Transport Canada / Transports Canada

Aviation Safety Letter

Learn from the mistakes of others and avoid making them yourself . . . Issue 2/2002

Direct Route Ends in CFIT

On September 28, 2000, a pilot in a Cessna 185 departed Deer Park (north of Spokane, Washington) on a ferry flight to Alaska. Around noon that day, he refuelled in Smithers, British Columbia, received a weather briefing, and filed a flight plan direct to Dease Lake, then direct to Whitehorse, Yukon. The pilot and two passengers departed Smithers at 12:17, and about an hour later an emergency locator transmitter signal was received from an area about 80 NM northwest of Smithers. Weather conditions hampered the search, and the wreckage was found the next day at 5100 ft ASL on a snow-covered, treeless hillside. The three occupants were fatally injured. This synopsis is based on the Transportation Safety Board of Canada (TSB) Final Report A00P0194.

The weather in Smithers at 12:00 was as follows: few clouds at 4000 ft ASL, broken clouds at 6000 ft, overcast at 9000 ft, and visibility 25 mi. in light rain showers. The forecast weather for the route north of Smithers included cloud layers at 4000 and 6000 ft and visibility reduced to 4 mi. in light snow showers.

The wreckage trail was from east to west, generally following the valley. The angle of impact with the hill was not extreme, but impact forces were high. The engine RPM pointer was at the 2400 RPM position, a normal cruise power setting. The airplane was equipped with a global positioning system (GPS). There was no radar coverage for the route from Smithers to Dease Lake, but radar tapes from their previous leg indicate that the airplane was flying directly on course, as it would be if the pilot were navigating using the GPS. It is therefore likely that the accident flight leg was initiated on a direct course, taking it into the high terrain. The terrain on this direct track rises to about 7000 ft ASL.

Because of the time that had elapsed and the direction of flight on impact, the pilot was likely trying to fly the airplane out of the high terrain. He may have tried to fly toward a visual flight rules route that is west of the direct track from Smithers to Dease Lake. With cloud layers forecast at 4000 to 6000 ft ASL and visibility four miles in light snow showers, the pilot would likely have encountered instrument meteorological conditions in areas of high terrain. The pilot would have had difficulty seeing the snow-covered, treeless hillside because of the reduced visibility and the lack of distinguishing ground features.

The engine power setting, wreckage pattern and weather data led the TSB investigators to believe this was a controlled flight into terrain (CFIT) accident. Many organizations have recognized the need to educate operators and flight crew with the aim of reducing the number of CFIT accidents. Transport Canada has a video entitled *Situational Awareness: Preventing CFIT*, available from your regional System Safety offices. An international CFIT task force, led by the Flight Safety Foundation (FSF), has developed the *CFIT Education and Training Aid.* This aid is designed to help users develop and deliver training to prevent CFIT accidents. For more details on the FSF and the CFIT Task Force, visit the FSF Web site at http://www.flightsafety.org. △

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Strikebound

A True Aviation Story by Paul V. Tomascik

Every pilot experiences times when plans fall apart and he or she is tested. Years of flying build experience, but maybe complacency too: a two-edged sword that can label a decision smart or stupid, lucky or foolhardy, calculating or gambling. Although flying always poses an element of risk—planning, training and applying knowledge effectively can mitigate the danger. I put my decision-making fortitude to the test one late spring day.

June 4, 2000, saw daylight break in the Ottawa area with bright sun and scattered altocumulus clouds. My seventeen-year-old son and I planned to fly to Smiths Falls airport that day and enjoy a fly-in breakfast. Although Smiths Falls is roughly 25 NM south of Ottawa, I planned the flight as if going on a long cross-country.

I always speak to a weather briefer when flying more than circuits. Why? I derive a certain level of comfort speaking to people that work in meteorology for a living. I want some professional reassurance that I can safely return to base within my allotted flight time. If there is a remote chance of being weathered in, if conditions are anticipated to be marginal visual meteorological conditions (VMC), if crosswind limitations are going to be exceeded, I cancel the flight or opt for some touch and goes. All indicators pointed to an uneventful flight.

Smiths Falls was busy. Descending on the dead side, I was number two in the circuit when I joined mid-downwind for Runway 06. The winds were opposite to those at Rockcliffe.

While waiting for breakfast one thing looked puzzling. I noticed that the windsock managed to change direction, rotating full circle every 20 min or so. The constant change in wind direction made for some very interesting landings by latecomers, testing their crosswind landing capabilities as well as their high-speed tailwind touchdowns. It seemed that aircraft in the circuit were reluctant or unable to change the flow of traffic and accepted Runway 06 as the active runway. Despite unpredictable winds, everyone was landing without incident. But was it variable wind conditions or poor decision-making that compromised safety?

I've seen some undisciplined airmanship at fly-ins, including the busting of regulations and pilots doing other stupid things, such as landing two planes on an active runway at the same time (one touching down short and one landing long). Other examples include taking off and touching down before the active runway is cleared of traffic, backtracking to the threshold while a plane is on a short final and cutting others off in the circuit. What happened to leg extensions, orbits, or better yet, slower flying and common courtesy? These pilots mastered the skill of flying but have become overconfident, complacent and careless. Maybe I was getting too comfortable as well. After two hours at the fly-in it was time to fly home.

In the air, visibility was more than 15 mi., allowing me to see a growing panorama—the Ottawa skyline had my attention. The entire horizon was veiled in a broken and advancing line of rain and thunderheads. We had a ringside seat to a squall line that covered the Gatineau Hills in Quebec, its fingers penetrating Ottawa's downtown buildings. I could see holes in the curtain of rain to the east, thinking I could go around that way and sneak into Rockcliffe.

I recalled that advancing cold fronts, even if you weren't near them, could produce deadly turbulence. The windshield started smashing an occasional raindrop. I looked behind and the weather was clear. I was listening to all kinds of chatter on the Smiths Falls universal communications (UNICOM) when a sign from God brought me to my senses.

Two conduits of raw energy, cloud-to-ground lighting bolts, arced five miles off our nose. The radio crackled. Rain started smearing the windshield. Surprisingly, we were well within VFR limits with good visibility, including separation from cloud. Perhaps those are the inviting conditions, that impel some pilots to keep pushing the weather. I felt uncomfortable. We were clearly exposing ourselves to a lightning strike and all the other ancillary dangers associated with thunderstorms. I took evasive action and executed a 180° turn.

Scanning to find back the runway at Smith Falls I became temporarily disoriented, not sure of its exact location. Gaining my composure, I tracked the VHF omnidirectional range (VOR) needle from my previous outbound setting to the airport and found the runway. Landing without incident, I secured the plane to wait out the storm. It was violent but brief. Clearing weather followed, and we were able to resume our return flight, late but safe.

Reflecting back, I analyzed the decisions I made that day. In hindsight, I believe I did the right thing, but I had to be pushed to act responsibly by increasing our risk and struggling with the consequences of pressing forward and gambling with our luck. I could have refreshed my weather briefing before takeoff.

The privilege of pilot-in-command is an authority that keeps plane, pilot and passenger(s) out of harm's way. It's an unwritten rule, a collective agreement so to speak, that assures the safety of passengers through the competent actions of licensed pilots. When that rule is broken, the fragile bond could be damaged irreparably, lost forever, or worse, it may lead to disastrous results from which there's no turning back. △

Transport Canada / Transports Canada

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Address correspondence to:
Editor, Paul Marquis
Aviation Safety Letter
Transport Canada (AARQ)
Ottawa ON K1A 0N8
Tel.: (613) 990-1289
Fax: (613) 991-4280
E-mail: **marqupj@tc.gc.ca**
Internet: *http://www.tc.gc.ca/ASL-SAN*

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Paul Marquis

Regional System Safety Offices

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

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

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

Prairie & Northern
• Box 8550
344 Edmonton St.
Winnipeg MB R3C 0P6
(204) 983-5870

• 61 Airport Road
General Aviation Centre
City Centre Airport
Edmonton AB T5G 0W6
(780) 495-3861

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

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Short Take on Human Factors Basics

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

MOTIVATION

Definition—Motivation is a drive that causes you to act or behave in certain ways.

The word *motivation* itself is neutral in meaning, having both positive and negative connotations. One can feel motivated to help the poor, just as one can feel motivated to embezzle funds. Similarly, in aviation, one can be motivated to take risks or to make safe decisions.

Motivation and Human Factors

Overall, however, motivation is usually considered a positive force because it causes one to act as opposed to doing nothing. Furthermore, increased motivation leads to increased attention, and usually better learning. Any instructor will tell you that teaching a motivated student is a pleasure because no effort has to be spent on getting attention.

As for the factors that affect your performance, it is your motivation that will lead you to explore them and address them. Only you can motivate yourself to develop the discipline for flying safely.

Excerpt from TP 12863E, Chapter 4, page 38. You can purchase your own copy of this publication by calling the TC Civil Aviation Communications Centre Services at 1-800-305-2059. △

In This Issue

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Type Checks and Recreational Aviation

by Martin Buissonneau, Recreational Aviation, Flight Training, Transport Canada

When we talk about training, we are usually referring to flying lessons and ground school taken in order to obtain an aircraft pilot licence or permit. Type checks can be thought of as a short-term training given by a flight instructor or competent pilot. This type of training allows to pilots learn to safely fly an aircraft whose category, class and type are permitted under the terms of their current licence or permit.

During their flying years, some pilots may take a type check many times. Some pilots will only fly one type of aircraft whereas others will be called upon to fly many types of aircraft. Holders of a private pilot licence-aeroplane or a recreational pilot permit-aeroplane may also fly ultralight aircraft. This not only involves a different aircraft type, but it also involves a different aircraft category; pilots should therefore demonstrate caution and must adapt to this aircraft's peculiarities. For example, first-generation ultralight aircraft are slow and light; they have a considerable wing area (considering their weight) and a low forward momentum. These striking differences can be disconcerting during the takeoff and landing as well as during other phases of flight. For these reasons, pilots of conventional aircraft who wish to fly an ultralight should undergo a type check with a competent flight instructor for the type in question. This is true even if the desired aircraft is an advanced ultralight or a more recent model.

In order to maximize the training aspect of the type check, type checks should be conducted in a constructive and logical order. It is important to study the aircraft's operating manual before the flight to learn about the aircraft's limits and peculiarities. In addition to the obvious, such as specific speeds (take-off, various climb, stall, optimal glide and approach speeds, and landing flaps), the sections of the manual that deal with weight and balance, on-ground and in-flight emergencies, etc., must be examined.

The instructor can conduct a review by giving participants an exercise to find specific information quickly. As part of a type check, instructors should ask the participants questions in order to determine if they have learned and retained the information and to ensure that the aircraft will be flown in a safe manner.

Once the theoretical information has been covered, the pre-flight check should be examined. This section comprises explanations of the main steps involved in the pre-flight check and, if necessary, specific aspects that differentiate this aircraft from others. The final step of the process involves conducting the flight or flights, depending on the aircraft type and the candidate's skill and experience.

There is no prescribed flight time for type checks. In some cases, one or two flights will be sufficient to determine the pilot's ability to fly a given aircraft safely and to deal with potential emergency situations. In other cases, more flights will be necessary. From the beginning, the instructor needs to make the participant understand that there is no imposed time limit on type checks — the top priority is safety. This ensures that no expectations are created and useless debates are avoided.

The flight(s) will include the following elements, depending on the candidate and the aircraft type: an overview of the items usually included in the checklist, a familiarization flight in the aircraft, the manoeuvres and exercises permitted by the manufacturer, simulations of in-flight emergency situations, and various circuits, including the takeoff, approach and landing. A final flight will be conducted with the aircraft loaded to its maximum allowable take-off weight to give the participant a chance to notice how the aircraft reacts during various stages of flight at this weight. Of course, different elements must be held back for the purpose of the type check, depending on the aircraft used and the conditions in which the type check is being conducted.

As with any training, a detailed post-flight briefing given by the instructor would be very helpful in allowing the participants to enhance their skills. Furthermore, the participants would be able to take advantage of this time to ask the instructor questions or discuss their concerns. This would help eliminate any nagging concerns that the participant may have.

Type checks also give the instructor a chance to provide participants with some positive feedback about their flying skills, aeronautical discipline, and the safety aspect of their flight. A complete and constructive type check should not only lead to participants' being able to fly a new type of aircraft, but it should also improve their general flying skills, which would at the same time help improve aviation safety. △

SARSCENE 2002

The National Search and Rescue Secretariat (NSS) is pleased to announce SAR*SCENE* 2002, its eleventh annual search and rescue workshop, to be held in **Halifax, Nova Scotia, September 11–14, 2002**. SAR*SCENE* 2002 will provide a forum for search and rescue personnel to share expertise and experiences, and to find out about new SAR technologies. Over 600 participants are expected from air, land and marine organizations across Canada (Department of National Defence, Royal Canadian Mounted Police, Environment Canada, Department of Fisheries and Oceans (Canadian Coast Guard), Canadian Heritage (Parks Canada), provincial and municipal governments, and volunteer organizations). SAR organizations from abroad are also expected. The workshop kicks off with the sixth annual SAR*SCENE* Games on September 11, followed by presentations, training sessions and the trade show over the following three days.

For information, please contact: National Search and Rescue Secretariat. Tel.: 1-800-727-9414, Fax: (613) 996-3746, e-mail *MJackson@nss.gc.ca*, or visit the NSS website at http://www.nss.gc.ca. △

A Look at the Joint Rescue Co-ordination Centre

by Major Clarence Rainey, Director, Joint Rescue Co-ordination Centre, Trenton, Ontario

I am the officer in charge of the joint rescue co-ordination centre (JRCC) located at the Canadian Forces Base (CFB) in Trenton, Ontario. As such I am responsible for the co-ordination of rescue efforts for all air distress situations within the boundaries of my search and rescue region (SRR). The editor of the *Aviation Safety Letter* has graciously allocated this space to the Canadian JRCCs for the airing of search and rescue (SAR)-related issues.

I am excited about this opportunity to talk directly to the Canadian aviation community on SAR-related matters from a JRCC perspective. This is an opportunity to familiarize readers with our excellent Canadian SAR system, how it works, and some of the philosophies associated with search procedures. When, why and how would a search be initiated? To what lengths do we go to locate a missing aircraft? And, most important of all, what can you as an aviator do to help us find you as quickly as possible and greatly enhance your chances for survival?

The two other JRCCs within Canada are similarly staffed with qualified SAR personnel and are capable of co-ordinating essentially the same response across the country. For the purposes of this column, each JRCC, in turn, will publish an article dealing with a SAR topic of interest to the general aviation community or address an issue peculiar to their region. The Canadian Mission Control Centre (CMCC), which is located on CFB Trenton as well, is also an integral part of the Canadian SAR system. CMCC deals with the satellite detection, processing and distribution of distress beacon information. They will produce an article dealing with emergency locator transmitter (ELT)-related issues.

False alerts, which cause SAR resources to be deployed unnecessarily, are costly and could prevent a response to a real distress situation. The causes of these unnecessary alerts, for the most part, are preventable, and it is intended that the causes of these unnecessary alerts be used as the subject matter for the majority of our articles. It is hoped that by talking about these incidents the number of false alerts may be reduced.

Canadian aviators, and those who fly within our boundaries, are indeed fortunate in that they come under the umbrella of one of the best SAR systems in the world. As well as providing information, we hope that our articles will generate further discussions in cockpits and flight centres across the country with the end result of increasing safety awareness throughout our aviation community. △

Learn From Others? ASL Caption Contest

Learn from the mistakes of others and avoid making them yourself. This statement is certainly not new to all of you, and most likely is quite a bit cliché in the minds of many! Nevertheless, the cover of the *Aviation Safety Letter* (ASL) has included this caption, or a variation thereof, for as long as we can remember. In fact, the original caption was *Learn from the mistakes of others; you'll not live long enough to make them all yourself*, and it was first published in ASL issue 3/77. The original caption was replaced in ASL issue 4/93 with *Learn from what others are doing right*, and it was changed again in ASL issue 4/98 to its current rendition.

Here is how the 3/77 issue introduced the new caption:

Confucius said "To hear is to forget, to see is to remember, to experience is to understand." The stories in the Letter can provide you with "substitute" experience—to help you avoid ever going through the real thing yourself.

While we still stand by this, the common theme from the three different versions is *learning from others*. What about the possibility that we could face the mirror once in a while and learn also from the person looking at us? If to err is human and we're all human, that would logically imply that we are all perfectly capable of making errors—and we do! Some of our most important lessons learned came from our own experiences.

So with this in mind, we are opening the floodgates for submissions for new ASL captions, and I plan to put a different one for each of the next several issues. Send your ideas to the ASL editor via e-mail, fax or regular mail (see page 3 for contact information); include your name and where you are from. ASL issue 3/2002 will feature the first reader's caption. △

Forest Fire Season Reminder!

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

Safety Culture: The Ultimate Goal

by Professor Patrick Hudson

*This article originally appeared in **Flight Safety Australia**, September-October 2001*
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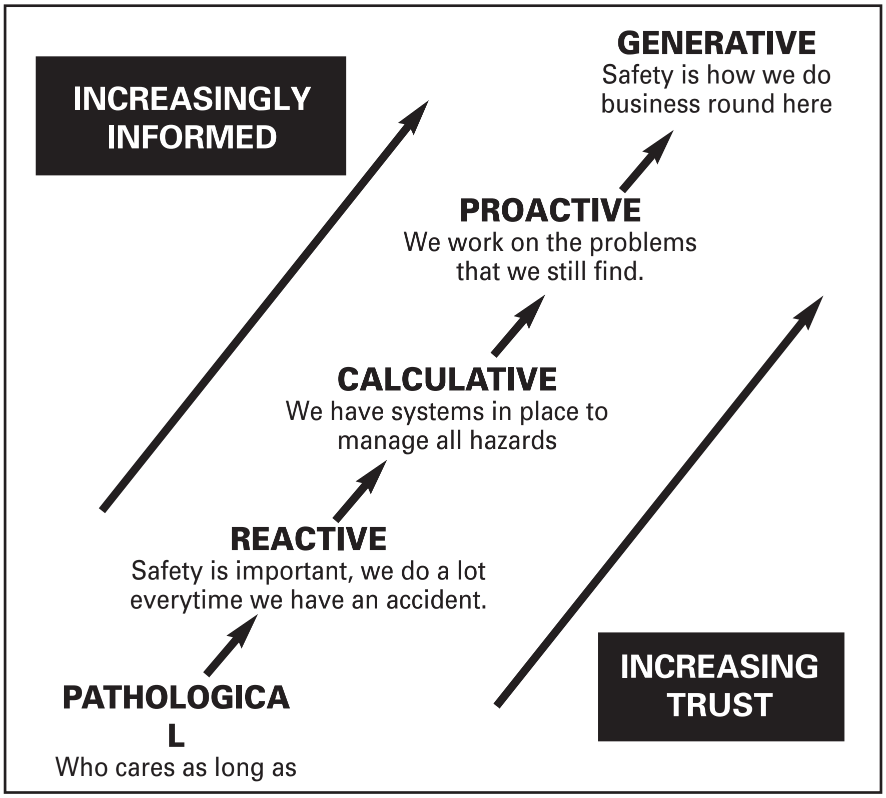
Safety management systems can make a big difference to any business. The benefits of taking a systematic approach to safety are obvious: the hazards of the business are known, understood and demonstrably controlled.

However, the possession of a safety management system, no matter how thorough and systematic it may be, is not sufficient to guarantee sustained safety performance.

To proceed further it is necessary to develop organisational cultures that support higher processes such as "thinking the unthinkable" and being intrinsically motivated to be safe, even when there seems no obvious reason to do this. What is needed is a safety culture that supports the management system and allows it to flourish.

The bad news is that creating a healthy safety culture and keeping it alive requires effort. The good news is that less effort is required in smaller organisations, and safety cultures are worthwhile, both in terms of lives and profits.



It's a long way to the top: The evolution of safety cutlure

Safety for profit: There is considerable evidence that the most safety-minded companies are also amongst the most profitable.

Safety cultures are characterised by good communication between management and the rest of the company. This not only enhances safety, but can elevate morale and in some cases, productivity. As communication failures are always identified as a source of problems for organisations, having a definitive focus for improving communication can only result in improved performance at all levels.

The other main reason why safety cultures make money lies in the fact that, if one has the safety enhancement that an effective safety culture can provide, then one can devote resources more effectively and take (profitable) risks that others dare not run.

What costs money is not safety, but bad safety management. Once the management of an organisation realises that safety is financially rewarding and that the costs incurred have to be seen as investments with a positive return, the road to a full safety culture is open.

What is a safety culture? Every organisation has some common characteristics we call its "culture". These characteristics have often become invisible to those inside, but may be startling to outsiders coming from a different culture. The notion of an organisational culture is difficult to define. I take a very general approach and see the organisational culture as, roughly: "Who and what we are, what we find important, and how we go about doing things round here".

In one sense, safety always has a place in an organisation's culture, which can then be referred to as the safety culture, but it is only past a certain stage of development that an organisation can be said to take safety sufficiently seriously to be labelled as a safety culture.

"What costs money is not safety but bad safety management."

From worst to best: Organisations can be distinguished along a line from pathological to generative:

- Pathological: The organisation cares less about safety than about not being caught.

- Reactive: The organisation looks for fixes to accidents and incidents after they happen.
- Calculative: The organisation has systems in place to manage hazards, however the system is applied mechanically. Staff and management follow the procedures but do not necessarily believe those procedures are critically important to their jobs or the operation.
- Proactive: The organisation has systems in place to manage hazards and staff and management have begun to acquire beliefs that safety is genuinely worthwhile.
- Generative: Safety behaviour is fully integrated into everything the organisation does. The value system associated with safety and safe working is fully internalised as beliefs, almost to the point of invisibility.

A safety culture can only be considered seriously in the later stages of this evolutionary line. Prior to that, up to and including the calculative stage, the term safety culture is best reserved to "describe formal and superficial structures" rather than an integral part of the overall culture, pervading how the organisation goes about its work. In the early stages, top management believes accidents to be caused by stupidity, inattention and, even, wilfulness on the part of their employees. Many messages may flow from on high, but the majority still reflect the organisation's primary production goals, often with "and be safe" tacked on at the end.

A true safety culture is one that transcends the calculative level. Even so, it is at this stage that the foundations are laid for acquiring beliefs that safety is worthwhile in its own right.

By constructing deliberate procedures, an organisation can force itself into taking safety seriously. At this stage the values are not yet fully internalised, the methods are still new and individual beliefs generally lag behind corporate intentions. However, a safety culture can only arise when the necessary technical steps and procedures are already in place and in operation.

An organisation needs to implement a managed change process so it can develop along the line towards the generative or true safety cultures. The next culture defines where we want to go to, the change model determines how we get there. (See "Change, for safety's sake", in following box.)

A cultural change is drastic and never takes place overnight. If a safety champion leaves, there is often no-one to take up the fight and the crucial top-down impetus is lost. But even without a personnel change there are two threats to the successful transition to a higher level of safety

Change, for safety's sake

The following model was developed for managing successful change within organisations. Its strength comes from the fact that it is intended to change both the individuals and the organisations they constitute, and realises that changing one without the other is impossible. The model puts together the requirements for change of individual beliefs that are so crucial in cultural development. It can apply to safety, but it can also apply to any other desirable development in an organisation. It gives substance to the oft-heard cries for workforce involvement and shows where and why such involvement is crucial, especially in the later stages of evolution towards a full safety culture:

Awareness
- Awareness: Knowledge of a better alternative than the current state.
- Creation of need: Active desire to achieve the new state.
- Making the outcome believable: Believing that the state is sensible for those involved.
- Making the outcome achievable: Making the process of achieving the new state credible for those involved.
- Information about successes: Provision of information about others who have succeeded.
- Personal vision: Definition by those involved of what they expect the change to be.

Planning
- Plan construction: All people involved in the change create their own action plan.
- Measurement points: Indicators of success in the process are defined.
- Commitment: Staff and management sign up to the plan.

Action
- Do: Start implementing action plans.
- Review: Progress is reviewed with concentration upon successful outcomes.
- Correct: Plan is modified where necessary.

Maintenance
- Review: Management reviews change process at regular (and defined in advance) intervals.
- Outcome: Checks to see whether new values and beliefs have become second nature. △

culture. One is success, the other failure.

In the case of success, effective processes, tools and systems may be dropped, because the problem is perceived to have gone away. In the case of failure, old-fashioned approaches may be retrieved on the grounds that they worked before. But in both of these cases, the new, and often fragile, beliefs and practices may not have become sufficiently internalised to survive changes at the top.

Management has to be truly committed to the maintenance of an advanced culture in the face of success and/or failure, and such commitment is rare.

Change is hard: One final underlying reason why cultural change often fails to succeed is that the new situation is unknown to the participants. If this is added to existing beliefs, such as the belief that the current situation is as good as it gets, then there is little real need to change and failure is almost certain. If these failures are at the level of the workforce, then strong management commitment may save the day. If the problems lie with management, then there is little hope because they will enforce the old situation, which feels most comfortable, on the most proactive of workforces.

A colleague has likened this to learning a new golf swing by changing the grip and the stance. At first the new position is uncomfortable. However, to improve your swing you have to trust the pro, do the work and be patient. (One advantage of this metaphor is that managers often play golf and can transfer their experience of learning a new swing to learning to manage an advancing culture. Change agents are like golf professionals: they can help develop a person's game, but they can't play it for them.)

Not too difficult: Given the financial inducements, why don't organisations try and develop the most advanced forms of safety culture? The answer seems to be contained in the type of culture the organisation has at the time.

Pathological organisations just don't care. Reactive organisations think that there is nothing better and anyone who claims better performance is probably lying. They do what they feel is as good as can be done. Calculative organisations are hard to move because they are comfortable, even if they know that improvement is possible. Large organisations will inevitably be heavily calculative unless active steps are taken to counter that tendency.

Small organisations are more likely to be able to develop past the calculative stage and become generative. The greatest single barrier to success for smaller organisations however, is the belief that it is too difficult. On the contrary, in the long term, it is more difficult, and dangerous, not to.

Professor Patrick Hudson is recognised internationally for his work on safety management systems. He is based at Leiden University in Amsterdam and is an active member of the ICAO Human Factors Awareness Group. △

25 years ago already...

…on March 27, 1977, a Boeing 747 attempted to take off from Tenerife for a flight to Las Palmas. Another Boeing 747 however was still taxiing down the runway. Both aircraft collided and burst into flames. 583 passengers and crew died, making this accident the worst in aviation history. The fundamental cause of this accident was the fact that the captain from the aircraft taking off 1. Took off without clearance. 2. Did not obey the "stand by for takeoff" from the tower. 3. Did not interrupt takeoff when the taxiing aircraft reported that they were still on the runway. 4. In reply to the flight engineer's query as to whether the taxiing 747 had already left the runway, replied emphatically in the affirmative. This is a long, fascinating and sad story, which complements our safety awareness campaign on runway incursions.

Photo: SIPA Press, Paris

For a quick recap of this accident, I invite you to check the Aviation Safety Network website at http://aviation-safety.net/specials/tenerife/index.htm. △

Erratum in ASL 1/2002

An error slipped into the "**Score Your Safety Culture**" checklist, which was added as a tear-out sheet at the end of ASL 1/2002. The second sentence in the paragraph on "**Blame**" should read: "It is recognized by all staff that a small proportion of unsafe acts are indeed reckless and warrant sanctions but that the large majority of such acts should **NOT** attract punishment." △

Recently Released TSB Final Reports

In an attempt to encourage readers to read more Transportation Safety Board of Canada (TSB) Final Reports on the Internet, at http:/www.tsb.gc.ca/*, we will gradually try to reduce the size of the accident synopsis found in the ASL. The following excerpts from TSB final reports include only the TSB synopsis and their findings. This should allow us to highlight more accidents, while allowing the readers to know where to look for the final reports that may be of interest to them. —Ed.*

TSB Final Report A99C0281—Runway Overrun/Collision with Approach Lights

On November 22, 1999, a Fairchild Metro SA-227-AC ran off the end of the Runway 11 at Dryden, Ontario, and came to rest about 300 ft past the end of the runway. There were no injuries, but the aircraft was substantially damaged. Emergency response services (ERS) located in the City of Dryden were not notified and did not respond to the accident scene.

TSB findings as to causes and contributing factors:
- The approach was flown such that the aircraft was about 90 ft too high and about 40 kt too fast at the threshold.
- The pilot-in-command landed the aircraft with about 2000 ft of runway remaining; about 3875 ft of runway were required to stop the aircraft after landing.
- Crew co-ordination during the approach and landing was minimal and ineffective, which likely contributed to the poorly flown approach.

Findings as to risk:
- The crew did not assess the condition of the aircraft and communicate clearly to the flight service station (FSS) whether ERS should be activated.
- The crew did not take action to evacuate the aircraft in a timely manner.

TSB Final Report A00P0103—Loss of Control

On June 19, 2000, a de Havilland DHC-2 (Beaver) floatplane departed Hotnarko Lake, British Columbia. The pilot and six passengers were on board, with fishing gear and fish. Soon after takeoff, the pilot entered a left turn.

Before the turn was completed, the aircraft rolled, without command, further left to about 40° of bank, and the nose dropped. The aircraft did not respond to initial pilot inputs and continued in a left, diving turn toward the trees at the edge of the lake. The pilot tried to get the aircraft back onto the lake. The aircraft started to recover from the bank, and the nose started to come up; however, the aircraft struck the lake surface before a level attitude could be regained. It broke apart on contact with the water and sank soon after. The pilot and four of the passengers managed to free themselves from the wreckage, but only three passengers and the pilot managed to swim to shore. One passenger slipped below the water surface before reaching the shore and drowned. Two passengers remained in the aircraft below the water surface, one secured by his seat belt, and drowned.

TSB findings as to causes and contributing factors:
- When the pilot entered the turn, the combined effects of the increased G-forces, the power reduction, the aircraft's heavy weight, the aft centre of gravity (C of G), the retraction of the flaps, and the wind conditions resulted in the aircraft stalling. The aircraft struck the lake surface before the pilot was able to re-establish a level-flight attitude.
- The aircraft was operating in excess of 385 lb above the maximum gross take-off weight, and the C of G was about 2.7 in. aft of the aft limit. This loading configuration aggravated the aircraft's stall characteristics.
- The pilot reduced power and raised the flaps before the climb was complete, contrary to the pilot operating handbook, thereby increasing the aircraft's stall speed.

Other findings:
- The shoulder harnesses worn by the pilot and the front passenger likely prevented serious head injuries.
- The centre seat broke from its footings. This may have incapacitated the two passengers inside the aircraft or impeded their escape.
- One passenger drowned while trying to reach shore.
- Life jackets were available in the aircraft but were not used by the pilot or passengers.

TSB Final Report A99P0136—Collision with Boat

On September 26, 1999, a de Havilland DHC-2 Beaver floatplane flew a standard arrival in preparation for a landing towards the west in Vancouver Harbour. When the aircraft was on final approach, at about 400 ft ASL, the pilot received clearance to land from the Vancouver Harbour control tower. Just as the aircraft was about to touch down, the pilot heard a thump and felt the aircraft shudder. The pilot did not see the small pleasure boat and was not aware of its presence until the impact. He immediately terminated the landing attempt, applied power, and initiated a climb. He then reported by radio that he was overshooting and he felt something had hit the aircraft. The pilot flew the aircraft to a position where the air traffic controller from the Vancouver Harbour control tower was able to visually confirm that the aircraft appeared to be undamaged. The pilot then landed the aircraft in the harbour without further incident.

As a result of the collision, the operator of the boat suffered serious injuries, and the passenger received minor ones. There were no injuries to the occupants of the aircraft, which was not damaged during the collision.

TSB findings as to causes and contributing factors:

- The pilot did not see the boat in time to avoid the collision.
- The pilot's ability to see the boat was reduced by sun glare on the water, masking effects of the aircraft's cabin structures, and limitations of the human eye.
- The operator of the boat was aware that aircraft operated in the harbour area but was unaware that he was transiting the designated landing area. He did not see the aircraft in time to avoid the collision.
- The controller did not see the boat and, therefore, did not recognize the potential for collision.

Other findings:

Vancouver Harbour air traffic controllers only control aircraft. They have no control over boats and do not communicate directly with boat operators.

TSB Final Report A00C0162—Loss of Control/ Collision with Terrain

On July 17, 2000, a Piper PA-25-150 spray aircraft had completed three passes applying fungicide to a wheat field when the engine abruptly lost all power. The pilot applied carburetor heat and attempted to restart the engine, but it did not respond. As the pilot turned in an attempt to reach a gravel roadway, the aircraft stalled, descended, and crashed into a farm field. At impact, a fuel-fed fire ensued, and the pilot suffered serious burns as he climbed from the aircraft. The aircraft was destroyed by the fire.

TSB findings as to causes and contributing factors:

- The aircraft engine lost power, likely as a result of carburetor icing.
- Following the loss of power, the pilot allowed the airspeed to decrease to the point that the aircraft stalled and descended uncontrollably to the ground.
- From the altitude at which the loss of power occurred, it is unlikely that carburetor icing could have been cleared with full carburetor heat applied.

Findings as to risk:

- The carburetor heat cable was weakened by fretting wear and the effects of fatigue. This weakening caused the cable to fail, either in a neutral position during impact or as the pilot applied carburetor heat.
- The fretting wear of the carburetor heat cable probably went undetected when the aircraft was inspected and certified for an annual inspection, approximately two months and 60 flight hours before the occurrence.
- The aircraft was not equipped with an optional post-production fuel bladder kit, recommended on January 18, 1988, by the aircraft manufacturer.

TSB Final Report A99Q0005—Controlled Flight into Terrain

On January 4, 1999, a Beechcraft 1900C with two pilots and ten passengers on board was making an instrument flight rules (IFR) flight between Lourdes-de-Blanc-Sablon, Quebec, and Saint-Augustin, Quebec. Just before initiation of descent, the radiotelephone operator of the Saint-Augustin airport UNICOM (private advisory service) station informed the crew that the ceiling was 300 ft, visibility a quarter of a mile in snow flurries, and the winds from the southeast at 15 kt gusting to 20 kt. The crew made the LOC/DME (localizer transmitter/distance-measuring equipment) non-precision approach for Runway 20. The approach proceeded normally until the minimum descent altitude (MDA). When the co-pilot reported sighting the ground beneath the aircraft, the pilot-in-command decided to continue descending below the MDA. Thirty-five seconds later, the ground proximity warning system (GPWS) "MINIMUMS" audible alarm sounded. Three seconds later, the aircraft flew into the frozen surface of the Saint-Augustin River. The occupants escaped the accident unharmed. The aircraft was heavily damaged.

TSB findings as to causes and contributing factors:

- The crew did not follow the company's standard operating procedures (SOP) for the briefing preceding the approach and for a missed approach.
- In the approach briefing, the pilot-in-command did not specify the MDA or the missed approach procedure (MAP), and the co-pilot did not notice these oversights, which shows a lack of co-ordination within the crew.
- The pilot-in-command continued descent below the MDA without establishing visual contact with the required references.
- The co-pilot probably had difficulty perceiving depth because of the whiteout.
- The pilot-in-command did not effectively monitor

the flight parameters because he was trying to establish visual contact with the runway.

- The chief pilot (also the pilot-in-command of the accident aircraft) set a bad example to the pilots under him by using a dangerous method; that is, descending below the MDA without establishing visual contact with the required references and using the GPWS to approach the ground.

Findings as to risks:

- The operations manager did not effectively supervise air operations.
- Transport Canada did not detect the irregularities that compromised the safety of the flight before the occurrence.
- The operator had not developed GPWS SOPs for non-precision approaches.

Other findings:

- The GPWS "MINIMUMS" alarm sounded at a height that did not leave the pilot-in-command time to initiate pull-up and avoid striking the ground because of the aircraft's rate of descent and other flight parameters.
- Neither the pilot-in-command nor the co-pilot had received pilot decision making (PDM) or crew resource management (CRM) training.
- At the time of the approach, the ceiling and visibility unofficially reported by the approach UNICOM (AAU) were below the minima published on the approach chart.
- The decision to make the approach was consistent with existing regulations because Runway 02/20 was not under an approach ban.
- Some pilots from this operator would descend below the MDA and use the GPWS to approach the ground if conditions made it impossible to establish visual contact with the required references. △

Corrosion of Auxiliary Steel Fuel System Components

by Mark Stephenson, Inspector, Continuing Airworthiness, Transport Canada

Problems associated with the corrosion of steel parts in an auxiliary fuel system can result in failure of the auxiliary fuel system, possible contamination of the main fuel system, or failure of the associated fuel quantity indicating system. The parts identified as susceptible to corrosion are the fuel quantity sending units, the steel springs in the distribution system check valves, and the steel plunger in the electrically operated fuel transfer pump.

Corrosion occurs when the steel components of these parts come into contact with water for extended periods of time. There are different ways that water can enter the fuel systems, including the following:

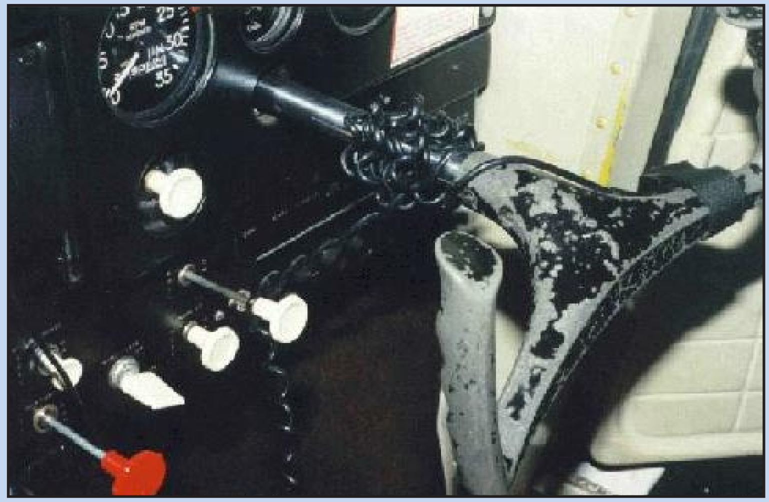
- Condensation of water vapour that enters the fuel tank through normal fuel tank venting;
- Settling of suspended water entrained in the fuel; and
- Leaks in the fuel cap or cap seals or from leaks between the fuel cap adapter and its seals.

For aircraft operating on floats, the tip tanks are typically rarely used because of the fact that these aircraft already have over five hours of fuel capacity in the main tanks, and the increased weight hampers float plane take-off performance and useful load. Because the tip tanks are rarely used, pilots sometimes neglect to do a tip tank sump check during pre-flight. Water trapped in the tip tank can then migrate to the fuel pump and, after extended periods of disuse, can result in corrosion of the steel pump components. This could lead to failure of the fuel pump or contamination of the fuel system.

Sealing problems were also reported between the fuel cap, the fuel cap adapter plate and the fuel tank. In many cases, these aircraft are stored outside for the entire float season, if not for the entire year. In these cases, it is highly likely that even a small leak in the fuel cap seals or adapter plate, combined with water accumulation as a result of condensation, can, over a period of time, allow water to accumulate in the tip tank fuel system. The following precautions can be taken to prevent contamination of your fuel system, downtime, and maintenance expenses.

- Drain all fuel sumps daily, including the tip tank sumps, even when the tips are not being used for the intended flights;
- Carefully inspect the tip tanks for leaks around the fuel caps and adapter plates, especially if any water contamination of the tip tanks has been noted during sump checks;
- Replace fuel quantity sending units, as required, with the new style sending units being supplied by the manufacturer;
- Replace the fuel cap seals frequently with new silicon seals supplied by the manufacturer; and
- If the tip tank system has not been used for an extended period of time, don't use it until it has been thoroughly inspected, including an internal inspection of the transfer pump and check valves. △

Wrapped Radio Cord Causes Control Problems



A student pilot and a flight instructor took off in a Cessna 150 to practise stalls. On the student's first stall recovery attempt, the student was slow to apply back pressure on the control column to bring the nose of the aircraft up. The instructor took control with the aircraft in a nose-low attitude. When the instructor applied back pressure, he found that the elevator control was restricted from full movement. Although he exerted considerable force on the control column, he could not get the elevator control back beyond neutral. The aircraft reached a speed of approximately 190 mph before the instructor was able to slowly pull out of the dive. The instructor was able to maintain altitude and fly back to the airport by using a combination of back pressure on the elevators, full nose-up trim, and an engine power setting of 2500 RPM. During a long final approach, the instructor lowered the flaps in an attempt to slow the aircraft to a lower touchdown speed. As he checked forward on the control column to compensate for the pitch change associated with the flap selection, he noted that he now had full elevator control authority. The landing was normal and uneventful. This synopsis is based on the Transportation Safety Board of Canada (TSB) Final Report A00O0210.

The aircraft sustained substantial damage to the wings, flaps, and ailerons as a result of the overspeed situation. An examination of the flight control system did not reveal any anomalies that could have restricted or jammed the elevator controls. It was noted that the cabin air control knob (ancillary control), which is located on the right side of the instrument panel, was pulled fully out. The aircraft had been modified to facilitate the use of headsets and boom microphones. This included the installation of a radio panel in the centre of the dash with receptacles for the push-to-talk connections. A push-to-talk button was attached to each control column with a Velcro strap. A spring-coiled electrical cord led from the push-to-talk button to the receptacle on the radio panel. The spring-coiled cord on the right side, which was old and had lost most of its recoil, was approximately four feet long when relaxed. It was common practice for the instructor in the right seat to take up the slack in the electrical cord by wrapping it around the right control column eight or ten times.

The cause of the restriction in the elevator control system had to be something subtle and transitory. The investigation revealed that if the push-to-talk cord was wrapped loosely around the control column, a single loop could snag on the cabin air control knob, and the electrical cord would then restrict the aft movement of the control column. This likely happened as the student was attempting to recover from the stall. The action of pushing the control column forward likely allowed a loosely wrapped electrical cord hanging from the right control column to swing forward and snag the cabin air control knob. The fact that the aircraft was in a nose-down attitude would also tend to allow the loop to swing forward. When the control column was pulled back, the cord would remain snagged and tighten on the knob. This was most likely the condition the aircraft was in when the instructor took control from the student. During the landing approach, when the control column was moved forward to compensate for the flap selection, the tension on the cord would have relaxed, allowing the cord to swing free of the cabin air control knob, freeing the control column through its full travel. △

Weather To Fly Video Vignettes Now on the WEB

The 26 *Weather To Fly* vignettes, exploring the effects that weather (seasonal and otherwise) has on flying in Canada, are now available on the Transport Canada Website in streaming video format, at http://www.tc.gc.ca/civilaviation/systemsafety/wtf/menu.htm. The vignettes were funded by the National Search and Rescue Secretariat and broadcast on The Weather Network and Météo Média in 1999. The vignettes are also available on video for loan from your regional System Safety office. △

TAKE FIVE...

for safety

Five minutes reading could save your life !

PIREP

"Long River radio, this is Birdman 621. I'm on a VFR flight plan between Centreville and Blanktown. I've got a PIREP for you. Turbulence is pretty bad, the visibility is dropping quite a bit and clouds are low in places. Looks like I'll be a little late on my ETA."

What is this pilot trying to say? It is obvious that he gave little useful information, even with all his good intentions. Where is he? What's his altitude? How much turbulence is there? What's the vis and cloud base? Why is his ETA off?

PIREPs are the only direct source of information on cloud heights, turbulence, visibility, winds, icing, etc, between weather reporting stations and at some airports. They are particularly important on flights below 10,000 ft. If they contain reasonably precise information, they are valuable to flight service specialists, controllers, weather briefers and forecasters—and of course, to other pilots.

There are several observation items which are valuable, such as outside air temperature, cloud types, bases and tops, thunderstorm activity and visibility restrictions. But even more important are conditions which are worse than forecast, and you should be able to describe them adequately. Here are some definitions relating to turbulence and icing, to demonstrate what we mean.

Turbulence

Light—turbulence that momentarily causes slight, erratic changes in altitude and/or attitude. Occupants may feel a slight strain against seat-belts or shoulder straps.

Moderate—turbulence that is similar to Light Turbulence but of greater intensity. Changes in altitude and/or attitude occur but the aircraft remains in positive control at all times. Occupants feel definite strains against seatbelts.

Severe—turbulence that causes large, abrupt changes in altitude and/or attitude. It usually causes large variations in indicated airspeed. Occupants are forced violently against seatbelts or shoulder straps.

Icing

Light—The rate of accumulation may create a problem if flight is prolonged in this environment.

Moderate—The rate of accumulation is such that even short encounters become potentially hazardous, and use of de-icing equipment or diversion is required.

Severe—The rate of accumulation is such that de-icing or anti-icing equipment fails to reduce or control the hazard. Immediate diversion is necessary.

Take an additional five minutes to review A.I.P. MET Section 2.0. For in-flight guidance, remember that the recommended contents of a PIREP are listed on the back cover of your Canada Flight Supplement (CFS).

One day, your PIREP could save someone else's life . . .

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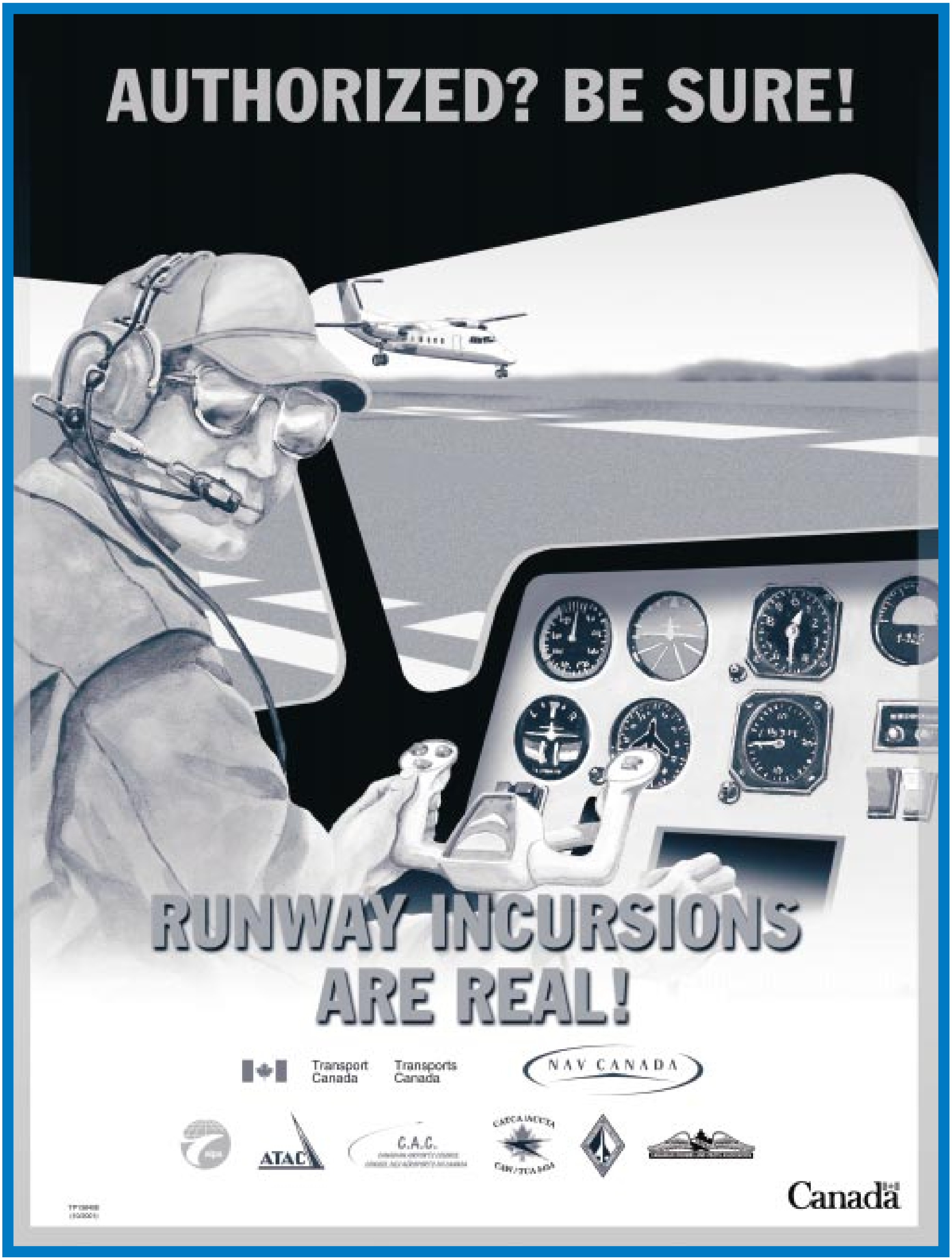
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