Transport Canada Transports Canada

Aviation Safety

Letter

Learn from the mistakes of others and avoid making them yourself . . . **Issue 4/2002**

Flight 2005—We've Now Reached Our Cruising Altitude

As we reach the mid-point of *Flight 2005—A Civil Aviation Safety Framework for Canada,* we can look back with pride and satisfaction on what has been achieved by working together. A broad overview of safety initiatives underway in support of our Flight 2005 goals are posted on our Web site at <http://www.tc.gc.ca/aviation/2005/StatusImpToc_e.htm>. This fall, we'll be taking stock of our performance, in general, and fine-tuning our strategic plan. The next step is to expand our horizons to 2010.

Flight 2005 identifies a high level of public confidence in our Civil Aviation program as a key result. Surveys show that following the events of September 11th, the public associated security with the safety of air travel. However, the most recent survey statistics indicate that public confidence is being restored, but we still have some work to do to reach our target of a 90% confidence rating by 2005. We have to educate the public on how safe our system actually is and we will be working with our security colleagues to accomplish this.

In terms of aviation safety, Canada enjoyed one of its best years in 2001. There were 295 accidents involving Canadian-registered aircraft, which was the lowest number of accidents in over 25 years, and a 7.5% decrease from the 2000 total of 319. This was also significantly lower than the five-year average of 349.

While we are heading in the right direction, it is important to remember that safety initiatives take time before the results become evident—it is an ongoing process. Take the air taxi sector of the industry as an example. In September 1996, the Safety of Air Taxi Operations Task Force (SATOPS) began reviewing the operational attitudes and practices in air taxi operations and recommending ways to reduce the number of accidents in this sector of the aviation industry. As a result, the number of accidents in air taxi operations has gone from a high of 128 in 1995 to last year's low of 52 and is proof that concentrating our efforts on safety-critical areas works!

Looking to the future, I see our joint efforts of implementing safety management systems in aviation organizations as the cornerstone for improving the safety and economic performance of the aviation industry. In support of the regulatory initiatives underway, advisory material has been published highlighting what is involved in implementing a safety management system. Civil Aviation has also embarked on an education campaign as an integral part of preparing to expand the applicability throughout the industry.

I look forward to seeing the results of this significant safety initiative, as well as continuing to strive to achieve our other safety goals, in the years to come.

Merlin Preuss
Director General, Civil Aviation

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Canada

Dangerous Goods and YOU the PILOT...

by Roger Lessard, Dangerous Goods Inspector, Transport Canada

Dangerous goods are defined as any material that poses a risk to health, safety, property or the environment. Such risks are associated with the toxic, flammable, corrosive, infectious, radioactive or explosive nature of the goods. Much of the travelling public is unaware of the hazards associated with common household materials undergoing rapid pressure and temperature changes, or the jostling that can come with rough handling or typical atmospheric turbulence.

The Transportation of Dangerous Goods Regulations (TDGR) regulates the handling, offering for transport, transporting and the importing of dangerous goods by all modes of transport whether or not the goods are in the system for commercial benefit. Failure to comply with the TDGR can lead to fines of up to $50,000 for the first offence.

Flight crew members should not assume that passengers have been informed about dangerous goods restrictions. Passenger check-in, security screening personnel, and pilots should never hesitate to ask passengers if they are carrying dangerous goods. When dangerous goods enter the aviation system in non-compliance with the provisions of the TDGR calamity can occur. Here are some examples of what can go wrong:

- The crew of the Shorts SD-330 had just departed and levelled off at 9000 ft and diverted for immediate landing. An undeclared dangerous goods (an improperly packaged pump containing gasoline) that had been loaded in the cargo/baggage compartment started to evaporate, which occurs more quickly at altitude due to reduced pressure, and dangerous fumes filled the cabin of the aircraft.
- A pilot, on a commercial fishing trip, had packed a duffel bag containing prohibited strike-anywhere matches. Fortunately the matches ignited **before** the bags were loaded on the aircraft.
- The pilot of a Cessna 172 had a spare nine-volt intercom battery stowed in his flight bag. During the flight, the battery shorted out against the zipper, producing sufficient heat to cause ignition. The pilot was able to extinguish the fire before it got out of control.
- A nine-volt battery that shorted out against a piece of metal caused a pilot's flight case to overheat and the Cessna 182 suffered an explosion in the baggage compartment.
- A DC-9 suffered an in flight cargo compartment fire when a misdeclared fibre drum containing five gallons of 50% hydrogen peroxide and 25 lbs of a corrosive agent leaked during the flight. Just before landing, smoke began to fill the passenger cabin. Since auxiliary power unit (APU) fumes were reported on a previous flight, the captain was sceptical of the smoke reports, and didn't notify air traffic control (ATC) of the possible cargo compartment fire until after landing. Of the 131 people aboard, 18 received minor injuries.
- A DHC-6 Twin Otter 300 had an in flight fire near the cargo locker; an undeclared flammable liquid from a passenger's luggage inadvertently ignited. The two-crew members and all 13 passengers were killed.

U.S. Department of Transport, data for the year 2000, reveal more than 1400 incidents involving dangerous goods on board aircraft. Over 800 incidents involving undeclared dangerous goods were reported in the past decade.

In the belief that awareness is the first step in preventing the unsafe transport of dangerous goods, the Dangerous Goods Standards Division of Commercial and Business Aviation is 'Spreading the TDGR Safety Message' through a variety of public outreach programs. This begins with posting information in conspicuous locations, educating pilots, ground crews and other personnel.

If you want to find out how you can do your part in promoting the safe transport of dangerous goods contact: Roger Lessard at 613 991-3988 or lessaro@tc.gc.ca. △

New Regulations for Airport Operations

by Bruce MacKinnon, Aerodrome Safety Inspector, Transport Canada

In order to address the increasing threat associated with some wildlife species hazardous to aircraft, Transport Canada (TC) will be adding a new Wildlife Management and Planning Regulation to the *Canadian Aviation Regulations* (CARs) later in 2002. Since the majority of collisions between aircraft and wildlife occur within the airport environment, it is appropriate that the regulatory focus be applied to airport operators. The motivation to implement the new regulation comes from the following key challenges:

- Aircraft operations are increasing worldwide.
- Resident populations of hazardous bird and mammal species are on the rise in Canada.
- Airport operators play a key role in the management of the risk associated with wildlife.
- A great deal is known about controlling wildlife in airport environments. The single most

important factor in reducing the risk associated with wildlife is a science-based airport wildlife management program.
- In spite of what has been learned over the past 40 years, some airports have yet to establish comprehensive wildlife management programs. Regulations are needed to ensure an adequate and consistent approach across Canada.

Who is affected?

Canadian certified airports and registered sites will be required to comply if any of the following conditions apply:

- The site receives commercial passenger carrying aircraft with more than 2800 movements per year.
- Turbine powered aircraft using the airport have struck birds. (multiple strikes)
- Wildlife known to be hazardous to aircraft have been observed on and around the airport.
- A waste disposal facility lies within 15 km of the airport geographic centre.
- The airport is located in a built-up area.

What are the requirements?

- Under the new performance based-regulation, airport operators are responsible for developing an Airport Wildlife Management Plan that is approved by the Minister and reviewed and amended at least every two years in response to changing risk elements.
- The management plan must include a risk assessment in Q850 or equivalent format, complete with information on wildlife strikes, aircraft movements, aircraft types, ecological studies and wildlife inventories.
- All airport personnel involved with wildlife management duties must be properly trained.
- Airport operators are required to submit an annual report to TC on all wildlife strikes. Upon request, the airport operator must submit training program material and records.
- Airport operators must establish a communication and reporting system including a method for alerting pilots of wildlife hazards.

In summary, the new Wildlife Management and Planning Regulation is part of TC's ongoing initiative to modernize the airport regulations and standards in the CARs. It is intended to address the ongoing need for airport wildlife control as bird and mammal strikes continue to be an aviation safety issue. △

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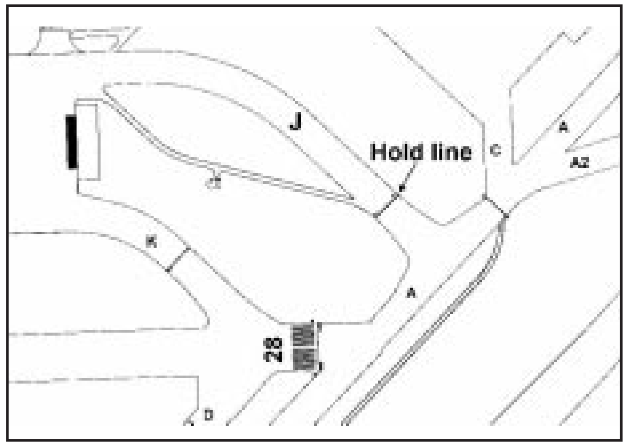
At Dorval, I Keep My Eyes Peeled on Juliett

A World of Constraints

When the de-icing pad was built at Dorval International Airport, several constraints had to be taken into consideration. They included limited available space, environmental arrangements, zoning criteria and the operational effectiveness of the pad. Taxiway Juliett was born of these constraints as a curved taxiway linking the de-icing pad to Taxiway Alpha. Because of the taxiway's special configuration and the need to meet the requirements of TP 312, the stop line for Runway 28 is located on Taxiway Juliett instead of Alpha. Pilots therefore find themselves holding at an angle of 180° to the runway instead of 90° as usual.



The Ingredients for Runway Incursions

To the unusual placement and irregular shape of the stop line add the following ingredients:

- a heavy workload for pilots exiting the de-icing pad;
- stop lines less conspicuous after the ravages of winter;
- a lighting system consisting of runway guard lights, used only at Category II airports;
- two agencies (the de-icing pad and NAV CANADA) communicating with aircraft, each with its own phraseology; and
- official publications that do not show the location of holding positions.

And, in short, you have a recipe for runway incursions. Since September 2001, more than 40 aircraft of different companies have inadvertently crossed the stop line on Taxiway Juliett protecting Runway 28. During this time, Dorval has stood at the top of the country's runway incursion list.

A World of Cooperation

Alerted by this high number of runway incursions, Transport Canada, Air Canada, Aéroports de Montréal and NAV CANADA met and decided to work together to find the cause or causes of the problem and ways to solve it.

To rectify this problem situation for all users, the partners involved agreed to take the following action:

- The marking of the holding position on Juliett, clear of Runway 10-28, was improved by:

1. repainting the stop line and doubling its area;
2. altering the holding position sign for greater clarity; and
3. adding two runway guard lights to draw pilots' attention to the position of the stop line.

- User awareness programs were set up.
- Air Canada communicated the problem clearly in its internal publications and training.
- Official publications will be revised to draw attention to the unusual placement of the holding position on Juliett protecting Runway 28.
- A warning message will be posted on the Dorval Tower ATIS when the de-icing pad and Runway 10-28 are in use.
- The phraseology of all the parties was reviewed for accuracy and consistency with established standards.
- Appeals for vigilance, already made to controllers, will be repeated on refresher courses and expanded to pilots.

A Safe World Through Your Vigilance

Measures already introduced have helped significantly to reduce the number of runway incursions related to the location of the Runway 28 stop line on Juliett.

However, with the safety of users of Runway 10-28 depending on vigilance by everyone, it is imperative to expand our education and awareness program to reach all concerned.

In conclusion, at Dorval, I keep my eyes peeled! And, without express clearance from ATC, I keep clear of Runway 10-28 at the holding position on Taxiway Juliett. △

Call For Nominations for the 2003 TC Aviation Safety Award

Do you know someone who deserves to be recognized?

The Transport Canada Aviation Safety Award is presented annually to stimulate awareness of aviation safety in Canada by recognizing persons, groups, companies, organizations, agencies, or departments that have contributed in an exceptional manner to this objective.

You can obtain an information brochure explaining award details from your Regional System Safety Offices, or by visiting the following Web site:
http://www.tc.gc.ca/aviation/syssafe/brochures/tp8816/english/index_e.htm.

The closing date for nominations for the 2003 award is December 31, 2002. The award will be presented during the fifteenth annual Canadian Aviation Safety Seminar, which will be held in Montreal, Quebec, April 14 to 16, 2003. △

The Accident Prone Pilot

by Gerry Binnema, Regional Aviation Safety Officer, Pacific Region

A survey revealed that 58% of people believe they have above average intelligence (Wylie, 1979). Clearly, some of these people have an overly optimistic view of their cerebral powers; however, they are not alone. This tendency to hold optimistic opinions about our own ability seems to be part of human nature. Studies have repeatedly shown that a majority of people in a variety of professions believes they are better than the average practitioner. Pilots are not immune to this optimistic bias. A recent study done by Wilson and Fallshore at the Central Washington University indicated that the majority of the pilots in their study believed that they were less likely than others to experience a visual flight rules (VFR) into instrument meteorological conditions (IMC) accident, that they were more capable than average at avoiding inadvertent flight into IMC, and that they were better able to successfully fly out of IMC.

Clearly, not everyone can be better than average, and it would seem that an overly optimistic opinion of our skills might lead us to take risks that are unwise. Where does this optimism come from? I believe one source is the myth of the accident-prone pilot. This myth claims that most pilots who get in accidents are the kind of people who make frequent mistakes, or display bad judgment on a regular basis. A casual read of accident reports often seems to support this myth, since the report details exactly what the pilot did or failed to do, that led to the accident. In hindsight, it is easy to spot the errors and gain a great deal of confidence that we would never be that foolish or incompetent. So we read the accident reports, see the mistakes, and increasingly believe that accidents only happen to the foolhardy, the incompetent, or the accident-prone.

My experience, as a pilot who has lost friends in aircraft accidents, as an accident investigator, and as a safety officer, tells me that pilots who are involved in accidents are not accident-prone. They are as competent, and as careful as any other pilot out there. How can that be? How can the people who commit these errors, or display such poor judgment, be as careful and competent as you or me?

The fundamental error we make when we read the accident reports is that we attribute the errors to the personality of the person committing them. We don't try to understand the situation from the perspective of the pilot, who is experiencing the events as they unfold. When we read the accident report we know that the events will end in an accident, and we judge the pilot's actions from that perspective. The question we should be asking is this, "Why did this make sense from the pilot's perspective, at that time?"

Any accident investigation has a great deal of difficulty uncovering what was occupying the attention of the pilot leading up to the accident. We cannot measure what stress the pilot was feeling. There is no blood test to measure how tired, distracted, or uncomfortable the pilot was. We do know that our attention is easily distracted from routine tasks, and focused on exciting or stressful events surrounding us. We all know how difficult it is to pay attention to tasks when we are tired, thirsty, hot, or stressed.

Every one of us has made errors while flying. At the very moment we were doing those things, they made sense to us, perhaps because we didn't understand the situation, perhaps because we were distracted, and perhaps because competing priorities made a high-risk flight seem like a good option. To other people, standing outside of the situation, the mistakes you made would have been obvious.

So what is my point? I have two points. The first is that we need to recognize the optimistic bias for what it is; a false sense of confidence created by the way we tend to view other people's mistakes. The cold hard reality is that we all make mistakes and anyone of us could be in an accident, especially if we approach our flying with over-confidence. When we start to recognize this, we will take seriously the second point. Accidents are the result of situations. When we read accident reports we should focus less on the specific mistakes that the pilot made, and focus more on the situation that produced the error. This would help us identify the kinds of situations that produce errors, and we could try to avoid those situations.

What are the kinds of situations that produce more errors? There are many, but they generally involve some combination of some of the following ingredients: a tired pilot, pressures, poor weather, an unfamiliar aircraft, an unfamiliar route, a minor mechanical problem, a sudden unplanned change in the operation, or a change that goes undetected. Look out for these ingredients as they creep into your flight, and be aware that they can dramatically impact your ability to make a safe flight. △

It doesn't pay to overload,
it does cost
to pick up the pieces…

Recently Released TSB Reports

The following summaries are extracted from Final Reports issued by the Transportation Safety Board of Canada (TSB). They have been de-identified and include only the TSB's synopsis and selected findings. We encourage our readers to read the complete Final Reports on the TSB's Web site at http://www.tsb.gc.ca/. *—Ed.*

TSB Final Report A00O0279—Runway Overrun

On December 18, 2000, an Antonov 124-100, was chartered to pick up 40 t of auto parts from Windsor, Ontario, for delivery to Oostende, Belgium. The crew conducted an instrument landing system approach to Runway 25 at Windsor Airport, and the aircraft touched down an estimated 3400 ft past the runway threshold, at about 23:33 EST (eastern standard time). During the landing roll, the aircraft overran the runway and stopped approximately 340 ft past the end of the runway, 20 ft from the airport boundary fence. There were no injuries, and the aircraft sustained minor damage. Emergency response services responded approximately 40 s after the aircraft stopped.

Findings as to Causes and Contributing Factors

1. The aircraft touched down 3400 ft past the threshold of Runway 25 and could not be stopped in the remaining 4450 ft.
2. Because of the weather minima on Runway 07, the aircraft was landed with a 4-kt tailwind component on Runway 25. The aircraft was about 20 ft higher and about 6 kt faster than recommended when it crossed the threshold of Runway 25. Consequently, the aircraft touched down well beyond the normal touchdown point.
3. The runway was covered with a trace of loose snow, which reduced braking friction and lengthened the landing roll.
4. The Canadian runway friction index (CRFI) report of 0.30, issued to air traffic control by the airport maintenance specialist, was not passed to the AN124 flight crew. This resulted in the flight crew decision to land at Windsor when a diversion to an alternate airport might have been conducted had the flight crew been aware of the CRFI.

TSB Final Report A00A0071—Loss of Control/ Stall

On May 6, 2000, a Piper PA-28-161 Cherokee Warrior II was departing Runway 01 at the Sydney, Nova Scotia, airport on a local pleasure flight with the pilot and three passengers on board. The take-off roll was started near the threshold of Runway 01, and the aircraft became airborne approximately 500 ft from the departure end of the 6000-ft runway. Shortly after take-off, the aircraft aerodynamically stalled. The aircraft struck the ground at 13:42 ADT (atlantic daylight time), 2000 ft beyond the departure end of the runway, 125 ft to the right of the extended centreline. The pilot was fatally injured, and the three passengers received minor injuries.

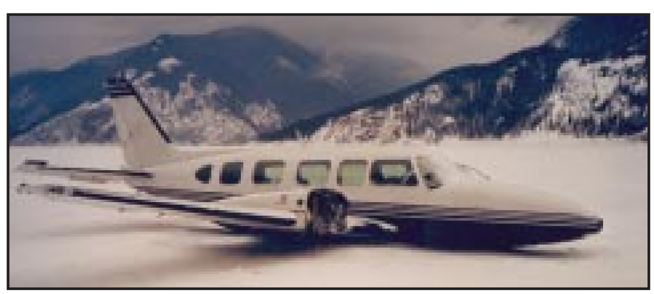
Findings as to Causes and Contributing Factors

1. Conditions conducive to serious carburettor icing at any engine power setting were present. These conditions almost certainly prevented the aircraft from accelerating normally and from attaining safe flying speed.
2. The takeoff was not aborted when it became evident that the aircraft was not accelerating normally. The aircraft was forced into the air at or near the aerodynamic stall speed; the aircraft stalled, and control was lost.

Other Findings

1. The pilot was not wearing his available seat belt and shoulder harness; this contributed directly to the severity of his injuries.

TSB Final Report A00P0019—Controlled Flight onto Ice



On February 7, 2000, the pilot of a Piper PA-31-350 Navajo Chieftain encountered an area of heavy snow and reduced visibility while on a visual flight rules (VFR) flight from Bear Valley, British Columbia, logging camp to Tsay Keh. The pilot was unable to maintain visual references and executed a

180° turn in an attempt to regain visual flight. Shortly after completing the turn, at about 10:55 PST (pacific standard time), the aircraft collided with the ice on the Peace Reach Arm of Williston Lake, British Columbia. The pilot was the sole occupant of the aircraft and received serious injuries. There was no fire. The aircraft was destroyed during the collision.

Findings as to Causes and Contributing Factors

1. Weather conditions at the time and location of the occurrence were not suitable for visual flight.
2. While the pilot was attempting to regain visual flight, he allowed the aircraft to descend and it struck the ice surface. The weather and surface conditions were such that it would have been virtually impossible to visually detect the ice surface.

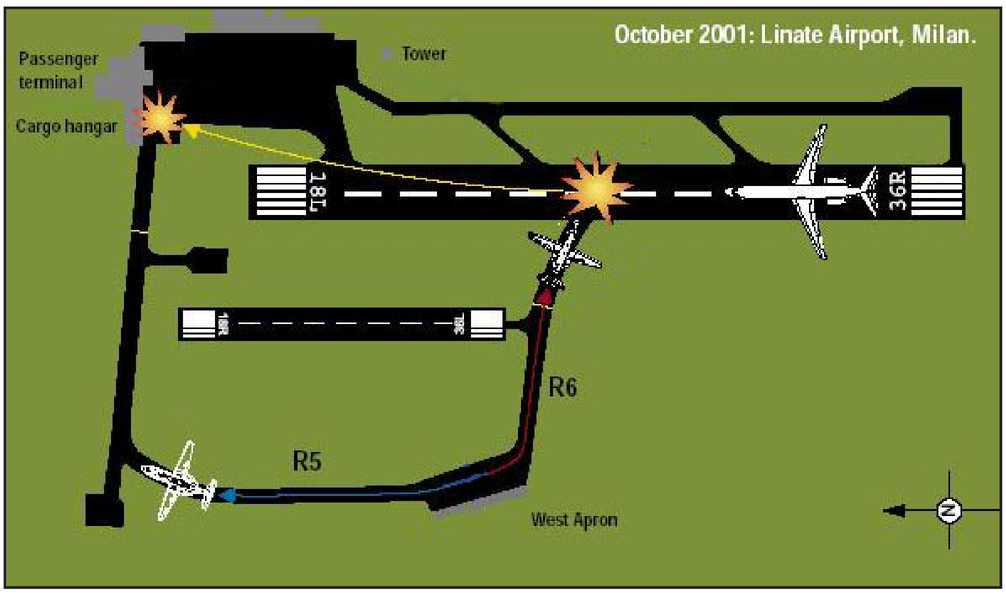
Other Findings

1. In the absence of en route weather reporting facilities, the pilot could only estimate weather conditions based on the area forecast and informal reports received from lay personnel. △

Milan Runway Collision Teaches Lessons

*Condensed from **Runway Incursions: reducing the risk**, by Ruth King; published in "Flight Safety Australia," January–February 2002 issue.*

It's your worst nightmare: you're on short final, your checks are complete, and you're mentally committed to the landing, you flare... and there, right in front of you, is another aircraft. "Go around! Go around!" The error processes involved in runway incursions—entering an active runway without a clearance—are essentially the same as for violations of controlled airspace or even controlled flight into terrain. They shouldn't happen, but they do.



The above illustration indicates how the Cessna Citation taxied onto taxiway R6 instead of taxiway R5, and later crossed the holding point of R6 to Runway 36R.

Milan, 8 October 2001: a McDonnell Douglas MD-87 carrying 104 passengers and six crew is scheduled to depart Linate Airport for Copenhagen at 7:35 a.m. Heavy fog delays the flight some 45 min. At departure the visibility had improved slightly to a runway visual range of 225 m. Meanwhile, a Cessna Citation also waiting to depart is cleared onto taxiway R5. R5 does not cross either of Linate's parallel runways. The Cessna pilot correctly reads back the clearance for taxiway R5, but mistakenly turns onto taxiway R6, which crosses the main runway, 18L-36R. Although ground radar is installed at Linate, it is not yet operational and the controller has no hope of seeing the Citation through the fog.

The Citation crosses the holding point as the MD-87 commences its take-off roll on Runway 36R. The airliner hits the Citation during rotation destroying the Cessna and killing its four occupants instantly. The airliner skids along the runway and starts veering right. Seconds later it crashes into a baggage hangar next to the main apron, killing all on board and four ground personnel. A slightly different trajectory would have sent it across the main apron into the passenger terminal.

Ground radar: Following the Milan accident fierce criticism arose over delays in getting the airport's ground radar operational. Had it been working at the time of the incident, it's possible that air traffic control (ATC) would have corrected the Citation's taxiing error well before the runway incursion. Nevertheless, the initial error was a very human one; disorientation at an unfamiliar airport in thick fog. Who could dare say it could not happen to them?

Runway incursions are not attributable to any one class of pilot; all licences and experience levels are represented. In other words, this is everybody's problem. The majority of runway incursions identified in Australian occurrence reports involved a failure to follow ATC instructions. In just over 90% of incursions, ATC intervened before the incident became serious, providing a critical final safety barrier.

Solutions: Runway incursions always involve an element of human error. While we cannot hope to eliminate error we can implement personal and system-wide strategies to make errors less likely and reduce the consequences of those errors that do occur.

Situational awareness: In a runway environment, situational awareness is largely about understanding and observing your clearances, knowing where you are, and where you are going in relation to the airport and other traffic. There are several things you can do to improve your situational awareness:

Planning: During pre-flight plan, study the current aerodrome charts and familiarize yourself with any special procedures. If possible, obtain an informal briefing from someone with local knowledge.

Anticipation: Take the time to consider the possibility of something going wrong and develop contingencies. For example, what would you do if an aircraft taxied onto the runway shortly after you landed?

Alertness: Most of us have had the experience of being stopped at the traffic lights, thinking about something or other, sensing a change to "green" and moving forward, only to discover that it was the turn arrow that had changed and not the main light. Attention is actually indivisible. The human brain can only concentrate on one thing at a time and other tasks get demoted to "automatic" or reflexive programs, which are executed without conscious thought.

Entering a runway or commencing take-off can likewise be demoted to an automatic "program" that we execute when triggered inappropriately. Runway entry should be performed with at least the same caution as stepping off the curb onto a busy road, and given due conscious thought.

Refrain from anything but safety-related discussion during the departure and arrival phases. Using taxiing time to perform checks divides your attention and increases the likelihood of error. Where possible restrict pre-flight checks to those times when the aircraft is stationary.

Communication: Ensure you understand all ATC instructions completely. If not, ask for clarification. Any controller would rather repeat a clearance than resolve a traffic conflict.

Think before you speak and use standard phraseology.

Physical environment: Maintaining a good lookout is as important on the ground as it is in the air—perhaps even more so given that the traffic is condensed into a much smaller area.

Monitor airport communications to form a mental picture of where other aircraft are and what they are doing. When taxiing, align the aerodrome diagram to your direction of travel. Keep your eyes outside as much as possible and watch for signs, taxiway markings, other aircraft, vehicles and pedestrians. If you get lost, or believe you have inadvertently crossed a holding point, notify ATC immediately.

Conclusion: Runway incursions present an unparalleled opportunity for aircraft collisions and loss of life. Vigilance on the part of each pilot will go a long way to prevent being at the wrong place at the wrong time.

Ruth King is a commercial pilot. She teaches commercial and ATPL Theory at the Australian College of Aviation. △

GPS for VFR Navigation—Databases and Maps

by Andrew Graham, Project Engineer, SatNav Program Office, NAV CANADA

Global positioning system (GPS) can be a tremendous aid to visual flight rules (VFR) flying. No more getting lost and having to ask for VHF direct finding service (VDF) steers. Those time and distance calculations you have to do for your flight test all go away. Newer models with moving map displays make navigation a piece of cake; no more trying to read town names on water towers. Some receivers even tell you when you're about to fly into controlled or restricted airspace.

This all sounds great, and it usually is. However, there have been cases reported where receivers have not depicted airspace boundaries correctly, and well-intentioned pilots have blundered into areas where they ought not to have gone. Naturally, this upsets air traffic control (ATC), and the pilots shoulder the blame briefly before passing it along to the GPS receiver manufacturer. Who's at fault in these cases?

Well, unfortunately, it's the pilots.

CAR 602.60 states that pilots shall not conduct a VFR OTT (over the top) or night VFR flight without carrying

... all of the necessary current aeronautical charts and publications covering the route of the proposed flight and any probable diversionary route.

The CARs don't say anything about day VFR chart requirements. However, CAR 602.71 states:

The pilot-in-command of an aircraft shall, before commencing a flight, be familiar with the available information that is appropriate to the intended flight.

At present, paper charts (VFR navigational chart [VNC], world aeronautic chart [WAC], and VFR terminal chart [VTA]) are the only authoritative source of VFR navigation information in Canada. Nevertheless, if avionics manufacturers supply aeronautical information, isn't that information checked to ensure that it's accurate and complete? Well, yes and no. It's important to understand the database requirements for instrument flight rules (IFR) versus VFR. Data used for IFR flight (navigation aids, airports, published fixes, and instrument procedures) must meet specific standards. In VFR avionics, while there is nothing to prevent a receiver manufacturer from depicting topographic features or airspace boundaries to assist in situational awareness, there is no standard or verification process to ensure that all information is presented accurately. That may sound odd, but remember what the "V" in "VFR" stands for. VFR ensure that the pilot will be able to navigate with respect to visible landmarks, using a chart, watch and compass. There are no provisions for another means of navigation to replace visual reference to the ground. Pilots may use GPS to supplement visual navigation techniques, but are not to rely on it.

It is worth noting that some receivers present an explicit warning to pilots that the receiver is to be used only as an aid to VFR navigation, and that any data presented is for reference only.

Transport Canada Aircraft Certification and NAV CANADA are currently investigating this issue. The ultimate solution may come with the advent of "paperless" cockpits, but this will depend on the development of detailed standards. Unfortunately, with database accuracy would likely come increased costs, both for the verification of the information, and for regular database updates.

Until this is resolved, by all means, cross-check your position using GPS, but don't use it as your only means of navigating. Don't let confidence in your GPS receiver tempt you to fly in marginal weather. And finally, always carry and use up-to-date paper charts (don't forget the chart updating data in the *Canadian Flight Supplement* (CFS), and (NOTAMs) and report avionics database anomalies to the manufacturer.

Safe flying. △

Circuit Incident

Article originally published in August 2001 edition of La Brousse magazine and is reprinted with permission.

During the "Fly-In" last winter, what seemed to be a minor incident could have taken a turn for the worst. The setting is a pleasant sunny day, calm winds and a temporary runway on an icy lake. Several planes are on wheels and skis and a person on the ground is providing traffic and runway information. The frequency to be used, 123.2, in accordance with the *A.I.P. Canada* (section RAC 4.5.1) for uncontrolled aerodromes, was given beforehand via Internet and by word of mouth.

The parking area is located at the north end of the runway, so planes land towards that end. In the afternoon the winds are still calm and takeoffs are done to the south, but some planes continue to land to the north. For my departure, all is calm and there is no traffic. I transmit on 123.2 to the traffic adviser that I am ready to taxi for take-off to the south. I am informed that a plane is flying east to west over the lake, which hasn't reported in. After a few minutes, I ask about the plane's position and I am informed that it is headed west and that it is out of sight. I look towards the circuit and I don't see anything. I transmit that I am going onto the runway and a few seconds later I report my takeoff to the south. Immediately after applying full power, I see a plane turning onto a long final for landing towards the north. I reduce power, apply full brakes while transmitting on 123.2 that I see a plane at a distance that is executing a missed approach. Almost simultaneously, the traffic adviser is trying, in vain, to contact the plane above the lake. Finally, the traffic advisor informs me that the plane in flight is now behind me and that the runway is clear for takeoff.

On one hand, many would say that the pilot landing didn't check the necessary information or should have known that 123.2 is the frequency used for an uncontrolled aerodrome, which isn't published in the *A.I.P.* This pilot was transmitting on 122.75. On the other hand, did I do everything to prevent this incident? The temporary runway didn't have the privileges of a mandatory frequency (MF), so that NORDO planes could also land. Absence of transmission doesn't necessarily mean that an aircraft isn't in the circuit. Moreover, because the traffic adviser no longer saw the plane, in no way did that mean that the plane wasn't there. Actually, now that I think about it, if the plane was flying east to west over the runway, wouldn't that seem like joining the circuit, heading north, with a crosswind? Furthermore, did I take the time to look at the potential traffic when I looked at the circuit in the radiant sun?

Since the traffic adviser and I couldn't see the plane any longer, I took for granted that it was just flying by and had disappeared somewhere to the west. Nothing bad happened, and all is well that ends well. However, next time you are in an uncontrolled aerodrome circuit, keep your eyes open and don't take anything for granted…at least that is what I am going to do. △

Search Considerations—A JRCC Halifax Perspective

The Joint Rescue Coordination Centre (JRCC) in Halifax started operations in 1947. The initial role of the JRCC was to coordinate the search and rescue (SAR) of aircraft in distress. This responsibility expanded in 1951 to include the coordination of vessels and persons in distress at sea. Today, JRCC Halifax has a staff of nearly 40 Canadian Coast Guard and Canadian Forces personnel and has broadened its mandate to include the coordination of other humanitarian incidents within its 4.7 million km^2 region. That is one big area to search for missing aircraft or boats!

In the Halifax Search and Rescue Region, maritime emergencies constitute approximately 80% of all distress cases, but the JRCC also coordinates its fair share of aircraft incidents. Although there are no two identical cases, observations made by JRCC Halifax Coordinators on aeronautical incidents identified two of the most important factors for pilots to consider when planning their next flight : stick to the intended flight planned route, and advise someone as soon as possible if you deviate from it.

The best way to illustrate our point is to describe a SAR scenario that starts with an aircraft that is reported overdue at destination. The JRCC begins its preliminary investigation by talking to Air Traffic Control (ATC) agencies and any other person who may know the whereabouts of the pilot or aircraft, followed by the launch of a SAR aircraft. If these attempts fail to locate the missing aircraft, the search effort will likely continue for several days or even weeks. So why is it so difficult to locate the aircraft?

Although the search area may expand to include areas of sighting reports and alternate low-level weather routes, the original search area only includes the area within 15 NM on either side of the intended track; therefore, from a search perspective, the importance of adhering to the flight planned route cannot be overstated. There are a lot of other questions asked during the course of a search. Was there an ELT onboard? Was it a 406 MHz beacon and registered? What were the occupants wearing? What did they have onboard for survival and signalling equipment? While those issues are important, the most important question searchers will ask is about the intended route: how did the pilot intend to get from point A to point B? This crucial information will determine where the searchers will look, which can make or break the search.

So a word to the wise from your SAR staff at JRCC Halifax who may be looking for you one day: Your chances of being found are a lot better if you stick to your intended flight planned route; and if you alter that route, advise someone (preferably an ATC agency, not your co-pilot!) as soon as possible.

Answers to Self-Paced Study Program

1. extricate any person; prevent destruction by fire or other cause; avoid danger to any person or property
2. X
3. commencing their approach
4. the manufacturer's name or the type of aircraft, followed by the last four letters of the registration
5. FSS; the location of the RCO being used
6. readable with difficulty; poor
7. follow normal communications procedures; 7600
8. wind; altimeter setting; air temperature; dew point
9. 4; 12; 24
10. confirm existing forecasts; highlight a requirement for an amendment; the only source of information available between reporting stations.
11. hundreds of feet ASL.
12. 1,500; WS
13. one hour; FM; BECMG
14. 4; 1
15. 3,000
16. Odd thousand feet plus 500 ft ASL
17. 3 mi; 1 mi; 500 ft
18. Prior to contacting either the ground control or the tower.
19. CFS
20. 126.7
21. five
22. obtain approval for the flight from the appropriate ATC unit or FSS
23. flight plan
24. 1 888 226 7277 or 1 888 CANPASS
25. 121.5
26. Inspect the ELT to ensure that it is secure, free of external corrosion and the antenna connections are secure; ensure that the ELT function switch is in the "ARM" position; ensure that the ELT batteries have not reached the expiry date; listen on 121.5 MHz to ensure the ELT is not transmitting.
27. As soon as possible.
28. Yes, at the SAR time or the last ETA specified.
29. cancelled; seven days
30. C of A; special C of A; flight permit
31. shall
32. 5-year and 2-year; 6-month
33. C of A ; regulations
34. Bonding prevents sparks by equalizing or draining the electric potentials.
35. 0.3
36. the pilot-in-command

Short Take on Human Factors Basics

Approximately 80% of aviation accidents are primarily caused by a human error, while the remaining 20% almost always involve a human factors component. The following is the third of a series of short passages from TP 12863E, Human Factors for Aviation—Basic Handbook. *We hope this encourages you to look further into this fascinating, and relevant, topic. —Ed.*

Whiteout

Whiteout is a snow related phenomenon that can prove exceedingly serious. There are two types of whiteout: one caused by blowing snow, the other by lack of definition and texture. Both can cause loss of orientation.

Blowing snow

This phenomenon usually occurs on or close to the ground in otherwise good weather, when snow on the ground gets blown either by the wind or by the propeller or engine blast. Suddenly, you find yourself in IFR conditions, unable to see very much, but usually in a VFR frame of mind. The sudden and unexpected transition can catch you unaware. Helicopter pilots have to be particularly careful about the blowing snow phenomenon.

Sector Whiteout

The second type, known as sector whiteout, is much more insidious than the first, because it can occur in VFR weather with no blowing snow. Sector whiteout happens under a low to medium overcast in snow-covered areas with featureless terrain. When the sun is in a certain position, its rays are reflected back and forth between the surface and the overcast and cause all texture on the ground to disappear, with no discernible distinction between the ground and the clouds (See illustration). Because our minds are programmed to observe a line between ground and sky, any slight shadow can cause us to believe it is the horizon.

This type of whiteout was one of the major contributing causes of the accident where a DC-10 flew straight into Mount Erebus in the Antarctic though visibility was 50 miles. The particular cloud that day, combined with the position of the sun, caused the mountain slopes to merge visually with the overcast. The crew, having no visual cues from the ground, did not realize the terrain was rising.

Excerpt from TP 12863E Chapter 6, Page 86. You can obtain your own copy of this publication by calling the TC Civil Aviation Communications Centre Services at 1 800 305-2059. △

A History Lesson on Whiteout: Mt. Erebus (cont. from page 12)

visually to McMurdo. On rolling out of the second orbit, 901 was descending through 5700 ft for 1500 ft on a course direct to McMurdo Station, which they believed to be still 30 mi south. Only three minutes later the aircraft's ground proximity warning system (GPWS) sounded and shortly after the aircraft impacted the ground, still doing 260 kts. Just before impact, Captain Collins had called for go-around power and the aircraft had rotated into a climb attitude. Navy crews in the area at the time of the accident reported that the cloud bases were about 3500 ft, with layers obscuring Mt. Erebus and the ground definition poor.

The tragedy was this, for 14 months prior to the accident, the co-ordinates of McMurdo Station were improperly entered on the flight plan route. This had been inconsequential for previous flights as they had all been able to make a visual descent into the area without having to enter clouds. The error was corrected the night before Flight 901 departed, but the crew was not briefed on the change. With McMurdo properly identified, the new flight plan would take 901 directly over Mt. Erebus. The crew still believed that they would be flying into the bay to the west of Mt. Erebus, so they felt no danger in making a descent. McMurdo Station was not notified of the minimum safe altitudes for 901, so they did not question the Captain's decision to descend in what he reported as visual conditions. The lack of awareness of flight plan changes, together with whiteout conditions, were cited as the cause of the accident. Sadly, media and political pressures brought the brunt of the blame on the flight crew for descending when they did. However, without the knowledge of the changed flight plan, it seems hardly fair to say that the same choice would have been made if the crew had all pertinent information. △

❄ ❄ *Think winter flying!* ❄ ❄

A History Lesson on Whiteout: Mt. Erebus

"Air New Zealand 901" by Andrew Ayers. Article courtesy of http://www.airsafetyonline.com/, *with permission.*

Early on the morning of November 28, 1979, Air New Zealand Flight 901 departed Auckland carrying 237 passengers and 20 crew members. This was no ordinary flight, however. Flight 901 was to carry its passengers on a 12-hour Antarctic journey, flying over either Ross Island and Mt. Erebus or the South magnetic pole and Ninnis Glacier, dependent on weather conditions upon arrival before returning to Auckland. The flight was set up with a party-like atmosphere, a bar and catering were provided and passengers were invited to roam the aircraft in search of the best views. Flight deck visits were encouraged and experts on the Antarctic were onboard to provide commentary as well.

Photo: New Zealand Transport Accident Investigation Commission

Wreckage trail looking North.

Captaining Flight 901 would be Jim Collins, a 15-year pilot with Air New Zealand having over 11 000 hr. With him were First Officer Greg Cassin and two flight engineers. All of the crew had been thoroughly briefed on the special procedures used for this route. The DC-10 used on the route was equipped with inertial navigational system (INS) for use over the long water legs to the Antarctic. After leaving New Zealand, the only ground-based navigational facility would be the non-directional radio beacon (NDB) at the U.S. Navy's McMurdo Station (Mac Center) near Mt. Erebus. The crew had also been briefed on the use of Grid Navigation, which would become necessary beyond 60° of latitude due to the convergence of lines of longitude nearing the pole. The plan was to cruise at 35 000 until contacting Mac Center and making a descent for a better view based on reported weather.

Four hours out of Auckland and at FL 350 ft, the first glimpses of white, icebergs drifting in the ocean, were visible from the windows. Shortly after, Captain Collins was able to make contact with Mac Center for a weather report. McMurdo was reporting some clouds with bases at 3000 ft and 40 mi. visibility below the clouds. Based on the report and what he saw from the aircraft, Collins decided to continue on towards McMurdo Station. About an hour later with Flight 901 paralleling the Antarctic coast, the clouds at McMurdo had dropped to 2000, but visibility was still good. Flight 901 was still in the clear, so Collins asked for a descent and was cleared to 18 000 ft. About 40 mi. north of McMurdo, 901 was still in the clear and was approved for a visual descent at the Captain's discretion. At this point, Flight 901 had not yet been picked up on Mac Center's radar. Collins reported that they were descending to 10 000 ft at which point they wanted a radar vectored descent through the clouds. Mac Center was still unable to acquire 901, but upon reports that the flight was still clear of the clouds, 901 was cleared to continue a visual descent and proceed to McMurdo Station. The last report heard from Flight 901 was that they were descending through 6000 ft for 2000 ft and still in visual conditions. Minutes later, Mac Center called back 901 several times to confirm that they had reached 2000 ft, but there was no response.

Rescue planes and helicopters were dispatched from McMurdo Station and at 12:56 a.m., 11 hr after the last contact with Flight 901, a C-130 Hercules radioed Mac Center reporting that they had located the wreckage just north of McMurdo Station on the slope of the 12 450 ft Mt. Erebus at a height of only 1500 ft. Experts from around the world dispatched immediately for McMurdo Station to assist in the recovery and investigation. Especially anxious to see the wreckage was McDonnell-Douglas, having lost another

DC-10 in the American 191 accident just six months earlier. The first investigators were taken to the site by helicopter and it became immediately apparent that, unlike American 191, Flight 901 impacted the ground in a nearly level attitude, apparently under control. The length of the crater and wreckage trail indicated that the DC-10 impacted at high speed, followed by a fire. Once investigators were able to reach the crash site, they were able to determine that there were no survivors. Because the flight was a sightseeing tour, several roles of film and videotapes were recovered from the wreckage that helped investigators put together the chain of events. Most important, though, were the flight data recorder (FDR) and cockpit voice recorder (CVR).

It became apparent that during 901's descent, two orbits were made, one to the right and then to the left, in order to keep the aircraft in a clear area north of McMurdo in hopes that they could get below the base of the clouds and then proceed

(cont. on page 11)

Flight Crew Recency Requirements, Self-Paced Study Program

Refer to paragraph 421.05(2)(d) of the *Canadian Aviation Regulations* (CARs).

This self-paced study questionnaire is for use from October 3, 2002, to October 2, 2003. When completed, it meets the 24-month recurrent training requirements of CAR 401.05(2)(a). It is to be retained by the pilot.

Note: The answers may be found in the *A.I.P. Canada*; references are at the end of the questions. Amendments to this publication may result in changes to answers, references, or both.

1. No person shall displace, move or interfere with an aircraft involved in an accident, or otherwise disrupt an occurrence site without first having obtained permission from an investigator, except to ____________________, to ______________________________, or to ____. (GEN 3.4.1)

2. When a section of a runway, or a heliport, is closed, it is marked with an _________________. (AGA 3.3, AGA 5.6)

3. During a night approach to an aerodrome with ARCAL, pilots are advised to key the activation sequence when ____________________, even if the aerodrome lighting is on. (AGA 7.19)

4. On initial radio contact, Canadian private civil aircraft shall state ____. (COM 5.8.1)

5. On initial contact with an FSS through an RCO, pilots should state the name of the _____ controlling the RCO and ____. (COM 5.8.3)

6. In communications checks, the readability scale 3 and strength scale 2 mean _______________ and ____. (COM 5.10)

7. Before using a phone to contact ATS in the event of an in-flight radio communications failure, you should ____and squawk code _____. (COM 5.15)

8. An aviation-approved LWIS is equipped with sensors to report the following: __________; ____________________; ____________________; and __________. (MET 1.2.5)

9. TAFs are generally prepared _____ times daily with periods of coverage from _________ to _________ hours. (MET 1.3.4)

10. PIREP's are invaluable data sources because they either __________________________, or _________________________________, and may also be _______________________________ ____. (MET 2.1)

11. On the Clouds and Weather Chart of a GFA, cloud heights are indicated in _______________________________, unless otherwise specified. (MET 3.3.11 para. b)

12. On a TAF, any cases of strong, non-convective wind shear within____________ ft AGL will be coded as "_________________________." (MET 3.9.3 para. g)

13. On a TAF, "TEMPO" is only used when the modified forecast condition is expected to last less than ________________________. When the modified forecast is expected to last longer, either "_____________" or "_____________" change groups must be used. (MET 3.9.3 para. k)

14. To activate a DRCO, the pilot is required to key the microphone button _____________ times. The push-to-talk should be held down a fraction of a second with no more than _____________ second(s) between each action. (RAC 1.1.4)

15. Cruising altitudes appropriate to aircraft track shall apply when VFR aircraft are operated at more than _______ feet AGL. (RAC 2.3.1)

16. What are the VFR cruising altitudes appropriate to an eastbound track above 3,000 ft AGL? ____ (RAC 2.3.1)

17. On a low level airway, the minimum flight visibility for VFR is __________, and the minimum distance from cloud is __________ horizontally and __________ vertically. (RAC 2.7.1, 2.7.3)

18. If available, when should pilots obtain the ATIS information?
____ (RAC 4.2.1)

19. The specific frequency, distance, and altitude within which the use of an ATF is required will be published in the __________________________________. (RAC 4.5.5)

20. Pilots operating VFR enroute in uncontrolled airspace or VFR on an airway should continuously monitor _________ MHz when not communicating on an MF or ATF. (RAC 4.5.6)

21. Where possible, VFR pilots shall report at least _____________ minutes prior to entering an MF or ATF area. (RAC 4.5.7)

22. When the ESCAT Plan is in effect, before take-off the pilot-in-command shall
____. (RAC 12.8.2)

23. A ___________ must be filed for all flights between Canada and a foreign state. (FAL 2.3.2)

24. On flights from the United States to Canada, pilots must land at a Canada Customs authorized AOE. Pilots must make their own customs arrangements by calling __________________ since ADCUS notification on flight plans will no longer be accepted. (FAL 2.3.2)

25. Pilots receiving a MANOT message are requested to maintain a radio watch on _______ MHz when operating in the vicinity of the missing aircraft's planned track. (SAR 2.3)

26. List the four steps that should be accomplished during your preflight inspection of the ELT.
____, ______________________________,
______________________________, and ______________________________. (SAR 3.4)

27. When should you activate your ELT in the event of an emergency landing? __________________________ (SAR 3.5)

28. You have filed a flight itinerary and have landed en route to wait out bad weather. No emergency exists. If you are unable to contact anyone by radio or telephone, should you activate your ELT? If so, when? ____ (SAR 3.5)

29. When the ownership of a Canadian registered aircraft changes, the registration is _____________, and the registered owner must notify Transport Canada in writing within ____________ after the change. (LRA 1.4)

30. No person shall operate an aircraft in flight, other than an ultra-light aeroplane or a hang glider, unless a flight authority is in effect. The flight authority may be issued in the form of a __________, ________________, or a _______________. (LRA 2.3.1 (a), (d))

31. In accordance with CAR 401.08 the applicant for, and holder of, a flight crew permit, licence or rating _____ (should/shall) maintain a personal log. (LRA 3.7.6)

32. The flight crew recency requirements address three time periods. To act as pilot-in-command or co-pilot you must meet the ______________________ requirements. To carry passengers you must also meet the ______________ requirement. (LRA 3.9)

33. The use of aviation fuel other than specified is contrary to a condition of the ____________________ and therefore a contravention of __________. (AIR 1.3.1)

34. Why should all fuelling equipment, including all funnels and filters, be bonded together with the aircraft? ____ (AIR1.3.2)

35. The wind is 30º off the runway heading at 20 kt. The minimum recommended CRFI is _____. (AIR 1.6.6, Table 3)

36. A takeoff should not be attempted unless ____________has determined that frost, ice or snow contamination is not adhering to any aircraft critical surface. (AIR 2.12.2(a))