraint.
- **Head-down activity (FMS programming or chart review) :**
  - define task sharing for FMS programming or reprogramming depending on the level of automation being used and on the flight phase (SOPs);
  - plan long head-down tasks in low-workload periods; and,
  - announce that you are going “ head-down”.
- **Responding to an abnormal condition or to an unanticipated situation :**
  - keep the AP engaged to decrease workload, unless otherwise required;
  - adhere to PF / PNF task sharing for abnormal / emergency conditions (i.e., PNF should maintain situational awareness, monitor and back-up the PF);
  - give particular attention to normal checklists, because handling an abnormal condition may disrupt the normal flow of SOPs actions;

  SOPs actions and normal checklists are initiated based on events (triggers); in case of disruption these events may go unnoticed and the absence of the usual trigger may result in the omission of actions or checklists.

- **Search for Traffic :**
  - Express a clear and loud " **I fly, you watch**" call.

The above lines of defense minimize the flight crew exposure to disruptions caused by interruptions and distractions.

VII Managing / Mitigating Interruptions and Distractions

Because some interruptions and distractions may be subtle and insidious, the first priority is to recognize and identify the disruption.

The second priority is to re-establish situational awareness, as follows :

- Identify :
  - What was I doing?
- Ask :
  - Where was I interrupted?
- Decide/Act :
  - What decision or action shall I take to get "back on track" ?

The following decision-making-process should be applied:

- **Prioritize:**
  - Operations Golden Rules provide clear guidelines for task prioritization :
    - **"Fly, Navigate, Communicate and Manage systems, in that order ".**
- **Plan:**
  - Some actions may have to be postponed until time and conditions permit.

Asking for more time (e.g. from the ATC or from the other crewmember) will prevent being rushed in the accomplishment of competing actions. In other words, take time to make time.

- **Verify :**
  - Using SOPs techniques (i.e., concept of next target, action blocks, event triggers and normal checklists), ensure that the action(s) that had been postponed have been duly accomplished.

Finally, if the disruption interrupt the course of a normal checklist or abnormal checklist, an explicit hold should be verbalized to mark the interruption of the checklist and an explicit command should be used for resuming the checklist.

VIII Summary of key points

Interruptions and distractions usually result from the following factors :

- Pilot / controller or intra-cockpit communications (i.e., including flight crew/cabin crew communications);
- Head-down activity;
- Responding to an abnormal condition or an unanticipated situation; or,
- Searching for traffic.

Prevention strategies and lines-of-defense should be developed to minimize interruptions and distractions and to lessen their effects.

Strict adherence to the following standards is the most effective company prevention strategy and personal line-of-defense:

- SOPs;
- Operations Golden Rules;
- Standard calls;
- Sterile Cockpit Rule; and,
- Recovery techniques such as :
  - Identify – ask – decide – act; and,
  - Prioritize – plan – verify. ■

HUMOR

turbulence on taxiway!

For months after California's Northridge earthquake of 1994, aftershocks rocked the San Fernando Valley and Van Nuys Airport. One morning about three weeks after the initial quake there was a particularly sharp aftershock.

Moments later on Van Nuys' ground control frequency: "Uh, four-three-kilo would like to file a pilot report for moderate turbulence on the east taxiway..."

Hurry up Syndrome

Take your time !

Aviation's worst disaster, the terrible KLM / Pan Am accident at Tenerife, was due in great part to schedule pressure p r o b l e m s experienced by both flight crews. The Air Line Pilots Association (ALPA) conducted an eighteen month, three country investigation of this accident, with an emphasis on the human factors of flight crew performance, ALPA found that the KLM crew had strong concerns relating to duty time, specifically that they would be able to return to Amsterdam that evening and remain within their duty time regulations.

They also expressed concern about the weather and its potential to delay the impending take-off. The cockpit voice recorder indicated the KLM captain said, "Hurry, or else it [the weather] will close again completely". Pan Am's crew was equally concerned with potential weather delays. They were detained for more than an hour due to the KLM flight crew's decision to refuel. The KLM aircraft and fuel trucks blocked the taxiway, thus preventing Pan Am's departure. These schedule related problems set the stage for the catastrophe that followed.

HURRY-UP STUDY

This review of the Hurry-up Syndrome is an adaptation of a research study in which we examined 125 ASRS incident records that involved time related problems. We define Hurry-up Syndrome as any situation where a pilot's human performance is degraded by a perceived or actual need to hurry or rush tasks or duties for any reason.

These time related pressures include the need of a company agent or ground personnel to open a gate for another aircraft, pressure from ATC to expedite taxi for take-off or to meet a restriction in clearance time, the pressure to keep on schedule when delays have occurred due to maintenance or weather, or the inclination to hurry to avoid exceeding duty time regulations.

ERRORS AND INCIDENTS

Each time-pressure incident had a point where the error occurred (Point of Error Occurrence), and another point, either immediately or further downstream, where the result(s) of the error(s) actually manifested themselves (Point of Incident Occurrence). Figure 1 shows the relationship between the error and incident occurrence for various flight phases.

Point of Error

A large majority of incidents (63 percent) had their origins in the pre-flight phase of operations. For example:
"...Inbound flight was late and we were rushed because of the scheduled out time report card mentality ... It turns out that the clearance / got on ACARS was for the inbound flight. The squawk was incorrect, the altitude was wrong and so was the departure frequency... " (ACN 200800)

The taxi-out phase accounted for the second highest number of error occurrences, while all other operational phases combined amounted to less than 10 percent.

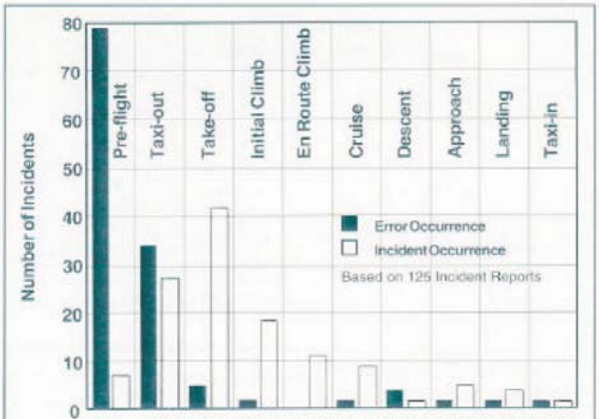


Figure 1. Most "Hurry-up" Errors Occur During Pre-flight

Point of Incident Occurrence

The errors made in pre-flight and taxi-out often manifested themselves later, during take-off and departure. One reporter writes:
"...we were busy with checklists and passenger announcements, while changing to Tower frequency. [The] Tower cleared us for immediate take-off, and even though we had not finished our checklists, / taxied our aircraft into position and started to advance the power for take-off .. After about 1 000 feet of take-off roll, Tower cancelled our takeoff clearance ... [we] asked the Tower why we had our take-off clearance cancelled ... the first officer said [that] we were not on the runway. At that point I realized we had started our take-off roll on an active taxiway. " (ACN 134919)

The next most common category for incident occurrence was the taxi-out phase with 22 percent of all reports:
"Aircraft expediting taxi after an extended maintenance delay, failed to follow cleared routeing and ended [up] on the active runway ... first officer busy with check-list ... captain rushed due to schedule pressure..." (ACN 55009)

WHO MADE THE ERROR?

Errors can be made by one individual, or they can be made by the flight crew as a collective unit. The majority (68 percent) of errors appeared to be collective. Collective error on the part of a three person flight crew is well illustrated by the following report:
"... I am relatively new at this position as second officer.. We had a tailwind which precludes reduced power [for take-off] in this aircraft, but they [captain and first officer] did not notice and I was so rushed that / did not back them up and notice. So we took off with reduced power.. We were just in too big of a hurry to get everything down and do it correctly." (ACN 67122)

DOING SOMETHING WRONG, OR MAYBE NOT AT ALL

Human errors may be categorized as errors of commission or omission. Errors of commission are those in which pilots carried out some element of their required tasks incorrectly, or executed a task that was not required and which produced an unexpected and undesirable result. Errors of omission are those in which the pilot neglected to carry out some element of a required task.

FACTORS THAT PROMOTED ERRORS

FACTORS	CITATIONS	% DATA SHEET
High Work load 1) Time Compression due to delays (49%) 2) Other Miscellaneous (15 %) 3) High Workload Flight Phase (14 %) 4) Pre-occupation with Check-List use (12%) 5) Operational Procedure (7%) 6) Loss of Positional Awareness (4%) 7) Loss of Situational Awareness (3%)	100	80
Physical or Motivational States 1) Mental / Emotional Predisposition to Hurry (64%) 2) Physically Induced Predisposition to Hurry (21%)	92	74
Delay (Source of Delay) 1) Other factors Not Listed Below (25%) 2) Maintenance on Aircraft (14%) 3) Nature of Delay Unspecified by Reporter (10%) 4) ATC Clearance Delays (8%) 5) Weather (6%) 6) Ground Crew Problems (3%) 7) De-Icing / Anti-icing (2%) 8) Dispatch Office Problems (2%)	69	55
Social Pressures 1) Pressure from Gate Agent / Ground Crew (25%) 2) Peer Pressure (14%) 3) Supervisory Pressure (1%)	48	39
TOTALS	**309**	**247**

Note : This table is based on 309 citations from 125 reports.

Errors of Commission

Sixty percent of human hurry-up errors were errors of commission. In the following example, the flight crew erred in not adequately examining the airport surface chart:
"Take-off was made from displaced threshold instead of beginning of paved runway. I feel some contributing factors were: Not studying airport runway chart closely enough to realize. We had an ATC delay and were at the end of our take-off release time... " (ACN 96427)

Errors of Omission

In 38 percent of instances, pilots made errors of omission. In the following report, the flight crew neglected an important element of pre-flight preparation - with annoying and unnecessary results:
"Got a pod smoke warning from central annunciator in cruise en route between Fresno and Ontario... Diverted to BFL ... no evidence of fire ... we found a placard, which showed the pod smoke detection system as deferred and inoperative... We were pressured to hurry, and in the process, failed to check the aircraft log prior to departure." (ACN 12974)

WHAT LED TO THE ERROR?

In each incident report, one or more contributory or causative event promoted Hurry-up error on the part of one or more of the flight crew. As noted in Table 1, high workload was cited in 80 percent of all incidents, while problems involving physical or motivational states were next with 74 percent of incidents.

Various Schedule Pressures

FAA publication of on-time performance figures for air carriers leads to "keep-to-the schedule" pressures for flight crews and other company personnel. Similarly, conducting quick turnarounds (typically for economic reasons), can also lead to schedule pressures for pilots. In the following narrative, the reporter attributes his emergency to company schedule pressures:
"Engine cowling became unlatched after take-off, oil pressure was lost and precautionary shutdown was completed. Emergency was declared. Uneventful landing and taxi to gate ... My company is very concerned with on-time departures, however, they do not give enough time in scheduling to turn the aircraft [round] safely... everyone involved was rushed. (ACN 147822)

ATC may contribute to the hurry-up mindset by requesting an expedited taxi or an intersection departure, by issuing a "clearance invalid if not off by...... or other time-sensitive requirements. (Of course, ATC personnel are similarly under pressure to maximize traffic flow.) In this example, the flight crew clearly felt pressured by ATC:
"Our inbound aircraft was late arriving and upon receipt of our ATC clearance for our outbound leg, we were informed we had an xx:xx wheels-up time. Needless to say, we were rushed... about 100 yards before reaching the end of the runway we were cleared for takeoff on runway 12 ... / taxied onto what / thought was 12R, but what was actually runway 17. (ACN 102290)

THE END RESULT

What types of incidents result from hurry-up errors? Deviations from Federal Aviation Regulations and/or ATC clearances are most common, and deviation from company policy or procedure is next. As indicated in Table 2, the remainder of the incident results comprise a fairly broad spectrum of problems.

PREDICTING AND AVOIDING HURRY-UP ERRORS

Hurry-up errors appear most likely to occur in high workload operational phases, specifically in preflight and taxi-out. External distractions and schedule pressure are significant pre-disposing conditions, but why is that so in these but not in other flight phases?

Most flight phases of air carrier and commuter operations employ well designed standard procedures that are linear in nature - a given required task follows another required task. For example, in the take-off phase the application of power is followed by a check of engine performance or power, which in turn may be followed by a performance check at 80 knots, and V1, VR, V2, gear and flap retraction respectively, depending on the particular aircraft and operator.

In contrast, duties in the pre-flight phase may be non-linear, i.e., there may be no logical or prescribed sequence. A pilot may need to deal with flight planning, weather information and changes, fuel loading, dispatch manifests and release, last-minute maintenance or MEL items, duty time requirements, or aircraft de-icing at pretty much the same time. There may be no standard operating procedure (SOP) for assigning sequence or priority to these tasks, nor does one task necessarily or obviously require that another task be previously and correctly completed. Thus it may be easier to make an undetected error. On the other hand, tasks or duties in the taxi-out phase should be linear, yet this was the second most common flight phase for error occurrence. It is possible that many flight crews have not cleanly transitioned from one flight phase to the next, and may be trying to complete pre-flight duties during taxi-out. Another thought is that pilots may experience difficulty in the transition from the non linearity of pre-flight activities to the linear duties of the taxi-out phase.

Returning to the issue of pre-flight activities, it may be appropriate to examine cockpit or crew coordination. In an in-flight phase where the flight

Table 2. Incident Results		
Factors	Citations	Percent
Deviation from ATC Clearance or FAR	60	48
Deviation from Company Policy/Procedure	26	21
Runway Transgressions	21	17
Miscellaneous Other	20	16
Aircraft Equipment Problem	15	12
Altitude Deviation	14	11
Fuel Errors	13	10
Dispatch and Paperwork Errors	12	10
Landing or Take-off Below Minima	11	9
Track or Heading Deviation	11	9
Totals	203	163

Note 1: This table is based on 203 citations from 125 reports.
Note 2: Multiple responses are permitted for each category, thus there can be more citations than the total number of reports.

crew is seated together with unrestricted capability for interpersonal communication, the practice of Crew Resource Management (CRM) is facilitated by physical proximity and access. In the pre-flight phase of operation, interpersonal communication may be degraded by physical separation of flight crew members, and by distraction from numerous external sources.

RECOMMENDATIONS:

It is suggested that companies and flight personnel consider providing greater structure to pre-flight activities in order to reduce the frequency of time related errors. Similarly, when distraction and schedule pressure are seen to occur in this flight phase, a reasonable response is to slow down and carry out tasks in as linear a fashion as practical.

Where time related pressure is encountered from external sources, pilots may find it a good strategy calmly to explain the nature, probability, and typical results of hurry-up errors to those who “apply the pressure”.

- Maintain an awareness of the potential for the Hurry-up Syndrome in pre-flight and taxiout operational phases.
- When pressures to “hurry up” occur, particularly in the pre-flight operational phase, it is a useful strategy for pilots to take the time to prioritize their tasks.
- If a procedure is interrupted for any reason, returning to the beginning of that task and starting again will significantly reduce the opportunity for error.
- Practising positive CRM technique will eliminate many errors. Effective crew coordination in “rushed” situations will catch many potential problems.
- Strict adherence to checklist discipline is a key element of pre-flight and taxi-out task execution.
- Defer paperwork and non-essential tasks to low workload operational phases.■

HUMOR

ATIS Hotel

"ATIS" stands for "Automated Terminal Information Service," which is a recorded message broadcast at most busy airports around the country. ATIS gives pilots the current wind, air traffic, and runway information and each time the information changes, the broadcast is revised, with each revision being assigned the next letter in the phonetic alphabet. This designation is included in the broadcast, which is identified as, "Information Alpha..." Bravo, Charlie, etc.

At ATIS-equipped airports, pilots are required to listen to the recording prior to contacting Approach Control or the tower and must repeat the "Information so-and-so" identifier when they make their initial radio call. Sometimes, the results can be hilarious...

The scenario: it was night over Las Vegas and "Information Hotel" was current on the ATIS. Mooney 33W wasn't too sharp, but he didn't let that stop him from talking to Approach Control.

Approach: "33W, confirm you have 'Hotel.'

33W: "Uhhhmm, we're flying into McCarren International. Uhhhmm, we don't have a hotel room yet."

After that, Approach was laughing too hard to respond. The next several calls went something like this call to United 583 (which didn't make it any easier to stop laughing)...
Approach: "United 583, descend to Flight Level 220."

United 583: "United 583, down to Flight Level 220. We don't have a hotel room, either."

Steady State

By James M. Burin

Accident categories in 2008 wre mostly familiar, including the unwelcome returned of the no-flaps takeoff.

"Average to below average" is the best way to describe the year 2008 in terms of safety performance for all segments of professional aviation, including commercial and corporate jets and commercial turboprops. The big killers remain, particularly loss of control in commercial jets and controlled flight into terrain (CFIT) in commercial turboprops. Even though there are occasionally new types of accidents — for example, the British Airways Boeing 777 landing accident at London Heathrow — the majority of accidents in 2008 are types we have seen before, including CFIT, runway excursion and no-flap/no-slat takeoff. This raises the question, why are we failing to fully benefit from aviation safety lessons learned? The total fatality count in all commercial jet, commercial turboprop and corporate jet major accidents was 688, down from 763 in 2007 and well under the 903 deaths reported in 2006.

Last year, the commercial jet fleet grew approximately 3 percent over 2007 numbers, while the commercial turboprop fleet stayed virtually unchanged. The corporate jet numbers showed the largest change, with a 9 percent increase. Some 8 percent of the world's commercial jet fleet is Eastern-built, while approximately one-third of the turboprop fleet is Eastern-built.

The active fleets, the aircraft actually in service, are somewhat smaller. Approximately 7 percent of the jet fleet is inactive, while 14 percent of the turboprop fleet is inactive.

Reviewing 2007 data for commercial jet major accidents in all scheduled and unscheduled passenger and cargo operations for Western-and Eastern-built commercial jet aircraft, there were 17 major accidents, 16 involving Western-built aircraft, killing 583 people. Of the 17 accidents, 12 were approach and landing accidents, two were CFIT accidents and four were loss of control accidents.

In 2008, there were 19 major accidents, one of which was an Eastern-built jet; fatality totals declined to 357 (Table 1). Only eight of the 2008 accidents were approach and landing accidents, and two were CFIT accidents. Six of the 19 major accidents were runway excursions, four occurring on takeoff. There were six commercial jet loss of control accidents in 2008, nearly one of every three accidents.

The major accident rate for Western-built commercial jet aircraft in losses per million departures for the last 10 years had been decreasing but now has leveled (Figure 1). The rate is only for Western-built aircraft because, even though we know the number of major accidents for Eastern-built aircraft, we do not have reliable worldwide exposure data to calculate rates for them.

Major Accidents, Worldwide Commercial Jets
Jan. 1, 2008–Dec. 31, 2008

Date	Operator	Aircraft	Location	Phase	Fatalities	
Jan. 2, 2008	Iran Air	F-100	Tehran, Iran	Takeoff	0	Loss of control
Jan. 17, 2008	British Airways	777	London, England	Landing	0	Approach and landing
Feb. 1, 2008	LAB	727	Trinidad, Bolivia	En route	0	
Feb. 14, 2008	Belavia	CRJ-100	Yerevan, Armenia	Takeoff	0	Loss of control
April 15, 2008	Hewa Bora Airways	DC-9	Goma, Democratic Republic of Congo	Takeoff	3	Runway excursion
May 25, 2008	Kalitta Air	747	Brussels, Belgium	Takeoff	0	Runway excursion
May 30, 2008	TACA	A320	Tegucigalpa, Honduras	Landing	3	Approach and landing; Runway excursion
June 10, 2008	Sudan Airways	A310	Khartoum, Sudan	Landing	29	Approach and landing; Runway excursion
June 30, 2008	Ababeel Aviation	Il-76	Khartoum, Sudan	Takeoff	4	
July 6, 2008	USA Jet Airlines	DC-9	Saltillo, Mexico	Approach	1	Loss of control; Approach and landing
July 7, 2008	Kalitta Air	747	Bogotá, Colombia	Takeoff	0	
Aug. 20, 2008	Spanair	MD-82	Madrid, Spain	Takeoff	154	Loss of control
Aug. 24, 2008	Itek-Air	737	Vishkek, Kyrgyzstan	Approach	65	Controlled flight into terrain; Approach and landing
Aug. 30, 2008	Conviasa	737	Toacaso, Ecuador	En route	3	Controlled flight into terrain
Sept. 14, 2008	Aeroflot Nord	737	Perm, Russia	Approach	88	Loss of control; Approach and landing
Sept. 22, 2008	ICARO	F-28	Quito, Ecuador	Takeoff	0	Runway excursion
Nov. 10, 2008	Ryanair	737	Rome, Italy	Approach	0	Approach and landing
Nov. 27, 2008	XL Airways Germany	A320	Perpignan, France	Approach	7	Loss of control; Approach and landing
Dec. 20, 2008	Continental Airlines	737	Denver, Colorado, U.S.	Takeoff	0	Runway excursion

Loss of control accident · Controlled flight into terrain accident · Approach and landing accident · Runway excursion

Source: Ascend, Aviation Safety Network

Table 1

There were 12 major accidents involving corporate jet aircraft in 2008, killing 39 people (Table 2). Reliable worldwide exposure data is not available to calculate rates for corporate jets, but assuming that exposure has been increasing along with the annual increases in aircraft in the corporate jet fleet and their number of departures, the accident rate is estimated to be decreasing slightly. There also were 12 corporate jet accidents in 2007; 21 people died as a result.

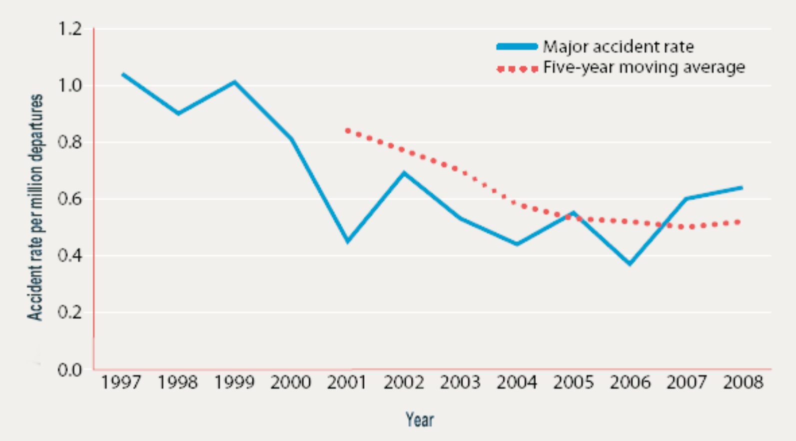
In 2008, there were 29 major accidents involving Western- and Eastern-built turboprop aircraft with more than 14 seats, causing 292 deaths, compared to 24 accidents in 2007 that killed 159. Eight of this year's 29 major turboprop accidents were CFIT accidents, more than one of every four.

Focusing on specific high-risk accident categories shows that CFIT, loss of control, and approach and landing accidents continue to claim the majority of the aircraft and account for the majority of the commercial aircraft fatalities. There were two commercial jet CFIT accidents in 2008. The CFIT accident record over the years shows the difficulty the industry has encountered in eliminating CFIT as an accident class.

Although fewer than 10 percent of commercial jets in the world during the past four years did not have a terrain awareness and warning system (TAWS) installed, we still suffered 10 CFIT accidents during that period. There has never been a CFIT accident involving an aircraft equipped with a functional TAWS.

Last year was the first in recent memory that fewer than half of the commercial jet and corporate jet accidents occurred during approach or landing. Flight Safety Foundation and its CFIT and Approach and Landing Action Group (CAAG) team started their worldwide approach and landing accident reduction (ALAR) campaign in 2001. There are now more than 40,000 FSF ALAR Tool Kits distributed, and the CAAG team has conducted 30 ALAR workshops around the world — four in 2008, including one in Tripoli, Libya. It is hoped that some of the success we are now seeing in reducing the

Western-Built Commercial Jet Major Accident Rates, 1997–2008



Note: Total departure data are not available for Eastern-built aircraft.

Source: Ascend

Figure 1

incidence of approach and landing accidents is the result of the CAAG team's efforts. The Foundation is updating its ALAR data, and an updated ALAR Tool Kit, to include a module on reducing the risk of runway excursions, will be available in 2009.

The loss of control accident category, however, has taken over from CFIT as the leading killer in commercial jets. The term "loss of control" is somewhat misleading, since many times in this type of accident the flight crew has full control of the aircraft. The FSF definition for a loss of control accident is "an accident in which an aircraft is unintentionally flown into a position from which the crew is unable to recover due to either aircrew, aircraft, environment or a combination of these factors."

There are basically two types of loss of control accidents. First, there is the type in which upset recovery training will reduce the risk and if possible prevent the accident. In most of these cases the crew has full control of the aircraft at all times, such as the Adam Air and Flash Air accidents. The second type of loss of control accident is one in which no amount of upset recovery training will help — for example, taking off with ice on the wings, or taking off with retracted flaps and slats. As the data show, we are not making much progress in reducing the risk of these high-fatality accident types.

To help reduce risk, there are many challenges that need to be addressed. One of these is safety culture. Safety culture is a very popular topic these days, and rightfully so. It is a critical element in reducing risk. There are definitions of safety culture, such as "the shared values, beliefs, assumptions and norms that govern decision making that may affect individual and group attitudes about risk, safety and the proper conduct of hazardous operations"; or "the way we do things around here"; or even "what you do when nobody is looking." Many people stress the need for a safety culture, or express the desire to establish a safety culture in t heir organization. Those sorts of discussions are misguided.

Every organization has a safety culture — it is impossible not to have a safety culture. What is needed is a positive safety culture. Likewise, a strong safety culture is not necessarily desirable. An organization can have a very strong safety culture, and it can be all negative. What we want to do to reduce risk is to create and maintain a positive safety culture.

A positive safety culture is unique in many ways, and here are two. First, it cannot be purchased. No matter how much money your chief executive officer (CEO) is willing to spend, you cannot buy a positive safety culture. It must be created. Second, a positive safety culture is the single most important element of a successful safety program. You cannot have a successful flight operational quality assurance program, an aviation safety action program or establish a just culture without the cornerstone of a positive safety culture.

Major Accidents, Worldwide Corporate Jets, Jan. 1, 2008–Dec. 31, 2008

Date	Operator	Aircraft	Location	Phase	Fatalities	
Feb. 1, 2008	Symons Living Trust	Citation I	Augusta, Maine, U.S.	Climb	2	● (Loss of control accident)
Feb. 18, 2008	Avion Sales	Citation III	Venezuela	En route	3	
March 4, 2008	Southwest Sports Clinic	Citation I	Oklahoma City, Oklahoma, U.S.	Takeoff	5	
March 4, 2008	Confort Vuela	HS125-800	Monterrey, Mexico	Landing	0	
March 30, 2008	Relton Muse Aviation	Citation I	London, England	Climb	5	
June 12, 2008	FAI Rent-a-Jet	Lear 35	Kisangani, Democratic Republic of Congo	Takeoff	0	● (Runway excursion)
July 30, 2008	My Aviation	Eclipse 500	West Chester, Pennsylvania, U.S.	Takeoff	0	● (Runway excursion)
July 31, 2008	East Coast Jets	Hawker 800	Owatonna, Minnesota, U.S.	Approach	8	● (Controlled flight into terrain accident)
Aug. 18, 2008	Corus Hardware Corp.	Citation I	Santo Domingo, Dominican Republic	Climb	1	● (Runway excursion)
Sept. 19, 2008	Inter Travel and Services	Lear 60	Columbia, South Carolina, U.S.	Takeoff	4	
Nov. 4, 2008	Mexican Government	Lear 45	Mexico City, Mexico	Approach	9	
Dec. 7, 2008	Tlaxcala State Government	Lear 23	Tlaxcala, Mexico	Approach	2	

● Loss of control accident ● Controlled flight into terrain accident ● Runway excursion

Source: Ascend, Aviation Safety Network

Table 2

You can institute a safety management system (SMS) without a positive safety culture, but don't expect it to be successful. Your SMS may influence your safety culture. Your safety culture will influence your SMS.

A positive safety culture must be fully supported by the top of the organization. If it is not supported there, it will not last. Changing the safety culture in an organization is an evolutionary process, not a revolutionary process. In other words, the change takes a while — any existing corporate culture, regardless whether it is positive or negative, has a lot of momentum to overcome. No matter how many statements the CEO has signed or how many of the right words he uses, you cannot fake a positive safety culture. If the organization from top to bottom does not practice the words they publish, the safety culture will be bad.

Today, several aviation organizations, particularly in the military, are measuring their safety culture, or their safety climate. Climate is an important indicator of the underlying safety culture and refers to the perception of the members of the organization that their leaders are committed to safety.

Many organizations do not only measure safety culture or climate, but can compare one organization's safety culture to similar organizations. Even better, they can provide recommendations on how to improve weak areas identified in a safety culture.

The U.S. Navy's cultural assessment program showed that in the 2002–2004 period, 93 percent of the Navy's major accidents happened in organizations without a culture assessment workshop. That is one reason why these assessment workshops are now mandatory for all Naval aviation organizations.

All this information on safety culture and the adoption of a positive safety culture will not reduce anyone's risk to zero. But it will reduce risk. The Foundation's goal is "to make aviation safer by reducing the risk of an accident." We have achieved great successes advancing toward this goal, but as can be seen from last year's safety record, there are still challenges, such as learning from lessons of the past and ensuring a positive safety culture.

In an industry where risk will never be zero, we face a constant challenge of meeting the public's expectation of perfection as the minimum acceptable standard. However, the aviation industry continues to successfully address that challenge and is constantly working to make aviation safer by reducing the risk of an accident.

HUMOR

how slow can you go?

It seems that it was a very busy day and a "good ol' boy" American (Texas-sounding) AF C-130 reserve pilot was in the instrument pattern for landing at Rhein-Main. The conversation went something like this...

Tower: "AF1733, You're on an eight mile final for 27R. You have a UH-1 three miles ahead of you on final; reduce speed to 130 knots."

AF1733: "Rog-O, Frankfurt. We're bringin' this big bird back to one-hundred and thirty knots fur ya."

Tower (a few minutes later): "AF33, helicopter traffic at 90 knots now one-and-a-half miles ahead of you; reduce speed further to 110 knots."

AF1733: "AF thirty-three reinin' this here bird back further to 110 knots"
Tower: "AF33, you are three miles to touchdown, helicopter traffic now one mile ahead of you; reduce speed to 90 knots"

AF1733 (sounding a little miffed): "Sir, do you know what the stall speed of this here C-130 is?!"

Tower (without the slightest hesitation): "No, but if you ask your co-pilot, he can probably tell you."

On Health

COOPER'S EXERCISE Rx

Kenneth H. Cooper, MD may be in the best position of all to write an exercise prescription. After writing THE book on exercise, Aerobics, he established the Aerobics Research Institute in Dallas, Texas. Over the years, he and his colleagues have had the opportunity to do pre-exercise testing and post-exercise follow-up on literally thousands of persons who have begun to exercise under his care. So, if you are exercising for fitness' sake, here's his prescription for exercise (using jogging as the example):

How much? Two miles.
How fast? Ten-minute mile pace.
How often? Four days a week.

Dr. Cooper says that doing less doesn't build cardiovascular fitness; doing more isn't necessary for general physical fitness.

SERVING SIZES

What are three things that the public is most concerned about in the food it buys? Answer: calories, fat and sodium content. So, food processors have learned when they can reduce these, they stand to win a lot of new customers.

Well, they've discovered an ingenious way to do just that: simply reduce the serving size. How does that work? Well, take Yoplait Lowfat Yogurt, for example. Here's how a serving of Yoplait compares with a serving of Dannon Lowfat Yogurt:

Yoplait: 190 calories, 3 grams of fat, 110 milligrams of sodium

Dannon: 240 calories, 3 grams of fat, 120 milligrams of sodium

It would seem that Yoplait was the better choice. But a serving of Yoplait is only 6 ounces compared to Dannon at 8 ounces. An 8-ounce serving of Yoplait would actually contain 253 calories, 4 grams of fat and 146 milligrams of sodium – considerable more per ounce than Dannon.

Yogurt isn't the only food item where serving size has been reduced. Some hot dogs, for example, weigh 2 ounces each; others only 1.6. A 1.6 ounce hot dog (what some producers call a "serving") will obviously contain fewer calories, less fat and less sodium.

Shrinking the serving size has become so wide spread that the Food and Drug Administration is now recommending standard serving sizes for 159 different food categories. The food industry, as you might imagine, is opposed to such regulation, claiming that they should be free to act independently.

In the meantime, look carefully at serving sizes. Hint: snack food producers are notorious for what they call a serving. Can four small cookies or ten potato chips really be considered a serving?

IN A PICKLE?

Are pickles junk food? Do they count toward your 5-a-day produce intake? Pickling means steeping a food in a preservative, usually brine or vinegar. Typically the food is a cucumber, which is not a dynamo of nutrition to begin with. But nearly anything can be turned into a pickle—green tomatoes, green beans, cauliflower, peppers, beets, onions, and even carrots. Before the advent of refrigeration and canning, pickled vegetables were a necessity of life.

Among the pickle fanciers of history were Julius Caesar, Queen Elizabeth I, Napoleon, and Jefferson. Any processing destroys some vitamins, particularly water-soluble ones like C and the B vitamins.

But the real trouble with pickles, of course, is that the sour or dill varieties are very high in sodium. A 5-ounce sour pickle has only 16 calories but 1,650 milligrams of sodium—70% of the maximum recommended daily intake of 2,300 milligrams. There are low-salt versions, but they don't taste like pickles. Sweet pickles are lower in salt, but higher in calories—about 115 in one large pickle. Eat pickles in small quantities, with other foods, as condiments. Or as occasional treats. Pickles are not junk food, but they're no substitute for raw or cooked vegetables.

CLOUDY APPLE JUICE

Choose cloudy apple juice if you want more antioxidants. It contains four times more polyphenols and exhibits greater ability to mop up free radicals than clear apple juice, according to a study in the Journal of the Science of Food and Agriculture. When apple juice is processed to make it clear, some polyphenols are removed. Also found in berries, red wine, and chocolate, polyphenols are thought to have cardiovascular, anti-cancer, and other possible health benefits.

A ROUGH GUIDE TO FIBER

"Good" carbs have taken center stage as one of the keystones of a healthy diet. But what is it that makes them good? For one thing, good carbs—whole grains, legumes, fruits, and vegetables—are high in fiber. And health experts continue to extol the virtues of this non digestible plant material—what your mother may have called "roughage."

The basics

There are two general types of fiber—soluble and insoluble—each with its own health benefits.

Soluble fiber forms a gel-like substance that delays absorption of glucose (sugar) in the intestines and helps prevent cholesterol absorption. Soluble types include gums (such as guar), pectins, mucilages, beta-glucan, and oligosaccharides (such as inulin, now added to some yogurts).

Insoluble fiber—parts of cell walls, like cellulose—increases stool bulk and speeds transit of food through the gut. Plant foods contain a mix of both soluble and insoluble fiber. The best sources of soluble fiber are oats, barley, legumes (beans, peas, and lentils), psyllium, seeds, and some fruits (such as apples, blueberries, and citrus) and vegetables (such as okra and broccoli). The best sources of insoluble fiber are cereals (especially those containing wheat bran), nuts, and some fruits and vegetables, like broccoli and green beans.

Though our bodies don't have the enzymes to digest fiber, some is broken down (fermented) by bacteria in our intestines. Thus, another way of classifying fiber, which some experts now prefer, is by how fermentable it is. Highly fermentable fiber includes gums and most other soluble fibers.

EYE EXERCISES

It's not uncommon to see ads for "eye exercise" programs which claim they can improve vision so much you'll be able to throw your glasses away. The ads say that the eyeball, being a muscle, needs to be exercised like other muscles. But, in fact, the eyeball is not a muscle at all. There is no evidence that exercise can correct nearsightedness, farsightedness, or astigmatism. Two eye conditions which can be helped with exercise are amblyopia ("lazy eye") and strabismus (crossed eyes), but they are conditions that need professional care. No exercise can eliminate the need for glasses.

GETTING FIT

Here are some tips from Women's Sports & Fitness on making fitness fun, thereby keeping you more committed to your exercise regimen:

- Make it a social affair. Plan to exercise with friends.
- Set a goal. Having something specific to train for will help your motivation.
- Join a local athletic organization. Whatever you like—walking, hiking, canoeing, biking, swimming, kayaking—joining a group will keep you active. Keep a journal. Regular entries to chart your progress will help you reach your goals.

MUSICAL WEIGHT LOSS

"Weight control is like playing the violin. You can have a Stradivarius of a diet, but without the bow of exercise, you won't hear the music of weight loss."

BOXERS VS. BRIEFS

It's been a long-held premise that men who wear briefs have a higher risk of being infertile. The never-beforetested theory that briefs trap body heat, hence raising testicular temperature, which can lead to sterility has been disproved. Researchers at the State University of New York at Stony Brook found no difference in scrotal temperatures between men who wore briefs and those who *wore boxers.*

ALTERNATIVE THERAPIES

Last year Americans made more visits to alterative practitioners than they did to primary care physicians. David Eisenberg, MD, of Beth Israel Deaconess Medical Center in Boston, says: "The typical physician's dismissal of a patient's interest in alternative therapies serves neither the patient nor the interests of the medical profession."

Coutresy Aviation Medical Bulletin