Transport Canada Transports Canada

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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

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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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Industry Leadership Initiatives

Trevor Heryet

The Province of British Columbia is one of the most beautiful places in the world, but with this beauty comes many challenges for the aviation industry. The weather can be unpredictable as it is influenced by the vast saltwater coastal areas and the mountains. The mountainous terrain creates aviation challenges such as limited VFR route choices when the ceilings are low, the need for complex instrument approaches, limited low-level communication capabilities, and congested IFR airspace. Historically, aviators in the Pacific Region have not only overcome such challenges, but in many cases, they have seen the challenges as opportunities. For example, some of the smaller communities in B.C. have limited or no road access. These communities rely heavily on the aviation industry to ensure the continued viability of their way of life.

In many cases, the geographical uniqueness of the Pacific Region has created business opportunities for aviators, such as heli-skiing. Locals and tourists from all over the world enjoy skiing through the undeveloped back country. However, in most cases, the only way to get to such locations is by helicopter. The hazards associated with flying in the back country have required initiatives to mitigate the safety risks. Over a decade ago, the Helicopter Association of Canada (HAC) took on the leadership role in helping to address the risks through the development of heli-skiing guidelines and best practices. The efforts paid off and the guidance material is still being used by operators today.

A leadership initiative similar to the HAC's was taken by the floatplane operators that use Victoria Harbour for their scheduled service. Victoria Harbour is a unique floatplane operating area, as it closely resembles a land-based airport with respect to its formalized structure and procedures. The structure and procedures of Victoria Harbour were instituted by Transport Canada (TC) after a safety study indicated the need for better management of the vast and diverse mix of traffic in the harbour. The structure allows for the continued use of the harbour by all stakeholders and contributes to the acceptance of aviation activity by the local residents. However, the success of the floatplane operations in the harbour vastly exceeds the formalized structure and procedures. On a monthly basis, the floatplane operators get together with the harbour operator to discuss issues and activities as a collective group rather than individual competitors. Many of the meetings also include the ferry/water-taxi and tugboat/barge operators. At the meetings, the participants check their "colours" at the door in order to achieve solutions that are in the interest of all stakeholders, rather than promoting a myopic view of their specific operations.

It is unfortunate, but sometimes it is tragedy that spurns a leadership initiative. Several years ago, there was a series of fatal accidents that involved a focused part of the west coast aviation sector in the Pacific Region. Civil Aviation and the operators involved were struggling to understand why apparently compliant, professional and safe operations would end in horrific events claiming a total of 23 lives. In response, TC organized and hosted the Floatplane Air Operator's Workshop, allowing dialogue on pertinent issues affecting that sector of the industry. The outcome of the workshop was an initiative taken by the local floatplane industry to form the Floatplane Operators Association of British Columbia (FOA). The association is now a year old, has 29 members and is already seeing positive benefits of having a collective voice, sharing best practices and making positive gains in achieving a culture of safety. It is hoped that the leadership initiatives taken by the FOA will bring the increased safety that lies beyond merely complying with regulation, while encouraging other floatplane operators to join their quest.

There have been many other leadership initiatives taken by the aviation industry in the Pacific Region; so many in fact, that there is not enough room in this article to mention them all. That being said, there are two initiatives that I will mention as they are not specific to any sector or activity within the aviation industry. The first is the long-standing Safety and Quality Summit facilitated by the CHC Helicopters. For almost a decade CHC has provided the opportunity to industry to dialogue about safety and quality of operations. Themes vary from year to year but the annual event draws guest speakers and delegates from all over the world to share their perspectives on safety and quality.

Another regional event is the annual Aviation Leadership Forum, focused on the leadership required in the aviation industry to initiate and sustain positive change. Highly qualified guest speakers and facilitators provide their insights into solving ongoing challenges. These innovative and non-regulatory solutions also fit well into the red tape reduction framework of the Government of Canada's regulatory policy, the *Cabinet Directive on Streamlining Regulation* (CDSR), where regulatory proposals are assessed at an early stage to determine where processes can be streamlined. CDSR aims to make the regulatory system more effective and efficient.

As the new Regional Director, Civil Aviation Pacific Region, I look forward to continuing from where the previous Director, Mr. David Nowzek, left off. The future is full of challenges, but with those challenges come opportunities for improved safety within our industry. We will continue to use risk management in the allocation of our resources and with the conduct of our oversight activities. We will employ a systems approach to managing risks while striving to balance the ever-competing needs of monitoring regulatory compliance and the provision of service delivery to the industry; all in support of TC's "… vision of a transportation system that is recognized worldwide as safe and secure, efficient and environmentally responsible."

Trevor J. Heryet
Regional Director, Civil Aviation
Pacific Region

2012 Transport Canada Aviation Safety Award

On March 27, John Nehera, Associate Director, Operations, Pacific Region, recognized the Canadian Helicopter Corporation (CHC) Safety and Quality Summit with the 2012 Transport Canada Aviation Safety Award. Mr. Nehera was invited to speak at this year's Summit and took the opportunity to present the award certificate signed by Minister Denis Lebel, bestowing congratulations on behalf of the department.

Mr. John Nehera (right) presenting the award to Mr. William Amelio, President and CEO of CHC, sponsor of the Summit.

Each year, the Aviation Safety Award acknowledges sustained commitment and exceptional dedication to Canadian aviation safety over an extended period of time. The selection committee unanimously agreed that the outstanding contribution of the CHC Safety and Quality Summit to aviation safety merits the award this year.

Since 2005, the CHC Safety and Quality Summit has succeeded in attracting industry leaders and innovators from the oil and gas, regulatory, aviation and related sectors to strategize improvements in aviation safety world-wide.

True to their theme of "Improving Safety Culture through Talent, Training and Trust," the CHC Safety and Quality Summit annually attracts hundreds of delegates from across the globe to explore and share tactics and best practices to reduce risk, manage crises and increase safety in aviation.

From its modest origin as a small gathering of international CHC Quality and Safety Managers, the CHC Summit has grown to include a vast network of operators, regulators, insurers, and experts in the field of aviation and its related sectors. To maintain its inclusive, community premise, all CHC Safety and Quality Summits are not-for-profit. This collaborative principle encourages experts and stakeholders to participate for the shared goal of enhanced aviation safety on a global scale.

The CHC Safety and Quality Summit continues to act as an industry leader in innovation and advancement, striving towards greater aviation safety in Canada and world-wide.

COPA Corner: Neighbourhood Watch Ten Years Later

by Kevin Psutka, COPA President and CEO

A lot of air has passed over the wings of General Aviation (GA) aircraft since 9/11 and that is a good thing considering how our freedom was so quickly taken away from us on that fateful day.

Common sense eventually prevailed and we were permitted to fly again. Although no terrorist threat using a GA aircraft has occurred in Canada since then, it does not mean that we can let down our guard.

At this ten-year point it helps to emphasize where this issue has gone and where it will likely go as well as refresh ourselves on measures we should continue to employ.

In my *COPA Flight* article in January 2002 (also reprinted in *Aviation Safety Letter* 3/2002) I introduced the concept of a neighbourhood watch for aircraft and airports that consists of common sense measures that everyone involved in GA should be incorporating into our daily activities at airports.

They include control of ignition keys, better supervision of students, sign-out procedures, establishing positive identification of all renters and students, having parents or guardians co-sign for teen students before they take flying lessons, improved securing of unattended aircraft, placing prominent signs near areas of public access warning against tampering with or unauthorized use of aircraft, posting emergency telephone numbers so that people may report suspicious activity such as transient aircraft with unusual or unauthorized modifications, persons loitering for extended periods in the vicinity of parked aircraft or in pilot lounges, pilots who appear to be under the control of another person, persons wishing to rent aircraft without presenting proper credentials or identification, persons who present apparently valid credentials but who do not display a corresponding level of aviation knowledge, any pilot who makes threats or statements inconsistent with normal uses or aircraft or events or circumstances that do not fit the pattern of lawful, normal activity at an airport.

All of these recommendations from 2002 remain relevant today. The security regulatory effort has been concentrated on airlines and their passengers and more recently on cargo and other commercial operations. COPA has been involved in virtually all regulatory meetings and on occasions when GA has been brought up for discussion, we have reminded proponents of increasing security for our sector that the nature of our sector is such that it would be very difficult if not impossible to impose airline-like measures on our sector.

CANADIAN OWNERS AND PILOTS ASSOCIATION

A more practical approach involving awareness, education and voluntary measures is the way to go. GA security enhancements have already occurred in these past ten years. The first and perhaps most onerous was the introduction of no-fly zones around significant events such as G8, G20, Olympics and dignitary visitors and permanent no-fly zones are in place around the Parliament buildings and Governor General's residence in Ottawa.

There is a warning in section RAC 2.9.3 of the *Transport Canada Aeronautical Information Manual* (TC AIM) that circling nuclear power installations may result in interception. Our licences have transitioned to tamper-resistant photo ID passport-like booklets. Access to sterile areas in and around terminal buildings has become more difficult for our sector and security measures for accessing GA ramp areas at airports have been increased at all airports.

There have been a few security incidents in the past ten years, such as the mentally ill person in Thunder Bay who stole a 172 and flew to the USA expecting to be shot down and incursions into restricted airspace because of pilot error, but the use of small aircraft as a terrorist weapon has not occurred in Canada.

So, do we need additional measures? That has been a matter of debate in recent months as Transport Canada (TC) has turned its attention to GA. Through COPA's efforts over the years, the government is at least sensitive to the difficulty in enhancing security measures as reflected in this statement from Transport Canada's Aviation Security Web site:

> "Transport Canada is continuing to examine what oversight and measures are needed to appropriately

address the risk within general aviation and FBO operations, working with the general aviation community. At the same time, Transport Canada acknowledges that any regulation of the general aviation sector will need to be appropriate to the level of risk, while also ensuring that the economic viability of the industry and comparability to our international partners is maintained."

The key word here is "risk" and that has become the focus of the GA Security Working Group on which COPA participates. The group is working its way through assessing the risk and developing mitigation measures that achieve not only enhanced security but also recognize the need to make them practical, affordable and not out of line with other nations.

As we work our way through the risk process, it is very important that we all remain vigilant. A security threat, perceived or real, involving a GA aircraft would not help our cause at all. It is far too easy to knee-jerk in response to an event, resulting in significant and permanent restrictions or prohibitions to our freedom to fly.

The best thing we all can do is to continue to employ the neighbourhood watch program that COPA suggested in 2002. If you don't think you need to do anything, just think back to September 2001 when our freedom to fly was suddenly and completely taken away. It returned gradually but to this day has not entirely returned to pre-9/11 levels.

For more information on COPA, visit www.copanational.org. △

Class E and G Airspace

by the Safety Management Planning and Analysis Division, NAV CANADA

Over the years, the two-way radio has become an important piece of safety equipment for many pilots, regardless of the airspace they frequent. NAV CANADA offers a number of in-flight services in Class G and Class E airspace; all available via two-way radio.

While operating in Class G airspace, pilots can obtain flight information, aviation weather, and emergency assistance services using the Remote Communication Outlet (RCO) network.

In-flight information requests often include NOTAM and runway surface condition reports which may have been posted since the pilot received their pre-flight briefing. In-flight weather reports available to pilots include: significant meteorological information (SIGMET), weather advisories (AIRMET), pilot weather report (PIREP), aerodrome forecast (TAF) and aviation routine weather reports (METAR). Other valuable information to assist pilots in decision making includes: aviation selected special weather reports (SPECI), weather radar and lightning information.

During hours of darkness, or whenever visibility is reduced, understanding changes to the en-route weather allows a pilot to modify their plan(s) early on. For pilots who do not have real-time weather radar or electronic text updates available in the cockpit, obtaining a weather update while in-flight can often be a valuable resource. A pilot can also use their two-way radio to submit a PIREP, an en-route position report (including updated arrival and departure times), or any revised flight plan or flight itinerary information.

When operating in Class E controlled airspace, pilots operating under visual flight rules (VFR) can obtain the same services as in Class G with the addition of the requirement to obtain special-VFR authorization in Class E control zones under certain weather conditions. When operating in Class E airspace, the RCO network can be used to relay any necessary requests for an Air Traffic Control (ATC) clearance through a flight service specialist.

Unless the airspace has been designated as transponder required, there are no special requirements to operate under VFR in Class E airspace, although VFR operating weather minima is increased. Pilots remain responsible for avoidance of traffic in Class E airspace, and separation is provided only to aircraft operating under instrument flight rules (IFR). While VFR-over-the-top flights must operate under the appropriate regulations, there have been cases where pilots have required an urgent descent through clouds, to land ahead of schedule. Coordination with ATC can assure that there would be no conflicts with IFR aircraft in the Class E airspace.

A two-way radio can also be used to file, amend or close a flight plan or flight itinerary which was filed with NAV CANADA. The flight plan is one of the most inexpensive insurance policies that most pilots will ever take advantage of. In cases where a pilot cannot access the RCO network via their two-way radio, a phone call can be used to update a departure time on a flight plan or to file an arrival report. In cases where pilots arrive at their destination beyond the expiration of the estimated en-route time they last updated, NAV CANADA first initiates a communication search to determine if the aircraft landed safely. Adding a cell phone number to the emergency contact field on the flight plan can reduce the chance of an unnecessary search being initiated—peace of mind all around. △

In Need of a Class E & G Airspace Refresher?

(from TC AIM RAC 2.8.5 and 2.8.7)

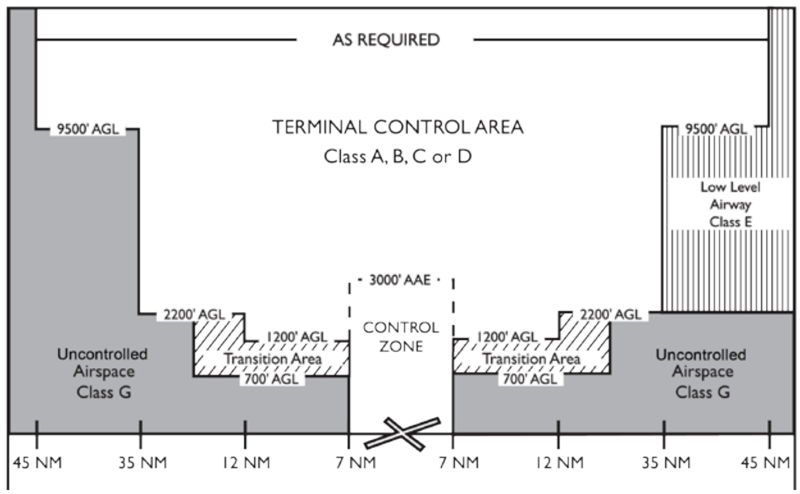
Class E Airspace

Class E airspace is designated where an operational need exists for controlled airspace but does not meet the requirements for Class A, B, C, or D.

Operations may be conducted under IFR or VFR. ATC separation is provided only to aircraft operating under IFR. There are no special requirements for VFR.

Aircraft are required to be equipped with a transponder and automatic pressure altitude equipment to operate in Class E airspace that is specified as transponder airspace (see RAC 1.9.2).

Low-level airways, control area extensions, transition areas, or control zones established without an operating control tower may be classified as Class E airspace.



Terminal Control Area diagram taken from TC AIM RAC 2.7.6.

Class G Airspace

Class G airspace is airspace that has not been designated Class A, B, C, D, E or F, and within which ATC has neither the authority nor the responsibility to exercise control over air traffic.

However, ATS units do provide flight information and alerting services. The alerting service will automatically alert SAR authorities once an aircraft becomes overdue, which is normally determined from data contained in the flight plan or flight itinerary.

In effect, Class G is all uncontrolled domestic airspace.

Low-level air routes are contained within Class G airspace. They are basically the same as a low-level airway, except that they extend upwards from the surface of the earth and are not controlled. The lateral dimensions are identical to those of a low-level airway (see RAC 2.7.1).

Pre-Flight

Spring Is Upon Us! An Update on the Floatplane Operators Association of British Columbia

by St.Clair McColl, President, Floatplane Operators Association of British Columbia

The recent growth of the Floatplane Operators Association of British Columbia (FOA) has been exciting, to say the least. We have seen our membership grow steadily to 29 members, 19 of which are operators and 10 of which are associate members within the industry. To these individuals and companies, I wish to extend my thanks and congratulations for supporting the FOA in its first year.

To date, our board has been busy. They have continued to be energized and focused on developing the Association as an organization that promotes and fosters commercial floatplane safety. I for one admit that this is not an easy task, and I must once again express my heartfelt gratitude to the group of volunteer board members for all their time and hard work.

Our mandate, if you recall, is "to establish best practices, together with a consistent culture of safety across the industry". In our initial focus group, we quickly realized that if we work independently and in isolation as individuals and companies, we cannot achieve our goal to have a consistent culture of safety across the industry. Therefore, the FOA has been working hard on the "together" part by constantly soliciting new members and getting the Association involved in a host of different activities. Lyle Soetaert, our former President, expressed in an earlier update that "we have made valuable inroads and connections as well as spoken with a common voice in the following organizations:

- Federal Aviation Administration (FAA)-Transport Canada (TC) Cross Border Aviation Summit;
- Civil Aviation Safety Officers Partnership; and
- ATAC - Special Flight Operations Committee regarding Flight Duty Times and Fatigue Management."

As our membership grew, we gained further acknowledgement from different agencies that now give credence and weight to our opinion. In the summer and fall of 2011, the FOA arranged for its members to take part in a national survey conducted by the federal government, which assessed the need to staff the lighthouses on our coasts. In March 2011, a Senate Committee on Fisheries and Oceans was asked to conduct a tour and fact-finding mission on the future of lighthouses in Canada. The resulting report was entitled *Seeing the Light: Report on Staffed Lighthouses in Newfoundland and Labrador and British Columbia*. The FOA members gathered in the various communities along the coast of British Columbia, where these fact-finding missions were taking place. It was at these events that we spoke with one loud voice, maintaining that the floatplane operators of British Columbia find immeasurable value in safety by keeping the lighthouses manned. I can proudly say that in lending our voice, the FOA assisted other agencies, such as the B.C. Aviation Council, and communities all along the coast in convincing the Senate Committee to make five recommendations to keep the lighthouses manned.

To view the report and recommendations, please go to www.parl.gc.ca/Content/SEN/Committee/403/fish/rep/rep06dec10-e.pdf.

In the spring, one of our founding associate members, Viking Air, offered a discount on parts to all members of the FOA. To encourage the further enhancement of safety, Viking Air also offered FOA members financial aid when purchasing DHC-2 safety modifications. Another associate member, Jouta Performance Group, has also offered a discount to FOA members in human resources support. Thank you, Jouta and Viking Air!

In mid-summer, the Medallion Foundation of Alaska made a presentation to the FOA board. The Medallion Foundation, like the FOA, is a non-profit organization promoting aviation safety through systems enhancement by providing management resources, training, and support to the aviation community. The Medallion Foundation told us that they are keen to assist British Columbia carriers as a group or as individuals. Our board was impressed and encouraged by their presentation. We were given many ideas as to where we can best lend our support. Some examples of this support are education and advocacy.

As the summer got busy, the board had to step back and take a break in August. It was at that point that Lyle Soetaert resigned from his position as President so that he could pursue a career in Airport Management at the Boundary Bay Airport. We at the board acknowledge all the time and hard work Lyle put into the Association to get it going. We wish him all the best and encourage him to come by sometime and get his feet wet again.

In the summer of 2011, TC invited the FOA to participate in a focus group in September to assess TC's response to the Transportation Safety Board's (TSB) recommendations that came out of the investigation of the Lyall Harbour, Saturna Island Accident of November 2009. This was a first! The FOA was impressed and encouraged to be included in discussions with TC at such an early stage. The focus group gathered, disseminated and discussed all the pertinent information alongside TC. Our voice was heard. We supported the recommendations, and we felt we had some valuable input in the group.

One of the major points that the FOA is focusing on today is webcams. Throughout the fall and winter of 2011–12, the board has been strongly urging NAV CANADA to install more weather observation webcams and to make the ones that are currently installed more functional. In the spring of 2012, the FOA hopes to be able to host their own webcam at the mouth of the middle arm of the Fraser River, close to the water aerodrome CAM9.

As we are a volunteer board that is striving to establish best practices, we have hired an administrative assistant, who will be calling on you shortly to join what we would like to become a national voice for floatplane safety.

On April 17, 2012, the FOA hosted a one-day workshop in cooperation with Viking Air at their All Operators Forum. Again, we believe that the information that we share and the connections we make during these events will only enhance the safety in our industry. Our board, members, operators and associates, as well as the industry as a whole, strive to make commercial seaplane travel the safest it can be. Safety requires constant diligence from all participants in order to continually improve the product that we deliver to our customers.

For further information on the FOA, please visit our Web site at www.floatplaneoperators.org.

You may also contact us by mail at:

Floatplane Operators Association of British Columbia
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YVR Domestic Terminal RPO
Richmond BC V7B 1W2 △

Help Reduce False Alarms

by Capt. Jean Houde, Joint Rescue Coordination Centre coordinator, Trenton, Ontario

At 18:30, Big Air flight 1203 reports hearing an emergency locator transmitter (ELT) on 121.5 MHz, fading away at FL370 over La Tuque, Que. The area control centre (ACC) contacts the Joint Rescue Coordination Centre (JRCC) Trenton with details, along with other high flyer reports. The aeronautical coordinator on duty starts calling every airport within this massive reception area, which extends 183 NM in any direction from the high flyer position. The aeronautical coordinator inquires about possibly overdue VFR and IFR aircraft in the area, investigates any open flight plans, and searches for lower altitude traffic hoping to reduce the size of the search area. A weather check reveals low ceiling and poor visibility in the area. Time is passing by, someone could be in distress. Should we launch an aircraft or continue investigating the source via other means? What if the signal stops abruptly and no one else is receiving it? Has the device been intentionally turned off or have the batteries failed?

This is a common dilemma each time a 121.5 MHz signal is detected. JRCC Trenton's area of responsibility covers from the B.C.–Alta. border to Quebec City, east–west, and from the Canada–U.S. border to the North Pole, north–south. Needless to say, it is vast.

Since the Search and Rescue Satellite Aided Tracking (SARSAT) system no longer monitors 121.5 MHz, there is no satellite position available. Using communications searching, JRCC can investigate a signal like this for a maximum of 2 hr, after which a search and rescue (SAR) aircraft, most likely military, must be tasked. If there is other corroborating evidence, such as an actual overdue aircraft in the area, an SAR asset will be launched earlier.

The selection of a fixed-wing or rotary-wing resource depends on the travel distance, weather in area, and platform capabilities. A crew is paged, the aircraft commander is briefed on mission details, the aircraft is prepared and fuelled, and a crew briefing is completed before everyone runs to the aircraft. Following this, the mighty C130 Hercules, all-weather VFR and IFR, is dispatched from Trenton to investigate. The signal is picked up and the homing commences from high altitude, descending in the process to pinpoint the signal. Finally, breaking into VMC conditions at minimum IFR altitude over the hills, the homing continues until a floatplane is sighted, gently resting dockside by a cabin. After a few low passes over the aircraft, someone is observed running from the cabin into the aircraft and suddenly the ELT signal ceases. With this SAR case closed, the aircraft returns to base after having flown 3 hr and upwards of 15 personnel having been involved in the investigation of this SAR case.

The consumption of valuable and costly aircraft hours, putting the crew in peril unnecessarily, and greatly impeding the availability of precious assets for responding to real distress situations is a typical situation at the JRCC. All ELT activations on 121.5 MHz and 406 MHz are investigated until the source is located or the signal ceases, untraced. JRCC Trenton handles over 3 000 incidents each year, both marine and air. The majority of air cases are false alarms due to accidental activations. JRCC sends an unnecessary SAR alerts (UNSAR) to Transport Canada (TC) whenever a careless activation results in excessive person-hours to solve a case, or if a resource was dispatched, TC then contacts the owner to explain the impact associated with an accidental activation and keeps a database of recurring offenders.

To prevent wasting valuable resources, flyers should listen to 121.5 MHz before shutting down the aircraft after a flight, or anytime maintenance is done on or near the beacon. An even better solution is to replace the aging 121.5 MHz beacon with a newer, digitally encoded SARSAT-monitored 406 MHz beacon. 406 MHz false alerts are usually resolved with a few phone calls, since a properly registered beacon contains several emergency contact numbers.

Should you ever notice that your ELT is transmitting, please contact your nearest flight service station (FSS) or JRCC immediately and advise them of the situation. Rest assured that someone is already working on your case and there may be aircraft searching for you. Help us reduce false alarms and allow us to concentrate on actual distress situations so that resources are not wasted on futile missions. Someday, you or your family members may be in real trouble and require our assistance. We want to ensure that we have the SAR resources available to respond to your needs! △

REGULATIONS AND YOU

Authorities and Processes Leading to the Suspension or Cancellation of Canadian Aviation Documents

by Jean-François Mathieu, LL.B., Chief, Aviation Enforcement, Standards, Civil Aviation, Transport Canada

This is the first of a series of articles describing the authorities and processes that Transport Canada Civil Aviation (TCCA) employs to address safety issues and non-compliance through the suspension or cancellation of Canadian aviation documents (CAD). Recently published TCCA internal guidance material will be described and explained in order to help CAD holders better understand the applicable legal authorities and TCCA processes used in the suspension or cancellation of a CAD.

TCCA is responsible for the enforcement of regulatory compliance with respect to civil aviation activities in Canada. Regulatory compliance is essential in developing and maintaining a safe air transportation system. While conducting compliance oversight activities, TCCA may become aware of safety-related non-compliance issues. Under such circumstances, TCCA may decide to suspend or cancel a CAD in order to prevent further risks related to non-compliant activity.

CAD is defined in section 3(1) of the *Aeronautics Act* (the Act) as being "any licence, permit, accreditation, certificate or other document issued by the Minister under Part I [of the Act] to or with respect to any person or in respect of any aeronautical product, aerodrome, facility or service." Section 6.6 of the Act further states that for the purposes of the authorities contained in the Act to suspend or cancel a CAD, it includes any privilege accorded by such documents. Typically, we think of a CAD as being some type of certificate issued by the Minister, such as a pilot's or AME's licence, or an air operator certificate, however given the broad definition in section 3 of the Act, CADs can range from Ministerial delegations (such as a Minister's delegate–maintenance, or approved check pilot) to such things as an air traffic service operations certificate for NAV CANADA. Additionally, specific privileges listed in a certificate, such as an individual rating on a licence, or an operations specification on air operator certificate, can also be considered as a CAD for the purpose of suspension or cancellation.

The Act gives the Minister the authority to suspend or cancel CADS on specific grounds. The grounds are stated in sections 6.9 to 7.21 of the Act. Additionally, section 6.8 of the Act authorizes the creation of regulations specifying conditions (grounds), other than those stated in sections 6.9 to 7.21, where the Minister may suspend or cancel a CAD. Following is a brief explanation of the grounds specified in each of these sections of the Act.

Section 6.9 is a type of suspension or cancellation that is carried out strictly as a punitive measure, and is assessed as a deterrent against future contraventions. This suspension or cancellation is not used to address current safety-related non-compliance situations; it is assessed in terms of events that have occurred in the past. It does not address current safety issues, other than indirectly, by providing a deterrent against further non-compliance.

Section 7.(1) is a type of suspension (since only suspension may be assessed for this reason) that is assessed to address an immediate threat to aviation safety. It is assessed immediately upon the discovery of an immediate threat to aviation safety and is terminated when the threat is neutralized.

Section 7.1(1) is a type of suspension or cancellation that is assessed to address current safety-related non-compliance situations. It is not considered to be punitive, but rather is intended to address existing significant safety-related non-compliance situations. There are three very specific grounds for suspension or cancellation under this section of the Act

Section 7.21(1) outlines the suspension, refusal to issue, amend or renew a CAD because a person was previously assessed a monetary penalty as a punitive measure for a contravention of a regulation, and hasn't paid it.

In order to help clarify the various legal authorities (for suspending and cancelling CADs) for TCCA inspectors involved in oversight of civil aviation activities, three new staff instructions (SI) have been drafted and published on the TCCA Documentation Framework Web site. These SIs explain the broader legal concepts surrounding the suspension or cancellation of a CAD rather than the specific circumstances or oversight procedures. Although these SIs apply specifically to TCCA personnel, they could be a valuable tool for CAD holders to assist them in an understanding of the suspension or cancellation process. The three SIs relate to the suspension or cancellation of CADs under the authority of section 7 and section 7.1, and suspensions or cancellations under the authority of the few CAR provisions made under the authority of section 6.8 of the Act.

The punitive suspension process described in section 6.9 is not discussed in these SIs, as it has long been described in the *Aviation Enforcement Policy Manual*. Also, section 7.21 of the Act is not discussed in this article, as it has been recently discussed in a previous ASL article and does not relate to safety matters, just financial concerns. If money is owed for a fine, it must be paid or the associated CAD may be suspended.

TCCA encourages CAD holders to read and understand the content of these three new SIs. They will help in understanding the Minister's authority, as well as a CAD holder's compliance responsibilities. These SIs can be found at the following Web addresses:

www.tc.gc.ca/eng/civilaviation/opssvs/managementservices-referencecentre-documents-sur-sur-014-1369.htm;

www.tc.gc.ca/eng/civilaviation/opssvs/managementservices-referencecentre-documents-sur-sur-015-1368.htm; and

www.tc.gc.ca/eng/civilaviation/opssvs/managementservices-referencecentre-documents-si-si-sur-016-1381.htm

Future articles will cover each of the SIs in greater detail. △

Looking for *AIP Canada (ICAO)* Supplements and Aeronautical Information Circulars (AIC)?

As a reminder to all pilots and operators, *AIP Canada (ICAO)* supplements and AICs are found online on the NAV CANADA Web site (www.navcanada.ca). Pilots and operators are strongly encouraged to stay up to date with these documents by visiting the NAV CANADA Web site at the following link: "Aeronautical Information Products".

Distracted

by Linda Werfelman. This article was originally published in the April 2009 issue of AeroSafety World *magazine and is reprinted with the permission of the Flight Safety Foundation.*

Five television news-gathering helicopters were manoeuvring to cover a police chase in Phoenix on July 27, 2007, when two of the aircraft—both Eurocopter AS 350B2s—collided over a downtown park as their pilot-reporters were describing the events occurring on the ground. The crash killed the two pilot-reporters and two news photographers and destroyed both helicopters.

The U.S. National Transportation Safety Board (NTSB), in its final report on the accident, said that the probable cause was the failure of both pilots to see and avoid the other helicopter, and "contributing to this failure was the pilots' responsibility to perform reporting and visual tracking duties to support their station's ENG [electronic news gathering] operation."

The report identified as a contributing factor "the lack of formal procedures for Phoenix-area ENG pilots to follow regarding the conduct of these operations."

Visual meteorological conditions prevailed when the midair collision occurred at 12:46 local time, about 23 min after a police helicopter contacted air traffic control (ATC) to join the pursuit by police on the ground of a suspect accused of stealing a pickup truck, backing it into a police vehicle and then fleeing in the truck. Over the next 22 min, pilots of the five news helicopters also checked in with ATC and headed for the area of the police chase.

In accordance with informal procedures, the six helicopter pilots shared an air-to-air radio frequency to report their positions and their intentions. The accident helicopters—from Channel 3 and Channel 15—had audio video recording systems, and the information recorded by those systems was analyzed in the accident investigation. At 12:38, the Channel 15 pilot was recorded telling the other pilots that he was flying at 2 200 ft, and the Channel 3 pilot said that his helicopter was at 2 000 ft.

"According to the Channel 3 and 15 audio recordings, about 12:41:02, the Channel 15 pilot stated, 'I'll just kinda park it right here.' About 12:41:18, the Channel 3 pilot broadcast, "OK, I'm gonna move.' Between about 12:41:22 and about 12:41:26, the Channel 15 pilot stated, 'where's three?' … 'like how far?' … and 'oh jeez.' The Channel 15 pilot then transmitted, 'Three. I'm right over

The pilots of two TV news helicopters were busy with news-reporting duties in the seconds before their midair collision in Phoenix.

you. Fifteen's on top of you.' Afterward, the Channel 3 pilot questioned which helicopter Channel 15 was over, to which the Channel 15 pilot responded, 'I'm over the top of you.' About 12:41:34, the Channel 3 pilot indicated that he was operating at 2 000 ft. About 12:42:25, the Channel 3 pilot stated to the Channel 15 pilot, 'OK. … I got you in sight,' to which the Channel 15 pilot responded, about three seconds later, 'got you as well.'"

These comments—about 4 min before the collision—were the last in which the two pilots coordinated their helicopters' positions or intentions. The video recordings from the helicopters showed that, during those 4 min, both helicopters continued to change position.

The report said that the suspect stopped the stolen vehicle about 12:46:05, and in a broadcast recording that began at 12:45:43, the Channel 3 pilot said, "Looks like he [the suspect] is starting to run. … Looks like he's gonna try and take another vehicle … looks like they've got him blocked in there, but he did get ... " The Channel 3 report then ended "suddenly, with an unintelligible word," the NTSB said.

The Channel 15 pilot, in a live broadcast that began at 12:46:03, said, "He [the suspect] has stopped … now it's a foot chase. Now he's in another vehicle … doors open police … oh jee." That report also ended suddenly, the NTSB said, and audio recordings from both helicopters indicated that the midair collision occurred about 12:46:18.

Both helicopters plunged to the ground in a city park, and the pilot of a third ENG helicopter told ATC there had been a midair collision.

The Channel 3 pilot, who in September 2006 reported having 13 579 flight hours, received a commercial pilot certificate with a rotorcraft-helicopter rating on August 24, 1987. He also held a certified flight instructor certificate with a rotorcraft-helicopter rating and a second-class medical certificate. He was a backup pilot under contract to Channel 3 and a part-time employee; the station's chief pilot said that the accident pilot had flown 79 flights and 124 flight hours for the station between January 2 and July 5, 2007. The accident pilot also worked full time for Westcor Aviation in Scottsdale, Arizona, as director of operations and a charter pilot; the operator said the accident pilot had flown 88 hr for the company in 2007.

The Channel 15 pilot, who had 8 006 flight hours—all in helicopters, including 907 hours in AS 350B2s—received a commercial pilot certificate with a rotorcraft-helicopter rating on December 7, 1990. He held a second-class medical certificate with a waiver for defective colour vision; the NTSB report said that the deficiency was not a factor in the accident. The pilot was hired in October 2005 by U.S. Helicopters, which had a contract to provide helicopter service to Channel 15. He flew an average of 45 hr per month for the station and did no other flying for U.S. Helicopters, the report said.

The Channel 3 helicopter had an ENG monitor near the instrument panel that displayed four scenes simultaneously: the station's current broadcast, the video being recorded by the helicopter's photographer and two other scenes selected by the pilot-reporter. The Channel 15 helicopter had a similar monitor that displayed one scene at a time.

Pilots of the two TV news helicopters had traded information about the positions of their aircraft several times, but investigators say the last exchange came about four minutes before their midair collision.

The Channel 3 helicopter was equipped with an L-3 Communications SkyWatch SKY497 traffic advisory system that provided aural traffic warnings via the pilot's headset, displayed traffic on a Garmin GNS 430 navigation unit and provided 20- to 30-s warnings of aircraft that were on a collision path.

"The system issued an aural alert when aircraft entered a cylinder of airspace surrounding the pilot's aircraft that had a horizontal radius of … 1,216 ft [371 m] and a height of plus or minus 600 ft [183 m]," the report said. Manufacturer's guidance said that after hearing an alert, the pilot should look for the traffic and comply with right-of-way procedures. The guidance material also noted that an alert is generated only when the collision threat is first detected and that it is possible for the alert to be "inhibited".

Channel 3's chief pilot told investigators that the system had been functioning when he flew the helicopter earlier on the day of the accident. He also said that, in situations in which "a lot of traffic (was) in close," the volume of the aural alert was turned down to ensure that the pilot could hear radio transmissions on the communications frequency.

Channel 15's helicopter had no on-board traffic advisory system, the report said.

In addition to their use of the shared air-to-air frequency and their scans of the TV display screens in the cockpit, the pilot-reporters monitored the Phoenix air traffic control tower frequency on another radio, communicated with their station news departments on a third radio and talked with their photographers over an intercom, the report said.

"Adequate" communication

Radar data showed that the Channel 15 helicopter had been between 2 000 and 2 200 ft and entered a climbing right turn in the seconds before the crash; the last radar return showed the helicopter at 2 300 ft. At the same time, the Channel 3 helicopter, which had been at 2 000 ft, turned right; the last radar return showed the helicopter at 2 100 ft.

As part of the investigation, NTSB representatives met with Phoenix ENG helicopter pilots, who said that communication between the accident pilots had been "adequate" during the police chase. They also noted that, at the time of the accident, all operators except one used pilot-reporters to fly their aircraft; the exception was a station that employed a reporter-photographer.

However, the pilots told investigators that they sometimes lost sight of other helicopters because the aircraft paint schemes "tended to blend in with the desert landscape and vegetation." They recommended the use of high visibility paint schemes for main rotors and tail rotors, and light-emitting diode (LED) anti-collision lights to improve helicopter conspicuity. Neither accident helicopter had these features.

The chief pilot for Channel 3 told investigators that, since the accident, pilots of the ENG helicopters have had "a lot more" air-to-air communication, describing the location of their helicopters and acknowledging the positions of others.

"He also stated that, in a static situation, such as a building fire, no helicopters would change position until all of the pilots responded and that, in a dynamic situation, such as a car chase, the pilots would constantly communicate with one another and confirm each other's positions," the report said. "He further indicated that the pilots were providing more distance between each other's helicopters and were asking the photographers more often to check clearances (separation) with other helicopters."

The two accident pilots were experienced in helicopter operations in general and ENG operations in AS 350B2s in the Phoenix area in particular, the report said. Both also were experienced in simultaneously flying their helicopters and reporting.

"Many of the tasks that the pilots were performing during the accident flight—such as flying the helicopter, operating the radios and initiating communications—were well-learned skills that would have been performed without much cognitive or physical effort," the report said. "However the two helicopters collided without either pilot detecting the impending hazard. Thus, even for experienced pilots, the ability to shift attention among competing task demands may break down under high workload conditions and can lead to a narrowing of attention on a specific task."

A review of audio recordings showed that the accident pilots did not use the air-to-air frequency to report their positions as often as the ENG pilots participating in the post-accident interview had thought, the report said.

"It is difficult to determine the extent that the Channel 3 and [Channel] 15 pilots' reporting duties contributed to the breakdown in each pilot's awareness of the other helicopter," the report said. "The additional tasks of directly observing activities on the ground and providing narration could have affected the pilots' ability to maintain their helicopter's position or track the other helicopter's positions. From about 12:45:43 (Channel 3) and about 12:46:03 (Channel 15) to the time of the collision, the pilots were continuously reporting the events as they unfolded, which narrowed the pilots' attention to the ground and away from other tasks, such as maintaining the helicopters' stated position and altitude and scanning the area for potential collision hazards.

"Even with the limited evidence to determine the extent that the pilots' ENG-related duties affected their ability to see and avoid the other helicopter, the circumstances of this accident demonstrated that a failure to see and avoid occurred about the time that a critical event of interest to the ENG operations (the carjacking) was taking place on the ground. … It is critical for ENG pilots to be vigilant of other aircraft during close-in operations and not to divert their attention to a non-flying-related task or event."

The NTSB also cited a report filed with the U.S. National Aeronautics and Space Administration Aviation Safety Reporting System (ASRS)—one of 18 reports of near-midair collisions involving ENG helicopters—in which the pilot described how he inadvertently allowed his helicopter to descend toward a police helicopter because his "hectic" workload had distracted him from altitude awareness.

"The midair collision in [Phoenix] and the near-midair collisions described in … ASRS reports demonstrate the hazards involved in conducting ENG operations with multiple aircraft nearby," the report said. "The safety board concludes that the Channel 3 and 15 pilots' reporting and visual tracking duties immediately before the collision likely precluded them from recognizing the proximity of their helicopters at that time."

Aftermath

After the accident, both Channel 3 and Channel 15 modified their flight operations. The Channel 3 news helicopter is now staffed by two pilots—one to handle flying and the second to handle news reporting. The Channel 15 helicopter pilot no longer has reporting duties; the helicopter carries a photographer to obtain video.

In February, the Helicopter Association International (HAI) approved a new *Broadcast Aviation Safety Manual* developed along the lines of many of the NTSB safety recommendations issued as a result of the accident investigation.

The 10 safety recommendations included a call for the U.S. Federal Aviation Administration (FAA) to require ENG operators to assign reporting duties to "someone other than the flying pilot, unless it can be determined that the pilot's workload would remain manageable under all conditions," and to require high-visibility blade paint schemes and high-visibility anti-collision lights on ENG aircraft.

Other recommendations said the FAA should develop standards for helicopter cockpit electronic traffic advisory systems to notify pilots of the presence of nearby aircraft, and require that the systems be installed in ENG aircraft; host annual ENG helicopter conferences to discuss relevant issues, and, based on those discussions, develop agreements specifying minimum horizontal and vertical aircraft separation requirements; and incorporate information from the HAI safety manual into an FAA advisory circular.

Other recommendations—superseding similar recommendations issued in 2003—call for requiring the installation of a "crash-protected flight recorder system" on new and existing turbine-powered, non-experimental, non-restricted-category aircraft that are not equipped with a flight data recorder and cockpit voice recorder and that are operated under U.S. Federal Aviation Regulations Parts 91, 121 or 135. The recorder should record cockpit audio, if a cockpit voice recorder has not already been installed, as well as "a view of the cockpit environment to include as much of the outside view as possible" and flight data, the NTSB said.

Since 2004, the NTSB has included similar recommendations on its "most wanted" list of transportation safety improvements.

This article is based on U.S. National Transportation Safety Board (NTSB) Accident Report NTSB/AAR-09/02, "Midair Collision of Electronic News Gathering Helicopter KTVK-TV, Eurocopter AS350B2, N613TV, and U.S. Helicopters Inc., Eurocopter AS350B2, N215TV, Phoenix, Arizona, July 27, 2007." Jan. 28, 2009. △

Focus on CRM

As mentioned in ASL 1/2012, we are currently running a series of selected articles dedicated to crew resource management (CRM) awareness. Our second feature article on CRM is entitled "CRM Assessment: A Pilot's Perspective" and was written by Captain David McKenney, Vice Chairman (Human Factors) for the IFALPA Human Performance Committee.

CRM Assessment: A Pilot's Perspective

by Captain David McKenney, Vice Chairman (Human Factors) for the IFALPA Human Performance Committee. Originally published in ICAO Training Report*, Vol. 1, No. 1 – July/August 2011. Reprinted with permission.*

The International Federation of Air Line Pilots' Associations (IFALPA) has long recognized that relying solely on a pilot's technical knowledge and skills is not sufficient to safely operate complex aircraft in today's flying environment. Crew Resource Management (CRM) was developed over 30 years ago to help address this issue.

As Captain David McKenney of the International Federation of Air Line Pilots' Associations highlights, IFALPA supports CRM as a training program and as an adjunct to traditional technical training approaches. The pilot's federation also suggests that industry and regulators should focus their efforts on producing guidance that encourages more effective CRM training approaches and on developing tools to measure CRM results across the entire culture within the airline.

Originally portrayed primarily as a conflict resolution skill, CRM has evolved today to define a set of skills that supports pilot technical and decision-making flying capabilities. It does this by providing them with the cognitive and interpersonal skills needed to address human error by managing resources within an organized operational system.

CRM is normally defined as a management system which makes optimum use of all available resources, including equipment, procedures and people, to promote safety and enhance the efficiency of flight operations. IFALPA believes CRM can improve the proficiency and competency of individual pilots and flight crews as a whole, especially when it is implemented as an error management strategy.

Flight crews need specific skills and strategies to assist them in coping with the dynamic demands of piloting and in reducing errors. IFALPA supports integrating CRM into flight crewmember training as a tool to minimize the consequences of human error and to improve flight crew performance.

Industry recognizes CRM as a "best practice" when fully integrated into initial licensing and recurrent training programmes, including Multi-Crew Pilot Licensing (MPL) and Advanced Qualification Programmes (i.e., AQP, ATQP).

When first introduced, a cornerstone in the acceptance for CRM training was the assurance that it would not include evaluation. Much of the value and strength of CRM is based on this principle. IFALPA believes the introduction of any checking or jeopardy assessment process has the potential to destroy such benefits and negatively affect safety. To understand the issues, one needs to review what CRM training is and how it is implemented.

Threat and error management

Fifth generation CRM places a good deal of emphasis on behavioural trends and Threat and Error Management (TEM). One of the underlying principles of this fifth generation approach to CRM is the premise that human error is inevitable and should be normalized within the system (Helmreich, 1997).

> *"Flight crews need specific skills and strategies to assist them in coping with the dynamic demands of piloting and in reducing errors. IFALPA supports integrating CRM into flight crewmember training as a tool to minimize the consequences of human error and to improve flight crew performance."*

Pilots should be taught the limitations of human performance and be trained to develop skills to detect and manage error. For this error management approach to succeed in any organization, the organization itself must first recognize and communicate their formal understanding that errors will occur and also adopt and strongly reinforce a nonpunitive approach to error reporting.

CRM as a culture

CRM is not just aircrew-centric; it does not start and stop with the captain or crew. Effective CRM must be embedded within the cockpit and safety culture of the airline while addressing airline specific items (i.e., carrier-specific operations and procedures) and needs to be practiced and accepted at all levels of the organization to positively affect operational safety.

To be truly effective, CRM must be embedded in the airline's Safety Management System (SMS), which should provide for open advocacy and feedback. Each carrier must therefore develop a CRM program that is tailored to their specific culture and pilot demographics and understand that no single CRM program or approach is suitable for all operations and all airlines.

This lack of "one-size-fits-all" characteristic has made it difficult for the industry to adopt a single and universal CRM program with standardized terms, definitions and application methodology.

Integrating CRM into flight crewmember training

Recognizing that safety depends on the coordination of key people in the entire system and not just on the actions of pilots, CRM training should be implemented by carrier flight operations personnel who possess pertinent knowledge of the culture, policies, procedures and training of that particular air carrier. Evidence shows that a joint CRM course for flight crews, cabin crews, and dispatchers can improve the level of understanding and cooperation across the entire team.

Air carriers develop CRM programs that promote the integration of practical flight management skills with traditional technical skills. CRM awareness and error management training is most beneficial when the training curriculum is individualized for each pilot, tailored to each airline's unique culture and includes the added realism of Line Oriented Flight Training (LOFT).

Lack of regulatory guidance

While CRM has evolved over the past 30 years, regulatory measures have not kept up. A lack of standardized CRM terms, definitions, application methodologies and guidance is continuing to impede CRM standardization across the industry.

Different CRM application methodologies relating to awareness training and error management strategies are currently used. For many years, the industry provided guidance material that centred on the benefits of flight crewmembers' awareness of CRM, often referred to as "soft skills". The biggest benefits to teaching soft skills were the resulting improvements in attitudes, perceptions and teamwork. Although training in the soft skills is useful to pilots as recognition and perception training, it only represents one of the issues confronting flight crews.

The error management methodology uses standardized procedures, flight management skills and specific error prevention techniques for the management of safe flight by flight crewmembers. Currently, there is no governing regulatory documentation for error-management techniques, although IFALPA strongly supports training in this area. As a result, CRM courses among airlines vary widely, some only teaching awareness training while others stress both awareness training and threat and error management.

Subjective evaluation criteria

IFALPA stands firmly against any CRM evaluations for flight crewmembers, individually or as a crew in any jeopardy event and most especially when the evaluations in question utilize only subjective criteria.

Little, if any, qualitative evaluation criteria exist for CRM and there is no universally accepted methodology for identifying unsatisfactory pilot CRM performance. Regulators have allowed operators with different corporate cultures a great deal of flexibility in introducing CRM training, resulting in a wide spectrum of quality, quantity and effectiveness levels in CRM courses across the industry.

Vague terms such as "Captaincy", "Airmanship", "Followership", and "Synergy" lack any formal or recognized definition within the CRM concept. These worthwhile attributes are presently beyond the ability of any expert to evaluate objectively, much less a check airman unskilled in the meaning of these terms.

Specifically, evaluation of the effectiveness of non-technical training skills is very subjective and extremely variable. There is no universally accepted definition of the CRM concept or category of CRM terms within the air carrier industry. IFALPA is concerned because flight crew CRM evaluators lack adequate standards and guidance material.

CRM evaluation exposes a crewmember's certificate and career to unsubstantiated jeopardy when no objective industry definitions or standards of CRM skills exist. In one case, an air carrier terminated pilots based on CRM performance alone, although CRM has not matured sufficiently enough for evaluators to effectively evaluate a flight crewmember's performance.

Industry experience has shown that it is difficult to train and calibrate instructors/evaluators to successfully identify markers that would lead to an overall "grade" or "consistent grading". This is in part due to these markers not being adequately defined and therefore not observable.

Unintended consequences of evaluating CRM

There has been no demonstrated case that improved safety results from introducing jeopardy assessment/checking of CRM. In fact some CRM experts within the aviation industry believe the unintended consequences of evaluating CRM could actually reduce current safety margins. IFALPA agrees in its published IFALPA Policy on CRM, which states in IFALPA Annex 6, Part I that:

> IFALPA believes that to introduce jeopardy assessment or checking of CRM at this point would fundamentally change the facilitator/instructor and flight crew relationship and potentially block or reverse the many benefits to be gained from CRM training, including the possibility of having a negative impact on safety. Jeopardy assessment or checking CRM may result in crews producing acceptable CRM behaviour in the simulator but have little real impact on the safety culture of the airline.

For CRM training to genuinely impact the safety culture in aviation, CRM must be wholeheartedly embraced by pilots without the threat of any punitive action. To this end, IFALPA supports open feedback and discussion between facilitators/instructors and flight crew on CRM topics. This feedback should however be non-numerical (e.g., Enhanced – Standard – Detracted) and focus on reinforcing good skills and discussing areas of improvement. IFALPA recognizes that a high level of trust and openness must be present for such discussions to be effective.

Besides IFALPA, individual pilots are also concerned about the negative implications of "evaluating" CRM skills. Evaluations can lead to a mistrust of the program, especially if the evaluation of these skills is done in an arbitrary and capricious manner. If we evaluated CRM today, it would be done in an "opinion-oriented" fashion. This could lead to evaluation controversies and mistrust of the system by the pilots, resulting in possible negative safety implications.

Another undesirable result of attempting to evaluate CRM would be the unwillingness of pilots to be themselves during evaluation and training. What is much more likely is that they would act the way they perceive the check airman wants them to act in order to achieve a passing grade. This would result in a misrepresentation of the crew's CRM skills and most likely some undiscovered deficiencies in a crew's performance, primarily because the evaluator wouldn't have established a realistic representation of how the crew conducts CRM during normal line operations and thus could not have provided meaningful feedback.

Introducing jeopardy assessment after 30 years of effective CRM training completely undermines the fundamental principles of fifth generation CRM. The success of an effective fifth generation CRM program that focuses on threat and error management requires the formal understanding that errors will occur and that companies must adopt a non-punitive approach to error. Introducing assessment/checking of CRM skills would introduce the possibility of failure which could be perceived by many pilots as punitive.

Since effective CRM must be embedded within the safety culture of the airline, and since it similarly needs to be practiced and accepted at all levels of the organization to positively affect operational safety, it is difficult to independently assess/check only one single element (in this case the pilots) on their company culture skills when these are actually dependent on multiple personnel performing multiple tasks across the entire company.

To evaluate only one aspect of a company's CRM system would do little to increase the safety of the entire system. Further complicating the issue is that evaluation would be based mostly on subjective evaluation criteria that have already proven very difficult to use as a basis for training and calibrating instructors/evaluators.

"Just because crews can demonstrate effective crew coordination while being assessed under jeopardy conditions does not guarantee they will actually practice these concepts during normal line operations. Industry studies show that line audits, where crews are observed under non-jeopardy conditions, provide more useful data."

Just because crews can demonstrate effective crew coordination while being assessed under jeopardy conditions does not guarantee they will actually practice these concepts during normal line operations. Industry studies show that line audits, where crews are observed under non-jeopardy conditions, provide more useful data (Helmreich, Merritt, & Wilhelm, 1999). Data from such audits demonstrates that changes in pilot behaviour result from CRM training that includes LOFT and recurrent training (Helmreich & Foushee, 1993), which is consistent with participant feedback.

Summary

IFALPA supports CRM as a training program and as an adjunct to traditional technical training programs. IFALPA recognizes the substantial benefits arising from training of non-technical skills and supports the continued instruction and reinforcement of CRM on a regular basis. CRM can improve the proficiency and competency of individual pilots and flight crews as a whole, especially when it is implemented as an error management strategy and is not checked/assessed by any method that could result in a failure.

Instead of jeopardizing the safety record of an already successful CRM program by introducing CRM skill checks that have no demonstrated safety benefits, industry and regulators should instead focus their efforts on producing comprehensive guidance on how to properly train CRM and measure its effectiveness across the entire culture within an airline. This would include developing training guidance on: how to effectively teach error management skills; specific error prevention techniques; integrating CRM training into scenario-based training; integrating flight management skills with technical skills; helping pilots develop decision-making skills; and lastly, training pilots on how to properly manage resources in today's complex aircraft/ airspace system.

Pilot CRM skills have been used in many high-profile "saves", such as the UAL 232 complete hydraulic failure in 1989, or more recently the US Air 1549 landing in the Hudson River. More important to overall industry safety is the fact that nearly a half million pilots successfully use their CRM skills day-in and day-out, safely completing nearly 100 000 daily flights without ever having had jeopardy assessment of their CRM skills.

About the author

Captain David McKenney is a B-767 pilot for United Air Lines and is the Vice Chairman (Human Factors) for the IFALPA Human Performance Committee. He also serves as a human factors and training expert for the Air Line Pilots Association, International (ALPA). Prior to his airline career, Captain McKenney was a Computer Science Professor at the U.S. Air Force Academy. He also served as Co-chair of the 2010 FAA Industry Stall/Stick Pusher Working Group and is Co-chair of the United States PARC/CAST Flight Deck Automation Working Group. Captain McKenney has accumulated over 16 000 hr in 35 years of military and civilian flying and has additionally served as a flight instructor and check airman. △

Maintenance Control Systems for Private Operators

by K. Bruce Donnelly, Civil Aviation Safety Inspector, Operational Airworthiness Division, Standards Branch, Civil Aviation, Transport Canada

The Interim Order

On March 16, 2010, the Hon. John Baird, then Minister of Transport, announced that Transport Canada Civil Aviation (TCCA) would be taking back all responsibility for certification and oversight of business aviation in Canada from the Canadian Business Aircraft Association (CBAA).

Under the authority of subsection 6.41(1) of the *Aeronautics Act*, the Minister issued the *Private Operators Interim Order* (the Interim Order), which took effect on April 1, 2011, and effectively repealed and replaced Subpart 4 of Part VI of the *Canadian Aviation Regulations* (CARs).

The Interim Order enables the Minister to issue a temporary private operator certificate (TPOC) to the holder of a private operator certificate (POC) that was previously issued by the CBAA to the applicant before March 31, 2011, until the new Subpart 604 for the CARs comes into force. Work is progressing in the development of a new Subpart 604. When complete, the revised regulations will be published in the *Canada Gazette*, Part I, allowing stakeholders to offer comments on the proposals. Following a consultation period, the new regulations will come into force with their publication in Part II of the *Canada Gazette*. A sample TPOC is reproduced below.

TEMPORARY PRIVATE OPERATOR CERTIFICATE CERTIFICAT D'EXPLOITATION PRIVÉE PROVISOIRE		
	CANADA TRANSPORT CANADA HEADQUARTERS ADMINISTRATION CENTRALE DE TRANSPORTS CANADA	Transport Canada Transports Canada
POC # / N° de CEP	Operator Name: / Nom de l'exploitant :	CBAA POC # / N° de CEP de l'ACAA
TC 5258 File # N° de dossier 5258 de TC	Operator address: / Adresse de l'exploitant :	
Valid until revoked / Valide jusqu'à révocation	Street: / Rue :	
	City: / Ville :	
	Province / State: Province / État :	
	Postal Code: / code postal :	
This document is issued by the Minister in accordance with section 604.05 of Schedule 1 of the *Private Operators Interim Order* (JUS-81100-2-109). Le présent document est délivré par le ministre en vertu de l'article 604.05 d'annexe 1 de l'*Arrêté d'urgence visant les exploitants privés* (JUS-81100-2-109).		
Date of issue:/ Date de délivrance : April 1, 2011	Name & Signature: / Nom et signature : Civil Aviation Safety Inspector / inspecteur de la sécurité de l'aviation civile For the Minister of Transport / Au nom du ministre des Transports	

DRAFT

Eligibility for a temporary private operator certificate

Section 604.04 of the Interim Order sets out the information the applicant must submit for a TPOC, which includes, among other things, a copy of the POC that was previously issued by the CBAA and a copy of the operations manual established by the private operator demonstrating compliance with the *Business Aviation Operational Safety Standards* (BA-OSS).

New applicants who did not have a POC issued by the CBAA prior to March 31, 2011, could not apply for a TPOC because they did not meet these criteria. In order to address this issue, TCCA allows new applicants without an existing CBAA POC to apply for an exemption to those requirements through their Principal Operations Inspector (POI) or local Transport Canada Centre (TCC). This way, they are able to meet the eligibility criteria to apply for a TPOC issued by the Minister.

As of April 1, 2011, all new applicants and former POC holders must comply with the requirements of the Interim Order. If the Interim Order does not discuss a particular requirement, the requirements of the BA-OSS prevail for former CBAA POC holders; applicants without a CBAA POC must meet the additional certification criteria specified in Appendix A of the exemption, which, for all intents and purposes, are the same as those in the BA-OSS.

The BA-OSS

Section 7 of the BA-OSS describes the specific requirements pertaining to the maintenance of the private operator's aircraft;

however, the description is very vague. Paragraphs a) to h) of section 7.1 list eight items that must be covered. However, the section does not provide an associated standard or criteria that the required procedures must meet; moreover, it does not provide this type of standard or criteria for the description of the relevant procedures in the operations manual (in terms of its breadth and scope).

During the transition period, TCCA worked closely with the CBAA to ensure a smooth transition of the certification and oversight responsibility. Prior to the implementation of the Interim Order, Transport Canada (TC) issued a TPOC to each POC holder that submitted specified information about their operation; however, the issuance of the TPOC was based on the assumption that the CBAA had performed its due diligence and ensured that the operator's maintenance control system met the requirements of the BA-OSS.

The maintenance requirements in the Interim Order have now superseded those of the BA-OSS, except for sections 7.5 and 7.6 of the BA-OSS, which remain in effect. Section 604.49 the Interim Order differs substantially from section 7 of the BA-OSS because it describes maintenance requirements and expectations far more explicitly. As a condition of issuance or amendment of a TPOC, the Interim Order requires that the applicant have a maintenance control system in place that meets the requirements of section 604.49 of the Interim Order.

In performing their due diligence by processing applications for amendments to TPOCs from private operators who were issued TPOCs during the transition period, Transport Canada Inspectors have found instances where the maintenance control systems did not meet the requirements of the Interim Order or the BA-OSS, which resulted in delays to those operators in obtaining an amended TPOC.

Since this is a condition of issuance for a TPOC, having a maintenance control system that complies with section 604.49 is of the utmost importance. Private operators should therefore review their maintenance control systems and compare them to the requirements of the Interim Order to ensure they comply.

Private operator aircraft maintenance duties

Section 604.10 of the Interim Order is also particularly relevant and important in terms of the maintenance of the private operator's aircraft. It requires a private operator to appoint a person to the position of maintenance manager. This section should therefore be read while taking requirements of section 604.48 into account (this section describes the duties and responsibilities of the maintenance manager). The position of maintenance manager carries with it a significant amount of responsibility; this person is responsible for the private operator's maintenance control system.

The person appointed must not have a record of convictions as described in the Interim Order, either before their appointment or during their tenure. If the private operator is also the holder of an Approved Maintenance Organization (AMO) certificate, the maintenance manager must be the person appointed as Person Responsible for Maintenance (PRM) for the AMO.

The private operator must ensure that the maintenance manager is provided with the necessary financial and human resources to ensure compliance with the CARs and the Interim Order. The private operator is further required to authorize the maintenance manager to remove aircraft from service if they do not comply with the CARs or pose a risk to aviation safety. The Interim Order actually imposes a legal obligation on the maintenance manager to assume this responsibility.

Description of the maintenance control system

The Interim Order does not actually impose any aircraft maintenance requirements on private operators. The requirements pertaining to the maintenance of a private operator's aircraft are already established and governed by other parts of the CARs. The Interim Order merely prescribes that the private operator must develop a maintenance control system ensuring that control measures are put in place to ascertain compliance with the regulations.

In essence, a maintenance control system consists of a series of written policies and/or procedures in the private operator's operations manual regarding the maintenance of its aircraft. When followed, this system will ensure that the aircraft will be maintained in accordance with the regulatory and operational requirements that apply in the relevant circumstances.

Its primary purpose is to ensure that the private operator safely operates aircraft that are maintained to remain airworthy. It should be commensurate with the size and complexity of the private operator's operations and take a number of variables into consideration, such as:

- the number and type of aircraft operated;
- the age and maintenance history of the aircraft;
- the complexity of the aircraft and its associated systems;
- the types of operations conducted; and
- the geographical areas where the flight and maintenance operations are conducted.

It is important to note the distinction between the requirements of a maintenance control system. These requirements consist of the policies and procedures that the private operator adopts regarding the actual control and execution of its maintenance; these policies and procedures must be described in the operations manual. The manual should provide a description of the policies and procedures that its personnel must follow, but the operator's records must demonstrate that those procedures are in fact being followed.

Required elements of a maintenance control system

Section 604.49 lists the 12 essential elements of a maintenance control system, which can be summarized as follows:

- procedures for controlling parts and materials;
- identification of any alternate elementary work and maintenance performance standards;
- procedures for recording servicing;
- procedures for authorizing persons to work on the aircraft;
- technical dispatch procedures;
- defect reporting and control procedures;
- service information review procedures;
- procedures for personnel records;
- maintenance task planning and control procedures;
- weight and balance recording procedures;
- description of the relevant maintenance schedules; and
- technical record keeping procedures.

The maintenance control system must also comply with sections 604.50 to 604.54 inclusively. Section 604.50 prohibits the private operator from authorizing a person to perform servicing, elementary work or maintenance on its aircraft unless that person is an employee with the prerequisite training or is authorized to do so under a written agreement describing the required work and the conditions under which it is to be performed. The private operator is further required by section 604.54 to establish and maintain a personnel record for each person authorized to perform work.

Section 605.51 requires the private operator to establish and implement procedures to ensure that defects are recorded and rectified within the applicable time constraints; it must also ensure that recurring defects are identified, previous repair methodologies are considered, and that recurring defects are verified accordingly. In addition, section 604.52 requires the private operator to include procedures to ensure that any reportable service difficulties are reported in accordance with the procedures described in Subpart 521.

Section 604.53 requires the private operator to establish procedures to ensure that service information (such as service bulletins, service letters, and service information letters) is known, reviewed and assessed for applicability and that a decision is made as to what actions, if any, are required (e.g., amending the maintenance schedule). The private operator is required to keep a record of those assessments for six years.

Section 7.5 of the BA-OSS requires the private operator to establish an evaluation program, also referred to as a quality assurance program, to ensure that its maintenance control system, and all of the included maintenance schedules, continue to be effective and comply with the CARs. It also ensures that mitigating measures, taken as result of an audit finding, are documented in the company's safety risk profile. The evaluation program may be performed by an internal or external agent, pursuant to Section 7.6 of the BA-OSS.

Dual role operations

It should be noted that the drafting of the Interim Order is based on the assumption that the private operator does not conduct any other types of flight operations with its aircraft or share custody and control with another person or entity that uses the same aircraft in commercial flight operations. This type of private operation is commonly referred to as a "pure 604 operation"; however, a TPOC applicant or holder is not prohibited from using the same aircraft under different operating certificates or "dual role operations".

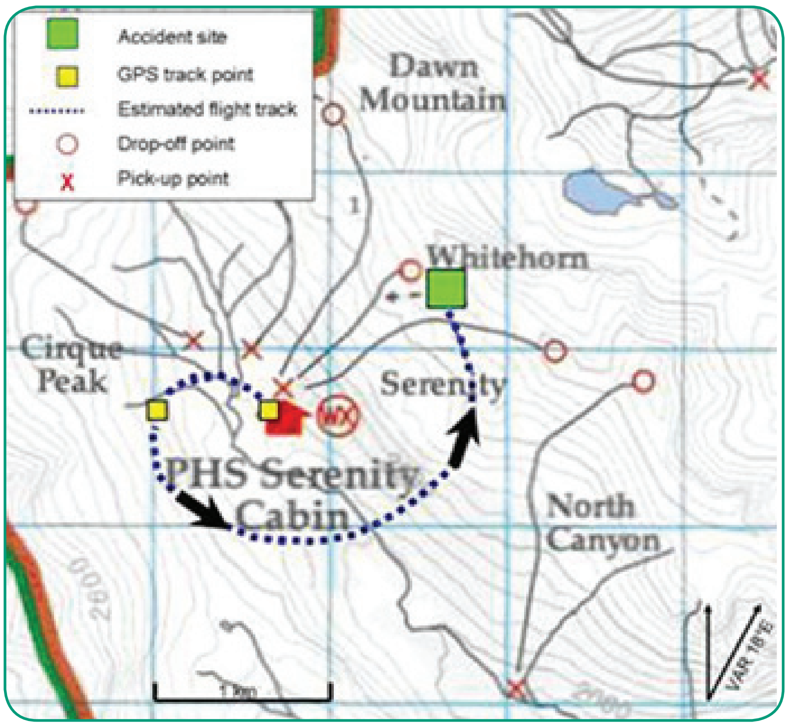
The maintenance requirements that are prescribed by the Interim Order represent the minimum requirements that the Minister has deemed necessary in order to ensure that private operations are conducted safely. This does not prevent private operators from establishing additional control or more restrictive procedures than the minimum regulatory requirements, if such procedures are better suited to their operational requirements.

In cases when private operators use their aircraft in dual role operations (such as Subpart 604 and Part VII operations, or Subpart 604 and Subpart 406 operations), the private operator should review and analyze the different requirements that apply in each subpart in order to determine and adopt the most restrictive requirements found in each subpart; it should also develop a maintenance control system that ensures it complies with those more restrictive requirements. △

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 the benefit of our readers, all the occurrence titles below are now hyperlinked to the full TSB report on the TSB Web site. —Ed.

TSB Final Report A08P0035—Loss of Visual Reference/Collision with Terrain

On February 7, 2008, at approximately 14:54 MST, a Bell 212's main rotor blades struck the mountainside during an approach to a landing site to drop off skiers near Golden, B. C. The helicopter remained upright, but the main rotor separated from the helicopter and struck the fuselage. The pilot received fatal injuries and the ski guide seated in the front left seat received serious injuries. The guide and skiers seated in the rear of the helicopter were uninjured. The uninjured guide shut off the fuel valves and turned the battery switches off. There was no fire. The survivors were evacuated using local helicopter operators.



Helicopter flight path

Analysis

Examination of the helicopter did not reveal any defects that would have contributed to the accident. The helicopter was carrying three fewer passengers on the accident flight than on previous flights and had minimal though sufficient fuel, thus decreasing the helicopter's gross weight. The density altitude was lower than the actual altitude and the prevailing wind was blowing strongly uphill. The combination of helicopter gross weight, density altitude, and wind would have increased the helicopter's performance including its rate of climb on the accident flight.

The pilot was familiar with the ski resort and had flown to the drop-off site three times earlier in the day. Although the enroute flight path during the accident flight was similar to the paths flown on earlier flights, the approach to the drop-off site was flown at a lower altitude than on the previous flight, resulting in a flatter approach profile.

Visibility above the treeline varied. The accident flight destination was changed because a snow squall obscured visibility at the original drop-off site. The sky cover was overcast, a condition creating a uniform, diffused (flat) light that, particularly on monochromic and relatively featureless surfaces such as snow, provides no shadows or reflections that can be used as visual references. As well, blowing snow may have obscured ground features. The flags at the drop-off site, 600 ft ahead of the helicopter, were visible moments before the accident. However, it is not known if visibility towards the featureless, snow-covered mountainside adjacent to the helicopter was compromised by flat light and blowing snow. It is also not known why the approach on the accident flight was flown at a lower altitude than on the previous flight. It is possible that, due to poor visibility, the pilot was not aware of the helicopter's proximity to the mountainside.

The helicopter's forward and vertical speeds were very low when it contacted terrain, consistent with a normal landing. The helicopter did not slide forward after the skids contacted the snow; it remained upright and oriented in the direction it had been travelling. The low vertical and forward speeds at touchdown are consistent with the pilot intentionally landing the helicopter at the accident site. It is possible that, due to a lack of visual references and to blowing snow from the rotor downwash, the pilot was unaware that the helicopter was close enough for the rotor blades to strike the mountainside.

Wind direction had remained steadily uphill (approximately 90° to the flight path) for several hours prior to the accident, but wind and gust speeds had increased substantially. The upflowing air would have provided lift, allowing the helicopter to operate using less power than would have been required in still or downflowing air. It is possible that a decrease in the upflowing air caused a momentary decrease in lift and the helicopter descended into the mountainside before adequate additional power was applied. As well, if the helicopter's airspeed had been allowed to decrease to below 20 kt, the resulting reduction of rotor efficiency may have caused the helicopter to descend into the mountainside.

The ski guide's shutdown of the helicopter's fuel and electrical system after the accident prevented injury to the passengers from leaking fuel and may also have prevented fire. The implementation of the heli-ski operator's emergency response plan also reduced risk of further injury to the survivors.

Finding as to causes and contributing factors

1. The helicopter's main rotor blades contacted the mountainside during the landing in poor visibility for undetermined reasons. The main rotor separated and struck the fuselage.

Finding as to risk

1. Further injury was reduced by the ski guide's shutdown of the helicopter's fuel and electrical systems and by implementing the heli-ski operator's emergency response plan.

TSB Final Report A08C0237—Loss of Control and Collision with Terrain

On November 22, 2008, a Beechcraft A100 departed Runway 32 at God's Lake Narrows, Man., for Thompson, Man., with two pilots, a flight nurse, and two patients on board. Shortly after takeoff, while in a climbing left turn, smoke and then fire emanated from the pedestal area in the cockpit. The crew continued the turn, intending to return to Runway 14 at God's Lake Narrows. The aircraft contacted trees and came to rest in a wooded area about ½ NM northwest of the airport. The accident occurred at 21:40 CST. All five persons onboard evacuated the aircraft; two received minor injuries. At approximately 02:50, the accident site was located and the occupants were evacuated. The aircraft was destroyed by impact forces and a post-crash fire. The emergency locator transmitter (ELT) was consumed by the fire and whether or not it transmitted a signal is unknown.

Findings as to causes and contributing factors

1. An electrical short circuit in the cockpit pedestal area produced flames and smoke, which induced the crew to take emergency action.
2. The detrimental effects of aging on the wires involved may have been a factor in this electrical arc event.
3. The crew elected to return to the airport at low level in an environment with inadequate visual references. As a result, control of the aircraft was lost at an altitude from which a recovery was not possible.

Findings as to risk

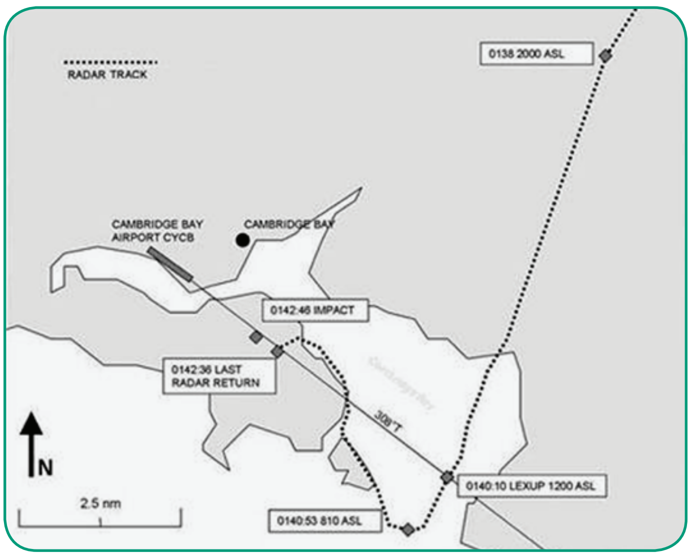
1. The actions specified in the standard operating procedures (SOP) do not include procedures for an electrical fire encountered at low altitude at night, which could lead to a loss of control.
2. Visual inspection procedures in accordance with normal phase inspection requirements may be inadequate to detect defects progressing within wiring bundles, increasing the risk of electrical fires.
3. In the event of an in-flight cockpit pedestal fire, the first officer does not have ready access to available fire extinguishers, reducing the likelihood of successfully fighting a fire of this nature.
4. Sealed in plastic containers and stored behind each pilot seat, the oxygen masks and goggles are time consuming to access and cumbersome to apply and activate. This could increase the probability of injury or incapacitation through extended exposure to smoke or fumes, or could deter crews from using them, especially during periods of high cockpit workload.

Other finding

1. A failure of the hot-mic recording function of the cockpit voice recorder (CVR) had gone undetected and information that would have been helpful to the investigation was not available.

TSB Final Report A08W0244—Controlled Flight Into Terrain

On December 13, 2008, a Dornier 228-202 was on a charter flight from Resolute Bay to Cambridge Bay, Nun., under instrument flight rules (IFR). While on final approach to Runway 31 True, the aircraft collided with the ground approximately 1.5 NM from the threshold at 01:43 MST. Of the 2 pilots and 12 passengers on board, 2 persons received serious injuries. The aircraft was substantially damaged. The ELT activated, and the crew notified the Cambridge Bay Airport radio operator of the accident via the aircraft radio. Local ground search efforts found the aircraft within 30 min and all occupants were removed from the site within 2 hr.



Radar plot of the occurrence aircraft. (The grey area represents land and the white area represents water.)

Analysis

Visual approach

From the time the flight left Resolute Bay until the occurrence, the visibility at Cambridge Bay deteriorated from 8 SM to as low as ¾ SM. The last observed visibility provided to the crew was variable from 1½ SM to 3 SM in snow and blowing snow and, as such, the weather was fluctuating below visual flight rules (VFR) limits. The crew would have been required to conduct an approach in accordance with IFR. By abandoning the full instrument approach and conducting an abbreviated visual approach, the flight reverted to VFR in reported weather conditions below VFR minimums. This reduced the protections against controlled flight into terrain afforded by adherence to published instrument procedures and associated company standard operating procedures (SOP).

Monitoring of altitude

The crew members' duties were not defined in their briefing for the approach. Except for minimum sector and LEXUP crossing altitudes, no other minimum descent altitudes, including the final approach descent profile or missed approach procedures, were discussed. Therefore, when the aircraft prematurely descended below the minimum altitude for the instrument approach, there was no trigger for the crew to terminate the approach. In low visibility at night over unlit terrain, it would have been difficult to visually judge height above the ground.

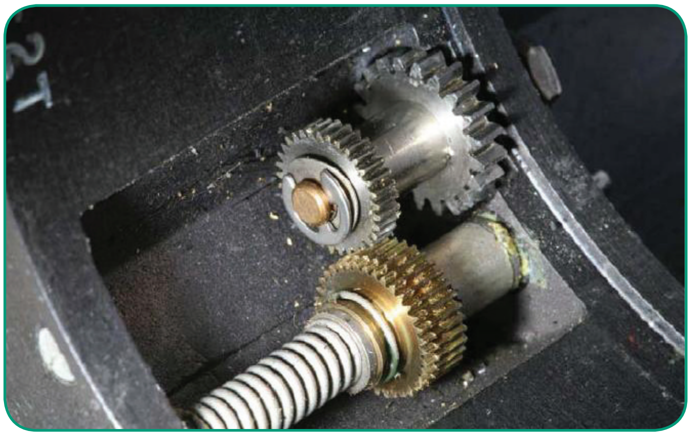
During the approach, the first officer's attention was focused on re-programming the GPS and actioning the pre-landing checklist. The captain's attention was directed outside the aircraft while flying with visual reference to the obscured lights of the town and the airport. Except for calling the 500-ft radar altimeter alert, there was no other monitoring or cross-checking of altitudes on the approach by either pilot. When the aircraft was at 500 ft AGL, it was about 120 ft lower than would have been required for a constant descent profile for the instrument approach.

GPS training

Although the pilots had been trained to use the KLN94 GPS, they were not trained in the use of the installed Garmin 430W GPS equipment. Therefore, during the accident flight, they were qualified to conduct IFR operations using only ground-based navigation aids as their primary source of navigation information. Their unfamiliarity with the GPS equipment and their difficulty in properly setting it up likely provided a distraction to the task of monitoring the proper lateral and vertical approach profiles. The full VOR/DME approach to Runway 31 True would have allowed the crew to make the approach using familiar equipment. This approach has the same minimum descent altitude and advisory visibility limits as the approach they were using.

Altimeters

During the flights from Yellowknife, Cambridge Bay, and Resolute Bay, there was a difference in readings between the two altimeters installed in the aircraft. The pilots recognized this discrepancy and compensated by setting the first officer's instrument to match the altitude reading on the captain's altimeter. The crew did not determine that the captain's altimeter was in error, although it would have been possible to determine which instrument was faulty by comparing altitude readings on the ground at known altitudes. Because altitude was not monitored in relation to aircraft position in the late stages of the approach at Cambridge Bay, it is unlikely that this error played a significant part in the occurrence. There was no company SOP to detect altimeter errors.



Barometric pressure/pointer setting gears.
The gear on the right had teeth damage.

An erratic altimeter barometric setting knob could be a symptom of internal gearing deterioration, which can result in loss of calibration. Because the only reference to this problem is found in the altimeter Component Maintenance Instruction Manual, which is not normally accessible to operator maintenance organizations, it is possible that an aircraft would be allowed to operate with a defective instrument with potential for calibration errors. Slippage of damaged gears could result in inaccurate readings.

Fatigue

The crew went to sleep early the night before the flight to Resolute Bay, but woke earlier than normal, likely reducing their sleep quality. Although the quality of the sleep obtained during the following day was likely less-than-optimal because it was obtained in the afternoon, it probably offset the effects of early rising and, to some extent, prepared the crew for the flight back to Yellowknife later that night. However, even a full 8 hr of rest would have been insufficient to shift the crew's circadian rhythm and fully offset the performance decrements due to flying late at night when their bodies would have been approaching a circadian low. The perception that an 8-hr rest resets the flight/duty clock is consistent with the current regulations; however, when pilots attempt to fly later on the same day at a period of circadian low, there are likely to be performance decrements because the body's internal clock cannot readily be reset. It is possible that fatigue could have reduced the crew's level of cognitive and decision-making performance during the flight.

PAPI system

The PAPI systems at Cambridge Bay had not been inspected in accordance with the *Airport Safety Program Manual*. Although calibration of the equipment did not have a bearing on this occurrence, there was an increased risk of aircraft misalignment from the proper glide path, especially during night and reduced visibility conditions.

Findings as to causes and contributing factors

1. An abbreviated visual approach was conducted at night in instrument meteorological conditions, which resulted in the flight crew's inability to obtain sufficient visual reference to judge their height above the ground.
2. The flight crew did not monitor pressure altimeter readings or reference the minimum altitude requirements in relation to aircraft position on the approach, resulting in controlled flight into terrain.
3. The pilots had not received training and performance checks for the installed global positioning system (GPS) equipment, and were not fully competent in its use.
4. The attempts at adjusting the settings likely distracted the pilots from maintaining the required track and ground clearance during the final approach.

Findings as to risk

1. The precision approach path indicator systems (PAPI) at Cambridge Bay had not been inspected in accordance with the *Airport Safety Program Manual*. Although calibration of the equipment did not have a bearing on this occurrence, there was an increased risk of aircraft misalignment from the proper glide path, especially during night and reduced visibility conditions.
2. The flight crew's cross-check of barometric altimeter performance was not sufficient to detect which instrument was inaccurate. As a result, reference was made to a defective altimeter, which increased the risk of controlled flight into terrain.
3. Operators' maintenance organizations normally do not have access to the troubleshooting information contained in Component Maintenance Instruction Manuals for the Intercontinental Dynamics Corporation altimeters. Therefore, aircraft could be dispatched with damaged instruments with the potential for developing a loss of calibration during flight.
4. The flight was conducted during a period in which the crew's circadian rhythm cycle could result in cognitive and physical performance degradation unless recognized and managed.

Safety action

Operator

The company amended company policy and standard operating procedures as follows:

- Approach briefings will be conducted before initiating descent and will cover the critical aspects of the approach.
- In night conditions, a VFR briefing is acceptable only if the ceiling is above the applicable sector altitude and visibility greater than 5 statute miles (SM). If a night visual flight rules (VFR) approach is to be conducted, the aircraft cannot descend below the minimum safe altitude (MSA) until established on the final approach track. The briefing will be backed up with the appropriate navigation aids.
- In instrument meteorological conditions (IMC), an IFR briefing must be completed.
- If a published IFR approach exists, the IFR altitude and track limitations for that runway must be adhered to. In all cases, once established on final approach, descent from the MSA may only be made by:

    1. following the approach path indicator lights (if available);
    2. following a stabilized approach path until touchdown; and
    3. following the IFR approach limitations (if available).

- Controlled flight into terrain (CFIT) and crew resource management (CRM) pilot training was enhanced and the frequency was increased from biennially (every two years) to annually.

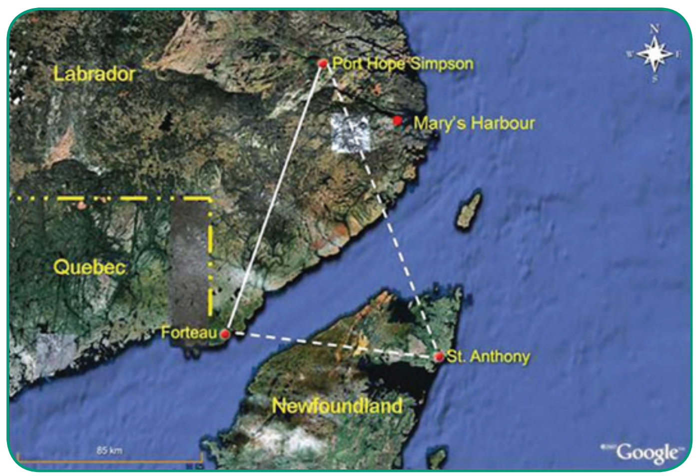
Government of Nunavut

Airport Safety Management Manual

The weekly inspection procedure for precision approach path indicator system (PAPI)/abbreviated precision approach path indicator system (APAPI) systems at all Government of Nunavut airports has been implemented and emphasized with airport maintenance personnel. The inspections and reports filed with the regional managers are in conformance with Transport Canada publication TP 312, *Aerodromes Standards and Recommended Practices*, and the *Government of Nunavut Airport Safety Program Manual*. Procedures for record retention, including PAPI/APAPI inspections as well as all other required documentation, are being included in the *Airport Safety Management Manual*.

TSB Final Report A09A0036—Loss of Control—Collision with Terrain

On June 7, 2009, the pilot of a Britten-Norman Islander BN.2A-27 was tasked with a MEDEVAC flight to take a patient from Port Hope Simpson to St. Anthony, Nfld. The aircraft departed the company's base of operations at Forteau, Nfld., at approximately 06:20 Newfoundland and Labrador daylight time. At approximately 06:50, he made radio contact with the airfield attendant at the Port Hope Simpson Airport, advising that he was 4 NM from the airport for landing. The weather in Port Hope Simpson was reported to be foggy. There were no further transmissions from the aircraft. Although the aircraft could not be seen, it could be heard west of the field. An application of power was heard, followed shortly thereafter by the sound of an impact. Once the fog cleared about 30 min later, smoke was visible in the hills approximately 4 NM to the west of the Port Hope Simpson Airport. A ground search team was dispatched from Port Hope Simpson and the wreckage was found at approximately 11:00. The sole occupant of the aircraft was fatally injured. The aircraft was destroyed by impact forces and a severe post-crash fire. There was no ELT signal.



Route map

Analysis

The sole occupant of the aircraft was fatally injured in the accident. There were no witnesses to the final moments of the flight and there were no onboard recording devices to assist investigators. The aircraft impacted the ground in a near-vertical attitude, suggesting an in-flight loss of control. As a result, this analysis focuses on possible scenarios for why the aircraft departed controlled flight and collided with terrain.

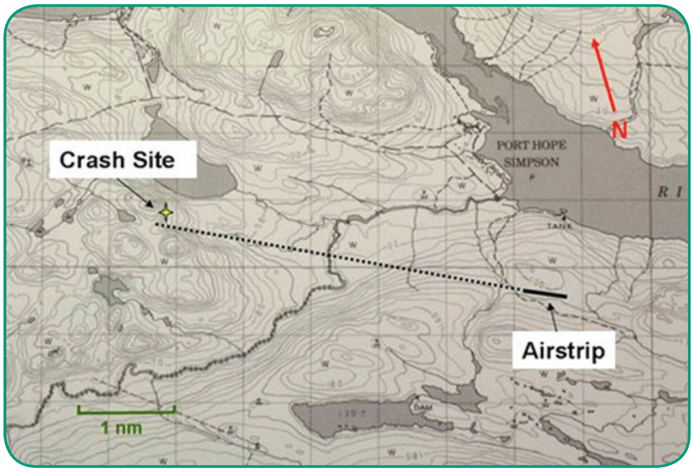
Although the aircraft was extensively damaged, there did not appear to be any evidence suggesting a problem with the flight controls or engines. Also ruled out was the scenario of pilot incapacitation. The application of power less than two seconds before impact indicates that the pilot was still trying to fly the aircraft. The investigation also ruled out turbulence as a factor for loss of control because there were no significant conditions in the area that could cause turbulence.

Visibility and ceilings were reported to be quite low in the Port Hope Simpson area. Therefore, the pilot would have been faced with the decision to return to Forteau and wait for the weather to improve, find a routing under the weather following lower terrain, or climb up into the weather to conduct an instrument approach.

The following scenarios were considered:

- If the pilot was attempting to return to Forteau, he was likely flying at a low altitude and a slower speed in order to maintain visual contact with the ground. The pilot may have inadvertently entered cloud and allowed his airspeed to decrease to the point of aerodynamic stall. Depending on the altitude of the aircraft at the point of stall, the pilot may not have been able to recover before the aircraft impacted the ground.
- If the pilot was trying to fly below and around the weather and suddenly lost contact with the ground or was faced with rapidly rising terrain, he would have had to abruptly initiate evasive action. If trying to maximize the climb with a steep nose-high attitude he may have inadvertently allowed the speed to decrease to the point of aerodynamic stall. Alternatively, he may have tried to turn away from rising terrain/weather and in doing so increased the aerodynamic wing loading and the angle of attack to the point of aerodynamic stall. Depending on the altitude of the aircraft at the point of stall, the pilot may not have been able to recover before the aircraft impacted the ground.
- The aircraft was equipped with a GPS; however, the company was not approved to conduct IFR approaches using the GPS. The company was certified for two-pilot IFR operations, but single-pilot IFR operations were not approved due to the lack of a functioning autopilot. The lack of a functioning autopilot imposes a high workload on a single pilot in IFR conditions (for example, tuning radios, programming navigation aids, reviewing approach plates, handling communications, and flying the aircraft). If the pilot decided to execute a GPS approach, it is possible that he inadvertently allowed the airspeed to decay towards the stalling speed while occupied with other flying-related tasks. Depending on the altitude of the aircraft at the point of stall, the pilot may not have been able to recover before the aircraft impacted the ground.
- The investigation also considered the possibility of icing in cloud while conducting an IFR approach as an initiating factor to a stall. It is unlikely that the pilot would climb any higher than the MSA while reverting from VFR low level flight to an IFR approach. The possibility of icing in cloud was eliminated as the freezing level was above the MSA for the approach. The instrument approach scenario is unlikely, given that the minimum descent altitudes (MDA) for both runways would have precluded a visual descent and landing.

None of these scenarios could be validated; however, an aerodynamic stall is a common factor.



Location of the crash site relative to the airstrip

Finding as to causes and contributing factors

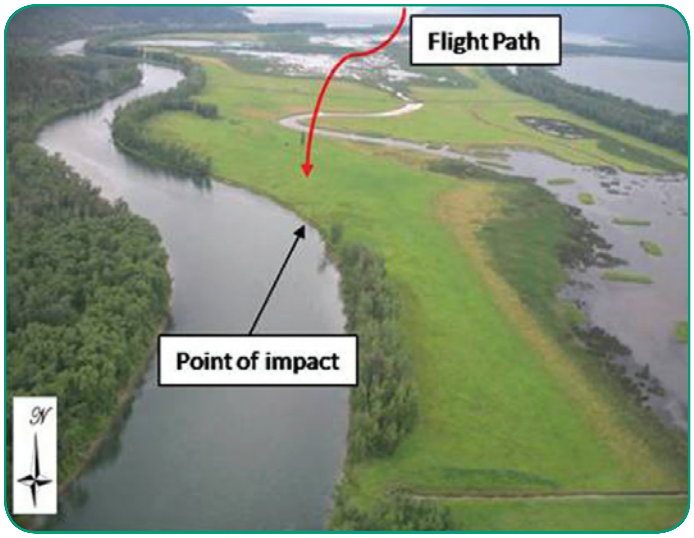
1. The aircraft departed controlled flight, likely in an aerodynamic stall, and impacted terrain for undetermined reasons.

Other finding

1. The lack of onboard recording devices prevented the investigation from determining the reasons why the aircraft departed controlled flight.

TSB Final Report A09P0210—In-Flight Breakup

On July 22, 2009, a Robinson R44 Astro helicopter took off from a heliport near Creston, B. C., at about 12:45 PDT with only the student pilot on board. The helicopter was on a daylight VFR flight in visual meteorological conditions in the local training area, practicing flight manoeuvres. At about 14:00, while flying over level marshland, the helicopter experienced an in-flight breakup. The helicopter struck the ground about 8.5 NM northwest of Creston, at an elevation of 2 100 ft ASL. The bulk of the fuselage fell into the Kootenay River, leaving a wreckage path of several hundred metres. The student pilot was fatally injured and the helicopter was destroyed by in-flight and ground impact forces. There was no fire. The ELT was functioning when found; however, no signal was detected because the unit was under water and it was designed to transmit a signal on 121.5 and 243 MHz, which are no longer monitored by the search and rescue satellite system.



Accident flight path

Analysis

The lack of an onboard flight recorder hindered the accurate reconstruction of the flight.

Based on the proposed training agenda, the student pilot's intentions, and the flight tracking unit data, it is most likely that the student pilot had been following the proposed training plan and was practicing steep turns in the area when the accident occurred.

Wreckage damage and distribution also indicate that the lead event was the main rotor flapping down into the tailboom severing the tail rotor driveshaft, tailboom, and tail rotor assembly in one unit. This damage and loss of airframe structure was catastrophic and immediately rendered the helicopter uncontrollable.

The cause of this excessive rotor flapping could not be identified, and this analysis explores the possible reasons and circumstances for this aerodynamic phenomenon.

Mast bumping

Main rotor blade impact marks on the tailboom are indications of extreme in-flight rotor flapping. Frequently, such rotor strikes signify low-to-moderate rotor RPM, and in this accident, the tailboom contact marks, the proximity of the separated components, and the rotor blade damage are all characteristic of a rotor strike being the initiating event of the in-flight breakup and resulting loss of control.

There are some situations where inappropriate pilot control inputs could influence excessive rotor flapping and mast bumping, which is a pre-condition for rotor-to-tailboom contact that often leads to in-flight breakup. For example, Robinson Helicopters warned pilots about the risk of low-g manoeuvres in the R44, stating that loss of control and mast bumping are often the result. In a similar fashion, rapid flight control deflection could lead to rotor instability and excessive rotor flapping angles.

Airframe examinations did not identify any mechanical condition that might have led to mast bumping. The other factor to consider, therefore, is pilot flight control inputs. Without flight data recorder information, the regime of flight and the student pilot's actions are unknown. However, several assumptions can be made, namely:

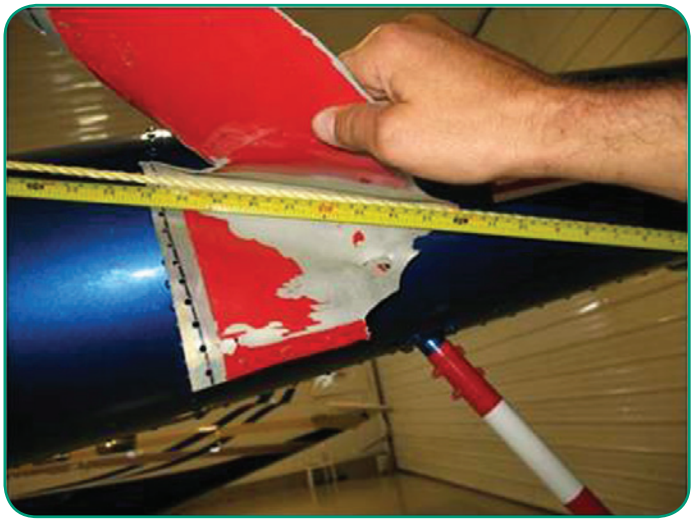
- no adverse mechanical condition existed;
- the helicopter was functioning correctly; and
- the student pilot was conducting steep turns.

Possible in-flight breakup scenario

Given the above factors that eliminate mechanical cause, it is reasonable to propose that the student pilot inadvertently induced the conditions necessary to cause mast bumping. It is known that low-g manoeuvring in the Robinson R44 helicopter can lead to excessive rotor flapping and mast bumping, as can some rapid and large collective or cyclic movements. It is clear that several combinations of flight circumstances exist that could lead to mast bumping, but the most plausible in this case is the student pilot manoeuvring quickly during a steep turn. In concert with an aft CG condition (forward cyclic bias), the student pilot may have had reduced forward cyclic travel.

The area where the accident occurred is known for its concentration of large migratory birds, and on the day of the accident, many birds were seen in the marshlands and adjacent waterways. The student pilot was well-versed on the consequences of bird strikes and had recently studied bird-avoidance techniques. He was characterized as being particularly sensitive to the dangers of collision with birds.

It is conceivable that the student pilot encountered a bird during his steep-turn practice. During his attempt to avoid it, he may have applied control inputs that led to excessive main rotor flapping and mast bumping. Had he also lowered the collective, pushed the nose forward, or both, he would have been even more greatly exposed to the large aerodynamic forces that cause mast bumping. Such reactive manoeuvring is instinctive and often rapid, and in conjunction with the control inputs and in-flight attitudes often seen in steep-turn manoeuvres, is likely to cause rotor path plane upset and reduced clearance from the tailboom. Such flight conditions make mast bumping almost inevitable. In-flight mast bumping is frequently irrecoverable and catastrophic, with either the mast being severed or a blade strike to the fuselage. In either case, the result is invariably fatal.



Tailboom rotor blade strike

Flight training and experience for R22 and R44 helicopters in Canada

United States SFAR 73 prescribes minimum requirements for pilots of R22 and R44 helicopters, both as the pilot-in-command, the student pilot, or the flight instructor. This regulation imposes specific training and experience criteria on United States licence holders because certain aerodynamic and design features of the helicopter cause specific flight characteristics that require particular pilot awareness and responsiveness. Following implementation of this SFAR in the United States, the in-flight breakup accident rate has fallen remarkably, suggesting that the provisions of the SFAR improve flight safety.

Relying solely upon the general awareness in the helicopter community of the operating vulnerabilities of the R22 and R44 helicopters, identified in SFAR 73, is inadequate in reducing the risk of in-flight upset (resulting from low-g manoeuvring or mast bumping for example) associated with these helicopters. While Canadian licensing requirements are more prescriptive, it can be reasonably argued that Canadian R22 and R44 pilots are at risk of inadvertent in-flight upset in the absence of the exposure to, and instruction about, the issues raised by the United States SFAR.

Findings as to causes and contributing factors

1. During flight, an undetermined flight manoeuvre caused the main rotor blades to strike the tailboom.
2. The blades severed the tailboom and tail rotor assembly, resulting in an in-flight breakup rendering the helicopter uncontrollable.

Findings as to risk

1. Low-level flight operations in areas known for migratory bird traffic increase the exposure to the hazards of bird strike and require the highest level of attention and caution.
2. In the absence of the exposure to, and the instruction about, the issues raised by United States Special Federal Aviation Regulation 73, some Canadian R22 and R44 pilots are at risk of inadvertent in-flight upset from low-g manoeuvring or mast bumping.

TSB Final Report A10O0018—In-Flight Separation and Impact with Terrain

On January 23, 2010, an amateur-built Vans RV-7A was part of a formation of three aircraft that departed Lindsay, Ont., on a VFR flight to Smiths Falls, Ont. En route, one of the three aircraft diverted to Bancroft, Ont. The two remaining aircraft continued with the RV-7A in tandem. The lead conducted a series of aerobatic manoeuvres, which the RV-7A was to film. While manoeuvring, the lead lost contact with the RV-7A. The lead conducted a visual search, but could not find the RV-7A. The JRCC was alerted and a search was conducted. The aircraft was located in a wooded area. It was destroyed on impact and the pilot, the sole occupant, was fatally injured. The accident occurred at approximately 13:45 EST. The ELT functioned, but its range was reduced significantly, as its antenna was sheared on impact.

Video

A video camera had been mounted behind and slightly over the starboard passenger seat of the RV-7A. It was positioned facing forward, looking out through the windscreen. The entire occurrence flight was recorded. The video showed that after takeoff, the RV-7A had maintained a formation position behind the other two aircraft.

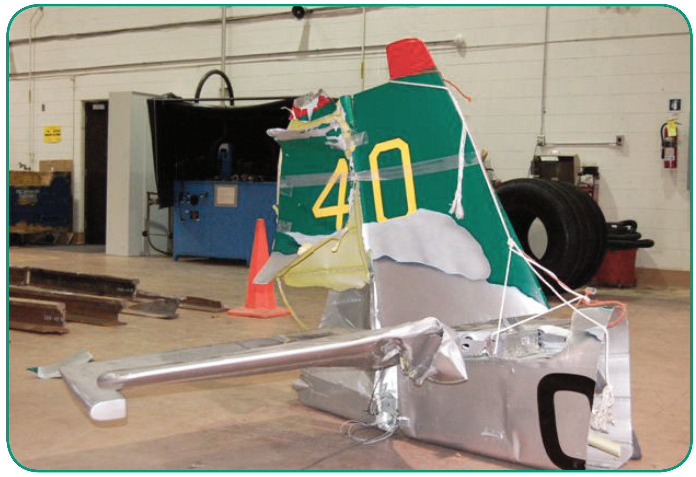
Shortly after, the first aircraft left the formation and the RV-7A moved to a tighter right echelon formation position with the lead. Near Wolfe Lake, the lead began a series of manoeuvres. The RV-7A chased the lead through the manoeuvres and, at times, the lead could be seen within view of the recording video camera. During this type of manoeuvre, the pursuing aircraft must turn at a higher rate or g in order to maintain the lead within the field of view of the video camera.

During a pull-out from a rapid descent, there was a sudden onset of an airframe vibration (shuddering around the longitudinal axis), which was followed by a yawing motion, a roll and ground impact.

Video still image of the lead aircraft manoeuvring

Wreckage examination

The aircraft struck terrain at approximately 80° nose down, flipped over and came to rest upside down. The aircraft was destroyed from impact forces and there was no post-impact fire. Damage to the aircraft was consistent with severe impact forces. The vertical stabilizer and top half of the rudder were missing from the aircraft and could not be located at the wreckage site. After an extensive ground search, the vertical stabilizer and rudder were found approximately 0.6 NM southeast of the main wreckage site. The vertical stabilizer was intact. A portion of the rudder was attached to the vertical stabilizer. Numerous parts of the rudder, including the right aluminum skin and rudder trailing edge wedge, had separated from the main rudder structure and were located within 100 m of the vertical stabilizer. The rudder counterweight could not be found. The vertical stabilizer had completely separated from the fuselage. The fractures in the vertical spars occurred just above where the spars fastened to the fuselage. The fracture surfaces were consistent with failure by overstress.



Picture of re-assembled tail section during the investigation. Pictures of the failed rudder are included in the TSB Final Report

Findings as to causes and contributing factors

1. After painting, the rudder was not likely balanced, nor the aircraft reweighed. As a result, the rudder was susceptible to flutter at a lower speed than designed and the aircraft was over the maximum aerobatic gross weight during the manoeuvres.
2. During the manoeuvring sequence, the speed of the aircraft reached 234 kt, exceeding the 124 kt manoeuvring speed and the 200 kt never exceed speed (Vne).
3. The aircraft encountered either flutter or overstress of some rudder components. Subsequently, the vertical stabilizer and parts of the rudder separated from the empennage during flight. Consequently, the aircraft became uncontrollable resulting in the impact with terrain.

Finding as to risk

1. Performing aerobatic manoeuvres below the minimum altitude required by the *Canadian Aviation Regulations* (CARs) introduces unnecessary risk.

TSB Final Report A10Q0111—Controlled Flight into Terrain at Cruising Altitude

On July 16, 2010, a float-equipped de Havilland Beaver DHC-2 Mk.I was flying under visual flight rules from Lac des Quatre to Lac Margane, Que., with one pilot and five passengers on board. A few minutes after takeoff, the pilot reported intentions of making a precautionary landing due to adverse weather conditions. At approximately 11:17 EST, the aircraft hit a mountain, 12 NM west-south-west of the southern part of Lac Péribonka. The aircraft was destroyed and partly consumed by the fire that broke out after the impact. The pilot and three passengers were killed; one passenger sustained serious injuries and one passenger sustained minor injuries. No ELT signal was received.

Analysis

The aircraft hit the side of a mountain at approximately 100 ft from the peak during level flight, in adverse weather conditions. The TSB analysis focuses on the decision to carry out this VFR flight in bad weather, and on the survival of the occupants.

At the time of the takeoff from Lac Margane to go pick up the passengers, the weather conditions met the VFR weather minima. Given the lack of weather observations in the area, it is customary to take off and then assess the conditions while airborne. Given the numerous lakes in the area, it is easy to make a precautionary landing should the weather conditions make it necessary to discontinue the flight.

The air mass was humid, the winds were calm and a band of precipitation had hit the region in the early morning. When the cold front moved in, the wind shifted from the south to the southwest, but the air mass remained humid. An air flow from the southwest in the Chute-des-Passes area is considered to be flowing upwards. This type of circulation, combined with very humid air, promotes persistent low ceilings.

Consequently, although light drizzle conditions prevailed in the area, it was not raining at the time of the accident. A substantial mass of clouds covered the flight area. At the time of departure from Lac des Quatre, the base of the cloud layer was at a height of less than 250 ft above the surface of the lake, and the visibility was such that the end of the lake could be seen.

The prolonged flying times between Lac Margane and Lac Grenier, and between Lac Grenier and Lac des Quatre, indicate that considerable detours had to be made before the flight arrived at its destination. It is therefore likely that the adverse weather conditions forced the pilot to follow the valleys and possibly to divert a few times. Moreover, the scope of these extended flight times suggests that it is quite likely that the weather conditions were below the thresholds prescribed by the *Canadian Aviation Regulations* (CAR).

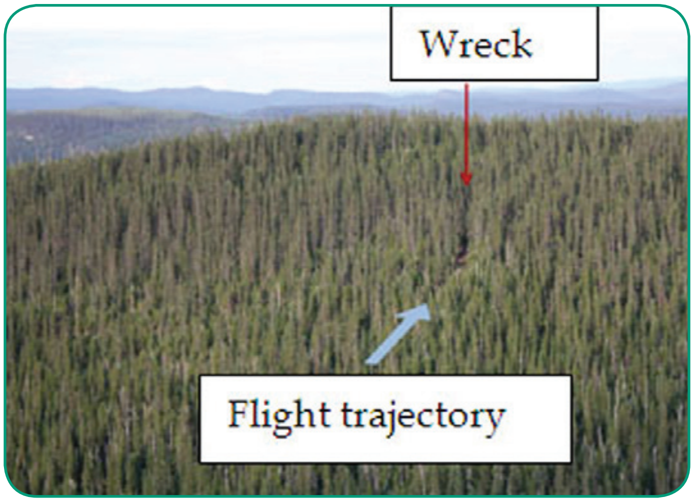
Once the aircraft had arrived at Lac des Quatre, no pressures of an operational nature were forcing the pilot to expedite the return to the base on Lac Margane, since the pilot's next flight was scheduled for 16:00. Consequently, it is reasonable to believe that the pilot was convinced of being able to return to the base in the existing weather conditions, since the pilot had just flown over the area.

Although the ceiling and the visibility forcasted in the GFA were, respectively, 800 ft AGL and 2 mi., the ceiling was below 300 ft since the base of the clouds covered the peak of the mountains located on the shore of Lac des Quatre, whose elevation is approximately 250 ft above the surface of the lake. Consequently, the weather conditions at the time of the takeoff from Lac des Quatre were below the minimum prescribed by the CARs for VFR flights.

The pilot had over 10 years of experience in the area, on this type of seaplane. The decision to take off in weather conditions below the minimum prescribed by the CARs was probably influenced by confidence the pilot had gained from successful past flights in similar conditions and from the fact that the pilot had just flown over the area. Since there is no direct communication between the operations manager and the pilot, the decision to take off from Lac des Quatre rested primarily on the pilot's judgment.

The pilot could not validate his decision to take off with another pilot or a colleague. The pilot made the decision on his own, based on the situation, his subjective evaluation of the risks, his knowledge and his experience. Some experienced pilots are not always concerned about flying close to rising terrain in limited visibility conditions. They do not feel that the safety margin is reduced to the point of reaching the real limit where a CFIT accident will occur.

In this case, the important decision, as far as safety was concerned, was whether to take off or not. It is possible that a question from a passenger as to the legality or the necessity of taking off in such conditions might have encouraged the pilot to delay the departure, since the weather conditions would have improved in the next few hours. After takeoff, the pilot was confronted with conditions that were no longer suitable for VFR flight.



Flight trajectory and position of the wreck on the side of the mountain

The pilot decided to make a precautionary landing and notified the passengers as well as the base at Lac Sébastien that the aircraft would land.

The GPS warning alerts of ground proximity at less than 100 ft are of limited usefulness when the entire flight is carried out at low altitude, because such alerts are frequent. Consequently, during a low-altitude flight, the pilot does not have time to analyze the numerous alerts and decide, in a timely fashion, whether a manoeuvre to avoid collision needs to be performed.

Findings as to causes and contributing factors

1. The pilot took off in weather conditions that were below the minimum for visual flight rules (VFR), and continued the flight in those conditions.
2. After a late decision to carry out a precautionary landing, the pilot wound up in instrument meteorological conditions (IMC). Consequently, the visual references were reduced to the point of leading the aircraft to controlled flight into terrain (CFIT).
3. The passenger at the rear of the aircraft was not seated on a seat compliant with aeronautical standards. The passenger was ejected from the plane at the moment of impact, which diminished his chances of survival.

Findings as to risk

1. The lack of training on pilot decision-making (PDM) for air taxi operators exposes pilots and passengers to increased risk when flying in adverse weather conditions.
2. In view of the absence of an ELT signal and the operator's delay in calling, search efforts were initiated more than 3½ hours after the accident. That additional time lag can influence the seriousness of injuries and the survival of the occupants.△

TC AIM—New Features

A new feature has been added to the "Explanation of Changes" section of the *Transport Canada Aeronautical Information Manual* (TC AIM). Instead of having to click on each link to print pages individually, you will now be able to open a separate PDF file and print all of the new pages at once. Another new feature of the upcoming TC AIM will be the introduction of full-colour images (e.g. graphics and charts).

ACCIDENT SYNOPSES

Note: The following accident synopses are Transportation Safety Board of Canada (TSB) Class 5 events, which occurred between August 1, 2011, and October 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 August 3, 2011, a **Convair CV580** was landing at Kasba Lake, N.W.T., on a flight from Winnipeg, Man. The runway was bumpy, with soft and wet spots after recent rains. During the landing roll, the aircraft's nose gear collapsed, and the aircraft came to rest on its nose. The passengers were deplaned with no injuries; the aircraft sustained substantial damage. *TSB File A11C0128*.

— On August 5, 2011, a **Bell 407 helicopter** was moving personnel in support of mining operations in the Hackett River Camp, Nun., area when an engine chip light came on. The pilot landed the helicopter and was following the normal engine cool-down procedure when a loud bang was heard and debris was projected in front of the helicopter. The pilot immediately activated the fuel shutoff and turned off the battery master. The pilot and four passengers exited the helicopter, and fire was observed in the engine area. The pilot returned to the helicopter and attempted to put out the fire with the hand-held cockpit fire extinguisher. The fire continued to burn; the pilot turned on the ELT and grabbed the hand-held radio. The helicopter was completely consumed by a post-crash fire. A cursory examination of the wreckage indicated an uncontained failure of the Allison 250 C47B engine. The engine was removed from the site and was shipped to the TSB Engineering Branch in Ottawa for examination. *TSB File A11C0129*.

— On August 6, 2011, a privately owned **Enstrom 280 FX helicopter** was landing on an unprepared sloped surface beside Lake du Chevreuil, Que. When the aircraft landed, its tail rotor struck the surface of the water and its drive shaft broke. The aircraft began rotating left before landing. The left skid was damaged. The accident occurred approximately 5 NM west of Duhamel, Que. Neither of the occupants was injured. *TSB File A11Q0149*.

— On August 11, 2011, the pilot of an **AS 350 B2 helicopter** had started the helicopter and began to perform the pre-flight hydraulic check. During the standard hydraulic accumulator test, the collective rose up and the helicopter became airborne. The pilot attempted to control the helicopter without hydraulic flight controls, but it struck the ground, bounced back into the air, rotated twice, and rolled over onto its left side. The pilot and three passengers escaped uninjured, but the helicopter was substantially damaged. The pilot had not engaged the collective lock. See TSB report #A06P0123 for identical circumstances. *TSB File A11P0121*.

— On August 13, 2011, a **float-equipped Cessna 170B**, with the pilot and two passengers on board, was taking off from Lake Sept-Îles, Que., when the pilot noticed that there was a personal watercraft ahead crossing his take-off path. The pilot completed a manoeuvre to avoid the personal watercraft, but the right wing touched the surface of the water, which caused the aircraft to stop suddenly. Both wings were significantly damaged. There were no injuries. *TSB File A11Q0151*.

— On August 14, 2011, a **float-equipped Cessna 172N** was on a recreational flight in the Caniapiscau, Que., region. While the aircraft was landing in very windy conditions on Lake Pau, the aircraft bounced. The pilot applied power to correct the situation. However, given that the aircraft's speed had decreased too much, the effectiveness of the flight controls was reduced and was so low that the pilot was unable to regain control of the aircraft for landing. The aircraft's right wing and nose touched the surface of the water first, and the aircraft came to a stop tilted, semi-submerged. The two occupants, who were wearing personal floatation devices (PFD), egressed and were quickly rescued by people from the nearby outfitter. There were no injuries. *TSB File A11Q0153*.

— On August 17, 2011, the pilot of a **Cessna C150F** was conducting circuits at Pokemouche Airport (CDA4) near Blanchard Settlement, N.B. At about 20:00 ADT, an engine RPM drop (Continental O-200) was noted as power was applied following a touch-and-go landing. The pilot elected to carry out a forced landing in a field adjacent to the airfield, but the aircraft's vertical fin struck utility wires during the approach. The aircraft came to rest on the ground inverted. The pilot sustained minor injuries that were treated at the scene by paramedics. It was estimated that 10 L of fuel remained on board at the time of occurrence. The aircraft sustained substantial damage. *TSB File A11A0048*.

— On August 20, 2011, a privately registered **Cessna T210M** was parked on the ramp at Humboldt, Sask., after a local VFR flight. The pilot had the engine running in an effort to lower engine temperatures prior to shutting it down. The pilot had opened the left cabin door to allow cooler air into the cockpit. At this point, the male passenger in the rear seat exited the aircraft and stood in the open doorway talking with the pilot. Sometime shortly afterward, the lone female passenger seated in the right front seat unlatched the right cockpit door and exited the aircraft. After exiting the aircraft, the passenger walked towards the front of the aircraft and was fatally injured on contact with the rotating propeller. The pilot and other passenger sustained no physical injuries. *TSB File A11C0135*.

— On August 21, 2011, a privately registered **Mooney M-20J** was landing on Runway 30 at Thunder Bay, Ont., with a pilot and three passengers on board. During the landing roll, the pilot's shirt became entangled on the landing gear selector, and the gear retracted. The aircraft settled on its belly and sustained damage to the belly and propeller. The pilot and passengers were uninjured. *TSB File A11C0137*.

— On August 23, 2011, a **Bell 206B helicopter** had landed on a makeshift lumber pad at a remote site 73 NM south of Smithers, B.C. Two passengers disembarked as the helicopter remained running and under the control of the pilot. As the helicopter was lifting off with only the pilot on board, a bear paw on the skid caught on a piece of lumber, which resulted in the helicopter rolling over. The pilot sustained minor injuries. Help was summoned by one of the passengers. The helicopter was substantially damaged. *TSB File A11P0127*.

— On August 24, 2011, a **float-equipped Stinson 108-3** struck glassy water during an approach to land on Upper Arrow Lake at Nakusp, B.C. The aircraft overturned and submerged. The pilot was able to exit the aircraft, but the passenger did not exit and drowned in the overturned aircraft. *TSB File A11P0128*.

— On August 25, 2011, a privately registered **Cessna U206D** was landing on a road adjacent to a farm where the pilot was to repair farm equipment. During the final approach, the vertical fin struck an unobserved wire crossing the road. The aircraft landed safely. The vertical fin and rudder sustained substantial damage. There were no injuries. *TSB File A11C0141*.

— On August 28, 2011, a **Cessna R182** was landing on Runway 30 at Charlo, N.B., after arriving from Bathurst, N.B. Upon touchdown, the aircraft landed on its belly, scraped along the runway for some distance, and came to rest on the paved surface. The pilot was the only occupant and was not injured; however, the aircraft was substantially damaged. The landing gear warning system was reported to be operating correctly, but the landing gear selector was not selected down prior to landing. *TSB File A11A0054*.

— On September 2, 2011, a **Piper PA28-151** failed to outclimb rising terrain in a coulee during a private sightseeing flight west of Claresholm, Alta. During a 180° turn, the aircraft stalled and crashed into trees. Two occupants sustained minor injuries, and one was flown by MEDEVAC helicopter to Calgary with serious injuries. The aircraft was substantially damaged. *TSB File A11W0129*.

— On September 3, 2011, two gliders (an **SZD-55-1** and a **G102 ASTIR CS**) were soaring in the same thermal about 7 NM southeast of the Invermere, B.C., airport when they collided. Both aircraft were substantially damaged and were incapable of controlled flight. Both aircraft struck the terrain and were destroyed. Neither pilot survived. The TSB is assisting the Office of the Chief Coroner for British Columbia in its investigation. *TSB File A11P0134*.

— On September 16, 2011, a **Lake LA-4 amphibian** airplane was taking off in VFR conditions between the St-Hyacinthe, Que., airport (CSU3) and Lake Geoffrion, Que. While the aircraft was attempting to land on water for the fourth time, it crashed in the lake. Both individuals were rescued by shoreline residents, who made their way to the aircraft in small boats. The passenger was fatally injured, and the pilot was severely injured. The aircraft was destroyed. *TSB File A11Q0177*.

— On September 16, 2011, an **Aerospatiale AS350B1 helicopter** was refuelled at Langley, B.C., and departed for Kelowna, B.C., at 18:20 PDT. The aircraft was last observed on radar at 3 800 ft in the vicinity of Hope, B.C. A citizen reported to the Kelowna tower that the aircraft was overdue. ATC had had no contact with the aircraft. The aircraft was found on September 20 by another helicopter operating in the area. The wreckage was located at 6 100 ft ASL on a north-facing 32° slope, indicating that the aircraft had turned back and reversed course. There was an intense post-impact fire that consumed most of the aircraft. The pilot was fatally injured. An installed 406 ELT was not working. *TSB File A11P0139*.

— On September 17, 2011, a **Cessna 182P** was inbound for Rockcliffe Airport (CYRO), Ont., and planned to land on Runway 27. During the final approach, the pilot lost sight of the runway in the setting sun and landed on Taxiway A, which was parallel to the runway. During the landing rollout, the pilot swerved to the left to avoid a taxiing aircraft and struck a parked aircraft. The pilot was uninjured; however, the landing aircraft was significantly damaged. *TSB File A11O0187*.

— On September 18, 2011, the unlicensed pilot of an **ultralight Aeros Model 582** had conducted numerous taxi runs to become familiar with the aircraft before departing from a private property in Carroll's Corner, N.S., for a local flight. This was the first flight for the pilot in this model of ultralight. After climbing above the trees shortly after takeoff, the ultralight pitched nose down, descended rapidly and crashed into a pond. The pilot, the sole occupant of the aircraft, was fatally injured. Fuel leaked into the pond. There was no indication of an in-flight structural failure, and the engine was operating at the time of impact. The pilot had about 9 hr of dual-flight training in a different model of ultralight. The pilot did not have any ground school training, nor was he authorized to fly solo. *TSB File A11A0061*.

— On September 23, 2011, a **Cessna U206G** was conducting a VFR charter flight from Fort Simpson, N.W.T., to the Root River Camp with two drums of avgas. The aircraft departed Fort Simpson in VFR conditions and followed the Root River. After approximately 1 hr of flying, the pilot began to encounter lower ceilings and visibilities. The pilot turned into what was thought to be the valley where the camp was located, but it was actually a box canyon. During an attempt to turn and climb out of the rising terrain, the right wing struck terrain and then the ground. The pilot sustained minor injuries and was located a few hours later with the help of the functioning 406 ELT. *TSB File A11W0146*.

— On September 23, 2011, an **amateur-built, float-equipped Wagaero Sport Trainer** was on a local VFR flight with the pilot and a passenger on board. When the aircraft took off from Lake Jourdain, Que., it entered a bank of fog. The pilot made a turn and the floats struck the surface of the water. The aircraft was severely damaged. Neither occupant was injured in the accident. *TSB File A11Q0183*.

— On September 24, 2011, a **float-equipped Wagaero Sportsman 2+2** took off from Lake Husky, Que., for a local flight with the pilot and a passenger on board. While the aircraft was returning and was on final for the lake, it experienced fuel starvation. The seaplane struck trees and crashed 20 m before it was to land on Lake Husky. Neither occupant was injured in the accident. According to the information that was obtained, a blocked fuel pipe caused the loss of power. The 406 ELT went off upon impact. *TSB File A11Q0184*.

— On September 24, 2011, an **R44 II helicopter** took off from Saint-Joseph-du-Lac, Que. at around 20:30 EDST on a VFR night flight to Saint-Jean-des-Piles, Que., with only the pilot on board. The aircraft struck the surface of Saint-Maurice River when it was approximately 350 m from its destination. The aircraft quickly sank. The pilot egressed from the cockpit and swam to shore, where he was rescued. He sustained serious injuries. *TSB File A11Q0182*.

— On October 2, 2011, an **amateur-built, float-equipped Beaver des Pauvres** took off from Nicolet River, Que., for the Outardes-4 dam, located north of Baie-Comeau, Que. While the aircraft was en route, the weather deteriorated, and the pilot conducted a precautionary landing on water in the southwestern portion of Jacques Cartier Lake, located in the Réserve faunique des Laurentides, at around 10:00 EST. Judging that the weather had improved, he took off again at around 12:30 EST. He found himself in a valley in which it was impossible to turn around. Due to the blanket of clouds, the pilot descended so low that the aircraft struck the tops of spruce trees. The seaplane crashed at around 13:00 EST and was significantly damaged. The pilot was not injured. The impact was not enough to set off the ELT. The pilot had a global positioning system (GPS) that could identify his location. Furthermore, he was able to communicate via cell phone and be rescued, as he was close to Route 175. *TSB File A11Q0186*.

— On October 19, 2011, a **Cessna 185** was conducting an engine run-up in the run-up designated area at Rouyn-Noranda airport (CYUY), Que., when a Boeing 737 parked 300 ft away increased engine power to taxi. The C185 pilot, realizing the B737 was advancing, applied engine power in an attempt to taxi further away; however, the C185's right wing lifted and the aircraft fell on its right side. The pilot and passenger were not injured. The C185 was substantially damaged. The C185 pilot was not aware that the B737 was preparing to leave and did not believe his aircraft was close enough to the B737 to be affected by the jet blast. The B737 flagman believed the C185 was far enough away and would not be affected by the jet blast. The flight service station (FSS) had not advised either crew of the presence of the other aircraft. *TSB File A11Q0190*.

— On October 26, 2011, a chartered **Cessna 180J** was climbing to 5 500 ft ASL towards St-Boniface-de-Shawinigan, Que. At approximately 3 500 ft ASL, the pilot noticed that the Continental O-470-S engine had lost power and stabilized the aircraft. The pilot turned around to come back and land and applied carburetor de-icing. The engine misfired a few times. While the aircraft was flying by the mountaintop upon its return, it entered an area of downdrafting air. While it was descending into the valley, the aircraft struck the treetops and came to a stop in the trees. The pilot and two passengers were not injured, and the aircraft was significantly damaged. *TSB File A11Q0198*.

— On October 30, 2011, a **Fairchild SA227-AC** was on an IFR flight from Montréal-Trudeau International Airport (CYUL), Que., to Kitchener/Waterloo (CYKF), Ont., with two pilots and two passengers on board. After the aircraft pushed back, the pilots were instructed to set the brakes and disconnect from the towing tractor. While personnel were still working near the nose wheel, the airplane started moving forward towards the tractor. The personnel moved away; the nose of the airplane struck the tractor and was damaged. There were no injuries. *TSB File A11Q0203*.

— On October 31, 2011, a **float-equipped Champion 7GCBX** took off on a VFR flight from Lake Labrecque, Que., to Lake Houlière, Que., with only the pilot on board. Approximately 30 min after takeoff, the pilot conducted a precautionary water landing on Péribonka River when he encountered low visibility conditions. When the aircraft landed on water, the pilot lost his visual references in the fog and the seaplane landed in a marsh on the shore of the river. During the ground run, a wing and a float broke off. The airplane caught fire after it came to a stop. The 406 ELT went off. The pilot was not injured in the accident. *TSB File A11Q0204*. △

New Four-Letter Words for Your Aviation Vocabulary: RESA and EMAS

by Mark Laurence, Civil Aviation Safety Inspector, Aerodrome Standards, Civil Aviation, Transport Canada

The landing overrun by Air France Flight 358, which occurred in August 2005 at Toronto's YYZ airport, has raised the profile of runway end safety areas (RESA) and Engineered Materials Arresting Systems (EMAS) in Canada. If you have heard these terms before but were not sure exactly what they referred to, this article may shed some light on these concepts.

RESA

Essentially, a RESA is a generally flat area at the end of a runway, which provides an area free of hazardous obstacles for aircraft to decelerate and facilitates the intervention of rescue and firefighting services should an aircraft overrun the end of the runway. A RESA is also beneficial when an aircraft lands short of (undershoots) the runway. This means that there must be no cliffs, bodies of water, deep ditches, boulders, roads, or similar obstacles for a specified distance at the end of a runway.

The International Civil Aviation Organization (ICAO) standard states that the RESA should end 150 m from the end of the runway, but ICAO also recommends that the RESA end 300 m from the end of the runway. Transport Canada (TC) has recommended the application of the ICAO standard, but is now considering making it mandatory[1] at Canadian airports. In reviewing runway overruns that occurred in Canada over the past 20 years or so, TC found that in 91% of overrun cases, the aircraft stopped within 150 m of the end of the runway.

The Federal Aviation Administration (FAA) chose the longer RESA (runway safety area in FAA terms), which ends 1 000 ft (300 m) from the end of the runway. Implementing this distance in Canada would have presented a challenge at many airports that do not have the space for the RESA to end 300 m from the end of the runway due to physical obstacles (such as roads, bodies of water, and steeply descending terrain). When the physical space does not exist, it is possible to reduce the declared distances of the runway in order to create the space for the RESA or, in other words, to make the runway shorter for calculation purposes without making any physical change to the runway length. This change may affect an aircraft's performance during takeoff and landing. For example, a shorter runway length may result in the need for greater engine thrust for takeoff or a reduced take-off or landing weight.

1 Notice of Proposed Amendment 2010-012 *Runway End Safety Area*

Photograph of an EMAS installation. (The EMAS bed is the grey area under the yellow chevrons) Ref: TC AIM AGA 9.1

EMAS

An overrun accident at New York's JFK airport in 1984 was the catalyst for an FAA project that led to the development of EMAS.

An EMAS is a bed located at the end of a runway; it is made of a lightweight, crushable concrete. For this type of concrete, sand and gravel are replaced with air and cellulose. The material looks like concrete but weighs about the same as a dry sponge. When an aircraft rolls into an EMAS bed, its tires sink into the lightweight concrete, and the aircraft decelerates in a predictable manner because it has to roll through the material. The blocks that make up the EMAS bed are progressively taller the farther they are from the end of the runway. This produces a similar effect to driving a car into snow that becomes deeper and deeper until eventually the car is stuck, but in a much more predictable manner. A typical EMAS bed is the width of the runway and 400–600 ft in length (120–180 m), depending on the characteristics of the critical aircraft for which the bed is designed.

Information on EMAS is available from the Engineered Arresting Systems Corporation, which is currently the only manufacturer of EMAS. At the moment, there are no EMAS beds installed in Canada. There are 63 EMAS beds installed worldwide, with 58 of them in the USA as of October 2011. Recently, the FAA has established a cooperative research and development agreement with Norsk Glassgjenvinning in Norway to cooperate in the testing and evaluation of their EMAS concept called Glasopor. Finally, more information on EMAS is available in the *Transport Canada Aeronautical Information Manual* (TC AIM) – AGA Aircraft Arresting Systems, Section 9.1. △

TAKE FIVE...

for safety

Five minutes reading could save a life

Overloading

Will an aircraft fly if it's overloaded? Of course it will; in fact, it's a way of life (or death) for too many pilots.

It's probably not hard to understand once having discovered that an aircraft can fly overloaded, that there will be opportunities and temptations to do just that. Of course, the margin of safety is reduced.

The real problem: that "extra" passenger has more than just weight—he has a wallet. Of ten crashes recently reviewed in which overloading and/or Centre of Gravity (CG) limits were clearly identified, all but one were commercial flights. Six of the accidents were fatal. Here's a sampling of what other pilots have experienced. Make a concentrated effort to ensure that you don't do the same:

The pilot falsified the weight and balance sheet to indicate the aircraft was within limits. With nine passengers on board, the light twin would not stay airborne and ran off the end of the runway.

The float Cessna 172's load was a pilot and two passengers, small outboard motor, pack sack, fishing gear and a day's abundant catch. It was asking too much of this aircraft, overloaded and with a 16-ft canoe tied to the float strut, to take off from the three-quarter mile lake. The pilot's luck didn't last because once airborne he couldn't coax it to clear the trees on the gently rising shore.

Loaded for a cargo haul, the aircraft was ready to go when the operator got a last minute change to add four passengers. The three available seats were set up to accommodate, but a party of seven adults and a baby arrived with baggage and several cases of beer. One passenger climbed into the co-pilot seat while the three extras settled themselves at the back, among the cargo. On takeoff the pilot struggled to lift the tail. Once airborne, the tail heavy aircraft climbed steeply to 100 ft, stalled and fell heavily to the runway. The CG was dangerously beyond the aft limit.

"After takeoff the aircraft began porpoising mildly as if it were perched on a needle point. Its movements were large and hard to control. Suddenly it dawned on me that the cargo had shifted aft on takeoff." Luckily this pilot was able to carry out a heart pounding safe landing with a CG beyond the aft limit.

The pilot of an overloaded float Twin Otter crashed trying to outclimb a mountain after complying with the tour director's request for a low, circling look at a fish hatchery in a narrow valley. One of 18 occupants was killed and two seriously injured.

Whatever your aircraft type, it does have a certified maximum all-up weight. The engineer who designed it knew his aerodynamics. Any attempts to defy the aircraft's physical limitations are usually exercises in futility. Know your specific load. Ensure that it is distributed and properly tied down. And don't succumb to customer pressure to stuff in that little extra bit for their convenience. That extra bit can cost you your life.

The First Defense

Effective Air Traffic Services - Pilot Communication

Pilot – ATS Communication Checklist

- ✓ Practice proper communication
  - Give full read backs of:
    - IFR clearances and instructions
    - Instructions to hold short of a runway
  - Pay attention to similar call signs
  - Use standard phraseology
  - Use full call signs
  - Speak up if you detect an error
  - Request confirmation
- ✓ If in doubt, ask
- ✓ Minimize distractions
- ✓ Challenge poor communications

Creating a culture of effective communications