Transport Canada Transports Canada

Aviation Safety

Letter

Learn from the mistakes of others; you'll not live long enough to make them all yourself . . . **Issue 3/2004**

When Night VFR and IFR Collide

On January 29, 2003, a Beech 99 with two pilots and three passengers on board was departing Pikangikum, Ontario, at 18:38 central standard time (CST) on a night visual flight rules (NVFR) flight to Poplar Hill, Ontario. The captain, who was the pilot flying (PF) and sitting in the right-hand seat, completed a normal takeoff. The flight took off from Runway 27, over a lake. About 400 ft above ground level (AGL), the PF began a climbing right turn en route. During the turn, the PF had difficulty seeing the artificial horizon and concentrated on the aircraft's bank angle. The first officer called that the aircraft was in a 2 000-feet-per-minute descent and took control. The aircraft struck the frozen surface of the lake, bounced, and became airborne again. The first officer retained control, and the captain attempted to feather the damaged right propeller. The first officer, believing that both propellers had sustained damage, force-landed the aircraft on the lake surface. The aircraft sustained substantial damage. No one was injured. This synopsis is based on the Transportation Safety Board of Canada (TSB) Final Report A03C0029.

The original first officer for the flight became ill and the operator sent a relief pilot as a replacement. On arrival, the relief pilot became the aircraft captain, based on seniority within the company. The original captain, who was now to act as the first officer, had flown the first series of scheduled flights in the left seat, and the cockpit was configured to accommodate him. When the new captain arrived, it was convenient for the new captain to fly from the right seat. The operator's Operations Manual (OM) permits a left-seat-qualified pilot who receives annual right-seat training to operate the aircraft from the right seat. However, the captain had never received right-seat training as a captain with the company.

Both held valid airline transport pilot licences and their pilot proficiency checks and required training were current. The captain had accumulated about 4 800 hr of flight time in nine years of flying and had been a Beech 99 aircraft captain for two years. The first officer had been flying for eight years and had about 4 200 hr of flight time. The first officer had also been a Beech 99 aircraft captain for two years.

After the crew change, the flight continued to Pikangikum in night visual meteorological conditions (VMC). During the flight, the first officer, the PF for this flight, adjusted the cockpit instrument lighting for both crew members. The captain, the non-flying pilot, found the lighting selection too bright and re-adjusted the instrument lighting on the right side of the cockpit to a lower setting. The flight landed at Pikangikum, and passengers and baggage were offloaded. Three passengers and baggage were loaded for the flight to Poplar Hill. During this time, the crew were working in the brightly lit area of the ramp. After the aircraft was loaded, the crew took their positions, with the

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captain, the PF for the departure from Pikangikum, in the right seat. The PF did not change the lighting selection on the right side of the cockpit from the selections made during the flight into Pikangikum.

The PF taxied to the runway, executed a normal takeoff, and established the aircraft in a climb at 1 500 feet per minute. After the first officer called positive rate, the PF called for the landing gear to be selected up. Approximately 15 seconds after takeoff, the first officer made the required 400-ft call. The PF called for flaps up and, after the first officer confirmed that flaps were selected, called for climb power and the after-take-off checks. The first officer acknowledged, and the captain indicated starting a turn toward Poplar Hill.

The first officer was setting climb power as the PF started the turn. The PF intended to establish the aircraft in a bank angle of 20° to 25°. However, the PF was unable to see the artificial horizon clearly. Although the aircraft was banked to one of the marks on the artificial horizon, the PF was uncertain of the bank angle that was reached. The PF concentrated on the artificial horizon, even leaning forward trying to identify the bank angle displayed. The PF was completing the roll-out of the turn when the first officer told the PF that the aircraft was descending at 2 000 feet per minute. The PF pulled back on the control column. When the first officer saw the frozen surface of the lake approaching rapidly (visible because one landing light was still on), the first officer also grasped the control column and pulled back. However, the combined effort of both pilots did not prevent the aircraft from striking the frozen surface of the lake. The aircraft struck the frozen surface in a wings-level attitude with the landing gear retracted and bounced airborne. The aircraft was equipped with a belly pod, which absorbed a large amount of the impact forces during landing. The frozen surface of the lake was covered with a layer of snow about two feet deep, which also reduced the force of the impact.

The captain noted that the right propeller was slowing and attempted to feather it. The crew agreed that the best option was to land immediately on the frozen surface, and the first officer completed a forced landing about 1.5 nautical miles (NM) from the departure end of Runway 27. The aircraft slid to a stop in about 300 ft on the frozen, snow-covered surface. The crew used the aircraft radios to contact company staff at the airstrip, and the passengers and the crew were transported to the terminal in a short period of time.

Damage was confined to the engines and the propellers and to the underside of the fuselage, wings, and flaps. Inspection of the airframe, flight controls, and engines revealed no pre-impact anomalies. There was no internal damage in the cockpit or the cabin. The flight instruments from both sides of the instrument panel were removed and tested. No unserviceablities were found.

Canadian Aviation Regulation (CAR) 602.115 requires, for NVFR flight in uncontrolled areas, that "*No person shall operate an aircraft in VFR flight within uncontrolled airspace unless, (a) the aircraft is operated with visual reference to the surface*." The 18:24 CST special weather report for Red Lake, Ontario, 46 NM south of Pikangikum, was as follows: wind 210° at 15 kt, gusting to 25 kt; visibility 12 statute miles (SM) in light snow and drifting snow; ceiling 2 500 ft broken; and temperature -15°C. The weather at Pikangikum was reportedly similar. The moon was in the last phase of waning, and there was no moonlight; it was a very dark night.

Analysis—The takeoff and departure were initiated in accordance with the company's standard operating procedures (SOPs). The aircraft captain, the PF, had completed currency requirements for the left seat but had not completed the required annual right-seat training to operate the aircraft from the right seat. Consequently, the aircraft captain was not current to operate the aircraft from the right seat.

The ramp was brightly lit, and there was no problem seeing the instrument panel, so the captain did not adjust the lighting illuminating the artificial horizon before taking off. However, once the aircraft was airborne, the lighting was too dim to allow the captain to see the artificial horizon clearly. The PF concentrated on the bank angle, but did not cross-check the climb angle or other instruments, and a high sink rate rapidly developed. When the first officer called the descent, the captain was unable to re-establish situational awareness, and the first officer correctly took control. The damage to the propellers and the engines was such that a forced landing on the lake surface was the only option.

The aircraft took off over a lake, and there were no ground lights under or around the aircraft after it left the airport area. The lack of ground and celestial lighting created conditions that made flight with visual reference to the surface very difficult, if not impossible. With adequate outside visual references, a pilot, unsure of the aircraft attitude, would certainly look outside to regain their situational awareness. The ambient (outside) lighting conditions after takeoff on the accident flight would have provided little or no help to this crew in orienting the aircraft. It is highly probable that the PF was referencing only the aircraft instruments, and they were not bright enough to ascertain the aircraft attitude. In essence, this flight was not being conducted in accordance with VFR.

The TSB determined that the captain chose to fly the aircraft from the right seat during a night departure when not current to operate the aircraft from the right seat, and that the captain did not set the instrument lighting correctly for the night takeoff and was unable to use the artificial horizon effectively, resulting in the loss of situational awareness after takeoff and the subsequent loss of control of the aircraft. The TSB also determined that the flight was filed as a VFR flight whereas, in essence, it was operating under IFR conditions.

The mixing of VFR and IFR procedures can be deadly in NVFR operations. Had the crew planned for an IFR flight to begin with, they would likely have configured the cockpit for the appropriate illumination, and they would likely have noticed any deviation from a controlled IFR climb before it was too late. NVFR regulations come increasingly under attack after such accidents; pilots must recognize when NVFR becomes IFR and plan accordingly. Furthermore, the conditions under which the original captain was re-assigned to first officer duties upon arrival of the relief pilot may have contributed to the chain of events—particularly with the "convenience" of letting the original captain stay in the left seat. Experienced pilots, such as the two involved here, are used to changing seats all the time, and this would have taken at most a few minutes. Of course, there is nothing inherently wrong with having the captain in the right seat; the argument rather is the judiciousness of performing a right-seat takeoff under these circumstances. Right-seat flying skills are valuable under controlled conditions such as VFR flight, dual training, and during an emergency. With the fine line between NVFR and IFR having been crossed, the appropriateness of the decision to perform a right-seat takeoff was proven strikingly wrong. —Ed. △

Airmanship is the application of flying knowledge, skill and experience, which fosters safe and efficient flying operations.

In This Issue

Transport Canada / Transports Canada

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Ben McCarty Wins the Transport Canada Aviation Safety Award

Deputy Minister of Transport, Louis Ranger, presenting the award to Ben McCarty.

Mr. Ben McCarty was awarded the 2004 Transport Canada Aviation Safety Award for his commitment to accident prevention. The award was established in 1988 to foster awareness of aviation safety in Canada, and to recognize individuals, groups, companies, organizations, agencies or departments that have contributed to this objective in an exceptional way.

Mr. McCarty's many achievements include being a founding member of the Canadian Aviation Regulation Advisory Council (CARAC) and the Atlantic Aircraft Maintenance Engineer Association, serving as president of the latter since its inception in 1983. He has suggested regulatory changes and provided input on new legislation, all helping to further enhance and foster aviation safety. Mr. McCarty has served on many councils, such as the Canadian Federation of Aircraft Maintenance Engineers Associations, Canadian Aviation Regulation Council and the Civil Aviation Regulatory Committee.

"Over a 30-year period, Mr. McCarty has had a profound impact on how we approach aviation safety in Canada," said the Honourable Minister of Transport, Tony Valeri. "His contribution and influence in aviation safety is both significant and constant, resulting in a safer and more efficient aviation system in Canada."

The Deputy Minister of Transport, Louis Ranger, presented the award on April 20 at the 16th annual Canadian Aviation Safety Seminar (CASS) in Toronto. CASS is an international event hosted annually by Transport Canada for all sectors of the aviation community. It features safety workshops and presentations by leading Canadian and international safety experts. Additional information on the award, such as previous winners and the nomination process, can be found on our Web site at: www.tc.gc.ca/civilaviation/SystemSafety/Brochures/tp8816/menu.htm. △

Canadian Aviation Safety Seminar (CASS) 2004—A Success

CASS 2004 came to a successful close in Toronto on April 21, where nearly 400 delegates from industry and government participated. Delegates attended a very strong workshop program on day one, followed by one and a half days of presentations in plenary, by industry experts, on aviation safety and risk management topics. The emphasis throughout was placed on the continuing path towards the implementation of safety management systems (SMS). Several question and answer sessions allowed participants to discuss issues directly with guest speakers.

Dr. Scott Shappell, Manager of the Human Factors Branch of the Civil Aerospace Medical Institute of the Federal Aviation Administration (FAA), demonstrated HFACS (Human Factors Analysis and Classification System), which emphasizes the importance of addressing human factors in occurrence investigation, and the associated links in establishing accident intervention strategies. He also made an excellent point about the necessity for industry to acknowledge the importance of "general aviation," as it is likely to become the primary pipeline for future commercial pilots, in comparison with past generations where the military route was more prevalent.

Captain Michael R. DiLollo, Director of Flight Safety at Air Transat, presented the SMS in place at his company. He demonstrated that once a company understands and buys into the SMS concepts and principles, there is no need to wait until it becomes mandatory. In support of the argument that aviation safety is an investment into "cost-avoidance," he showed how his company, through their SMS, was actually able to measure avoided costs and improve safety. Captain DiLollo was unequivocal on how his company has bought into SMS early and now reaps the benefits of having implemented it.

CASS has been praised again by industry as one of the best aviation safety conferences in Canada. Since CASS 1998, coincidentally also in Toronto, the program's quality and value for the industry have been very strong and have improved from year to year. Despite its successes in recent years, however, CASS was still under represented in key areas: chief executive officers (CEO), aerodrome operators and air navigation service providers. Many aviation CEOs in Canada were passing on the event, sending middle managers and line staff, as the perception may have been that the "executive" value was not considered sufficient.

This led to the creation of the Canadian Aviation Executives' Safety Network (CAESN), which consists of a full day of dialogue between Canadian aviation executives and key decision makers. The inaugural CAESN meeting was held in April 2003 in Montreal, concurrently with CASS 2003, and was repeated this year in Toronto. Gathering the industry leaders for a productive annual meeting while getting them to CASS at the same time was quite a feat! Read more about CAESN on our Web site at: www.tc.gc.ca/CivilAviation/SystemSafety/CAESN/menu.htm.

Call for Papers—CASS 2005: Aviation Risk Management in the 21st Century

CASS 2005 will take place April 18–20, 2005, at the Fairmont Hotel Vancouver, in Vancouver, British Columbia. The theme of CASS 2005 is "Aviation Risk Management in the 21st Century," where current and future approaches to risk management in aviation will be explored. A cross-section of high-profile speakers from aviation and other sectors, as well as from government and academia, will be called upon to provide, in plenary, their insights into which approaches work best under which specific circumstances. Building on this theme, a series of workshops will be offered to help aviation companies manage risks.

Submission Form: If you wish to present a paper at CASS 2005, please complete the instructions found at www.tc.gc.ca/CASS. Abstracts must be submitted by Monday, August 23, 2004. Papers will be selected on the basis of content and applicability. Written papers and formal presentations are due on Monday, February 21, 2005. For more information, e-mail: ssinfo@tc.gc.ca. △

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. For more information contact the TSB or visit their Web site at www.tsb.gc.ca. —Ed.

TSB Final Report A02P0136—Aircraft Stalls on Takeoff

On July 1, 2002, a rented Cessna 172N was taking off from Boundary Bay Airport, British Columbia, at 12:14 Pacific Daylight Time (PDT), with the pilot and three passengers on board, for a local pleasure flight. The takeoff on Runway 25 appeared to be normal until the main wheels left the ground, whereupon the nose rose to a very steep attitude. The aircraft climbed to an estimated height of 100 to 150 ft, the right wing dropped, then the left wing, then the right wing again, and the aircraft struck the runway nose down and right wing low. A fire broke out in the area of the left cowling, fed by a broken fuel line from the left fuel tank, but was quickly extinguished by bystanders with portable fire extinguishers. Two passengers were fatally injured, the pilot sustained serious injuries, and the third passenger died in hospital the next day. The aircraft was destroyed.

Findings as to causes and contributing factors

1. The elevator trim tab was set halfway between the neutral (take-off) position and full nose-up on the cockpit indicator, which resulted in a very strong nose-up pitching moment at lift off, causing the aircraft to stall aerodynamically at a height from which recovery was not possible.
2. The checklist used by the pilot contained no challenge to verify the position of the elevator trim tab before takeoff.
3. The flaps were set inappropriately for the attempted takeoff, adding to the instability.
4. The aircraft was overweight at takeoff; it is unlikely a weight and balance calculation was completed prior to flight.
5. The aural stall warning mechanism was defective and probably did not activate when the aircraft stalled during the accident sequence.
6. The wrong flap selector plate for the particular Cessna 172 model was installed around the cockpit flap lever, which limited flap extension to a maximum of 30°.

TSB Final Report A02C0072—Runway Excursion

On April 16, 2002, a Swearingen SA226-TC Metro II was on a scheduled flight, under instrument flight rules (IFR), from St. Theresa Point to Winnipeg, Manitoba, with two pilots and 13 passengers on board. The crew was anticipating a visual approach to Runway 36 at Winnipeg International Airport but, because of conflicting traffic, accepted vectors for the instrument landing system (ILS) approach to Runway 13. At approximately 19:08 Central Daylight Time (CDT), the aircraft landed to the right of the runway centreline, then drifted further right and departed the runway surface, damaging a runway edge light, a taxiway edge light, and a runway identification sign. It then travelled 1 150 ft through the infield and came to rest near the intersection of Runways 13/31 and 18/36. There were no reported injuries. The aircraft's left engine (Garrett TPE 33) sustained damage from ingested mud and vegetation. The right wing, left wing, and fuselage were damaged when the aircraft struck the edge lights and the runway identification sign. After the aircraft stopped, the crew shut down the engines and advised the Winnipeg Airport air traffic controller of their position. The airport crash alarm was activated and emergency response personnel responded.

Findings as to causes and contributing factors

1. The aircraft landed during heavy precipitation on a wet runway, and it likely hydroplaned, resulting in a loss of directional control and runway excursion.
2. The aircraft was cleared, on short notice, for an approach to a runway with a tailwind that exceeded MANOPS guidelines for operations on a wet runway, and was cleared to land with a crosswind that approached the limit in those guidelines.
3. The crew continued with an instrument approach in rapidly deteriorating weather conditions characterized by heavy rain, low visibility, wind shear, turbulence, and tailwind and crosswind components.

Safety action—After the occurrence, the operator added a crew resource management (CRM) segment to its training program for Metro pilots.

TSB Final Report A02C0145—Collision with Water

On June 29, 2002, at approximately 14:10 Central Standard Time (CST), a Cessna A185F seaplane was taking off from Engemann Lake, Saskatchewan, on a visual flight rules (VFR) flight to Thomson Lake, with a pilot and two passengers on board. The aircraft was about 10 to 15 ft above the water, established in a wings-level, nose-up climb attitude, when the pilot glanced to the left. Before the pilot was able to look back to the front, the aircraft struck the water, overturned, and began to sink. The pilot and front-seat passenger escaped from the sinking aircraft and survived. The second passenger, who was in the left rear seat directly behind the pilot, sustained serious injuries to the legs, chest, and head during the impact, did not escape from the aircraft, and drowned. The aircraft was substantially damaged. The accident occurred during daytime visual meteorological conditions (VMC).

Findings as to causes and contributing factors

1. The horizontal stabilizer trim was set to a nose-down setting, resulting in a need for the pilot to maintain back pressure on the control column to hold a nose-up climb attitude.
2. The pilot most likely unintentionally relaxed the control column back pressure after takeoff, causing the aircraft to pitch nose down and strike the water.

Findings as to risk

1. The eye bolt from the upper left forward float strut attachment had a pre-impact fatigue crack greater than 75% of the cross section of the eye bolt.
2. Injuries sustained by the rear seat passenger likely prevented his escape from the sinking aircraft. The risk of injury was increased because the seat was not equipped with a shoulder harness.
3. The pilot's rest period the night before the accident was less than the minimum required by either the *Canadian Aviation Regulations* (CARs) or the company operations manual. △

Recreational Aviation

Serge Beauchamp, Section Editor (E-mail: beauchs@tc.gc.ca)

Fibreglass in Amateur-built and Ultralight Aircraft

Fibreglass has been used in amateur-built aircraft for over forty years. Since the early 1980s, with the advent of modern aircraft designs such as the Vari EZ, Long EZ, the Cozy, the Velocity, the Glassair, the Seawind and many others, the use of fibreglass has become quite common. It is a composite material that is light, strong, somewhat flexible and can be shaped into many useful aircraft structures. It is made of two or more components: glass fibre (glass fibre reinforced plastic—GRP) and an epoxy or polyester resin. A catalyst is used to create the chemical reaction that will bond the two parts. Over time, composite parts are affected by cyclic variations in temperatures, weathering, rain, snow, moisture absorption, ultraviolet (UV) radiation and other factors. The initial methods and care of fabrication will influence the longevity of the part. Many believe that composite parts are free from maintenance, but this is not the case. Here are two stories that recount the importance of having an inspection schedule for these parts in order to ensure continuing airworthiness.

The amphibious amateur-built aircraft was made of fibreglass and had been sitting at a local airport for several years, when it was put up for sale. An aircraft mechanic purchased it, inspected the structure as best he could, made repairs, and put it up for re-sale. He soon found a buyer who was hoping that the amphibious abilities of the aircraft would allow him to fly from his home airport to the numerous good fishing spots that abounded in the northern region of Canada, where he lived. The aircraft was ferried successfully to the new owner's home-base where an inspection was carried out and the transaction completed. The new owner was given flight instructions and later went off by himself to do a fly-by. During this flight, one of the wings failed and the aircraft plummeted to the ground, killing him. Investigation by the Transportation Safety Board (TSB) revealed that one of the wing's integral fibreglass fuel tanks had delaminated and allowed fuel to seep through and weaken the wing spar to a point where failure occurred. This construction flaw had gone unnoticed for some time and the wing deteriorated and failed.

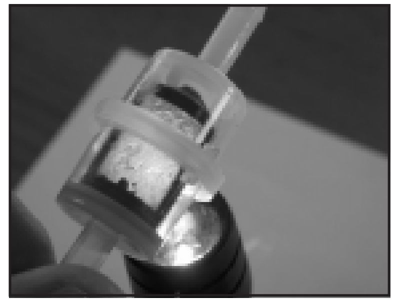
In another instance, two pilots were ferrying an amateur-built aircraft from their home strip to a nearby airport. The aircraft was of a design that had been around for over twenty years. The cabin and fuel cells were made of fibreglass and the wings were made of metal. Fifteen minutes into the flight, the engine failed and a forced landing was initiated on a provincial highway. There would not have been any damage if oncoming traffic had not compelled the pilot to veer off into a four-foot ditch. Fortunately, there were no casualties. In order to transport the aircraft, the wings were disassembled and it was noted that the cabin header tank was empty. A check of the fuel line of the wing tanks revealed that it was blocked. Blockage was found to be due to fibreglass debris in one of the fuel tanks. A vent pipe was also found blocked by a nest of mud wasps.

Fibreglass parts need care in order to ensure continued airworthiness in service. Your inspection schedule has to take into consideration these composite parts and if you are unsure of how to proceed, communicate with a licensed aircraft maintenance engineer (AME) for assistance. Be especially careful with fuel cells, which are an integral part of a wing structure, as wings flex and may increase the risk of delamination. Commercial airliners today are proof that the use of composites is very safe. They can represent up to 30% of the total weight of a commercial airliner. In helicopters, they represent 60–80% and in today's fighter aircraft, close to 50%. It is a very efficient material, but it needs care too. Inspect and repair, as necessary. Happy flight.

Jelly in the Fuel Filter Causes Engine Failures

The owner of a Challenger ultralight aircraft had used over 6 400 litres of a 50:1 mixture of Shell Gold Premium fuel and Quaker State TC W3 oil, without a problem. In January, he decided to use a new fuel mixture using synthetic instead of mineral oil in his Rotax 503 DCDI engine (dual carburetor and dual ignition). Immediately following this change, he experienced the first of several in-flight engine failures caused by fuel starvation. Inspection of the fuel filter revealed a gold coloured jelly-like substance blocking the screen of the Kimpex 07-245 filter. This prevented the fuel from reaching the carburetors. Fortunately, the engine failures did not result in a forced landing because the aircraft was equipped with a parallel electrical fuel delivery system that the pilot activated to restart his engine.

In subsequent flights, it was necessary to replace the filter four times because of repeated contamination by the jelly-like amber coloured substance. He noted that it was of a colour similar to the synthetic oil that he was using. In order to find the cause of this chemical substance, the pilot decided to do some experimenting on the ground. First, he had to determine that it would occur, so he set-up a 25-L Jerrycan of a 50:1 mixture of new fuel and oil identical to the one he used in flight. He installed a Kimpex filter and a length of clear 5/16-in. fuel line between another similar container. He transferred the mixture from one container to the other, using a 2-5 psi pump, in temperatures similar to those he encountered in flight; approximately -20°C. He obtained the same results, a significant presence of an amber-coloured goo or slime in the filter screen. He repeated the experiment several times. The manufacturer was asked to proceed with similar tests, but has been unable to reproduce the same results. The fuel filter blockage only occurred when the pilot switched from a mixture of fuel and mineral oil to one with synthetic oil.



Fuel suppliers modify the chemical constituents of their fuel from time to time to take into account the seasonal temperature fluctuations, regional use and the various octane-rating environmental factor requirements. Chemicals vary from one fuel and engine oil manufacturer to the next. The use of different fuel and oil may change the performance of your engine. In this case, the engine kept running until fuel flow to the carburetors stopped. The chemical reaction creating the substance seemed to have been occurring inside the fuel filter; more specifically within the fuel filter element walls. The filtering element itself seemed to have served as a catalyst. This is purely hypothetical, however, as we do not know the cause at this time.

As an aircraft owner, your responsibility is to ensure that the fuel and oil you use is of a type recommended and approved by your aircraft engine manufacturer. If any of you have experienced similar situations, we would like to hear from you. Please e-mail me at beauchs@tc.gc.ca. Thank you.

Improving Stall and Spin Awareness

General Aviation Advisory Circular (GAAC) 2003-04 was released on November 20, 2003 and its purpose is to advise flight instructors of the amendment to *Stall/Spin Awareness Guidance Notes*—TP 13747E. It is also intended to remind pilots of the importance of adhering to procedures for the spin manoeuvre recommended by manufacturers of training aircraft and Transport Canada.

Stall/Spin Awareness Guidance Notes—TP 13747E, 2nd Edition, revised October 2003, is a reference to help flight instructors teach stalls and spins as outlined in the *Flight Training Manual* (FTM) and the *Flight Instructor Guide* (FIG). The document encourages scenario-based training and includes advice to instructors to improve the learning of these exercises. The minimum altitude for spin recovery in Canada is 2 000 ft above ground level (AGL) or a height recommended by the manufacturer, whichever is greater.

Canadian Aviation Regulation (CAR) 602.27 states: "No person operating an aircraft shall conduct aerobatic manoeuvres […](d) below 2,000 feet AGL, except in accordance with a special flight operations certificate issued pursuant to section 603.02 or 603.67." Some training aircraft manufacturers have put forward conditional recommendations that suggest recovery at altitudes higher than those required by regulation. The majority of manufacturer's manuals are silent on the issue of spin entry altitudes.

Pilots are therefore reminded that selecting a safe spin entry altitude is the responsibility of the pilot-in-command (PIC). The entry altitude is not governed by regulation, but pilots must make this determination safely with the full knowledge of the aircraft capabilities under existing conditions of aircraft configuration, pilot skill and meteorological and human factors. Keeping always within the requirements of the pilot operating handbook (POH) or aircraft flight manual (AFM) and CAR 602.27, flight training unit (FTU) operators and flight instructors are encouraged to adopt and communicate procedures outlining the conduct of the spin exercise best suited for their aircraft, pilots and geographical location. To read this GAAC in full, go to www.tc.gc.ca/CivilAviation/general/circulars/menu.htm.

Taken from TSB and CADORS Files

The following excerpts are extracted from reports made available by the Transportation Safety Board of Canada (TSB) and the Canadian Aviation Daily Occurrence Reporting System (CADORS). Most occurred in 2002 and are reproduced here to respond to the need for ultralight and amateur-built aircraft pilots to familiarize themselves with the causes of accidents. The types of accidents reported here are by no means solely restricted to amateur-built or ultralight aircraft.

Pre-flight inspection should cover all of the major components: The pilot of an ARV-1 Golden Hawk ultralight aircraft reported that he was taxiing for takeoff and was provided with a remote airport advisory. A few minutes later, when queried by the controller as to his position, he reported that he had had an incident and that the aircraft had been damaged. During the take-off run the pilot lost control in wind and gust conditions reported at 15 to 20 kt. Investigation revealed that the landing gear had failed when it became loose and was displaced, causing a pivoting moment that led to the loss of control. When control was lost, the aircraft exited the runway and incurred damages to the landing gear, propeller and the wings. The landing gear had not been secured to the structure properly and had failed due to wear. Give your best during the pre-flight inspection. You never know when you will find that a major part is unairworthy.

Know your aircraft's limits of operations: The pilot of a C.A.D.I. ultralight aircraft was flying circuits when he encountered crosswind conditions that exceeded his ability to control the aircraft during the landing sequence. The wind was at 7 to 8 kt with gusts at 40 to 60° to the landing path. The aircraft swung to the left upon touching down, nosed over and was substantially damaged. The pilot sustained minor injuries. The failure to control an aircraft during landing accounts for a high percentage of accidents, especially in tail-wheel equipped aircraft. Adequate training and practice are the only solutions to ensure safe landings under crosswind conditions. In a similar occurrence, a pilot flying a Junior JK-05 advanced ultralight was doing circuits when he lost control on landing. The aircraft veered off the runway, into the grass area and sustained extensive damage. There were no injuries.

Foreign object damage (FOD) causes mishap: The pilot of a float-equipped Quad City Challenger II ultralight aircraft was on final approach to land when he found the controls difficult to operate. As he reached an altitude of approximately 200 ft above the water, the controls froze and he could not move them. The aircraft suddenly pitched forward and the tips of the floats struck the water and the aircraft flipped over. The pilot received minor injuries but the aircraft was heavily damaged. It is reported that a life jacket may have moved under the control mechanism during flight, jamming it and causing the crash. Always secure all equipment on board your aircraft.

Steep turns at low altitude are very dangerous: The pilot of a Nordic V ultralight aircraft was seen performing tight turns at low altitude. During a pull-up, followed by a steep turn, the aircraft stalled and fell to the ground. The pilot was fatally injured. Steep turns at low altitude should not be executed, as a stall can occur at a time when there is no room allowing for a safe recovery. This manoeuvre requires altitude and if it is insufficient when a stall occurs, disaster is likely to follow.

Wearing a shoulder harness can be a blessing: The pilot of a Quad City Challenger II ultralight aircraft was simulating a forced landing when the aircraft struck power lines, nosed over and crashed in a field. The pilot received serious injuries but the passenger was more fortunate and suffered only minor ones. They were both wearing the 4-point harness-type safety belt and it saved the day. The aircraft was substantially damaged.

Structural failure in flight leads to crash: The pilot and a passenger of a Bushmaster DM-3 ultra-light aircraft lost their lives when the airplane they were travelling in crashed into a field, following the loss of an aileron in flight. An observer on the ground saw a part fly off the aircraft before it impacted the ground. Structural failures are rare and can be eliminated through careful maintenance and inspections, including the application of sound pre-flight inspection principles and by limiting the parameters of operations to those prescribed by the manufacturer of the aircraft. Keep tabs of all maintenance carried out on your aircraft, as it constitutes a very inexpensive insurance policy that your family will appreciate. Knowing the time in service of major aircraft parts, as well as the date and name of the person who performed the last inspection on your aircraft will confirm that the maintenance schedule is indeed satisfied and that your aircraft is airworthy.

A stitch in time saves nine: The pilot of a Bushmaster ultralight aircraft was seriously injured when the aircraft sustained wing damage following an encounter with turbulence. As the pilot was making a precautionary approach to land, he observed that the stitching on the left wing was coming undone. The aircraft rocked from side to side and then spiralled to the ground. The wing had inflated to a point where the drag exceeded the thrust. Careful maintenance and inspection will help reduce the risk of failure and ensure safe flight.

Pre-take-off check is very important: The pilot of a Tierra II ultralight aircraft was on the take-off run when suddenly the left door became unlatched. The aircraft veered to the left and crashed adjacent to the runway. There were no injuries but the ultralight was substantially damaged. The pilot declared that he forgot to ensure that the door was properly latched before proceeding for takeoff. A checklist of items to verify during pre-flight, pre-start, pre-take-off and other phases of flight should be part of the aircraft's equipment and be used to ensure that all necessary checks are carried out in the proper sequence. This will certainly help reduce the risks of an accident.

Pre-take-off checklist should include the safety harness: The pilot of a powered parachute Adventure F2Q found himself at the end of his rope when, shortly after takeoff, he observed the harness straps, which were holding him to the craft, were coming undone. He immediately turned around and proceeded to land downwind, hanging on for dear life by the parachute lanyards. Control of the craft was very limited but nevertheless he was able to land. He suffered serious injury and the craft sustained significant damage. A pre-flight check of all the equipment would have reduced the risk of such an accident.

Pre-landing checklist can save the day: The pilot of an amphibious Challenger IIA ultralight aircraft had departed from a grass strip for a local flight. As he approached the lake for a water landing, the movement of motorboats along the intended landing path diverted his attention and he may have failed to check the position of the landing gear. As a result, the aircraft hit the water with the gear down and sustained serious damaged to the wings and structure, but remained upright. No one was hurt. Pre-landing checks are a must.

COPA Corner—How Much Gas Is Enough?

by Adam Hunt, Canadian Owners and Pilots Association (COPA)

Back in the 1970s, I used to rent a club aircraft that had a sticker on its instrument panel. In orange letters it said, *It is Dumb to Run Out of Gas.* There must have been a good reason for the club to have put that sticker there.

Every year, at least a few pilots fail to make it to their planned destination because they simply run out of fuel. Some of these aircraft make precautionary landings at other aerodromes, which is a good choice, while others end up in the trees, sometimes only a few miles short of destination.

Very few of these accidents seem to involve IFR aircraft, and almost none involve helicopters. Most of the accidents in this category involve VFR airplanes.

The rules for VFR airplanes are pretty straightforward. *Canadian Aviation Regulation* (CAR) 602.88 requires the pilot to start the flight with a fuel reserve of at least 30 minutes at normal cruise in the daytime, and 45 minutes if landing after dark. It also says that you can't change destinations in flight, unless you can still make that requirement. That CAR also says that you need to account for "taxiing and foreseeable delays prior to take-off," "meteorological conditions" (including winds), "foreseeable air traffic routings and traffic delays" and "any other foreseeable conditions that could delay the landing of the aircraft." Despite the rules covering just about every possible reason for doing so, they do not prevent people from running out of gas.

There seem to be many reasons for running out of fuel, but there are some consistent traps that can be avoided. One of these is that many light aircraft fuel gauges are famous for not being accurate enough to be relied upon. Quite simply, if you use light airplane fuel gauges alone to tell you whether you will make it to destination, you will run out of gas sooner or later.

One of the reasons that ultralights seem to be involved in very few fuel exhaustion accidents is that many of them have transparent fuel tanks that allow the pilot to see how much gas they have left while in flight.

Few certified aircraft offer that ability to actually see the amount of gas that is left. That means that the quantity has to be verified, usually by dipstick, before flight and then the clock used as the best indication of how much fuel is left.

Perhaps interpreting the rules themselves brings some pilots to grief. Most pilots will tell you that the CARs require "Fuel for destination plus 30 minutes by day." Actually, the CARs require you to carry fuel to get to destination, account for all possible changes in wind, weather, air traffic control (ATC) clearances and "any other foreseeable conditions that could delay the landing of the aircraft" and then "plus 30 minutes" of fuel in daytime. Just carrying "destination plus 30 minutes" is not enough fuel to be safe every time.

Many prudent light airplane pilots add an automatic reserve of at least one hour. That means with five hours of gas on board (and verified by dipstick), the trip, including possible winds and other delays, cannot add up to more than four hours. If it does, you need an intermediate stop.

By always physically verifying the amount of fuel on board ("dipping the tanks"), and never planning to use the last hour of gas on board, many fuel exhaustion accidents can be avoided.

Local Area Weather Manuals

by Bob Robichaud, Meteorological Service of Canada

"Highly recommended reading," that's what the author of an article in issue 2/97 of the *Aviation Safety Letter* (ASL) had to say about the Meteorological Service of Canada's (MSC) publication called *Aviation Weather Hazards of British Columbia and the Yukon*. Therefore, it is fitting that when MSC was approached by NAV CANADA to document and publish local aviation weather across the country, they used this publication as a model.

When NAV CANADA announced a new approach to delivering aviation weather briefings by centralizing flight-briefing services, one of the users' concerns was the possible loss of local area knowledge. To ensure that this type of information was systematically captured and retained, NAV CANADA started the Local Area Knowledge Project (LAKP) and contracted the MSC to produce a series of weather manuals to document this local knowledge. A series of six manuals have been published, each corresponding to a specific graphic area forecast (GFA) domain, with the exception of *The Weather of Nunavut and the Arctic*, which covers two GFA domains.

The most critical component to the project was the interview process. To conduct these interviews, MSC meteorologists traveled across the country and sat down with pilots and other aviation professionals to discuss local weather. The meteorologists would ask the pilots to indicate where they would routinely encounter elements such as low cloud, restricted visibility, turbulence, icing, strong winds and other aviation weather hazards. Reference was made to different seasons and various types of synoptic situations. To supplement the forecasters' notes, pilots were urged to actually draw on navigation charts to accurately show where hazards were encountered. Although the main focus was "Seasonal Weather and Local Effects," several other interesting sections were added to supplement the manual, including "Basics of Meteorology," "Aviation Weather Hazards," "Weather Patterns," and "Airport Climatology."

Here is an excerpt from *The Weather of Atlantic Canada and Eastern Quebec*: "Cape Breton often experiences some of the worst turbulence encountered in the Maritime Provinces. […] Southeast winds ahead of low pressure systems will be quite violent here, due to mountain waves. […] They occur near Chéticamp and extend out to about 3 miles from the mountain peak. Here severe turbulence, downdrafts […] and wind speeds as much as double those of surrounding areas can be expected. The downdrafts on the northwest side of the mountains will hit the water and flow outward, much like microbursts, producing patterns on the water that are readily seen from the air. Local pilots call these patterns "cat tracks" or "cat paws"."

The production of these aviation weather manuals should prove to be beneficial to pilots, flight service specialists, meteorologists, and flight dispatchers alike. They can be downloaded free of charge from the NAV CANADA Web site at www.navcanada.ca, under flight planning, local area weather manuals. △

ATAC Recognition Awards

by Glenn Priestley, Vice-President, Fixed Wing Air Taxi and Flight Training, Air Transport Association of Canada (ATAC)

To celebrate the millennium, ATAC established an annual award series to better profile and applaud innovation and professionalism within commercial general aviation and flight training. Past winners include: Coastal Pacific Aviation, for pioneering partnered diploma training; Moncton Flight College, for its integrated instructor training; Toronto Airways, for innovative partnering on simulation with Flying Colours; Harv's Air Service, for developing online ground school and marketing applications; and *le Centre Québecois de Formation Aéronautique,* for developing online advanced training systems.

The *Human Resources Study of Commercial Pilots in Canada*, released in 2001, recognized the value of positive initiatives to support good efforts. There is a cadre of professional aviation business people and instructors in Canada, whose dedication has had a positive influence on society in Canada, and these committed individuals deserve to be recognized. The Innovation Awards were renamed the "**ATAC President Awards**" in 2002, and are given to a company or individual that has been recognized as a leader in improving instructional techniques within their training facilities, or has developed a support program for their instructing staff that improves overall system safety. Examples of this recognition include Dennis Cooper of Sky Wings Aviation, for developing outreach programs that promote aviation to public schools, and Tom Lawson of Empire Aviation, for incorporating ISO 9001 standards for flight training.

The "**David Charles Abramson Memorial Flight Instructor Safety Award**" was introduced at the 2003 ATAC Annual General Meeting in Québec City. It recognizes a flight instructor who has made a significant contribution to aviation safety in Canada. This award was established by the Abramson family to honour the memory of their son who was a truly dedicated flight instructor, and who gave greatly to others in life. To qualify for this award, the applicant must possess superior teaching skills, outstanding leadership qualities, and demonstrate an unusually high level of performance through their accomplishments and devotion for the advancement of aviation safety. The 2003 inaugural recipient is Mr. Aaron Speer who instructs at Ottawa Aviation Services.

For more information on ATAC Awards and the nomination process, please contact ATAC at 613 233-7727 ext. 309 or e-mail glennp@atac.ca. △

I Have Seen The Eyes of Death—Part 2

by Dr. John Albrecht. Continued from "I Have Seen The Eyes of Death—Part 1," published in Aviation Safety Letter *2/2004.*

Understanding spatial disorientation and the human frailties that contribute to this seductive siren are essential to a pilot's longevity. Three senses interact to keep us upright, feet firmly planted on terra firma: vision, proprioception (pressure sensing organs in the skin and joints), and vestibular (balance apparatus in the inner ear called the semicircular canals). Once airborne, the rules change dramatically with the two fallible senses, proprioception and vestibular, being negated. Vision rules supreme as the only reliable orientation sense once the aircraft abandons the earth's surface. Remove the natural horizon, ignore attitude instruments and your lifespan is reduced to an average of three terror-filled minutes!

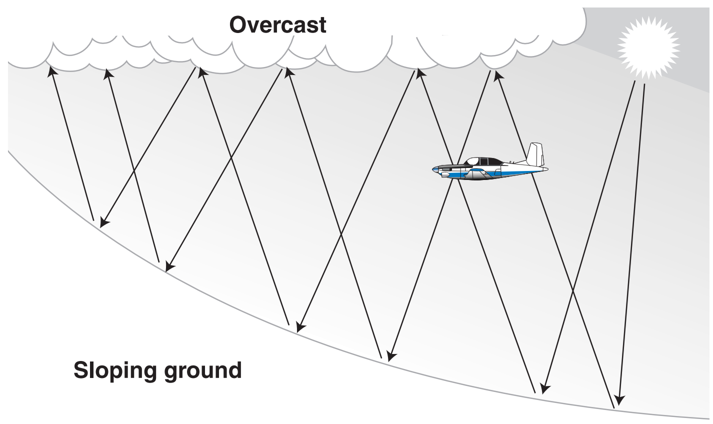
There are certain natural phenomena and emergency situations that may deprive a pilot of their vision. The brilliance of the low setting sun can temporarily blind a pilot as they flare to land. A windscreen covered with ice or oil from a failed engine can severely restrict visibility. Smoke in the cockpit can have serious consequences. Even sweat and suntan lotion can lead to temporary visual loss. A direct bird strike on the windscreen can result in catastrophic visual impairment with plexiglass fragments, blood and feathers. Vision and aircraft control go hand in hand.

Pilots should be aware that spatial disorientation may occur in three distinct forms—each just as seductive and deadly. Unrecognized spatial disorientation (Type I) describes a situation wherein the pilot is disoriented, but is unaware and controls the aircraft using false sensory information. This may occur in visual or instrument conditions. Visual illusions are the most common factor contributing to Type I accidents. The pilot misinterprets what the eyes see, often with deadly consequences. Many of us have experienced visual illusions in our automobiles, such as jamming the brakes at an intersection as our vehicle starts to roll backward. The reality is the adjacent car is edging forward. Our interpretation and reaction are in error. In a carwash, the sensation is one of a stationary vehicle and moving brushes, when the reverse is true.

Visual illusions encountered in flight deserve special consideration to increase awareness and avoidance. Heavy rain causes light refraction. This can lead to approaching obstacles appearing lower than they actually are. The potential risk is a controlled flight into terrain (CFIT) accident or undershooting the approach in a heavy rain shower. Night flying has its perks, but the risk of disorientation with these illusions is much greater.

Float flying can be a risky business, and one of the reasons for this is the alluring tranquillity of glassy water conditions. Float planes frequently approach to land, fail to flare, dig a float or the nose and flip inverted. The reason is spatial disorientation due to visual illusion. If you have ever walked nose-first into a spotless plate glass door or window, you have experienced the shock and unpredictability of glassy water.

Under certain conditions of diverse light refraction and terrain absorption, IFR conditions prevail even though ceiling and visibilities are well in the VFR domain. The result is an indiscernible horizon and/or lack of ground shadows or contrast, known as whiteout. Accidents are often of the CFIT variety, and can involve highly experienced crews.



Example of sector whiteout conditions.

Type II, or recognized spatial disorientation, is when the pilot is disoriented and aware of the fact, but for reason of lack of instrument proficiency or vestibular (inner ear) or proprioceptive (seat of the pants) illusions, is unable to believe the attitude instruments. Once in instrument conditions, the VFR pilot does not have the training or discipline to cope with loss of the natural horizon, and smooth transition to instrument flight is most unlikely.

Acceleration without monitoring the attitude instruments gives an illusion of the nose pitching up. The pilot compensates by pitching the nose down, a very dangerous reaction when taking off on a dark featureless night. The end result can be an aircraft impacting terrain on takeoff for no apparent reason. With deceleration, the process is reversed with the illusion of the nose pitching down and the pilot reacting by raising the nose of an already slowing aircraft; a setup for a stall and spin in instrument meteorological conditions (IMC).

Type III spatial disorientation, or vestibulo-ocular disorganization, is fortunately a rare variation. In this type, the pilot is aware of the disorientation, but is unable to control the aircraft because reflex eye movements prevent instrument interpretation. Chances of survival are remote. The sensations of this type can be mimicked by rolling down a grassy hill. The resulting intense vertigo (spinning) makes walking a straight line impossible. Controlling an aircraft would be out of the question!

Type III spatial disorientation can also be induced by the pilot in-flight. This condition is called the coriolis effect. It results from simultaneous stimulation of two or more of the semicircular canals in the inner ear. This can occur in IMC when the pilot initiates a turn and simultaneously looks up or down with head movement. The stimuli to the brain are overpowering and produce a tumbling sensation. Rapid reflex movements of the eyes (nystagmus) make instrument interpretation and aircraft control impossible. Prevention comes with a disciplined instrument scan—eye movement only. By holding the head still, only one set of semicircular canals is stimulated by the rolling movement of the aircraft. Vertigo and nystagmus are averted.

It is quite possible that more than one type of disorientation come into play in an accident. A pilot suffering from unrecognized spatial disorientation (Type I) may receive an altitude alert from a vigilant air traffic controller. Distraction or fixation may result in progression to recognized (Type II) disorientation as instrument skill deteriorates. Over-controlling the aircraft and sudden head movement in search for the elusive runway environment may induce the coriolis effect (Type III). The odds of survival in this escalating scenario would be close to nil!

Several factors can contribute to the likelihood of a pilot becoming spatially disoriented. There is usually an element of surprise and unpreparedness as the VFR pilot stumbles into instrument conditions. Anxiety can rapidly escalate to a panic state when the outside world disappears. With panic goes any semblance of problem solving, which is key to survival.

VFR flight into IMC having such a high fatality rate, insight, avoidance and prevention are key to longevity in aviation as a recreational pastime or career. Weather smarts, with sound decision making, in the go/no go scenario are critical survival tools. A VFR pilot receiving a briefing of marginal VFR or IFR conditions for the intended route, or an en-route update of unforecast deterioration at destination, is well advised to stay on the ground or press plan B into action.

"Get-home-itis" is a term that often comes into play with spatial disorientation accidents. It refers to the psychological pressure perceived by the pilot, whenever there is a seemingly urgent need to complete a flight for personal or business reasons. The next link in the accident chain is this statement: "Let's take off and have a look, we can always come back to the airport." Once airborne, IMC may be encountered in the climb out and the safe sanctuary of the departure runway vanishes.

When I obtained my private pilot's licence, instrument flying was not included in the syllabus. Now it is, as well as with the night rating and commercial licence. This experience provides the pilot with the ability to fly straight and level, recover from unusual attitudes, turn 180° and perhaps penetrate a thin cloud layer—that's it! This skill is maximal at the time of the flight test and rapidly deteriorates thereafter if not practiced.

A current instrument rating is good insurance against a disorientation accident, but not a guarantee. Several scenarios come to mind of IFR drivers coming to grief. A typical example is a non-precision approach with circling procedure. During the circle to land, visual reference is lost but the pilot pushes on in low-level IMC rather than carrying out the missed approach procedure. On an IFR flight test, there are several critical safety checks which, if omitted, will result in automatic failure. In the real world of IMC, similar omissions can have dire consequences!

During my years as an Aviation Medical Examiner, I have heard some fascinating anecdotes. One private pilot en route to Tofino, British Columbia, inadvertently entered a band of cumulus clouds near Nanaimo, B.C. After a roller-coaster ride of terror lasting close to 45 min, he and his passengers were spit out near Courtenay, B.C., a little older and infinitely wiser!

The real champion was a student pilot flying out of Bellingham, Washington. He was climbing out on a solo VFR flight to Oregon. Just above circuit altitude, he entered cloud. Aware of the risk of adjacent hills, he elected to climb. At 4 000 ft, he broke out into brilliant sunshine, in an extreme banked attitude. After regaining control and his composure, he notified Bellingham Tower of his predicament. Cloud below as far as the eye could see! After orbiting for several minutes, he was handed off to Vancouver air traffic control (ATC). A calm voice provided radar vectors northward along the invisible coastline. At a break in the cloud, he transmitted his intention to descend, but was advised against this by ATC, as airliners were passing below cloaked in cloud. Eventually, he was guided to a cloud break over the Strait of Georgia and authorized to shuttle down below the overcast. He then navigated VFR back to Bellingham for an uneventful landing. Survival is possible, as demonstrated by this fortunate young pilot. He did everything right and did not lose control of his aircraft, despite a prolonged climb in total instrument conditions.

Readers interested in the full, unedited version of Dr. Albrecht's article can e-mail the editor. —Ed. △

Transborder Flights Without a Flight Plan

by Michel Paré, Civil Aviation Safety Inspector, Regulatory Services, Transport Canada

Transport Canada was recently apprised of frequent occurrences in the Pacific and Atlantic Regions concerning transborder flights without a flight plan being filed or activated.

Regulatory requirements are specific. *Canadian Aviation Regulation* (CAR) 602.73(4) reads: "Notwithstanding anything in this Division, no pilot-in-command shall, unless a flight plan has been filed, operate an aircraft between Canada and a foreign state." U.S. *Federal Aviation Regulation* (FAR) 91.707 reads: "Unless otherwise authorized by ATC, no person may operate a civil aircraft between Mexico or Canada and the United States without filing an IFR or VFR flight plan, as appropriate."

Three additional sources offer various levels of hands-on information on the topic: the *Aeronautical Information Publication Canada* (A.I.P. Canada), the *Canada Flight Supplement* (CFS), and the Federal Aviation Administration (FAA) *International Flight Information Manual*. Here is a short summary of their content, and some of their shortcomings:

- A.I.P. Canada RAC sections 3.6.1 to 3.6.4 specify when a flight plan is required, how it can be filed, and the means by which it can be opened. References to appropriate CARs are listed.
- The CFS does include information on how to file a flight plan and how to file an arrival report, but not how to open a flight plan.
- The FAA *International Flight Information Manual*, *Flight Planning Notes* section, provides specific information on the purpose of international flight plans, and the filing process. However, no information could be found concerning how to open and close international flight plans.

On the subject of flight plan requirements for transborder flights, some 82 alleged violations were registered nationally over the past two years; about 20 from the Atlantic Region, and the vast majority from the Pacific Region. Possibly using different search criteria, a Civil Aviation Daily Occurrence Reporting System (CADORS) search extracted 76 similar occurrences between September 2000 and September 2003. These flights had originated in the United States and at least 70% had landed within the Pacific Region. However, it is important to note that in most cases, customs arrangements were made for the flight. Therefore, it is fair to say a lack of awareness of transborder regulatory and/or technical (i.e. opening/closing) requirements seems to prevail in the general aviation community, and especially so in the United States.

Occurrences are frequent enough, and do not yet show an appreciable downward trend. Valuable enforcement resources are tied up investigating a large number of cases while enforcing regulations that have a minimal impact on aviation safety (although the activation of an alerting service constitutes an important safety feature of a flight plan).

The aim of this article is to inform Canadian pilots of this concern in order to cut down the number of occurrences of this type. However, since a large proportion of these violations are committed by American aircraft entering Canadian airspace, Transport Canada plans to communicate with its FAA counterparts in order to disseminate this important message to the American pilot population. △

VFR En-route Altitude

by Daniel Morissette. This article is an authorized translation of an article originally published in the January-February 2004 issue of the magazine Aviation Québec.

When giving taxi clearance at a controlled airport, the ground controller often asks what the altitude in flight or the initial altitude in flight will be. Once in flight, and out of the area, the pilot will request, on occasion, to change their cruising altitude.

The pilot may choose their VFR altitude, depending on if they remain in the appropriate class of airspace, notwithstanding the *Canadian Aviation Regulations* (CARs).

The VFR pilot is responsible for choosing an appropriate altitude for their flight. Air traffic control (ATC) may impose certain restrictions in certain airspaces, for example, in a control area. Example: "No higher than…no lower than…" Specific altitudes will be assigned or approved in a class C airspace for improved safety, and to facilitate the exchange and flow of traffic.

Why does the controller want to know your cruising altitude when you are taxiing? They really want to know your intentions so that they can plan their traffic. If you would like to climb to 6 500 ft, they may anticipate a potential conflict with an aircraft arriving on landing. They could order the arriving aircraft to enter the control area at 3 000 ft or higher, and order you to not climb higher than 2 500 ft in the area, until the two aircraft are able to see each other, or until they have passed each other. However, if you would like to fly at only 1 500 ft, the controller's strategy will surely be different.

In VFR flight, outside class C or D airspaces—that is to say in class E or G airspace—you do not require clearance, but must comply with visual flight rules and the CARs on cruising altitudes (see CAR 602.34). However, if you would like to continue with radar surveillance while it is still available, advise the controller of your changes in altitude, and remain on the frequency until you are advised that the radar surveillance is ending, or you advise the controller that you no longer require the service. It has happened in the past that a pilot calls the area control centre (ACC) for radar surveillance and, after having been identified by the controller, leaves the frequency without warning the controller, and never calling back. In this case, the controller was trying in vain to inform the pilot of traffic.

Once you are out of the control area and/or in class C or D airspace, your altitude is at your discretion. It is the pilot's responsibility, if not using radar surveillance, to advise their intentions and changes in altitude on the appropriate frequencies. △

Pilots and Weather

Dear Editor,

I am a dedicated ASL reader and the reason I am writing is to express my concerns regarding inexperienced pilots who choose to depart on a flight in very poor weather. I have experience as a search and rescue (SAR) pilot, a flight safety officer, and a ground school instructor. Accidents published in the ASL seem to be primarily human-error related (typically 80% at fault); however, weather also seems to play a large role. While teaching ground school, I realized that a significant percentage of pilots have a very poor grasp of weather theory, and also a poor ability to decode the multitudes of weather charts, forecasts, etc. The biggest concern that I am seeing, however, is the inability of many pilots to take all the weather data and make a meaningful mental picture of the weather along a proposed route. For example, how fronts and air masses affect stability, icing, turbulence, winds, etc. How are these variables accounted for in the graphic area forecasts (GFA), aerodrome forecasts (TAF), etc? Are the METARs supporting the TAFs and GFAs? What would the weather be along the route of flight and at the proposed altitude? Where are the outs?

As a SAR pilot, I have been tasked to search for a number of overdue aircraft. I was authorized to carry out a search over land with weather limits of 700 ft AGL and 1 SM visibility and over water in 500 ft and 1 SM. These limits are quite low but we had the benefit of multi-engine and automated aircraft, with a highly experienced crew. Why were my weather limits higher than the weather limits of certain pilots who have few hours of flight experience, in a single-engine aircraft, and a poor grasp of weather? Millions of dollars are spent searching for overdue aircraft, in many cases because a pilot made a bad decision to fly in weather that was forecast to be below legal limits or beyond their limits. Why are pilots taking this risk?

Most flying schools are teaching pilots to decode GFAs, TAFs, and METARs, but in my opinion this is not enough. Pilots need to understand the forecast weather as it would look multi-dimensionally, and that's what I tried to impress upon them when teaching weather. I then encouraged them to use sound pilot decision-making skills in making their weather decisions. To improve weather knowledge, I believe Transport Canada should raise the bar significantly in terms of weather knowledge, both for "*ab initio*" training and for re-currency.

If in-depth and permanent weather knowledge for pilots is not universally addressed, we are likely to keep spending millions searching for overdue aircraft that departed in poor weather. Perhaps NAV CANADA personnel should be given enforcement abilities to stop pilots from filing flight plans if the weather is below limits. Why can a flight service station (FSS) specialist brief a visual flight rules (VFR) rated pilot on the weather along a proposed route, which is known to be below visual meteorological conditions (VMC), and also enter a VFR flight plan into the computer? The system has no "teeth." Is this occurring? Yes! It is depressing to think that loss of life could be prevented time and time again, if pilots only made better decisions. Of course, millions of dollars of taxpayers' money would also be saved.

Name withheld on request

Slow for Thunderstorms...

Dear Editor,

Your letter is always interesting reading prior to the joy of updating my *A.I.P. Canada* (AIP). One item was evidently missed in your primer for thunderstorms in the "*Take Five*" feature of ASL 3/2003. The most important action to take if one is unable to avoid flying into a cumulonimbus (CB) is to slow down. This means to fly below the manoeuvring speed for the airplane at its current loading. This requires a knowledge and understanding of V_a [design manoeuvring speed] and its implications. Also, lowering the gear in a retractable will help stabilize the A/C [aircraft], although this action must be weighed against the additional surface for ice build-up if icing conditions exist. Having had a few unplanned encounters myself with CBs, I wonder if I would still be around if I had not applied the knowledge relative to V_a? Pilots also need to be reminded that the placarded value for Va is for gross weight and that the speed diminishes for lower indicated airspeeds. Having given well over 6 500 hr of instruction, I can state that V_a is still not well understood amongst many pilots.

D.S. Cowan
Kenmore, WA

Thank you D.S. The AIP, AIR section 2.7 covers inadvertent flight through thunderstorms quite nicely and indicates that you should set the power settings for turbulence penetration airspeed recommended in your aircraft manual. Some publications do not use the term V_a, as it is considered that understanding of the words "turbulence penetration airspeed" (shown in the aircraft manual) is more important at the early stages of training than learning V speeds. —Ed.

Erratum—ASL 2/2004

An editorial mistake occurred in the article "When Things Aren't..." on page 1 of ASL 2/2004. The third sentence of paragraph 1, which ends with "...killing all onboard." should have read "...killing 83 of the 179 on board."

One Phone Call Away

Have you ever wondered what was in that FedEx® box which remained unopened for four years by a normally zealous but now stranded FedEx® manager, Chuck Noland (i.e. Tom Hanks), in the movie *Castaway*? My guess has always been that it was a new world-coverage satellite phone with fully charged batteries, user's manual and a couple weeks worth of granola bars. If only...

Like other technologies, satellite phones have improved, are more accessible, more affordable and more reliable. They are not inexpensive by any means, but for the serious flyers who like to venture far away from urban centers, they provide phone coverage that a standard cellular phone can't match.

A coroner's inquiry into the crash of a Cessna 172 near Fort Good Hope, Northwest Territories on December 31, 2001 (see ASL 4/2003, page 4) recommended that all pilots operating in the North and in remote areas carry satellite phones. Not all northern pilots may need to carry satellite phones in all situations, but where communications are limited, and in the event of an emergency, we do encourage the practice of carrying a satellite phone or other means of communication that function independent of the aircraft's electrical systems. The January-February 2004 issue of the magazine *La Brousse* had a very good article on this topic, where author and pilot Claude Laplante recounted the time last summer when his investment into a satellite phone paid huge dividends. A a matter of fact, it most assuredly saved his life and the life of his flying partner.

On August 17, 2003, Mr. Laplante and a friend were flying in Northern Labrador in his Cessna 172 on floats, exploring fjords and lakes, and planning to meet two more friends in a separate aircraft at a rendez-vous point for a few days of camping and flying. Having arrived early at the rendez-vous point, Mr. Laplante and his friend decided to fly 10 to 12 mi. further north to Kangalaksiorvik Lake, to film known wildlife at that location. They landed safely on the lake and spent a half-hour filming seals and other wildlife. Unfortunately for them, the wind started to pick-up significantly, and the waves were causing some serious handling difficulties. While attempting to manoeuvre the aircraft back into wind for departure, a float dug in, and in very short order, the aircraft had overturned in shallow water, giving them just enough time to exit and inflate their life jackets.

However, Mr. Laplante's first reaction while leaving the cabin was to ensure he had the sealed yellow plastic case, which held his satellite phone. The water depth was about 7 ft, so they were able to sit on the inverted floats. The winds were strong, the water was cold and their clothes were wet, causing them to shiver seriously even though it was August. Mr. Laplante did not lose a minute, and called for help. He first called a reliable friend to raise the alarm, and he followed immediately by calling the Rescue Coordination Center (RCC), in Trenton, Ontario; a couple thousand miles away—direct dialed! He spoke to a French-speaking operator at the RCC who assured him that his friend had already notified them and help was on the way. A rescue aircraft landed 4 hr later, within daylight, and they were flown to warmth and safety.

"What a relief to know that help is on the way," Mr. Laplante would say later. With the aircraft underwater, strong winds, very cold water and hypothermia looming, who knows how long it would take for their friends to find them, if ever. They would later learn that their friends also had a mishap earlier in the day and had not made the rendez-vous point either… Mr. Laplante is quite sure that without his satellite phone, he and his friend would no longer be with us. His satellite phone is not for sale at any price.

This story is inspired by an original article by Claude Laplante, titled "Assurance-vie par téléphone satellite" (Satellite Phone Life Insurance) published in the January-February 2004 issue of La Brousse *magazine. This adaptation is published with permission. Private pilots and operators are encouraged to learn more about satellite phones by researching this subject through reputable pilot supplies shops, outdoors outfitters and on the Internet. —Ed.*

TAKE FIVE...

for safety

Five minutes reading could save your life !

Let's Stop UNSARs!!!

Canada's search and rescue (SAR) crews are amongst the finest in the world. Together, they save hundreds of lives each year in the difficult and demanding role of rescuer.

An "UNSAR" is an unnecessary search and rescue alert. When our rescuers respond to UNSARs from emergency locator transmitters (ELT), personal locator beacons (PLB), and emergency position-indicating radio beacons (EPIRB), there is a cost to Canadian taxpayers; however, more importantly, rescue crews are diverted away from real emergencies while endangering their own lives when responding to false alarms in difficult weather conditions. Fortunately, most of these false alarms can be avoided. Owners are strongly encouraged to ensure their device is in good working condition and proper maintenance is carried out to avoid inadvertent transmission. Your emergency beacon should be readily available and functioning properly when you really need it—during an actual emergency! Some examples of UNSARs include:

- Over 18 hours spent by CASARA and Industry Canada inspectors locating an Aeronca parked in a hangar. The ELT had been accidentally activated.
- 6.8 hours spent by a Canadian Forces Hercules aircraft in locating a helicopter whose ELT was activated during maintenance.
- 4.2 hours of Canadian Forces time to locate an ELT in a courier truck. The ELT had been shipped for maintenance armed and with the batteries in place.

To put the wasted resources into perspective, approximate total operating costs for various military SAR aircraft run anywhere from $3,000 to $5,000 per hour and per aircraft type…no chump change by anyone's standards. Of course, this does not include all the smaller CASARA aircraft.

You can help minimize this number and amount of time spent dealing with those incidents by:

- Making sure the ELT is part of your pre-flight check:
  - Secure, free of corrosion and antenna connections are secure
  - Armed
  - Batteries are current
  - Listen on 121.5 to ensure the ELT isn't transmitting
- After landing—as part of your post-flight routine:
  - Listen on 121.5 to make sure you did not set off the ELT with that bounce on landing.
  - Turn your ELT function switch to "OFF" if practical.

If your ELT does go off accidentally, let an air traffic service (ATS) unit or JRCC know, advising them of the ELT location and how long it was activated. This may prevent the unnecessary launch of search aircraft. Just turning your ELT off without telling anyone will leave SAR officials in doubt about the incident and whether or not the search should continue.

Any testing of an ELT must only be conducted during the first 5 minutes of any UTC hour and restricted in duration to not more than 5 seconds. When shipping your ELT for maintenance, turn the ELT function switch to "OFF" and remove the batteries, if possible. Finally, take a few more minutes to review the *A.I.P. Canada SAR* 3.0—Emergency Locator Transmitter.

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Aircraft/Vehicle Conflict

"*Golf-Alpha-Bravo-Charlie cleared to land Runway 05, caution maintenance crew on Taxiway Alpha, 100 ft from Runway 05.*"

A basic requirement for all pilots, air traffic controllers, flight service specialists, airport managers and airside vehicle operators is an ability to make decisions and exercise sound judgment.

Aircraft/vehicle conflict is a major concern to everyone at both controlled and uncontrolled airports. The increase in frequency and the potential for damaged equipment, serious injury, or loss of life is too great to ignore.

What can you do?

Pilots

- Report position and intentions on appropriate frequencies.
- Acknowledge or readback instructions using proper phraseology.
- Ensure you understand instructions; don't assume.
- Read back all hold, or crossing instructions.
- Ensure flight path is, and will remain, clear before taking off or landing.
- If in doubt—hold your position or go around, as applicable.
- Expect the unexpected.

Air Traffic Controllers, Flight Service Specialists

- Give clear and concise instructions/advisory to vehicle and aircraft.
- Use proper phraseology.
- Advise aircraft and vehicles early of any possible conflict.
- Remind pilot and vehicle operator often of potential conflict.
- Repeat information as often as necessary to ensure it is understood.
- Implement a system to remind yourself of the locations and intentions of all traffic.
- Remember—Safety takes priority over operational convenience.

Vehicle Operators

- Know aircraft control procedures and approved areas for vehicle movement.
- Ensure you have the authority to operate a vehicle on the airside of the airport.
- Ensure aircraft manoeuvring areas are free of potential conflict before entering.
- Keep a visual look out as well as monitoring the radio and communicate often with ATC/FSS.
- Read back all hold short instructions.
- If in doubt about an instruction or radio transmission, request, "Say again."
- Check an area prior to entering your vehicle to ensure a more complete, unobstructed view.
- Ensure your rotating lights and other safety equipment are functioning.
- Vacate the runway immediately if an aircraft is observed or reported in the circuit.
- Remember aircraft are not very manoeuvrable and the pilot's visibility is limited, as is the controller's and flight service specialist's.

Airport Managers

- Review and revise training plan for vehicle operators, as required.
- Ensure all operators are properly trained and kept aware of changes to procedures.
- Check security gates often to ensure only authorized vehicles and personnel have access to airside.
- Check runway and taxiway signs to ensure adequacy and visibility.