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AVIATION SAFETY LETTER

In this Issue...

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

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Canada

The *Aviation Safety Letter* is published quarterly by Transport Canada, Civil Aviation. It is distributed to all holders of a valid Canadian pilot licence or permit, to all holders of a valid Canadian aircraft maintenance engineer (AME) licence and to other interested individuals free of charge. The contents do not necessarily reflect official government policy and, unless stated, should not be construed as regulations or directives.

Letters with comments and suggestions are invited. All correspondence should include the author's name, address and telephone number. The editor reserves the right to edit all published articles. The author's name and address will be withheld from publication upon request.

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The International Civil Aviation Organization and its Impacts on Canadian Aviation

Shelley Chambers

As aviation professionals, you have no doubt heard of the International Civil Aviation Organization (ICAO). One of my roles as Director, International Operations, is to be Transport Canada Civil Aviation's (TCCA) official liaison with ICAO on matters pertaining to aviation safety. In writing this article, my objective is to expand awareness of the influence and impact that ICAO has on our aviation safety activities within the aviation community.

Let me begin with some background on this multilateral organization, its headquarters located in Montreal.

ICAO is a Specialized Agency of the United Nations. It resulted from a meeting in Chicago, the Chicago Conference of 1944, when planning for peace was already underway in the middle of the Second World War. In 1944, 52 states signed the Convention and today, 190 states have become parties. As a signatory to the *Convention on International Civil Aviation*, otherwise known as the Chicago Convention, Canada has agreed to certain principles so that international civil aviation may be developed in a safe and orderly manner. These principles are translated into *Standards and Recommended Practices* (SARPs), which regulate international civil aviation.

TCCA has always been a major contributor to the development of the ICAO SARPs. We do this by providing technical experts to participate on the various panels, study groups, regional planning groups, task forces, etc., that propose, discuss and make recommendations on new standards. I am very proud of the contributions these individuals make to the establishment of international standards. As I meet with my ICAO and international counterparts, I get to see first-hand how they contribute to the international recognition of Canada in matters of aviation safety.

Once all of the technical analysis is complete, ICAO asks contracting states for comments on the new SARPS through official state letters. This is one of Canada's best opportunities to provide final input in the establishment of ICAO SARPs.

You may be wondering how your interests are represented at ICAO. Many of you will be associated with your own national organization. Many of these national organizations have international representation at ICAO. For example, the International Air Transport Association (IATA), the Airports Council International (ACI), the Civil Air Navigation Services Organization (CANSO), the Fédération Aéronautique Internationale (FAI), the International Federation of Airline Pilots' Associations (IFALPA), the International Federation of Air Traffic Controllers' Associations (IFATCA), the International Coordinating Council of Aerospace Industries Associations (ICCAIA), the International Business Aviation Council (IBAC) and the International Council of Aircraft Owner and Pilot Association (IAOPA) are observers on the Air Navigation Commission (ANC) and are able to contribute to the development of the SARPs.

As you may be operating internationally, it is important to understand that under the Chicago Convention, every state has complete and exclusive sovereignty over the airspace above its territory. This means that to fly to or over another state's territory, you need the state's permission and, just as importantly, you need to follow their aviation rules. This means that operating internationally requires you do your homework in case the state you are flying into has filed a difference to an ICAO SARP. Article 38 of the Convention requires contracting states to notify ICAO of any differences between its own national regulations and practices and the international standards contained in the eighteen (18) *Annexes to the Chicago Convention*. Differences filed by all contracting states are located in the supplements to the Annexes, which can be purchased directly from ICAO. Canada's differences are also published in the Aeronautical Information Publication [AIP Canada (ICAO)], which can be found on the NAV CANADA Web site.

Canada is very proud to be host country to ICAO. Canada maintains a Permanent Mission located within ICAO. Leading the Mission is Canada's representative on the Council. Canada is one of 36 contracting states elected to this executive body. Also within the Mission is Canada's nominee to the ICAO ANC. The ANC comprises of 18 nominees from contracting states and directs and oversees the development of ICAO SARPs. The ANC reviews all new SARPS and recommends them to the Council for approval. Presently, Canada's nominee to the ANC is Mr. Jim Dow.

Another important role of ICAO is to audit its contracting states' compliance to the SARPs. Not all contracting states have the same resources to direct to the development of a safe and efficient national aviation system. However, operators of all nations fly citizens of all nations all around the world. Through its audit program, ICAO establishes a baseline for safety in each state and where there is both a need and desire, assists them through technical cooperation activities to raise their level of compliance to ICAO's SARPs. Canada has been audited twice and ICAO considers this country as having one of the safest national aviation systems in the world.

ICAO Headquarters in Montreal, Quebec.

As a contracting state of ICAO, Canada also recognizes the need to provide subject matter experts (SME) to participate in ICAO technical cooperation activities. TCCA regularly releases SMEs to work with contracting states to raise their level of safety. Through ICAO, TCCA also provides SMEs to deliver training on technical subjects and hosts foreign inspectors for an on-the-job training activity.

It is my hope that from this article you will gain a better appreciation of the fact that decisions made at the ICAO level can have a significant impact on Canadian civil aviation. TCCA remains actively involved at ICAO to make sure Canada's interests and positions are represented on the international stage.

TCCA is proud to work with ICAO and is eager to continue its leading role in promoting aviation safety worldwide. For more information on ICAO, please visit: www.icao.int/.

Shelley Chambers
Director, International Operations
Transport Canada, Civil Aviation

International Winter Operations Conference: Safety is no Secret

ACPA APAC

The Air Canada Pilots Association (ACPA) will host the *International Winter Operations Conference: Safety is no Secret* on October 5 and 6, 2011, at the Fairmont Queen Elizabeth Hotel, in Montreal, Que. Experts from the aviation industry will be in attendance to discuss the latest technologies, operational procedures and lessons learned in the field that can keep you operating safely during winter operations.
For more information, visit www.winterops.ca.

An Ounce of Prevention: Developing a Safety Case

by Cliff Marshall, Civil Aviation Safety Inspector, Technical and National Programs, Standards, Civil Aviation, Transport Canada

When it comes to managing risks associated with an operational change, the adage "an ounce of prevention" is certainly appropriate. A safety case acts as a proactive prevention tool. Safety cases are developed when a major change occurs in your organization. They help the organization anticipate hazards that can result from operational change, and help ensure the successful management of risk during that change. This allows your organization to demonstrate to all stakeholders how you have managed the associated risks. A safety case is developed in much the same way as a business case.

Some common examples requiring the use of a safety case are:

- when a major operational change is planned;
- when a major organizational change is planned;
- when key personnel change;
- when a new route structure is contemplated;
- when a new aircraft is introduced into the fleet;
- when a new airport is being considered for use;
- when a new control tower or terminal or other facility is contemplated; or
- when an extension or resurfacing of an existing runway is planned.

Building the safety case involves identifying the hazards associated with major change. Consideration should be given to hazards arising as a result of a change in management, facilities, routes, or operating equipment. Once the hazards have been identified, an assessment of the related risks and a plan for managing these risks should be developed.

When we talk about safety cases, two key words, *hazard* and *risk*, should be clearly understood:

- **hazard**: a source of potential harm or a situation with a potential to cause loss.
- **risk**: the chance of injury or loss measured as the probability and severity of an adverse effect on health, property, the environment, or other things of value.

It is management's responsibility to manage the risk associated with a project. Since all projects involve some degree of risk, a safety case is necessary to define and document procedures that will be used to manage risk throughout the life of a project. Therefore, it follows that by recognizing potential problems, organizations can develop options to manage risk to an acceptable level using the four methods of controlling risk: **transfer** the risk, **eliminate** the risk, **accept** the risk and **mitigate** the impact of the risk.

The procedures used to manage risks are documented in the safety case, and then executed throughout the life of a project. Risk management is the process of thinking systematically about all potential undesirable outcomes before they happen and determining procedures that will minimize their likelihood and impact if they were to occur.

There are four stages to risk management planning:

- Risk Identification: "What could go wrong?"
- Risk Quantification: "How likely is it to happen and how bad would it be if it did happen?"
- Risk Response: "How do we prevent or reduce the effect of that happening, or is it an acceptable risk?"
- Risk Monitoring and Control Assessment: "How do we know if our plan is working?"

A safety case should also specify who is responsible for managing the different areas of risk, how risks will be tracked through the project life cycle, and how monitoring risk control effectiveness will be addressed.

Project size also has an effect on the safety case. Large projects normally require more detailed risk planning than smaller projects due to the volume and complexity of potential risks. Quite often, this requires developing and analyzing alternative risk control strategies and evaluation criteria.

In summary, a safety case helps you increase your chances of success by assessing risk occurrence and defining clear strategies, techniques, and control mechanisms to deal with risk and move forward with your planned change. △

Eyes Wide Open: Operating VMC in Class C and D Airspace

by Jeff MacDonald, Director, Operations Planning and Programs, NAV CANADA

Recent discussion in safety forums and with the pilot community have revealed a lack of understanding of NAV CANADA services in Class C and D airspace under Visual Meteorological Conditions (VMC), for both IFR and VFR aircraft. This article aims to clarify this, as well as address both ATC and pilot responsibilities.

The following paragraphs describe the terminology and specifically the collision risk management methods available today.

See and Avoid: The oldest risk mitigation strategy, it provides the foundation for the Rules of the Air. It is applicable to any situation where the individual flight operators:

- are responsible for their own collision avoidance;
- can detect emerging conflicts; and,
- can negotiate and apply solutions based on an established rule structure.

The effectiveness of this strategy declines as traffic levels, airspace compression, aircraft mix, and speeds increase. When augmented by traffic alerting or emerging sense and avoid systems, however, it is still a valid risk mitigation strategy.

Traffic Information: Information issued by Air Traffic Services (ATS) to pilots regarding other known or observed traffic that may be in such proximity to their position or intended route as to warrant their attention.

Conflict Resolution: The resolution of potential conflicts between IFR/VFR and VFR/VFR aircraft that are radar-identified and in communication with ATC (*Transport Canada Aeronautical Information Manual* [TC AIM] RAC 2.8.3). Conflict resolution or visual separation implies a collaborative environment between pilot and controller. The ultimate responsibility for collision avoidance rests with the pilot; however, in certain types of airspace and under particular conditions, ATC is responsible for detecting conflicts, providing traffic information, and suggesting avoidance actions.

Separation: The spacing between aircraft, altitude, or tracks. A separation minimum is a statement of the least allowable amount of lateral, longitudinal, or vertical separation to be applied by ATC between aircraft and between aircraft and obstacles. Separation standards are published in CARs, *Standard 821-Canadian Domestic Air Traffic Control Separation*.

Runway Separation: The separation of aircraft operating on the runway.

Using the preceding definitions, the required ATC services for each class of airspace, in accordance with CAR 801.02, are summarized below.

Table 1 – Required ATC Services – ATS Airspace

Airspace Class	*ATC Service Required (CAR 801.02)*		
	VFR / VFR	**VFR / IFR**	**IFR / IFR**
A	VFR Not Permitted	VFR Not Permitted	• Separation
B	• Separation	• Separation	• Separation
C	• Conflict resolution (upon request) • Runway Separation • Traffic Information	• Conflict resolution • Runway Separation • Traffic Information	• Separation • Runway Separation • Traffic Information
D	• Runway Separation • Traffic Information	• Runway Separation • Traffic Information	• Separation • Runway Separation • Traffic Information
E	No specified VFR service	No specified VFR service	• Separation
F	ATC services as specified	ATC services as specified	ATC services as specified
G	No Specified ATC Service	No Specified ATC Service	No Specified ATC Service

NAV CANADA also provides service in Class D airspace beyond what is required under CAR 801.02, as follows (TC AIM RAC 2.8.4):

> *Equipment and workload permitting, conflict resolution will be provided between VFR and IFR aircraft, and upon request between VFR aircraft.*

So, how do pilots operating in Class D airspace know whether conflict resolution will be provided? The simple answer is, they don't, because the service depends on workload and equipment. Pilots are therefore urged to remain vigilant under VMC conditions.

Other important facts to remember when operating in Class C and D airspace are (TC AIM RAC 2.83 and 2.84):

- Both IFR and VFR flights are permitted in Class C and D airspace;
- an ATC clearance is required to enter Class C airspace;
- two-way communication must be established with ATC before entering Class D airspace; and,
- a continuous listening watch on the assigned ATC frequency must be maintained by the flight crew while in Class C and D airspace.

The aircraft must be equipped with both:

1. radio equipment capable of two-way communication with the appropriate ATC unit; and,
2. a transponder and automatic pressure altitude reporting equipment (for all Class C and D airspace that is designated transponder-required).

In summary, it is important to understand what ATC services are provided in each airspace classification. While NAV CANADA may provide conflict resolution and traffic information in Class C and D airspace, the ultimate responsibility for collision avoidance under VMC rests with the pilot. △

We're Watching and Planning

by Civil Aviation Contingency Operations (CACO) Division, National Operations Branch, Civil Aviation, Transport Canada

Did you know that Transport Canada Civil Aviation (TCCA) monitors the National Civil Air Transportation System (NCATS) 24/7? This function is the responsibility of the Civil Aviation Contingency Operations (CACO) Division of the National Operations Branch in Ottawa. CACO is the Civil Aviation focal point for all emergency preparedness activities, operational communications with NAV CANADA concerning incident and occurrence reports, and has national responsibilities for coordinating operational response, contingency planning, exercises and training.

So, what does this mean? CACO manages and operates an Aviation Operations Centre and provides a 24/7 operational response capability. CACO is responsible for monitoring and tracking aviation-related accidents, incidents and high profile events, including aviation security incidents, for the purpose of keeping senior managers apprised of operations in the NCATS and, where applicable, triggering operational responses and activations of the Transport Canada Situation Centre (TCSC) in Ottawa and Regional Transport Canada Situation Centres (RTCSC).

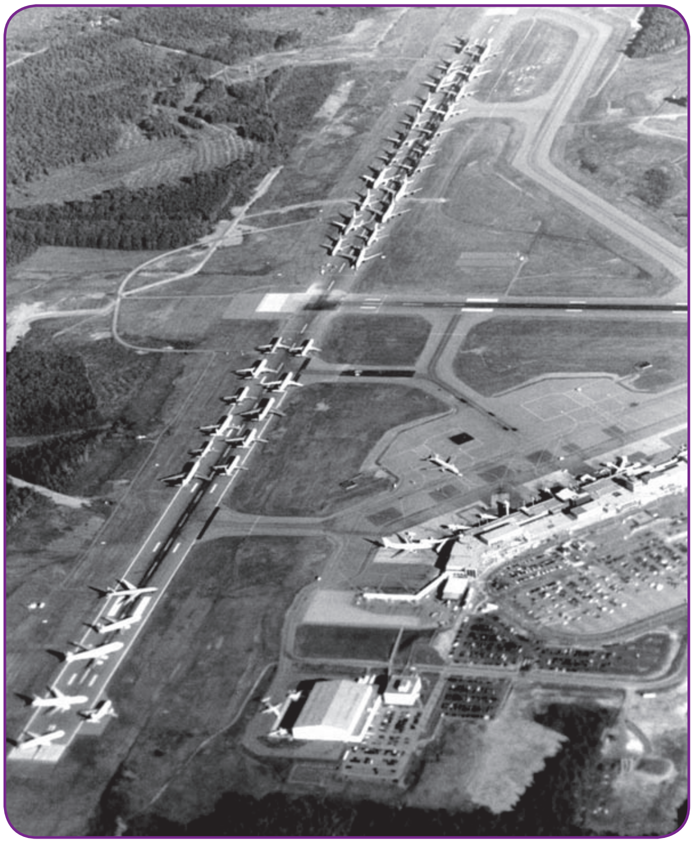
Why is monitoring and tracking necessary? It is the first step in the process of identifying potential hazards in the NCATS. For example, if multiple incidents are reported involving the same air operator, airport, air traffic services unit or aircraft, there may be a potential danger to the public requiring intervention by Transport Canada (TC), using the regulatory tools available to its inspectors.

NAV CANADA is CACO's primary source of information on aviation incidents; however, information can be received from the Royal Canadian Mounted Police (RCMP), local law enforcement agencies, the Transportation Safety Board (TSB), an air operator, pilot or member of the public. Aviation and security incidents that do not require immediate intervention or are not extremely time sensitive can be reported to CACO online: www.tc.gc.ca/eng/civilaviation/opssvs/emergencies-incidentreporting-menu.htm.

In practical terms, a response to an accident or incident would be as follows:

CACO receives a call from NAV CANADA advising of an in-flight emergency involving an air operator: the pilot has advised Air Traffic Control that the landing gear is not indicating down and locked. The pilot has declared an emergency and has requested that airport rescue fire fighters be on standby. The gear collapses on landing. There are no injuries. CACO's role in this situation would be to gather as much preliminary information as possible and immediately advise the region where the incident took place, the Transport Canada Marketing and Communications Group, Civil Aviation management and external partners such as the TSB. CACO would then monitor the situation and provide updates as required.

Incidents that are more complex require a large, coordinated response by Headquarters and the region(s) and may necessitate the activation of the main TCSC in Ottawa and those in each affected region. Upon triggering an activation, CACO would assume the role of Director of the TCSC, coordinate the gathering of information and brief senior management. Using the TCSC allows CACO to focus on the response to an event and coordinate with stakeholders, while permitting normal daily operations to continue in the Aviation Operations Centre. Examples of previous activations by CACO include: September 11, 2001, the SwissAir 111 crash at Peggy's Cove, the Air France 358 crash at Toronto Pearson, the Y2K (Year 2000) transition, the 2010 Icelandic volcanic eruption, and H1N1 Influenza.



CACO was activated to assist in the recovery of airliners affected by the events of September 11, 2001. This photo shows Halifax Airport around 3:30 pm on 9/11.

In order to respond to incidents efficiently and effectively, plans and procedures must be developed in advance, they need to be validated through exercises and maintained. In fact, the *Emergency Management Act* requires the Minister of Transport to do exactly this for risks identified within or related to his area of responsibility. Within TCCA, CACO has been delegated the responsibility of developing, maintaining and implementing contingency plans for use by personnel at Headquarters and in the regions. CACO also provides input, from a Civil Aviation perspective, regarding other departments' plans and participates in multi-modal, multi-departmental and international exercises that help confirm plans, procedures, communication and cooperation between stakeholders. All this contributes to CACO's state of readiness and enables it to respond to accidents, incidents and other major events that occur within Canada or affect Canadian interests.

Additionally, CACO partners with TC Intelligence in order to maintain current situational awareness on threats to aviation safety and security. It has state of the art facilities and equipment that enable secure communications with other government departments, agencies and/or stakeholders, and the ability to monitor and track aircraft.

In dealing with potential aviation threats, or to prepare for major events such as the Vancouver 2010 Olympics or the G8/G20 Summits, CACO routinely exercises scenarios with the Department of National Defence, RCMP, TC Aviation Security, NAV CANADA, Canadian North America Aerospace Defense Command, U.S. Homeland Security and the U.S. Federal Aviation Administration.

To carry out the many and varied duties, the staff of CACO undergo extensive, structured, on-the-job training in addition to TC mandatory courses. CACO staff have been delegated a Ministerial Authority which, in part, allows them to restrict airspace, divert or detain aircraft or to authorize a person to give an interception signal or an instruction to land, if such authorization is in the public interest and is not likely to affect aviation safety.

That's CACO in a nutshell; however, did you know that CACO also:

- Provides support to NASA shuttle launches and the 5 Canadian East Coast emergency landing sites?
- Coordinates the authorization of over-flight and technical landing permits for foreign air operators after hours?
- Distributes Emergency Airworthiness Directives after hours?
- Coordinates activities related to space launches or space junk re-entry?
- Represents Canada on the NATO Civil Aviation Planning Committee and provides guidance and input to the NATO Transportation Group – Aviation working groups?
- Provides Technical Advisors to the ICAO Cooperative Arrangement for the Prevention of the Spread of Communicable Disease Through Air Travel (CAPSCA) Program?
- Acts as the emergency point of contact for Canadian Coast Guard and Transport Canada aircraft?
- Acts as emergency point of contact should Civil Aviation Inspectors become incapacitated while travelling on government business?

- Contributes to the government-wide coordination of activities for VIP visits such as Queen Elizabeth, or President Obama?

In undertaking all of the above, CACO is doing its bit to contribute to an Aviation Safety Program in which the public can have a high level of confidence and to the continued improvement of aviation safety in Canada.

More information on CACO is available on the following Web site: www.tc.gc.ca/eng/civilaviation/opssvs/nationalops-caco-menu.htm. △

St. Clair McColl: 2011 Transport Canada Aviation Safety Award Recipient

St. Clair McColl of Salt Spring Island, B.C., has become the twenty-third recipient of the Transport Canada Aviation Safety Award. Brian Jean, then Parliament Secretary to the Minister of Transport, Infrastructure and Community, presented the award to Mr. McColl on February 23, 2011, during a reception to celebrate the third annual National Aviation Day.

"I would like to congratulate Mr. McColl for his tremendous contribution to aviation safety and for being such an excellent role model to other aviation professionals and those considering a future career in this field." said Mr. Jean while presenting Mr. McColl with the award.

Mr. Brian Jean (left) presenting the award to Mr. St. Clair McColl on February 23, 2011.

The selection committee unanimously selected Mr. McColl as this year's winner for his commitment to excellence in aviation safety in Canada. The founder of Saltspring Air, Mr. McColl has been a pilot and an air operator owner on the British Columbia coast for over 30 years, offering safe transportation to thousands of passengers to a wide variety of locations under all conditions imaginable.

In his earlier years, St. Clair realized the need for safety and the constant vigilance required to mitigate one's exposure to hazards. He felt a compelling drive to keep the safety of his flight foremost in his operations. It should come as no surprise that he insists that all his pilots be trained in Underwater Egress and that he constantly upgrades his training programs to ensure his flight crew not only meets the standards, but also exceeds them. McColl has acquired a team of dedicated partners and employees who embrace his mantra: "If it's not safe, we aren't flying. If it's not fun, we are not interested."

In the fall of 2009, a tragic accident involving another operator prompted McColl's to become the first operator in North America to outfit his entire fleet of de Havilland Beaver floatplanes with emergency push out windows, which provide an alternate exit to the main cabin doors in case of an emergency. When asked about this decision, McColl replied, "It just made common sense. If I need to be the first to install these windows in order to get the rest of industry on board then so be it." This process involved expense and down time for each aircraft, but that did not deter him from making safety his top priority.

As someone who demonstrates industry leadership and who prides himself on his company's safety record, it should come as no surprise that Mr. McColl was recently elected vice-president of the newly formed Floatplane Operators Association.

More recently, St. Clair developed his own "Pre-Boarding Safety Video", which he hopes the rest of the industry will use to adopt their own.

Those who know McColl know him not only as a leader, but also as a hero. During what began as a routine flight, St. Clair rescued a father and son from the frigid waters of the Strait of Georgia after a sharp-eyed passenger noticed a capsized boat and notified McColl. Despite choppy seas, McColl successfully landed the de Havilland Beaver and, using a rope he was able to pull them close enough to his aircraft so they could jump aboard. In 2007, the Lifesaving Society of British Columbia honoured McColl and his two passengers for the rescue.

A leader and a hero, St. Clair is undoubtedly worthy of this award and the excellent reputation he enjoys in the industry is well deserved. To quote St. Clair: "The pursuit and dream of flying is constantly kept alive and supported by ALL of us. Therefore before we entertain our dreams, we must first attend to our primary goal: the safety of flight."

To date, St. Clair has not rested. He spends countless hours at work, as his wife and three sons can attest to. He continues to passionately pursue his dream of "running his own airline."

The Transport Canada Aviation Safety Award recognizes persons, groups, companies, organizations, agencies or departments that have contributed, in an exceptional way, to aviation safety in Canada. Visit www.tc.gc.ca/aviation-safety-award to learn more about this prestigious award or to find out how to submit a nomination.

In 2009, February 23 was designated as National Aviation Day in Canada. This occasion highlights the federal government's role in the safety and security of all Canadians and celebrates the successes of the aviation industry in Canada. The Canada Aviation and Space Museum hosted a career day for students. Transport Canada joined industry and education leaders to showcase the many aviation career opportunities.

"This day is about inspiring our youth to pursue rewarding careers in aviation and highlighting the progress we've made toward safe, efficient and sustainable aviation in Canada," said the Honourable Chuck Strahl, then Minister of Transport, Infrastructure and Communities. "The men and women in the Canadian aviation sector keep Canadian skies safe for travellers, giving us a safety record that is the envy of the world." △

Snowbirds' Canadair CT-114 Tutor

On February 23, 2011, the Canada Aviation and Space Museum unveiled the Snowbirds' Canadair CT-114 Tutor to celebrate the official inauguration of their new wing. In the glassed-in entrance of the museum, the Tutor dangles upside down from the exposed trusses of the ceiling—a suitable way to showcase an aircraft that's renowned worldwide for its skyward acrobatics.

Ballistic Recovery Systems: What First Responders Need to Know

This article is based on Transportation Safety Board of Canada (TSB) Final Report A10O0101, and on Aerodrome Safety Circular ASC 2006-28, Ballistic Recovery Systems Info For First Responders.

On May 25, 2010, a Cirrus SR20 aircraft departed from the Toronto Buttonville Municipal Airport on a flight to the Burlington Airpark in Ontario. Shortly after takeoff from Runway 15, the pilot reported a problem and initiated a left turn to return to the airport. It is estimated that the aircraft did not reach an altitude of more than 500 ft above ground level (AGL). The aircraft's bank angle increased and its nose dropped suddenly. The aircraft entered a spin and crashed on the roof of a nearby building. A post-crash fire broke out shortly after impact and consumed most of the aircraft. The two occupants were fatally injured. Fire and emergency services arrived within 10 minutes.

As a result of the accident investigation, the TSB determined that the number 3 cylinder head failed due to fatigue and separated from the cylinder during takeoff, resulting in reduced power from the engine. This article focuses on the risk posed by an undeployed airframe-mounted ballistic emergency parachute system in aircraft wreckage.

The Cirrus SR20 aircraft is equipped with an airframe-mounted emergency parachute system, which had not been deployed in this occurrence. The Cirrus Airframe Parachute System (CAPS) is designed to lower the aircraft and its passengers to the ground in the event of a life-threatening emergency. Approximately 15 minutes after impact, there was an explosion as the rocket from the CAPS ignited from the heat of the fire. Still partially tethered to the airframe by stainless steel cables, the rocket ricocheted across the roof before breaking free of the cables and landing in the street approximately 165 ft from the crash site.

Picture of the accident scene when the ballistic parachute system deployed from within the aircraft wreckage.

In its final report, the TSB made the following finding:

> "The Cirrus Airframe Parachute System activated post impact as a result of the post-crash fire and the rocket projectile landed in the street. Unless first responders are aware that some aircraft may be equipped with ballistic projectiles, and are trained in how best to deal with them, they will be placed at risk if there is ignition."

Back in 2006, Transport Canada (TC) published Aerodrome Safety Circular ASC 2006-028 on this issue. In the interest of making this information better known, we are reprinting the information found in ASC 2006-028 below, as well as some current links. This advisory circular can also be found on the Transport Canada Web site at: www.tc.gc.ca/eng/civilaviation/opssvs/nationalops-audinspmon-program-safetycirculars-2006028-871.htm.

The following is based on Aerodrome Safety Circular (ASC) 2006-028. *(Note: links have been updated and may change over time.)*

Subject

Aircraft Rescue and Fire Fighting (ARFF) safety information on rocket-deployed aircraft emergency parachute systems.

Purpose

This circular is to provide information for the ARFF to respond safely to incidents or accidents involving aircraft equipped with rocket-deployed aircraft recovery parachutes.

Background

Following the crash of a small aircraft equipped with a rocket-deployed recovery parachute that had not been deployed, the emergency responders reported that some of the existing warning labels did not provide sufficient information on safety precautions for handling such systems when responding to an emergency. The U.S. National Transportation Safety Board (NTSB) issued a safety recommendation to provide emergency responders with training and information on such systems.

Application

To this date, only a small number of these systems are in use in Canada. However, as the use of these systems received significant interest in the U.S., their use in Canada is expected to grow. It is important for airport operators to obtain and disseminate information regarding rocket-deployed emergency parachutes to the on-site and off-site responding agencies to allow them to introduce pertinent information in their site-specific ARFF training and emergency response plan procedures.

The following Web sites include information that is currently available on rocket-deployed parachute systems:

- www.brsparachutes.com/first_responders.aspx
- www.faa.gov/aircraft/gen_av/first_responders/
- www.firefighternation.com/forum/topics/faa-first-responder-training
- www.faa.gov/aircraft/gen_av/first_responders/media/mod4/mod4.htm

Summary

Awareness and training information should be provided to emergency responders. They must first identify the presence of an un-deployed emergency rocket-deployed parachute system and then de-activate it to render it harmless.

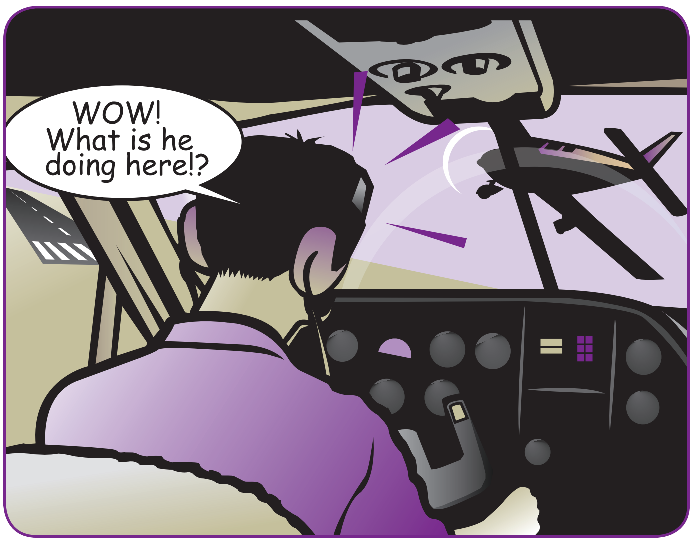
The information and pictures provided in the document published by the manufacturer, Ballistic Recovery Systems (BRS), entitled *BRS Ballistic Parachutes: Information for Emergency Personnel*, available at the BRS website, should be used as reference for the development of response procedures to maximize the safety of emergency responders.

For additional information, please contact the Aerodromes and Air Navigation Services Division, Standards Branch, at 613 990-2201, or by e-mail at services@tc.gc.ca. Aerodromes and Air Navigation Circulars are available electronically at: www.tc.gc.ca/CivilAviation/nationalops/AudInspMon/Program/SafetyCirculars/menu.htm. △

Mid-Air Collisions—CASA's Prevention Campaign

by the Civil Aviation Safety Authority (CASA) of Australia. The following article on mid-air collision prevention was published in the July-August 2009 Issue of Flight Safety Australia*, and is reprinted with permission.*

In the 35 years leading up to 2003, there was an average of one mid-air collision per year. However, since December 2007 there have been seven mid-air collisions, resulting in nine fatalities. This is a concerning increase. The majority of mid-air collisions occurred in the circuit area. Additionally, there have been a number of 'near misses' at busy aerodromes. Detailed are some key safety factors and practical recommendations to assist pilots in avoiding mid-air collisions. This list is not exhaustive, nor are these recommendations the only factors a pilot should consider.



Example of a near-miss in the circuit: always know what is going on around you.

Situational awareness

Maintaining situational awareness can save your life

- know what is going on around you;
- predict what could happen.

High cockpit workload is a significant factor in a pilot losing situational awareness. High traffic density, radio congestion, instructional flights and inexperience can increase cockpit workload.

Make sure you:

- prepare and plan your flight;
- prioritize your tasks and remain alert;
- listen for other radio calls to identify other aircraft positions;
- consider re-scheduling if traffic density or radio congestion increase to an uncomfortable level.

You need heightened situational awareness during diverse and complex circuit operations at busy aerodromes. Infringement of opposite circuit flight paths during contra circuit operations[1] and management of different aircraft speeds and performance in the circuit are especially important factors.

To minimize these risks, you should:

- remain clear of the opposite circuit, don't drift after takeoff and don't overshoot turning onto finals;
- maintain an active lookout for traffic in the other circuit;
- familiarize yourself with the speed and performance of other aircraft.

Lookout

The first and last line of defence

An effective lookout is essential—always assume that you are not alone. 'See and avoid' principles are commonly used, but have limitations. 'Alerted see and avoid' can be more effective, but is not always possible. Most mid-air collisions occur when one aircraft collides with another from behind, or both aircraft converge from a similar direction.

You should:

- maintain an effective lookout in all directions, including behind;
- not become complacent, even if you are familiar with an aerodrome;

1 "Contra circuit operations" (or contra-rotating circuit patterns) is a terminology used in Australia. In cases where two or more parallel runways are in operation concurrently, the aircraft operating on the outermost runways are required to perform their patterns in a direction which will not conflict with the other runways. Thus, one runway may be operating with a left-hand pattern direction, and the other one will be operating with a right-hand pattern direction. This allows aircraft to maintain maximum separation during their patterns, however it is important that the aircraft do not stray past the centreline of the runway when joining the final leg, so as to avoid potential collisions.

- increase vigilance in high-risk areas, including inbound reporting points and in the circuit area;
- ensure you sight any preceding aircraft before turning finals, otherwise consider going around;
- be aware of, and manage blind spots as part of your lookout technique;
- use strobes, beacons and landing lights to increase aircraft visibility;
- turn your transponder on, code 1200, ALT mode.

Radio procedures

Talk is not cheap

Aviate, navigate and communicate—they're your priority. Effective communication assists situational awareness.

Incident reports show pilots sometimes do not follow or understand instructions given by air traffic control (ATC). When ATC gives you an instruction, you should:

- acknowledge ATC in a timely manner;
- think about what is required and then action the instruction;
- tell ATC if you do not think you can comply with an instruction;
- advise ATC if you do not understand an instruction;
- not be afraid to ask ATC for assistance[2].

2 Over the years we received a lot of mail from pilots who are intimidated by ATC, for having been scolded on the air due to a variety of honest mistakes, resulting in a fear of controllers. Pilots must get over this and not be afraid to call, question, ask for repeats, etc. Similarly, controllers must be patient and understanding of pilots who do request or require assistance. —*Ed.*

When an aircraft is equipped with dual radios, incorrect selection of frequencies or transmission mode may create communication difficulties. To avoid these:

- always confirm that the frequency, transmit selector and volume control are set for the radio in use;
- ensure you have received and understood the ATIS well before the approach point.

Pilots can become confused when they receive an unexpected instruction from ATC, or are unable to make a planned radio call. To avoid confusion:

- have an alternative plan if you are unable to make your inbound call to ATC due to frequency congestion;
- monitor radio communications, and do not transmit during ATC instruction and responses with other aircraft;
- make radio calls brief, clear, to the point and use standard phraseology.

Often pilots do not have a contingency plan for frequency congestion. Common congestion problems occur at approach points and on final approach. Remember:

- if the frequency is congested, have a 'plan B';
- consider specific risks at your location;
- consider re-scheduling if traffic density or radio congestion increase to an uncomfortable level.

The publication of this CASA article was planned before the February 9, 2011 mid-air collision between two Cessna 150 aircraft flying formation in British Columbia. We will report on that collision in a future issue of the ASL, but in the meantime, we are republishing the following article from Issue 4/1996 of the Aviation Safety Vortex *on some of the hidden hazards of formation flying. Since we tend to repeat accidents, it makes sense to repeat the lessons learned. —Ed.*

Hey, Let's Do The Next Leg Together!

Article previously published in Aviation Safety Vortex *Issue 4/1996. It is republished in ASL 3/2011 for the enduring lessons it conveys.*

Beware of this phrase! For many reasons, even the simplest of "same way same day" flights can go wrong. Uncertain decision-making, poor formation skills and discipline, and lack of communications between aircraft, are just a few. The military recognizes that formation flying can be hazardous; they authorize it only when necessary, and then, only after the pilots meet stringent requirements. In the civilian world, formation flying is at least as hazardous and probably more so (most commercial pilots aren't trained to fly formation), and it's totally unnecessary. Despite this, we have seen, since 1993[1], four formation or "same way same day" related helicopter accidents, two of them resulting in six deaths.

MD 500D involved in mid-air with a second MD 500 near Yellowknife, N.W.T.

1 As of the date of the original article (1996).

The Transport Canada definition of **"formation flight"** is: "More than one aircraft which, by prior arrangement between the pilots, normally operate as a single aircraft with regard to navigation and position reporting."

The *Transport Canada Aeronautical Information Manual* (TC AIM) Section RAC 12.13[2] adds: "Formation flight is considered to be more than one aircraft which, by prior arrangement between each of the pilots involved within the formation, operates as a single aircraft with regard to navigation and ATC procedures. Separation between aircraft within the formation is the responsibility of the flight leader and the pilots of the other aircraft within the formation. This includes transition periods when aircraft within the formation are manoeuvring to attain separation from each other to effect individual control, and during join-up and breakaway."

You might think you aren't in formation if you aren't welded to lead like a Snowbird (Canadian military formation demonstration team). However, if you're on the same flight plan and are flying within 1 mi. and 100 ft of the lead's altitude, you are. ATC considers any formation to be 1 NM wide, 1 mi. long, and 100 ft thick, and they protect airspace accordingly for CVFR and VFR flights.

Question: If you can be a mile away and still be in "formation", why is this "formation" flying considered hazardous?

Answer: Because you surrender some of your decision-making ability.

Consider the following:

Two helicopters are being ferried cross-country. You toss a coin to choose lead and "win" the toss. You turn your brain off and have another coffee while lead files the flight plan. The first legs are uneventful, lead is half a mile ahead and there are good tunes on the ADF. Midway through the third leg, the weather starts to close in. You move up a little to keep lead in sight. The visibility drops gradually and you tuck it in. Better turn off that darned music! You're now concentrating on lead. You can't get too close, but can't afford to lose him in the goo.

He must be thinking about turning around because you sure are! But you're not sure just how you would do it. He better not turn into you. You're thinking you should land but there are no suitable spots and right now, your only "situational awareness" is that you don't like this situation one bit. You don't know where you am, you don't know where to go, or even where the maps are. You'd better hang on to lead. It's odd that he hasn't called lately, but he does have his hands full. Suddenly, a wire flashes by the chin bubble. Lead flares, you haul back on the cyclic and it's too late.

Does this all sound far-fetched? After all, it's just a bit of fiction, isn't it? You would never follow someone into adverse conditions, would you?

Consider the following:

"The wreckage trail is consistent with a mid-air collision of two helicopters flying in formation. This is also compatible with eyewitness reports of the helicopters flying in formation on their route of flight earlier that afternoon.

It could not be determined why the pilots involved in this occurrence elected to fly in formation. There were no apparent operational or technical reasons to do so. The specific cause of the collision could not be determined. In light of the rain and isolated thunderstorms reported in the Edmundston area during the afternoon of the occurrence, it is possible that the aircraft entered localized adverse weather conditions. The limited burn damage to the vegetation surrounding the wreckage, despite the presence of an obviously intense fire, is also consistent with moderate to heavy rain occurring at the time, which would have confined the spread of the fire. This rain would have degraded the pilots' visibility and possibly contributed to the collision."

TSB Report A93Q0157

"A Bell 206B helicopter was the second in a flight of six helicopters transporting passengers out to the ice-covered Gulf of St. Lawrence to observe seals. Approximately 40 minutes into the flight, the helicopter entered a whiteout condition and the pilot lost all visual reference. The pilot reduced speed and started a slow descent but was unable to pick out any visual cues. Just prior to the Bell 206B striking the ice, the pilot of the third helicopter advised the pilot of the Bell 206B to pull up. The pilot then pulled full up collective pitch but was unable to stop the descent in time to prevent the impact with the ice. The impact tore off the floats and the helicopter spun around coming to rest in an upright attitude facing 180 degrees to the direction of flight. The occupants were picked up by the other helicopters and transported to Charlottetown."

TSB Report A93A0060

2 The original article referred to *Aeronautical Information Publication* (A.I.P.), Rules of The Air and Air Traffic Services (RAC)12.8

Six helicopters, full of passengers, nearly rolled it up on the sea-ice in whiteout conditions. Did the five wingmen surrender their free will and become so lemming-like they were willing to follow lead anywhere? Hardly. It can be a difficult decision to abandon a pre-planned flight route, even when you have been able to carefully assess all of the factors and have good "situational awareness". However, it's even tougher to let go of lead and strike out on a new track when you don't know which way is up. If you're following someone, you're not in a leadership position. Decisions become more difficult. Not because you are suddenly a less capable pilot, but because you are not in a decision-making role. You aren't collecting the information you need to make decisions. True, there's safety in numbers, and it's nice to know your pal is just a radio call away, but don't surrender your decision-making ability. File your own flight plan. Fly your own trip.

Paul Traversy, Ottawa

Except for aerial photography or other like activities, including authorized air show performances, there is no reason for civil aircraft to fly formation. When helicopters fly in formation, the lead pilot assumes responsibility for a number of flight decisions, including navigation and communication. The trail pilot must concentrate on maintaining position, at the exclusion of normal decision-making. When the weather turns sour, stress levels rise. Both pilots suffer heightened anxiety: the lead pilot in developing and modifying a game plan for two, and the trail pilot attempting to keep the lead in sight. Any bad decision by the lead has more than twice the normal potential for an accident due to the proximity and dependency of the second aircraft.

Rob Freeman, Ottawa △

COPA Corner: Night Flying Primer

The following article was published in the December 2010 issue of COPA Flight *under the "Pilot's Primer" column, and is reprinted with permission.*

CANADIAN OWNERS AND PILOTS ASSOCIATION

Night flight can be a whole lot of fun, especially on a clear moon-lit night, but night flight also presents additional hazards to the pilot over that of daytime flying.

These hazards mostly pertain to the reduced environmental cueing in darkness; cues that are heavily relied on by VFR pilots during daylight hours. This month I'll go over night flying in terms of the pilot and the aircraft equipment.

Psychologically, nighttime flying doesn't usually present new problems for the pilot to deal with. However, physiologically speaking, the pilot will experience a few changes that can significantly impact flight safety. Without a doubt, these changes all revolve around the eyes.

Nighttime flying presents new challenges for the eyes in several ways: 1) the eye is less adept (less visual acuity) at seeing objects at a distance, 2) the best area for viewing is no longer straight ahead (foveal view), 3) adapting to dark conditions takes time, and 4) there are several new illusions at night that can disorient the pilot. Awareness of these limitations is the first step to improving night time vision capability.

Vision is made possible by the light and colour receptors located on the retina at the back of the eye. Located more centrally near the optic nerve are the cones. The cones primary job is colour detection, but they also facilitate seeing distant objects and can focus to sharp detail.

The rods are located mainly in the periphery of the optic nerve, in a band around the cones and are most useful for locating peripheral movement. Fine detail and colour are not detected by the rods, so only shades of gray are seen. As a result of the characteristics of the rods and cones, a lack of normal light means that the rods are almost entirely responsible for visual identification of objects.

But this presents a problem since the center of viewing, right behind the pupil, does not support nighttime viewing, when the rods are doing most of the work.

Most people grow up being unaware that their eyes are not well designed to see straight ahead in dark or poorly lit environments. In fact, most people probably never figure out that nighttime vision can be measurably enhanced by using slightly off-centred viewing.

While an object can be best seen during the daytime by looking straight-ahead at it, at nighttime, it is best seen by moving the head slightly away from the object so that the image falls off-centre in the back of the eye (hence making better use of the rods).

Ignoring for a moment that everyone has a anatomical blind spot due to the location of the optical nerve precluding the existence of rods and cones at that location of the retina (rarely a problem due to there being two eyes), it is entirely possible to not see an object directly

ahead if it is dark. A slight shift of the head while keeping the eyes focused to the original area of interest will then allow the object to be seen.

Clearly, off-centred viewing is an important practice to keep in mind for effective night time viewing.

Although the rods are much more capable of facilitating vision in dark conditions, they do not adjust to the lack of light as fast as the cones. The cones will adjust to dim lighting in five to 10 minutes and be about 100 times more sensitive to light than prior to experiencing dark condition. The rods on the other hand take up to 30 minutes to fully adapt to the dark, but the end result is sensitivity 100,000 times better than in lit conditions.

This process of adaptation can be experienced by walking into a dark room and sitting down; initially, very little if anything will be visible in the room around you. Within about 10 minutes a noticeable improvement in acuity will have occurred. Continue to sit for another 20 minutes and you'll generally be able to see shapes and objects well enough to navigate around them.

Once the eyes adjust, the process can be quickly reversed by entering a well-lit area. Re-entering a dark environment will then cause the adaptation process to start all over again. The nature of this process, and its reversal, requires the pilot to be careful about exposure to bright lights once the dark adaptation has begun.

Temporary blindness is possible if exposed to a short burst of bright light (such as accidentally staring into a flashlight). While the eyes are recovering from a flash of light, visual illusions may occur, further exacerbating the recovery. Recognizing that illusions may occur is the only way to combat this potentially dangerous phenomenon.

If you think you might be exposed to a bright light during night flight, sometimes closing one eye will help. This way, you still have one eye adapted while the other is recovering.

There are several common nighttime illusions that pilots might experience. One such illusion is referred to as the autokinesis effect. If a pilot stares too long at a light (such as a lit object on the horizon) it will appear to move. The apparent movement might then distract the pilot and lead to spatial disorientation.

Likewise, even distant stationary lights can be confused with stars or other aircraft when seen on a clear night. Darker, lower visibility nights eliminate the horizon from view. As a result of these problems, reliance on the instruments for attitude orientation is often required.

One very dangerous illusion is referred to as the black-hole approach. This type of approach occurs when approaching a well-lit airport from non-lighted terrain. With the runway as the primary source of visual cues, disorientation is common.

Typically, the pilot will perceive their glide path to be too high and adjust to a lower than safe glide path and impact terrain or land short of the runway. Clearly, electronic or visual approach slope indications need to be followed when approaching a runway under these conditions.

An additional problem, regardless of the terrain lighting on approach, is that bright airport or runway lighting will make the runway appear closer than it actually is. The obvious ramification of this is that the pilot might let down too early. Again, rely on the electronic or visual approach slope indicators.

In the absence of those devices, preplan your approach profile by noting 1) the airport touchdown zone elevation, 2) terrain clearance information, and 3) how far out a standard decent should be started to arrive at the runway safely. If possible, at controlled airports, ask the controller to turn down the runway lights to the lowest step that still allows you to adequately see the dimensions of the runway.

One last illusion is called the moth effect. This effect is exactly what it sounds like: flying towards light! Since runway edge lighting is the key visual cue for runway alignment, more attention is given to the lights than where the centreline should be (unless the centreline is lit as well).

Under these conditions the pilot will have the tendency to drift off centreline towards the lights. Extra care should be taken to assure that the airplane evenly bisects the edge lights on the runway (i.e. on centreline!), and the best way to accomplish this is by looking farther down field during landing and takeoff (You can try this in your car on a road with no traffic; try to stay in the middle of your lane by looking just over the hood at the roadside edge line. I'll bet you have a hard time keeping the car centred! Now if you drive while looking farther ahead toward the centre of your lane, you'll be better able to keep the car centred).

Beyond the limitations of the human eye, the aircraft can present additional night time challenges if not properly equipped. Aircraft lighting is probably the most important equipment to consider.

If you've ever tried landing without a landing light at night, you know how tricky it can be. In airplanes that have both a taxi light and a landing light, I'll try to use only the taxi light until I absolutely need the landing light for takeoff and landing. This preserves the landing light for when it is needed most. But in a pinch, most taxi lights can double for a landing light should it burn out unexpectedly.

Although the landing light may not be specifically required for certain flights (as is the case in the United States) it also provides the benefit of adding visibility of your aircraft to others who might need to see and avoid.

Likewise, operating position lights is a must when it's dark. Since most position lights are difficult to see from the cockpit, a lights-on walk-around is necessary prior to night flight.

Finally, some sort of anti-collision light is also a must. Either strobes or a rotating beacon, depending on how your aircraft was originally certified, can suffice for anti-collision. My family's aircraft had both for added safety!

In addition to aircraft lighting, consider the regulatory requirements that may exist for your aircraft and/or your type of mission. For instance, in some cases, spare fuses (for older aircraft) may be required. The pilot should also have two hand-held light sources available. A D-cell white light flashlight for the preflight inspection and a red light flashlight for cockpit use are recommended.

Be sure to always check battery condition prior to intended use! And remember that red markings on charts will not show up well under red lighting so you may want a small white- or blue-light flashlight with an adjustable aperture so you can limit the amount of light and reduce the risk of destroying your night vision.

Finally, consider using supplemental oxygen (if equipped) for night flights above 5 000 MSL. Studies have shown that there is a significant reduction in visual capability above this altitude at night, and since the cones are already down for the count, you can't really afford any additional vision losses.

And since the eyes are extremely sensitive to reductions in oxygen, consider that anything that reduces the availability or transportation of oxygen will have an equally deleterious effect on night vision.

Included in the list of ways to reduce oxygen to the eyes are smoking, drinking, and certain drug use. Pilots don't drink and fly, so we can safely rule out that as a troublemaker (I hope!), but smoking can easily raise the physiological altitude of the pilot several thousand feet.

Drug use, prescription and non-prescription alike, can also limit or inhibit oxygen transportation to the eyes. A little research online will generally yield good information on side-effect and adverse reactions to common drugs, but please consult your aeromedical doctor prior to flying with any new drugs.

Avoiding the problems of night time illusions is mainly accomplished by being aware of their existence, and the limitations of sight in dark conditions. Having the right aircraft lighting equipment and personal lighting equipment is also a must.

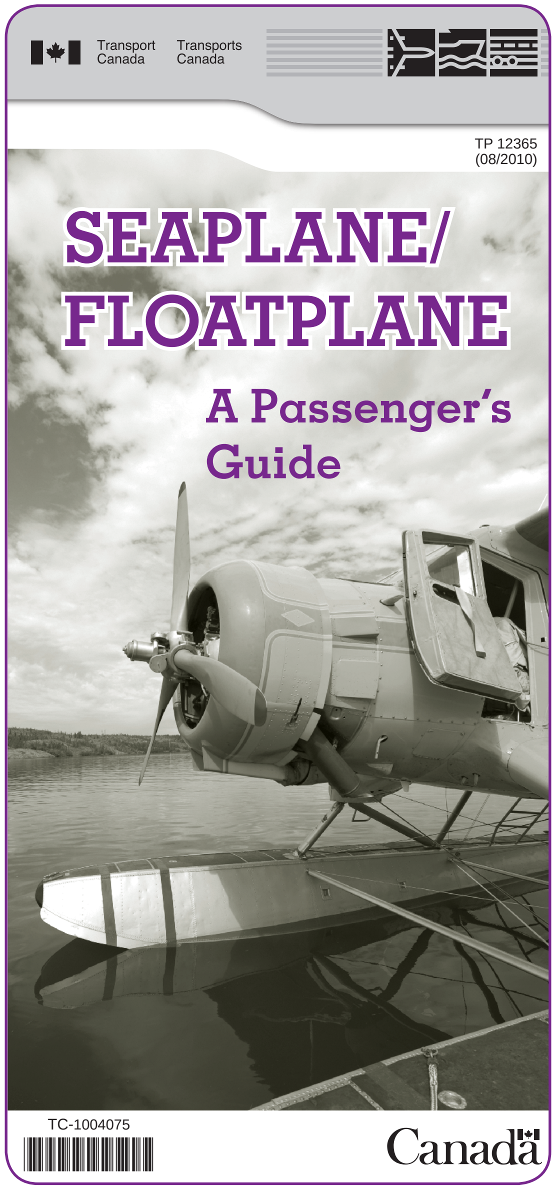
This month's Pilot Primer is written by Donald Anders Talleur, an Assistant Chief Flight Instructor at the University of Illinois, Institute of Aviation. He holds a joint appointment with the Professional Pilot Division and Human Factors Division. He has been flying since 1984 and in addition to flight instructing since 1990, he has worked on numerous research contracts for the Federal Aviation Administration (FAA), the Air Force, the Navy, the National Aeronautics and Space Administration (NASA), and the U.S. Army. He has authored or co-authored over 200 aviation related papers and articles and has an M.S. in Engineering Psychology, specializing in Aviation Human Factors. △

Risk Profile of Floatplane Operations

by Jim McMenemy, Manager, Safety Intelligence, Regulatory Branch, Civil Aviation, Transport Canada

After a fatal accident in the Pacific Region in late 2009, the Aviation Safety Analysis Division examined the risk profile of floatplane operations. The last comprehensive look at floatplane safety was the Transportation Safety Board Safety Study, *A Safety Study of Survivability in Seaplane Accidents*, published in 1994. That study analyzed over 1 400 floatplane accidents that occurred between 1976 and 1990. There were 103 fatal accidents on the water, accounting for 168 fatalities.

Transport Canada's (TC) safety analysts examined the seaplane accidents during the twenty-year period from 1990 to the end of 2009 to determine what had changed, to confirm the hazards, and to understand the dynamics by which those hazards manifest as risk. Using the Transportation Safety Board's Aviation Safety Information System (ASIS) database, we found 134 accidents on water accounting for 72 confirmed fatalities and five missing persons. The accident rate appears to be declining, but examination of investigation reports indicates that the survival issues remain unchanged. In this edition, the ASL hopes to shed some light on the survival issues and give some advice on how to protect yourself in case of an accident.



You can read, download or order the above brochure titled ***TP 12365 Seaplanes/Floatplanes - A Passenger's Guide*** *by visiting* www.tc.gc.ca/floatplanes

An accident on the water presents survival challenges above and beyond accidents on land. Most of those who perished in floatplane accidents survived the impact, but drowned inside the aircraft. Transport Canada Civil Aviation (TCCA) analysts concluded that the major survival issues in floatplane accidents are: egress, use of the shoulder restraint by front seat occupants and use of personal floatation devices.

As an aircraft settles after a water crash, the pressure of the water on the exterior surfaces can make it impossible to open doors or exits. The shock from sudden immersion in cold water can be incapacitating and make it impossible to hold your breath. The situation is further complicated in over half of the floatplane accidents because the aircraft ends up inverted in the water. To help people get out, knockout windows and new door handles have been designed and certified for the de Havilland Beaver and some operators have adopted them.

In situations when passengers did get out, investigation reports often cited that pilots helping passengers is the main factor in successful egress and survival. However, a significant number of reports indicated that pilots and front seat passengers who were not using available shoulder restraints were incapacitated on impact. Not only were they unable to assist passengers, it is very likely that they blocked the way out for others.

The most important thing to think about in the event of an accident is getting out of the aircraft. Start thinking about that before you take your seat. Take a look around. If you are a passenger, listen to the pre-flight briefing. Ask questions if you are uncertain about anything. What are the ways out? Windows may not be marked as exits, but sometimes they are the only way out. Often people focus on the door they entered when they would be better off using another route. What if the aircraft is upside down? How will you find your way out? If you are the pilot, do a thorough job. Make sure your passengers understand what you tell them. This is probably the only chance you will have to prepare yourself.

If you are in the front seat, wear the shoulder restraint. It can protect you from being incapacitated and might allow you and others to escape. This is probably the easiest and most cost-effective enhancement to seaplane safety available. The shoulder belts are there but do not do any good unless you use them.

You should know where your personal floatation device (PFD) is located. Make sure it is within reach. Know how to put it on and how to inflate it. The investigation reports consistently showed that donning a PFD in the water is very difficult. Regulations do not require the wearing of a PFD in flight. Operator practices vary. If you do wear a PFD, never inflate it inside the aircraft.

Accident prevention is the best way to reduce injury and damage and TC will continue work at prevention in cooperation with the aviation community. Always remember that the floatplane operational environment presents significant risks so crew and passengers alike should be conscious of things that can save their lives if an accident occurs.

For more tips on survival, see TC's *Seaplane/Floatplane: A passenger's Guide*. Many operators have copies for their passengers. Download yours at: www.tc.gc.ca/floatplanes. There is also a short video on floatplane safety and survival at: www.tc.gc.ca/eng/mediaroom/video-menu.htm. △

Webster Memorial Trophy Competition Develops Safer Pilots

The John C. Webster Memorial Trophy Competition was established in 1932 by the late Dr. J. C. Webster of Shediac, New Brunswick, who wished to honour the memory of his son, John, who lost his life at St. Hubert, Que., in an aircraft accident, while practising to represent Canada in the Trans-Canada Air Pageant, an aerobatic flying competition. This annual event is intended to declare the "top amateur pilot in Canada", and is open to any Canadian citizen or landed immigrant holding a valid Canadian pilot's licence.

To be eligible, applicants must never have received pilot training from the Armed Forces, excluding Air Cadet flight training, or have used their pilot licences for hire or reward within the five years prior to the final competition month, and they must never have been declared a winner of the Webster Trophy. Regional finalists undergo two separate flight tests covering various phases of their pilot navigation skills and flying abilities and a practical written examination and a navigation planning exercise are administered. The winner, runner-up and all finalists receive a large number of prizes (products and/or services) from the competition sponsors as additional incentives to participate.

Past experience has shown that pilots enthusiastic to enter this prestigious and rewarding competition have determined that extra attention to detail in their flying abilities is necessary; consequently, most have endeavoured to receive additional flight training in order to develop more precise flying skills. In the past few years, the program has achieved a greater national awareness; its support has grown through involvement from all sectors of the aviation community, thus making it more a more attractive event to participate in.

In fact, organizers claim that flight test report marks submitted by applicants have increased significantly with every passing year, indicating that a higher standard of pilots are competing, which results in safer pilots. In 2010, out of all of the competitors who entered, approximately 40% had submitted flight test marks in the high 90s percentile, whereas the lowest received was still an admirable 76%. In addition, flight test reports received were very consistent from one region to the next. This indicates to the Webster Team that training across Canada is at a very high level. The incentive of possibly becoming a national finalist and perhaps acquiring the title of top amateur pilot in Canada definitely encourages competitors to work harder in their training. The results are extremely impressive.

Every year, the National Finals take place in a different location in Canada. In 2010, they were held in Calgary, Alta., hosted by the Calgary Flying Club. In 2011, the event is being hosted by Grondair in Saint-Frédéric, Que., from August 17–20. For more information, please visit www.webstertrophy.ca. △

Editor's note: In the **Repair and Modification of Amateur-built Aircraft** article that appeared in Issue 2/2011 of the *Aviation Safety Letter*, the "General Rule" section that provided definitions of "acceptable data" should have included the following: "drawings and methods found appropriate by a delegate in conformity with paragraph 4.2(o) and subsection 4.3(1) of the *Aeronautics Act*".

MAINTENANCE AND CERTIFICATION

Maintenance Schedule Approval: What is it and how do you get one?

by Dan Haughton, Civil Aviation Safety Inspector, Operational Airworthiness, Standards Branch, Civil Aviation, Transport Canada

Introduction

Section 605.86 of the *Canadian Aviation Regulations* (CAR) requires that all aircraft, other than ultra-light or hang-gliders, be maintained in accordance with a maintenance schedule that is approved by the Minister and that meets the requirements of Standard 625–*Aircraft Equipment and Maintenance Standard*. Standard 625.86 and Standard 625 Appendices B, C and D contain the specific requirements pertaining to the differing aircraft types and operations. Standard 625 Appendix B contains a useful and convenient chart that summarizes the requirements for the various aircraft types and operations.

There are essentially two types of maintenance schedules established by CAR 605.86. The first type, authorized by paragraph 605.86(1)(*a*) of the CARs, is considered to be "pre-approved" by the Minister and may be used without the need to submit any further documentation. The second type of maintenance schedule requires review by, and approval from Transport Canada Civil Aviation (TCCA) under subsection 605.86(2) of the CARs. This article will focus more on the second type. The process for developing this type of maintenance schedule and obtaining a Maintenance Schedule Approval (MSA) from TCCA will also be described.

Pre-Approved Schedules

Owners of small non-commercial aircraft and balloons (excluding pressurized turbine-powered aircraft) may choose to use the maintenance inspection schedule described in Standard 625 Appendix B, Part I or II, as applicable. The aircraft must undergo a complete inspection, as described by Appendix B, every 12 calendar months and the owner must also comply with Appendix C with respect to the out of phase tasks and equipment maintenance requirements.

The aircraft owner is required by CAR 605.94(1) to make an entry in the technical record stating that the aircraft is maintained pursuant to the requirements in Appendix B, Part I or II.

Schedules that require Transport Canada Approval

All other aircraft operators require an MSA, approved by the Minister under subsection 625.86(2) of the CARs. Depending on the aircraft type and operation, operators may chose to use either Appendices B and C or Appendices C and D of Standard 625 to develop their respective schedules.

The Appendix C items are out of phase tasks and equipment maintenance tasks, while Appendices B and D pertain to scheduled inspection tasks. The proposed maintenance schedule must contain the instructions and procedures for the performance of maintenance on the particular make and model of aircraft in the form of a checklist. The checklist will contain the items to be maintained, the nature or type of inspection or maintenance task to be performed, the proposed interval for the task and any tolerances applicable to the task.

Developing a maintenance schedule

When developing the aircraft maintenance schedule, the operator must consider all tasks from the manufacturer's recommendations and include any additional items necessary to ensure compliance with airworthiness limitations, such as component life limits, etc. The schedule must also take into account the aircraft's operational environment. For example, aircraft engaged in agricultural operations may require additional engine, landing gear and corrosion inspection tasks or increased task intervals. In addition, specific operational requirements, such as those for Instrument Flight Rules, Extended Range Operations, Category II & III approach minima, etc., may necessitate additional equipment maintenance requirements.

The applicant must review and evaluate any type certificate holder's recommendations and all maintenance requirements resulting from any modifications or repairs. This includes the recommendations issued by the type certificate holder (airframe, engine, or propeller), in the form of Instructions for Continued Airworthiness (ICA), Service Bulletins, and Service Letters, etc. The applicant must also consider any additional maintenance task recommendations issued by the holders of type design change approval documents, such as Supplementary Type Certificates (STC), Repair Design Approvals (RDA), etc.

The development of the maintenance schedule must be based on a Maintenance Review Board Report (MRBR), where one exists. Only when no MRBR exists for the aircraft can the owner base the development of the aircraft' s maintenance schedule on an alternative basis, such as the aircraft manufacturer's recommendations or on another Canadian operator's approved program, provided there are significant similarities between the types of operations. It may also be approved based on other data, such as schedules approved by other airworthiness authorities. When the owner or operator wishes to base the maintenance schedule on data other than the aircraft manufacturer's recommendations, the onus is on the owner to satisfy the Minister that the proposed basis is more appropriate for its particular operation.

Transport Canada (TC) has published TP 13094E as guidance material in order to assist owners and operators to develop maintenance schedules and it is available at no cost on the TC Web site at: www.tc.gc.ca/eng/civilaviation/publications/menu.htm.

The Application Procedure

The applicant submits the appropriate completed application form to their Principal Maintenance Inspector (PMI) or to the local TC Centre (TCC), along with the fee prescribed by CAR 104 Schedule IV. Form 24-0055A is applicable to small aircraft and Form 24-0055B is applicable to large aircraft. The forms are available on the TC Web site at the following link. wwwapps.tc.gc.ca/Corp-Serv-Gen/5/Forms-Formulaires/search.aspx.

The forms contain an expanding checklist for adding tasks; however, the data cannot be saved using the on-line form. The applicant would therefore have to re-type the data each time they sought to make revisions to the schedule. For that reason, it may be advisable for the applicant to create their own Table 1 and 3 checklist documents for attachment to the application form, in order to facilitate future amendments.

The first part of the form is used to record basic information, such as operator information, aircraft type and model, type of operation, annual utilization and it contains a section reserved for recording the applicant's signature and another for recording the maintenance schedule revision status.

The next section, Table 1, records the details of any required inspections, the schedule interval and any applicable tolerance to the interval. This section also records the details of the aircraft scheduled check cycle and an explanation of how the checks or series of checks are applied and interact with each other.

The operator must also complete Table 3, which describes the out of phase tasks and any equipment maintenance requirements. The applicant must review the list of out of phase items required by Standard 625 Appendix C for applicability and include those that are applicable.

The applicant must ensure to include all required aircraft and component inspections, component overhaul times, engine and propeller overhaul in Table 3 and any other inspections that are not included in the scheduled inspections in Table 1. In Table 2, the operator must provide a list of reference documents that were used as source documents to develop the maintenance schedule.

Finally, in the last section, the applicant must specify if it is a new or experienced operator of the aircraft type and what basis was chosen for the development of the maintenance schedule.

Approval and Revisions

Upon receipt of a maintenance schedule approval request, TC will perform a review of the application and supporting documentation. The depth of review required for TC approval will depend on the applicant's individual circumstances and the basis that was used to develop the applicant's maintenance schedule. TC will also advise the applicant if any additional documents are required and or if a site visit will be necessary.

The items that will be considered during the approval process include: the type of operation, environmental factors, the aircraft maintenance history, the age of the aircraft, the experience of the operating personnel, any maintenance schedules for similar aircraft types already in use by the operator, any additional equipment required by regulations, any airworthiness limitations, Supplemental Inspection Documents (SID), Corrosion Prevention Control Programs (CPCP) and any previous repairs to damaged tolerant structures. In addition to the airframe and systems, the schedule must also consider the engines, propellers, appliances, survival equipment, emergency equipment, etc., and must take into account any modifications made to the aircraft.

TC must approve the initial maintenance schedule and all subsequent amendments to the schedule. Except where specifically authorized in the operator's MCM, TC must approve all maintenance schedule amendments that relate to changes in the aircraft's operational role, for deletion of tasks, increase in task intervals, or any other significant changes. Prior approval is not required, however, for the addition of tasks or reductions of task intervals, the operator must notify TC at the earliest convenient opportunity. △

Emergency Locator Transmitter Programmable Dongle

The following article was prepared by the National Aircraft Certification Branch of Transport Canada Civil Aviation as a result of an Aviation Safety Information letter from the Transportation Safety Board of Canada (TSB).

On November 12, 2009, a privately owned and operated Robinson helicopter R44II took off from a worksite in Baie Trinité with a pilot and two passengers on board on a return flight to Baie Comeau, Qué. At 12:49 Eastern Standard Time (EST), the helicopter collided with one of two ground wires on top of a transmission line over the Franquelin River, 10 NM from Baie Comeau. The helicopter crashed on the riverbank and was destroyed. The pilot did not survive and both passengers were seriously injured. A passerby discovered the wreckage and sought help.

An emergency locator transmitter (ELT), manufactured in France by Kannad, model 406 AF-Compact (part number S1840501-01, serial number 2619976-0123), was installed in the helicopter. The ELT was capable of transmitting data on a 406 Mhz carrier frequency and audio on a 121.5 MHz carrier frequency. Upon acquiring the helicopter, the owner ensured the ELT was programmed and registered, as required. The unit was tested and found to be serviceable in January 2009.

During the accident investigation, the Transportation Safety Board (TSB) tested the helicopter's ELT in order to verify its serviceability. Although the unit was serviceable and had activated on impact, the ELT unit antenna had been severed.The COSPAS-SARSAT Canadian Mission Control Centre (CMCC) confirmed that no ELT signal had been detected by the satellite following the time of the accident. This likely explained the severed antenna, which rendered the signal weak, and the wreckage or surrounding terrain possibly shielded the localized signal.

It was also determined that the occurrence ELT was transmitting on the 'Test User Protocol' mode, a country code of 227 (France) and an identification code different from the beacon identification code included in the Canadian Beacon Registry (CBR) database.

Upon further investigation, it was found that this ELT was coupled with an out-of-factory programmable dongle containing a default manufacturer's code. A dongle is a connector plug, which contains a microchip. Refer to Figure 1.

Dongles are useful in fleets when a company needs to service an aircraft ELT. When a dongle is installed, it allows the ELT to be easily repaired or replaced without putting the aircraft out of service.

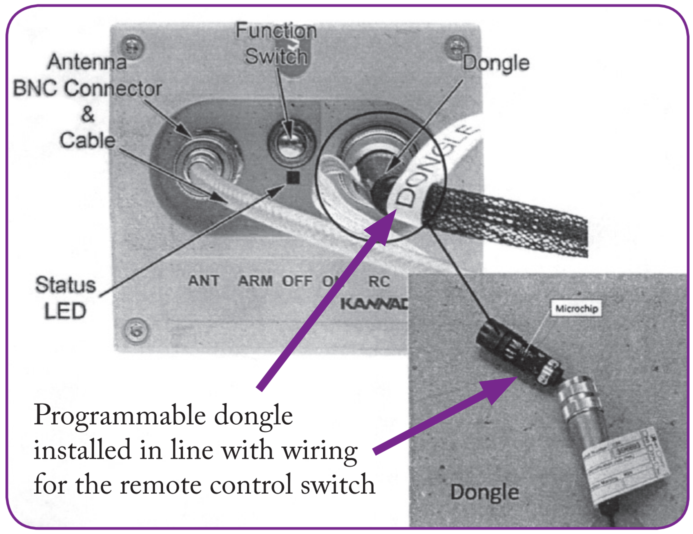
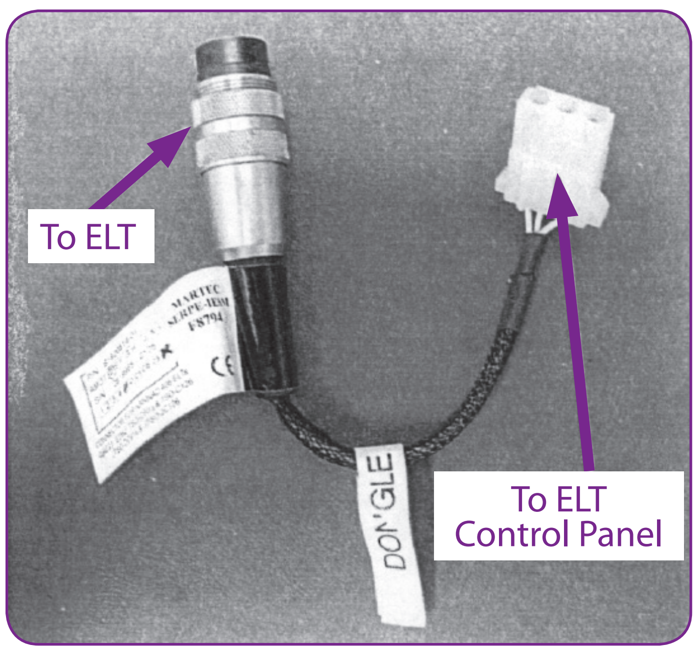


Figure 1, ELT & programmable dongle

Information specific to an ELT, such as the owner and aircraft, is programmed and stored in the dongle's non-volatile memory (NVM). When a new or replaced ELT is connected to the dongle, and the ELT is switched from the 'OFF' to the 'ARM' position, the dongle will automatically reprogram the ELT with the information stored in its NVM, including the ELT's 15 digits hexadecimal identification code (if the dongle is programmed correctly).



Dongle with three wires connector

In this particular accident, although the ELT was properly registered, programmed and tested serviceable in January 2009, the dongle had not been reprogrammed with the helicopter's specific information. Maintenance personnel did not know the dongle was programmable and the avionic shop was not aware that this particular ELT installation included a programmable dongle.

Any transmission on the Test User Protocol mode, if received by the COSPAS-SARSAT CMCC may not be treated as though it had been received in the normal mode.

Since 406 MHz ELTs are new to the industry altogether, Transport Canada (TC) and the TSB recommend that aircraft operators, owners, maintenance and avionics facilities be aware of the purpose of the programmable dongle and the importance of ensuring that the programmed information is correct. Dongles need to be reprogrammed when the aircraft country of registration changes.

TC recommends checking if a dongle is installed and programmed correctly at the next ELT servicing. △

Elementary Work Entries in the Journey Log

by Steve McLeod, Civil Aviation Safety Inspector, Aircraft Maintenance and Manufacturing, Sudbury Transport Canada Centre, Ontario Region, Civil Aviation, Transport Canada

During ramp inspections of CAR 703 commercial floatplane operators by Transport Canada inspectors, one issue was prevalent with each aircraft inspected. All the pilots interviewed during the ramp inspection of their aircraft acknowledged that they removed and installed passenger seats, but none of them made the corresponding journey log entry for the work completed. Of the elementary work tasks listed in CAR 625, Appendix A, "the removal and replacement of role equipment designed for rapid removal and replacement", in this case aircraft passenger seats, is one of the most common tasks performed by commercial floatplane operators.

Depending on the nature of the flight, the aircraft will either be configured for cargo, passengers or both. Aircraft like the DHC-2 Beaver use seats that have a quick disconnect, allowing them to be removed from the aircraft, while the DHC-3 Otter and the Beech 18 have seats that fold up along the side of the fuselage. Regardless of the aircraft and seat attachment means, the performance of any task designated as elementary work shall be entered in the journey log of the aircraft in accordance with CAR 605.94, Schedule I. This entry is required as soon as it is practical to do so, once the elementary work is performed, before the next flight, at the latest.

Seat installation becomes more of an issue when we refer to Airworthiness Directive (AD) CF-85-03R1, applicable to the DHC-3 Otter cabin utility seats. This AD addresses the disengagement of the front leg of the seat from the keyhole slot in the floor, which creates a hazard to the occupants. There is a check of the forward seat leg associated with this AD that ensures the front leg is secure; it is carried out at intervals not to exceed 100 hr time in service and after each time the seats are moved from the stowed position to the deployed position. If, during the check, the seat leg can be released from the keyhole slot, the seat must be removed from service. A pilot briefed on the procedure can carry out this inspection.

A modification from the manufacturer, adding a positive lock to the front leg of the seat, provides relief from the check outlined in the AD. However, should the forward lock become unserviceable, the check outlined in the AD must be carried out.

In addition to the seat removal and installation, there is a requirement to indicate the correct aircraft configuration for weight and balance purposes. Typically an aircraft is weighed with the seats installed and are therefore included in the basic empty weight of the aircraft. If the seats are removed to change the configuration of the aircraft, the weight and balance have to be amended. Operators who frequently take seats in and out will have different aircraft configurations already calculated, complete with the required maintenance release. When the aircraft configuration is changed, the applicable weight and balance addendum is used to indicate the basic empty weight and centre of gravity for that configuration. In addition to the elementary task entry, CAR 571, Appendix C (3)(*b*) requires the current applicable addendum to be identified in the aircraft journey log.

CAR 703 operators include the policies and procedures for the training and authorization to perform elementary work and servicing in their Maintenance Control Manuals. Initial and recurrent training should include the recording requirements of the performance of elementary work and servicing and the corresponding weight and balance requirements as applicable. The person responsible for maintenance during their review of aircraft journey logbooks will be able to determine if the required elementary work and applicable weight and balance addendum entries are being made. △

The following summaries are extracted from Final Reports issued by the Transportation Safety Board of Canada (TSB). They have been de-identified and include the TSB's synopsis and selected findings. Some excerpts from the analysis section may be included, where needed, to better understand the findings. For more information, contact the TSB or visit their Web site at www.tsb.gc.ca. *—Ed.*

TSB Final Report A07W0138—Loss of Control and Collision with Terrain

On July 23, 2007, an Aerospatiale AS350BA helicopter was en route from a staging site at Johnson Lake to Fort McMurray, Alta., with the pilot and four heli-tack firefighters on board. About 20 minutes into the flight, as the helicopter was cruising at about 1 500 ft above ground level (AGL), the pilot initiated a rapid descent to just above the tree tops, and lost control of the helicopter when he attempted to level off. The helicopter rolled right, nosed down, struck the marshy terrain, and rolled over onto its left side. One passenger was fatally injured, and the other occupants were seriously injured. One of the passengers manually switched on the emergency locator transmitter, while another passenger contacted the forestry radio dispatcher on his radio. Rescue helicopters were dispatched immediately and arrived at the accident site within an hour. The time of occurrence was about 20:00 Mountain Daylight Time (MDT).

Other factual information

The flight initially climbed to, and cruised at, an altitude of about 1 500 ft AGL. About 20 minutes later, the pilot descended to a lower altitude to observe wildlife. He did not notify the unit leader or consult with the passengers. Instead of lowering the collective to descend, the pilot pushed the cyclic forward to lower the nose of the helicopter and increase the airspeed. On reaching an altitude just above the treetops, the pilot attempted to level off by raising the collective slightly and pulling back on the cyclic. However, the cyclic control could not be moved. As the pilot continued to pull back on the cyclic with both hands, the helicopter rolled to the right, pitched up, then dove into the ground and came to rest on its left side. The passenger in the left rear seat was ejected from the helicopter when his inboard seat belt attachment failed and he became trapped under the fuselage.

Servo transparency

Awareness of servo transparency and recovery was part of the pilot's initial and recurrent ground training on the AS350 series helicopters. It was reported that the pilot had previously flown in a similar manner on other flights when transiting between bases, with sudden climbs, descents, and pull-ups. Some of the passengers reportedly were discomforted by the manoeuvres; however, no complaints were submitted.

The terms servo transparency, servo reversibility, and jack stall all refer to the phenomenon whereby the aerodynamic forces on the rotor blades can exceed the opposing power of the hydraulic servos to control the blade pitch. This phenomenon can occur in any helicopter that has hydraulically actuated flight controls. Factors that affect servo transparency are as follows: high airspeed, high collective pitch, high gross weight, high g loads, and high density altitudes. The maximum force the servo actuators can produce is constant, and is a function of hydraulic pressure, the servo characteristics, and possibly the level of maintenance of the system. All components of the hydraulic system, with emphasis on the servos, were examined after the wreckage was recovered to Fort McMurray. No anomalies were found.

The manufacturer has stated that the transparency phenomenon in AS350s is non-violent and transitory, and normally lasts for a period of two to three seconds. The controls are fully operable throughout the event. However, the force required to move the controls increases significantly, to the extent that an unknowing pilot may think that the controls are jammed. On AS350s with a clockwise main rotor rotation (as viewed from above), the right servo receives the highest load; therefore, servo transparency will result in an uncommanded cyclic movement to the right and aft. This will cause the aircraft to roll to the right and pitch up. Normal recovery procedure is to decrease the aerodynamic load on the main rotor by lowering the collective. Depending on the aircraft weight, speed, and atmospheric conditions, the manufacturer has calculated that servo transparency can occur at g loads as low as 1.5 g.

On May 14, 2007, the Australian Civil Aviation Safety Authority issued Airworthiness Bulletin (AWB) 27-008, based on Federal Aviation Administration Special Airworthiness Bulletin (SAIB) SW-04-35 issued on December 19, 2002. These bulletins reference Eurocopter Service Letters 1648-29-03 for the Astar (AS350) family and 1649-29-03 for the Colibri (EC120) family, and provide detailed information on servo transparency, as well as recommendations to reduce the possibility of encountering the phenomenon.

Analysis

The atmospheric conditions, aircraft weight, and the pilot's manoeuvres at the time of the occurrence were conducive to the onset of servo transparency, a phenomenon the pilot was aware of, and had been trained to recognize. He was not able to translate his training into a conditioned response: to lower the collective instead of fighting the cyclic, when the event occurred. The altitude and proximity to the trees at which the pull-up was initiated did not allow sufficient time for the pilot to correct his initial reaction. Servo transparency in AS350s is a well-known phenomenon and the recent service letters and airworthiness bulletins emphasize the need for operators and pilots to be more actively aware of the onset conditions and recovery procedures.

The passengers were not weighed, nor were the weights recorded or presented to the pilot, who did not complete an accurate weight and balance report before departure. These actions created the potential for the weight and balance to be outside allowable limits. This in turn introduces a risk that the helicopter performance could be affected. The gross weight, one of the factors affecting the onset of servo transparency, needs to be closely monitored by the pilot.

Findings as to causes and contributing factors

1. The pilot initiated a sudden high-speed descent, and experienced a loss of control due to servo transparency when he attempted to level off at the bottom of the descent.

2. The pilot did not initiate the correct recovery procedure when servo transparency was experienced and, due to the proximity to the trees, insufficient time remained for the pilot to correct his initial reaction.

Findings as to risk

1. The pilot had previously initiated sudden climbs and high-speed descents that were not standard operating procedures. These manoeuvres had not been reported to Alberta Sustainable Resource Development (ASRD) or to the helicopter operator.

2. The pilot did not complete a weight and balance report before departure. Therefore, the pilot could not confirm if the helicopter was being operated within allowable limits.

Safety action taken

Alberta Sustainable Resource Development (ASRD) amended its Representative Responsibility Standard Operating Procedure (SOP) with the addition of several detailed criteria regarding passenger and cargo weights (*see final report on TSB Web site for more details*).

TSB Final Report A07W0186—Engine Failure and Collision with Terrain

On October 26, 2007, a privately operated Piper Malibu PA46-310P was en route from Salem, OR, to Springbank, Alta., on an instrument flight rules flight plan. During the descent through 17 000 ft at approximately 55 NM southwest of Calgary, the pilot declared an emergency with the Edmonton Area Control Centre, indicating that the engine had failed. The pilot attempted an emergency landing at the Fairmont Hot Springs airport in B.C., but crashed at night at about 19:12 MDT, 11 NM east of Invermere, B.C., at approximately 3 633 ft ASL in wooded terrain in the Rocky Mountain ranges. The pilot and two passengers were fatally injured.

The aircraft was certified, equipped, and maintained in accordance with existing regulations and approved procedures. In the summer preceding the accident, the engine developed a knocking sound that was audible when power was reduced for landing. This had not been entered into logbooks nor reported to any maintenance facility. All flights on the day of the accident were carried out without the oil filler cap in place, as it was found at the hangar where the aircraft was kept. The absence of the oil filler cap could have resulted in the loss of engine oil, but its absence did not result in any loss of oil through that opening. The crankcase oil breather has a tube running from the dipstick opening to the breather canister. There was no evidence of oil accumulation here or at the bottom of the cowling.

Two alternators generate electrical power, one belt-driven and one gear-driven. The gear-driven alternator derives its rotational power from a gear bolted to the crankshaft between the number four and five main journals. This in turn drives the alternator coupler. This coupler consists of a sleeve with an attached cup, locked to the alternator shaft. The cup is driven by a formed rubber ring on the inner surface of the cup outer wall, which is then attached to the gear on the alternator shaft. The alternator drive hub is designed to slip when abnormal torque is required to rotate the alternator shaft. This prevents engine damage or loss of power in the event of an alternator seizure.

In the months before the occurrence, a number of maintenance actions were performed on the gear-driven alternator as a result of alternator failure indication. The alternator drive coupling was replaced approximately five flight hours prior to the accident flight. The coupling that was removed had a substantial amount of rubber material missing from both the front and back surfaces. This allowed the slip joint to spin and not lock to the cup as is normally the case. The coupling also made use of a handmade unapproved flat washer inside the cup that had a number of very rough edges and markings. This type of alternator is not designed to be used with such a washer, nor is it approved as a repair for continued airworthiness of the engine.

This washer was found to have forced the rubber ring further out of the cup and engage the gear teeth of the crankshaft alternator drive gear. This resulted in the destruction of the rubber portion of the coupling. Rubber particles of various sizes found their way into the engine sump (*see Photo 1*).

The rubber particles found in the engine sump matched those of the old coupling. In addition, several of the lifters contained rubber debris, indicating that the oil filter had been in a bypass state, allowing debris to flow into the system. The oil filter was also found to contain a large amount of rubber and metal debris. When the coupling was changed, the engine oil and filter were not changed, nor was the engine oil system flushed. The engine

Photo 1. Gear damage to rubber material

maintenance manual recommends checking the oil filter for metal debris during oil changes, but does not specify checking for other types of debris during other forms of maintenance. The engine manufacturer issued Service Bulletin M84-5 in 1984 that addressed gear-driven alternator malfunctions on all of its 520 series engines. It specifies that if any contamination is found upon removal of the alternator, the oil sump must be removed, the pick up cleaned or replaced, and, if anything further is found, a Teledyne Continental service representative should be contacted. This service bulletin does not apply to the 550 series engines even though they are equipped with gear-driven alternators. Standard industry practice is to check oil systems when contamination of any kind is found or known about, to flush the system, and to ascertain the source before releasing the aircraft for flight.

The top of the engine at centreline had a large hole over the number two connecting rod. The crankshaft and the number two connecting rod had indications of extreme heat, which was localized to this area (*see Photos 2 and 3*). The number two main bearing on one side was broken due to low-cycle pounding stresses. The number two piston had been making contact over time with its cylinder head and valves.

Photo 2. Heat and contact damage to connecting rod 2

Photo 3. Crankshaft showing heated area

Analysis

Examination of the airframe wreckage and its components found no indication of any mechanical malfunction that may have initiated or contributed to the accident.

Weather was also not considered to be a factor, though the darkness in the valley floor may have contributed to the pilot's inability to find a better location to conduct the forced landing. The wreckage trail and the evidence of impact forces indicate that the aircraft crashed in a stalled flight condition.

An unapproved, shop-made washer that had been installed in the alternator drive coupling contributed to a quantity of rubber debris entering the engine. The presence of the washer in the coupling also caused the rubber disc to contact the alternator spur gear on the crankshaft, causing more debris to enter the sump. This debris then restricted oil flow in the failed area of the engine. The industry standard check of oil systems when contamination is found or known to exist was not carried out. The company performing the maintenance did not benefit from guidance developed in Service Bulletin M84-5 as the bulletin did not include this series of engine even though it had a gear-driven alternator.

It is highly probable that the engine failure was initiated by a partial blockage of oil flow, caused by debris in the oil, to the number two connecting rod journal and bearing. This resulted in a progressive loosening of the clearances at that location, which allowed a gradual increase in piston stroke and increasing contact between the piston and the cylinder/valves. This looseness caused repeated reaction forces on the number two main bearing, pounding it until fatigue cracking broke up the left bearing shell. The connecting rod journal continued to overheat and elongate the bearing area until the lower connecting rod end cap nut came apart. Total engine failure and seizure then occurred.

The engine knocking that occurred during the summer prior to the accident was not noted in the journey log book nor mentioned to maintenance personnel. Early detection of the loosening and overheating parts might have prompted preventative maintenance.

Findings as to causes and contributing factors

1. An unapproved part was installed in the alternator coupling. This resulted in debris from the coupling causing a partial blockage of oil flow to the number two connecting rod bearing. This low oil flow caused overheating and failure of the bearings, connecting rod cap bolts and nuts, and the subsequent engine failure.
2. The engine failure occurred after sunset and the low-lighting conditions in the valley would have made selecting a suitable landing area difficult.
3. The engine knocking was not reported to maintenance personnel which prevented an opportunity to discover the deteriorating engine condition.

Finding as to risk

1. All flights on the day of the accident were carried out without the oil filler cap in place. The absence of the oil filler cap could have resulted in the loss of engine oil.

Other findings

1. There were no current instrument flight rules charts or approach plates on board the aircraft for the intended flight.
2. The Teledyne Continental Motors Service Bulletin M84-5 addressed only the 520 series engines and did not include other gear-driven alternator equipped engines.

Safety action taken

Teledyne Continental Motors states that it will update Service Bulletin M84-5 to include the 550 series engines. The Teledyne Continental Motors Instructions for

Continued Airworthiness will also be updated to reflect the content of Service Bulletin M84-5 as periodic updates to that document are performed.

TSB Final Report A08C0124—Fuel Starvation/ Forced Landing

On June 13, 2008, a Cessna 337D was returning to Buffalo Narrows, Sask., from Stony Rapids, Sask., after having dropped off a passenger. Approximately 14 mi. northeast of the airport, the pilot declared an emergency due to a double engine power loss. The pilot completed a forced landing in a swampy area on the east shore of Churchill Lake, Sask. The aircraft was substantially damaged. The pilot was transported to hospital in Île-à-la-Crosse, Sask., and was subsequently released with minor injuries. The accident occurred at about 11:40 Central Standard Time (CST).

Analysis

The pilot did not use any auxiliary tank fuel prior to completely exhausting the fuel in the main tanks. This procedure prevented a successful restart of either engine and is contrary to the procedures outlined in the C-337D owner's manual. The pilot's departure from the specified procedures and incorrect fuel estimate indicated that he did not fully understand the aircraft's fuel system.

The fuel selectors are located overhead on the cockpit ceiling, which requires that the pilot divert his attention from monitoring primary flight information when changing fuel selections. In a high-workload situation such as dealing with a dual-engine power loss, this cockpit configuration could complicate the management of the fuel system. The overhead location and tandem layout of the fuel selectors, along with the nomenclature of the system, which includes "aux" pumps that do not pump fuel from the "aux" tanks, can make operation of the C-337's fuel system confusing to pilots who are not totally familiar with its operation.

The higher rate of fuel consumption for the training flight as compared to cruise power fuel consumption contributed to the exhaustion of the fuel remaining in the main tanks.

Findings as to causes and contributing factors

1. The pilot's estimates of the fuel remaining in the main tanks and the amount required to complete a round trip to Stony Rapids were inaccurate. Consequently, both engines stopped operating when the fuel in the aircraft's main tanks was depleted.
2. The pilot did not have a full understanding of the aircraft's fuel system and was unaware of the method and sequence for accessing the fuel in the aircraft's auxiliary fuel tanks. As a result, the pilot's operation of the fuel system rendered the fuel in the auxiliary tanks unusable after the fuel in the main tanks was depleted and the engines could not be restarted.
3. The operator's training program for the C-337D did not establish or test the pilot's knowledge on how to operate the C-337D's fuel system.

Finding as to risk

1. The design and nomenclature of the C-337D fuel system complicates its operation during periods of high cockpit workload, thus increasing the risk of confusion.

Safety action taken

The operator has added questions to the C-337D training exam which test for knowledge of the operation of the fuel selectors, fuel management, and the auxiliary boost pumps.

TSB Final Report A09P0156— Engine Power Loss-Forced Landing

On June 12, 2009, an amateur-built Glastar was on a recreational flight from Yellowknife, N.W.T., to Kelowna, B.C., with two pilots on board. At approximately 14:01 Pacific Daylight Time (PDT), shortly after passing Chetwynd, B.C., a severe powerplant vibration and loss of power was experienced. The engine power was reduced to 1 000 RPM and a forced landing into a field was attempted. On short final, the aircraft struck a power line and veered off course to the right, where it struck trees and rising terrain. The pilot in the left seat received non-life threatening injuries. The pilot in the right seat was fatally injured. There was no emergency locator transmitter (ELT) signal and no fire. The switch on the ELT was found in the OFF position.

Examination of the wreckage revealed that the No. 2 cylinder head had separated from the base (*see Photo 1*) and the crankshaft was severed at the propeller flange. The engine had 212 hr total time since new (TTSN) when the failure occurred.

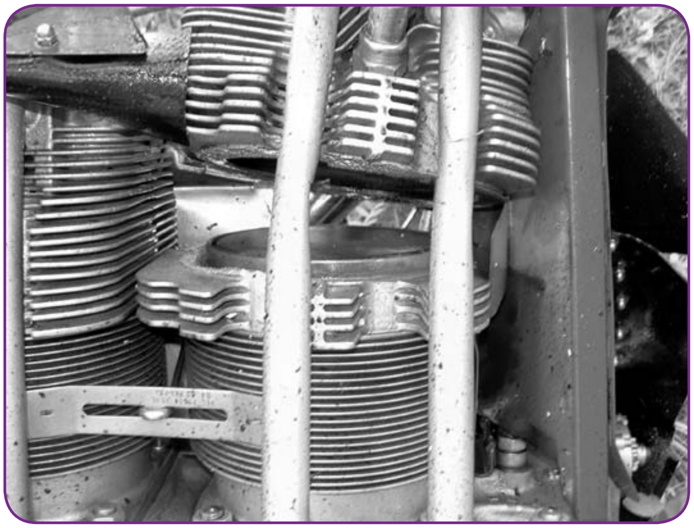


Photo 1: No. 2 cylinder head

The engine crankshaft sheared at the propeller hub and the propeller was found embedded in a tree at the accident site (*see Photo 2*). The propeller was nicked and scuffed in a manner consistent with striking the severed power line.

Photo 2: Propeller from the Glastar

The Aero Sport Power O-360-A2A engine is assembled by Aero Sport Power based in Kamloops, B.C. These engines are built using parts purchased from various suppliers who hold parts manufacturing authority (PMA) granted by the U.S. Federal Aviation Administration (FAA). The Aero Sport Power O-360-A2A can be described as a non-certificated clone of the Avco Lycoming O-360-A2A engine, which holds type certificate number E-286 issued by the FAA.

PMA parts may be sold with certification for use on type-certificated engines. The Aero Sport Power O-360-A2A engine is sold to amateur builders as an experimental engine, and no certification is required for this category by Transport Canada.

Aero Sport Power used cylinders manufactured by Engine Components Inc. (ECi). At the time of the build-up, Aero Sport Power installed pistons that increased the engine compression ratio from 8.5:1 to 9.2:1.

The failed cylinder assembly was sent to the TSB laboratory for examination. A fracture surface analysis of the No. 2 cylinder and sheared crankshaft was completed. The crankshaft propeller flange showed signs of minor hydrogen embrittlement. The sheared crankshaft was determined to be from overload fracturing due to impact. The minor hydrogen embrittlement was not causal to the accident.

In the fall of 2008, the FAA issued Airworthiness Directive (AD) 2008-19-05 regarding ECi cylinder assemblies installed on the Lycoming engines. The AD addressed a manufacturing defect that caused the cylinder head to separate from the base. It did not, however, address engines with increased compression ratios. Engines that are not type-certificated, such as the Aero Sport Power engines, were not mentioned in the AD. The cylinder head failure fracture surfaces were typical of fatigue failures addressed by this AD.

Prior to the issuance of AD 2008-19-05, ECi issued Mandatory Service Bulletin (MSB) 08-1. This MSB called for the inspection and replacement of the faulty cylinders by 350 hr total time in service.

On April 29, 2009, Aero Sport Power advised the owners of the occurrence aircraft by e-mail that three of their cylinders were affected by the ECi MSB. The surviving owner/pilot was not aware of AD 2008-19-05 or the MSB regarding the faulty cylinders. He also was not involved with the building of the aircraft. The deceased owner/pilot had built the aircraft. Aircraft records do not indicate compliance with the AD or MSB. However, records do show that differential pressure checks, required by the AD, were carried out. None of the differential pressure checks resulted in values that would have required further inspection and action in accordance with the AD. These checks were carried out 22 hr prior to the failure, during the last annual inspection and service.

Analysis

The failure of the cylinder head occurred at 212 TTSN, well in advance of the 350-hr limit set out in the AD. Compression checks completed 22 hr prior to the accident failed to detect a problem. This is not uncommon because compression tests will not necessarily detect an impending failure. It is possible that the premature failure of the cylinder head was due to the increased compression ratio of the engine.

The surviving owner/pilot was unaware that there was a critical AD that affected their engine. The deceased partner was notified by e-mail of the MSB, which was referenced in the AD, and he performed the required differential checks. There was plenty of time remaining before reaching the 350-hr limit on the cylinder head.

Transport Canada does not issue ADs for non-type-certificated aircraft, propellers, engines, and equipment; nor do they notify the owners of these aircraft of ADs that could adversely affect them.

The number of amateur-built, owner-maintained, and ultralight aircraft is growing. The onus is on the owners of these aircraft to ensure airworthiness. Without additional system safeguards, there is a greater risk that these aircraft will not be properly built and maintained.

These aircraft often operate in the vicinity of populated areas, thereby increasing the risk to the public and to property.

Findings as to causes and contributing factors

1. The failure of the No. 2 cylinder caused the engine to lose power.
2. During the attempted forced landing, the aircraft struck power lines, control was lost, and the aircraft collided with trees and terrain.

Finding as to risk

1. Non-type-certificated aircraft owners are not advised of, nor are the owners required to comply with, ADs that are potentially critical to aviation safety. This greatly increases the risk that important airworthiness issues may go unaddressed by the amateur-built community.

Other findings

1. The population of amateur-built, owner-maintained, and ultralight aircraft is growing. This increases the risk to the public and to property if they are not properly designed, produced, and maintained.
2. Evidence of minor hydrogen embrittlement was found in the crankshaft. While not causal to the accident, it increases the risk of material failure over time.

Safety action taken

Aero Sport Power

Aero Sport Power has notified all engine owners potentially affected by AD 2008-19-05 and those who have increased the compression ratio.

Recreational Aircraft Association of Canada

The Recreational Aircraft Association of Canada issued a notification to its members regarding AD 2008-19-05 and the possible effect of the increased compression ratio. This notification also reminded members how to search for ADs by aircraft registration using the Transport Canada Continuing Airworthiness Web Information System (CAWIS).

Danbury Aerospace

Danbury Aerospace, the parent company of Engine Components Inc. (ECi), has elected to limit the compression ratio of cylinders sold in engine kits. △

Coming soon in ASL 4/2011!

Update on the newly-formed *Floatplane Operators Association of British Columbia*!

In the meantime, check them out at: www.floatplaneoperators.org.

Accident Synopses

Note: The following accident synopses are Transportation Safety Board of Canada (TSB) Class 5 events, which occurred between November 1, 2010, and January 31, 2011. These occurrences do not meet the criteria of classes 1 through 4, and are recorded by the TSB for possible safety analysis, statistical reporting, or archival purposes. The narratives may have been updated by the TSB since publication. For more information on any individual event, please contact the TSB.

— On November 4, 2010, an **ATR 42-300** was parked on the ramp at Arviat, Nun. The #2 engine was running on speed with the parking brake set. As the #1 engine was brought out of feather during the start procedure, the landing gear unsafe chime rang. The nose gear lights (both upper and lower) indicated unsafe. The aircraft slowly settled to rest on the collapsed nose gear and gear doors. Maintenance action: replacement of nose gear and nose gear doors. *TSB File A10C0198*.

— On November 8, 2010, an **ultralight Challenger II** was carrying out touch-and-go landings at the airport in Lachute, Que. When the aircraft was landing on Runway 10, a wind squall carried it southward just before touchdown. The student pilot pulled up. The aircraft hit some trees about 75 m south of the runway. The aircraft sustained significant damage. The pilot was not injured. *TSB File A10Q0195*.

— On November 12, 2010, an **amateur-built Kitfox IV 1200** was on the ramp at Brantford, Ont., with the engine (Rotax 912UL) running. The passenger approached the aircraft to enter from the right side and inadvertently turned towards the propeller. Before the pilot could shut down the engine, the propeller struck the passenger's right shoulder resulting in serious injury. One propeller blade broke as a result of the impact. Emergency medical services responded and the passenger was taken to hospital for surgery. *TSB File A10O0239*.

— On November 12, 2010, an **advanced ultralight Quad City Challenger II/A** was carrying out touch-and-go landings on Runway 09 at the airport in Gatineau, Que. (CYND). During the initial climb, a wind squall carried the aircraft to the right about 20 ft above the ground. The right wing hit the grass and the aircraft turned before coming to a stop. The pilot, who was alone on board, was not injured. The aircraft sustained significant damage to the right wing, the front wheel and the nose. *TSB File A10Q0199*.

— On November 13, 2010, an **unregistered motorized parachute** was flying in the Sorel/Tracy area, above the town. The engine failed while the aircraft was at a low altitude and it struck the ground a few ft from a cycling path. The pilot was seriously injured. *TSB File A10Q0200*.

— On November 13, 2010, an **ultralight float-equipped Teratorn Tierra II** was on a VFR flight in the Luskville, Que., area. When landing on the glassy water of the Ottawa River, the aircraft struck the water hard and flipped over. The pilot was not injured. The aircraft sustained significant damage. *TSB File A10Q0201*.

— On November 18, 2010, a **float-equipped DHC-3T** aircraft was taking off at Kingcome Inlet, B.C., for a flight to Campbell River, B.C. Takeoff into the 8-10 kt wind was considered impractical because of a sandbar and rising terrain, so the takeoff was being made downwind. As the aircraft came up on the step, it was struck by a strong gust of wind, which caused a complete loss of rudder authority and the aircraft began to turn to the left. Full right rudder and a reduction of power could not arrest the left turn and the left wing struck a dolphin (marine structure). The aircraft was substantially damaged but the two occupants were not injured. *TSB File A10P0371*.

— On November 24, 2010, an **amateur-built Cyclone 180** was on a VFR flight to a water aerodrome in the Montréal area when it struck the ground approximately 4 NM southeast of Lake Simon, Que., its point of departure. The pilot, who was alone on board, sustained fatal injuries. The aircraft was destroyed by the impact, after which it burst into flames. Two TSB investigators were deployed to the accident site. *TSB File A10Q0208*.

— On November 28, 2010, a **Lancair IV-P** had departed from Edmonton City Centre, Alta. (CYXD) on an IFR flight plan for Wetaskiwin, Alta. (CEX3). Near the airport, the pilot cancelled IFR in favour of a VFR approach. The aircraft struck the ground approximately ½ mi. southwest of the threshold of Runway 30 on a track of 210 degrees. The aircraft bounced and skidded for 1 000 ft, losing the empennage, right wing and engine before coming to a rest. Both occupants walked away with minor injuries. *TSB File A10W0191*.

— On November 28, 2010, a **amateur-built Zenair CH200** was on approach to the Saugeen Municipal Airport (CPN4), Ont., when the engine (Continental O-200-A) lost power. The pilot conducted a forced approach and ditched the aircraft in Lake Rosalind, Ont. The landing on the lake surface caused substantial damage to the left wing, landing gear and engine. The aircraft sank shortly after it came to rest. The pilot drowned, as he was unable to evacuate the aircraft before it sank. *TSB File A10O0244*.

— On November 30, 2010, a **Piper PA-31** was conducting geographical surveys in the La Grande Rivière, Que., area when the right engine (a Lycoming TIO-540-A1A) surged significantly. The pilot secured the engine and declared an emergency when he saw that the aircraft could not maintain its altitude of about 1 200 ft. The pilot made an emergency landing about 12 mi. north of the La Grande Rivière airport (CYGL). The two occupants were uninjured. The aircraft was completely destroyed by fire. The pilot was able to make an emergency call with a cell phone and the two occupants were rescued a few minutes later by a helicopter that was in the area. The aircraft was equipped with a 406 MHz ELT, which activated on impact and sent a distress signal to the search and rescue centre. The two engines were dismantled. *TSB File A10Q0212*.

— On January 3, 2011, a **Beech B200** was landing on Runway 24 at Maple Creek (CJQ4), Sask. The runway was covered in snow. During the landing roll, the left main gear contacted deeper snow and the aircraft veered to the left. The left main gear caught a 14 in. windrow along the south edge of the runway and the pilot lost directional control. The aircraft departed the runway surface to the left and the nose gear collapsed. The aircraft sustained substantial damage to the nose and propellers. The pilot and two passengers were not injured. *TSB File A11C0002*.

— On January 4, 2011, an **Aerospatiale AS332L1 Super Puma helicopter** was undergoing ground runs for tail rotor balancing adjustments at Boundary Bay, B.C., after maintenance. A pilot was operating the helicopter, seated in the right seat, accompanied by three aircraft maintenance engineers (AME): one was seated at the left front next to the ground power unit (GPU), one was seated at the right front outside the rotor disc, and one was operating the balancing equipment at the rear. The #1 engine was started and moved to 97%, rotors turning. As the #2 engine was started, the helicopter began to rise off its right wheel and tilt to the left. It was assumed there was a flat tire, but confirmed not to be so. The pilot ensured the collective was down but the helicopter continued to roll to the left, ending up on its left side. Both engines were shut off and the three AMEs exited the immediate area. The pilot released himself from his harness, switched off electrical power and exited the helicopter from the right rear cabin door. The pilot sustained minor injuries. There was no fire but the helicopter was substantially damaged. *TSB File A11P0004*.

Super Puma resting on its side after rollover
Photo: Mr. Brad Jorgenson

— On January 6, 2011, a **Cessna 172RG** was returning to Regina, Sask., from Assiniboia, Sask., when the aircraft encountered deteriorating weather conditions. The pilot requested special VFR flight clearance into Regina, but the weather was below limits. The pilot requested a diversion to Moose Jaw, Sask., but the runway was closed. The pilot turned towards a private airstrip located near Lumsden, Sask., and at low altitude, lost visual reference with the ground. The aircraft struck the ground at a level attitude and bounced back into the air. The engine began to run rough and the pilot elected to land in a snow-covered field ahead. The pilot extended the landing gear and flaps and upon touchdown, the nose gear collapsed. The pilot escaped uninjured; however, the aircraft's propeller and nose gear were damaged. A subsequent examination of the aircraft revealed that the nose gear may have failed to extend due to gear door damage caused by the initial contact with the ground. *TSB File A11C0003*.

— On January 31, 2011, the pilot was starting a **basic ultralight Spectrum Beaver** for an intended local flight at the Welland/Niagara Central Airport (CNQ3), Ont. The aircraft is powered by a pusher propeller and is fitted with ski landing gear. The aircraft was equipped with a manual pull-starter that is operated from outside the aircraft. After the engine started, the aircraft moved forward and the pilot was struck by the propeller resulting in serious injury. *TSB File A11O0011*. △

Accident Synopses

Update on Passenger-Carrying Commercial Balloon Operations in Canada

by Flight Standards Division, Standards Branch, Civil Aviation, Transport Canada

Prior to the implementation of the *Canadian Aviation Regulations* (CARs) in 1996, balloon operators offering rides to fare-paying passengers were not subject to the requirements of *Air Regulations*, Part 700. In 1993, Transport Canada formally recognized the operation of balloons in Canada for the purpose of carrying fare-paying passengers. Following direct consultation with members of the ballooning community, a series of exemptions to the affected sections of the *Air Regulations* and an authorization were issued. The authorization contained a series of schedules that formed part of the exemption, with specific conditions that a balloon operator had to meet to ensure compliance with the exemptions.

With the implementation of the CARs in 1996, the conditions of the exemptions and authorization issued in 1993 were formalized in Part VI, Subpart 3 – Special Flight Operations, Division II – Balloons with Fare-paying Passengers. Under this regulatory structure, balloon operators carrying fare-paying passengers are required to obtain a Special Flight Operations Certificate and comply with the applicable standards. The standards outline requirements for balloon maintenance, crew member qualifications and passenger briefings.

Presently there are approximately 92 holders of Special Flight Operations Certificates – Balloons with Fare-paying passengers in Canada. There is no requirement to track the number of passengers carried, thus the estimated annual number of passengers carried, obtained unofficially from operators, varies from 12 000 to over 20 000.

From 1996 to 2008, there were a total of 84 incidents and 21 accidents involving balloons recorded in the Civil Aviation Daily Occurrence Reporting System (CADORS) database.

Following two serious balloon accidents in August 2007, Transport Canada, in 2008, carried out a risk assessment (RA) of the current regulatory structure pertaining to the carriage of fare-paying passengers in balloons. The main objectives of the RA, as outlined in the Terms of Reference (TOR) were:

- To assess the adequacy of Transport Canada's current safety oversight program for this activity.
- To examine all risks associated with fare-paying balloon operations.
- To identify an appropriate strategy and responsibility center for oversight of this activity to improve safety and reduce risks in the operation.

The RA team determined that the current regulatory structure "[...]was adequate but the departmental direction for monitoring the activity, albeit low risk, is somewhat lacking." The RA also contained recommendations that the team felt could improve safety and reduce risks in the operation of balloons with fare-paying passengers.

Upon completion of their investigation into the accidents, the Transportation Safety Board of Canada recommended that, "the Department of Transport ensure that passenger-carrying commercial balloon operations provide a level of safety equivalent to that established for other aircraft of equal passenger-carrying capacity."

An issue paper, *Regulation of Balloons with Fare Paying Passengers,* was presented at the Civil Aviation Regulation Advisory Council Technical Committee meeting November 2-6, 2009. Valuable information was heard from stakeholders to determine the way forward.

A proposal to approve the formation of a CARAC Working Group was presented at the June 2010 Civil Aviation Regulatory Committee (CARC) meeting. At the Civil Aviation Regulation Advisory Council Technical Committee meeting in November 2010, the Terms of Reference (TOR) for the Balloons with Fare-paying Passengers Working Group was finalized and the members were confirmed. The Working Group will use the 2008 risk assessment findings, in addition to examining industry best practices to make recommendations to the Technical Committee for regulatory changes or make recommendations to utilize any non-regulatory instruments to promote the safe operation of balloons with fare-paying passengers. The TOR for the working group outlines the purpose of the group as:

> *"The purpose of this new Balloons with Fare-Paying Passengers Working Group is to make recommendations on how to best provide an adequate level of safety to the public involved in sightseeing activities. This may include recommending amendments to existing regulations and standards and introducing new regulations and standards*

for balloon operations. These recommendations will require justifications since they will ultimately serve as the basis for Transport Canada to develop the Notices of Proposed Amendments (NPAs) that will be presented to the CARAC Technical Committee."

The TOR further defines the working group's direction with the following:

"Deliverables

The Working Group will make recommendations on topics including, but not limited to:

- *Conditions for issuance of a Special Flight Operations Certificate (SFOC);*
- *Safety Management System (SMS);*
- *Review existing operating regulations and standards for applicability to large envelopes, large baskets and large companies;*
- *Flight crew training, experience, currency and licensing;*
- *Ground crew training;*
- *Basket safety personnel;*
- *Passenger safety briefings;*
- *Flight planning;*
- *Flight information (altitude, airspace, weather information limitations);*
- *Safety equipment on board; and*
- *Any other topic identified by the Working Group that needs to be addressed to promote the safe operation of balloons with fare-paying passengers."*

To date, the Working Group has held two meetings via teleconference. The Working Group will present an interim report/update at the September 2011 CARAC Technical Committee meeting. The final report will be presented at the following CARAC Technical Committee meeting. △

Business Aviation: Transport Canada Taking Back Certification and Surveillance Authority

by Arlo Speer, Chief, Commercial Flight Standards, Standards, Civil Aviation, Transport Canada

On March 16, 2010, Transport Canada (TC) announced that as of April 1, 2011, it would take back all responsibility for the certification and oversight of business aviation in Canada from the Canadian Business Aviation Association (CBAA).

TC has always been responsible for regulatory safety oversight of the CBAA Private Operator Certificate (POC) program and the CBAA. Because certification and oversight of air operators is a core responsibility of TC, it was confirmed, after review, that these activities should not be conducted by the private sector for business aviation.

This transfer brings together all aspects of business aviation regulation, certification and safety monitoring into one organization: TC. This means greater consistency and an opportunity to identify common strategies to improve the already high level of safety found across the aviation industry.

The Transition Process

To facilitate this transition, a Transport Canada Civil Aviation Private Operator Program Steering Committee was created to coordinate and direct all activities required to ensure a straightforward transition from the Canada Business Aviation Association Private Operator Certificate program to a Transport Canada Civil Aviation (TCCA)-managed program, and to design and implement a framework for the new TCCA private operator program for the oversight of Canadian private operators.

To formalize the transition between CBAA and TCCA, the department issued, at no charge, Transport Canada Private Operator Certificates to operators who hold a valid CBAA Private Operator Certificate and comply with the conditions specified in that CBAA certificate. This allowed TC to provide operators with a Temporary Operator Certificate in April 2011.

On April 1, 2011, an interim order issued by the Minister of Transport came into effect. The interim order replaced current regulations found in Subpart 604 (624) of the *Canadian Aviation Regulations* (CARs) and addressed only those operators holding a CBAA Private Operator Certificate.

The development of new regulations for the long-term operation of aircraft under Subpart 604 of the CARs has continued and will be published, for consultation, in *Canada Gazette*, Part I, later this year.

The transition will progress until March 31, 2013, at which time the new regulations will replace the interim order and address all aspects of private aircraft operations. At this time, all private operators will need to hold Transport Canada Private Operator Certificates and comply with the Subpart 604.

Throughout this transition process, business aviation operators continue to be responsible for compliance with existing regulatory requirements and certifications.

Although business air operations are not available to the public at large, this sector is regulated under sections of the CARs due to the sophistication of the aircraft being operated. Canada is the only country that requires business aviation operators to hold an operator certificate for business aviation. The regulatory requirements for business aircraft in Canada have been in place since 1983. The new regulations in Subpart 604 are patterned after the International Civil Aviation Organization (ICAO) standards for corporate aviation operations. △

Contact Information

Transport Canada Regional Offices are responsible for ongoing certification and surveillance.

For specific service or oversight questions, please contact the regional office closest to your company headquarters.

Atlantic Region
1-800-387-4999

Quebec Region
(514) 633-3030

Ontario Region
(416) 952-0230
1-888-231-2330

Prairie and Northern Region
(204) 983-3152
1-888-463-0521

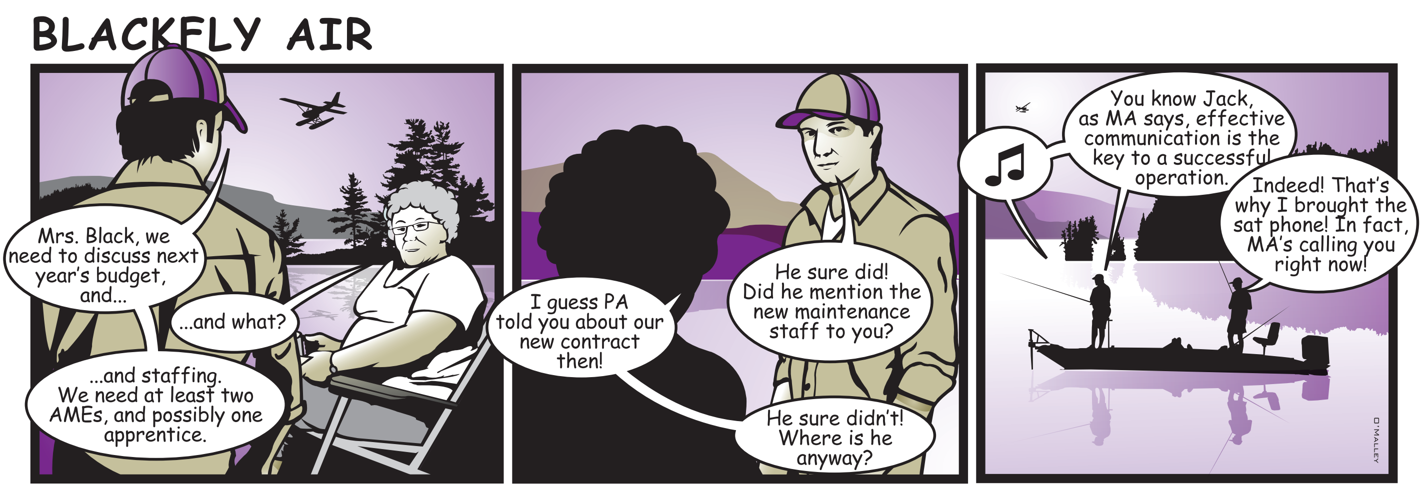
Pacific Region
(604) 666-3518

For general information, please contact the Civil Aviation Communications Centre at:
613-993-7284 / 1-800-305-2059

E-mail: services@tc.gc.ca

Treaty Training Coming Soon

The European Aviation Safety Agency (EASA)/ Transport Canada Civil Aviation (TCCA) Treaty is an agreement on civil aviation safety between the European Community and Canada, primarily focused on issues related to the certification of aeronautical products, design approvals, continued airworthiness, and maintenance. With ratification of the new TCCA/EASA Treaty expected to happen soon, Transport Canada is planning on offering training to introduce the changes. To find out more, please visit www.tc.gc.ca/eng/civilaviation/opssvs/training-courses-menu-747.htm.



Toe the CORRECT Line: Airport Vehicle Corridors

by Currie Russell, Safety and Security Supervisor, Region of Waterloo International Airport (YKF)

At many airports, particularly those with commercial air service, vehicle corridors are painted on the aprons to allow for the safe and orderly flow of service vehicles on airside. These corridors are painted to resemble roadways, with solid white lines on either side, and a dashed line down the middle to separate them into two opposing lanes. The primary role of vehicle corridors is to help ensure adequate separation of service vehicles from aircraft on parking stands.

On a number of occasions, I have observed small aircraft taxiing along the vehicle corridor while transiting our main terminal apron. I have also witnessed aircraft parked so close to our vehicle corridors that their wingtips were over the solid white line. These practices defeat the safety factor that vehicle corridors seek to provide.

This safety factor is determined by the code or class of aircraft the airport is designed to handle. In Canada, the *Manual of Aerodrome Standards and Recommended Practices* (TP312E) specifies the distance required from the centreline of a taxilane to any object in order to ensure adequate clearance for taxiing aircraft. This distance is related to the airport's design aircraft code number.

For example, as shown in the table below, which uses the specifications listed in TP312E, airports that are designed to handle Code C aircraft (aircraft with a wing span of 24 m up to but not including 36 m, and an outer main gear wheel span of 6 m up to but not including 9 m, such as the Airbus A320 or the Boeing 737) must provide separation of 24.5 m from the centreline of a taxilane to an object.

Recommendation: the following minimum separation distances should be provided between the centre line of an aircraft stand taxilane and an object:

Code Letter	Clearance (from centreline of taxilane to an object)	Wingspan	Outer Main Gear Wheel Span	Example Aircraft Types
A	12.0 m	Up to but not including 15 m	Up to but not including 4.5 m	Most light single and twin engine GA aircraft
B	16.5 m	15 m up to but not including 24 m	4.5 m up to but not including 6 m	Beech 1900 Cessna Caravan 208
C	24.5 m	24 m up to but not including 36 m	6 m up to but not including 9 m	Airbus A320 CRJ 900
D	36.0 m	36 m up to but not including 52 m	9 m up to but not including 14 m	Boeing 757, 767 MD-11
E	42.5 m	52 m up to but not including 65 m	9 m up to but not including 14 m	Airbus A330, 340 Boeing 747, 777, 787

Aircraft should always taxi along the solid yellow taxi lines and should never use a vehicle corridor to pass another aircraft. The vehicle corridors are to be used only by vehicles that don't take to the air.

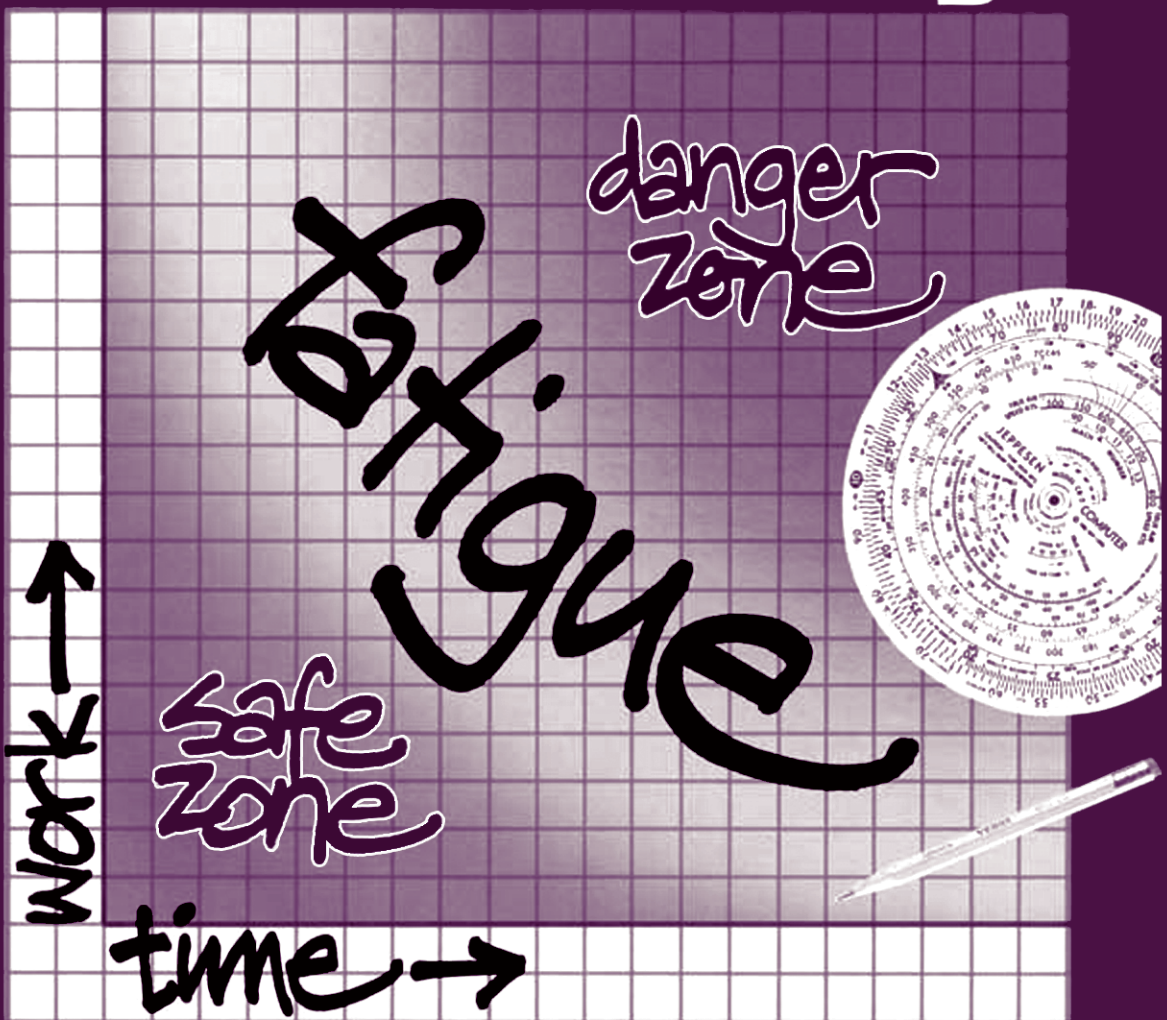
When driving in the corridors, vehicle operators should remember never to pass behind an aircraft that has its anti-collision lights operating and engines running, unless the marshaller grants permission by waving them on. The speed limits, as specified in an airport's local traffic directives, must always be respected. A vigilant watch for moving aircraft and other vehicles must be kept and attention to weather conditions is required when driving. Vehicle operators should ensure that they have received proper training and that they are certified to operate the class of vehicle they are required to drive in the course of their duties. Airports will likely require operators to possess a permit (usually an Airside Vehicle Operators Permit [AVOP]) for driving on airside. Vehicle operators must verify that their rotating beacon is operating and that they are in contact with ground or apron control, as applicable at their respective airports.

Hazards are everywhere on airside. Vehicle operators must be airside aware, exercise vigilance at all times and report hazardous conditions or activities to a supervisor or airport operator. Safety is everyone's responsibility. Don't give accidents the opportunity to occur. Be proactive! △

Transport Canada / Transports Canada

TP 5307E
(02/2009)

work+time=fatigue



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