National Defence Défense nationale

WINTER 2005

Flight Comment

IN THIS ISSUE:

- *8 Seconds to Impact*
- *Maintainer's Corner: Aircraft Danger Areas*
- *Dossier: SAR — A PARAdigm Shift*

Canada

Table of Contents

Cover Page:
CH-149 *Cormorant* flying over the North Atlantic.
Photo: Sergeant Rick Ruthven, Canadian Parachute Centre, 8 Wing Trenton, 2001.

DIRECTORATE OF FLIGHT SAFETY

Director of Flight Safety
Colonel A.D. Hunter

Editor
Captain Rob Burt

Deputy Editor
Sergeant Anne Gale

Art Direction
ADM (PA) DMCS

THE CANADIAN FORCES FLIGHT SAFETY MAGAZINE

Flight Comment is produced four times a year by the Directorate of Flight Safety. The contents do not necessarily reflect official policy and unless otherwise stated should not be construed as regulations, orders or directives. Contributions, comments and criticism are welcome; the promotion of flight safety is best served by disseminating ideas and on–the–job experience.

Send submissions to:

Editor, *Flight Comment*
Directorate of Flight Safety
NDHQ/Chief of the Air Staff
Labelle Building
4210 Labelle Street
Ottawa, Ontario Canada
K1A 0K2

Telephone: (613) 992–0198
FAX: (613) 992–5187
E–mail: Burt.RM@forces.gc.ca

Subscription orders should be directed to: Publishing and Depository Services, PWGSC, Ottawa, ON K1A 0S5
Telephone: 1-800-635-7943

Annual subscription rates: for Canada, $19.95, single issue, $5.50; for other countries, $19.95 US, single issue, $5.50 US. Prices do not include GST. Payment should be made to Receiver General for Canada.

To contact DFS personnel on an **URGENT** Flight Safety issue, please call an investigator who is available 24 hours a day at 1-888-WARN-DFS (927-6337). The DFS web page at www.airforce.forces.gc.ca/dfs offers other points of contact in the DFS organization or write to dfs.dsv@forces.gc.ca.

ISSN 0015–3702
A–JS–000–006/JP–000
Art Direction: ADM (PA) DMCS
CS04-0523

1 Canadian Air Division Commander's

Views on Flight Safety

Since assuming Command of the Air Division last August, I have had the privilege of meeting many of you. Throughout, I have been impressed with the professionalism, dedication and willingness to go the extra mile that you have consistently displayed.

You are the driving force behind our successes. The first pillar in my approach to command is mission accomplishment in a safe and efficient manner. My primary duty as Commander is to set the course ahead for the Air Division. Though we may have differing horizons, our ultimate goal, the safe and efficient accomplishment of the mission, must be the same.

Flight safety, in these times of high ops tempo and constant change, is about making smart and informed choices. With our scarce resources, failure is not an option, and we cannot accept the loss of life or equipment due to preventable accidents or incidents in accomplishing our mission. This does not mean that we can only do our job when there is no risk; it means that we have to accomplish our job by sensibly mitigating the risks that exist through the principles of sound risk management. Everything we do imparts a certain level of risk, but an educated acknowledgment and acceptance of that risk at the appropriate level of Command, and reasonable mitigation wherever possible, make it acceptable to continue to operate when required.

Flight Safety is a force multiplier, which reinforces the concept of teamwork. It must be an integral part of our overall mindset. It cannot exist as a stand-alone "stove pipe", but rather as an integral link to operations, maintenance and how we do our day-to-day business. My role as the Commander is to lead, and in doing so I must also ensure I communicate our objectives clearly. You in turn must decide how best to focus your efforts to achieve these goals. When change is constant, it is easy to become distracted from the task at hand by issues over which we have no control. It is essential that we all remember to focus on the right things. We must concentrate on the things over which we have some control and Flight Safety is one means to ensure that this occurs.

I see our Air Force as a place where everyone can make a difference, and by that I mean it is a place where everyone believes that their concerns are listened to, and that we all work together towards a common goal. Flight Safety is the means to ensure we can do the job today, tomorrow and in the future. We must bring our people home from their missions, and this can only be done with strong leadership at all levels, within a sound risk management process, superior communications and a sound Flight Safety culture.

Lastly, I truly believe that we can get there from here. Our Air Force and our Flight Safety system have evolved and will continue to evolve. We must ensure that our focus, the safe accomplishment of our mission, is never obscured by the perceived belief that we must complete the mission at any cost. We must not only do things differently, we must (on occasion) do different things. In this way we can ensure that we get the job done, bring the people and the equipment back and, do it again tomorrow. ◆

Major General Charles Bouchard, Commander 1 Canadian Air Division

From the Flight Surgeon

WINTER TIME POTPOURRI

Rather than focus this column on one specific topic, I thought it would be a good idea to cover a few shorter specific items of aeromedical importance that have come to light in the last year or so.

So, here goes:

A. Centrifuge Returns to Operational Status

After several years of not functioning due to various maintenance issues, I am pleased to report that the human centrifuge at Defence Research and Development Canada, Toronto (DRDC-T) is up and running again and ready to conduct G-training. This facility is the only human centrifuge in Canada and is capable of simulating the rapid-onset G-forces experienced by Canadian Forces (CF) pilots flying high performance aircraft. The return of this capability will close a large gap in the Canadian Forces' G-Training program that has existed for some time. Anyone interested in receiving training should go through their Chain-of-Command (CoC) and 1 Canadian Air Division (Cdn Air Div) A1 Training for details and course loading.

B. Fatigue Working Group (WG) Stood Up

This is a vital topic these days considering the types of operations that the CF is conducting and has conducted in the last few years. The use of Performance Maintenance Drugs (PMD) including "go" and "no-go" pills is controversial at the best of times and as such, a WG has been stood up under guidance of WG Chairman Colonel G.P.S. Faucher, D Air PM&S, in order to come up with an initial "Strawman" policy and guidance on the entire spectrum of PMD. This initial direction will provide policy direction on the use of PMD from the CoC perspective, clinical perspective and the use of PMD in CF exchange personnel.

C. Hearing Protection

For those aircrew that use David Clark headsets or similar, this is a friendly reminder to have your hearing seals checked as it has been found that often the fit is not sufficient to provide proper protection. Veteran Affairs Canada (VAC) pays out $140 million annually in compensation for hearing loss!!!!

D. G-Suits Fitting

For those of you who have gained or lost weight in between your annual G-suit fitting sessions, another friendly reminder to have your G-suit checked for proper fit. A properly fitting G-suit ensures maximum G-protection!

E. Viagra (Sildenafil)

For those aircrew that utilize Viagra (I am sure there aren't many), remember that its use is not approved for 48 hours prior to returning to flying duties. Viagra can affect colour vision in subtle manners and that is the reason for the grounding period.

G. Ground Crew and Medication

It has come to the attention of the CoC that some ground crew within their squadrons may be taking medication that could affect their ability to safely perform their occupational duties without the system being aware of any potential increased risk. Ground crew are reminded of CANFORGEN 026/00 which states that: "***Any employment limitations*** that have been assigned to a CF member because of a medical or social work condition, as well as the prognosis of that condition, ***will be fully described and explained*** to the member's Commanding Officer (CO) ***through the appropriate means.***"

What this means is that the CoC must be made aware in general terms that a member may be taking medications that could affect him/her safely performing their tasks. If a ground crew member is taking medication not assigned by a CF/DND physician (either a uniformed of civilian hired Medical Officer) they must be assessed by a CF designated physician as to their ability to safely perform their duties. If the CoC has concerns with a member, the CO can direct the member to a CF designated physician for an occupational assessment. This assessment may place restrictions on the member as to their specific duties, however, it must be kept in mind that this is done for both the member's and CF's overall safety. ◆

If anyone has any suggestions for topics or concerns, please do not hesitate in contacting me through my DND e-mail: Sardana.TM@forces.gc.ca.

COLD POP ANYONE

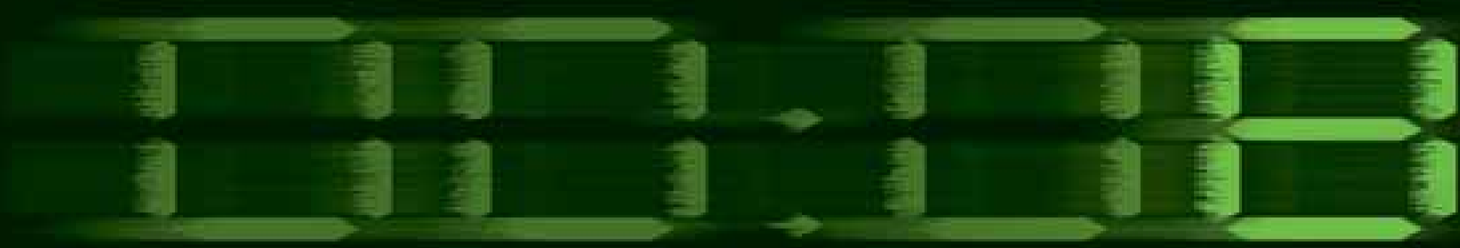
Photos: Mr. Jeff Charter, 412 Transport Squadron Ottawa, 2005.

This trip was a European training mission for a couple of rookie pilots aboard a *Challenger* aircraft. There were five people onboard: two trainee pilots, one instructor pilot and two technicians. The atmosphere inside the plane was really pleasant and relaxed and everyone was looking forward to a great European adventure. During the flights, we (the technicians) were in charge of preparing and serving meals, coffee and cold pop or juice. Now, there was a "cold drawer" especially designed to cool down pop and juice in the airplane's galley but everyone knew that the coldest place to keep the beverages was against the crew door. So, the routine was that after take-off, we would put on a pot of coffee and set the cold beverages by the crew door.

On the way back from Crete to England, I was doing my post take-off routine, I started the pot of coffee and then I placed the pop cans by the crew door without really looking at what I was doing. One pop can hit the door handle latch and the door handle popped into the unsafe position. Immediately, a door master caution warning light started flashing in the cockpit. The reaction from the pilot was pretty much instantaneous, "What's going on with the door back there?" All that was needed was a quarter turn on that handle to completely disengage it. Now as we were well above 30 000 feet, should this have happened I would have been sucked out of the plane, not to mention that the pilots could have possibly lost control of the plane and crashed! So I immediately moved the pop cans out of the way and slowly pushed the handle to the locked position. I was lucky that everything was still lined up and the handle latched up again.

Needless to say that after this little scare, we started using the proper place to cool down the beverages. Although no one or nothing got hurt or damaged, I could tell that the atmosphere in the plane wasn't as relaxed anymore. The lesson here is that everything has a safe place on an airplane, therefore it should be used as designated even if you feel it might not be as efficient as other places. ◆

Sergeant Claude Bélanger serves with 413 Squadron, 14 Wing Greenwood.



SECONDS TO IMPACT

ON THE WING AT NIGHT...325 KNOTS

The incident that I'm about to describe to you will stay engraved in my memory forever.

During an exercise in September 2001, a detachment of my squadron was called to Goose Bay, Labrador, to support missions during the Dutch fighter instructor course.

Once we arrived, we were briefed on local flight rules and procedures relative to the local area. Before the first mission, we met our Dutch hosts in their facility to discuss mission objectives and training rules to follow. They also gave us photocopies of the local aide-memoire that highlighted local procedures as well as local restrictions.

On 10 September 2001, well after sunset, we took off as planned from Goose Bay. During the initial climb, only stars and a shy half moon accompanied us. Behind my jet I saw nothing but blackness. There was only one island of light at my six o'clock witnessing the human presence in this isolated and fascinating environment.

The CF-18 is an incredible aircraft, offering an impressive number of resources to the pilot. One of them, the one that interests us here, consists of the possibility to program three altitude passage warnings. At each programmed altitude passage during the descent, a verbal warning is heard. At those altitudes the pilot will hear a female voice saying: "Altitude, Altitude." This voice is notoriously known as "Betty", and we only hear her when a warning is necessary.

The night of September 10, I had programmed my first two altitude warnings at ten and five thousand feet above sea level (ASL) and above ground level (AGL), respectively. The third one was programmed at one thousand feet AGL. With this program I was not expecting to hear the last altitude warning before the final approach in Goose Bay. My rationale behind programming the thousand feet from ground warning, was that it would be possible to initiate a recovery to allow me to miss the ground if something were to go wrong...a small family insurance policy, I suppose. I never dreamed I would actually need it.

The return to base was in formation under visual flight rules (VFR). From about forty nautical miles, we went through twenty thousand feet in descent. Shortly after, following a radio conversation with Goose Bay tower we received instructions to proceed to point "Sierra", which is 13 nautical miles southwest of Goose Bay.

Up until that point, during our recovery to base, everything was normal. I had no doubt about the procedures we were following; everything was according to the visual flight rules and seemed routine. As we were passing ten thousand feet ASL in descent, Betty could be heard. (I have developed the habit of acknowledging Betty whenever she warns me about my altitude passage; that way I can maintain an active response to the information given to me in the cockpit.)

Still in descent, my leader called a formation change to "right echelon." That formation is easier on radio communications with the tower as well as air traffic control during the return to base with a large number of aircraft. At this point, I need to specify that as winger, I did not know at what altitude my leader was planning to level off around point "Sierra".

Photo: Captain Daniel Bélanger, Wing Operations, 3 Wing Bagotville, 2004.

WITHOUT SITUATIONAL AWARENESS.

As the descent continued, Betty pointed out to me the five thousand foot passage, and once again, I acknowledged her by confirming and reading my altitude. We were now in the lower level (below five thousand 5000 feet AGL). I was convinced that we were not to descend below the instrument flight rules (IFR) minimum sector-safe altitude. That altitude assured us one thousand feet clearance from the highest obstacle within 25 miles of the airport. This meant that I was not to hear my last altitude warning... especially when Goose Bay sits at 160 feet ASL and is surounded by obstacles as high as 2100 feet ASL within that 25 nautical miles. Point "Sierra" being one of them, reaching almost 1575 feet ASL.

So our descent continued and my confidence level was reinforced by that island of light in my peripheral vision at my one o'clock position and slightly below horizon. We were getting closer to Goose Bay. At less than twenty nautical miles, suddenly, something was wrong. Betty manifested herself again...this time to warn me that we had passed through one thousand feet AGL!

The following events happened very quickly (in less than 3 seconds). Never, in more than six thousand flying hours, had I been confronted with such an appalling reality. In a fraction of a second, the safety of my flight , ***MY*** safety, was threatened. I could not believe it. Since I was in close formation, I had to first make power and position adjustments before I could stop looking at the lead aircraft. Once I had a safe distance from the lead aircraft, I was able to quickly glance at the radar altimeter.

Before I could even satisfy my curiosity, Betty was heard again. That only meant to me that we were still below one thousand feet AGL and in rapid descent. The horror was to climax when I saw the radar altimeter needle active and in rapid descent from six to four hundred feet AGL. Without any doubt in my mind about what had just happened in front of my eyes, I transmitted to my lead the code words associated with this rare event, "***PULL UP ! PULL UP !***" At the same time I initiated an aggressive recovery.

Fortunately, my lead made his recovery as well. Even though my radio transmission must have been like thunder in his helmet, his recovery was tinted with disbelief. He took the time to ask me if we were supposed to report ourselves at point "Sierra" at 1500 feet ASL. After this radio transmission, trying to overcome my surprise, I quickly began to convince him of the danger that had just occurred. I told him that I saw four hundred feet on the radar altimeter when I had given him the "pull up" call. Now back at five thousand feet ASL we proceeded back to the base in "route" formation (a loose formation) until we were in a position to land without any further problems.

It was on the ground that I realized that my lead had used the photocopy of a Dutch "Genbook" that they had given to us and was referring to ***day*** visual flight rules. The 1500 foot altitude was designed for aircraft on a low-level mission during daytime only. According to the procedure, those low level aircraft have to climb to 1500 feet ASL as they fly around obstacles, before entering the Goose Bay control zone.

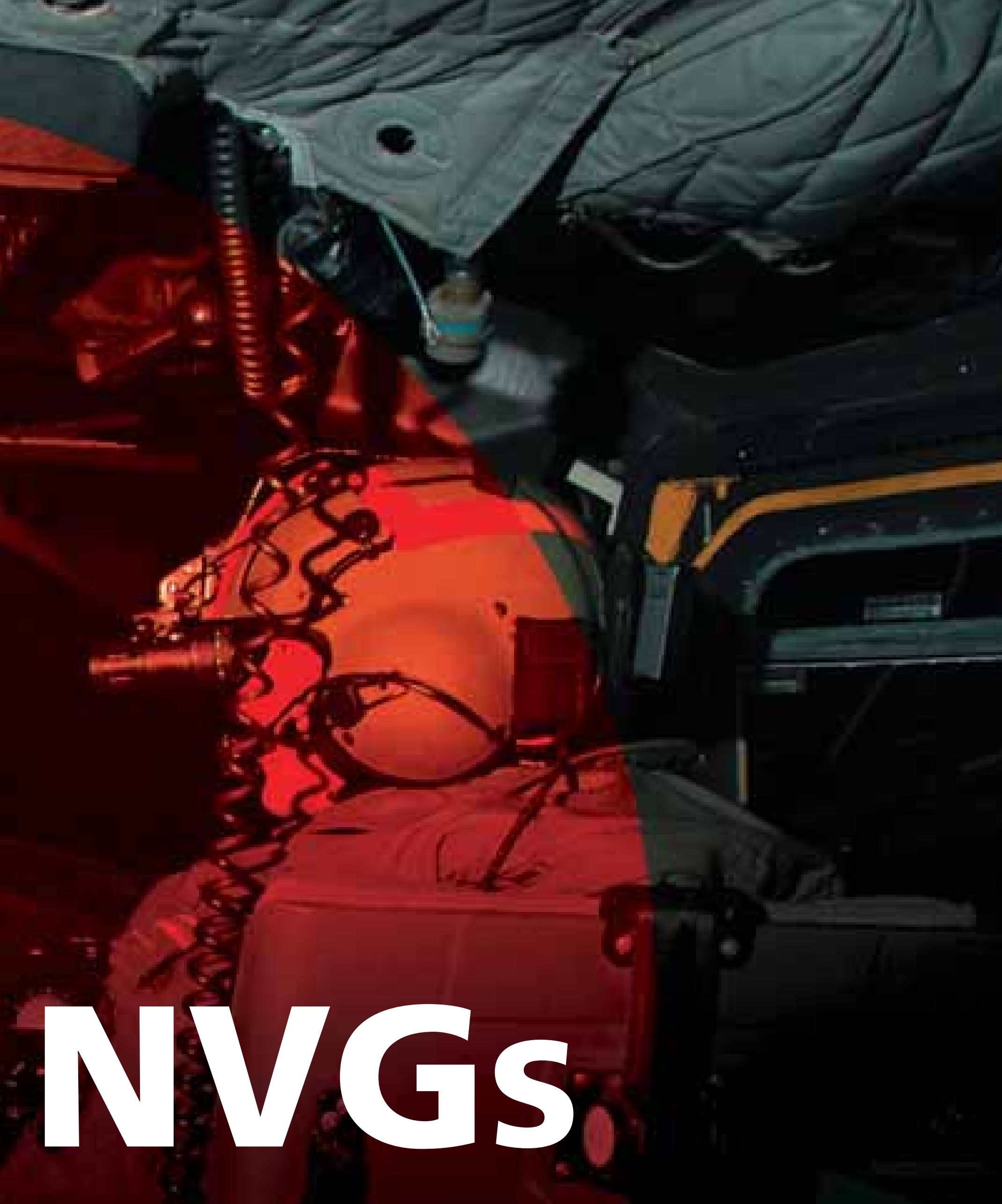
Continued on page 7

Photo: Sergeant Gerry Antle, Wing Chief Warrant Officer's Assistant, 5 Wing Goose Bay, 2005.

ROSE COLOURED

The briefed mission was to be a night vision goggles (NVG) training trip in which we would review hoist sequences involving insertion and recovery of the search and rescue (SAR) technician as well as the stokes litter. The weather in the "Goose" that night was sufficient for visual flight rules (VFR) at 1500 feet and 5 miles; however, the trend was forecasted to deteriorate over the course of the evening. Though a bit of a concern, my need for an NVG hoist for my currency requirements and with the end of the quarter quickly approaching, the crew collectively decided to go ahead with the mission.

I took the right seat while the aircraft commander (AC) occupied the left. After doing the normal pre-start checks the CH-146 *Griffon* was running in no time. It had been several months since the last time I had flown on NVGs. The rest of the crew had flown the previous two evenings and were well adjusted to flying on goggles. As briefed, we decided to start off with a hoist sequence. While flying over the Goose River, our flight engineer (FE) pointed out a suitable area on a large sand bank. The AC agreed that the area looked suitable. While asking for the pre-hoist check, I set up for a right-hand orbit around the intended hoist area. While in the orbit the aircraft was slowed to below 80 knots indicated air speed (KIAS) and the FE asked if he was clear to open the cabin door so he could have a better look at the area. After clearing him to open the door, he mentioned that he was being hit by rain. Unknown to any of the crew, it had started to rain. Deteriorating weather is insidious at the best of times; however, when wearing NVGs the problem becomes even worse. After evaluating the weather, we decided to continue with the hoist and keep a close eye on the ceiling and visibility now that it was raining. As we turned onto final I noticed that my hover references were poor at best with the sand bar extending about 50 feet to the right of the hoist spot and



NVGs

then disappearing into the river. After the FE had conned us over the area briefed, we were in the hover at 50 feet above ground level (AGL) based on the radar altimeter reading. Finding the high hover particularly challenging and wanting to get this over with, I cleared the SAR Tech for the hoist. While he was one-quarter of the way out, the AC and FE both called steady left which meant that I was drifting in my hover to the left. I corrected using the poor hover references and quickly got the same call again, this time louder. At that point the AC took control and asked that the SAR Tech be recovered, as this was the end of the trip.

During the debrief, it came out that everyone was more concerned about the weather than they initially led on. The AC didn't feel that it was fair to subject a relatively new pilot, such as myself, to such a challenging hoist environment after being away from NVG flying for so long. I learned that flying well on NVGs is something you can't expect to be proficient at minutes after putting them on after such a long time away from using them. In addition, I learned that if you don't have good hover references, either hand off control to someone who does or call and carryout the overshoot. ◆

Captain James Loose serves with 444 Combat Support Squadron, 5 Wing Goose Bay.

00:08 SECONDS TO IMPACT

Continued from page 5

The aim here is for the fast air aircraft to rejoin the circuit in a safe manner allowing all helicopters and floatplanes around Goose Bay to fly ***below*** all military traffic, in this case below 1500 feet ASL.

After the "MSDRS" review (the equivalent of the " black box" for the F-18) we found out that we avoided impact with the earth by only 396 feet. Also, it was found that at the recovery altitude we were actually 125 feet below the highest obstacle (2100 feet ASL) which was somewhere around us...in the darkness of the night. From that altitude and at that rate of descent (nearly three thousand feet per minute) there was only eight seconds before impact with the ground. That profile is based on a descent over a flat terrain with no trees or obstacles, which was not the case around Point "Sierra"!

There are two colossal lessons to take from that night mission: first, whatever we want to believe, night VFR is not the perfect visual meteorological conditions (VMC) condition. In this case, the ground visibility was nonexistent; we may have been VFR but we needed to be flying under instrument meteorological conditions (IMC). Under these conditions it is imperative to follow approved published approach plates (GPH 200) and nothing else; secondly, it is crucial to instinctively react to the "PULL UP" call without one second of hesitation. It would always be possible to discuss it in the debreifing room but impossible at the cemetery... ◆

Captain Daniel "Dano" Bélanger is at Wing Ops, 3 Wing Bagotville.

Photo: Sergeant Ron Hartlen, Base Imaging Section, CFB Petawawa, 2003.

How Cold is It?

Every fall, we educate aircrew on cold weather procedures. They receive various briefings and lectures such as hypothermia, frostbite, wind-chill factor, low visibility, whiteout, icing and more. Such briefings are critical, especially for aircrews that are exposed to the elements while working with open doors or under the down draft of the helicopter's main rotor.

One day in February, the weather was forecast to be CAVOK (ceiling and visibility OK) with wind from the west at 10 knots gusting to 15 knots, with a high of -13°C. Upper wind at 3 000 feet forecast to be from the northwest at 30 knots. This was the second week in a row that the temperature would climb above -20°C.

Around noon, the standby crew received an update on the weather. The latest actual in Bagotville was still calling for CAVOK, wind from the west at 10 knots, temperature of -12°C so the standby crew decided to go on a training flight. They proceeded to Mont Valin, which is about 25 nautical miles north of Bagotville. The scenario called for a reported injured mountain climber near the top of the mountain (about 3 000 feet above sea level). Upon arriving on site, the crew completed their recce of the ground using mountain-flying technique. They confirmed that the wind near the top of the mountain was quite strong but manageable. After a lot of work and time, the search and rescue (SAR) Technician was inserted with the hoist then the crew initiated a standard circuit. At that moment, the flight engineer (FE) complained about the cold. One of the aircrew noticed the FE had a small spot of frostbite on the left cheek. The flying pilot noticed the outside temperature was -20°C. The crew decided to continue with the scenario and inserted the stokes litter. They delayed opening the door to the extent possible, kept the cabin heater on until the last minute and expedited the manoeuvre in order to reduce the time spent on top of the SAR Tech. The stoke litter and SAR Tech were extracted and the *Griffon* crew returned to Bagotville without further incident.

Even if the crew were quite experienced, they failed to recognize the danger of the cold. They took for granted that the temperature at Bagotville (-12°C) was warm enough to carry out a normal training flight at any location. We all learned, during our basic training, that the air is normally colder the higher you go. Furthermore, the crew did not consider the wind at altitude for the safety of the SAR Tech. He was actually exposed to an extreme wind-chill factor (colder than -36°C). The more I think about it the more sure I am that we should have stopped the training at the first sign. We were lucky that nobody got seriously hurt. ◆

Major J.D. Rodier is the Wing Flight Safety Officer at 3 Wing Bagotville.

Photo: Private Vaughan Lightowler, Wing Imaging, 19 Wing, 2004.

New to the Floor

A few years ago, I belonged to the world of the CF-188 *Hornet*, which to me was the ultimate in Canadian Forces aircraft. I have been serving in the Air Force for 16 years, first as an air weapons technician, then as an aviation technician (AVN).

Because positions had been cut and no new technicians had been trained for a few years, one day several new level 3 technicians were assigned to the flight. We had to start by training them on line servicing, as a starting/parking team, on refueling, etc.

The supervisor of the maintenance office gave me the task of showing a young technician the procedure to follow before starting a CF-188. I asked the newcomer if he had done it before, and he told me he'd done it many times and knew what to do. We went to prepare the aircraft for the start. Part of the procedure is to remove the landing gear pins (front and rear) and the arrestor hook pin. I went to the rear of the plane, and the new tech went to the front. I thought he was going to the front to remove the front landing gear pin, but I didn't confirm that with him, nor did I check to see if he'd done it correctly. When the pilot arrived, he checked his aircraft before take-off, but he also failed to notice that the pin was still in the front landing gear, even though this item is on the pilot's checklist.

A few seconds after the plane took off, the front landing gear light was still on. At that point, the pilot made an emergency landing. I immediately wondered what piece of equipment had caused the emergency, and it occurred to me that maybe the pin had not been removed. And sure enough, after the aircraft was back on the ground, we saw that the pin was still there.

The point of the story is that, when training new technicians, it is crucial to check their work. We must constantly remain vigilant and take the time needed to do our jobs properly. ◆

Master Corporal Marielle Bédard serves with 430 Tactical Helicopter Squadron, CFB Valcartier.

WIRED!

Wiring: The Aircraft's Central Nervous System

On 18 February 2002, a fire onboard a *Labrador* helicopter CH113304 was initiated at an electrical connector. One possible cause identified by the Quality Engineering Test Establishment (QETE) was that the blank/empty pinholes in the connector possibly allowed pin movement and shorting. The connector was a ten pin connector but only five pins were used, neither the unused pins nor the blanking pins were installed.

Although the cause can never be accurately determined, the practice of not filling all spaces in the connector and inserting blanking plugs is contrary to standard practices as defined in the C-17-010-002/ME-000 and SAE ARP 5881, which are the standards for all CF aircraft.

Not all fleets have comprehensive electrical repair manuals. Therefore, the C-17 series of books "INSTALLATION PRACTICES AIRCRAFT ELECTRICAL AND ELECTRONIC WIRING" is an invaluable tool for technicians in the field.

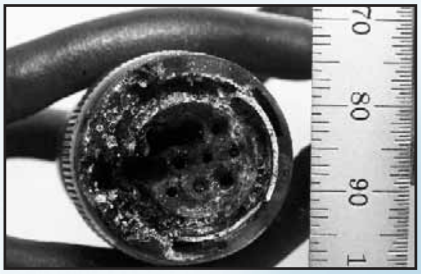
The C-17 series is continually being updated and improved by the Electrical Working Group (EWG) which was formed in Director General Aerospace Equipment Program Management (DGAEPM) and deals with issues of common interest that cross the normal boundaries of Directorate responsibilities with respect to aircraft Electrical Wiring Interconnect Systems (EWIS). The EWG is an open forum to present, discuss and highlight issues of common interest or that require action at the Division level.

EWG issues include but are not limited to proposed airworthiness rule making, new products, prohibitions and Flight Safety issues. As this forum is a cross sectional representation of the Division, issues affecting common policy or procedures are discussed and recommendations/consensus sought as required. Additionally, changes in aircraft EWIS policy or requirements for new policy may be identified and addressed by the EWG. The EWG prepares recommendations within its field of expertise and forwards them for staffing as required.

Historically, the EWG was comprised solely of Instrument Electrical Technicians (MOC 551). With the advent of the trades restructure and realignment of some of the EWIS responsibilities to the AVS trade, the EWG recognizes the requirement to include Avionics Systems Technicians (MOC 526) as members of the working group. Every fleet has representation at the EWG therefore technicians in the field have the ability to bring up their issues, questions and concerns through the proper channels.

Several of the past civilian airliner incidents and accidents have been wiring related. That being said, the aviation world as a whole is viewing aircraft wiring and its associated maintenance as a system by itself. We here in DGAEPM/DTA/DAES 5 have strongly taken this approach.

All aircraft technicians should be aware of and use when applicable, the C-17 series of books "INSTALLATION PRACTICES AIRCRAFT ELECTRICAL AND ELECTRONIC WIRING", to stay abreast of the introduction of new tools, technologies and installation practices adopted by the CF such as the introduction of new thin wall composite wires that require specialized tooling.



Connector showing damage to the three phase pins

Relay end of the connector showing the damage to the three phase pins and the melted connector case.

The C-17 also identifies prohibited materials and practices, such as the use of PVC and KAPTON insulated wires and direct hot stamp wire identification.

We here at NDHQ are continuously working with industry and regulatory authorities to provide the most up to date information to technicians in the field. We require your input from the field to identify publication discrepancies and shortcoming with the C-17 series. By working together we can ensure the health of the aircraft central nervous system and produce a truly airworthy product through knowledge, proper wiring installations and inspection techniques. ◆

Warrant Officer Scott Corley serves at National Defence Headquarters, Directorate of Technical Airworthiness, Electrical Systems Policy and Standards.

The Editor's Corner

As I write this, the fall issue is still not on the street. I sincerely hope that the fall issue has been well received and that you have been able to glean something useful. If not, read it again, maybe you missed something.

In any case I still have this issue to cut my teeth on and then we can go to "*fight's on*"! Seriously, I invite any criticism or ideas at any stage so if you have anything to say please let me know. Internally — I'm the only Capt Burt RM in the book and externally my e-mail address is — Burt.RM@forces.gc.ca

Just a few thoughts about the future of *Flight Comment*: my current vision for the magazine is to change very little. Frankly, I don't know enough to change things. Secondly, I would like to expose the Air Force to the Air Force. There are so many units and players who make up the team that works to get an aircraft off the ground and to conduct the mission. I will endeavour to shine some light on these organizations in an effort to give all players their time in the sun. That is your cue to send me an article about your unit and how it contributes to the whole.

For those of you who are less than pleased with my performance thus far I've got great news — I've already found a Deputy Editor and with a little more time I should be able to talk my way right out of this job. DFS has recently named Sergeant Anne Gale as Deputy Editor of *Flight Comment*. Most of you should recognize Anne as the writer of "Maintainer's Corner". Anne wrote the inaugural column in the winter 2001 issue and 17 issues later she is still producing great articles. Due to my "pas si bon français" Anne has been working in the background to ensure the quality of the French half of the magazine. It's time she got the credit, so now she has a fancy title and a plastic DEPUTY badge. Oh Anne, did I mention that you'll write this column in the next issue? All I have to say is "*hallelujah and welcome aboard*".

Enjoy the magazine and Fly safe! ◆

Note: This issue's poster "The Time It Takes", corresponds with the *Maintainer's Corner* article from the Fall 2004 issue.

ICING: A Slippery Subject

Aircraft **deicing** fluids (ADFs), known as SAE Type I, are designed primarily to remove frozen contaminants from an aircraft's critical surfaces prior to take-off, but they also possess a very limited capability to protect an aircraft from frozen contamination build up. Aircraft **anti-icing** fluids (AAF), identified as SAE Type II and Type IV, are generally available at the major civilian airports throughout North America and Europe but among DND aircraft only the *Challenger*, the *Polaris* and the *Dash 8* have original equipment manufacturer (OEM) data and procedures available to allow use of these advanced fluids. Type III fluid is a new AAF type specifically formulated for use with propeller aircraft and one manufacturer currently has a Type III fluid in the proving stages.

Recently, testing has revealed that the principle mechanism at work, when using heated Type I fluid to remove frozen contaminants, is the actual heat energy in the fluid. Contrary to previous understanding, it is not the glycol content of the Type I deicing fluid that ensures the frozen contaminants are removed from the aircraft's surfaces. Type I fluids would typically be heated to between 60°C and 80°C before application. The glycol in Type I fluids provides very limited protection for the pilot against further contamination while he prepares for take-off, or while he has a more advanced AAF (Type II, III or IV) applied to his aircraft.

Testing of Type I fluids in a controlled environment has revealed that Type I fluids cannot be relied upon to provide extended anti-icing protection during active precipitation conditions such as snow. The original Type I holdover time (HOT) tables have been shown to be overly optimistic. This fact is reflected in the rather significant reduction in published Type I HOT values starting in 2001, when, for example, the HOT time under light snow conditions went down from 15 to 4 minutes. Note also that the clock starts running on the HOT at the **beginning** of fluid application, so the time available to perform the take-off after the deicing truck has pulled away is effectively non-existent in many situations when exposed to continuing precipitation. Every effort should be made to expedite the deicing process and the subsequent departure of the aircraft

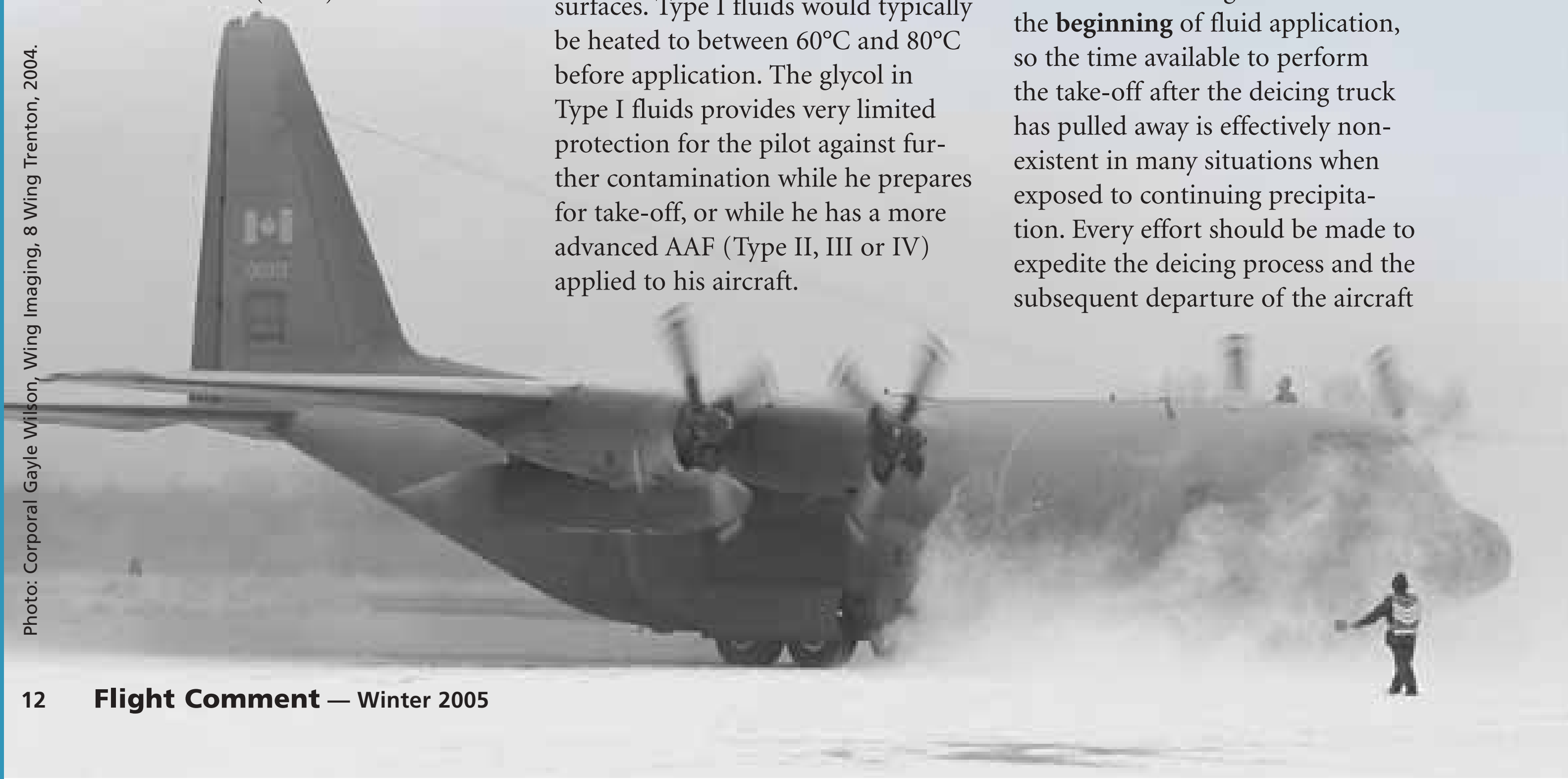


Photo: Corporal Gayle Wilson, Wing Imaging, 8 Wing Trenton, 2004.

TABLE 1
SAE TYPE 1[5] FLUID HOLDOVER GUIDELINES FOR WINTER 2004–2005
THE RESPONSIBILITY FOR THE APPLICAITON OF THESE DATA REMAINS WITH THE USER

OAT		Approximate Holdover Times Under Various Weather Conditions Minutes								
°C	°F	Frost[2]	Freezing Fog	Very Light Snow[1]	Light Snow[1]	Moderate Snow[1]	Freezing Drizzle[3]	Light Freezing Rain	Rain on Cold Soaked Wing	Other[4]
-3 and above	27 and above	45	11–17	18	11–18	6–11	9–13	4–6	2–5	
below -3 to -6	below 27 to 21	45	8–13	14	8–14	5–8	5–9	4–6	CAUTION : No holdover time guidelines exist	
below -6 to -10	below 21 to 14	45	6–10	11	6–11	4–6	4–7	2–5		
below -10	below 14	45	5–9	7	4–7	2–4				

°C = Degrees Celsius °F = Degrees Fahrenheit OAT = Outside Air Temperature FP = Freezing Point

NOTES

1 To use these times, the fluid must be heated to a minimum temperature providing 60°C (140°F) at the nozzles and an average rate of at least 1 litre/m² (2 gal./100 sq.ft.) must be applied to deiced surfaces. OTHERWISE TIMES WILL BE SHORTER.
2 During conditions that apply to aircraft protection for ACTIVE FROST.
3 Use light freezing rain holdover times if positive identification of freezing drizzles is not possible.
4 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain and hail.
5 Type 1 Fluid / Water Mixture is selected so that the FP of the mixture is at least 10°C (18°F) below OAT.

CAUTIONS

- The time of protection will be shortened in heavy weather conditions, heavy precipitation rates, or high moisture content. High wind velocity or jet blast may reduce holdover time to the lowest time stated in the range. Holdover time may also be reduced when aircraft skin temperature is lower that OAT.
- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- Fluids used during ground deicing do not provide ice protection during flight.

in these conditions. Consider, for example, using two deicing trucks per aircraft whenever they are available and review your capability for deicing with engines running.

Type I fluid not only has a very limited protection time capability but also has the tendency to flash freeze. This tendency makes predicting or observing Type I failure very difficult. Further, Type I fluid tends to adhere to the aircraft surfaces immediately upon freezing. This tendency is in contrast to the thickened anti-icing fluid's characteristic behaviour, i.e. freezing progressively from the outer surface of the fluid down to the aircraft's surface. AAF fluids are designed to have much longer HOTs than Type I deicing fluids. Type I fluid should be considered primarily as a deicing fluid with some residual protection only against frost and very light precipitation. Figure 1 shows the latest Transport Canada HOT information for Type I fluids. Further information is available from the Transport Canada website (www.tc.gc.ca).

All fluids have a lowest operational use temperature (LOUT). LOUT is a temperature below which the fluid must NOT be used. The dilution ratio used must be carefully controlled to allow the necessary freezing margin. The fluid manufacturer should be consulted in establishing the LOUT for any particular fluid.

The proper application of a fluid is absolutely essential in order to assure a safe and effective process. Proper fluid application can only be assured: (i) with the use of proper equipment, (ii) with thorough training, (iii) with use of correct methods or techniques, (iv) with the use of an approved fluid in sufficient quantity and (v) by observing any limitations. It is vital to coordinate carefully with the deicing crew and to know the type of fluid, the dilution ratio, the temperature, and the time at which fluid application commenced.

The identification of fluid failure can sometimes be a challenge during harsh operational conditions, especially with inadequate illumination. Testing on a representative wing in the outdoor environment has shown that fluid failure will occur first at the leading and trailing edges of the wing. These areas should therefore be included in the inspection when checking for fluid failure before committing to take-off.

Questions concerning aircraft ground icing operations in general can be directed to Mr. Ken Walper, DTA 5-6C2 at (613) 991 9530 or WalperKL@forces.gc.ca ◆

Mr. Ken Walper works with the Directorate of Airworthiness at National Defence Headquarters in Ottawa.

QETE

Quality Engineering Test Establishment
Solving Tomorrow's Problems Today

Who Are We?

The Quality Engineering Test Establishment (QETE) is an Assistant Deputy Minister (Materiel) organization that provides a wide range of technical services. Our mission is to help ensure that materials, equipment, procedures and services used by the Department of National Defence and the Canadian Forces meet their operational and performance requirements.

QETE provides technical advice and consultation, materiel evaluation, investigation and analysis, calibration and measurement, in the domains of mechanical and materials engineering, applied chemistry, electrical and electronics systems engineering, physical reference standards / calibration and measurement sciences. We deliver these services in the laboratory, in the field, and at contractors' facilities.

Who Uses Our Services?

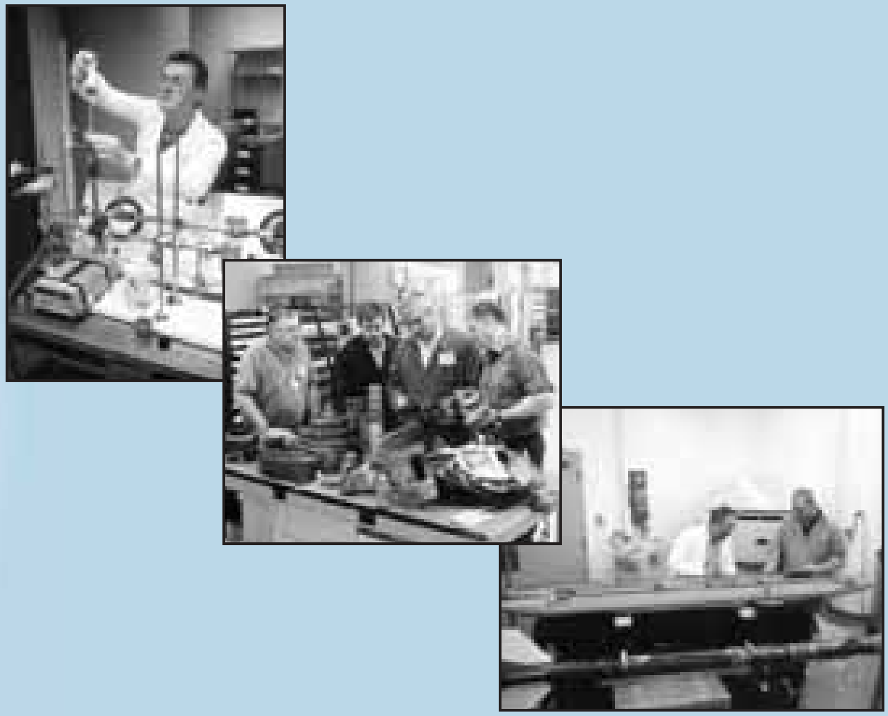
QETE provides services to all elments of the Canadian Forces, Departmental authorities such as Life Cycle Materiel Managers and Project Management Offices, and on occasion other government departments.

Specifying and Purchasing Equipment or Systems?

QETE can assist you to:

- exploit the latest technologies in developing specifications to meet operational requirements;
- determine whether commercial, military or other specifications should be called up in your statement of requirements;
- tailor specifications for unique Canadian conditions;
- develop a viable test plan that meets operational and contractual requirements;
- mitigate design and manufacturing risks and address technical issues during acquisition;
- ensure that your products or decisions incorporate legislative requirements;
- incorporate lessons learned from past experience and failures of equipment;
- ensure that your materiel will be interoperable with existing systems; and
- determine whether life extension and/or changes of role are possible.

QETE provides services to all elments of the Canadian Forces.



Our mission is to help ensure that materials, equipment, procedures and services used by the Department of National Defence and the Canadian Forces meet their operational and performance requirements.

Dealing with In-Service Equipment or System Problems?

QETE can assist you to:

- investigate in-service performance of systems, equipment, components and materials;
- conduct or review failure investigations;
- recommend changes to design, maintenance practices or production processes;
- select and specify materials and processes;
- assess manufacturing and testing capabilities, processes, procedures and results;
- represent the Department's interest for tests and trials and other activities undertaken by external organizations;
- provide reference level, independent technical assessments of products and processes for authoritative decision-making and dispute resolution; and
- provide technical advice ranging from engineering changes to disposal of hazardous materials to environmental issues.

How Do You Reach Us?

Quality Engineering Test Establishment

45 Sacré-Coeur Blvd,
Gatineau, Québec
Tel: (819) 994-9801
Fax: (819) 997-2523
E-mail: QETE@forces.gc.ca

To learn more about our laboratories and facilities, visit us on the Internet at http://www.forces.gc.ca/qete ◆

A PARAdigm

The parachute has been around conceptually since medieval times, and quite frankly, a lot of people's idea of what a parachute is and does remains in the dark ages. A current edition of the Oxford dictionary defines a parachute as an umbrella-shaped apparatus of silk.

In the old days, it was relatively easy to parachute, as there was no requirement to learn to fly; one simply fell to earth. Today sport parachutes have developed into dynamic wings, capable of speeds in excess of 75 miles (120 kilometres) per hour. The modern day parachutist must have an understanding of the dynamic forces involved in flight, for to learn what makes a parachute fly well will teach us what makes it fly badly.

The CSAR-7 square parachute is actually an aerodynamically stiffened fabric airfoil that generates lift by forward flight thru the air. The leading edge of the canopy is open, causing air to be rammed into the canopy forming a false leading edge in front of the canopy, which in turn deflects air above and below the wing in flight.

Thrust and Weight

For a wing to move through the air and produce lift, there must be some force propelling it. Normally this is called 'thrust'. In an airplane, it is easy to understand, the engine does the work. With a ram-air parachute gravity becomes your engine. The weight of the jumper pulling down on the canopy results in generated thrust. As the weight increases, so too does the amount of thrust generated. A Search and Rescue Technician (SAR Tech), heavily ladened with equipment will generate more thrust and this understanding of wing loading allows for more effective piloting and added penetration in higher winds.

Wing loading however, is not a static force that remains the same throughout the descent. If we simply think of a weight swung on the end of a string, the faster it goes, the heavier it seems. A jumper suspended below a canopy has the same effect on the canopy in a turn. As the canopy turns, the jumper's body continues in a straight line until the canopy pulls him to the new heading (Newtons first and second law). If the turn continues, centrifugal force continues to keep the jumper swung out from under the canopy. When the turn stops, the suspended weight then swings back under the canopy.

This transition from the swung-out position to back under the canopy is the moment when the greatest speed is reached. The canopy reaches top speed because of an increase in wing loading in combination with the speed garnered from an increase in descent rate. The relevance to all of this comes to light in the realization that low turns, near the ground, are very dangerous. Even after the turn has been completed, the canopy is travelling significantly faster than before the turn as you approach the ground.

Lift

The parachutist is suspended underneath the canopy by a grouping of lines. These lines are specific lengths from front to back, causing the canopy to have a downward tilt. This angle of incidence allows the wing to "slide", like a sled down a slope determined by the angle created by suspension lines.

Wings are shaped so that air must flow faster over the top of the wing than the bottom. When the velocity of air increases, its pressure decreases. This creates a low-pressure area on the top of the wing and a corresponding higher pressure below. This pseudo vacuum produces lift toward the low-pressure area. To demonstrate this principle, try this simple experiment.

Lay a piece of paper across the top of two stacks of books. Now blow under the piece of paper, between the two stacks of books.

What do you think will happen?

If you thought the paper would drop lower, you were correct. The paper drops down lower because the speed of the flowing air changed the pressure between the books. The faster flowing air decreased the air pressure between the books.

shift

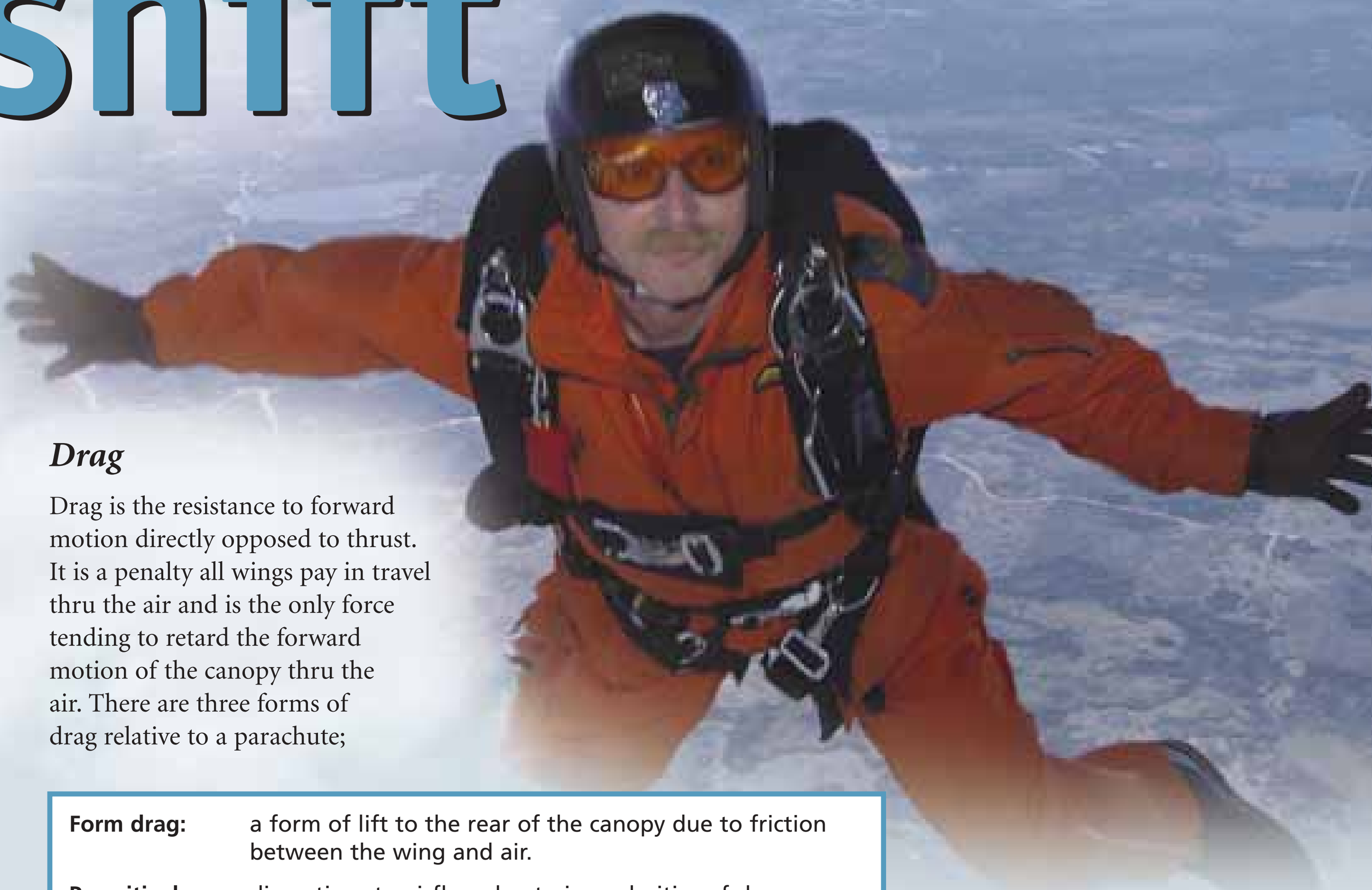


Photo: Master Corporal Bill Parrott, 404 MP Squadron, 14 Wing Greenwood, 2003.

Drag

Drag is the resistance to forward motion directly opposed to thrust. It is a penalty all wings pay in travel thru the air and is the only force tending to retard the forward motion of the canopy thru the air. There are three forms of drag relative to a parachute;

Form drag:	a form of lift to the rear of the canopy due to friction between the wing and air.
Parasitic drag:	disruptions to airflow due to irregularities of shape including suspension lines, jumper, slider, etc.
Vortisism drag:	air flow from the high pressure area that travels around and over the wing tips that tend to spoil airflow.

Lift and Drag

Parachutes are designed to slow our descent. They do this by way of lift and drag. A round parachute creates drag (no lift) by simply grabbing as much air as it can, effectively slowing us down as we descend straight down. A square canopy however creates lift, which forces the airfoil in a particular direction determined by the design or manipulation of the foil and its presentation to the relative air. Controlling this flow of air over the canopy is the art of being a canopy pilot.

Lift and drag increase in geometric proportion to speed; twice the speed equals four times the lift and drag. This is relevant to the parachutist because it means that airspeed is crucial to performance. Going faster means, to a point, more lift and crisp control response. The canopy on final approach to landing, in deep brakes will not possibly react as crisply to toggle inputs as it does at full glide. The parachutist who expects his canopy to recover from a stall turn at low level is in for a hard landing as the speed and resultant lift is non-existent.

Practical Application

Faced with a 10 mph (16 km/h) wind, what is the best profile to fly your canopy in for:

a. downwind of target and penetrating into wind (IW)

b. upwind of target and running down wind (DW)

A SAR Tech knows that his descent rate at full glide is 1000'/minute (304m/minute) and only 600'/minute (182m/minute) at half brakes. He is also aware that on a calm day, the parachute flies at an airspeed of 25 mph (40 km/h).

Flying into the wind, faced with a 10 mph (16 km/h) head wind, typically he will want as steep an angle of approach as possible to minimize the exposure to the wind. Full drive with minimal toggle input is the best approach. The limiting of steering input minimizes the induced drag from the canopy being pulled down into the air and the parachutist can further reduce parasitic drag by drawing in his elbows, pulling up his legs and making his body as small as possible in the face of the oncoming wind. Additionally front riser input, caused by the parachutist reaching up and pulling down on the front riser group of suspension lines will change the angle of incidence, effectively increasing the slope of the canopies glide angle, further increasing the descent rate.

Flying down wind, the opposite holds true. By flying the canopy at 50% brakes, the parachutist slows his descent rate and remains exposed to the 10 mph (16 km/h) wind longer. The increased drag induced by trapping air with brakes is offset by the effect of the wind. Here is the math:

- *A parachutist that opens his canopy at 3000' (914m) will take three minutes to reach the ground in full glide and five minutes in half brakes.*
- *The canopy groundspeed is 25 mph (40 km/h) at full glide and 15 mph (24 km/h) at half brakes.*
- *Add in the 10 mph (16 km/h) downwind push and the respective groundspeeds will be 35 mph (56 km/h) and 25 mph (40 km/h).*
- *In three minutes at 35 mph (56 km/h) you will cover 6,300 horizontal feet (1920m).*
- *In five minutes at 25 mph (40 km/h) you will cover 11,250 horizontal feet (3429m).*

Photo: Corporal Dave McVeigh, 14 AMS Imaging Section, 14 Wing Greenwood, 2004.

The irony lies in the knowledge that applying brakes and slowing your canopy down is actually the most effective means of gaining ground when running with the wind, even though you are increasing drag.

Conclusion

Under the most controlled of circumstance, parachuting is an extremely dangerous and dynamic discipline. The situations in which SAR Techs often find themselves push those circumstances to the extreme. An understanding and practical application of these and other flight theories can have a direct impact on the success of the mission.

The forces that affect a parachute are invisible, but not incomprehensible. The more effort we put into the understanding of these and other flight theories can do nothing but make us more proficient and safer parachutists. ◆

Sergeant Bryan Pierce is an instructor at the Canadian Forces School of Search and Rescue, 19 Wing Comox.

MAINTAINER'S CORNER

AIRCRAFT DANGER AREAS — STAY ALERT, STAY ALIVE

You have been working on the same aircraft for a few years now so you know all there is to know about it's danger areas. But, do you, really? Sure, you know not to get too close to the intakes, the props or the blades. But do you know how far away you should be to be safe? More importantly, do you know where to find the official information (rather than the word-of-mouth information from the person who showed you how to do starts and parks)? If you do, excellent! If you don't or you are new to the flight line, keep on reading!*

Each aircraft has its own specific danger areas. However, I believe general guidelines can be applied to the three main categories of aircraft: helicopters, propeller-driven aircraft and jet aircraft.

Helicopters

Today in the Canadian Forces (CF), we fly the CH-124 *Sea King*, the CH-139 *Jet Ranger*, the CH-146 *Griffon* and the CH-149 *Cormorant* helicopters. Other types of helicopters can also visit any of our Wings at any time. Even though there are important physical differences between the helicopters in use in the CF, it is possible to distinguish four typical danger areas that are common to all of them.

In addition to these four typical danger areas, personnel have to be aware of other dangers. For example, on the *Sea King*, torpedoes and pyrotechnics are often loaded on the helicopter, and the *Griffon* carries chaff and flares on a regular basis. Also, since the *Cormorant* is used for Search and Rescue (SAR), all sorts of pyrotechnics will be loaded aboard the aircraft. Please consult Figure 1 for the typical danger areas for helicopters.

	AREA	THINGS TO WATCH FOR:
1	Main rotor	• Length of blades • Blade droop during shutdown and start • Rotor wash
2	Tail rotor	• Length of blades
3	Engine(s) exhaust	• Very high temperature behind the engine(s) or on the side for some engines (temperature can reach up to 480°C (900°F))
4	Engine(s) intake	• Powerful suction

Table 1: Main danger areas for helicopters

***Note:** The Figures in this article are meant for information purposes only. Personnel shall consult the applicable publications for the most current and specific description of all the danger areas for the aircraft type on their unit.*

** The term "aircraft" includes rotary- and fixed-wing aircraft.*

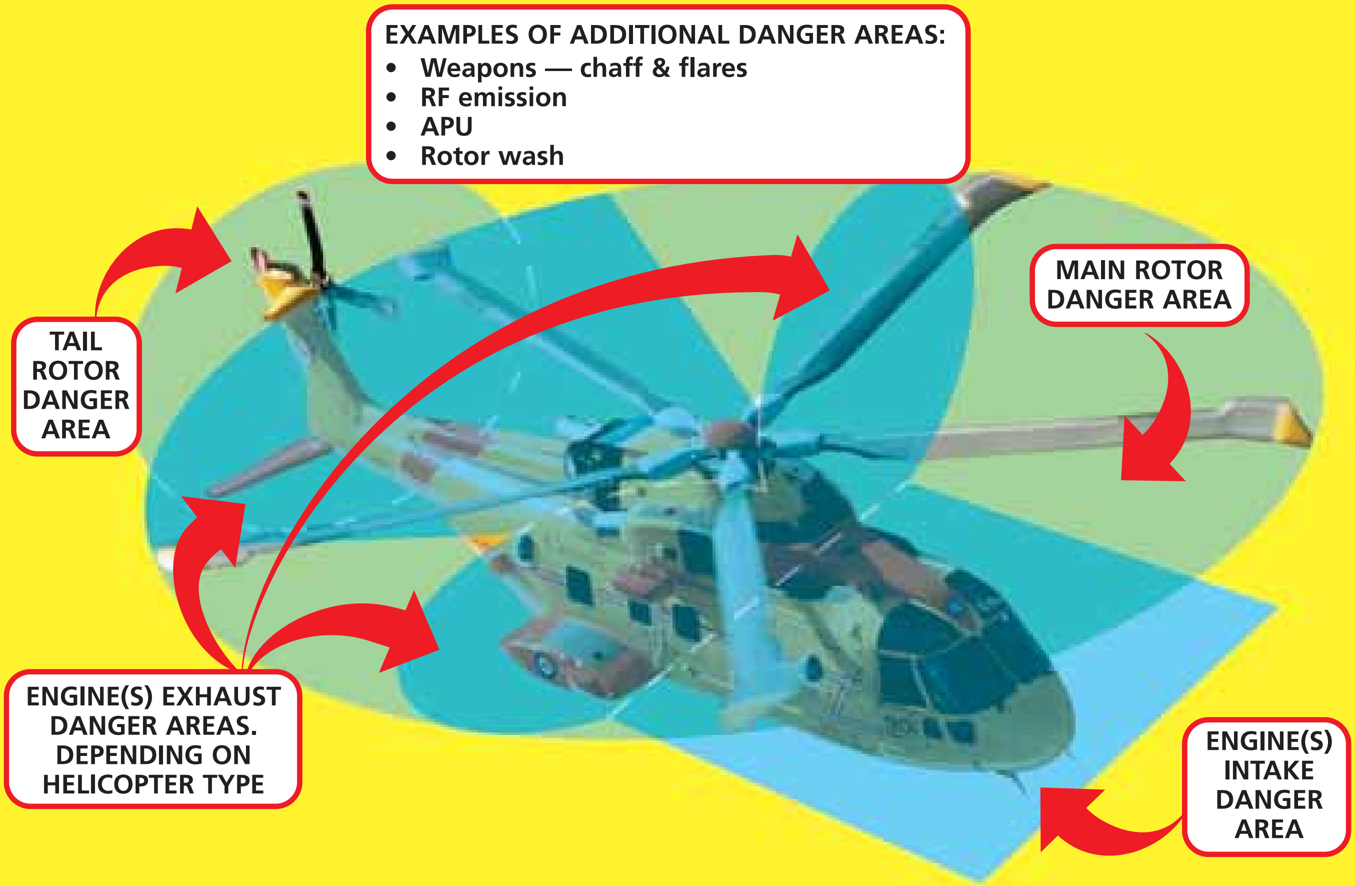


FIGURE 1: Major/typical danger areas for helicopter

Propeller-driven aircraft

The CF has a large variety of aircraft with propeller(s), used operationally or in training: CP-140 *Aurora*, CP-140A *Arcturus*, CC-138 *Twin Otter*, CC-130 *Hercules*, CC-115 *Buffalo*, CT-156 *Harvard*, CT-145 *King Air*, CT-142 *Dash 8* and CT-111 *Slingsby*. Even though aircraft with propeller(s) vary in size, from the tiny *Slingsby* to the very large *Hercules*, and the number of propellers differs from one aircraft to the next (one for the *Harvard*, two for the *Twin Otter* and four for the *Aurora*, for example), they all share typical danger areas that everyone should know.

Besides the danger areas mentioned above, people approaching aircraft with propeller(s) have to be cautious of:

- weapons
  - on board, such as pyrotechnics,
  - in bomb bays, such as torpedoes
  - externally jettisoned stores such as sonobuoys, chaff and flares;
- bomb bay doors; and
- escape systems, such as the ejection seat on the *Harvard*.

	AREA	THINGS TO WATCH FOR:
1	Propeller(s)	• Propeller(s) often hard to see when running • Propeller(s) blades failure
2	Propeller wake (Prop wash)	• Wind velocity behind aircraft can be very high, which causes people, AMSE, rocks, dust and other matter to be thrown far behind the aircraft (up to 450 m (1500 ft) for the CP140)
3	Auxiliary Power Unit (APU, GTC)	• Exhaust — high temperature • Intake — powerful suction on some aircraft
4	Turbine	• Disintegration of turbine could create shrapnel and other debris

Table 2: Main danger areas for propeller-driven aircraft

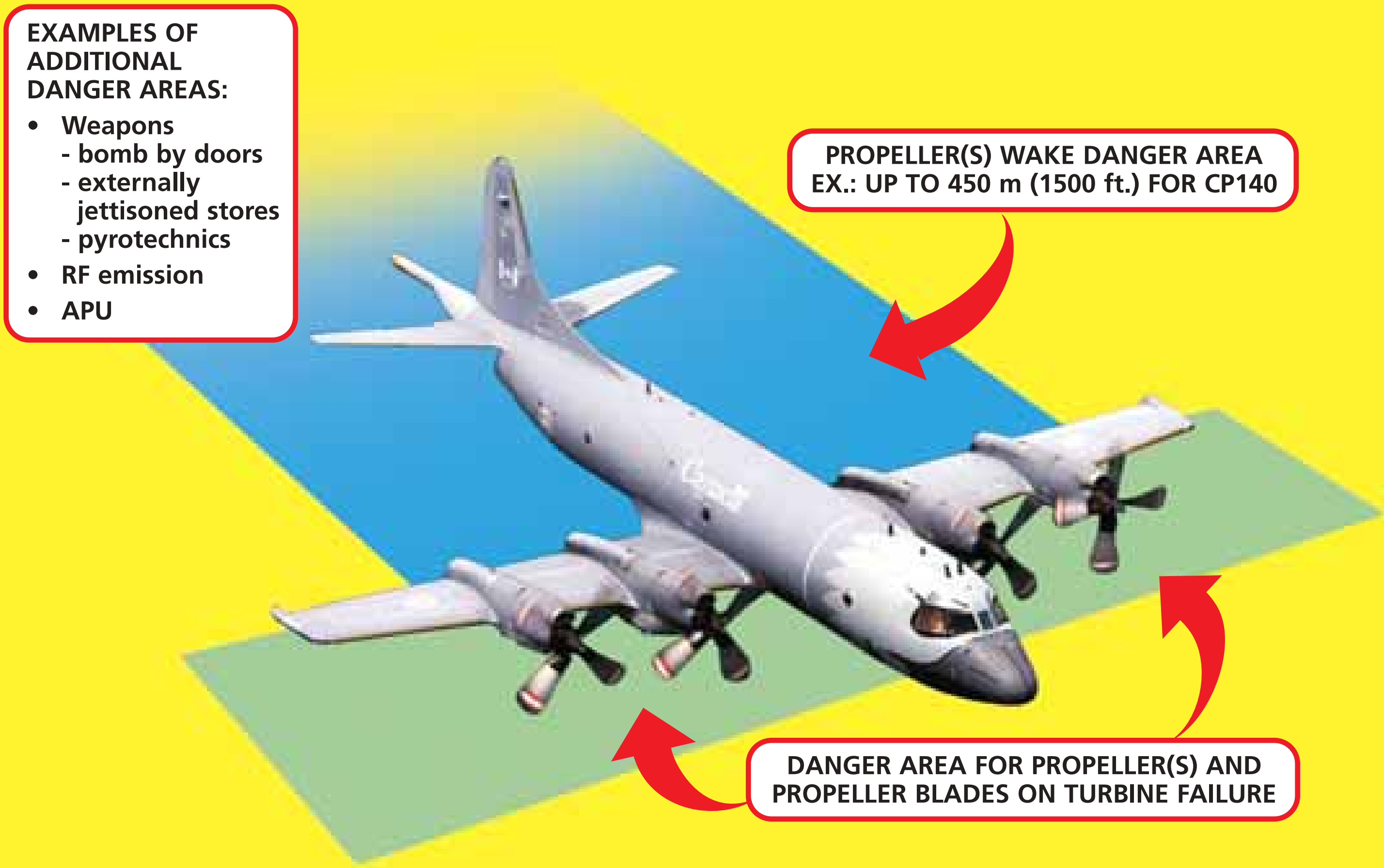


FIGURE 2: Major/typical danger areas for propeller-driven aircraft

Jet aircraft

Jet aircraft in the CF's inventory includes the CF-188 *Hornet*, CT-114 *Tutor*, CT-133 *Silverstar* (yes, it still flies!), CT-155 *Hawk*, CC-144 *Challenger* and CC-150 *Polaris*. As with helicopters and propeller-driven aircraft, it is possible to establish common danger areas applicable to almost every jet aircraft flying today.

Personnel also have to know where additional hazards may be located on the aircraft at their unit. For example, weapons, either forward firing (missiles, rockets, gun, etc.) and ejected (bombs, chaff and flares, etc.), ejected stores (fuel tanks) and RF emission could cause injuries or even death.

	AREA	THINGS TO WATCH FOR:
1	Jet engine(s) intakes	• Very powerful suction. Danger area starts from the intake(s) to approximately 3 m (9ft) and can extend up to 7.5 m (25 ft) or more in from of the engines, depending on power settings and aircraft type
2	Jet engine(s) exhaust	• Jet blast behind aircraft can be severe, which causes rocks, dust and other matter to be thrown far behind the aircraft (up to 275 m (900 ft) for the *Hornet* at maximum power) • At high power, people and AMSE can be thrown to the ground as well • High temperature — up to 538°C (1000°F) for the *Hornet* at maximum power
3	Auxiliary Power Unit (APU)	• Exhaust — high temperature • Intake — powerful suction on some aircraft
4	Ejection system	• Ejection of canopy and/or seat(s)

Table 3: Main danger areas for jet aircraft

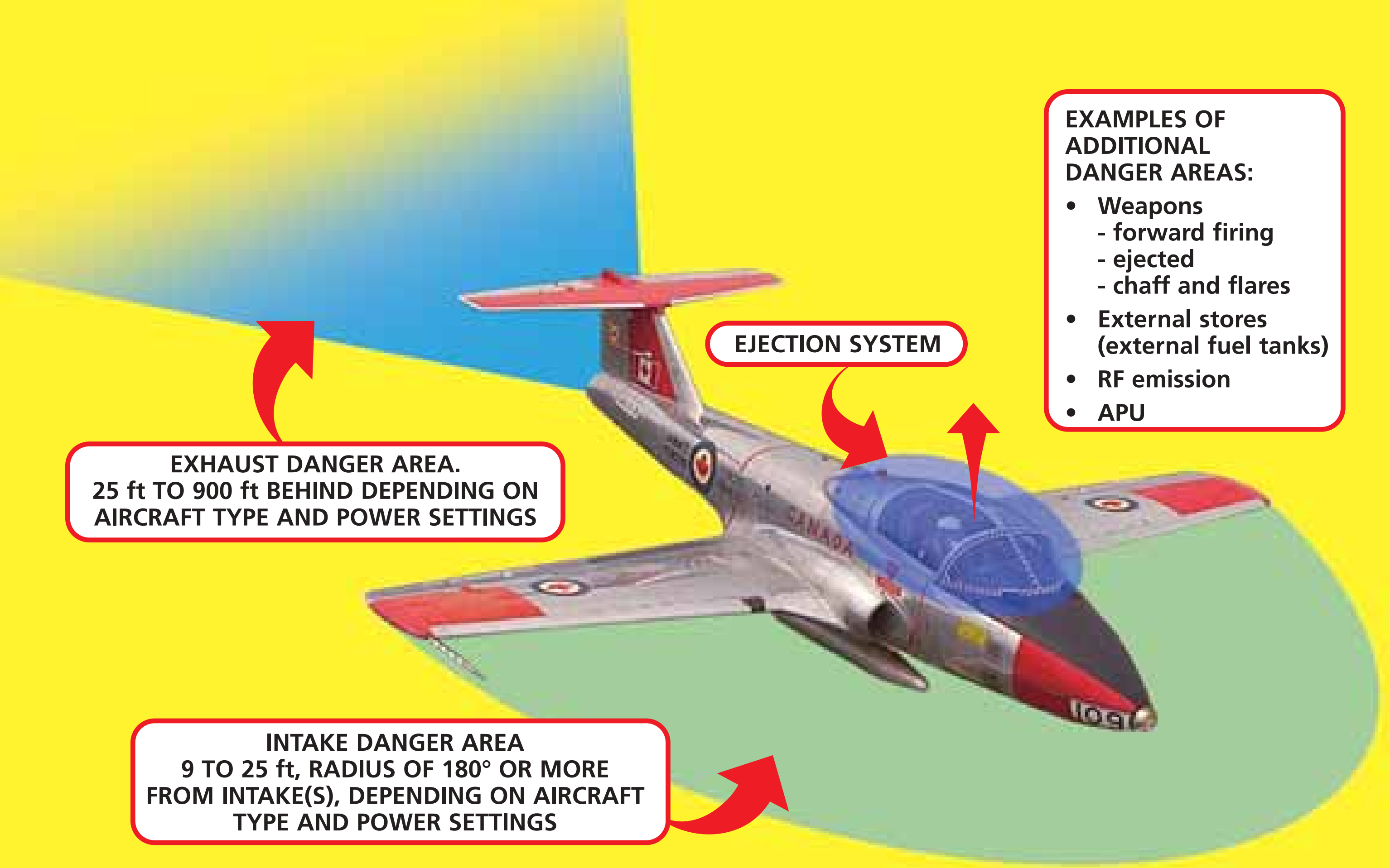


FIGURE 3: Major/typical danger areas for jet aircraft

Staying alert

When on the airfield, whether you are going to refuel, park or arm an aircraft, vigilance is of the utmost importance. Because of the noise, you may not hear if engines or propellers are engaged so, to be safe, always approach an aircraft as if it were running.

If you think that our safety record is perfect and no one has ever been ingested in an engine or hit by a propeller, you are dead wrong. People who have been in the CF for a little while will remember the bowser driver who was ingested by a CF-188 engine. The civilian driver expected the aircraft to be shut down as per normal, and he did not notice the right engine was still running at idle. The pilot and ground crew personnel were busy desnagging the aircraft and did not see the driver walk to the centerline tank to plug in the grounding cable. The driver sustained fatal injuries.

These pictures should remind you never to take anything for granted and to STAY ALERT.

Other incidents concerning jet blast, propeller wake and rotor wash have been reported in the Flight Safety Information System, and the following are a very small sample of these incidents:

- September 2004 — a technician's ear defenders are blown off his head by the blast from the engine bleed valve exhaust port of a CT-114 *Tutor*.

- February 2004 — a technician, not realizing that a CP-140 was running above normal ground idle, walks behind the aircraft. There is ice on the ramp, and the technician slips and falls, resulting in an injured wrist and shoulder.
- January 2003 — the fibreglass cab is blown off a line-servicing vehicle. The line crew chief, who is driving, is flagged by a technician and proceeds towards the aircraft requiring servicing. He drives behind a CF18 undergoing a ground run. The driver's focus is entirely on accomplishing the task and looses awareness of the running aircraft on the line. No injuries.
- February 2000 — a technician marshalling a CP-140 *Aurora* is blasted with debris from the downwash of a *Labrador* helicopter taxiing close by. Witnesses say that the *Labrador's* rotors passed within 3 to 4.5 m (10 to 15 ft) of the technician. The technician never heard or saw the approaching helicopter.
- April 1989 — a maintenance dock assembly for the *Aurora* is blown over by the propeller wake of a CP-140. The dock assembly and the security fence are also damaged when the dock falls over, but no one is injured.
- December 1988 — two technicians doing starts are thrown approximately 7.5 m (25 ft) and sprayed with snow, ice and water by a CF-188. Luckily, no serious injuries as a result of this incident.

As you can see from these few incidents, technicians and other people working on the line sometimes lose situational awareness. The airfield is an extremely dangerous place to let your guard down.

Visiting aircraft

Wings often host deployments from foreign countries and transiting crews from other Air Forces sometimes choose our airfields for a rest period. Furthermore, CF crews often land at airfields other than their own during cross-country trips. In any case, Canadian technicians may have to park, start and service unfamiliar aircraft.

Unfortunately, information on the danger areas of these aircraft may be very hard to find, especially for aircraft from foreign countries. So, unless you have received training or have been given specific directions by the aircrew, technicians should not approach the aircraft. The aircraft should be marshalled into position and be completely shut down prior to personnel approaching it. Remember that what you don't know, i.e. danger areas, can kill you. Supervisors have responsibilities as well and should be 100% certain the personnel they send to the line to recover a visiting aircraft are trained and thoroughly aware of the extent of the tasks they should be performing.

Where to find more information

Safety information for CF aircraft is contained in the specific aircraft's AOI (Aircraft Operating Instructions) or CFTOs. Information for foreign aircraft can also be found on the Web. An excellent source of information is 14 Wing's Flight Safety Web site (http://greenwood.dwan.dnd.ca/FltSafety/welcome.htm), which contains information of Canadian aircraft and provides a link to a USAF site listing NATO aircraft (http://www.robins.af.mil/logistics/LGEDA/documents/to00-105e-9.htm). There is also a link to 14 Wing's Web site through the Directorate of Flight Safety's site (http://airforce.dwan.dnd.ca/dfs/docs/DFS_e.htm).

Final words

If you take only one safety message out of this article it should be the following:

If you are not thoroughly knowledgeable of the danger areas of the aircraft you are approaching — STOP and wait until it is completely shutdown before getting closer.

STAY ALERT — STAY ALIVE. ◆

Sergeant Anne Gale
DFS 2-5-2-2

EPILOGUE

TYPE: ***Katana*** **DA 20 C1 C-GMFB**
LOCATION: **Moncton, New Brunswick**
DATE: **21 July 2004**

During the second flight of the day, a student pilot participating in the Air Cadet Powered Flying Scholarship Program at Moncton Flight College experienced a hard landing while conducting a solo training flight at Moncton Airport. There were no injuries. The aircraft suffered "C" category damage.

The student pilot flew the final approach according to standard procedures. However, the flare prior to touch down was not initiated. The aircraft was subsequently flown onto the runway in a nose low attitude which allowed the propeller to contact the runway. Following the hard landing the pilot applied power and commenced an overshoot. Once airborne and back in the ciruit again, the aircraft experienced significant vibrations. The pilot notified the tower and then successfully continued the circuit to a final landing. The aircraft was then taxied to the ramp without further incident.

The Flight Safety Investigation concluded that the hard landing was caused by the student pilot's failure to initiate a flare. The student pilot had experienced difficulty and shown inconsistency with landings in previous lesson plans. Two instructor changes in the four lessons prior to the accident flight made the student's ability to correct landing problems more difficult.

Moncton Flight College has initiated action to address the need for instructor continuity during critical phases of training. ◆

EPILOGUE

TYPE: ***Hornet* CF188906**
LOCATION: **Bagotville, Quebec**
DATE: **31 July 2001**

This is an update to an Epilogue originally published in February 2004.

The pilot's mission was to conduct an instrument flight rules (IFR) cross-country to Toronto. Shortly after taking-off from runway 29, yellow, acrid smoke began to fill the cockpit. The landing gear and flaps were selected up and, although the landing gear indicators showed three wheels "up and locked", the light remained on in the gear selection handle; this indicated that the landing gear doors were not completely closed. The pilot selected the landing gear down and carried out the emergency procedure for smoke in the cockpit. While the pilot contacted air traffic control and squadron operations, several other aircraft system advisories also illuminated. Distracted by these advisories and multiple radio transmissions, the pilot forgot to lower landing flaps and consequently flew the approach to runway 36 at a speed in excess of the arrester cable limits. During the arrestor cable engagement, the arrestor cable gear failed and damaged the aircraft's right side. A successful overshoot was then conducted which was followed by an approach to runway 29. The aircraft landed without further incident and taxied clear of the runway. The aircraft sustained "C" category damage. There were no injuries.

The investigation revealed that the aircraft experienced multiple failures after take-off because the Flow Temperature Limiting Anti-Ice Modulating Valve (FTLAMV) did not function correctly. The resultant hot bleed air leak damaged environmental control system ducting causing it to overheat and vent smoke into the cockpit. It was found that the FTLAMV was unserviceable when it was originally installed on the accident aircraft during previous maintenance. Of particular concern was the lack of proper maintenance documentation for the FTLAMV when it was originally removed from aircraft CF188751, in 1999, due to an unserviceability. Personnel throughout the supply chain had accepted this inadequate documentation which resulted in its re-introduction to the supply chain without rectification of the original snag.

Recommendations included changes to the supply system at both the CF and contractor ends as well as changes to the process of squadron technical inspections. Further recommendations addressed the capture of aircraft data from arrested landings, pilot crosschecking of the E-bracket to ensure correct aircraft configuration on approach, and minor changes to air traffic control procedures. ◆

EPILOGUE

TYPE: ***Hawk* CT155216**
LOCATION: **Moose Jaw, Saskatchewan**
DATE: **4 July 2003**

The solo student was on a clear hood 8A mission, his third solo flight on the *Hawk*. After a touch-and-go landing he requested a closed pattern from tower. Once downwind, he was sequenced number three behind another *Hawk* on short final and a Snowbird *Tutor* directly ahead. In order to accommodate all aircraft tower requested that the Snowbird extend his downwind and land behind the re-sequenced solo student. The accident pilot, now number 2, initiated the final turn and landed on the centreline of runway 29 Right with the landing gear in the up position

The pilot landed the aircraft with the gear up, because he was task saturated and channelized his attention. Specifically, he was monitoring air traffic control (ATC), planning his re-sequence to land, reducing speed, and adjusting power and configuration for the final turn. The pilot was also distracted trying to monitor the Snowbird, who was flying a pattern unfamiliar to the student. Management of the aircraft's non-standard configuration (gear up) on the final turn increased the pilot's task saturation level. The final defence against a gear up landing would have been personnel in the 'Tasker Shack' who would have alerted the pilot of a gear up situation via both visual and R/T means. Unfortunately the Tasker Shack had been de-commissioned.

Since this accident the Tasker Shack operations have been reinstated. As well, recommendations have been made that students be briefed on time management strategies for use when task workload is high. Also, the student 'solo-exam' should include reference to the Snowbird traffic pattern, and the Snowbird traffic pattern should be included in 15 Wing Flying Orders. ◆

EPILOGUE

TYPE: ***Hornet* CF188798**
LOCATION: **Aalborg, Denmark**
DATE: **25 June 2003**

The accident aircraft, CF188798, was part of a 10-aircraft detachment, which wasdeployed to Aalborg, Denmark in support of Exercise CLEAN HUNTER.

On 25 June 2003, after completing a morning sortie, the accident aircraft required a recharge of the arrestor hook accumulator. The two Canadian technicians involved in the accident retrieved a nitrogen-servicing cart and with the assistance of a Danish technician proceeded to the aircraft. The senior of the two Canadian technicians connected a nitrogen hose to the aircraft and requested 3400 PSI from the Danish technician who was operating the nitrogen cart. When the requested pressure was reached, the senior technician opened the air charge valve and almost immediately thereafter the pressure accumulator of the hook actuator exploded due to a massive over-pressurization. The aircraft suffered "B" category damage. All technicians escaped without injury.

The investigation revealed that an unqualified technician attempted to conduct routine servicing on the accident aircraft. A contributing factor was the operations tempo at this Squadron that tacitly encouraged technicians to reduce the time required for maintenance actions and bypass approved maintenance procedures. This finding was confirmed by a concurrent airworthiness audit which stated that the Squadron was working at a level of risk that is normally unacceptable for a Canadian Forces maintenance organization.

On 12 December 2003, this Squadron developed a risk mitigation plan, which addressed many of the issues raised in this report and identified in the airworthiness accreditation audit of November 2003. The risk mitigation plan incorporates 49 separate and positive procedures to strive for a safe maintenance practice. ◆

FROM THE INVESTIGATOR

TYPE: ***Hornet* CF188933**

LOCATION: **Tinker AFB, Oklahoma, USA**

DATE: **13 January 2005**

The Pilot in Command (PIC) and second pilot were enroute from Cold Lake, Alberta, to Key West, Florida, via a fuel stop at Tinker Air Force Base, Oklahoma. Approximately 100 NM from Tinker and at FL390, the crew experienced an engine-right voice alert and a right oil pressure caution display on the digital display indicator. The right engine oil pressure was then noticed to fluctuate from 55-110 PSI. The throttle was retarded to idle after which the oil pressure fluctuations reduced to 0-10 PSI. The right engine was then shutdown in accordance with the checklist and the left engine afterburner was used in an effort to maintain altitude and airspeed. Unable to do so, the crew declared an emergency and began their descent.

With CAVOK weather at Tinker, the crew planned for an arrested landing via a visual straight in approach to runway 12. At 15 NM prior to touchdown and with the left engine at a low power setting, half-flaps were selected. A flight control set caution then illuminated on the digital display indicator; this then cleared without further input. 6 NM prior to touchdown, the landing gear emergency lowering procedure was completed and the aircraft stabilized at 150 knots on a 3° glideslope that then shallowed to 2° just prior to touchdown. Within 2 NM of touchdown and unable to visually identify the Bak 12 arrestor cable on the runway, the PIC planned to land at the runway threshold. With the PIC at the controls, the aircraft's arrestor hook caught the E-5 arrestor gear in the 1000' undershoot area of runway 12, 70' before the threshold. The aircraft's left and right main landing gear then touched down 59' and 35', respectively, before the runway threshold; the nose gear touched down about 35' beyond the threshold on runway 12. After encountering difficulty with directional control, the PIC used emergency braking to bring the aircraft to a halt on runway 12, 7500' from the threshold. After conducting a normal shutdown, both pilots egressed uninjured. The aircraft sustained "D" category damage; the E-5 arrestor cable and runway also sustained damage.

The Flight Safety Investigation is focussed on the human factors involved with the crew's preparation for the arrested landing and the PIC's aim and intended touchdown points in relation to the arrestor hook's position. ◆

FROM THE INVESTIGATOR

TYPE: ***Tutor* CT-114173 / 114064**
LOCATION: **Mossbank, Saskatchewan**
DATE: **10 December 2004**

The Snowbird solos (#8 opposing solo and #9 lead solo) were conducting training at Mossbank airfield, an abandoned WWII aerodrome, about 30 Nautical Miles (NM) south of 15 Wing Moose Jaw. During the on site training several lateral crossing sequences were completed and at the time of the occurrence, the solos were conducting a "Co-loop", which consists of the two aircraft performing opposing direction loops.

The sequence was proceeding well with both aircraft in alignment as the apex of the loop approached. As the two aircraft neared the top of the loop, it became evident that there was potential for a collision. Accordingly, one aircraft maintained a predicted flight path (as briefed prior to the mission) so that the other pilot could manoeuvre his aircraft to make the miss. When it was evident that a collision was imminent, one pilot initiated an evasive manoeuvre to the inside of the loop, his briefed safe exit direction.

Immediately following this decision, a collision occurred at the top of the loop at about 3500 feet above ground level (AGL) with the aircraft having a closing speed of between 360 and 400 knots.

The collision caused a fireball, which engulfed both aircraft. The pilot of #8 was killed instantly in the collision. The pilot of #9 was expelled from his aircraft without initiating ejection. He realized he was outside of the aircraft and pulled the "D" ring on his parachute but then realized he was still in the seat. He manually released his lap belt and pulled the "D" ring again. Shortly thereafter his parachute blossomed. About 5 seconds later he landed on the ground having sustained minor injuries from travelling through the fireball.

Both aircraft were completely destroyed during the collision.

The investigation is ongoing and will focus on the training regimen and human factors aspects associated with this collision. ◆

For Professionalism

CAPTAIN SYLVAIN LARUE, CORPORAL TREVOR NEMISH AND CAPTAIN ALAIN RHÉAUME

On Wednesday, 8 October 2003, 15 Wing Moose Jaw was conducting night training for *Harvard* CT-156 aircraft. Moose Jaw has two parallel runways; both were in use and were relatively busy.

At approximately 2013 local, a *Harvard* aircraft transmitted on guard frequency "Pan, Pan, Pan, this is aircraft #, smoke in the cockpit, will land runway 29 right". The tower controller, Captain Rhéaume, responded. Unbeknownst to Captain Rhéaume, the emergency aircraft had shut down its electrics and did not hear Tower's instructions. Captain Rhéaume could not find the emergency aircraft on the Radar Situational Display (RSD)

At that time, Corporal Nemish was controlling a *Harvard* aircraft, piloted by Captain Larue. Corporal Nemish saw another aircraft on the PAR scope, approaching from a different direction. This aircraft was not showing up on the RSD because its transponder was not being received. Assuming that this was the emergency aircraft, Corporal Nemish immediately informed Captain Larue. Coincidently the incident pilot turned on the aircraft's battery to select the gear down. At this time, Captain Larue saw the emergency aircraft underneath and to his right and informed Corporal Nemish. Corporal Nemish advised Captain Rhéaume who then directed other aircraft away from the runway to allow the emergency aircraft to land. When the gear was down, the emergency aircraft pilot again turned off his battery and could no longer be seen by Captain Larue. Corporal Nemish continued to monitor the emergency aircraft on the PAR scope and passed this traffic information to Captain Larue. At approximately 5 miles final, Captain Larue cancelled his PAR approach to allow the emergency aircraft to land. Captain Rhéaume cleared Captain Larue's aircraft for a low approach between the runways, then transmitted a clearance on tower frequencies and guard for the emergency aircraft to land. Another controller in the tower used the Aldis lamp in the direction of the aircraft, giving it clearance to land. Captain Larue, who was conducting the low approach between the runways, spotted the emergency aircraft as it touched down.

Captain Larue demonstrated a professional attitude, and high level of coordination with Corporal Nemish and Captain Rhéaume, during a period of busy night flying traffic that allowed the runway to be cleared for the emergency aircraft to land safely. ◆

Captain Larue, Corporal Nemish and Captain Rhéaume all serve at 15 Wing Moose Jaw.

For Professionalism

PRIVATE MICHAEL BRIDEAU & CORPORAL MARK TREMBLAY

On 12 January 2004, while assisting in the trouble-shooting of a persistent fault indication of the HF (High Frequency) PA (Power Amplifier) on a CP-140 *Aurora*, Private Brideau and Corporal Tremblay were unsatisfied with the amount of troubleshooting information available in the technical publication for that system. By methodically searching for more information, they discovered additional information in a supplement publication on an upgraded HF system that had yet to be delivered to 407 Squadron. The supplement publication gave them precise parameters for PA fault indications. Working on the assumption that the measured fault indication parameters would be similar for the two systems, Corporal Tremblay and Private Brideau focused on low airflow through the PA as the probable cause of the persistent snag. After informing their supervisors of their theory, the airflow to the PA rack was checked and found to be absent. On removal of the exhaust manifold, a plastic parts bag was found restricting the airflow in the main branch of the duct. The FOD was removed and quarantined, the manifold was reinstalled and airflow to the PA was confirmed. To ensure a complete check of the systems cooled by this manifold, Corporal Tremblay proceeded to check the airflow to the HF Receiver Transmitter and HF Filter and discovered zero airflow to these assemblies. Removal and inspection of the manifold a second time revealed the complete blockage of the secondary branch of the duct with a white plaster-like substance that had effectively formed a 1 cm thick plug shaped to the contours of the duct. The blockage was removed, the manifold was reinstalled and all systems were checked serviceable.

For their tenacity in the search for answers, and by using all information available to them, Corporal Tremblay and Private Brideau showed outstanding dedication and superior professionalism in rectifying a persistent systems snag. As well, without the attention to detail displayed by these two technicians it is extremely unlikely that the second blockage would have ever been discovered. Their actions set an excellent example for their peers, colleagues and supervisors. ◆

Private Brideau and Corporal Tremblay continue to serve at 19 Wing Comox.

CAPTAIN CRAIG STONE & MASTER CORPORAL DWAYNE EARLE

On 19 July 2003, Captain Stone, the terminal controller, and Master Corporal Earle, the Precision Approach Radar (PAR) controller, were on duty at 8 Wing Trenton. While controlling, they acknowledged a MAYDAY call from the pilot of a light civilian aircraft in the vicinity of Rice Lake, at an altitude of 7,500-feet and descending. The aircraft had experienced total engine failure, with a sheared prop and broken canopy, a situation that appeared desperate for the pilot and his 8-year-old son. The aircraft's altitude continued to decrease and time became the enemy. The closest airport was Peterborough, approximately 15 miles northeast of his position.

Quickly but calmly, Captain Stone relayed directions and relevant airport information as well as several alternate landing sites to the pilot, but the stricken aircraft was unable to travel the required distances. Master Corporal Earle quickly contacted the Rescue Coordination Centre (RCC) to coordinate, while simultaneously providing assistance to the terminal controller by searching local maps and charts for a possible landing site. Quickly, realizing that radio contact would soon be lost as the aircraft continued descent, Captain Stone intuitively asked the pilot if he had a cell phone and obtained the number. Both controllers feverishly studied maps of the area and, in a final desperate attempt, offered directions to a grassy area, which was much closer than the airfield. In the final seconds before both communications and radar contact were lost, the pilot reported he had the site visual and declared his intention to attempt an emergency landing.

The approximate position was swiftly relayed by the PAR controller to the Rescue Coordination Centre (RCC) for deployment of Search and Rescue aircraft. However, after several minutes and numerous failed connection attempts, Captain Stone was finally able to contact the pilot on his cell phone and ascertain that both of the occupants had miraculously escaped without any injuries. Master Corporal Earle continually kept RCC informed of all emergency details. The landowner provided an address to the pilot and this information was swiftly passed through RCC to local police authorities who, in turn, dispatched a unit to the forced landing site.

In the performance of his duties, Captain Stone displayed not only a calm demeanour in a highly stressful situation, but also a superb spirit of initiative, leadership, and professional expertise. Master Corporal Earle's stellar response in coordinating the efforts to assist an aircraft in distress was prompt and professional. His timely dissemination of the emergency information to RCC ensured they were well informed and capable of responding without delay. The regard for aviation safety displayed by both Captain Stone and Master Corporal Earle is a credit to the occupation and the Canadian Forces equally. Their actions could well have saved lives and they are commended for their professionalism and teamwork. ◆

Captain Stone serves with 8 ATC while Master Corporal Earle serves with 8 ACCS, 8 Wing Trenton.

For Professionalism

CORPORAL JASON MILLER & CORPORAL SCOTT ROBERTSON

In December 2003, Corporals Jason Miller and Scott Robertson, both Aviation Technicians, were performing a routine power turbine change on a GE-T-58-100 *Sea King* engine. The two technicians had removed the power turbine from the engine and were preparing to install a new one. They noticed that the third stage nozzle had developed cracks along several of the vanes. The third stage nozzle is not part of the power turbine and therefore an inspection in this area of the engine is not called for.

Corporals Miller and Robertson immediately called for the Non-Destructive Testing (NDT) technicians and researched CFTOs to determine if the cracks were within acceptable limits. The NDT results revealed that the cracking on the third stage nozzle was beyond acceptable limits. The unserviceable nozzle was removed from the engine and sent back to the contractor for overhaul.

Corporal Miller and Corporal Robertson both displayed extreme professionalism, attention to detail and initiative, preventing the possible loss of a valuable CF asset. These cracks had the potential for serious or fatal injury if they had not been noticed. Both Corporal Miller, a journeyman, and Corporal Robertson, an apprentice, are commended for their dedication, alertness, and attention to detail in preventing a potentially hazardous in-flight emergency. Their actions warrant this For Professionalism award. ◆

Corporal Miller and Corporal Robertson are still serving with 12 Air Maintenance Squadron, 12 Wing Shearwater.

CORPORAL DARRYL BEAUCHESNE

On 6 May 2004, Corporal Beauchesne was working on CF188706. After completing an avionics system (AVS) related job he carried out a FOD check of his surrounding work area. While doing this, he noticed that one of the bolts securing the anti-rotation lug on the rudder servo was loose. On closer inspection of this obscured area, he realized the head of the bolt had sheared off and was dangling by its lock-wire. In addition, the anti-rotation lug was separating from the rudder servo. Corporal Beauchesne is an AVS technician and is not familiar with this particular area of the rudder servo. However, because of his exceptional attention to detail, the unserviceability was discovered and brought to the attention of an aviation systems technician (AVN) supervisor.

Without Corporal Beauchesne's curiousness, initiative and attention to detail, this condition would likely have remained undetected and resulted in the servo breaking loose and causing extensive damage to the aircraft's structure in the rudder servo's location. ◆

Corporal Beauchesne serves at 416 Squadron, 4 Wing Cold Lake.

CORPORAL TRUDI KWAKERNAAK

On 16 December 2003, Corporal Kwakernaak, an AVN technician with 14 AMS Periodic Maintenance, was tasked to carry out the interior survey of a CP-140 *Aurora* aircraft during periodic inspection. After routine removal of a floorboard requiring repair, she carried out a detailed inspection of the area underneath, including several primary flight control cables. As her inspection progressed beyond the immediate area, she discovered a bracket of four pulleys on which one of the lockclad cables had jumped its pulley due to a broken sidewall. The cables were not an inspection item on the cards for this periodic inspection, and although she was responsible to conduct an "area inspection" under the floorboard, the location of the bracket was under an adjacent floorboard mounted in such a way as to make an inspection of the pulleys very difficult.

Further examination revealed that the sidewalls of all four pulleys were flexible instead of rigid and a check with the applicable CFTO disclosed that the pulleys were the incorrect part number. After further examination, she found that the wrong pulleys were also installed on a bracket located a few feet away.

An in-depth survey was conducted on the aircraft, which showed that both correct and incorrect pulleys were in use throughout the primary flight control systems, frequently on the same bracket. Subsequent inspections of two other CP-140/A aircraft found similar results. Given the potentially significant airworthiness concerns, an investigation was launched immediately within DND in conjunction with IMP. Direction is forthcoming to have all improper pulleys on the CP-140/A fleet replaced with the correct part number.

Corporal Kwakernaak displayed phenomenal attention to detail in finding this defect that could have had serious consequences had it gone undetected. Her remarkable professionalism in the ensuing follow up is a testament to her outstanding abilities and dedication. ◆

Corporal Kwakernaak still serves with 14 Air Maintenance Squadron, 14 Wing Greenwood.

CORPORAL JAMES ALLISON

On 12 January 2004, Corporal Allison was tasked to return a number of unserviceable tire assemblies to Tire Bay. While off loading the tires, he noticed that something did not appear correct with one of the assemblies. When he took a closer look, he noticed that a spacer was still inside one of the tire assemblies. He retrieved the spacer and noted the aircraft number from which the assembly was removed, on form CF 543. Corporal Allison then returned to the squadron, immediately informed his supervisor, and raised a CF 349 against aircraft 723 to ensure the correct installation of the tire assembly. When Corporal Allison removed the new tire and wheel assembly from 723, he observed that the required spacer was missing. Corporal Allison then informed his supervisor and immediately contacted the unit flight safety team.

Corporal Allison's sharp eye and investigative attitude averted a potentially dangerous situation from developing. Not having the spacer installed would result in loose play of the wheel assembly and wheel assembly bearing seizure. In recognition of his attention to detail and persistent investigation, Corporal Allison is awarded this flight safety *For Professionalism* award. ◆

Corporal Allison still serves with 416 Tactical Fighter Squadron, 4 Wing Cold Lake.

For Professionalism

MASTER CORPORAL RUSS BROWN

On 7 November 2003, a *Griffon* helicopter returned from a mission with a strong odour that appeared to be emanating from the heating system. Since this was the first time the heater had been used in many months, technicians elected to clean and purge all heating system components so as to clear out what was believed to be residual contamination that had likely been introduced into the system since its last use. However, during the aircraft's next flight, the strong odour once again became apparent and was described by aircrew as being petroleum, oil, and lubricant in nature. When technicians decided that a more thorough alcohol cleaning of the heating system was necessary, Master Corporal Brown, despite being new to the squadron and the airframe, was not totally convinced that this course of action would rectify the problem. Master Corporal Brown convinced the more experienced *Griffon* technicians that further investigation of the snag was warranted.

He specifically suggested that a thorough visual inspection of all areas that might introduce a contaminant into the system be carried out. As a result, it was discovered that pressurization of the fuel boost system was resulting in leakage from a fuel pressure sensor fitting, which was then running along the pressure line and pooling at the lowest point of the baffle. Fumes from this pooled fuel were then being drawn into the system via the compressor inlet and eventually being introduced into the heating system via engine air. Rectification of the leak eliminated the odour problem and the aircraft was once again serviceable.

This particular fault was noticeable only when the heating system was in operation, and due to varying temperatures over the following days could easily have gone unabated with possible severe consequences. Although this was not a known common fault associated with heater snags, Master Corporal Brown nevertheless utilized his experience and technical expertise acquired on other aircraft types to lead him to his conclusion that this snag required further investigation. ◆

Master Corporal Brown serves with 400 Tactical Helicopter Squadron, CFB Borden.

CAPTAIN PAUL GAUTRON

Captain Gautron was doing the pre-flight of *Griffon* 146426 on 7 July 2004. During his inspection of the main rotor hub, he noticed a gap in the elastomeric bearing of one of the blades. On further inspection he noticed that the bearing had delaminated from the spindle, causing dust to build up on the spindle. He immediately reported the situation, which led to the grounding of the aircraft.

This particular component degradation has never before been experienced at this unit. Had this incident gone unnoticed, excessive stress would have been exerted on the rotor yoke possibly causing dangerous vibrations.

Captain Gautron's thorough pre-flight inspection and dedication prevented a possible catastrophic main rotor failure. His actions earn him this *For Professionalism* award. ◆

Captain Gautron serves with 403 Squadron, CFB Gagetown.

MASTER CORPORAL BRIAN SMITH

While supervising a nose and right-hand main landing gear change on a CP-140 *Arcturus* (CP140112), Master Corporal Smith noticed two critical steps that were overlooked by the technicians conducting the maintenance. The first oversight he noted was that the technicians installing the nose landing gear doors failed to install a crucial set of washers essential for door alignment and to stop excessive play. The second oversight observed was during the landing gear functional phase. During retractions, he noted there was a slight vertical play in the right-hand main gear upper drag brace. Upon further investigation he discovered the main landing gear upper drag strut bushings were still installed on the old, time-expired landing gear and were not installed on the new landing gear mounted on the aircraft. Realizing the aircraft just had a similar nose and main gear replacement, he took the initiative, checked the old, time-expired landing gear from aircraft CP140112 and found the upper drag strut bushings still installed on the removed gear. Realizing the aircraft was minutes away from departing on a mission, Master Corporal Smith immediately informed the Maintenance Control Office of his findings and recommended the landing gear on CP140112 be inspected for the installation of the main landing gear bushings as well as the washers for the nose landing gear door hinges. The inspection of the aircraft revealed that neither the washers nor the spacers had been installed.

Master Corporal Smith's exceptional supervisory skills and outstanding initiative prevented a possible catastrophic failure of the landing gear, which could have resulted in a significant loss of life. Having the foresight and initiative to check possible oversights in maintenance recently conducted on other aircraft is indicative of Master Corporal Smith's professionalism and dedication towards his profession. ◆

Master Corporal Smith still serves with 14 Air Maintenance Squadron, 14 Wing Greenwood.

CORPORAL COLIN WILLOUGHBY

On 14 June 2004, Corporal Willoughby, a journeyman avionics technician employed with 12 Air Maintenance Squadron (AMS) was performing first line maintenance on CH124417, a *Sea King* helicopter. During a hot refuel procedure, he noticed an irregularity in the vicinity of the main rotor head. He relayed to the aircrew the observance of a body erratically spinning around the main rotor head. The aircraft captain elected to taxi out of the hot refuel pit and disengage the main rotor head. Upon visual inspection of the area, it was discovered that a swash plate seal had become detached and was encircling the main rotor mast. The aircraft was shut down and quarantined. The main rotor head was subsequently replaced. Left undetected, the grease in the main rotor head would have escaped, causing the main rotor head to seize.

The task at hand required Corporal Willoughby's attention to be focused on the hot refuelling procedures; it is thus commendable that he noticed the snag in the main rotor head area. Corporal Willoughby's professionalism and attention to detail in an area outside of his field of expertise prevented a potential catastrophic failure of the main rotor head and averted a potentially disastrous flight occurrence that could have seriously endangered both aircrew and aircraft. ◆

Corporal Willoughby serves with 423 Maritime Helicopter Squadron, 12 Wing Shearwater.

For Professionalism

SERGEANT ARMAND GALLANT

While conducting a safety check on a CP-140 *Aurora*, as part of his pre-flight inspection, Sergeant Gallant noticed that something did not look right with the nose wheel steering cable. As part of a more thorough investigation, he followed the cables behind a panel in the nose wheel well and found that the cables were on the wrong pulleys. To confirm his findings he contacted the technicians of 14 Air Maintenance Squadron (AMS) who also agreed with his findings and made the aircraft unserviceable. When all panels in the area were removed the technicians observed that the cables were in fact twisted around each other. A serious incident or accident was pre-empted thanks to the extra effort by Sergeant Gallant during his routine checks. ◆

In recognition of his attention to detail and persistent investigation, Sergeant Gallant is awarded this flight safety For Professionalism award.

Sergeant Gallant serves with 405 Squadron, 14 Wing Greenwood.

CORPORAL VALERIE O'KRAFKA

On 16 April 2004, as part of a maintenance periodic survey, Corporal Valerie O'Krafka carried out an inspection of the four life raft doors on aircraft CC130326. She discovered that all four doors were unserviceable (u/s) for wear and took appropriate maintenance action to correct the deficiency. She then took it upon herself to further investigate the case. Her research revealed that in November 2003, a Special Inspection (SI) of the radio and life raft doors was carried out on aircraft 326. The life raft doors had been removed, repaired and then installed without a rigging check or an independent inspection being carried out. She discovered two important shortcomings with the SI instruction in that it failed to identify the requirement for a rigging check and that the work unit code assigned in the Canadian Forces Technical Order (CTFO) did not name the life raft doors as requiring an independent inspection

Not satisfied, she reviewed the Automated Data for Aerospace Maintenance (ADAM) system history for all CC-130s at 8 Wing and discovered that four other aircraft lacked the required independent check and signature following the SI. Corporal O'Krafka quickly reported her findings to the Unit Flight Safety office and followed up with a well-written Crew Chief's report. Further, she initiated the appropriate paperwork to rectify the publications in order to prevent further re-occurrences. Additionally, she reported her findings to the aircraft maintenance control and repair office so that immediate notification to other units and headquarters could be carried out.

As a result of Corporal O'Krafka's diligent efforts, proper maintenance actions have been carried out across the fleet. Her commitment to this task ensured that critical life support equipment is in place if ever required. ◆

Corporal O'Krafka currently serves with 8 Air Maintenance Squadron, 8 Wing Trenton.

CORPORAL BRIAN BÉRUBÉ

On 18 October 2000, Corporal Brian Bérubé was employed in the completion of an engine change on CC130325, working in the area aft of the new engine. This compartment is commonly referred to as the 'horse collar' area, and is where the aircraft wiring, plumbing and cables are connected to the engine Quick Engine Change Unit (QECU). Corporal Bérubé identified something unusual about the routing and support of one of the larger wire bundles. This harness contained wire bundles for systems that must be routed separately (e.g., generator and propeller circuits in accordance with C-17-010-002/ME-001). Further inspection revealed that this unusually large harness was drooping to the point where it contacted the engine throttle cables due to inadequate support. There was evidence of chaffing and one wire was damaged.

Corporal Bérubé checked several available aircraft and noted similar situations exclusively in the #3 engine position. Aircraft Maintenance Control and Repair Office (AMCRO) was made aware of the problem and an AMCRO tasking was issued to immediately inspect the fleet for chaffing and to record all findings. Corporal Bérubé followed up with an Unsatisfactory Condition Report (UCR). It recommended individual clamping of the wire bundles and the use of standoffs to hold the harnesses clear of the throttle cables. This permitted the addressing of all aircraft on a case-by-case basis.

The diligence and professionalism demonstrated by Corporal Bérubé brought to light a serious fault with the wiring systems inherent to #3 engines in the CC-130 fleet. Subsequent review by NDHQ and SPAR Aviation revealed the wider extent of these faults, including some airframes with harnesses too short to follow common routing practices. This resulted in complete wiring harness replacement and rerouting by third line facility contractors. Clearly this dangerous situation had gone undetected for some time and had the potential for catastrophic consequences. ◆

Master Corporal Bérubé has since been promoted to his current rank and now serves at 435 Transport and Rescue Squadron, 17 Wing Winnipeg.

MRS. JEANNE BARRETT

On 10 July 2003, Mrs. Barrett, an Immediate Operation Requirement (IOR) clerk with *Sea King* Supply, was processing an item for disposal, which local authorities had discovered on the shoreline. In the course of her inspection, Mrs. Barrett realized that although the item had been described as a sonobuoy, she did not recognize this particular type.

In order to clarify the item's designation, Mrs. Barrett called an expert in armament stores who identified the item as a LUU 2/B flare that had apparently been armed, but had not ignited. This flare emits 2,000,000 candlepower and is composed of magnesium and white phosphorous. Once ignited, these materials will burn until exhausted. Had this error gone undetected, the key ingredient would have been in place to start an almost inextinguishable fire. The flare was sent to 14 Wing Greenwood Explosive Ordnance Disposal (EOD) team for disposal, where it was confirmed that the flare had stopped its explosive train just before igniting the candles.

Mrs. Barrett does not come in contact with LUU 2/B flares in her day-to-day tasks. Ensuring that an investigation be made of the unfamiliar item was well above and beyond her call of duty. Due to her outstanding situational awareness, Mrs. Barrett removed the potential for a serious incident, and may well have prevented a very serious fire. ◆

Mrs. Barrett continues to work at 12 Air Maintenance Squadron, 12 Wing Shearwater.

For Professionalism

CAPTAIN JONATHAN TREMBLAY

Shortly after getting airborne in a *Harvard II* aircraft, and following completion of his post take-off checks, a loss of thrust, mild vibration and rumbling noise was experienced. While in a critical flight regime of low airspeed and altitude, Captain Tremblay initiated a mild zoom and assessed his condition. Seeing 108% engine torque, Captain Tremblay suspected an uncommanded prop feather situation and immediately switched his Propeller Management Unit to off in order to alleviate the problem. With power still available, a left climbing turn was initiated to place the aircraft in a downwind position. The engine power was then reduced to a lower power setting (25 torque) and an emergency declared. Following configuration for landing, Captain Tremblay decided to initiate an early final turn towards the runway. Mid-way through the final turn, another power fluctuation was experienced, accompanied by an increased rate of descent. With little to no thrust being produced by the engine, Captain Tremblay raised his flaps in an attempt to make the runway. On short final the master warning light illuminated and aircraft power dissipated. Landing only 200 feet down the runway, the power was then retarded to idle. Once on the runway, Captain Tremblay noticed a chip light and shut the engine down.

Captain Tremblay displayed a high degree of professionalism, airmanship and piloting ability in dealing with this emergency. His skill enabled him to return to land safely thus avoiding the potential loss of an aircraft and possible injuries if an ejection had been necessary. ◆

Captain Tremblay now serves in Yellowknife with 17 Wing's 440 Transport and Rescue Squadron.

PRIVATE BRIAN HOBBINS

On 03 March 2004, while undergoing apprentice training, Private Hobbins demonstrated outstanding professionalism by averting a potentially dangerous situation. As the number one man during the start of a CP-140 *Aurora*, he noticed the propeller fluid access door on the number three engine had opened mid start. Intensely aware of the potential hazard to the aircraft and to personnel, Private Hobbins immediately signalled the aircrew to abort the start. Private Hobbins then informed his supervisor of the findings, the panel was secured and a normal start was carried out. This observation was exceptional, considering the open panel was noticed in the early morning under minimal light conditions. Furthermore, this particular panel is approximately three by four inches in size, is black on black and was located directly aft of the spinning propeller.

Private Hobbins demonstrated an outstanding level of vigilance for an apprentice airman. His attention to detail, coupled with quick actions prevented the development of an event chain that would have led inevitably to blockage of the propeller throttles linkage. Private Hobbins' outstanding professionalism averted an imminent flight emergency and warrants this award. ◆

Private Brian Hobbins serves with 407 Squadron at 19 Wing Comox

Good Show

MR. DEAN FLANAGAN & MR. CLAUDE HENRI

On Tuesday, 4 May 2004 Mr. Dean Flanagan and Mr. Claude Henri, avionics technicians, were conducting an 800-hour inspection on *Challenger* 144617. One element of the inspection was to check the wiring behind the cockpit instrument panel.

While performing the inspection of the wiring they became aware of an abnormal mechanical configuration related to the windshield installation. Demonstrating an extremely high level of professionalism they reported their concern to the Team Leader.

The condition that they discovered had most likely occurred during maintenance to correct a pressurization leak that was conducted at an outside Fixed Base Operator (FBO) over seven months before. It is suspected that following that maintenance the lower link supports to the center post of the windshield had not been reconnected after resealing of the center post.

This situation had the potential to cause damage to the airframe and possibly injury to personnel. The seriousness of this situation was further demonstrated through the direction issued by Canadair Engineering that ordered the removal of both windshields to allow for non-destructive testing (NDT) of the frames and the airframe sills.

Every aircraft services employee can take pride in the level of awareness and professionalism as demonstrated by Mr. Flanagan and Mr. Henri. ◆

Mr. Dean Flanagan and Mr. Claude Henri work for Transport Canada Aircraft Services Directorate supporting the Challenger fleet at 412 Squadron, Ottawa

MAJOR MIKE SAVARD

Major Savard was conducting an airsickness progress flight in a *Harvard II*, on a phase II student, in the Moose Jaw flying area. While recovering from a slow flight sequence, Major Savard noticed a restriction in the flight controls. Initially thinking the student pilot may have inadvertently restricted the flight controls, Major Savard queried the student pilot. When the student informed Major Savard that he had not restricted the controls, Major Savard began to slowly verify the extent of control restriction. Major Savard discovered that there was only left, forward, and aft stick movement available; there was no right stick movement at all.

Currently at 9000 feet and 25 miles from base, Major Savard then proceeded to carry out a controllability check on the aircraft by simulating a mock approach and overshoot while at a safe altitude. He determined that the aircraft was controllable to a minimum speed of approximately 135 knots indicated airspeed (KIAS,) just 12 KIAS below the gear speed and 25 KIAS higher than the recommended final approach speed. Upon declaration of an emergency with air traffic control, Major Savard demonstrated a high level of professionalism and superior aircraft control while positioning the aircraft on a long straight-in approach, using only rudder to counteract any left hand rolling moments and right rudder for turns. Simultaneously, he maintained a high level of crew resource management with the student pilot while he performed a controlled ejection checklist procedure, in case the aircraft departed controlled flight. Bringing the aircraft back to base on a steep flapless approach, well above the recommended approach speeds, Major Savard successfully brought the *Harvard* to a full stop landing. He did this with restricted use of his flight controls and using only rudder authority to counteract any left rolling moments.

The practice of using rudder only without aileron for recovery or approach is neither a taught sequence nor a written response in the aircraft approved flight manual. Major Savard demonstrated a high level of professionalism and superior aircraft handling when faced with an emergency that could have led to the loss of an aircraft and/or lives. ◆

Major Savard took his retirement from the Canadian Forces in the summer of 2004.

Good Show

CAPTAIN DAVE MILLER & MASTER CORPORAL JOHN MOSS

On the evening of 29 August 2004, the Comox Duty Terminal Controller, Captain Dave Miller, was providing Air Traffic Control (ATC) services to a *Cessna 208* aircraft that had departed on an Instrument Flight Rules (IFR) flight plan from Comox to Fort St. John, British Columbia at an altitude of 13000 feet.

As the aircraft was climbing northward, Captain Miller noticed that the climb rate was not sufficient to get above the rising topography and began to issue corrective vectors to ensure that the aircraft would clear the mountainous terrain. The aircraft eventually levelled off at 13000 feet. The aircraft reached the boundary of Comox airspace, enroute to its destination, and was handed off to the Vancouver Area Control Centre (VR ACC).

Shortly after the handoff, Captain Miller received a call from VR ACC indicating that the aircraft had encountered significant icing conditions, was unable to maintain altitude and had commenced an emergency descent. The pilot had reversed course and was now heading south toward Campbell River, 20 nautical miles (NM) west of Comox. Captain Miller quickly re-established radio contact with the aircraft but was unable to establish radar contact. Recognizing the gravity of the situation, Captain Miller calmly advised the pilot to do his best to maintain altitude until radar contact could be re-established. The aircraft, having descended through 12000 feet, was already well below the minimum safe altitude for the area. While awaiting radar contact, Capt Miller instructed the Duty Precision Approach Radar (PAR) Controller, Master Corporal John Moss, to assist with the situation by contacting various agencies to determine freezing levels and the cloud tops for the area. Radar contact was re-established when the aircraft was 67NM north of Comox and in descent through 11000 feet; an altitude 2000 ft below the minimum safe vectoring altitude.

An experienced controller and a qualified Visual Flight Rules (VFR) pilot, Captain Miller quickly determined that he could utilize VFR navigation charts in conjunction with the radar display to provide emergency assistance vectors to the aircraft, as Master Corporal Moss verified positions and determined the headings required to direct the aircraft towards the lower terrain of Bute Inlet. After approximately 25 minutes of continuous guidance and assistance, the aircraft reached an area with a minimum safe altitude of 9000 feet. Captain Miller then issued a descent to a safe altitude. As the aircraft passed through 9500 feet, the ice cleared from the aircraft and the pilot secured the emergency.

The outstanding airmanship and resourcefulness in utilizing VFR charts in addition to normal radar resources permitted Captain Miller and Master Corporal Moss to provide potentially life saving navigational assistance to a pilot experiencing a grave emergency. Despite the stressful and time critical situation, their actions were sound and decisive, resulting in an exemplary level of service that clearly extended above and beyond the call of duty. ◆

Captain Miller and Master Corporal Moss continue to serve at 19 Wing Comox.

National Defence Défense nationale

The time it takes

ONE

... **LIFETIME** to become a safe technician

... **YEAR** to receive a Flight Safety award

... **MONTH** to implement a Unit Flight Safety Program

... **WEEK** to carry out a formal Flight Safety survey

... **DAY** to conduct Flight Safety training

... **HOUR** to hold a Flight Safety briefing

... **MINUTE** to read a Flight Safety poster

FLIGHT SAFETY SÉCURITÉ DES VOLS

ONE SECOND to destroy all of the above through a FLIGHT SAFETY ACCIDENT

Art Direction: ADM (PA) Director Marketing and Creative Services CS04-0523

Canada