Transport Canada Transports Canada

Aviation Safety Letter

Learn from the mistakes of others and avoid making them yourself . . . **Issue 3/2000**

Spatial Disorientation at Night

On December 15, 1998, a pilot and passenger departed Shearwater, Nova Scotia, at 18:43 local time in a Cessna 172 on a night visual flight rules (NVFR) flight to the Liverpool airport for a touch-and-go before a return to Shearwater. About 2 hours after departure, an emergency locator transmitter (ELT) signal was reported and a search was initiated. The wreckage was found the next day. The aircraft had crashed in heavily wooded terrain 2 NM west of the Liverpool airport. The 2 occupants were fatally injured, and the aircraft was destroyed. This synopsis is based on the Transportation Safety Board of Canada (TSB) Final Report A98A0184.

This was a time-building flight in preparation for the pilot's upcoming commercial flight test. The aircraft was equipped with an altitude reporting transponder, and a review of the radar data indicated that the aircraft approached the Liverpool airport from the east, turned south across Runway 25/07 and joined the circuit for Runway 25. The aircraft disappeared from radar at 1100 ft above sea level (ASL) while on final to Runway 25 and reappeared on radar at the same altitude just west of the airport 1 min and 27 seconds later; radar coverage continued for another 47 seconds. During this phase, the aircraft climbed to 1300 ft, levelled off, and then descended to 1100 ft ASL before disappearing from radar.

The pilot was issued his night endorsement in July 1998 and, at the time of the occurrence, had about 187 hr. total flight time. He had recently flown to the Liverpool airport on four occasions. Three of the flights were conducted at night with either an instructor or another pilot on board; the accident flight was the first night flight without another pilot on board. The pilot flew with his instructor on the morning of the occurrence, and slept several hours in the afternoon before returning to the Shearwater airport for the night flight.

At the time of the occurrence, the Liverpool area was under clear skies with no restrictions to

visibility and no possibility of icing at lower levels. The moon was below the horizon at the time of the accident, and pilot reports indicated that dark-sky conditions existed; there would have been fewer visual cues than there would have been during his previous flights to Liverpool. A local resident, who had frequency-scanning equipment for recreational purposes, heard the pilot transmit his intentions and said that there was no inflection in the pilot's voice to suggest he was experiencing difficulty.

The aircraft descended into trees about 2 NM beyond the departure end of Runway 25, on a magnetic heading of 270°. The aircraft was in a wings-level, 30° descent angle when it struck the trees. Propeller strike marks on trees along the wreckage trail were consistent with the propeller being powered at impact. The flaps were in the retracted position. The elevator trim tab position was consistent with a slight nose-down trim setting, normal for final approach for a touch-and-go landing. The engine was examined and there was no indication of a pre-impact mechanical failure.

TP 185E
ISSN 0709-8103

Canada

All undamaged light bulbs were examined by the TSB. The light bulbs for the aircraft's overhead instrument flood light, cabin dome light, compass light, and tail navigation light were retrieved from the wreckage. With the exception of those for the dome light, these bulbs would normally be illuminated during a night flight. The analysis determined that the instrument flood light bulb was illuminated at impact. The remaining lamps were either off at impact or had not received sufficient force to distort the filament.

The TSB conducted a representative night flight to the Liverpool airport in a rented Cessna 172 at a time when light and sky conditions were similar to those of the occurrence night. The purpose was to identify the visual references available to a pilot when flying a Runway 25 approach and departure/go-around. The airport is located in a sparsely populated area where there is little peripheral lighting. The runway lights were observed clearly on approach and during the go-around phase, and the aircraft passed over a road about 1.5 mi. west of the airport, where there was some street lighting in an area of houses. Beyond the road there were few external visual cues, and the horizon was not easily discernable. The TSB flight was recorded on radar, allowing a comparison of the radar data for the occurrence flight and the TSB flight. The TSB flight included four approaches to Runway 25, with two touch-and-go landings and two go-arounds. A comparison of elapsed time during a touch-and-go versus a go-around indicated that the pilot of the occurrence flight had conducted a go-around.

The most accurate sensory information available to a pilot about aircraft attitude and motion are the visual cues provided by the earth's horizon, the aircraft's flight instruments, or both. When this information is not available, such as when the horizon is obscured by darkness or weather, or when the pilot's attention is distracted from the attitude instruments for a short time, the pilot's sense of orientation may be taken over by the inner ear, a very inaccurate source of sensory information during flight. Spatial disorientation occurs when a pilot's sense or "orientation percept" of the position, motion, or attitude of his/her aircraft or himself/herself with respect to the earth's surface and the gravitational vertical is based on incorrect or misinterpreted sensory information. Pilots with limited instrument flight time are most susceptible to spatial disorientation.

One form of spatial disorientation is the *false climb illusion*. This illusion can occur during acceleration when a pilot loses or is uncertain of visual references and relies on the inner ear rather than on the instruments. Because the inner ear cannot distinguish between gravity and horizontal acceleration, forward acceleration can generate the same perception as backward tilt (i.e., a climbing aircraft). This illusion can be experienced by pilots operating low- or high-performance aircraft.

In low visibility, a pilot may attempt to counteract a perceived climb by lowering the aircraft's nose until the downward pitch of the aircraft counterbalances the apparent backward tilt caused by the acceleration, often resulting in flight into terrain. Furthermore, if the false climb illusion is reinforced by the presence of a false visual horizon (such as a shoreline or other extended cluster of lights with ocean or unlighted terrain beyond) receding under the aircraft, the pilot's compulsion to push the nose down can become overwhelming.

Knowledge and experience are the key determinants of a pilot's susceptibility to disorientation. A pilot's only defence against spatial disorientation is to develop the ability to suppress natural vestibular responses through training and practice (vestibular suppression), and to always use visual information from the instruments to maintain spatial orientation (instrument discipline) and, consequently, his/her situational awareness. The environmental conditions on the night of the occurrence and the limited outside visual ground references in the vicinity of the Liverpool airport were elements conducive to spatial disorientation. During the go-around, false horizon and false climb illusions were both possible. At low altitude there is minimal time for a pilot to recognize an illusion and take the appropriate corrective action. The impact angle of the aircraft appeared to be more consistent with the nose-down pitch attitude associated with the false climb illusion.

The complex skill set that a pilot requires to recognize and counter the effects of spatial disorientation are developed through flight instrument training, experience, and practice. In the end, the TSB determined that, during the overshoot from the approach to the airport, the pilot probably lost situational awareness as a result of spatial disorientation and unintentionally flew the aircraft into the ground. △

Forest Fire Season Reminder!

Forest fire season is once again upon us, and section 601.15 of the the *Canadian Aviation Regulations* (CARs) provides that no unauthorized person shall operate an aircraft over a forest fire area, or over any area that is located within 5 NM of one, at an altitude of less than 3000 ft AGL. Refer to the "Take Five" published in ASL 3/99, which can also be found at http://www.tc.gc.ca/aviation/syssafe/newsletters/letter/asl-399/english/T5_forestfire_e.htm

Transport Canada / Transports Canada

The **Aviation Safety Letter** is published quarterly by Civil Aviation, Transport Canada, and is distributed to all Canadian licensed pilots. The contents do not necessarily reflect official policy and, unless stated, should not be construed as regulations or directives. Letters with comments and suggestions are invited. Correspondents should provide name, address and telephone number. The ASL reserves the right to edit all published articles. Name and address will be withheld from publication at the writer's request.

Address correspondence to:
Editor, Paul Marquis
Aviation Safety Letter
Transport Canada (AARQ)
330 Sparks St.
Ottawa ON K1A 0N8
Tel.: (613) 990-1289
Fax: (613) 991-4280
E-mail: marqupj@tc.gc.ca
Internet: http://www.tc.gc.ca/aviation/syssafe/newsletters/letter/asl.htm

Paul Marquis

Regional System Safety Offices

Atlantic Box 42
Moncton NB E1C 8K6
(506) 851-7110

Quebec 700 Leigh Capreol
Dorval QC H4Y 1G7
(514) 633-3249

Ontario 4900 Yonge St., Suite 300
Toronto ON M2N 6A5
(416) 952-0175

Prairie & Northern
- Box 8550
  344 Edmonton St.
  Winnipeg MB R3C 0P6
  (204) 983-2926
- 61 Airport Road
  General Aviation Centre
  City Centre Airport
  Edmonton AB T5G 0W6
  (780) 495-3861

Pacific 4160 Cowley Cres., Room 318
Richmond BC V7B 1B8
(604) 666-9517

Sécurité aérienne — Nouvelles est la version française de cette publication.

Flight 2005—Partnerships and Safety Management Systems

Our review of the evolving directions established by Transport Canada as part of *Flight 2005* continues with an overview of the need to maintain strong partnerships with the industry and the implementation of safety-management systems.

Evolving direction No. 3: Emphasizing the consultative approach with the aviation community to promote and establish a pervasive safety culture.

Safety is a shared responsibility. Civil Aviation is committed to seek out and strengthen the co-operative relationships needed to promote and establish a widespread yet viable safety culture. Inside Canada, joint industry–Transport Canada working groups and new consultative mechanisms are needed to champion safety awareness and the implementation of cost-effective safety enhancements and achievements. Internationally, Transport Canada will continue to participate with regional aviation safety organizations and developing States to strengthen their safety frameworks.

Evolving direction No. 4: Implementing safety management systems in aviation organizations.

The aim here is to improve safety through proactive management rather than reactive compliance with regulatory requirements. As aviation organizations generally possess an in-depth knowledge of the risks inherent to their operations, they are well placed to manage them and achieve positive shifts in their safety culture. Transport Canada's role is to provide these organizations with information about the safety-management concept and to facilitate its implementation. Instituting this concept will require specialists in different areas of the Civil Aviation program to interact with one another as well as with their safety partners in the aviation community through small, informal, multidisciplinary work teams. For these teams to be effective, an atmosphere of trust and respect will be paramount as the members bring their different disciplines, specialties and perspectives to the table, as will ready access to information systems and reliable communications technology.

For a complete look at *Flight 2005*, visit http://www.tc.gc.ca/aviation/2005/toc.htm △

Cats Have Nine Lives—How Many Do You Have?

Recently, a helicopter was conducting a flight for the provincial government as part of a duck count. The helicopter was flying at low altitudes and, after manoeuvring over a meandering river, the pilot found himself in front of a high-voltage line. He was not able to pass under it or avoid it. The main rotor severed two cables. Afterward, the pilot successfully carried out a forced landing in a field. The blades were damaged, but the four occupants were not injured. This crew was very lucky. Who doesn't remember the helicopter that collided with cable-car wires at Chute-Montmorency park near Quebec City and left no survivors?

Low flying is a high-risk activity and requires excellent alertness in flight as well as an even more thorough pre-flight preparation. Valid aeronautical charts are essential. Use these charts to identify all electrical wires, towers, and other objects that appear in publications. Although unlikely, it is nevertheless possible that a wire or cable does not appear on your chart, so always be on your guard. Finally, if you are carrying passengers, don't hesitate to ask them to keep their eyes open—that can make all the difference. △

Mr. Ian Oldaker Receives The Transport Canada Aviation Safety Award

Transport Minister David Collenette presented the 2000 Transport Canada Aviation Safety Award to Mr. Ian Oldaker, Chairman of the Soaring Association of Canada's Flight Training and Safety Committee. As a pilot with over three decades of experience as an instructor, Mr. Oldaker has been a mentor to many up-and-coming Canadian pilots and continues to encourage the development of partnerships within the glider aviation community.

Over the years, he has been a strong and active voice in the promotion of aviation safety, and he has volunteered countless hours to the Soaring Association of Canada as Chair of its Flight Training and Safety Committee. His leadership has greatly contributed to the continuous improvement of aviation safety in Canada. Today, he continues to motivate others within the community to promote strong organizational safety cultures—to extend safety beyond the pilot.

The award was established in 1988 to foster an awareness of aviation safety in Canada and to recognize persons, groups, companies, organizations, agencies or departments that have contributed, in an exceptional way, to this objective. The award was presented in St. John's, Newfoundland, on May 8, 2000, at the 12th annual Canadian Aviation Safety Seminar (CASS 2000), a major industry event hosted annually by Transport Canada.

The Minister of Transport, the Honourable David Collenette, presenting the award to Mr. Ian Oldaker.

CASS 2000 provided an introductory look at the implementation of safety management systems. Several lectures from prominent speakers detailed the need for a total systemic approach to accident prevention, and Mr. Kevin Ward, New Zealand's Director General of Civil Aviation, explained their systems approach to aviation safety.

CASS 2000 was a success, thanks to the dedication and efforts of the Atlantic Region staff; the Civil Aviation Safety Services team in Ottawa has accepted the challenge to match that great seminar for CASS 2001. Next year's conference will dig deeper into safety management systems to help the entire aviation industry develop strategies in this regard. CASS 2001 will be held at the Westin Hotel in Ottawa, Ontario, from May 14 to 16, 2001, coinciding with the Canadian Tulip Festival. We hope to see you on "the Hill." △

Get to Know Your RASOs—Richard Berg and Norbert Belliveau

Richard Berg

Norbert Belliveau

Richard Berg started his aviation career in 1976 as an aircraft groomer for Toronto Airways. While in school, he spent his summers working for Bradley Air Services as a ramp and flight attendant, and in 1985, he started to work as an aircraft maintenance engineer (AME) for Emirates Air Services in Abu Dhabi. In 1990, Richard joined the local community college where he developed and instructed the curriculum for the AME program. He joined the Transport Canada Aircraft Services Directorate in 1993, where he worked as an avionics technician, an inspector, and as the acting chief avionics technician. Richard joined the Safety Services team in Ottawa in September 1999, where he develops national safety programs and responds to the safety needs of the aviation community.

Norbert Belliveau started in aviation maintenance shortly after attending technical school. He landed his first job as an apprentice AME at the Moncton Flying Club and later joined the school's charter operation called "Eastwind Flights." In 1988, Norbert also joined the Transport Canada Aircraft Services Directorate and was involved with fixed- and rotary-wing maintenance. Norbert's involvement in the Company Aviation Safety Management Program led him to notice a growing demand to represent his maintenance colleagues on safety issues. He joined System Safety, Atlantic Region, in August 1998 and is eager to share his many years of experience to promote safety awareness within the aviation community.

Both Richard and Norbert were involved in the development of the highly successful Human Performance in Aviation Maintenance (HPIAM) workshop. You are encouraged to voice your safety concerns or comments to Richard in Ottawa at (613) 990-2079 or to Norbert in Moncton at (506) 851-7554. △

Combatting Stress

by Denis Mallette, System Safety Specialist, Dorval. This article was originally published in La Brousse; *reprinted with permission.*

For many pilots, stress is a subject that is often ignored, if not one that is taboo. The strong personality needed to carry out a pilot's duties often leads pilots to believe they are above physiological and psychological dysfunctions. This perception is false: since pilots are human, they are just as vulnerable as anyone else. Furthermore, the environment in which they work puts pilots in stressful situations on a regular basis. This is why we, as pilots, should broaden our knowledge about stress so we can learn more about ourselves, recognize the symptoms of stress and take the necessary actions to manage it better.

Stress is without a doubt the scourge of modern time. It costs companies and people time and money by eroding health. To combat stress effectively, you need to:

– recognize it (understand the causes);
– know how to manage it; and
– take actions to reduce it.

To really understand stress, you need to know the definition of stress. Stress can either be positive or negative. When it is positive—when it is caused by excitement or positive events—it is called *eustress*. Eustress, or positive stress, doesn't cause a problem, although it is a rare state for most people. However, negative stress leads to a state of *distress,* which represents a physiological imbalance. If the stress lasts for a long time, it called *chronic stress*. Chronic stress can vary from moderate to severe and is caused by stressful situations that occur over a long period of time.

Life is full of demands that increase tension until it becomes stress. The main causes of stress are work, money, personal difficulites and health (physical or psychological).

The results of stress are unpredictable. Doctor Selye defines stress as a "non-specific reaction of the body." This means that, unlike a known situation where there is a reaction, i.e., where the body reacts in a predictable manner (for example, the body perspires in hot weather), the effect of stress is unpredictable because it varies from one person to another.

Here is a list of *some* of the common reactions to stress:

– panic;
– anger;
– loss of motivation;
– decreased performance;
– loss of control (mental, physical);
– irregular heart beat;
– perspiration;
– serious illness;
– reduced quality of sleep.

When is there too much stress? Stress is an essential part of living; it is the natural reaction to activity. The ideal level of stress is the degree of stress that allows an individual to live in harmony with his/her environment and with his/her ability to adapt. It is the basis of biological balance.

For hereditary reasons, some people are more likely to worry than others—some families have higher levels of tension. Such a tendency influences peoples' reactions to stress as well as their tolerance level. As you have surely noticed, your colleagues have different psychological tendencies and react very differently to the same situations.

An individual's level of stress is related to the nature of his/her job. An air traffic controller, a pilot and a surgeon, for example, have jobs that are much more stressful than that of a gardener. The greater the amount of information that needs to be retained and the greater the number of decisions that need to be made quickly, the greater the level of stress the person who carries out these tasks will have.

There are techniques to eliminate or reduce stress. Developing a positive self-image helps to better protect yourself against stress. It also helps you resolve problems in a more efficient and objective manner. If you develop a positive self-image, you will notice that your life will become less and less problematic. Another way to reduce stress caused by unexpected events is to imagine the worst possibility and plan how you would react to it. This exercise considerably reduces the shock of a stressful situation. It allows you to control yourself better and, as a result, to perceive the situation clearly. This way, the level of stress that results from a situation is reduced considerably.

A few suggestions to reduce, and even eliminate, stress:

– physical activity (walking, sports, etc.);
– leisure activities (hobbies, music, reading, etc.);
– positive reinforcement (self esteem);
– anti-stress diet (balanced meals, avoiding caffeine and sugar, etc.);
– good relationships with your colleagues;
– relaxation techniques (meditation, yoga, etc.);
– taking breaks.

The last strategy we can fall back on to combat stress and feel well consists of a spiritual exercise that helps us find a meaning for something that is bigger than we are. It is essential to channel our energy in something that inspires us, that gives meaning to our lives, that makes us feel alive. This helps us overcome our difficulties.

In summary, there are many things we can do nowadays to stay healthy. As human beings, we are responsive and each of us has a personal and professional background that allows us to overcome difficulties. We only have to stop and think about it! △

Pilot Decision Making in Single-engine IFR Flight

On May 18, 1998, a Pilatus PC-12 was on a domestic flight from St. John's, Newfoundland, to Goose Bay, Labrador, with the pilot, a company observer and eight passengers. Twenty-three minutes into the flight, the aircraft turned back toward St. John's because of a low-oil-pressure indication. Eight minutes later, the engine had to be shut down because of a severe vibration. The pilot then turned toward Clarenville Airport but was unable to reach the airfield. The aircraft was destroyed during the forced landing in a bog one and a half miles from Clarenville Airport. The pilot, the company observer and one of the passengers sustained serious injuries. This synopsis is based on the Transportation Safety Board of Canada (TSB) Final Report A98A0067, which can be found on the TSB Web site in both official languages. Due to space limitations, this article will be limited to the pilot decision-making aspects of this accident.

As the aircraft approached the planned cruise altitude of 22,000 ft, the pilot noted an unusually low indication on the engine oil pressure gauge, which was followed by the low-oil-pressure caution annunciator light, and then by the low-oil-pressure warning annunciator light. The pilot contacted his maintenance personnel and was advised to return to St. John's. The relaying of messages between the pilot and maintenance took about six minutes, and the aircraft was, by then, 71 NM from the St. John's airport and 40 NM from the Gander airport.

An engine vibration developed four minutes after starting the turn back towards St. John's. The pilot declared an emergency and was cleared direct to the St. John's airport. The pilot was initially able to decrease the vibration by reducing the power setting; however, about four minutes later the vibration became so severe that the pilot had to shut down the engine. The aircraft was approximately 49 NM from the St. John's airport at an approximate altitude of 13,000 ft when the engine was shut down. The pilot reported to Gander Area Control Centre (ACC) that there was a complete engine failure and asked for vectors to the nearest suitable airport. The nearest suitable airport, St. John's, was beyond the glide range of the aircraft at its present altitude. When the pilot advised Gander ACC of this, the controller provided him with vectors to Clarenville Airport, the only other airport in the area, which was 20 NM back. Clarenville Airport is located approximately 47 NM southeast of Gander.


Despite the severity of the forced landing, everyone onboard survived.

During the descent toward Clarenville, the pilot was advised that the cloud layer in the vicinity of Clarenville was estimated to be above the surrounding hills and the visibility was estimated to be approximately five miles. Approximately 15 min after the engine was shut down, the aircraft broke out of cloud over a wooded area at an estimated altitude of 400 to 500 ft above ground level (AGL). The front windshield was obscured by engine oil on the outside and condensation on the inside; consequently, the pilot side-slipped the aircraft to see out the side window. The airport was not visible, and the pilot elected to force-land in a bog.

Calculations determined that if the pilot, at the time engine vibrations occurred, had immediately turned back to Gander and maintained 22,000 ft, he could have reached the airport. It was also determined that if he had remained at 22,000 ft until the engine was eventually shut down, he could have reached St. John's. The engine chip detector, which was disabled, would have increased the probability of giving the pilot advance warning of the impending engine failure and might have influenced his decision making had it been operational in flight.

The first indication of a problem was a lower-than-normal oil pressure gauge reading, followed quickly by a flashing low-oil-pressure caution light, and then a flashing warning light. These progressive indications were designed to alert the pilot to the worsening situation and trigger the required action called for in the pilot operating handbook (POH), i.e., land as soon as possible. The onset of engine vibrations was a further indication to the pilot that there was an actual problem. The pilot believed that what he was experiencing was an indication problem and, consequently, he did not follow the land-as-soon-as-possible direction called for in the POH. The aircraft was 39 NM from the St. John's airport when the low-oil-pressure warning light illuminated and, based on the time the engine remained operational after this, a landing under engine power could probably have been carried out in St. John's. The aircraft was 44 NM from Gander at the onset of engine vibrations and probably could have reached that airport if a decision had been made to divert there at that time.

Another indication that, to the pilot, it was "only an indication problem" was his decision to start descending as soon as he commenced the turn back to St. John's. The POH states that, if possible, always retain glide capability to the selected landing area in case of total engine failure.

There were a number of factors that influenced the pilot's decision to return to St. John's. He reportedly had previous experiences of the oil pressure diminishing during the climb and then returning to normal; he was expecting this to happen again. He also thought that the low-oil-pressure indication was related to an unserviceable oil quantity indicator system. Further, the weather in Gander, although not below limits, was not as good as the St. John's weather. St. John's is a maintenance base, and the suspected indicator problem could be quickly rectified and the flight could continue, whereas the aircraft would be grounded if he diverted to Gander. Lastly, the pilot was advised by maintenance, via dispatch, to return to St. John's.

The pilot encountered and failed to recognize an "error trap" (unsafe actions taken as a result of wrongful assumptions). Error traps are covered in Transport Canada–recognized pilot decision-making (PDM) courses. The intent of the PDM course is to reduce risks associated with flight by providing pilots with better decision-making skills. The pilot, who had not had PDM training, did not recognize the error trap, and the subsequent delay in the decision making reduced his options when engine shutdown became inevitable.

Ineffective PDM in small air carrier operations has been a matter of concern to the TSB for some time. In 1995, after a spate of occurrences that were linked to ineffective PDM, the TSB recommended that Transport Canada establish guidelines for crew resource management (CRM) and decision-making training for all operators and aircrew involved in commercial aviation. The intent of the recommendation was to communicate the requirement for all aircrew involved in commercial aviation to have the tools and skills needed to reduce the likelihood of inappropriate decisions in the day-to-day commercial flying environment. TC responded to the recommendation by requiring formal CRM and PDM training only for pilots employed by the large commercial air operators (CAR 705, "Airline Operations").

Standard operating procedures (SOP), can also help to improve PDM in complex environments. SOPs can be considered to be decisions, made in advance, that tell a pilot how to safely proceed in an expeditious manner. SOPs help to streamline decision making and are a regulatory requirement for commercial operations involving more than one pilot; however, they are not a requirement for commercial single-pilot operations.

The pilot received his simulator training on the Cessna 208, an aircraft type substantially different from the PC-12. The Cessna 208 is not pressurized, whereas the PC-12 is. Overall, the PC-12 is a more sophisticated concept and design. An engine failure scenario in the Cessna 208 would not have to take into account high-altitude considerations such as passenger welfare, strong upper winds, and temperature change. Provided that complex situations such as impending and eventual engine failure at altitude were emphasized, the provision of PC-12 simulator training would have increased the probability of the pilot making effective decisions in the circumstances of the progressive indications of failure.

One of six aviation safety recommendations made by the TSB in this report recommends that **"the Department of Transport improve the quality of pilot decision making in commercial air operations through appropriate training standards for crew members"** (TSB A00-06). Transport Canada has indicated that it will review the PDM training standards for the purpose of single-engine instrument flight rules (SEIFR) operations.

Other significant issues discussed in the report include the engine chip detector system, the electrical system, engine monitoring systems, windshield heat and the oxygen system, all in relation to SEIFR operations. It is suggested that readers seek a copy of the final report on the TSB Web site for a complete picture of this investigation.

The TSB concluded that the pilot did not follow the prescribed emergency procedure for low oil pressure and the engine failed before he could land safely. The pilot's decision making was influenced by his belief that the low-oil-pressure indications were not valid. The engine failed as a result of an interruption of oil flow to the first-stage planet gear assembly; the cause of the oil flow interruption could not be determined. △

CASARA

The Civil Air Search and Rescue Association (CASARA) is a Canada-wide volunteer organization formed to promote aviation safety and to provide trained, safety-conscious crews and aircraft to augment federal search and rescue (SAR) forces. Its objectives are to prevent accidents by promoting aviation safety and, for those accidents that can't be prevented, to provide faster rescue of distressed aviators by using locally based aircraft and crews, rather than always having to await the arrival of federal SAR aircraft.

The Department of National Defence (DND) provides the air resources for the Canadian SAR responsibility area, which covers more than 15,000,000 km^2. They have a limited number of aircraft dedicated to SAR and must call on resources from other government sources, industry and the private sector for assistance. This is where the concept of CASARA originated. For years, volunteer groups, such as the British Columbia Provincial Emergency Program and the Alberta Civil Air Rescue Emergency Services, had provided valuable assistance to the federal SAR program on a regional basis. Their success in augmenting federal SAR forces led Cabinet to direct that Transport Canada (TC) and DND explore the possibility of expanding this regional volunteer support into a federally supported volunteer SAR organization. In April 1986, directors of provincial and territorial associations, which had been created in anticipation of the formation of the national association, met in Ottawa with representatives of TC and DND.

All parties signed the CASARA agreement, which listed the support that the federal government would provide to the Association and what the Association would provide in return. The federal sponsors agreed to provide training in aviation safety awareness, meteorology, aero-medical factors, and search techniques and procedures. They also provide the financial support that provides an insurance package, which includes personal accident, hull and liability coverage; reimbursement for administrative and organizational expenses; and reimbursement for flight-training expenses and incidental expenses, such as the amount of the deductible on the hull insurance and minor aircraft repairs. In return, the Association agreed to participate in aviation safety promotion programs and SAR training and to provide air search support services and suitable aircraft and crews.

The CASARA Board of Directors has established a national qualification standard necessary for participation as aircrew in the Association. A minimum age of 18 is required for all crew member positions. In addition, pilots must have a private pilot licence with a minimum of 150 hr. as pilot-in-command with not less than 50 hr. on an aircraft of similar type and performance as the type to be flown on CASARA activities, be in possession of a current licence validation certificate (LVC) and a valid restricted radio operator's certificate, and their capability must be well known by authorized representatives of their member organization; navigators must have either a private pilot licence or considerable prior aircrew experience and training and a current LVC or medical self-declaration stating that they meet the medical requirements; and spotters must have either a current LVC or medical self-declaration. The medical self-declaration is a written statement from the member stating that he or she is physically fit for aircrew duties, does not suffer from any chronic medical condition requiring regular medication, does not have colour blindness and has 20/20 vision uncorrected or corrected by prescribed lenses. The standard is the minimum requirement. It can be increased by any of the member associations if desired but may not be decreased.

The training varies with the position that an individual will fill and includes both classroom and flying instruction. The initial training, which includes aviation safety, survival awareness and spotting techniques, is taken by everyone. Pilots and navigators take additional training in map preparation, map reading and search planning; the pilots then receive further instruction in operating techniques. To be employed on a search, members must be registered with their parent organization and the organization must certify that they have completed training and are operationally ready.

The TC regional aviation safety officers provide the aviation safety awareness program to CASARA, while SAR training is provided by DND liaison teams at 442 Squadron Comox, British Columbia; 435 Squadron Winnipeg, Manitoba; 424 Squadron Trenton, Ontario; and 413 Squadron Greenwood, Nova Scotia. The provincial and territorial member associations each have a director from which the national executive is elected. The provinces and territories are divided into zones, each with a zone commander. These are further divided at the local level into chapters made up of SAR units of an aircraft, a pilot, a navigator and two spotters.

CASARA membership is currently 3620 personnel with 385 aircraft. CASARA has flown many hours in response to distress incidents since its formation in 1986, saving the government millions of dollars in direct SAR costs. It is impossible to estimate the savings that have been incurred and the lives that have been saved because of their involvement in the aviation safety promotion programs.

For further information on CASARA, you can visit their Web site at www.casara.ca or write to
John Kelly, CASARA Administrator
P.O. Box 183
Winnipeg Stn., Westwin MPO
Winnipeg MB R3J 3Y5. △

Upcoming Regional Events

The following schedule for upcoming courses and/or workshops is tentative. Please contact your regional office for exact location and cost.

Crew Resource Management (CRM). This course is designed to provide knowledge and skills by using all available resources to achieve safe, efficient flight. The course covers the topics for initial training as identified in paragraph 725.124(39)(*a*) of the *Commercial Air Service Standards*.

Company Aviation Safety Officer (CASO). This program is designed to provide both the theory and practical application of topics such as incident reporting, tracking and analysis; the company safety survey; risk-management concepts; accident prevention; the safety committee; and emergency response planning. This course covers the topics as identified in subsection 725.07(3) of the *Commercial Air Service Standards* (Air Operator Flight Safety Program). System Safety offers ***one free seat*** to each CEO, Operations Manager, Chief Pilot, Chief of Maintenance or Chief Flight Attendant for every company employee that attends.

Pilot Decision Making (PDM). This course covers the decision-making process, hazardous attitudes and behaviour, judgment, risk management and communication skills. It satisfies the requirement of section 723.28 of the *Commercial Air Service Standards, VFR Flight Minima—Uncontrolled Airspace* for a "recognized Pilot Decision Making course".

Human Performance in Aviation Maintenance (HPIAM). The concept of HPIAM is to provide awareness to the maintenance personnel and management in order to reduce an accident or incident.

Atlantic Region

CRM	September 12–13	St. John's, Nfld.		
	November 7–8	Goose Bay, Nfld.		
CASO	October 17–18	Halifax, N.S.		
PDM	September 16	Bathurst, N.B.	October 28	Port Hawkesbury, N.S.
	November 4	Waterville, N.S.	November 9	Goose Bay, Nfld.
HPIAM	September 6–7	Halifax, N.S.		

Courses and workshops are available on demand. For further information, please contact Rosemary Landry at (506) 851-7110.

Quebec Region

Skills Review Seminar (in French)

September 6 Joliette

For more information or to register, please call (514) 633-3249.

Ontario Region

CRM	September 21–22	Toronto	**CASO**	September 25–26	Toronto
PDM	October 28	Toronto	**HPIAM**	December 4–5	Toronto

Safety Briefing: "Your Personal Flight—Assessing the Risk Factors"

September 14 Ottawa   November 15 Thunder Bay   November 23 London

For information or to register for the above courses, or for information on the Toronto area 2000 Monthly Aviation Safety Seminars schedule, please contact Nicole Nel at (416) 952-0175 or neln@tc.gc.ca.

Prairie & Northern Region (PNR)

HPIAM	September 13–14	Calgary, Alta.	October 18–19	Winnipeg, Man.
	November 15–16	Saskatoon, Sask.		

For information on courses and workshops in PNR, contact Carol Beauchamp at (780) 495-2258 or beaucca@tc.gc.ca; fax (780) 495-7355.

Pacific Region

Special one-day CRM workshop for CASARA, open to the public at no charge.

September 17 Boundary Bay

PDM Third Thursday of every month Richmond

July 27	Abbotsford	September 25	Castelgar
September 26	Cranbrook	September 27	Invermere
September 28	Golden		

For information on courses and workshops in Pacific Region, please contact Lisa Pike at (604) 666-9517 at toll-free at 1-877-640-2233 or by e-mail at pikel@tc.gc.ca; fax (604) 666-9507.

Fire, Emergency Egress, Lifejackets

Dear Editor,

A few points struck me from two articles in the latest issue, ASL 2/2000.

1) Fire, smoke, and toxic gases—A good article, but what wasn't mentioned is that it is possible to buy single-use smoke hoods/air filters at a very reasonable cost. One example is the "Evac-U8," which is about the size of a pop can. You should encourage every pilot to carry, at minimum, one of these for his or her own use, if not one for each person on board. It could easily make a life or death difference.
2) Underwater egress—Having taken a couple of dunks in Montreal a couple of years ago, I support your "over-indulgence" on this subject. Even after seeing the video, talking through the procedure, etc., I was shocked that I was so disoriented that I couldn't find the door handle on the first attempt. The second dunk went better, but I would go so far as to suggest that this type of training should be a mandatory requirement for the seaplane rating!
3) Life jackets—In the "Take Five" article, you say "For extended over-water flights, consider wearing your life preserver." I believe that you should be much stronger on this point. Any pilot who has tried donning a life jacket in the cramped quarters of a light aircraft will realize that this involves up to a couple of minutes of very tough gymnastics, unless you are Houdini! For a pair of 200-lb men in a Cessna 152, it may be physically impossible. It is a very scary concept to consider putting on a life jacket at the same time as maintaining control of the aircraft and dealing with an engine-out emergency over water. For floatplane pilots especially, there are self-inflating floatation vests designed for fishermen that can be worn comfortably all the time when in and around the aircraft. For any flight beyond gliding distance from land, donning a life jacket before takeoff (or at the latest in cruise flight, before commencing the water-crossing) ensures that the pilot will be able to fully concentrate on dealing with an emergency should one develop. And, of course, any water-crossing should be made at the highest practical altitude—more altitude gives more time to solve the problem, as well as reducing the exposure time out of gliding range from land!

Norman G. Henderson
Ottawa, Ont.

Choose to Live

Dear Editor,

I hope that no pilot will ever have to go through severe turbulence and the subsequent consequences that follow. I know that my experience wasn't the first and won't be the last. You will hopefully never need my advice, but if you are ever in the predicament that I am about to describe, I pray that you will remember the words of your fellow pilot.

The low ceiling kept me from flying above the mountains in the canyon, and for the first part of the canyon, my wife and I experienced some light turbulence. The light turbulence then turned into severe turbulence, and items in the plane were starting to be thrown around. As I passed over a low mountain ridge, my plane started to lose altitude. I added full power and attempted to climb, but I was still descending. I was stuck in a downdraught more powerful than my plane. Below me were the river and a road. Unfortunately, the road was right up against the mountainside and would not be useful for landing. I had started out at 3000 ft and was now down to about 800. I say *about* because I was too busy to look at the altimeter. The image of the terra firma below me was etched into my mind as if it were my final glimpse at earth. On the way down, I advised the flight service station (FSS) at Kamloops; I did not say "Mayday," because I didn't want to frighten my wife anymore than she already was. Because of my location, I had to relay the message through a commercial airline jet above me. When the pilot asked me what I would like to do, my response was "to live through the experience."

The descent was slow but consistent. I was eventually able to pull the plane out of the descent, but was understandably shaken. While through the canyon I was disoriented and was not sure which path to take to arrive at Kamloops. My hands were firmly attached to the yoke and I was not going to remove them to look at the map. Gusts of wind were pushing my airplane around like a kite. I remember my right wing being lifted up so high I felt as if we were going to hit the mountainside. The plane was bouncing around so much that I was starting to hit my head on the top of the plane even though I was securely attached by the seat belts. There are only two choices in this situation. The first is to go on and hope to get out of the weather before it pushes you to the ground or into a mountainside. The second is to land, possibly wrecking the plane, but hopefully getting out alive. I went for the latter and landed on a sand bar—there are far too many stories of pilots with "push-on-itis" thinking they can make it and then don't. Transport Canada agreed with my decision and told me that my decision would have been the right one, even if I had landed on the treetops. A pilot has a 95% chance of living if he/she lands on the treetops. Treetops are a lot more forgiving than a mountainside.

Kevin Coelho
Langley, B.C.

Visual Limitations

Dear Editor,

I believe that some of the regulations concerning vision are outdated or unreasonable. You are probably already aware that Transport Canada imposes certain visual restrictions: a refractive error that falls within ±5 diopters to obtain a commercial pilot licence and a refractive error of ±3.5 diopters to obtain an airline transport pilot licence. In my opinion, these restrictions are unreasonable and discriminatory. As well, I believe that there is absolutely no reason for these regulations to continue to exist in their current form and that they should be amended as soon as possible.

Transport Canada allows pilots to wear glasses but imposes its own visual requirements, which I find completely arbitrary. If vision can be corrected to 20/20, what is the difference in the **level of competence** of a pilot whose prescription is –6 (and whose vision is corrected to 20/20 with glasses) and a pilot whose prescription is –3 (whose vision is also corrected with glasses)? There isn't one.

Quite some time ago, the FAA amended its regulations to ensure that all pilots can hold a licence if their vision is 20/20 **with or without** corrective lenses. If the law can be amended in the United States, where air traffic is even denser than it is in Canada, the Canadian regulations can also be amended. I understand that an airline pilot in Canada is currently flying with only one eye. If a pilot with only one eye can be considered fit to fly an airplane commercially, then perhaps a pilot with two working eyes, but who has myopia and whose vision is completely corrected (20/20) with glasses, should also be considered competent.

Jean-Philippe D'Astous
Montréal, Que.

Tower, Why Should I Do What You Say?

The following events were recently reported, for the same location, over a four-month period. They may (but I hope not) be representative of a more widespread malaise.

—The pilot of a private Cessna 172 reported to the tower controller that he was ready for takeoff. The controller instructed the pilot to hold short of Runway 25 because there was traffic on final approach. The pilot of the Cessna did not hold at the hold-short line, however, and began to taxi onto the runway. The controller overshot the aircraft on final and stopped the 172.

—The pilot of a Cessna 152 was cleared by the tower controller to land on Runway 30 and to hold short of Runway 25. The pilot acknowledged the clearance and the hold-short restriction. However, the aircraft taxied past the hold-short line at the same time as a Cessna 172 was conducting a touch-and-go on Runway 25. The tower controller initially stopped the Cessna 152 and then told it to proceed across Runway 07/25. The other Cessna carried on without risk of collision.

—The tower controller cleared a Cessna 172 to taxi to position onto Runway 25. Moments later, a Cessna 152 landed on Runway 30 and the controller cleared it to cross Runway 25, at the end of the runway. The pilot of the 172, however, commenced takeoff from Runway 25 without clearance just as the Cessna 152 was crossing the end of the runway.

—The pilot of a Cessna 172 was instructed to taxi to position on Runway 12. The pilot took off, however, without clearance.

—A Cessna 172 had been cleared to land on Runway 30 with an instruction to hold short of Runway 07/25 because of other traffic on that runway. The pilot, however, did not stop and crossed the hold-short line by about 75 ft.; the controller overshot two other aircraft on final for Runway 25.

These events did not result in an accident but are true to the most basic runway incursion blunders. Do you think you could make the same mistakes these pilots did? △

So You Have to Write Up a Snag?

Pilots most likely have, second to doctors, the worst handwriting skills. Maybe it has to do with our exposure to avgas or jet B fumes, but it would seem that the art has been lost on us under a spell from someone who failed flight school many moons ago. The use of computers, for all their qualities, has also further eroded our opportunities to practise.

After checking the weather on-line, calculating your weight and balance on the flight ops' PC and e-filing your flight plan, you go flying, and upon your return, you have to report an unserviceable flap control handle, a burned-out landing gear indicator light, some noise from the back and a fluctuating whatchamacallit gauge. The maintenance supervisor listens to you with a face so bland he looks like an artifact from Madame Tussaud's Wax Museum, and after you finish your blurb, he hands you this greasy pen and says "write them up."

You start sweating because not only must you do this archaic thing called *writing*, but you must also generate some adequate prose to explain the problems. Here are some actual examples of snag write-ups, followed by the corrective actions by the maintenance personnel.

Problem: "Left inside main tire almost needs replacement."
Solution: "Almost replaced left inside main tire."

Problem: "Test flight OK, except autoland very rough."
Solution: "Autoland not installed on this aircraft."

Problem: "No. 2 propeller seeping prop fluid."
Solution: "No. 2 propeller seepage normal."
Problem: "Nos. 1, 3, and 4 propellers lack normal seepage."

Problem: "The autopilot doesn't."
Signed off: "IT DOES NOW."

Problem: "Something loose in cockpit."
Solution: "Something tightened in cockpit."

Problem: "Evidence of hydraulic leak on right main landing gear."
Solution: "Evidence removed."

Problem: "No. 3 engine missing."
Solution: "Engine found on right wing after brief search."

Problem: "DME volume unbelievably loud."
Solution: "Volume set to more believable level."

Problem: "Dead bugs on windshield."
Solution: "Live bugs on order."

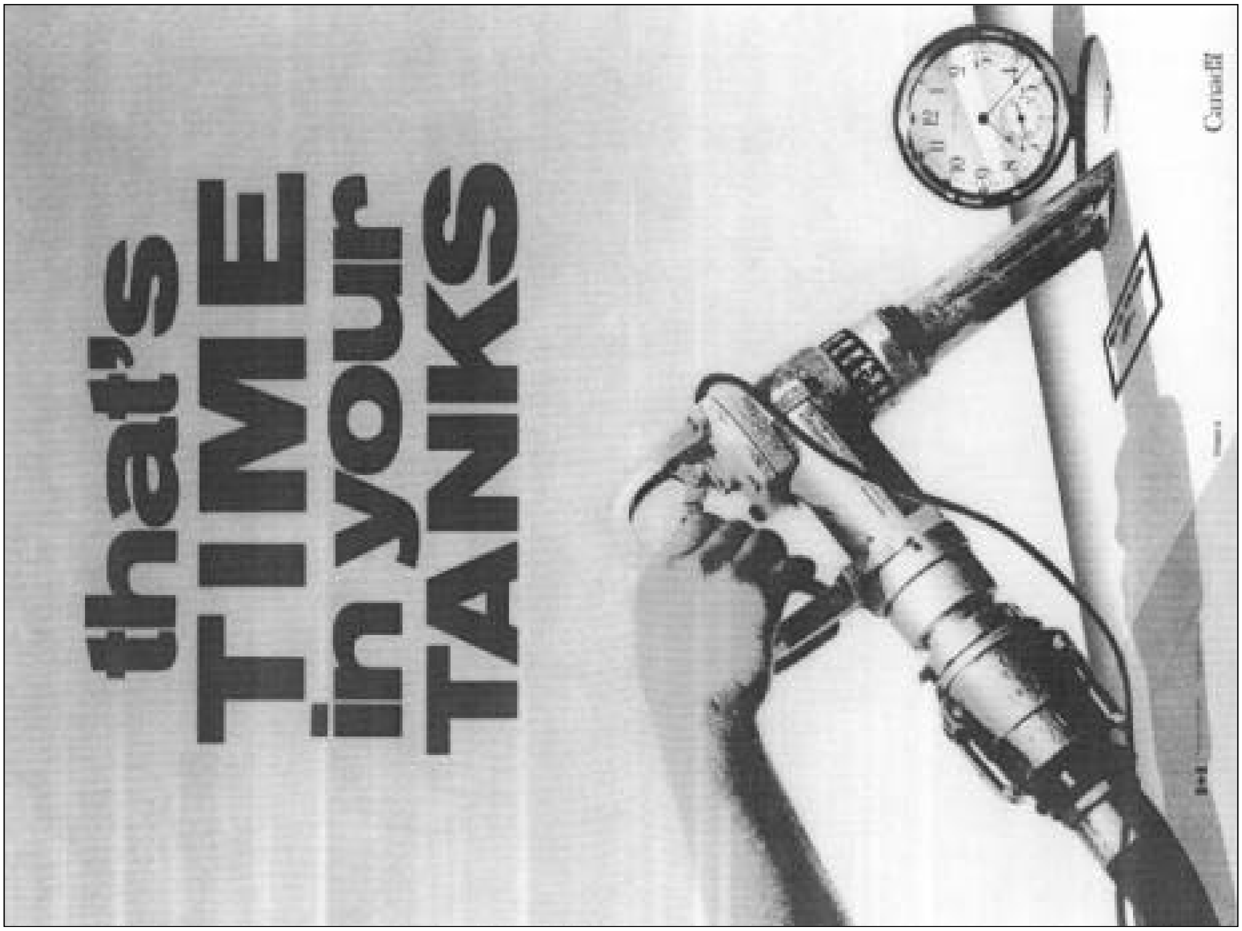
Problem: "Autopilot in altitude hold mode produces a 200 fpm descent."
Solution: "Cannot reproduce problem on ground."

Problem: "IFF inoperative."
Solution: "IFF inoperative in OFF mode."

Problem: "Friction locks cause throttle levers to stick."
Solution: "That's what they're there for."

These light-hearted examples prove a point. Try to ensure your snag write-ups are always clear and readable so that the aircraft maintenance engineers (AMEs) understand exactly what the problem is. Our AMEs probably deserve a medal just for deciphering the words we write and trying to understand what we mean. Of course, it's always better if you carry your own pen. △

"Have you checked NOTAMs?"



cut here

Frequencies Card

CIVIL AVIATION RADIO FREQUENCIES

from 118.0 MHz to 137.0 MHz (see A.I.P., COM 5.9)

USE	FREQUENCY
En-route VFR position reports and FSS	126.7 MHz
Emergency	121.5 MHz
Soaring	123.4 MHz
Air-air	122.75 MHz in Southern Domestic Airspace
(communication between aircraft)	123.45 MHz in Northern Domestic Airspace
ATF	123.2 MHz if there is no UNICOM or MF
flight in remote regions (hf radio)	5680 kHz

fold here

TRANSPONDER

Mandatory in all class A, B and C airspace; in class D and E airspace when specified (see A.I.P., RAC 1.10)

USE unless otherwise instructed by ATC	**CODE** to be squawked
VFR flights: below 12,500 ft ASL	1200 (mode A or C)
above 12,500 ft ASL	1400 (mode A or C)
IFR flight: controlled low level airspace	1000 (mode C if available)
uncontrolled high level airspace	2000 (mode C if available)

EMERGENCY: 7700 COMMUNICATIONS FAILURE: 7600* HIJACKING: 7500

*(A.I.P., COM 5.14) Use a cellular phone after having followed the normal procedures (see A.I.P., RAC 6.3.2.1)