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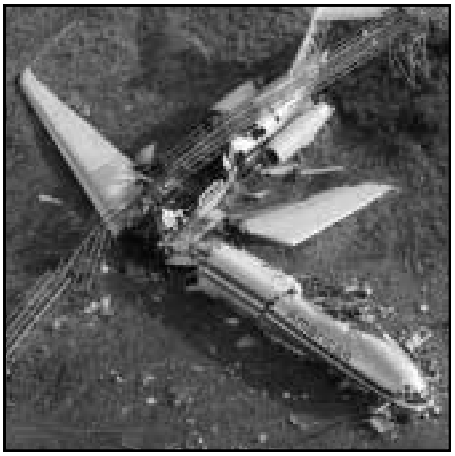

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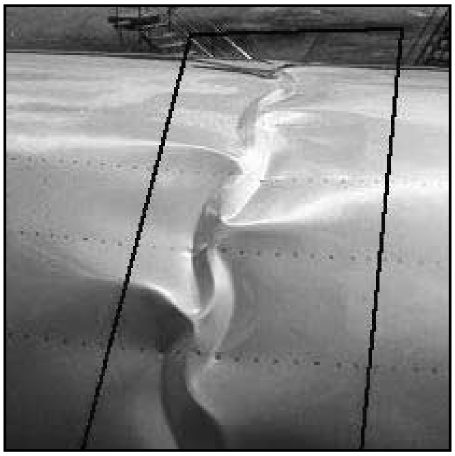

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From Tim Ahern

Vice President Safety / Security and Environmental

Communication of safety information is a vital 2-way link; particularly important between employees and their managers. Before we can take corrective action on any safety issue, we must first identify and document the concern. Once corrected, it is incumbent on us to share the results with front line employees, thereby raising awareness. Working together in this way we will continuously preserve and improve the safety quality of our work life.

The information contained in this magazine is limited to use by American Airlines' personnel. It is intended for general information purposes only and should not be regarded as authority to deviate from established operational policy or Aircraft Operating Manual procedures.

FLIGHT SAFETY

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Looking Forward

Aviation accidents make headlines. Understandably, the public wants to know why aircraft accidents occur and how to stop them. The National Transportation Safety Board (NTSB) and other investigative authorities are charged with documenting the facts surrounding these events and making recommendations to prevent their recurrence. However, investigating an accident is relatively easy; preventing them requires everyone's effort every day. We must do more than investigate accidents. In order to prevent them from occurring we must look forward as well. The challenge of aviation safety is to continuously improve. Even though commercial aviation in the United States remains the safest mode of transportation in the world, we must do more.

Since June 1, 1994, the American Airlines Aviation Safety Action Partnership (ASAP) Program has worked to prevent accidents through voluntary self-reporting and corrective action. Our proactive approach accomplishes corrective action before an accident occurs. Recently, the White House announced that the Federal Aviation Administration (FAA) is expanding ASAP to the rest of the air transport industry this spring. This is great news for all of us at American Airlines, in part because it will allow us to share our experiences from ASAP with other airlines operating similar programs; thereby learning from the experiences of others. Still we must do more.

Flight Operations Quality Assurance (FOQA) programs have been in place throughout the world since the 1960's. To varying degrees, these programs have attempted to use flight data recorder information to monitor system operations and improve flight safety. Airlines have used de-identified FOQA data to quantify safety concerns and uncover operational trends that might lead to aircraft accidents. Most importantly, FOQA, like ASAP, is a proactive (rather than reactive) approach to accident prevention. But like any powerful tool, these programs have the potential for misuse if not handled properly.

American Airlines and the Allied Pilots Association (APA) recognize both the enormous safety value and the potential for abuse of programs such as ASAP and FOQA. Based on our experience with ASAP, we are confident that developing and implementing FOQA will improve aviation safety and will be done without compromising the principles necessary for success. Looking ahead, we see enormous benefit to these proactive programs. American Airlines and APA are committed to working with you to improve safety, as well as continue communication on our progress. In the meantime, let's look forward when remembering the accidents of the past and pledge to work together toward prevention.

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and
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Decision-Making

The most versatile and valuable component of the aviation system is the human factor. Pilots, dispatchers, mechanics, and air traffic controllers make decisions constantly that no one else in the operation can, and that cannot be automated. Their key role exposes pilots to opportunities to overcome adverse situations, to judge and resolve daily whether any anomaly poses a safety threat, and to err seemingly inexplicably in judgment with adverse consequences. Not surprisingly, then, when accidents occur the judgment of pilots comes directly into focus.

This article examines how pilots (and other system experts) tend to make decisions, offers a contrast between your decision-making and other types of decisions, and points toward potential lessons learned.

How pilots tend to make decisions

When confronted with a situation which requires a decision, pilots tend to decide quickly and accurately. This is similar to the strategy employed by other systems experts such as military officers and oilwell firefighters. As soon as you encounter the situation, you quickly come up with a solution. You do not usually generate and evaluate a series of alternative actions – experts tend to formulate quickly a single, satisfactory solution.

Gary Klein (1989) who first documented this process in the psychological literature has described it as recognition-primed decision-making. For an expert, situations requiring a decision are not novel; they fit categories that he or she already knows about. All the expert has to do is categorize the situation and apply its predefined solution. This is positive because the solutions are almost always valid and highly efficient – the solution works and we get to it quickly. In fact, it probably comes from the time constraints we face. When an aircraft is traveling at high speed, or an oilwell fire is burning out of control, time is of the essence. Generating and evaluating a variety of alternative courses of action becomes a liability.

But there are some exceptions or vulnerabilities. First, experts may generalize this strategy to situations that are not time constrained. Do you remember from your flight officer training as a new-hire the saying, “When something goes wrong, the first thing you need to do is sit on your hands?” That statement recognizes that a problem encountered at altitude allows time for evaluation prior to action. It is similar to the distinction drawn between red-box items and complete procedures. There are certain things we need to do immediately and others that can wait while we maintain aircraft control. Second, experts are vulnerable when they make decisions with limited information – once a course of action has been selected, they rarely revisit it when new information comes in. Third, experts are vulnerable to misjudgments of very low-probability situations. For example, if a thunderstorm is in the terminal area, an expert decision-maker will evaluate the thunderstorm and judge whether its proximity presents a threat, deferring takeoff or landing only if he or she believes it is a threat. If the threat is misjudged, the expert pilot may be involved in an accident while a novice would not, because the novice would always treat it as a threat. Where information is limited, expert decision-making may set us up for an error. We may need to do something else.

In contrast: deliberative decision-making

When decisions are made well in other fields, such as business, they typically fit what has been called expectancy-value theory. By this approach, when a decision must be made, alternative courses of action are generated. The costs, benefits, and probability of success for each alternative are examined, and the most beneficial alternative is adopted. This is something akin to how we purchase a household appliance if we do it well. We should consider our needs (How large of a family do I have? How many clothes do I need to wash each week?), examine the benefits (How large is the capacity? How many wash cycles does it have?), look at the costs (How much more do I get for the extra $200?), and the probability it will function reliably as designed (A measure comparable to probability of success – Is this really a good manufacturer?). If we do all of this, we should make the best decision.

Now, we all recognize situations where we, and businesses, do not make decisions in this manner. (I went shopping for a car and I bought the sporty red one.) But, expectancy-value theory is intended as a prescription for how to make decisions well. Does it work when it comes to flying the aircraft? Only in certain circumstances – where time is available to generate and evaluate options and where the immediate control and habitability of the aircraft or situation is not in question. This approach could pay off if we're deciding to depart an airport and sitting on the ground off the gate, or if we're about to begin descent from cruise and learn that weather conditions are becoming marginal. In these cases, it might be worthwhile to consider our options and not be pressed by our desire to complete our original plan.

But if there's smoke in the cabin, an engine or cabin fire, or loss of pressurization, we need to decide and act quickly. We'll be better off if we have planned and practiced those situations before and simply apply the judgment we may have made in advance.

Is there a middle ground? Should pilots alter their decision-making strategy?

It is unlikely you will fundamentally change how you make decisions. It is probably also unwise, because recognition-primed decision-making works where time constraints apply. However, there are some things you might do deliberately to improve your odds.

1. Decision models

Transport Canada issued a Judgment Training Manual in which they suggest "Pilot judgment is the process of recognizing and analyzing all available information about one's self, the aircraft and the flying environment, followed by the rational evaluation of alternatives to implement a timely decision which maximizes safety." If a pilot learns how to perceive, observe, detect and understand a situation, he or she will be more prepared to choose the best alternative while under stress or time constraint. This concept is very consistent with expert decision-making. From this perspective, we train for good decisions by knowing what to look for when selecting alternatives – we build our expertise.

Transport Canada offered a model for decision-making using the word "decide" as a memory aid. It was intended as a tool to assist pilots in making a critical decision, or perhaps, to frame how we think about making decisions. It is intended to make the pilot contemplate the outcome of an action to ensure the safety of the aircraft and its passengers.

Detect change – in many accidents, the threat was not detected by the pilots until it was too late to resolve it. We need an active search for safety threats on every flight.

Estimate the significance of the change – accidents can result when pilots underestimate a safety threat. Dig for more information about the symptoms and indications you observe.

Choose the outcome objective – what am I trying to achieve? To complete the plan despite new constraints? To minimize risks? The flight department states its priorities in FM1 as safety, passenger comfort and convenience, and on-time performance, in that order.

Identify plausible alternatives – this will vary greatly by the time constraints faced and the degree of information available. Where time is critical, there is little to do but command and act. In the face of limited information, discussion of options may be warranted.

Do the best action – make a decision and carry it out.

Evaluate the progress – are you getting closer to your objective, or is the situation continuing to deteriorate? Remember to revise your plan as the situation changes or you learn new information.

What this model makes clear is the need to deliberately search for threats and evaluate the results of the decision. Whether you would use something like this as a memory aid or not, remember those two points – search for threats, evaluate the results.

2. Look for disconfirming information

When human beings make a judgment or decision, our natural tendency is to look for information that reinforces our judgment. After you buy a car, do you read more about the model you chose or the one you didn't? That tendency needs to be overcome if we are going to make decisions like experts – we have to be able to recognize that the situation did not fit our decision or that it is changing further. When you make a call, deliberately look for anything that might be wrong with that solution. Maintain an attitude of searching for problems and you will likely identify and resolve them.

3. Make your judgments finer by looking at the details of information

Consider an ASAP report from last year. The crew of a S-80 was number two for takeoff from 27L ORD with convective activity in the airport area, ATC reported winds as 240 at 27 gusting to 41 knots. The aircraft departing ahead reported a loss of 20 knots. on takeoff. ATC then cleared the S-80 for takeoff. Would you depart? What further information would you look at? Would you apply any precautions? The S-80 Captain elected to use max power on takeoff and rotate at a higher speed, but encountered a 30-40 knot loss at 100 ft. agl. DFDR review revealed g forces varying from -0.65 to + 1.4 during the encounter.

Now look again at the details of the situation. Gusts to 41 knots. Reported loss of 20 knots. Crosswind components varying from 14 to 20 knots. Was the runway wet given convective weather in the area? What might you observe on radar? While each of these items was likely within limits and ATC issued no "microburst alert," which would prohibit the takeoff, the combined weight of several marginal variables must be taken into account. In retrospect, the Captain would have preferred to wait. But everyone else was departing, weren't they? Was there enough information present to choose prospectively what the Captain believes was correct in hindsight? Look to the details of the information to make your judgment and refine it.

Conclusion

Pilots usually tend to make decisions quickly and accurately by recognizing the type of situation and applying a strategy that fits. The advantages of this approach are timeliness and accuracy. Its risks lie in the tendency not to re-evaluate a decision made and implemented, when new information suggests the situation has changed or the decision did not have the desired effect. To make these decisions better, be more deliberative when time permits. Search for safety threats. Evaluate decision results. Look for any problems with a decision. And look to the details of the information you have to refine your judgment.

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NTSB PUBLIC HEARING ON AMERICAN AIRLINES 1420 ACCIDENT

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The National Transportation Safety Board (NTSB) convened a public hearing in Little Rock, AR, on January 26-28, 2000, as part of its ongoing investigation of the American Airlines flight 1420 accident.

The hearing took place at the Arkansas Excelsior Hotel in Little Rock, AR, with NTSB Chairman Jim Hall presiding.

The National Transportation Safety Board conducts public hearings for the purpose of supplementing the facts discovered during the on-scene and subsequent follow-up investigation of the accident. Public hearings generally are held with regard to a major accident in which there is wide and sustained public interest, or significant safety issues. Testimony is obtained through public hearings to ensure an accurate, complete and well-documented factual record.

AA Flight 1420

A hearing involves Safety Board investigators, other parties to the investigation, and expert witnesses called to testify. At each hearing, a Board of Inquiry is established that is made up of senior Safety Board staff, chaired by the presiding Board Member.

The Board of Inquiry is assisted by a Technical Panel. Some of the Safety Board investigators that have participated in the investigation serve on the Technical Panel. Depending on the topics to be addressed at the hearing, the panel often includes specialists in the areas of aircraft performance, powerplants, systems, structures, operations, air traffic control, weather, survival factors, and human factors. Those involved in reading out the cockpit voice recorder and flight data recorder, and in reviewing witness and maintenance records also might participate in the hearing.

The hearing focused on:

- availability and dissemination of weather data;
- aircraft performance;
- passenger safety and emergency response;
- runway overrun protection;
- American Airlines' operational practices and procedures, and FAA oversight.

The NTSB hearing revealed the following:

- conclusive evidence showing the spoilers did not deploy after touch down;
- inconclusive evidence on whether the spoilers were armed before touch down;

The final cause of the 1420 accident is undetermined at this time. A technical review of the accident will take place in the coming months.

Researched by Ali W. Davis, Flight Safety Intern (ERAU PR)

john h. darbo, **flight safety investigator**

Contaminated Runways

Proper procedures will keep you safe...

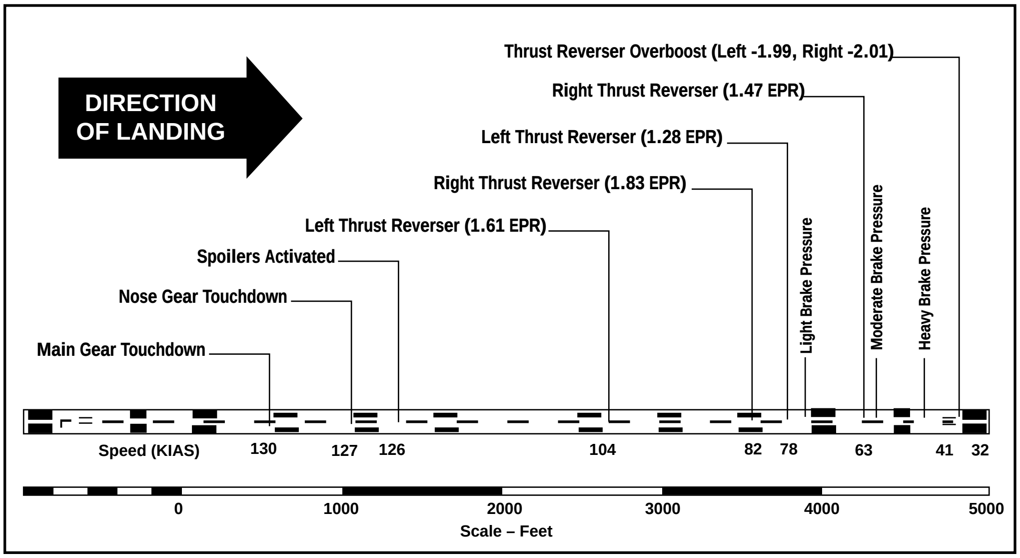
There have been a number of runway excursions in the last few years. Some of these incidents were minor in that they ended in no damage or slight damage to the aircraft. Let's look briefly at three:

The first incident report reads like this:

> *"Tower reported braking action 'good.' Normal touchdown and spoiler deployment on runway 36 1,000 foot stripe, at V_{ref}...after which normal reversing and initial deceleration. Transitioned to manual braking after 100 knots callout...with no apparent braking action. Maximum brake pressure applied...with no apparent effect. Braking action 'nil.' Steered aircraft off center line to avoid approach lights, aircraft departed the runway at a 'very slow taxi speed'."*

Just one month later another aircraft:

> The aircraft touched down on the runway, then came to rest 40 feet off the end. **Refer to the runway/time integration depiction below.**



The aircraft touched down 500 feet past the glideslope touchdown zone about 5 knots above V_{ref}. Target thrust reverser power was delayed until 18 seconds after touchdown. The reverse power was increased, reduced briefly, then reapplied through runway departure.

Brake application was also delayed. Although the crew had selected autobrakes, brake pressure remained nominal until the aircraft reached a point approximately 1,200 feet from the roll-out end of the runway.

The third case ended with the aircraft off the end of the runway overrun:

> *RVR 5000, braking action was reported as FAIR with turnoffs poor by the tower. The aircraft touched down normally, on speed, flaps 30. The First Officer got on the brakes and reverseres and aircraft decelerated normally. At 38 knots the First Officer transferred control to the Captain. The Captain continued slowing and tried to turn off the runway. Even with full reverse on the right engine the aircraft continued straight ahead and departed the runway at 8-10 knots. Approximately the last 1500 feet of the runway was snow covered.*

Information is the stuff from which we create perceptions. It all comes down to communications, or lack of it. Air Safety Investigator Mick Quinn of Quantas Airlines makes this statement:

> *"Communications may severely affect the way in which a flight is performed. A breakdown in the system may cause vital information regarding the safe operation of the flight to be withheld from the crew."*

Some would blame the lack of reliable runway condition reports on the tower; this is not usually an ATC problem since their authority is limited to:

> *"Issue to aircraft only factual information, as reported by the airport management concerning the condition of the runway surface, describing the accumulation of precipitation."*

According to FAA Advisory Circular AC 150/5200-30A the responsibility for field condition and the reporting of same rests with airport management. The AC addresses the issue of condition reporting this way:

> *"Generally, the condition of the pavement should be reported by the airport operator whenever there is a change in the runway condition that is not reflected in the current information available to airport users.* ***Time is of the essence in pavement condition reporting****." (underline emphasis is the FAA's)*

These reports should not only include braking action reports from aircraft; they should include friction values, closing schedules and "significant change" in the runway surface because of snow or ice conditions.

We don't face this "information gap" alone. Consider these reports from an airline based in the U.K.:

From a Gatwick based Captain:

> *"There was a failure of [a U.S. gateway airport] ATC to appreciate the significance of inconsistency of information, and to obtain meaningful braking action co-efficient for the landing runway during an approach I made on January 4, 1994.*
>
> *The ATIS broadcast gave 22L thin patches ice/snow, runway sanded..., i.e., every indication that the landing conditions were satisfactory. During approach ATC gave us information that landing aircraft were reporting braking action 'poor'. ATC seemed unaware that this was scarcely the impression conveyed by their current ATIS. To clarify the situation, braking action coefficients were requested. [Airport] ATC did not have this information, did not seem to appreciate its value to landing aircraft, and admitted that the JBI equipment was anyway unserviceable (a fact they appeared to accept as routine.)*
>
> *A precautionary go-around was flown (rather than make an immediate, and possibly incautious, landing) so that more information could be obtained before proceeding. The dilemma was resolved when subsequent landing aircraft reported braking action 'fair'. Our subsequent approach and landing were uneventful.*
>
> *I am concerned at the lack of concern shown by [airport] ATC as to the implications of runway state reports on landing decisions. In the circumstances the decision to defer landing was a safe one, but probably unnecessary if only [airport] ATC had taken the trouble to provide measured coefficients."*

One of this Captain's colleagues writes:

> *"Inadequate and misleading braking action-reports – given by ATC before takeoff. Waiting for take-off on runway 31L at [same airport as the above scenario] stated 1/4-inch compact snow (no actual precipitation) braking action reported by tower as 'fair' (apparently assessed by preceding aircraft). An American Airlines aircraft landing on runway 31L and reported virtually 'nil' braking action when brakes applied at 60 knots. No Mu meter equipment available although requested. Considered potentially dangerous to use runway 31L for take-off. Captain decided therefore to use 31R for take-off, as several arriving aircraft had reported the braking action as 'medium.'"*

Taxiways can be treacherous as well. Sometimes airport authorities expend great energy clearing the runways for us but we find the going slippery as we leave the cleared runway and begin the taxi phase. Here are a couple of examples:

> *After landing, a slow, meticulous taxi was begun. The Captain began a slight right turn to the concourse at which time it was apparent the aircraft was not responding to steering inputs. The Captain applied brakes, smoothly, but firmly, eventually reaching full braking, again with no effect. The aircraft continued sliding straight ahead, and slightly to the left, in spite of braking and increased nosewheel turning inputs. The aircraft stopped promptly, though not abruptly when the left maingear left the taxiway.*
>
> *Information available to them in the cockpit--in fact, information known--prior to their incident did not indicate that they should expect "nil" braking conditions during taxi. The Captain anticipated deteriorating conditions, so he was being very cautious. Unfortunately, the aircraft lost all traction just when traction was needed to negotiate a turn. The taxiway was so slippery that the aircraft's slide was likely exacerbated by the taxiway "crown."*

Again, the next month:

> *"Taxiing to gate the aircraft slid off the ramp. Left main gear departed paved surface followed by nose gear. Secured aircraft and departed via aft airstairs."*

Frozen vs. Wet

Frozen contaminants obviously pose the most potent hazard to a successful flight; however, there is evidence that liquid contaminant, that is large quantities of water on the lifting surface, impair air flow over the wing and degrades lift.

Just the same as structural contamination, frozen contaminants on runways and taxiways pose the greatest hazard; however, even small quantities of water on the runway or taxiway surface can cause problems.

Hydroplaning

Remember the three kinds of hydroplaning:

- **Viscose**
- **Reverted rubber**
- **Dynamic**

We'll not go into a dissertation of these three phenomena here, rather lets look at a couple of examples of the trouble hydroplaning can cause:

One of our Captains reports:

> *"After landing on 2L at [airport] I was taxiing off of the runway at the 90 degree turn when the aircraft 'slid' into a wider than normal turn (the white paint at the runway end was wet and the tires lost friction...). This caused the nose and left main to overshoot and be in the grass. The aircraft sunk in and stopped."*

Another example of wet runway hazard is AA flight 102 in April 1993. Although the NTSB has determined the probable cause of the accident exclusive of non-crew factors, the Company feels that wind shear and viscose hydroplaning were at least "significant factors" in this event.

Most of these examples are landing events. Takeoff and rejected takeoff scenarios can also play out poorly when runway conditions are changing rapidly and critical contamination information is not placed in the hands of the decision makers in a timely fashion.

Self-Awareness

So what can the flight crew or dispatcher do to gather the "latest-and-greatest" runway contamination information from the system? One person asked me: "When was the last time you received anything other than braking action?" After a moment of thought I replied: "When I asked."

Let's briefly review a typical operating manual, the Boeing 737 in this case:

- Flaps 30° may be used if gross weight permits, but flaps 40° are recommended for landing with braking action reported as less than GOOD.
- Autobrake level 2 or 3 (MED) should be used for wet or slippery runways.
- If manual braking is elected, FULL PEDAL DEFLECTION should be applied-to the mechanical stops. Most pilots think they are commanding full brakes when in fact they aren't.
- A note suggests that the Captain may elect to use MAX autobrakes on short, slippery runways.
- A judgment call is suggested in the Landing on a Slippery Runway section "…to decide if a landing should be attempted at all."
- Flight Manual Part I lists restrictions when Captains must make takeoffs and landings if the First Officer has less than 100 hours in type.

737-800 Runway Overrun, ORD

It is interesting to note that the **least effective** braking is at the end of the runways because of rubber deposits and snow or ice accumulation. Often the rollout end of a runway is worse than the rest of the runway because neither landings nor takeoffs traverse this region so the contaminate is allowed to perpetuate. The **best friction** for wheel braking in often in the middle region of the runway, so brakes should be aggressively applied.

Also any attempt to turn, or any side-slipping of the aircraft will reduce the traction characteristics of a tire because of the friction lost to cornering.

The operating manual for the aircraft you fly contains procedures and techniques for operating in various sorts of adverse runway conditions. A review of Flight Manual Part I, Section 3 and your aircraft operating manual will serve to refresh your mind as we continue through another winter season, and a case-specific pre-takeoff and pre-landing briefing sets a good stage for each event. Also the aircraft performance manual contains distance parameters under some, if not all, anticipated operating conditions. Reference to this data can prevent landing incidents in rapidly changing conditions such as alternating closed runways for plowing.

Some important considerations <u>may</u> be:

- Execute a firm touchdown providing minimum float, to provide for wheel spin up; if the tires don't spin up, then braking action is negatively impacted.
- Set auto-brakes to an appropriate level, or full manual brakes commanded.
- Promptly lower the nose, followed closely by application of appropriate thrust reverser and application of effective manual braking as necessary,
- On touchdown, it is important to lower the nosewheel to the runway and hold a positive forward pressure on the control column, thus placing more weight on the main gear sooner and increasing nosewheel steering effectiveness.

A word of caution: Don't lower the nose too fast. The elevators on any of our aircraft are effective enough to damage the aircraft if the nose is brought down abruptly. Also, too much forward pressure on the column can actually raise the tail and unload the mainwheels, especially at high speed. A slight forward pressure will normally do the job nicely.

Should you encounter communications problems, let yourself be heard via the ASAP/OF-25 system. Also, don't be shy on the frequency; advertise the conditions as you encounter them. Update both ATC and other crews who are monitoring the frequency when you find conditions are different from those reported to you, or when runway or taxiway is contaminated.

We hope these reminders, added to your training, experience and a dose of effective communications, will culminate a good, safe landing... or an appropriate decision to execute a missed approach.

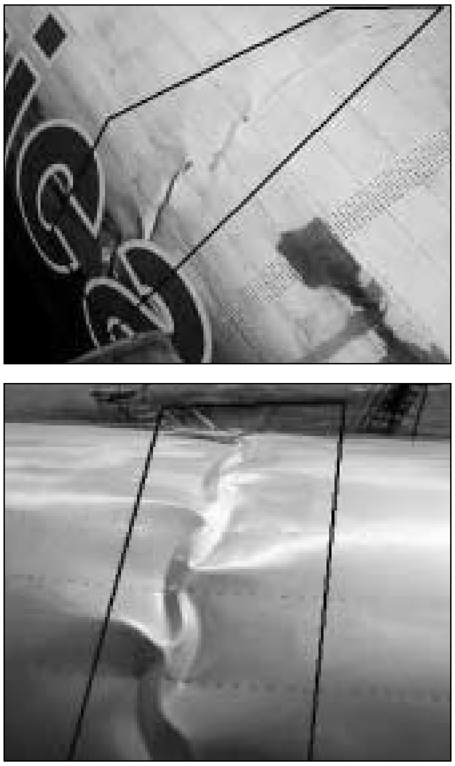
robert ruiz, **flight safety investigator - latin america specialist**

Hard Landings

Over the past ten years American Airlines has suffered 3 major hard landings involving the Boeing 757/767 fleet; two of these resulted in sufficient damage to be classified as accidents by the investigative authority. This sentence sounds almost identical to the beginning of my previous article “A Tale of Three Tails” in the first edition of AA Flight Safety magazine. Unfortunately this is a different article, different circumstances, and different fleet type. These three events will demonstrate the hazards associated with hard landings coupled with hard nose gear impact. The structural damage sustained was a direct result of high nose down pitch rates prior to nose gear touchdown. Each of the accident airplanes was Out-Of-Service (OTS) for approximately 6 weeks and incurred about 8-10 million dollars worth of damage to each airframe. In an effort to increase hard landing awareness and to prevent them from recurring, we will look at the common causal factors between these events and what actions can be done to prevent them. Synopses of each event were taken from the investigative authority reports and supplemented with company information.

Sao Paulo, Brazil 1992

The first accident (NTSB DCA93WA004) occurred while landing in Sao Paulo, Brazil on runway 09L and it involved a B-767-300. The landing was during daylight in VMC, winds 340/09; the runway was dry with the First Officer flying. Autospoilers (prior to change in mandatory landing procedure) and autobrakes were not used. The approach was described as normal, with autopilot disconnect occurring at 2000 feet. From 500 feet AGL, the final approach phase was conducted with all appropriate radio callouts. At 300 feet the Captain called out a 17 knot crosswind as displayed on the FMC and a minus bug of 4-5 knots. The First Officer acknowledged, disconnected the autothrottles and added power. The approach was flown with a 10-degree crab into the wind. At 100 feet the windsock indicated a crosswind of 10 knots. At approximately 30 feet, the aircraft was aligned with the runway centerline. At 10 feet, power was reduced to idle. Main gear touchdown was normal, with the left main gear touching down first. The aircraft then had a light skip and settled back down on the main gear. After main gear touchdown the First Officer lowered the nose gear onto the runway. Once he felt runway contact on the nose gear, forward pressure was increased to ensure nose wheel contact with the runway because of the crosswind condition. Nose gear contact with the runway was reported as firm. Upon exiting the aircraft, maintenance personnel advised the crew of damage to the upper fuselage. The fuselage crown skin was buckled from station 610 to 632 and from stringer 14 left to 14 right. The Brazilian authorities investigated the accident with assistance from the NTSB.



Aircraft damage from the Sao Paulo hard landing, 1992

Aircraft damage from London Heathrow hard landing, 1999

London, Great Britain 1999

This event will be analyzed in more detail since it is current and the Air Accident Investigation Branch in Great Britain (AAIB) has completed its investigation into the accident. The event (AAIB EW/C99/1/3, NTSB DCA99WA031) occurred while landing at London Heathrow and involved a B-767-300. The landing was at night in VMC, winds 220/11 knots; the runway was dry with the Captain flying. Upon initial contact the crew was advised to expect runway 27L; the Captain briefed this approach. During the descent, the landing runway was changed to 27R and the Captain rebriefed the change to his crew. During the approach the Captain elected to land with manual braking and manual spoilers (prior to operating manual change). The approach was normal and the autopilot was disconnected by 2000 feet AGL. There was some slight “chop” on the approach and the aircraft was stabilized with landing flaps 30° by 1000 feet AGL. At 500 feet AGL the auto-throttle was disconnected. At approximately 30 feet AGL the Captain flared the aircraft and retarded the throttles. The main gear touched down gently and the aircraft started skipping. Over the next few seconds the aircraft started porpoising and at one point the nose wheel came down firmly on the runway. During this sequence, the Captain stated that it appeared he was going to have a tail strike; therefore, he induced a nose down movement on the control column to avoid the tail strike. Upon exiting the aircraft, maintenance personnel advised the crew of damage to the upper fuselage. The fuselage crown skin was buckled from station 610 to 632 and from stringer 13 left to 14 right, almost identical to the damage suffered in Sao Paulo.

Both the CVR and DFDR were read out by the AAIB following the accident. The CVR demonstrated that the crew was operating in a competent and co-operative manner with no discrepancies being found.

DFDR data indicated that the approach was accurately and smoothly flown. Then after a normal flare, the aircraft touched down on the main gear at an airspeed of 146 knots and with a positive pitch attitude of 4°. The aircraft subsequently bounced three times, resulting in four touchdowns over a total period of 6 seconds; during this time both thrust levers remained at idle. Additionally, over the same period, roll attitude varied between 3° left and 1° right.

The bounces generated high pitch rates; however, the recorded time sampling of pitch attitude and elevator angle could not be used to accurately analyze the dynamics of the aircraft attitude. Nevertheless, it was possible to analyze the pitch attitude changes of the aircraft at the points where the air/ground switch was activated during the bounces. On the initial touchdown, the pitch attitude had been relatively constant for 2 seconds at positive 3.5°. The second touchdown was at positive 1.5° with the pitch decreasing. The third touchdown was at positive 0.5° again with pitch decreasing. The final touchdown was at minus 1.0° with the pitch decreasing which was the most extreme nose down pitch attitude. The audio recording from the CVR also concurred that the final touchdown was the firmest.

At the conclusion of the investigation, the AAIB stated that the accident sequence started when the aircraft bounced on the first touchdown and the DFDR, CVR, and flight crew information indicate that the damage to the aircraft resulted from a subsequent Pilot Induced Oscillation (PIO). This PIO was initiated as the aircraft bounced on the first touchdown and the damage probably occurred on the final touchdown. The extent of the nose down elevator command could not be accurately determined because of the limitation on the recorded data.

La Paz, Bolivia 1999

The event was similar to the ones detailed above except for the fact that this involved a B-757 at our highest airport of operation, La Paz, Bolivia 13,313 feet MSL. The flight was uneventful until the final phases of the approach. The weather at arrival time was VMC, at 7:00am. The Captain stated that the approach was stabilized at 1000 feet AGL and that they were in “the slot”, with flaps set at 25° (normal flap setting used at La Paz). At 700-800 feet there was an increase in power to maintain speed. At 50 ft AGL sink rate was too high and pitch was increased. Main gear touchdown was reported as smooth with pitch attitude at 7°. The Captain stated that 1-2 seconds after main gear touchdown pitch attitude increased rapidly and, to prevent a tail strike, he aggressively pushed the nose down. Nose gear contacted the runway hard and bounced back up. Upon arrival all three crewmembers were convinced that a tail strike had occurred. The Captain also stated that because of the high altitude, he noticed a decrease in elevator effectiveness when he tried to arrest the increasing pitch rate following the first bounce. He therefore had to increase his downward force on the control column to prevent the tail strike.

The Captain instructed both the First Officer and the International Officer to go inspect the tail area of the aircraft. No damage was found near the tail area; however, a fuselage skin buckle was detected abeam the nose gear on the left side of the aircraft. The damage, however, was within limits and the aircraft was allowed to continue in revenue service up until the time it would a have a heavy maintenance visit, where it would be permanently repaired.

The DFDR was downloaded and analyzed by company personnel. The data substantially matched the Captain's recollection of the event. The aircraft landed with a 7° pitch attitude, then the air/ground switched cycled three times indicating a rapid series of bounces. The increase in pitch after touchdown was not recorded on the DFDR due to the time sampling limitation of the recorder. The two final touchdowns were the firmest registering 1.51 and 1.64 vertical g's on the main gear. This is most likely where the damage to the aircraft occurred. The DFDR did not record the deployment of the spoilers since it did not capture this parameter.

Commonalities

Lets quickly review the common factors between all three events.

1. International overnight flights
2. Early morning landings
3. Bounce after initial main gear touchdown
4. Pilot induced oscillation
5. Excessive nose down elevator commanded
6. Small speed decay on short final
7. Landings were done in VMC conditions
8. In both accident events manual spoilers were selected
9. In two of the events, the pilots were trying to avoid a tail strike

AAIB Recommendations and Procedural Changes

To prevent the reoccurrence of these events it is important to reiterate the recommendations that arose from the investigations. The AAIB put forth an operational recommendation following their investigation into the Heathrow event.

"Use autospoilers on every landing. If autospoilers are always used, pilots will become accustomed to the effects of spoiler deployments on the aerodynamic characteristics of their aircraft." (After an internal review of this accident and other events, American Airlines Flight Department changed the landing procedures on the B-757/767 fleet to mandate the use of autospoilers on every landing.)

Also, the importance of a stabilized approach should not be over-looked. From the B-757/767 Operating Manual, Techniques Page 11;

> **Stabilized Approach Concept**
>
> The stabilized approach concept requires that, before descending below the specified minimum approach attitude, the airplane should be –
>
> 1. In the final landing configuration (gear down and final flaps),
> 2. On Approach Speed,
> 3. On the proper flight path and the proper sink rate,
> 4. And at stabilized thrust.
>
> These conditions should then be maintained throughout the rest of the approach.
>
> The minimum recommended stabilized approach altitudes are:
> VFR - 500 ft AFL
> IFR - 1000 ft AFL

Finally, if a bounce occurs, proper bounce recovery techniques must be applied. Maintain pitch, add thrust to arrest descent rate, evaluate need to go-around. Do not increase pitch, as a tail strike may occur. These are also found in the B-757/767 Operating Manual, Techniques Page 9.

If the airplane should bounce, hold or re-establish a normal landing attitude and add thrust as necessary to control the rate of descent. Thrust need not be added for a shallow bounce or skip. When a significant bounce occurs, initiate a go-around. Apply go-around thrust and use normal go-around procedures...

Caution

Pitch rates sufficient to cause airplane structural damage can occur if large nose down control column movement is made prior to nose wheel touchdown.

tom chidester, Ph. D., manager human factors & safety training

ASAP Turns Five and a Half

Prominent trends and observations

Over a five and one-half year period in which American Airlines pilots operated nearly 4.8 million flight segments, over 20,000 reports of safety issues were submitted to ASAP. These reports represent over 12,000 unique events. During the most recent six months, over 2000 reports were received. Analysis of reported events revealed a small number of event types accounting for the majority of reports, but also a number of significant and changing trends reflecting the impact of the program and actions that need to be taken.

This article reports what is happening in reported events, contributing factors, and changing trends. We hope to alert all pilots to risks and encourage actions to counter them.

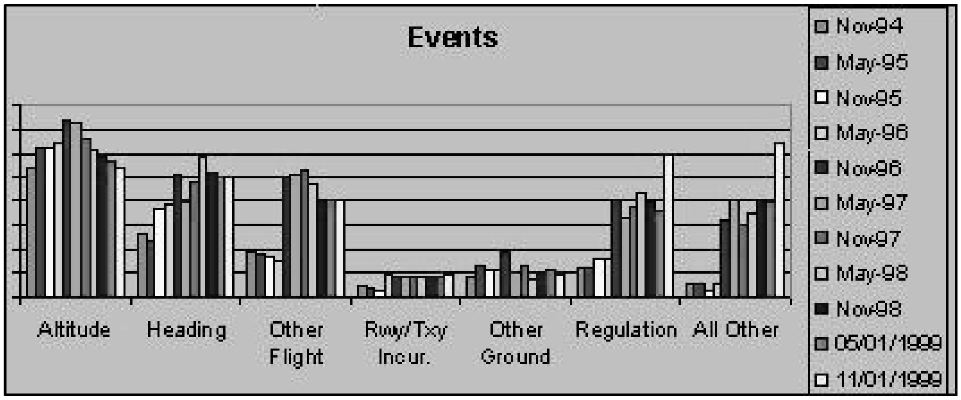
Categories of Events and their Distribution.

During initial processing of each event, a descriptive category is assigned. This type of analysis describes *what* happened – the rule, requirement, or procedure from which the event deviated. In order of frequency, ASAP reports identify:

- ➞ Altitude deviations
- ➞ Heading deviations
- ➞ Other irregularities, communication problems with ATC, or clearance deviations during flight
- ➞ Deviations from regulations or AA operational procedures including the MEL
- ➞ General irregularities or communication problems with ATC on the ground
- ➞ Runway or taxiway incursions
- ➞ A range of other categories including aircraft damage, turbulence encounters, and mechanical problems

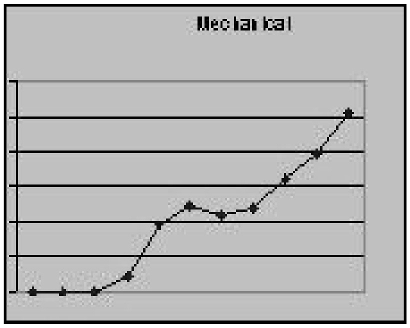
The figure below shows how the frequency of these events has changed over time. Each period represents six months ending on the date shown.

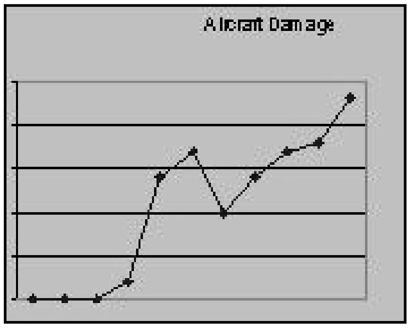
Altitude deviations are continuing a 3-year decline. Heading deviations, which had shown a long-term increase through early 1998 and leveled off over the past year, were up slightly, but well below their peak rate. The increase was associated with decommissioning of the Omega Navigation System (ONS) and its delayed replacement with GFMS on MD-80s. Heading deviations on these aircraft rose sharply as the decommissioning began. The decline from the peak rate may be attributed to pilots on these aircraft re-establishing habit patterns for enroute navigation by ground based facilities or to increasing numbers of aircraft having GFMS installed, but overall, heading deviations remain significantly more frequent than 3 years ago.



Deviations from regulations and procedures including the MEL have increased sharply from early in the program with their greatest increase occurring over the last six months. A review of the three category codes making up this group – deviation from the MEL, deviation from operational procedures, and deviation from FARs – reveals the increase is primarily in the area of operational procedures. Deviations from the MEL are at their high-point for the program, but did not show an increase over the previous six months. This trend might be attributable to decreasing time-in-type among the pilot group discussed below, but a detailed review shows these events include inadvertent noncompliance by pilots, dispatchers, flight attendants, ground crewmen, and load agents. A more plausible explanation might generalize the time-in-type concept to agents other than pilots. Expansion and resulting turnover reduce the experience level in a variety of job categories and would tend to make these errors more likely. However, we cannot rule out other historical factors, such as certain management-labor friction involving the various employee groups, discussed in more detail below, as one of two potential causes. All front-line employee groups should continually re-commit themselves to procedural compliance and standardization. Both are critical to what we do.

Deviations fitting “all other” categories have increased over the life of the program. This represents a wide range of category codes most frequently including aircraft damage, mechanical failure, hazardous materials, and turbulence encounters. The charts below review two of these categories from 1994 through 1999 – mechanical problems and aircraft damage. The number of ASAP reports in both of these areas are on the rise, and we will discuss each in more detail below.



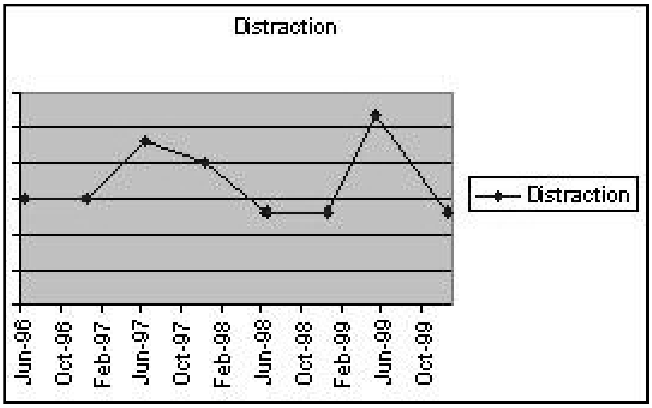


Prominent Underlying Concerns during the most recent six months of the program

This type of analysis attempts to describe why an event occurred – what factors were present in the situation that contributed to a deviation or safety concern. A random sample of 100 reports submitted during the most recent six months was analyzed in detail to identify trends in causes underlying reported events. ***These trends have shifted over the five years this analysis has been tracked.*** The top trends are described below:

- **Distraction from primary duties to other tasks (13% of randomly sampled reports).** Distractions at a critical point in flight have produced altitude deviations, navigation errors, and runway incursions. The word “distraction” usually implies that attention is drawn from critical tasks to irrelevant factors in the situation. That is rarely the case in these reports. While distractions include factors within the pilots’ control such as timing of cabin communications and PA’s, most are inherent in the operation, such as weather, ACARS messages, distractions related to autoflight systems, and minor mechanical problems. Most of these events have occurred at a point of flight where more than one duty must be accomplished – pilots must set priorities between primary and secondary tasks. While this remains the most frequent contributing factor, these reports were down sharply over the last report –reversing a serious concern – and returning to the levels of a year ago. This may reflect the results of recent emphasis in training and publications, may be a temporary correction, or may reflect other historical factors.

  Specifically, a review of the trend in distractions over the past four years reveals a disturbing pattern of events associated with distractions and periods of peaking labor-management unrest. During the six months surrounding the pilot strike in 1997, and the following six months in which the resolution played out, events associated with distractions were sharply higher. In the six months surrounding the dispute over the Reno Air integration, events associated with distractions were at their highest point in the program. This suggests how labor-management unrest may lead to safety-related issues, but the effects are indirect. Note that the acts or interruptions that distracted pilots from key tasks were factors always present in the operation, such as conflicting duties and priorities, but appear to be consequential more often during unrest. From this perspective, our labor-management struggles seem to reduce the capacity of our pilots to set priorities and deal with distracting events, rather than to be distracting in and of themselves. This is a double-edged sword. To the good, we have little evidence from our reports that contractual issues are under discussion during critical phases of flight. To the bad, this reduced capacity is unlikely to be apparent to pilots as they do their jobs. All pilots must take great pains to set priorities and control those distractions that they can. Management and APA’s continued cooperation and dialog will produce positive safety results.



- **Miscommunication with ATC (13%).** Not unique to American Airlines, pilots and controllers miscommunicate concerning altitude, heading, speed, and approach assignments, altimeter settings, and other information. Some of these problems are inherent in radio communication and some result from use of nonstandard phraseology. Most have been documented in human factors research and NASA ASRS publications. Factors associated with miscommunication include nonstandard phraseology, similar call signs, high-density/multi-instruction clearances, and failure to verify clearance in doubt by the pilots. The causes lie both with pilots and with FAA Air Traffic – solutions require multiple approaches. Frequency of reports resulting from miscommunication with ATC was up over the last report but below average for the life of the program.

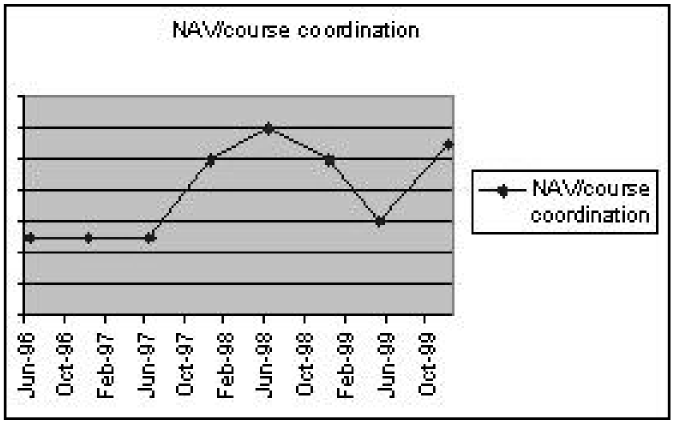
- **Clearance provided by the controller in error (13%).** A significant number of events, some involving loss of separation between aircraft or with terrain, result from a clearance issued in error. Controllers, like pilots, occasionally make errors. But once an error occurs, it must be corrected. Where separation with other aircraft is involved, the situation awareness of pilots may identify the error and TCAS serves as a backup. Where terrain is involved, situation awareness is also critical. Pilots need to know the minimum safe, enroute, or off-route altitude appropriate to their position at all times. ATC can clear aircraft below these altitudes only by providing radar vectors in compliance with minimum vectoring altitude (MVA). ASAP and NASA ASRS reports document a significant number of events in which the controller cleared a crew in error below these altitudes, or the crew misunderstood a clearance, taking them below MVA. Pilots need to position themselves to catch such an error, and can do that only by knowing their minimum altitude. GPWS and EGPWS serve as backups. Frequency of these reports is up sharply over the last report and above average for the program.

- **NAV tuning, course selection, or altitude selection not coordinated between pilots (11%).** A number of reports describe navigation to a fix or course other than intended. This re-emphasizes the need for both pilots to communicate their intentions for radio navigation. Frequency of these reports increased sharply following decommission of ONS, and most involve MD-80 crews. No comparable trend has been reported on the B-727, most of which have GPS replacing ONS navigation. These deviations have included early turns on airways where a turn point was defined by adding several DME segments, tracking a wrong (and unidentified) VOR, and failing to change course on station passage. All of these were potentially automated using ONS and all could at least be cross-checked with ONS information when the system was operative. Perhaps more importantly, MD-80 crews had frequently been using ONS-direct clearances, reducing their enroute radio navigation. Without this tool, MD-80 crews must revert to more basic IFR navigation, and that is something of a challenge to habit. Greater vigilance in navigation is necessary. This trend had leveled off in the past year, however, reports were up from the previous report, and above average for the program. This has been an area of emphasis in training and publications, and this emphasis will continue.

- **Mechanical failure (9%).** These reports described necessary deviations or actions to respond to a mechanical failure. As noted above, this has been a steadily increasing trend and the Flight Safety department is discussing the issue with Maintenance.

- **MEL noncompliance (7%).** Crews have misinterpreted, not read, not signed, or flown with open items in the E-6 logbook resulting in deviations from the MEL. Incorrect application of the MEL has slipped past Mechanics, Tulsa and Alliance Tech, the Dispatcher, and crew. These events may be associated with rushing to comply with an operational constraint. The ERT has reminded all pilots that while Maintenance is responsible for their actions and signoff of the E-6, the Captain and Dispatcher are responsible for ensuring all MEL requirements are met. Frequency of these events were unchanged over the last report, but above average for the program.

- **Responding to TCAS RA (6%).** TCAS events can indicate errors by controllers or pilots, or may simply identify unobserved aircraft in airspace of class C or below. The majority of reports are of the latter



type and are discussed in more detail below. These reports are down over the last report and represent a long-term low-level trend.

- **Use of emergency authority to deviate around weather (5%).** Instances in which a controller did not approve a deviation and the Captain elected to use emergency authority to deviate. Each of these events resulted in American notifying the FAA of the declaration. These events were up over the last report and about average for the program.

- **Mis-reading navigational chart or referring to an incorrect chart (4%).** A number of reports reflect inadvertent noncompliance with SIDs, STARs, and restrictions on approach or airport pages. In most cases, these restrictions were simply overlooked. In others, distractions, miscommunication, setup of flight guidance, and other issues discussed above came into play. Some involve misunderstanding of printed instructions or restrictions. These reports were up from the last report and average for the life of the program.

- **Operational pressure with which the crew rushed to comply (3%).** A number of reports highlight the challenge in deciding whether to exercise judgment and PIC authority versus rushing to comply with a tight, possibly unrealistic clearance or other operational constraint. The most obvious examples are crossing restrictions, but pilots reported deviations from assigned heading, speed, or altitude while rushing to comply with clearance in a variety of situations. Others involve factors in our operation and in our industry associated with gate departure and arrival. These reports were down sharply from the last report, and below average for the life of the program. This represents an improvement similar to the trend in distractions. Rushing has been a significant, but low volume trend throughout the program, and has been an emphasis subject in ASAP publications and recurrent Human Factors training. Captains must exercise their judgment to avoid the pressures to rush.

- **Selection of wrong mode on mode control panel or autopilot interface, or entry of incorrect data into FMS (2%).** These reports were down over the last report, and below average for the life of the program. See the discussion of automation decisions below.

- **Autopilot or FMC anomaly – autoflight did not perform as expected (2%).** These reports involved a failure of the autopilot to capture and hold an altitude, heading, target speed, course, or ILS as expected. Frequency of reports resulting from autoflight anomalies were down over the last report, and below average for the life of the program. Over all, this appears a trend in long-term decline. Are you making a greater effort to monitor and control the autoflight system?

The primary purpose for analyzing ASAP reports in this fashion is to identify where pilots should focus their attention to prevent further events. We want to call attention to both high-frequency contributing factors and to those lower-frequency factors that appear to be on the increase. From this perspective, in the coming six months all pilots should be watchful for:

- Distractions
- Miscommunication with ATC
- Positioning to catch a controller error
- Coordination of navigation between pilots
- Identifying and responding to mechanical failure
- Compliance with the MEL

Perhaps more importantly however, while the prominent trends in which the ERT has invested much of its emphasis appear mostly in long-term decline, some of the most significant events ever reported to ASAP have occurred in the past six months. These events differ in underlying causal factors from the majority of ASAP events and require a shift in attention. These issues, described below, warrant attention due to their severity rather than frequency.

Critical but Infrequent Events.

Beyond prominent trends, there have been a number of significant infrequent events that have raised concern. Here are some examples:

- **Execution errors leading to tailstrikes and hard landings.** These events account for a significant portion of the long-term increase in reports of aircraft damage, and have absorbed a great deal of the ERT's focus. Over the past six months, eight crews have damaged an aircraft during landing, predominantly through tailstrikes, but also through bounces or landing short of the runway surface on an overrun area. What these events have in common is loss of airspeed during the final 200 feet agl. In the majority of cases, the aircraft was stabilized at the correct approach speed until that altitude, then allowed to decay below V_{ref} prior to touchdown.

- **Aircraft Damage on the ground.** This is a separate category of event leading to aircraft damage. Over the past six months, ten aircraft were damaged in ground incidents. As early as 1992, the Flight Department attempted to focus attention on three types of incidents occurring during aircraft movement on the ground – collisions while under guideman control, collisions during taxi, and ground navigation errors resulting in runway/taxiway incursions.

- **Time in type.** This issue began to appear one year ago and appears to be increasing. Over the past five years, pilots were spending extended time in aircraft and seats. They are now beginning to move to larger equipment or to the left seat much more quickly. As a result, many pilots have less time in type than a year ago. The mistakes or threats pilots are vulnerable to differ with their experience. Pilots with a great deal of time in type tend to make mistakes by misapplying habit patterns, having habit patterns interrupted, or becoming complacent. Pilots with low time in type are vulnerable to habit patterns not yet established, or routines developed for one pilot but not the other. This leads to assumptions about the less experienced pilot that may not be warranted. The ability to crosscheck and identify any mistake by the other pilot, for example, may be reduced. Low time in type creates a vulnerability for both or all of the pilots, not just the one who's new. As workload increases, all pilots need to maintain their vigilance to standard operating procedures – checklists, briefings, and confirmation of clearances and actions between pilots, especially with low time pilots in either or both seats. This trend may generalize to other employee groups as well.

- **Checklist errors.** Over the past six months, the ERT has observed a number of events where failure to complete items on a normal checklist led to a deviation or unsual situation. For example, events have resulted or been associated with failure to capture localizer due to NAV/RAD switch not reset to RAD, failure to set hydraulic pumps to high on the MD-80, and failing to verify final landing configuration. Many of these events are associated with distractions, but others are associated with low time in type by one or more crewmembers. Additional emphasis on normal checklists may be required, and Flight Operations Technical is currently revising the challenge and response requirements for these checklists.
- **Instrument reference while conducting a visual approach.** A small number of crews initiated approaches to runways other than the one for which they were cleared. Typically, both pilots had tuned the ILS, but spotted a runway or airport and accepted a visual while looking at the wrong runway. Nothing is more compelling than a runway in sight, and disciplined instrument crosscheck and correction are necessary to prevent similar events. The requirement to tune, identify, and monitor approach navaids remains in effect, as stated in FM1 Sections 10.1.1 and 5.2.3.A.1. Both sections exempt FMC/RNP approaches on B-737 aircraft, but in all other cases, ground-based navaids are required for all approaches. Data from those navaids – when properly attended to – can prevent a variety of events reported to ASAP.

- **Thunderstorm avoidance.** Several ASAP reports have highlighted the difficulty pilots sometimes encounter in determining whether convective activity in the vacinity of an airport is a threat to a safe operation. For example, the Captain of an aircraft arriving into FLL initially declined an approach after observing a cell on the final approach path. When he and the FO observed that other aircraft were continuing approaches with no reported problems, the Captain initiated an approach, encountered windshear at 1,500 ft., executed a missed approach, and held until the weather cleared. Another Captain departed ORD after the aircraft departing ahead reported a 20 kt. loss. He elected to use max power on takeoff and rotate at a higher speed, but encountered a 30-40 kt. loss at 100 ft. agl. DFDR review revealed g forces varying from -0.65 to + 1.4 during the encounter. Further, pilots of another aircraft reported encountering difficulty in stopping or controlling the direction of the aircraft that resulted from significant standing water on the runway at YUL after precipitation had appeared to pass.

  What these events reveal is the difficulty Captains encounter in making judgments about convective weather in the context of limited information. With the exception of catastrophes such as a hurricane, earthquake, or blizzard, neither an airport authority nor ATC will close an airport or prohibit a landing, regardless of the severity of the prevailing weather conditions. Rather, they will provide inbound flights with an objective description of wind, visibility, RVR, temperatures, etc. At those facilities with Enhanced LLWAS and Terminal Doppler Weather Radar (TDWR), ATC may also be able to provide location and intensity of weather and runway-specific windshear or microburst alerts. However, they still will not close a runway or airport. Instead, pilots must be prepared to assemble an understanding of the weather conditions from the pieces of available information and assess the risk of encountering convective activity. From this perspective, whenever thundershowers are active in the vicinity of the departure or arrival airport, the Captain must assess the potential for encountering convective activity or windshear on departure or arrival. All pilots must be alert to the level of weather services at the airport (LLWAS, Enhanced LLWAS, TDWR as indicated on the back of airport pages in FM2). In addition, thundershower activity on the airport can leave significant standing water on runways. In the absence of pilot reports of runway conditions, ATC and dispatchers may have no knowledge of them and cannot provide any caution or warning. American Airlines and APA are jointly addressing this information deficiency.

- **Level of automation decisions.** Throughout the course of the ASAP program, pilots have reported events or deviations resulting from problems in working or controlling aircraft automation. Those reports have resulted in a number of changes in emphasis in FM1, operating manuals, and in training. But over the past six months, three issues have shown up in a series of events.

First, pilots on GFMS aircraft have reported a sense of lost standardization involving the use of that equipment. For example, one MD-80 pilot described observing very aggressive use and programming of the GFMS down to 5,000 feet and failure to confirm with the other pilot the input and results of route changes. Both of these issues are discussed in FM1, but may not be properly applied by all pilots. Section 5.2.4 states that FMS/GFMS programming should be avoided during critical phases of flight. Section 5.2.2.B emphasizes verification of FMS/GFMS entries between pilots prior to execution. Both of these problems arose very quickly with the introduction of FMS aircraft at American and other airlines. The automation policy section of FM1 is intended to deal with them and it applies to GFMS-equipped aircraft. Pilots flying the MD-80, DC-10, or B-727 must recognize that GFMS is a sophisticated piece of aircraft automation, and brings all the benefits, risks, and policy associated with automation into their cockpit. All pilots should review and apply the policy to their flight operations.

Second, choosing the right level of automation remains something of an art and may require more training. according to recent reports. For example, a crew inbound to LAX on the PDZ arrival was changed to the CIVET arrival. While the Captain set up the arrival and approach in the CDU, the FO departed his assigned altitude. He had been watching and verifying the Captain's inputs and was distracted from flying the aircraft. The Captain, described the event as his own responsibility – for being heads down when he should have been heads up. FM1, Section 5.2.4 emphasizes that updating FMS/GFMS and moving map displays for a clearance change in the terminal area is not required if data entry would distract from primary flight duties.

Third, pilots report some difficulty in responding to discrepancies discovered between the map display and raw data from ground-based navaids. For example, numerous map shifts were encountered in the LA Basin recently when a nav database software correction for duplicate ILS DMEs was inadvertently deleted during a routine revision release. This was highlighted in an F4 message on flight plans. The crew of a B-757 discovered that the magenta line and flight director were providing different course guidance than the localizer and the airplane symbol location relative to waypoints did not agree with their location by DME. The PF continued to fly the magenta line until the PNF called out full-scale deflection. Both pilots then recognized what had happened and acted to correct their track. FM1 Section 5.2.3 emphasizes that such discrepancies must be resolved immediately. Once the FMS position has been determined to be inaccurate, it cannot be used for lateral or vertical navigation reference.

- **Expectations of ATC services by Airspace category.** A number of reports identified pilot expectations about ATC separation services that were not appropriate to the class of airspace in which they were operating. For example, a crew departing Palm Springs received a TCAS TA which rapidly became a descend RA. The PF immediately established a rate of descent to comply with the alert and both pilots observed a single-engine aircraft pass over them with limited vertical separation. The reporting pilots commented that ATC provided no separation from the traffic and that they expected better separation when departing on an IFR flight plan. A review of PSP area charts reveals the reporters were operating in Class D airspace. The crew's expectations of ATC were too high in this case. And we have seen similar reports from pilots operating into other Class D airspace airports. Whether pilots will be separated from, or alerted to the presence of VFR aircraft, depends upon the class of airspace.

  Look over our recent poster in Operations areas around the system and ask whether your expectations are appropriate to the airspace you operate in. In class C, pilots can expect as little as 500 ft. of vertical separation from VFR aircraft. In Class D, they receive advisories rather than separation, and must deliberately increase traffic watch. Providing traffic advisories is a high priority for these controllers, but that will be balanced against other priorities in his or her work situation.

Conclusion

Providing a mechanism for pilot self-disclosure of safety concerns and potential FAR violations resulted in over 20,000 reports over a five and one-half year period. Without such a system, the FAA would have knowledge of less than 1%, and American Airlines only slightly more. Instead, the ERT reviewed every report, provided feedback to reporting pilots, had the opportunity to make recommendations for actions by American Airlines and publicized problems and solutions to all AA pilots. Trends in reporting suggest that those actions may be having an effect on some problem areas, but that other areas need continued attention. The ERT urges all pilots to review and understand the trends reported here and adopt the personal strategies described above to avoid these traps or errors in your daily flying.

OPERATIONAL EVENTS

AA Events

MD-80

Approximately 10 minutes after departing Miami, the left engine oil pressure dropped to 40psi. The engine windmilled for 8 minutes and had pressure flux but “no” low oil pressure in view. With the engine shut down. the flight returned to Miami and landed without further incident. The flight logged 9 minutes of single engine operation. Subsequent inspection found the left-hand engine oil filter leaking. The seal was confirmed to be blown out.

B-727

Aircraft encountered a bird strike after takeoff. The bird impacted the left wing panels and lower surface. The bird was also ingested into the number 1 engine. Numerous 1st stage compressor blades were damaged beyond repair limits. Several fixed stators were mangled, as well as, several rows of rotating stator blades. Subsequent inspection found the need to replace the entire engine due to heavy FOD, at a cost of approximately $500.000.00

B-757

Ten minutes after takeoff the left-hand hydraulic quantity dropped to zero, plus there was a loss of center system hydraulic pressure. The crew declared an emergency and returned for landing. The aircraft landed over weight at 223.0 lbs with a smooth touch down at 175k. Subsequent inspection found both flex lines to the left hand main landing gear extension and retraction cycle blown, which required replacement. Also replaced all tires and brakes.

Other Airline Events

Inflight Accident MD-83

On Monday January 31, after reporting mechanical trouble, an MD-83 crashed into the Pacific Ocean about 20 miles northwest of Los Angeles International Airport. The aircraft was carrying eighty-three passengers and five crewmembers was enroute from Puerto Vallarta, Mexico, to San Francisco, California, on their scheduled route when they radioed Air Traffic control regarding stabilizer problems. According to the recordings of conversations between the two pilots and Air Traffic control, the stabilizer became jammed and the crew requested permission to turn around and make an emergency landing at LAX. At that point, they were about 40 miles north of Los Angeles.

John Hammerschmidt, investigator in charge from the NTSB, said accounts of the last seconds of the MD-83 aircraft had been obtained from three witnesses — two Skywest airline pilots and the pilot of a private plane who watched as the aircraft went down on Monday afternoon.

(COURTESY KCBS

The eyewitness reports paint a devastating picture of the last moments of the flight. The ill-fated aircraft nose-dived into the Pacific Ocean in a “deadly corkscrew motion, twisting and turning as it plunged from 17,000 feet, eventually landing upside down just a few miles off the coast of southern California.”

NTSB chairman Jim Hall told a news conference the crew had made references in a CVR tape retrieved from the wreckage that the plane was “inverted” and that they had been trying to correct their stabilizer problems for 30 minutes.

The NTSB interviewed the mechanic who had been contacted by radio by the jet’s flight crew shortly before the crash. The pilots reported to the mechanic that they were having trouble controlling the stabilizer. He (the mechanic) asked the crew if they had tried the various methods of controlling the stabilizer — the horizontal stabilizer — that were available to them. The pilots asked the mechanic if there were any hidden circuit breakers for the stabilizer. The mechanic didn’t know of any hidden switches. Later, according to this mechanic, the crew said they had “a horizontal stabilizer runaway in the nose-down position,” and the mechanic also told investigators he believes the pilots later said something like “We are in a worse situation than we were.”

The NTSB investigators also interviewed the two pilots who flew the same MD-83 jet to Mexico before the return flight. The earlier flight crew reported no problems with the aircraft. Investigators hope that analysis of voice and flight data recorders as well as the recovered aircraft maintenance log will reveal the cause of the crash.

Other Airline Events continued

Landing Accident DC-10

While landing on runway 19, a DC-10 with 314 occupants (18 crew, 296 pass.) overran the runway end and slid off the airport property down an embankment at La Aurora Airport in Guatemala City. The aircraft went down a steep slope and crashed into 10 houses before coming to a stop. The accident caused 26 fatalities of which 2 were crew, 15 were passengers, and 9 were persons on the ground. Preliminary information indicates that the runway was wet and that the aircraft either slid off the runway or landed long and was unable to stop. Guatemalan authorities with assistance from the NTSB are still investigating the accident.

Takeoff Accident B-747-200F

A B-747-200F crashed immediately after takeoff. As the aircraft climbed through 1,400 feet, the crew were instructed to change frequency to contact departure control. The crew acknowledged this. The aircraft was then seen to crash in flames into a field, 1.5 miles south of the airport. The plane was carrying 63.7 tons of cargo. Eyewitnesses reported seeing an engine on fire as the aircraft took off. Debris found on the runway is believed to include parts of the Boeing 747's engine and fuselage. Weather report for the airport was: Temperature 10deg C.; Dewpoint 9deg C; 29.77in/1008mb pressure; Wind 190 degs at 18knots - mist and a 400-500 feet cloudbase. The four crew members on board were fatally injured in the accident. The British AAIB is investigating the accident.

Inflight Accident B-767-300ER

The aircraft took off from JFK Airport, New York at 0119L and reached its first enroute altitude, FL330, about 30 min. later. Up until then, the flight appeared to be proceeding routinely, however, shortly after this, the aircraft was seen on radar to be descending in a steep, high-speed dive. The aircraft crashed into the sea and was destroyed killing all 217 occupants. No distress call was received. Preliminary investigation into the accident has revealed the following. The aircraft was cruising at 33,000 feet, 3 nautical miles east and 57 nautical miles south of the Nantucket radar antenna at 01.49:52 EST, when the autopilot was disconnected. About 8 seconds later, a large nose-down elevator deflection and reduction of power to both engines are recorded by the FDR. For the next 20 seconds, the airplane was in a zero-G pitch-over with the wings approximately level. At about halfway through this descent, the speed of the aircraft reaches 0.86 Mach and the Captain's and the First Officer's Master Warnings activate. A maximum nose-down pitch angle of about 40 degrees was reached. Then, the nose-down pitch angle started to lessen, and the G forces on the aircraft increased from about Zero to about 2.5. At this point, the FDR data show a split between the left and right elevator positions. A few seconds later, both engine start levers were changed from "run" to "cut-off." Radar data indicated that the aircraft climbed back up to about 24,000 feet after descending to about 16,700 feet. This climb was not recorded by the FDR, however. At some time during the descent, the Boeing apparently broke up and crashed into the ocean. The NTSB in continuing its investigation.

Landing Accident MD-11

Following a manually flown VOR/DME approach to Runway 07 at Subic Bay, the MD-11 touched down, reportedly landing long and fast. The aircraft was not stopped before the end of the runway consequently overrunning the end and hitting a concrete post and slamming into a wire fence before plunging into the bay. The aircraft broke up and sank. The accident happened in darkness. Weather, reportedly, wind, calm, visibility 6km in intermittent light rain and cloud, scattered at 1,800 feet and broken at 7,000 feet. The runway was wet. The aircraft was operating a cargo flight. Both crewmembers were injured in the accident.

Takeoff Accident DC-9-31

The aircraft was destroyed when it crashed about 2 min. after takeoff from Runway 20 at Uruapan. The aircraft impacted the ground, in a nose-down attitude, on a heading of 110deg. about 3.3DME south of the airfield. Witnesses reported that the aircraft had a higher than normal nose-up attitude as it left the runway. Shortly before the crash, the crew reported to ATC that they had a problem, but apparently gave no details of what it was. The accident happened in darkness (1903L) but in VMC, all 18 occupants were killed.

An Update on ASAP

tom chidester, Ph.D., manager human factors and safety training

In January of 1998, the ERT published a special issue of the Update focusing on reports from international operations. Our goal was to point out the types of events that are common to all our operations and those unique to international operations. With two years of reports since then, we thought this would be a good topic to revisit in *Flight Safety*.

International procedures

This one is obvious, but deviations from international procedures often cause ASAP events. Some examples – the crew of a B-757 inbound to SJU from AUA failed to make a position report, the crew of a B-767 inbound to LHR set inches rather than millibars in the altimeter, several Latin America or ETOPS crews failed to apply MEL restrictions relevant to their division by accepting a deferral legal for domestic, but not for their operation, and several S-80 crews accepted re-routes across the Gulf of California which carried them beyond 50NM from shore without limited overwater equipment. Pilots must know, recognize, and apply the procedures that apply to the division in which they are operating.

Communicating with controllers with whom we do not share a native language

ATC communications are more difficult because our native language affects how we construct and understand messages such as a clearance, how we pronounce words and phrases, and how we interpret the meaning of any non-standardized instruction or request. ICAO procedures and use of English as the standard language represent attempts to deal with this issue, but both controllers and pilots sometimes deviate from those standards. Despite that, ASAP reports of readback/hearback errors in international operations are surprisingly low. This suggests that our pilots recognize the issue and deal with it effectively, or are more vigilant for traps because they perceive a greater risk. Keep that up. If you or any crewmember have any doubt about the content of a clearance, request confirmation. Some examples – the crew of a B-757 understood “position and hold” when the controller meant “hold short,” the crew of an A-300 flew a different departure than they were cleared for, and several crews have read back altitudes, headings, and speeds that differed from their clearance.

More non-radar environments – fewer layers of protection

We operate to more non-radar airports in international than domestic operations. When we do, we know we encounter a different set of air traffic procedures for IFR operations, but do we raise our vigilance to a level necessary to unmonitored operations? ASAP reports often reflect an error on someone’s part that resulted in a safety threat, and more importantly, always document a risk that was caught and corrected. One method for correction is removed whenever radar is not present – any mistake or deviation from clearance will be unmonitored by ATC and must be spotted by the pilots backed up by TCAS and (E)GPWS. That increased vigilance is critical, because safety threats that are not caught and corrected in aviation become accidents.

More hit-city or challenging airports

There are more challenging airports in our international operations. While not discounting the hazards addressed by crews operating into RNO, DCA, or the snow cities, we must recognize that international crews deal with terrain, high altitude, limited vertical guidance, and challenging runways more frequently. Some of our ASAP reports reflect that exposure to risk. For examples, we had a tailstrike at LPB, an airport at 14,000 msl. and had a crew land in the overrun area approaching runway 19 at TGU. Pilots must increase their flying performance at these challenging airports, and keeping to that higher level is something of a challenge in itself. Humans become accustomed to things they do routinely, even those presenting significant risks. When we become familiar and comfortable with such situations, our vulnerability to error increases.

Less-accessible weather information

Even within the domestic operation, real-time weather can be hard to come by. American’s dispatchers have integrated weather and aircraft situation displays within the U.S. on their desks, in addition to access to AA meteorology. But, these tools are not up-to-the-minute real time. Even here, our dispatchers can advise you of weather and traffic conditions, but cannot be expected to alert you of the intensity or location of all or specific cells within a terminal area, nor to predict their time of arrival over an airport. At best, they can caution you of weather that has arrived or developed in close proximity to your route of flight.

Weather information is even more limited internationally. Dispatchers rely more on satellite imagery and pilot reports, having weather radar information only in limited areas. This leads to more frequent deviations around weather by international pilots. ASAP reports often describe using emergency authority to deviate around weather cells or lines that were detected by airborne radar or visual observation. They also describe finding weather worse than forecast as they descend into their destination. For example, the crew of a B-727 arriving into MEX encountered deteriorating conditions. The ceiling had decreased to 800 overcast, with winds at 20, gusting to 35 knots. Descending into the terminal area, they observed virga, lightning, and rain over the airport. They abandoned the approach and held, then diverted to ACA when conditions did not improve quickly. Good, conservative decision-making in the context of limited weather information!

Greater abnormal/emergency consequences

We all prepare for emergencies, and hopefully, we frequently ask ourselves, “What would I do now if. . ?” That kind of thought preparation recognizes that we may on any flight have to develop and carry out an emergency plan. That options are further constrained during international flight operations was apparent in two ASAP reports from 1999.

The crew of a B-767 returning to MIA from LHR lost engine oil from one engine and had to shut it down. BDA was the nearest suitable airport. The crew declared an emergency, conducted a descent off the NAT track, headed directly for BDA, and landed a little less than two hours later.

The crew of a B-757 enroute to SJU from DFW encountered smoke in the cabin while abeam NAS. They began an immediate descent and divert into NAS while trying to control the smoke. While running these procedures, the Captain noticed low oil quantity and pressure on one engine. The crew shut down the engine and completed procedures for a single-engine approach and landing. By the way, all this was accomplished in night IMC with both pilots on oxygen.

Bird Strikes

tammy l. smart, **flight safety investigator**

The aviation community has become more interested in bird hazards around airports in recent years. In 1995, a US Air Force KC-135 crashed, after striking a flock of Canadian geese during takeoff. All 24 people onboard were killed and the aircraft was destroyed. In January of 1997, American Airlines had one bird strike that resulted in over $200,000.00 in repair costs alone.

As a result of these and similar events, the U.S. and Canadian governments have addressed the bird hazard issues with the addition of programs and recommendations to the aviation industry. In October 1996, the National Transportation Safety Board (NTSB) recommended the FAA urge air carrier pilots and maintenance personnel to report all bird strike incidents to the FAA via the FAA form 5200-7. This will enhance safety by providing essential information to identify airports where additional attention should be focused to prevent the threat of bird strikes.

AA Flight Safety Department conducted a review of American Airlines bird strikes between January 1, 1999 – October 22, 1999. Internally, 276 bird strikes were reported. The FAA bird strike database contained 218 bird strikes reported by American Airlines personnel during this same period. Of the total bird strikes reported internally, 79% were also reported to the FAA. Our goal should be 100% reporting to the FAA. To enhance the reporting of bird strikes, look for a change to FM1.

Reported AA 1999 Bird Strikes

Jan	**13**
Feb	**11**
Mar	**17**
Apr	**28**
May	**26**
June	**21**
Jul	**29**
Aug	**44**
Sep	**49**
Oct	**53**
Nov	**46**
Dec	**13**
TOTAL	**350**

Tammy L. Smart
American Airlines
Flight Safety Investigator

Tammy Smart has been with the AMR Corporation for 7 years during which time she has worked as a dispatcher for AMR Combs Charter - MEM; as a Crew Scheduler; as an Operations Specialist in NavData/SOC, and the last 3 years as a Flight Safety Investigator. She is a 1991 and 2000 graduate of Embry-Riddle Aeronautical University with a B.S. in Aeronautical Science with a Commercial pilot license, and a Masters of Aeronautical Science specializing in Aviation Safety. She also has a dispatch license. She is a member of the SAE – Aerospace Division, Systems Safety Society, and International Society of Air Safety Investigators.

NTSB Events in Review

tammy l. smart, **flight safety investigator**

Federal regulations require operators to notify the NTSB immediately of aviation accidents and certain incidents. 49 Code of Federal Regulations Part 830 defines an Aircraft Accident as: An occurrence associated with the operation of an aircraft that takes place between the time any person boards the aircraft with the intention of flight and all such persons have disembarked, and in which any person suffers death or serious injury, or in which the aircraft receives substantial damage.

An Incident is defined as: An occurrence other than an accident that affects or could affect the safety of operations.

Based on the above requirement American Airlines Flight Safety Department notifies the NTSB of all such events. The following is a brief description of American Airlines accidents and incidents for 1999. The information on these events can be found on the NTSB's Website: www.ntsb.gov.

Note: Some information contained below is preliminary.

January 15, 1999, Accident – B-767 Hard Landing

A Boeing 767-300 experienced a hard landing at Heathrow IAP, London, England. The British government is investigating the accident. The aircraft sustained damage to the fuselage.

January 24, 1999, Incident – F-100 Evacuation

A Fokker 100 had smoke coming from the right main landing gear while taxiing after landing at Douglas International Airport, Charlotte, North Carolina. Visual meteorological conditions prevailed at the time. The evacuation occurred though the L1 and R1 slides, plus the left over wing exits. The right over wing was available but not used. Two flight crewmembers, 2 flight attendants, and 70 passengers reported no injuries. Personnel in the ATC tower dispatched fire rescue equipment, followed by the flight crew making a request for fire equipment. The crew advised the ATC tower that the airplane would be evacuated. Examination of the landing gear revealed that hydraulic fluid had leaked onto the brakes, causing the smoke. The airplane received minor damage.

January 31, 1999, Incident – MD-11 Smoke in Cabin

A MD-11 experienced smoke in the cabin and performed an emergency landing at the Seattle-Tacoma International Airport. The Captain, First Officer, 14 crewmembers, and 64 passengers were not injured. Instrument meteorological conditions prevailed. The flight had departed Seattle and was enroute to Narita, Japan. The airplane was airborne for about 1 hour and 10 minutes while cruising over North Vancouver Island, British Columbia, Canada, when the event occurred. A "buzz" was first heard over the public address system, so the flight crew reset the circuit breaker for it. Smoke was then observed in the first class cabin area. The crew immediately declared an emergency and turned back to Seattle. A crewmember located the source of the smoke and opened up an overhead bin just forward of the R2 door located near the right rear section of the first class cabin. A halon fire extinguisher was discharged onto a video system control unit (VSCU) and the smoke dissipated with no further incident. No reports of fire were made, and no fire damage was found. Examination of the VSCU by representatives of the Federal Aviation Administration (FAA) revealed that part of a circuit board was charred. Further examination of the entire video system revealed internal damage to several video distribution units (VDUs) downstream of the VSCU. A "cannon plug" power connector that linked the damaged components exhibited evidence of moisture damage and a short circuit between two pins. All video system wiring was intact and undamaged. The video system was manufactured by Rockwell Collins Passenger Systems and certified by the FAA Long Beach Aircraft Certification Office. McDonnell Douglas installed it in the incident airplane prior to the aircraft's delivery from the factory. According to manufacturer records from Rockwell Collins, the connector failure was the first of its kind.

February 8, 1999, Accident – MD-80 Severe Turbulence

A MD-80 enroute from Chicago, encountered severe turbulence, 10 miles southwest of the South Boston VOR during let down into Raleigh, North Carolina. Visual weather conditions prevailed at the time of the accident. The airplane was not damaged; the pilot, the First Officer, and 131 passengers were not injured. Three flight attendants received minor injuries, and one flight attendant was seriously injured.

May 11, 1999, Incident – A-300 Rudder Deflection

An A-300 scheduled from Bogota, Columbia, to Miami, Florida, landed successfully after the flight crew experienced multiple rudder deflections that caused the airplane to yaw excessively from side to side while on final approach to runway 9R. There were no reported injuries to the 119 passengers or crew of 10. Preliminary information from both the American Airlines engineering group and a Safety Board crew interview indicates that during the initial approach to runway 9R, as the crew configured the airplane for landing with flaps 40 degrees and the landing gear down, the airplane began to yaw left and right. The flightcrew stated in an interview that the rudder pedals in the cockpit did not move, though the rudder was deflecting and causing a yaw motion that was sufficient to prompt the Captain to abandon the first landing. During the go around, and specifically, as the airplane was reconfigured with the landing gear up and flaps at 20 degrees for the go around, the yaw deviations increased and became extreme. The crew reconfigured the airplane twice during the go around and completed the landing with 20 degrees of flaps. Initial information from FDR readout indicates that the rudder, which is a single panel with three hydraulic actuators, deviated continuously but not rhythmically between 5 and 11 degrees each side of center during both approaches. The FDR has been transported to the Safety Board for additional readout.

June 1, 1999, Accident – MD-80 Runway Overrun

A MD-80 crashed after landing at Little Rock, Arkansas. There were thunderstorms and heavy rain in the area at the time of the accident. The airplane departed the end of runway, went down an embankment, and impacted approach light structures. There was a crew of 6 and 139 passengers on board the airplane. There were eleven fatalities.

June 14, 1999, Incident– B-757 Landed Short

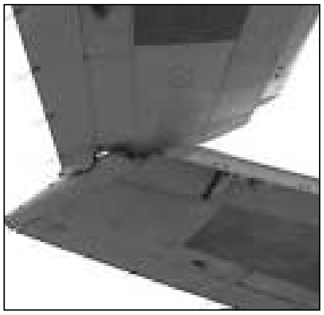
A Boeing 757 struck the airport boundary fence at Tegucigalpa, Honduras while landing on runway 19. There were no injuries and minor damage to the airplane.

June 25, 1999, Incident – MD-82 Contained Engine Failure

A MD-82, experienced a contained engine failure during departure from Lindbergh Field, San Diego, California. The Captain, First Officer, 4 cabin attendants, and 135 passengers were not injured. Visual meteorological conditions prevailed. The crew told a Federal Aviation Administration (FAA) inspector they heard a pop after the nose wheel lifted up during rotation on takeoff. The aircraft pulled to the right as they lost power on the right engine. They did not notice any alarms or caution lights. They stated they performed required checklists and secured the engine. An emergency was declared and an uneventful landing was completed at the Miramar Marine Corps Air Station, San Diego. All passengers deplaned by the aircraft's stairs. A preliminary visual inspection determined all of the blades were missing from the last stage of the turbine. Damage was also observed on the next stage forward. The compressor section did not exhibit any damage that could be observed. A detailed examination of the engine will be performed in Tulsa, Oklahoma.

June 29, 1999, Incident – Boeing 767-300 vs. Boeing 767-200

A Boeing 767-300 on a scheduled flight to Stockholm, Sweden collided on the ground with an American Airlines B-767-200, which was stopped on the International Ramp at the O'Hare International Airport, Chicago, Illinois. There were no injuries to the 3 cockpit crew, 10 cabin crew, and 173 passengers on board the 767-300. In addition, there were no injuries to the two mechanics on board 767-200. The 767-300 received minor damage to its right wingtip. The 767-200 was at gate M-3 at the International Terminal and was pushed back onto the ramp so that it could be repositioned to the domestic side of the airport. The 767-300 had been parked at gate K-19 and was given clearance to taxi to Runway 32R via the Bravo Taxiway. The right wing of the 767-300 contacted the left wing of the 767-200 as it was taxiing on the Bravo Taxiway. This event resulted in a change of AA procedures when pushing back from M3. The current procedure is push directly onto Bravo.



July 15, 1999, Accident – A-300 Tail Strike

An Airbus A-300-600ER was substantially damaged while landing at John F. Kennedy International Airport, Jamaica, New York. There were no injuries to the 2 pilots, 8 flight attendants, or 180 passengers. The Captain was receiving his initial operating experience in the airplane. Visual meteorological conditions prevailed for the flight, which had departed from Port-au-Prince International Airport (PAP), Haiti. The flight was uneventful until the landing on Runway 13L, at which point the tail struck the ground. The airplane subsequently taxied to the gate without assistance where the passengers deplaned through the jetway. Post flight examination of the airplane revealed that the fuselage was damaged between frames 68 and 80, and stringers 51 on the left and right sides of the fuselage. Internal structure elements were found to be bent, twisted, and broken. Several areas of fuselage skin, which covered the area, were also damaged. According to the FDR, the airplane made initial touchdown on the right main landing gear and the squat switch transitioned from the flight mode to the ground mode. The airplane then became momentarily airborne, and while airborne, the ground spoilers on both wings extended. The airplane touched down a second time on both main landing gear and the tailskid, with a pitch attitude of 9.32 degrees airplane nose up, and a +2.26 "g" load recorded on the vertical acceleration axis. The ground spoilers will extend if both throttles are at the flight idle position and either main landing gear squat switch transitions to the ground mode. Upon becoming airborne, the spoilers will not automatically retract without the throttles being advanced.

October 27, 1999, Accident – A-300 Turbulence

An Airbus A-300 encountered clear air turbulence enroute to Miami, Florida. The flight originated from Lima, Peru, on October 26, 1999 at 0010 eastern daylight time. Visual meteorological conditions prevailed at the time of the accident. The pilot, first officer, 8 cabin crew members, and 146 passengers were not injured. One passenger was seriously injured. The fasten seatbelt sign was illuminated. A passenger was walking in the aisle at the time the turbulence was encountered and was thrown off balance into a passenger seat armrest. The passenger sustained a non-displaced fracture to one rib.

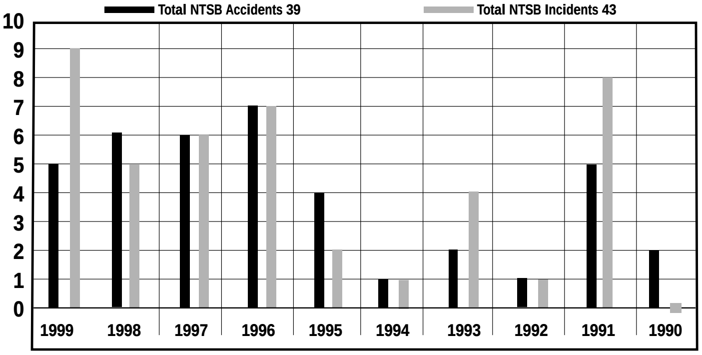
November 7, 1999, Incident – Boeing 757 Smoke in Cabin/Cockpit

A Boeing 757 had smoke fill the cockpit and cabin, The aircraft landed without further incident at Nassau, Bahamas, while on a flight from Dallas/Fort Worth Airport, Texas enroute to San Juan, Puerto Rico. Visual meteorological conditions were reported. The airplane was not damaged. The 2 flight crew members, 6 cabin attendants, and 188 passengers reported no injuries. According to the Miami Air Route Traffic Control Center (ARTCC), the crew declared an emergency, due to smoke in the cockpit and cabin. At the time the flight was 125 miles east of Nassau, at flight level 370 (37,000). It was reported to the ARTCC that the crew and passengers had put on their oxygen masks. The flightcrew shut down the No. 2 engine due to low oil quantity. After shutting down the No. 2 engine, the smoke dissipated. The flight diverted to Nassau and landed without incident. Examination of the engine revealed a cracked and completely separated intermediate case oil tube (the radial drive shaft passes through this oil tube). Failure of this tube allowed oil to be drawn into the engine core airflow and into the environmental control system (ECS), resulting in smoke in the cabin and the loss of oil quantity and pressure. The engine was repaired and put back into service.

November 18, 1999, Incident – B-767 Rapid Decompression

A Boeing 767-223 experienced a rapid decompression during climb from San Diego, California enroute to John F. Kennedy International Airport, New York. The pilot performed an emergency descent and landed without additional incident at the Palm Springs International Airport, Palm Springs, California. Visual meteorological conditions prevailed. The airplane sustained minor damage. According to the flight crew, while climbing through 32,000 feet mean sea level, a rumbling sound was heard followed by the illumination of the "Center Duct Leak" light on an overhead panel. Action was taken to isolate the center duct. The cabin pressurization controller indicated a maximum rate of climb. Unable to control the rate of depressurization, the crew performed the "Explosive Depressurization" operating checklist procedure and descended to 10,000 feet. An examination of the airplane revealed the main cabin air supply duct ruptured at a weld. Thereafter debris/insulation entered the cabin while it lost partial pressure. The Captain, First Officer and 123 persons on board were not seriously injured. Preliminary information indicates that 2 of the 10 flight attendants, and 4 of the 111 passengers reported having sustained minor injuries and several were transported to a local hospital for examination.

The information below contains the number of NTSB Accidents (fatal and non-fatal) and Incidents American Airlines had during the 1990's.



that the emergency response provided will depend on an accurate pilot request for those services.

Miscommunication on the UL5

The Flight Safety department has received several reports concerning lack of communication on the UL5 airway between Brasilia and Porto Velho (Brazil). These reports indicate that Brasilia Center will authorize the flight up to the Signo intersection, whereupon the crew is to call Porto Velho Center for further clearance. However, when the aircraft arrives at Signo intersection, no radio contact is possible either with Brasilia or Porto Velho.

The ATC authorities in Brazil have been contacted concerning this problem, and are working on a solution. At present, Brasilia Center will clear the flight to a point further along the airway than Signo, whereupon radio contact with Porto Velho Center can be established. Local ATC authorities recommend our pilots contact Porto Velho or Manaus Center through HF 8855 or 5526 if any problem with communications is experienced.

All three items cited in this article do not reflect a dangerous or chaotic ATC situation in South America. They are described here to heighten pilot awareness and further the cause of accident prevention.

Sergio Sales
Flight Safety Investigator - South America

Sergio Sales has been with American Airlines Flight Safety Department for more than four years focusing his activities in South America. Prior to joining American Airlines, he worked for the Brazilian CAA. He held positions as Flight Safety Director, Principal Operations Inspector (POI) for the B-737 fleet at Transbrasil Airlines, and the Brazilian Delegate at ICAO Meetings for the Annex 13 Revisions. Prior to the Brazilian CAA, he was the Flight Safety Officer for the Brazilian Safety Center in the Brazilian Air Force. He is a B-737-300 Captain and test pilot for helicopters and fixed wing aircraft. He is the founder and coordinator of the Airport Emergency Response Group for Latin America. He is a graduate of the Brazilian Civil Aviation Institute in Airport Planning and Administration. He is a professional member of the International Society of Air Safety Investigators.

Did you know… ?

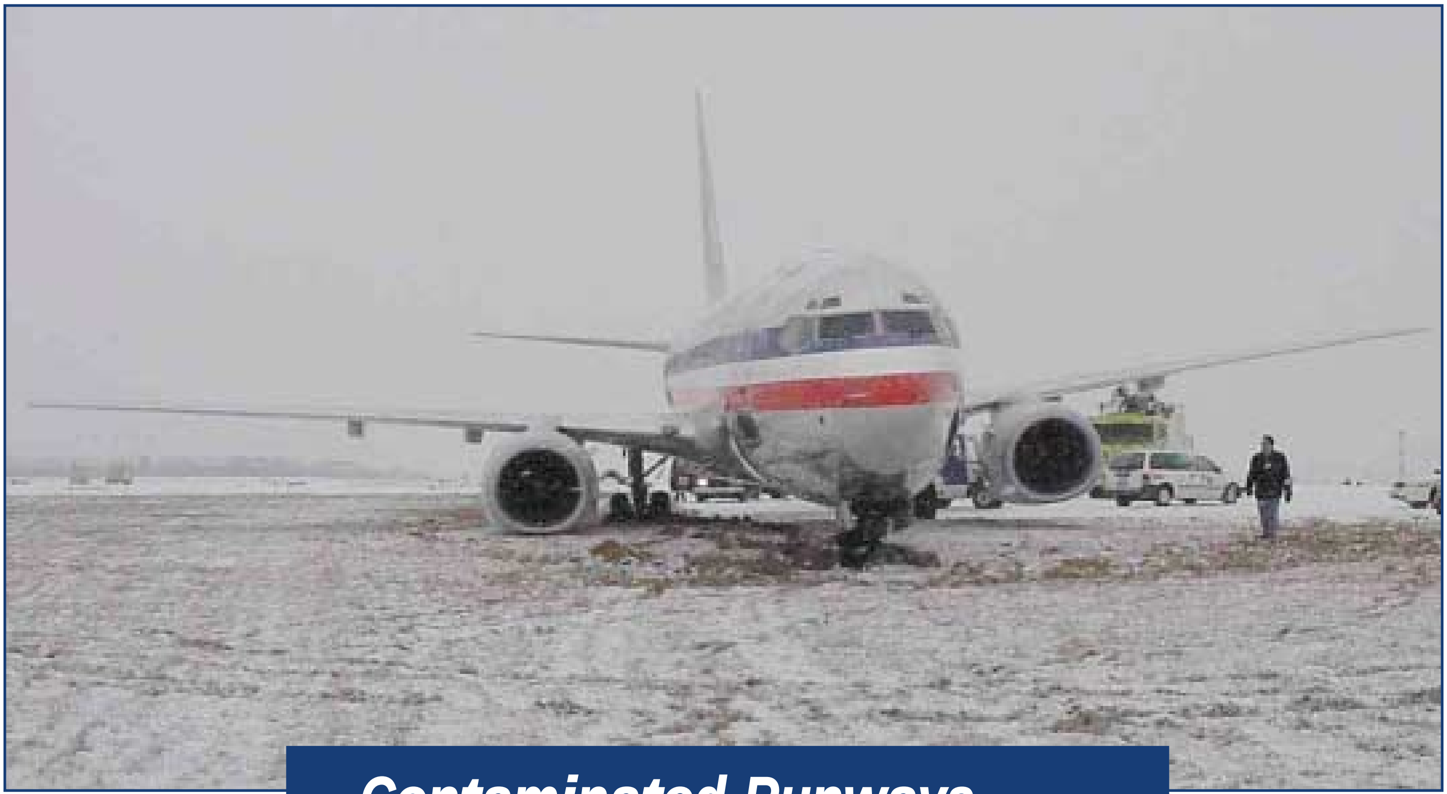
…the FAA can fine American Airlines $11,000 each time we knowingly board a person who appears intoxicated? (FAR 121.575 [c])

…FARs 91.17 and 121.575 prohibit the pilot of a civil aircraft from knowingly boarding and transporting a passenger who appears to be intoxicated (see also FM1, Sec. 13, para. 1.15). No definition of “appearance of intoxication” is written in the FARs or FM1. The responsibility of the pilot is to ensure that the appearance of intoxication is not due to medication/medical condition. If there is uncertainty concerning a passenger’s condition, contact the CCRO who has guidelines for intoxication that can assist in determining the passenger’s condition, as well as having an AA physician on call at all times.

…FM1, Sec. 8, para. 2.12 / Sec. 9, para. 4.2 require 2 minutes or the appropriate 4 or 5 mile radar separation when taking off behind a heavy or 757 jet. However, the separation is required at the time the subsequent aircraft becomes airborne, and not at the time the aircraft is cleared for takeoff. Therefore the controller can anticipate the proper separation and clear subsequent aircraft for takeoff prior to the full 2 minutes or actual 4 or 5 mile separation. Further, if there is a turn on departure, the controller will not look at the straight line distance between aircraft, but will consider only the total air distance.

…FAR 121.589 requires all carry-on bags be stowed, and overhead bins and closets closed and latched before the final passenger entry door is closed. However, AA procedures require the #1 Flight Attendant to coordinate with the agent on when to close the door, not the Captain. Additionally, the #1 FA cannot notify the Captain that the cabin is ready until all doors are closed, all passengers are seated, and all evacuation slides are armed (FM1, Sec. 8, para. 1.2).

Prepared by
Flight Safety Department



Contaminated Runways *PAGE 5*

Operational Events in brief…

American Airlines Events

- **MD-80**
  Approximately 10 minutes after departing Miami, the left engine oil pressure dropped…
- **B-727**
  Aircraft encountered bird strike…
- **B-757**
  Ten minutes after takeoff the left-hand hydraulic…

Other Airlines Events

- **Inflight Accident MD-83**
  On Monday, January 31, after reporting…
- **Landing Accident DC-10**
  While landing on runway 19, a DC-10 with 314…
- **Takeoff Accident B-747-200F**
  A B-747-200F crashed…
- **Inflight Accident B-767-300ER**
  The aircraft took off from JFK…
- **Landing Accident MD-11**
  Following a manually flown VOR/OME approach…
- **Takeoff Accident DC-9-31**
  The aircraft was destroyed…

INSIDE

See page 19 for An Update on ASAP

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