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Flight Comment

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Canada

Director of Flight Safety Views on Flight Safety

By Colonel Chris Shelley, Director of Flight Safety

There is said to be an ancient Chinese curse: "May you live in interesting times!" It seems to me that for the Canadian Forces, times are getting more and more interesting every day. Our flying operations face ever increasing challenges, as our operational tempo remains high and new demands appear almost daily. Procurement programs for new capabilities have been announced and some of these are likely to be introduced to the flight line with a rapidity not seen since the 1950s. As if all that were not enough, the air force's direct support to operational theatres, such as Afghanistan, is very likely to increase. While Canada has never been a neutral country, it has been quite a while since we have been so overtly engaged on the international scene, and there can be no doubt that Canadian airpower will figure more and more prominently in upcoming combat and security operations. The challenge this poses for the flight safety program is to continue to contribute effectively to force protection and mission accomplishment.

Some might question the utility of flight safety as we become more involved in direct support to combat operations, or indeed, in combat operations proper. This is certainly an area that I want to address, because there could possibly be some misconceptions out there about the role flight safety should play. What is the perception at the coalface? Am I going to find myself in the situation of the US Army's Director of Army Safety, who was told by a front-line trooper in Iraq that, "we need to start [fixing things] by disbanding the Safety Center!" If flight safety were to be seen as a barrier to mission accomplishment, then we would have gotten something wrong, somewhere.

The purpose of the Canadian Forces' Flight Safety program is to prevent accidental loss of aviation resources. Period. This very simple and direct statement makes no distinction between wartime and peacetime. No matter the situation, the purpose of the program does not change. The flight safety program is not a peacetime construct; rather, it exists to ensure that combat capability will be available to accomplish future missions, and this remains true in peace or in war. Consider this: in every war where air power has been employed, accidental losses have exceeded combat losses by a very wide margin. To take a recent example, do you realize that from 2002 through 2005, the US Army lost 24 aircraft to hostile action, while losing 94 due to accidents? That's a lot of airpower no longer available for the fight! Seen in this light, an active flight safety program is a vital force protection measure that no commander can do without.

Force protection — it is not a new concept. In July 1942, the Accident Investigation Manual used by the RCAF stated that the purpose of accident investigation was, "to reduce the wastage of personnel and material by careful examination of all the contributory causes." Sound familiar? However, progress was slow. As Group Captain R.D. Schultz (the first DFS of the unified CF) put it; flight safety "was set back (or worse) with the beginning of the Korean conflict and the very rapid build up of the air force." All the bad aspects of "press-on regardless" attitudes crept back in and in fact some new unproductive but deadly wrinkles were added." In other words, a cavalier approach to taking risk, born of a fatalistic wartime experience, imbued the culture of the RCAF in the early 1950s. The command structure of the air force realized that things had to change, that the air force could not survive its unacceptable loss rate, and so started us on the path that led to the flight safety program we have today.

Certainly, for Canada's air force, flying in challenging operational conditions is nothing new. Whatever our aircraft type or community, we have all had to accomplish difficult missions in the face of known and unknown risks. More and more, we have taken a deliberate and reasoned approach to managing the risks of flight operations, and it has paid off. As the operational challenge increases, the key to avoiding unnecessary losses will be in managing the risks appropriately to the situation, and ensuring that risks are consciously accepted at the appropriate level of command. The flight safety program can play a greater part in giving you the tools to do that, but my sense is that we have to do some further work before we can realize our full potential for force protection. I think the journey towards that goal is going to be interesting, and not just in the ancient Chinese sense.

May you live in interesting times, and survive to talk about them!

Strive for perfection and cope well with what reality deals out. ◆

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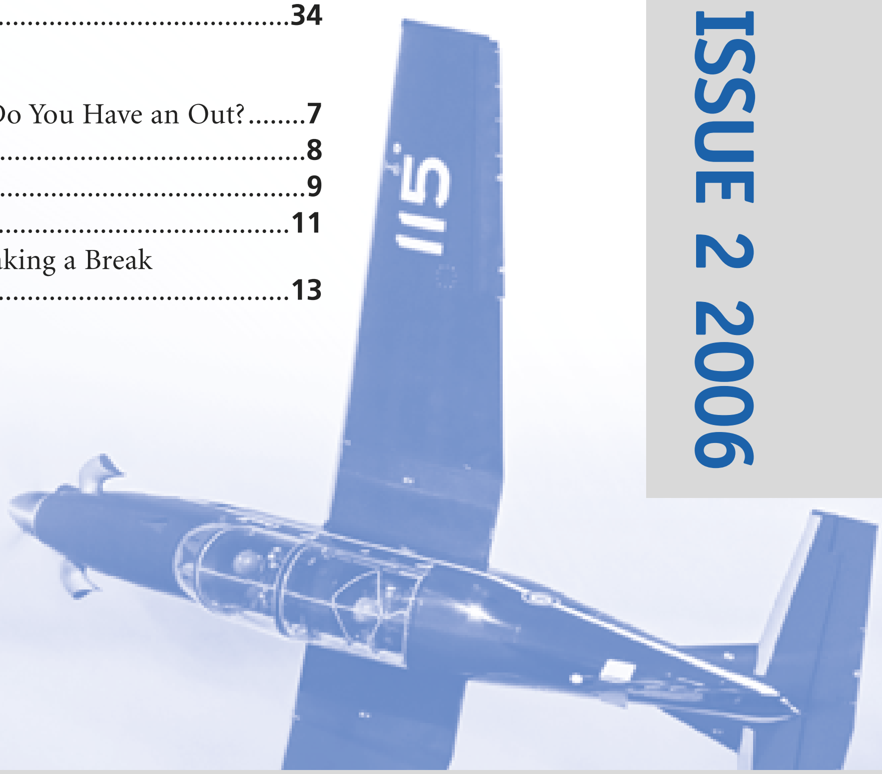

Cover Page:
Pilot training on the *Harvard* near Moose Jaw.

Photo: Ken Lin, www.aviography.com

DIRECTORATE OF FLIGHT SAFETY

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Good Show

For Excellence in Flight Safety

Corporal Jamie Jordan

In June 2005 Corporal Jordan was working on an ASE snag found during a post periodic inspection test flight of *Sea King* CH124A440. Corporal Jordan was tasked to carry out a basic flight control rigging check in preparation for AVS technicians to check the automated flight control computer system.

During the installation of the flight control rigging pins he encountered significant resistance while inserting a rigging pin through the mixing unit. Closer examination revealed that the mixing unit, which is mounted laterally, was able to move well beyond tolerance from side to side on its shaft. Corporal Jordan informed his supervisor of the find. With a maintenance test flight crew, the supervisor tested the unit but could not duplicate the snag.

Still concerned there was a problem, Corporal Jordan convinced his supervisors to let him remove the mixing unit, even though this would delay a test flight a further three days. With the unit removed, the two main bearings supporting the mixing unit's lateral shaft were found unstaked, worn and able to move within their own flanges. The severe deterioration of the bearings permitted the mixing unit to tilt internally thus giving the impression that it was operating within normal parameters and thus disguising the fault.

The mixing unit is a critical component of the helicopter. Ten flight control rods and nine bell cranks are all mounted on the mixing unit's lateral shaft. Through these rods and cranks the unit integrates collective pitch control movements with the lateral, fore-and-aft and directional system inputs and allows the controls to move the main rotor head primary servo cylinders simultaneously in the same direction and to change the pitch on the rotary rudder blades.

Corporal Jordan's, technical ability, steadfast determination, and unwavering tenacity resulted in the detection and elimination of what could have developed into a catastrophic flight control failure. In the face of operational pressures and the apparent serviceability of the part, Corporal Jordan persisted. Trusting his instincts and training he ensured the serviceability of a critical flight control component and, in so doing, ensured the safety of an aircraft and those who would fly in it. ◆

Corporal Jamie Jordan is an aviation technician serving with 12 Air Maintenance Squadron, 12 Wing Shearwater.

Good Show

For Excellence in Flight Safety

Corporal Christopher Bonnier

During a routine post flight discussion, Corporal Bonnier, a new Aviation Systems journeyman employed at first line CC-115 *Buffalo* maintenance at 19 Wing Comox, learned of a possible navigational systems anomaly. With the bearing pointer source selected to GPS, the track bar was also displaying GPS data no matter what the equipment setting. The result would leave aircrew believing they were getting track bar data from VOR/ILS receivers, an authorized precision approach aid, when in fact they would be receiving data from the GPS that is not certified or flight checked for precision approaches. At the time, the crew were not certain the observation constituted an unserviceablility and the matter could have been dropped at that point.

On his own initiative, Corporal Bonnier researched the schematics of the system, liaised further with aircrew and instructors on the Buffalo Technical Training Flight and eventually uncovered a design problem in a junction box that generated the extremely hazardous functionality observed. He immediately raised an unsatisfactory condition report and notified the chain of command of the possible risks. An aircrew information file was circulated and crews were briefed.

Upon receiving the report, avionics subject matter experts visited Comox to research the problem. By that time, Corporal Bonnier had already determined what modifications were required and he demonstrated both the problem and the fix to the avionics team. His proposed changes were released as a fleet modification instruction and were adopted fleet wide within three months of the first report.

Corporal Bonnier demonstrated outstanding technical knowledge and determination in addressing a fault that would result in *Buffalo* aircrew flying approaches with incorrect, uncertified navigational information. His find and fix with respect to the CC-115 navigation suite, prevented what would have undoubtedly been a catastrophic flight safety occurrence. ◆

Corporal Christopher Bonnier is an aviation technician serving at 442 Transport and Rescue Squadron, 19 Wing Comox.

From the **Flight Surgeon**

Errare Humanum Est
or Human Factors 101

By Major Martin Clavet, Flight Surgeon, Directorate of Flight Safety

Fact: In this day and age, when asked: "In your opinion, what would you say caused or contributed to this accident?", more often than not aircrew and ground crew alike, as well as witnesses, stakeholders or outside observers, still throw on the table, often without hesitation, the archaic expression: "Pilot Error"!

It must be "Pilot Error"

Errare humanum est. To err is human. That is a fact of life, and it will not change in the near future. All right then, let's pack our things and go home. The pilot was flying, and the aircraft crashed. So it must be "Pilot Error". Or is it?

Yes, human error continues to plague modern aviation, both military and civilian. Yet, simply writing off aviation mishaps as "Pilot Error", or even "Technician Error" or "Controller Error", is a simplistic, if not naive, approach to mishap causation. Mishaps cannot be attributed to a single cause, or in most instances, even a single individual. Rather, accidents are the end result of a myriad of latent and active failures, the overall cause factors.

"Personnel" as cause factor

A cause factor could be defined as being any event, condition, or circumstance the presence or absence of which, within reason, increases the likelihood of a flight safety occurrence. If we refine it a little more, looking at "personnel" cause factors, as opposed to material or environmental cause factors, is looking a "Human Factors" per se.

When an accident or unsafe condition involves personnel, the study of "Human Factors" comes into play and has shown that there are two general categories for the causes associated with the situation. These categories are referred to as "active" and "latent" causes. Flight Safety investigations need to identify both the active and latent causes for occurrences and hazards so that effective preventive measures can be implemented to reduce the likelihood of recurrence.

"Active" and "latent" causes

Active failures (or causes) are errors, events or conditions directly related to the occurrence. Usually active causes are the last action leading to the condition or act. They are traditionally referred to as "Pilot Error" or something similar, i.e. the so-called "unsafe acts" committed last by individuals, often with immediate and tragic consequences.

Latent failures (or causes) are, on the other hand, events, circumstances or errors associated with the individuals, or conditions present anywhere in the supervisory chain of command or the system of management of the individuals, which predispose to the tragic sequence of events characteristic of an accident. For example, it is not difficult to understand how tasking crews at the expense of quality crew rest, can lead to fatigue and ultimately errors (active failures) in the cockpit. Viewed from this perspective then, the "unsafe acts" of aircrew are the end result of a chain of causes originating in other parts (often the upper echelons) of the organization. Latent causes contribute to the final sequence of events of the occurrence or hazard by predisposing it to happen. Though they are not the direct cause, they can have as much of an impact on the negative outcome as the direct cause, or active failure. The problem is that these latent failures may lie dormant or undetected for hours, days, weeks, or longer until one day an "unsafe act" occurs or an "unsafe condition" is recognized, which can bite the individual who then makes the active failure.

Looking at the "Human Factor" causal model as a whole, it can be seen that active cause factors can be the end product of a long chain, the roots of which originate in other parts of the organization (latent causes). For instance, latent failures such as fatigue, complacency, illness, and the loss of situational awareness (SA) all effect performance but can be easily overlooked. Likewise, supervisory practices can promote unsafe conditions within operators and ultimately unsafe acts will occur.

But the idea is not to stop at the supervisory level either, the organization itself can impact performance at all levels. For instance, funding could be cut and as a result training and flight time is restrained. Supervisors are therefore left with tasking "less-proficient" aircrew with, sometimes, complex missions. Not surprisingly, causal factors such as task saturation and the loss of SA will begin to appear and consequently performance in the cockpit will suffer. As such, causal factors at all levels must be addressed if any mishap investigation and prevention system is going to work.

The purpose of flight safety investigations is to identify these active and latent failures in order to understand why the mishap occurred and how it might be prevented from happening again in the future. The goal is to prevent future accidents through the careful determination of cause and the formulation of recommended preventive measures to mitigate the active and latent failures.

Going back to this "Human Factors" thing…

Human Factors means a variety of things to a variety of people. A human engineer might tell you it has to do with crew station design an anthropometry. A physiologist might emphasize the effects of flight, such as altitude, cold, acceleration or movements along a 3-axis reference system, on bodily processes. A psychologist might tell you that Human Factors has to do with information processing, emotion and motivation. A sociologist will tell you that it concerns personality, life event stresses and social relationships. A life support specialist might emphasize egress systems and life support equipment. In fact, Human Factors includes all that, and even more, which affects human behaviour.

In relation to the Human Factor aspects of aircraft accidents, this suggests that so-called "Pilot Error" accidents can be described, if not explained, in terms of anomalies or deficiencies within one or more of these categories of attributes.

A comprehensive study of Human Factors would therefore include the physical, physiological, psychological, psychosocial and pathological attributes of humans in the context of their influence on the interface of the human with the environment.

The environment includes here factors external to the person that determine or modify human behaviour. It also includes the total organizational system design to prepare the person to cope with the external demands.

The interface of the human with the environment consists of the crucial human and environment interactions that proved to be incompatible and ended in an accident.

Wisdom at last…

Statistics suggest that the greatest single cause of aircraft accidents and incidents is human failure. The human is present at all levels where flight safety is concerned: in the aircraft, on the flight line, in the control tower… even at decision-making level in the office. The key role that the human plays explains why the Human Factor, not the "Pilot Error", by itself or in combination with other factors, is present in as much as 80% of air accidents (if not 100%!). Numbers do obviously depend on the statistical source and how one looks at things; nonetheless, they are huge and cannot be overlooked.

To minimize the reality, importance and salient role that Human Factors have in the investigation of aircraft accidents by the simplistic expression "Pilot Error" would be not only fallacious but also missing the point.

Errare humanum est. To err is human. And one would err if one kept referring to "Pilot Error" as the all inclusive bin into which we could shove anything that goes wrong on the human side of the house when aircraft accidents and tragedy occur. ◆

On One Hand…
On The Other Hand…

Do You Have an Out?

By Captain Scott Young,
423 Maritime Helicopter Squadron,
12 Wing Shearwater

Life is about choices and so is the aviation business. Making a bad choice usually has a bad outcome. Here's the story of my fork in the road.

In the spring of 2005 I was attached to a *Sea King* HelAirDet operating with multiple warships off the coast of Norfolk, Virginia. It was about 45 minutes to official night and very hazy. The forecast called for clear skies with a slight chance of patchy fog near the coast. Our position at the time was 135 miles from Oceana, Virginia.

The sortie began with a passenger transfer from our Destroyer (DDH) to a Frigate (FFH) about 18 miles away. After leaving the FFH we flew 20 miles to the South to conduct a preplanned anti-submarine warfare serial with a French sub. After 30 minutes of ping time on the sub, and while in the hover at 40 feet, we noticed the ceiling coming down. We called our DDH and asked for the latest actual. Our first call was unanswered. We decided to break dip and climb a little for better line-of-sight reception. We called again regarding the weather at the ship. The answer this time was "Standby". As we believed the DDH to be only 25 miles or 15 minutes away we not concerned about the reduced ceiling. Five minutes later the DDH called back "The ship is looking for better weather". With 40 minutes of fuel, fog forming at a rapid rate, the sun starting to set, 135 miles from shore, and our ship in the clag the temperature in the helo suddenly felt warmer.

The next radio call came from our Commanding Officer on the DDH who wanted us to return to the ship. That was it; we were heading back to the DDH hoping that they would find weather good enough for recovery. Or was that it? Was that our only choice? While we waited for word that the DDH had found clear air we thought about other options, other choices. We knew that the FFH that we had done the transfer to was approximately 20 miles to our North. We called them for a weather sitrep and they reported a 500-foot ceiling with 10 miles visibility, but dropping. We were at the fork! There was a choice and we had to make one. Our options were dwindling fast. We realized that we may not find our DDH in the fog, and if we did, it would probably require a below limits approach to the ship — essentially an emergency procedure. With that in mind we opted for the FFH. We'd get fuel and then go look for our DDH.

After we fuelled up on the FFH, we departed and hit a solid wall of fog. Not only that, but it was getting dark. We called our DDH for a position report and found out that they were not 25 miles away as previously thought, but 68 miles away and still looking for better weather. Thirty minutes later with about 5 minutes of daylight left, we broke out of the fog just in time to see our DDH also break out of fog. Three minutes after setting down night arrived and so did the fog — it lasted for 3 days with 50 yards of visibility.

As the aircraft captain, straying from the direction of the CO, I believed that I would be reprimanded for my choice. I was not reprimanded, instead the crew and I were congratulated for having found another option and for choosing it. I shudder to think what would have happened if we had gone with option one.

Often life points you in one direction and we obediently head that way, but this lesson taught me to seek out choice, to consider what life readily offers and to also root around for the less apparent. When the road ahead looks bumpy don't just slow down, look around for detours or alternate routes. You do have an out! ◆

Photo: Sergeant Dennis Power

We Can Land ANYWHERE!

By Captain Marcel Rochat, 403 Squadron, Canadian Forces Base Gagetown

Anyone remember the *Twin Huey*? Well I do and I won't forget this lesson. With the many new pilots that are being trained yearly as Tac Hel aviators this story could apply to just about any new OTU grad.

I was on a cross-country trainer to the Maritimes. We had a combined mission — compassionate — due to an illness in the family, we were flying a squadron member home for a couple of days and — training — operating in a new and unfamiliar area we would practice some of the skills recently taught on OTU.

After an easy first day we arrived in the Gaspe area. With our compassionate passenger delivered home and a good night's rest it was down to business. For the next two days we would do some IFR training and some night flying before returning to pick up our passenger for the ride home.

It was a nice sunny September morning and we were enjoying our flight along the Gaspe coastline. We spotted a sizeable rock up ahead and decided to try and land on it.

I was new, wet behind the ears. I thought to myself, we must do this all the time, we're in a helicopter, this is thrilling — we can land **anywhere**!

Now, looking back, there were a couple of clues that it probably wasn't the best move:

There was a blue duck symbol (bird sanctuary) on the chart that corresponded with the location of the rock.

On short final there were four hundred or so birds lifting off to get out of our way.

It was a really cool rock — if you're ever out that way it is called Roche Perce — a well-known, well-advertised bird watching location. As a matter of fact, the tour boat operator who was pointing out the various species to his bird enthusiasts was now pointing at us.

When we got back to Base we found out (okay it was pointed out) that the Squadron had some very specific regulations regarding off-airfield landings and combined with that bird sanctuary thing, that we had broken a few rules in landing on that cool rock. We suffered a few minor punishments and some bruised egos, but the lessons remain fresh:

- If you're new, don't be afraid to ask a question or two or; don't be afraid to point out the chart notations or; don't be afraid to point out the thousand or so birds.
- If you're going somewhere new, plan ahead, read the charts, pick up a brochure?
- Know the Squadron's procedures and regulations.
- Don't bird watch in a helicopter. ◆

FLYING with the LEANS

By Captain Gerhard Proksch, CANSOFCOM, Canadian Forces Base Petawawa

Basic instrument flying saved my life! Without it I wouldn't be the old pilot I am today, telling you this story. Though it occurred a long time ago, I believe it to be of value regardless of what aircraft type you fly.

The task for the day was to fly to England to pick up one of our aircraft that had been left there for repairs. We were to fly down in one and return in formation with both. As usual the weather was poor, in other words, we would be IMC for the majority of the transit and would be doing instrument approaches for landing — no big deal! I was very comfortable flying in IMC, and in formation, and having done that many times before, wasn't at all concerned with combining the two. The flight to England was uneventful even though the weather was down to minimums. Before heading back to Germany we had the standard formation briefing, including all the contingencies given the IFR weather for the day. I was "on the wing" so I didn't feel it necessary to clutter up the cockpit with charts and pubs, after all, I was plenty familiar with home base. It was to be a 75-minute flight. The take-off and enroute portion were uneventful, but after an hour IMC and in close formation, I could have used a break. I was looking forward to getting on the ground.

We were cleared for the HI-TACAN approach, which I knew would require a long level turn to the right to reach the initial approach fix, followed by a short descending straight portion and then another long descending turn to the left onto final. After this snaking we would then configure for landing and complete the final approach. The weather was down to limits again. We started the first turn, no problem, but then I expected the straight portion before starting the left turn — why was my lead turning left so soon? I crosschecked my attitude indicator (AI) and that was when I realized I had a problem! I had a case of "the leans"! We were in fact wings level, but I felt as if I was in a steep turn to the left. My internal gyros must have toppled during the roll out, but who cares, right then I needed to get my brain "caged" again. I had heard about, and actually felt this sensation before, and I knew that all I had to do was take a few more peeks at my AI and I would be OK. Right then we must have started the left turn onto final because the sensations I was feeling got worse. I tried to tell myself not to worry about it, I have been in close formation nearly upside down and I've never had a problem with that, in fact, I enjoyed it. The sensation seemed to subside slightly, I took a peek inside and we were now level on the AI, but I still felt like we were in a 90-degree turn to the left. It occurred to me that we would soon be selecting gear down, followed immediately by the flaps down selection — both of which I had never done while in a 90-degree bank turn. I started to perspire and a sense of panic began to well up. To stay in formation my control inputs were getting more and more erratic. I had a decision to make, stay on my lead's wing for the landing and risk a possible mid-air, or break away to sort things out on my own? I'm not sure how I made the decision, but I made one and what occurred after that, words cannot completely describe. Remember the formation was in fact wings level when I initiated the break away and I had put myself in a real unusual, nose low attitude in IMC with severe "leans". I remember hearing my voice inside my helmet coaching me to believe and trust the instruments and to ignore what my senses were telling me. I did eventually recover, talk to ATC, and get vectors for a PAR approach and landing.

This is where I thank God and my instrument flight instructors in Moose Jaw for drilling into me the "Centralize, Analyze, Recover" and all the other basic instrument flight crosscheck skills which I had to call upon. Even now, with 6000 hours, I look back and this still ranks as the most significant emotional (near-death) experience of my career.

Here are the take-aways:

- If IMC and you really don't have to fly in formation for extended periods of time — don't.
- Always have your charts & pubs readily available even if you don't expect to need them. I recall not being able to pull the approach plate out of my pocket while I was fighting to keep the wings level. Fortunately for me, the PAR approach was available.
- Swallow your pride and communicate to your lead that you are experiencing a problem.
- You may fly by the seat of your pants some of the time, but you must trust your instruments all of the time.
- Near-death experiences never heal completely — try not to have one.
- Just because its never happened to you doesn't mean that it never will. ◆

Thumbs UP

A Lesson in Hoist Safety

By Captain Yves Soulard, Canadian Forces Air Navigation School, Winnipeg

March fifth 2002, I'm on the operating table in Guam waiting for a doctor to reattach my right thumb. My right hand is my dominant hand but the only thing I can think about is the accident that lead me here.

Six hours earlier, 300 nautical miles East of Guam, our *Sea King* lifted off HMCS Ottawa to conduct a routine diver deployment with three of the ships divers. We had briefed the crew and the divers and everyone was straight on the who and what of the mission.

Everything was going as per the plan. It was my turn to be harness man and be lowered into the water to retrieve the divers. Once in the water I proceeded to hook up the first diver. No real difficulty, but there was a noticeable sea swell which forced the hoist operator to leave me 10 to 15 feet of slack on the hoist. Once I finished putting the horse collar around the diver, who was over six feet tall and weight about 250 pounds, I gave the signal to raise by patting my head. At that point, the hoist operator started to raise the hoist, but with so much cable in the water I didn't realize we were being reeled in, so I signalled again but used the thumbs up — it means the same thing. What I failed to notice was that I had just stuck my thumb in a loop that was about to close. Before I could react, the cable cinched around my thumb. My weight, the weight of the diver and all the gear was now bearing on my thumb. I could feel the cable cutting through my thumb. I attempted to wave off the hoist but failed. Seconds later, the cable ripped my glove and my thumb from my right hand. I remember briefly falling back into the water and looking for my thumb but I couldn't see it. The hoist operator knew that that something had gone terribly wrong, but the only thing he could do was to hoist the diver and I back into the *Sea King*. As we re-entered the helicopter I remember seeing the hoist operator's face turn from a healthy pink to a sickly green. It's about at that time that I started to feel the pain.

My thumb was gone and there was no way to recover it; I knew that was bad. It also occurred to me that we were in the middle of nowhere; I knew that was bad too. I wasn't having a great day! But to the credit of my crew and the ship's company, they settled me down and had me on a medevac to Guam within 45 minutes of the accident. That's when things started to look up. As they were loading me on the helo someone told me that they had my severed thumb. I thought that I must have misunderstood, but then they

showed it to me. It was a thumb, and I was missing one, so it seemed like a good match. Apparently, when my glove came off, it fell right beside the diver I was hoisting. Not knowing that my thumb was inside, he picked it up figuring that I would need it later — little did he know how true that innocent thought was! When he got back into the helo, he noticed something fall from the glove. It was my thumb, the one I had misplaced only a few short moments ago.

The operation was a success. The doctor, who happened to be a hand surgeon, managed to reattach my little friend — it's a little shorter than before. Physiotherapy followed and I was able to regain my full category within 2 months of the accident and to resume full flying duties. Since that time, when hoisting I signal by patting my head. ◆

The Editor's Corner

What's New Pussycat?

I have a lot of explaining to do with respect to *Flight Comment*:

What happened to the Winter 2006 issue? — In the Fall 2005 Issue I lamented my inability to align the issues with the seasons and proposed a government intervention to realign the seasons to correspond to my lack of time appreciation. Well no response, but thankfully global warming saved the day and winter was cancelled here in Canada — alas no winter — no winter issue.

What happened to the Spring and Summer issues? — Seasonal adjustment disorder (SAD). With the cancellation of winter we slipped into a long dreary period of rain, drizzle and fog. With the resultant vitamin D deficiency I just couldn't motivate myself — alas no energy, no interest — no Spring issue. As for Summer issue, who cares, everyone went on vacation!

With this kind of chaos, i.e., global warming, climate change, SAD, an unprecedented rise in the Canadian dollar, etc changes were necessary:

- **We are only producing three, instead of four, issues of *Flight Comment* annually.**
- **If I can locate the content, the issues will be larger.**
- **The magazine is now full colour.**
- **A great column, *On the Dials*, has been resurrected by the Instrument Check Pilot Flight. Part II of their first article on NOTAMS appears in this issue.**
- **We have a new DFS. He's #1, so I put him on page one. Hopefully this will help my evaluation!**
- **The Table of Contents moved to page 2.**
- **New banners for the *From the Flight Surgeon* and the *On the Dials* articles.**
- **The price per issue has increased, but the annual subscription remains at the same low price.**
- **Each Good Show award has its own page.**

This list is not exhaustive, so keep your eyes peeled for other tweaking.

Ultimately, the goal is to produce a top quality flight safety publication that provides those in the business of aviation with the tools and lessons to fly safe. You are cordially invited to contribute to this endeavour. Our website has a survey that solicits your opinions on *Flight Comment*, Debriefing, the website itself, etc. Fill it in at: http://www.airforce.forces.ca/dfs/docs/home/new_e.asp. With readers in at least forty countries I think that there's lots we can learn from each other. ◆

Fly safe.

Hoping for a Break is NOT as Good as Making a Break

A LESSON IN TIMELY DECISION MAKING

By Captain Theodoros Foulidis, Regional Cadet Support Unit, St-Jean

It was a long September weekend; our mission was to transit 2 gliders on tow with 2 tow planes north to provide some local familiarization flying to some northern cadet squadrons. We would depart St-Jean, PQ enroute to Mont-Laurier, PQ. Standard stuff, as with every pre-flight, we crew briefed the trip including weather and in this case a transit check for a junior instructor. As the more senior instructor, I was conducting the check ride-out from the second glider.

We strapped in and the two formations took off expecting a total trip time of about 2.5 hours. About one hour in we encountered rain showers that had moved in sooner than predicted. We quickly diverted to a familiar enroute airport from which we could still achieve the mission of providing cadets with some familiarization flying. Our flight lead, in the tow plane, called up the Flight Service Station and got another weather briefing which called for nicer weather in a few hours. With that window of hope we decided to sit it out there and re-evaluate the situation in a couple of hours.

The weatherman was right and it cleared, but another update showed some TCU's in the forecast. We talked it over and decided to continue north. To avoid turbulence below the developing clouds, we flew at 9500 to 10000 feet throughout the flight. As we approached our destination, or more precisely about 20 miles out, a scattered cloud layer below us was beginning to be not so scattered. We talked that out and, as the weather was supposed to be scattered over Mont Laurier, we decided to press on. As we got closer, all the holes filled in and now we had a solid

layer of overcast below us. Pushing into 40 knot headwinds we pressed on hoping for some breaks overhead the airfield. The tow planes, using their onboard GPS, let us know that we were overhead destination but there were no holes, no breaks, we couldn't get down!

As we circled we realized that we had become a tow plane/glider two layers and the weather was closing in on us from the top and the bottom! With dwindling options, we decided to head back home to St-Jean, but before we turned the lead formation inadvertently entered cloud at 8500 feet and the glider released. The lead tow plane descended and broke out at 4000 feet. We, the second formation, circled overhead awaited word from the released glider. A few silent, scary minutes passed before they radioed breaking out at 4000 feet and then declaring that they had landed.

After holding our breaths for the drama of friends and colleagues making a 4500 foot descent through cloud we returned to focus on our situation. We realized that we were now tight for fuel for the trip home and there were no options in between. As a crew, we decided that we too would release and make the descent through the layer…

I've written this story so the outcome was positive, but for 30-40 minutes of what seemed like a perfect start to a long weekend in September I wasn't so sure. Neither of us realized that we were heading ourselves down a dead end path, neither of us fully perceived the threat that the weather posed that day, and neither of us wanted to end the mission before accomplishment as long as there was hope that we could make it. From that day forward, I decided not to hope for or count on a break in life, I decided I would make my own breaks! ◆

Photo: Captain Brian Cole

On the Dials

NOTAMs: Do You Really Have Them All? (Part 2)

Information for IFR Flight

By Major Kevin McGowan, United States Air Force exchange officer, Central Flying School, 17 Wing Winnipeg

In the last issue of "On the Dials", we began to investigate just what exactly was involved with checking "All the NOTAMs". More particularly we focused on what the purpose of NOTAMs were followed by a more in depth discussion of aerodrome, enroute, vendor, and database NOTAMs. Part 2 of "NOTAMs, Do you really have them all?" takes your NOTAM search to the next level as we focus more on tackling geographic regional NOTAMs and the intimidating U.S. NOTAM system nuances. More to the point, what are ASHTAMs, Attention Notices, Temporary Flight Restrictions, Special Notices, and the very elusive "Notice To Airman Publication".

On December 15th, 1989, a KLM Boeing 747-400 descending for landing in Anchorage, Alaska, was about 70 nm north of the city and entered a light cloud while descending through FL260. Shortly thereafter things got dark and the cloud started to sparkle "like fire-flies in the dark". The Captain ordered a climb to get out of the cloud but shortly after climb power was added and the aircraft began it's climb, all four engines quit. The aircraft stall warning and stick shaker followed shortly thereafter and all airspeed indications were lost. The aircraft had inadvertently flown through a volcanic ash cloud from Mt. Redoubt, a volcano about 120 miles southwest of Anchorage, which in turn had failed all four engines and caused approximately $80 million worth of damage.

Volcanic Ash Advisories/ NOTAMs (ASHTAMs):

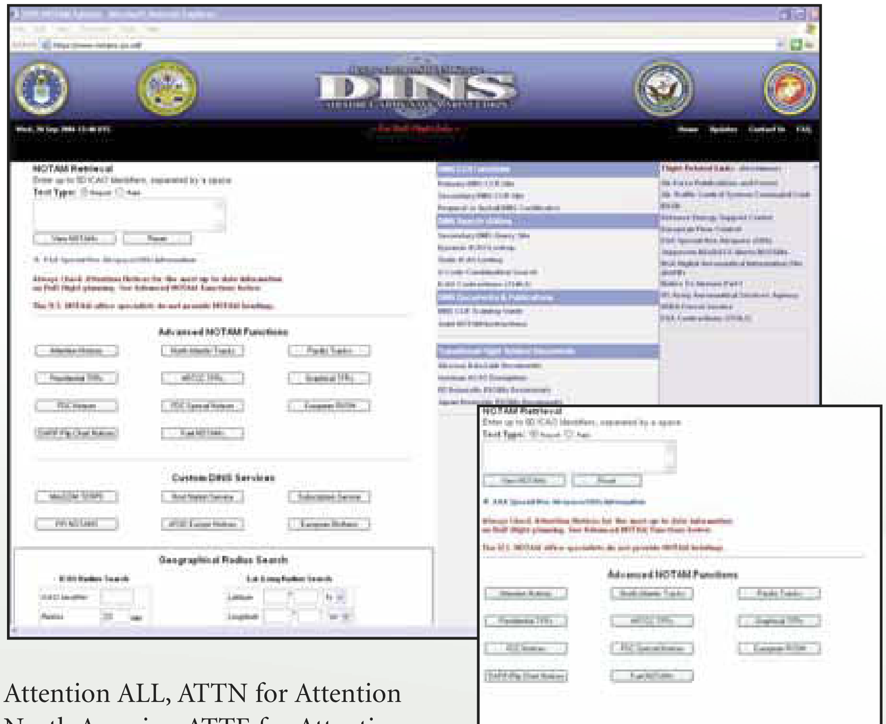
As many pilots have found, volcanic ash can have catastrophic effects on an aircraft. While volcanic ash may appear soft and fluffy, it is in fact very abrasive and flying through it can have similar effects to sandblasting your aircraft. In addition to clogging and ultimately failing engines, volcanic ash has been known to clog ports (including pitot-static tubes), glaze cockpit windows, damage flight control surfaces, and wreck havoc with aircraft environmental and electrical systems.

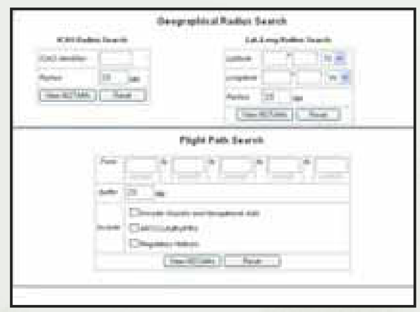
Ok, so who would intentionally fly through a volcanic ash cloud? Well, during day VMC you might be able to see the plum of smoke and ash spewing from the volcano but did you know that that same ash can be carried hundreds of miles by the winds aloft and can even be embedded in regular clouds. And to make matters worse, volcanic ash clouds are not picked up on normal radar scopes so you may not even know you're flying in an ash cloud until it's too late.

So, how do you avoid such a deadly menace? Aside from visually avoiding these clouds, the best option is to check the Volcanic Ash NOTAMs (ASHTAMs).

Since 1995, nine volcanic observatories have been monitoring volcanic activities worldwide. This information is then made available to aircrew through the ASHTAM advisory system. One such advisory source is the U.S. National Oceanic & Atmospheric Administration volcanic activity website, http://www.ssd.noaa.gov/VAAC/, where worldwide volcanic ash advisories and related materials are posted. On the other hand, if you're one of the many pilots who never leave Canada, then you can click on the "Volcanic Ash" button found on the NavCanada NOTAM website (http://www.flightplanning.navcanada.ca/) and get the ASHTAMs that may affect your flight here in Canada.

With this being said, do you need to add an ASHTAM check to your daily pre-flight routine? No, probably not, especially if you're not flying anywhere near any volcanoes. But then if this check is not part of your regular pre-flight routine, you may want to add it to your pre-flight checklist for when you're away from home station.





Attention Notices:

Attention Notices are deemed pertinent to operations within certain regions of the globe but often tend to be overlooked by most aviators. Included in these NOTAMs might be region-wide announcements (such as new regional procedures, no-fly zones, and shoot down areas, etc.) that don't really apply to a specific ARTCC and are thus not included in the normal ARTCC or enroute NOTAMs.

Excerpt from DoD ATTE and ATTP Notices

Oftentimes, there aren't very many NOTAMs in this file and there probably won't be anything of value, but you never know. Just click on the "Attention Notices" button on the DoD NOTAM website's main page (https://www.notams.jcs.mil/) or type in the specific designator for the region you want (ATTA for Attention ALL, ATTN for Attention North America, ATTE for Attention Europe, ATTP for Attention Pacific, and ATTC for Attention Central/South America) in the ICAO NOTAM Retrieval Form.

Temporary Flight Restrictions and Special Notices:

Here's where it starts getting complicated as it deals with the U.S. NOTAM system. We've all heard the phrase, "information is power", well, the U.S. takes this to the extreme and provides so much information that it can be intimidating. As a result, many pilots choose to avoid these pages and pages of NOTAMs and then hope for the best. Unfortunately, many pilots, especially those operating under VFR within U.S. airspace discover all too late that this course of action can lead to not only violations but also incarceration, loss of aircraft, loss of aeronautical ratings, and under extreme cases, being shot down. The FAA takes it's airspace and procedures very seriously and they expect all pilots operating aircraft within this airspace to be aware of their rules (something that is actually required by ICAO regulations).

So, now that I've gotten your attention, what are Temporary Flight Restrictions (TFRs) and Special Notices and how do I proceed from here? Well, for starters, get the Flight Data Center (FDC) NOTAMs. These are regulatory changes and advisories that have been issued and are kept on file until they're either cancelled or published in the FAR/AIM or Notice to Airmen Publication (NTAP). They include things like amendments to charts, temporary and combat zone flight restrictions, and certain changes to the Federal Aviation Regulations (FARs). These NOTAMs tend to be plentiful and rather dry reading. Although most of the stuff won't apply to your specific flight, there is a good chance that one or two little tidbits will. Legally, you're responsible for knowing these tidbits so be sure to include this in your NOTAM search. The FDC NOTAMs (including TFRs and Special Notices) can be obtained by asking the local Flight Service Station (FSS) for them via phone (800-WX-BRIEF while in the U.S. or 866-WX-BRIEF in Canada) or by clicking on the "FDC Notices" button on the main DoD NOTAM web page (https://www.notams.jcs.mil).

The Temporary Flight Restrictions (TFR's) are NOTAMs contained within the FDC and ARTCC NOTAMs that restrict flight over certain locations. These temporarily restricted airspaces are not printed on any chart so you'll have to transfer the NOTAM to your charts. Many of these areas are places where disaster clean up or fire fighting efforts are in progress. Many others are infrastructure, government, or military facilities that are included for national security reasons or airspace closure due to a Presidential or VIP visit.

Luckily, the TFRs are included in the NOTAMS you download for each ARTCC. They're also available by clicking on the "ARTCC TFRs" button (although this will give you ALL the TFRs for the U.S.) but they are not included in the FDC NOTAMs returned when you click on the "FDC Notices" button. You can also access a specific ARTCC's TFRs by using the "DINS ARTCC Notices, TFRs and Special Notice Page" located on the bottom of the main page. From here select "All Center Notices" or "TFRs Only", select the ARTCC(s) you want the notices for, and then click on the "View Notices" button. I would also recommend clicking on the "Include Regulatory Notices" option to ensure you don't forget these important NOTAMs. Either way, violating these restrictions might constitute a significant safety risk, possible interception by heavily armed combat aircraft, or the dreaded "Call this number when you land" radio call from ATC. Read and heed as it's not really worth the risk.

During your NOTAM search you're also bound to find Special Notices. Special Notices are also regulatory in nature but don't necessarily meet the criteria for a standard FDC or Facility NOTAM. These are typically new or modified procedures or restrictions, or the reissuing of previously published procedures or restrictions that the FAA wants to draw special attention to. These Notices will be spread out in each applicable section but mostly in the FDC NOTAM section.

Notice to Airmen Publication:

The NTAP is an elusive "catch-all" document that's published every 28 days. Unfortunately, due to budget cuts and advances in technology, you may only find this document online now and all pilots are responsible for complying with the contents. The NTAP is designed to contain NOTAMs that will be in effect for extended periods of time (at least 7 days past the expiration date of the NTAP it is published in) and to advertise future special airspace procedures around predicted high volume areas or special events. It's also meant to be a means of removing long running NOTAMs from the normal NOTAM system to reduce congestion without cancelling them. NOTAMs contained within this document tend to focus on flight within U.S. airspace but may include critical NOTAMs that may affect U.S. and foreign aircraft flying outside U.S. airspace that the FAA deems important enough to draw extra attention to.

Excerpt from NTAP International NOTAMs section

This document can be found through the FAA website (http://www.faa.gov/NTAP/) or through the DoD NOTAM website by clicking on the "Notice to Airmen Part 1" link on the right side of the page. Even though it says "Part I", it is in fact the entire document and is broken down into 7 sections:

1. General Information — Foreword and other NTAP Background Information
2. Special Events
3. Sporting Events
4. Part 1 — Airway; Airport/ Facilities/Procedural; and General FDC NOTAMs
5. Part 2 — Revisions to MEAs and Changeover Points
6. Part 3 — International Notices to Airman
7. Part 4 — Graphic Notices

Photo Copyright Juan Carlos Guerra Aviation Photography of Mexico

While the special and sporting events procedures/restrictions may be listed in the ARTCC NOTAMs when they go into effect, many of the Parts 1 to 4 items are not found anywhere else. For example, the International NOTAMs are notices that might affect your decision to operate in foreign airspace and will include procedural changes or even warnings from foreign governments.

The Graphic Notices section, on the other hand, focuses on U.S. airspace and is filled with a very wide assortment of need to know information (such as new airspace, new or modified procedures, navigation sources, airport lighting, etc.). If you haven't taken the time to read this section before now, I would highly recommend sitting down and reading through it… It doesn't take too long to check but it is one extra resource to devote some time to before stepping to go fly.

Oh, and by the way, if you call an FSS (1-800-WX-BRIEF) while in the U.S., you'll need to specifically request the NOTAMs from this publication as they won't typically give them to you right away. They won't give you the NOTAMs for Special IAPs that you may be certified to fly either unless you specifically request them. Also, if you attempt to call an FSS in Canada (1-866-WX-BRIEF) in preparation for your flight to the U.S., don't bother asking for the NOTAMs from the NTAP because they don't have access to it.

All right, so there you have it. Never knew how involved checking the NOTAMs really was, did you? I realize that this all sounds very intimidating and perhaps even restrictive but ARTCC expects you to know this information and they will hold you accountable if you violate it. Now granted, in most places we fly, we operate under IFR and ATC will keep us out of trouble… or will they? Are you willing to take that chance?

When it comes right down to it, completing a thorough NOTAM check isn't that hard. Run through it a couple of times to get it down to a routine and then it becomes just that, routine. In the end, while getting NOTAMs has become more difficult, it is no less important to the accomplishment of the mission. Mission Accomplishment, particularly in peacetime, includes getting everything and everyone to their destination in one piece. Fly Safe! ◆

This article (Parts 1 and 2), as well as many other IFR related articles written by the CF Instrument Check Pilot Flight Staff are available online at http://www.icpschool.com/track.html. Furthermore, extensive flight planning resources are available online at http://www.icpschool.com/planning.html.

HELICOPTER GROUND RESONANCE

By Curt Lewis and John H. Darbo

Ground resonance is one of the most dangerous situations a helicopter pilot can face. This emergency situation can result in the entire hull being ripped apart by the aircraft's own extreme oscillations. Ground resonance can be safely prevented, every pilot should know what the causes are, what to do if it does occur, and how to prevent an incident.

Photo: Master Corporal Charles Barber

Ground resonance develops when the rotor blades move out of phase with each other and cause the rotor disc to become unbalanced. Ground resonance only occurs on helicopters with a fully articulated rotor system such as the Chinook, TH-55, OH-6 and MD500. Go to this INTERNET site to see a CH-47 destroy itself in ground resonance: http://video.google.com/videoplay?docid=-7722389053980760993&pl=true

On a fully articulated system the individual rotor blades use a lead-lag hinge at the rotor hub to allow a blade to catch up or slow down along its path to be in sync with the other blades. The term "fully-articulated" means that the rotor head allows the blade to move in three independent planes. A horizontal hinge pin allows the blade to move up and down. This is known as "flapping". Components within the pitch varying housing allow the blade to rotate about its span (the distance from end-to-end). This is known as "feathering". A vertical hinge pin allows the blade to swing forward and aft with respect to rotor-head rotation. This is known as "leading and lagging" (hunting) . The vertical hinge pin has also been called the "drag hinge". *(see Figure 1)*

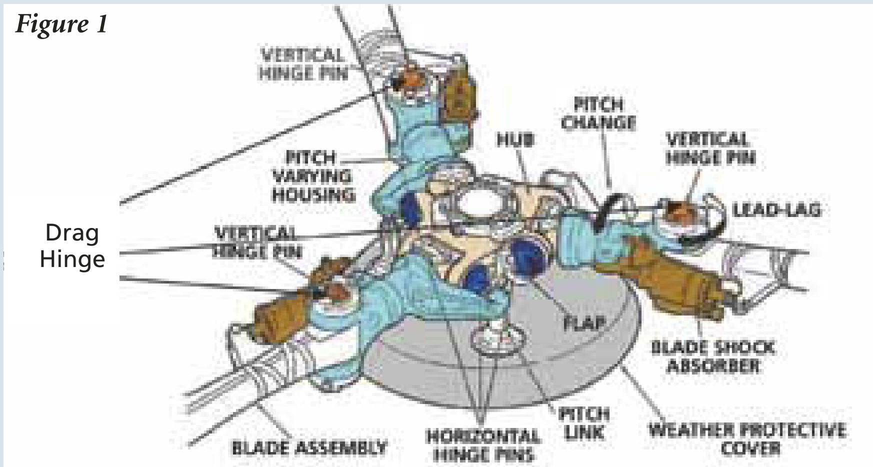


Figure 1

It is the drag hinge that allows any given pair of blades to either get closer to or farther away from each other. When the pair of blades get too close or too far away, the blades go out of sync and the balance of the entire rotor disk becomes off center. When they fall out of sync this creates oscillations within the aircraft. This is because the center of gravity of the main rotor, acting as a flywheel, is displaced from in line with the axis of rotation, or the main rotor shaft., causing a "wobble." In flight this causes no ill effect, however, if the skids or wheels are touching the

http://video.google.com/videoplay?docid=-7722389053980760993&pl=true

ground, especially lightly, the wobble becomes exaggerated. If the frequency of these oscillations matches the helicopter's natural frequency, then ground resonance occurs. As each oscillation occurs, within seconds the amplitude increases until the aircraft has a hull breach.

Many modern helicopters implement measures to prevent ground resonance. The U.S. Federal Aviation Administration defines ground resonance prevention as :

(a) The reliability of the means for preventing ground resonance must be shown either by analysis and tests, or reliable service experience, or by showing through analysis or tests that malfunction or failure of a single means will not cause ground resonance.

(b) The probable range of variations, during service, of the damping action of the ground resonance prevention means must be established and must be investigated during the test required by 14 CFR Sec. 27.241 (U S).

Common factors that may cause or aggravate ground resonance are:

- Unbalanced rotor head or blades
- Faulty blade tracking
- Damaged or malfunctioning lead-lag dampers
- Uneven oleo struts or tire pressures
- One-skid/wheel landing
- Hard landing or running takeoff/landing over rough ground
- Takeoff from, landing on or lightly touching, a pitching ship's deck

Being able to dampen the vibrations is the key to prevention. Implementation of shock struts, lead lag dampers, and properly inflated tires are among the solutions. One type of damper is described in the following quote from heli-chair.com. "Ground resonance is mitigated…by employing the use of damping vibration isolators to attach the landing gear to the airframe. The dampers are tuned to absorb energy at the proper frequencies of ground resonance and typically can prevent this destructive event." Proper maintenance of dampers is critical for safe flight. *(see Figure 2)*

Ground resonance most often occurs when a helicopter is attempting to set down although it can occur while

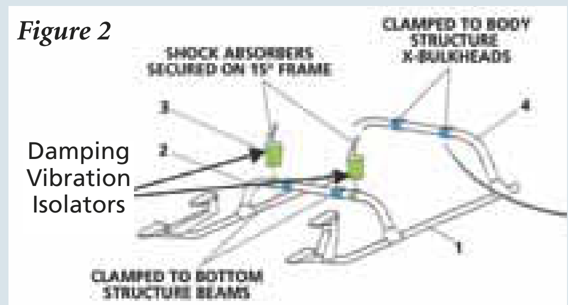
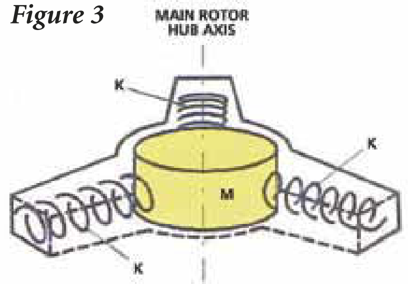


Figure 2

sitting on the ground although the rotor must be turning. The first step occurs when either the right or left skid or wheel touches down before the other side. The shaft normally is perpendicular with the hull of the helicopter but in this case it becomes tilted to one side of the aircraft, causing an out-of-balance condition. This loss of balance causes the rotor blades to fall out of their natural synchronization. This initial contact sends a shock to the main rotor shaft and throws off its center of gravity.

Figure 3



Also poorly maintained shock struts or low tire pressure can induce ground resonance. Landing gear shock absorbers between the aircraft body and landing skids are designed to attenuate any divergent vibration.

Various engineering arrangements are useful in intervening in the resonance scenario. For example a Rotor Hub Vibration Absorber may be used to counteract divergent excitation vibrations in the rotor mast. The resonator acts on excitation loads at their source. A weight is located on the rotor hub axis and is held in place by 3 springs allowing it to vibrate. The weight/springs system is excited by the periodic cyclic loads on the rotor hub, and responds at the excitation frequency by counteracting the excitation load. *(see Figure 3)*

Another engineering intervention is a Cabin Resonators system, used to cancel out vibrations at the aircraft natural frequency, which is normally near three (3) Hertz . The cabin resonator acts on a principle of physics called the resonator principle. It acts by damping the aircraft vibration at the attachment point, thereby reducing the vibration level. *(see Figure 4)*

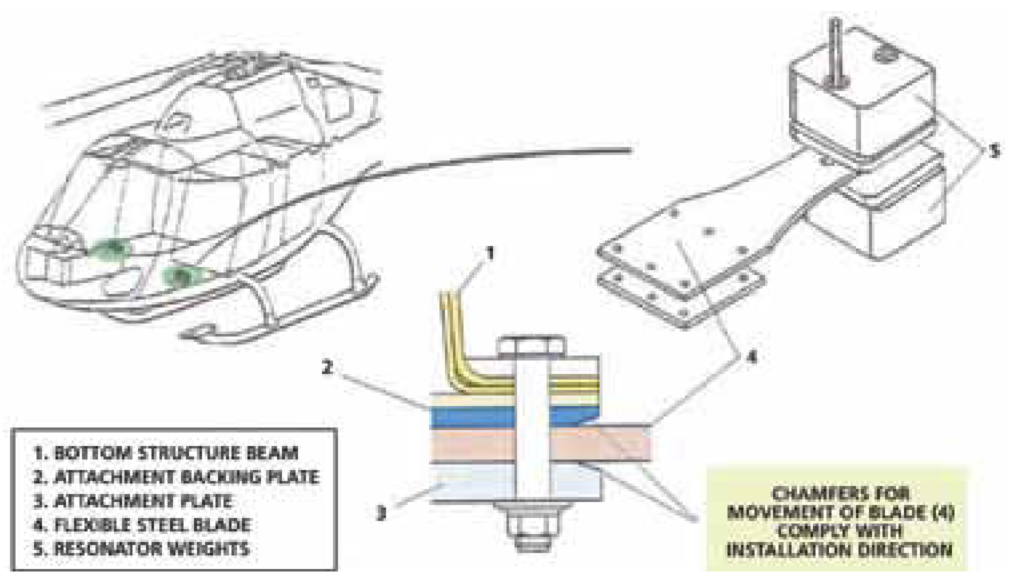
Predicting ground resonance is difficult but possible. As the last intervention strategy the pilot must know what to do during a ground resonance emergency. If the pilot has maintained the rotor RPM within the normal operating range after touchdown, breaking contact with the ground is the best way to break free of a ground resonance incident. If there is not enough rotor energy (RPM) present then shutting down the helicopter, lowering collective reduces lift and the tendency for the individual blades to "hunt" is reduced. Reducing this hunting may allow the blades to return to their normal in-phase position. Engaging the rotor brake may stop the event before it becomes destructive. Guidance in the manufacture's operating instructions should be referenced for design-specific procedures. ◆

This article was published with permission from the Flight Safety Information Journal*. It originally appear in the 2 May 2006 edition. See www.fsinfo.org*

The Canadian Aeronautics and Space Journal has an excellent report on this topic at http://pubs.nrc-cnrc.gc.ca/casj/q02-021.html.

The American Institute of Aeronautics and Astronautics publishes a related article "Influence of landing gear design on helicopter ground resonance". It is available online for a fee at http://www.aiia.org.

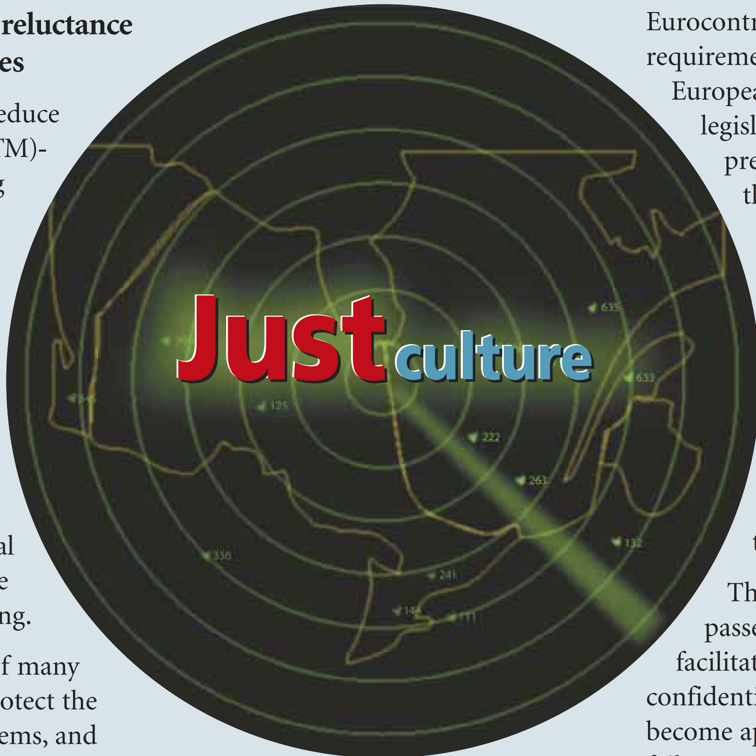
Figure 4



EUROCONTROL:

LACK OF 'JUST CULTURE' LEADS TO POOR INCIDENT REPORTING, JEOPARDISING AVIATION SAFETY

Eurocontrol bemoans reluctance of staff to report lapses



Eurocontrol's efforts to reduce air traffic management (ATM)-related fatalities are being hampered by the lack of a “just culture” in most member states, leaving risks to go undetected until they are exposed by an accident.

Although Eurocontrol set up a centralised ATM incident reporting and data sharing system several years ago, safety chiefs are convinced it is not working.

They believe the failure of many European countries to protect the safety data reporting systems, and those who submit reports, from the law means that no-one dare use them.

A crucial pillar of Eurocontrol's European Safety Programme (ESP) is a robust incident reporting and data sharing system, says ESP manager Tony Licu. The fundamental enabler for an effective incident reporting system, he says, is a “just culture data sharing agreement”. According to Dragica Stankovic, who has joined Licu's team from the International Air Transport Association, this culture is absent from most European countries.

Reporting systems have worked well in the airlines for years, but in a state-controlled sector like ATM there was no such system until Eurocontrol set one up, and even now the reporting rate is low and does not reflect reality, says Dr Erik Merckx, the agency's head of safety enhancement.

At Eurocontrol a just culture is defined as one in which “front-line operators or others are not punished for actions, omissions or decisions taken by them that are commensurate with their experience or training, but where gross negligence, wilful violations and destructive acts are not tolerated”.

Eurocontrol safety regulatory requirements, embodied under European Single European Sky legislation, are supposed to put pressure on states to make the necessary adjustments to their national laws to protect open reporting by removing the fear of punishment or criminal prosecution from those who report on unintentional mistakes, errors, incidents, or on systems that are not working as they should be.

The Danish parliament passed a law in 2002 that facilitated non-punitive, strictly confidential reporting after it had become apparent that there was a failure to report loss of separation incidents in Danish airspace because individuals feared career and legal consequences.

Licu says he is trying to raise awareness of the need for action like this to improve the quantity of ATM incident reporting. Eurocontrol wants the ESP to be fully operational by December 2008, says Licu, but it will be partially disabled unless member states make the changes necessary to support a just culture. ◆

This article was used with the permission of Flight International. *It was published on 30 May 2006.*

BLUE THREAT—RED THREAT in Aviation Maintenance

By Chief Warrant Officer Michel Bernier, Directorate of Flight Safety

I travel across the country and abroad, learning with you about the dos and don'ts as we go over the history of incidents and accidents.

Through our discussions one thing sticks out. We never come up with new threats.

Everyone in the aeronautical industry accomplishes the mission using a combination of airmanship and leadership skills. Our next challenge is to teach our work force how to keep the red and the blue threats in check.

Let me explain!

For aircrew, the mission is to deliver steel to target keeping the red threat (the enemy) and the blue threat (CRM — cockpit resource management) in check.

Technicians are trained to recognize red threats (snags, be they ACS, AVS or AVN related) and we are good at that; however, we are not very good at recognizing what I call the blue threat and how it affects us on a daily basis!

For ground crew, the mission is to provide rubber on the ramp. The red threat is the component that has an inherent design flaw; the component that will fail at an unpredictable time. Technicians do their best to identify them early enough to prevent catastrophes. But in the process we too often lose sight of the blue threats.

Blue threats are always present on a daily bases and can take many forms as we too often discover in 99% of our investigations.

Blue threats can take many shapes and forms, they include the following:

- Losing focus, due to a person taking you away from a task at a crucial moment;
- Pressure due to a person rushing you at the wrong time, i.e. an impatient crew chief, or aircrew pacing back and forth in the servicing area, or even a fellow worker pressuring you to do job faster;
- The weather, e.g., you're working outside and it's freezing, it's too hot, it's raining, or the mosquitoes and the black flies are driving you nuts;
- Task saturation due to the number of subordinates (too many to manage);

Photo: Master Corporal Michel Durand

Photo: Sergeant Joanne Stoeckl

- Your “Can Do” attitude, as you’re the only one with expertise and constantly have to manage too many snags at once;
- The people pleaser, the tech that can’t say “no” or “enough is enough”;
- Your shift is almost over, you have an important appointment and no one is there to take your debrief;
- You have done the job so many times that you are overconfident;
- You’re not getting proper rest and you are chronically tired;
- Your technical publications are vague and/or the translation to French is bad;
- You don’t have enough bodies to do the task;
- You don’t have the proper tools to do the job;
- You have something on your mind; e.g. caught in a family crisis, posting, etc.;
- You do not know how to be a supervisor because you still have your tool box attached at the hip;
- You do not know how to be a supervisor because you don’t remember what a toolbox looks like, e.g. you’re stuck behind the snag or servicing desk when you should be walking the floor to see what’s happening.

Keeping blue threats in check is very much a leadership responsibility. We need to learn to slow down in order to avoid repeating the same old mistakes.

If we can’t slow down due to ops tempo, then the risk should be formally assessed by leadership at the right level within that organization. ◆

Photo: Master Corporal Marc Gauvin

Photo: Sergeant Joanne Stoeckl

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Photo: Master Corporal Marc Gauvin

EPILOGUE

TYPE: **SZ2-33A Schweizer C-GFMC**
LOCATION: **Olds, Alberta**
DATE: **01 May 2005**

The mission was a winch launch and circuit for two qualified glider pilots. Immediately after becoming airborne, at approximately fifteen feet above ground level, the aircrew felt a loss of power from the winch. The pilot manually released the tow cable and lowered the nose of the glider in an attempt to land straight ahead. As the glider over-flew the tow-rope, the winch motor accelerated and the recovery parachute blossomed. The parachute became entangled with the tail wheel of the glider and as the winch surged it pulled on the tail-wheel which caused the glider to complete a low-level, 360-degree rotation about its lateral axis. The glider impacted the ground in a flat attitude with very little forward speed. The entire sequence, from beginning of the winch launch until ground impact, lasted between 10-15 seconds. Both glider occupants were treated and released from a local hospital with only minor injuries.

Investigation revealed that the winch had not been operating at optimum performance throughout the day. The spark plugs had become increasingly fouled due to a leaking power valve. The normal maintenance inspections did not pick-up this progressive breakdown. Discussion is on-going with respect to treating winch engines as 'airworthiness' assets.

The investigation also noted that after the momentary power loss the winch operator focussed his attention from the glider to the winch, then back to the glider. This delay in reducing the winch engine to idle and applying the cable brake was a contributing factor to this accident. A National Pilot Information File was issued which states, "At any time that a winch experiences a momentary power loss, the immediate action shall be to close the winch throttle and apply the cable brake." Recommendations also address winch operator training. ◆

EPILOGUE

TYPE: ***CF188732 Hornet***
LOCATION: ***Cold Lake Air Weapons Range, Alberta***
DATE: ***26 May 2003***

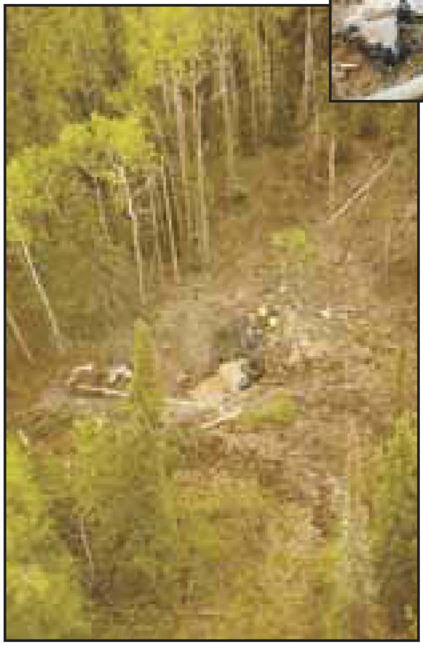
The accident aircraft was number three of a four plane formation launched from 4 Wing, Cold Lake, Alberta, to participate in a Maple Flag mission. The four aircraft had completed their simulated weapons delivery and were flying relatively level at about 480 knots indicated airspeed and 3000 feet above ground level in a "card" formation. Just prior to the accident, the number two aircraft had moved from a 6000 — 9000 foot line abreast position to tight formation on the lead aircraft to inspect it for a possible gear problem. This put the leading element about 1.2 nautical miles directly in front and slightly above the accident aircraft. When number three reached the approximate point in space where the lead element of aircraft had rejoined, it began a very fast negative G "barrel" roll to the right, completing a full roll in 3.5 seconds. Although the aircraft roll rate momentarily stopped at wings level, shortly thereafter the negative G continued and the roll to the right resumed. At about this time, with the aircraft in a negative G regime, the pilot ejected. The pilot sustained fatal injuries during the ejection process. The aircraft continued to roll under negative G, nosed down and impacted the ground basically inverted at about 45 degrees of pitch and at a high velocity. The aircraft was destroyed on ground impact.

The CF-188 is not equipped with a flight data recorder (FDR) or a cockpit voice recorder (CVR). However, the aircraft was equipped with an Air Combat Manoeuvring Instrumentation (ACMI) pod, which recorded the aircraft's flight path all the way to impact. The data recovered from the ACMI, although containing a limited number of parameters, was used extensively to corroborate the investigators' research and analysis.

The cause of this accident could not be determined with certainty because of the lack of sufficient data due to the absence of a crash worthy CVR/FDR and the amount of destruction sustained by the aircraft upon impact. The investigation team believes the accident flight profile was created by a flight control malfunction of the left horizontal stabilator which abruptly deflected to a full trailing edge down position, sending the aircraft into a violent, high negative G barrel roll to the right. It is believed the pilot was able to momentarily stop the aircraft's rolling motion near wings level, however, as described above, by the time the ejection was initiated, the aircraft had resumed the negative G roll to the right.

The pilot was fatally injured during the ejection sequence. A number of deficiencies were revealed with the CF-188 escape system, both in terms of system limitations, as well as training and procedures used by operators. The escape system is now undergoing a modernization program.

The preventive measures and recommendations for this accident include pilot checklist and training amendments, acquiring an FDR/CVR system, further recommendations for the escape system modernization, and Aircrew Life Support Equipment upgrades. ◆



EPILOGUE

TYPE: **SZ2-33A Schweizer C-GFME**
LOCATION: **Picton, Ontario**
DATE: **31 July 2003**

The standards instructor pilot (IP) and the Air Cadet student were participating in the Central Region Air Cadet Gliding School Program. The flight was the student's pre-solo check ride and required the student to fly the entire flight with minimal verbal input from the IP. Shortly after take off, a significant amount of slack developed in the tow-cable. The IP took control of the glider and after a quick re-assessment of the situation, the pilot believed the potential existed to snap the cable, upset the tow-plane, or have the cable back-release from the glider. The IP elected to release the tow-cable at approximately 50 feet above the treetops. The glider climbed to 100 feet at which point the IP set up for an approach to the only use-able field amongst the departure-end trees. Just prior to touchdown, the glider's left wing struck a large tree 12 feet above the ground. The glider came to rest in an upright position on the ground, oriented 160 degrees to the left of its final flight path. The student and IP exited the aircraft uninjured and contacted an overhead tow-plane via radio. The aircraft received "A" Category damage.

This accident was the result of a premature tow-rope release due to a significant slack cable situation and subsequent landing in an unprepared alternate field. The slack situation developed because the student pilot was allowed to place the glider in a precarious position. Finally, not all possible slack reduction techniques were utilized prior to releasing from the tow plane.

This accident was one of seven gliding accidents that occurred during the summer of 2003. This was an unusually high number of accidents for the Air Cadet Gliding Program. While it was recognized that the safety record of this organization was excellent, this rate of accidents was still cause for significant concern. Accordingly, a Glider Program Standards and Evaluation Team (SET) was established in 2004 by Comd 1 Cdn Air Div. This SET has rectified a number of the problems identified. ◆

EPILOGUE

TYPE: **SZ2-33 Schweizer C-FARD**
LOCATION: **Trois-Rivières, Quebec**
DATE: **31 October 2004**

Two gliders were re-positioned from the main runway at Trois-Rivières to a nearby grass strip where gliding activities were to be conducted for the day. A runway inspection of the grass strip was not conducted and the first glider was forced to land in the middle of the strip due to a puddle of water. Shortly after, the second glider was inbound for landing and the launch control officer (LCO) felt pressured to remove the obstructing glider from the grass strip. The LCO asked a nearby instructor pilot (IP) to take a student pilot (SP) for an instructional trip. The crew quickly completed the pre-flight inspection and launched in challenging wind conditions without conducting a pre-flight briefing. The launch was not manned by the required number of personnel.

The SP flew the take off, and the IP initiated the cable release at 600 ft AGL on the upwind leg. During the downwind leg, the glider drifted towards the runway and the turn to base leg started late. The IP took control of the glider on the base leg as the glider overshot the runway centerline to the south. The IP increased the angle of bank (AOB) to at least 45 degrees in an attempt to realign the aircraft with the runway. The glider then headed towards nearby trees and the IP entered a left turn during the final stages of landing. The aircraft's left wing struck the ground first followed by the tail wheel, it then skidded along the grass for 30 meters prior to coming to rest.

The investigation focused on the procedures used at the Trois-Rivières gliding site and on human factors. The cause of this accident was that the aircraft was placed in a position from which it could not be landed safely. The weather conditions at the time of the accident were very challenging and the airfield environment at this particular landing strip leave few viable options to safely compensate for errors in judgement.

Recommended safety actions included the use of this accident as a case study for cadet instructor training and in the air cadet Human Performance in Aviation program. As well, the Eastern Region Gliding School has modified their local gliding procedures to include a full operations briefing at the grass strip prior to continuing with flying operations. It is also recommended that the ERGS review their procedures when re-positioning the gliders from the main runway. ◆

EPILOGUE

TYPE: **CF188933 *Hornet***
LOCATION: **Tinker AFB, Oklahoma, USA**
DATE: **13 January 2005**

The Pilot in Command (PIC) and second pilot were enroute from Cold Lake, Alberta, to Naval Air Station Key West, Florida as part of an exercise deployment. An enroute fuel stop was planned at Tinker Air Force Base (AFB), Oklahoma. Approximately 100 Nautical Miles (NM) from Tinker and at an altitude of 39,000 feet, the crew experienced indications of right engine oil pressure fluctuations. The checklist items were actioned and the right engine was shut down. The crew declared an emergency and began their descent.

The crew planned for an arrested landing via a visual straight in approach to runway 12. Within 2 NM of touchdown and unable to visually identify the Bak 12 arrestor cable on the runway, the PIC decided to land at the runway threshold. Just prior to touchdown, the aircraft's arrestor hook caught the E-5 arrestor gear in the undershoot area of runway 12, 70' before the threshold. The aircraft's main landing gear then touched down prior to the runway threshold. 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 revealed that the CF-188 crew were unaware that the tail-hook touchdown point can be over 500 feet prior to the intended aim-point (depending on variables such as glide path angle, and angle of attack). Recommendations include amending manuals to ensure aircrew are aware of the difference in touchdown points.

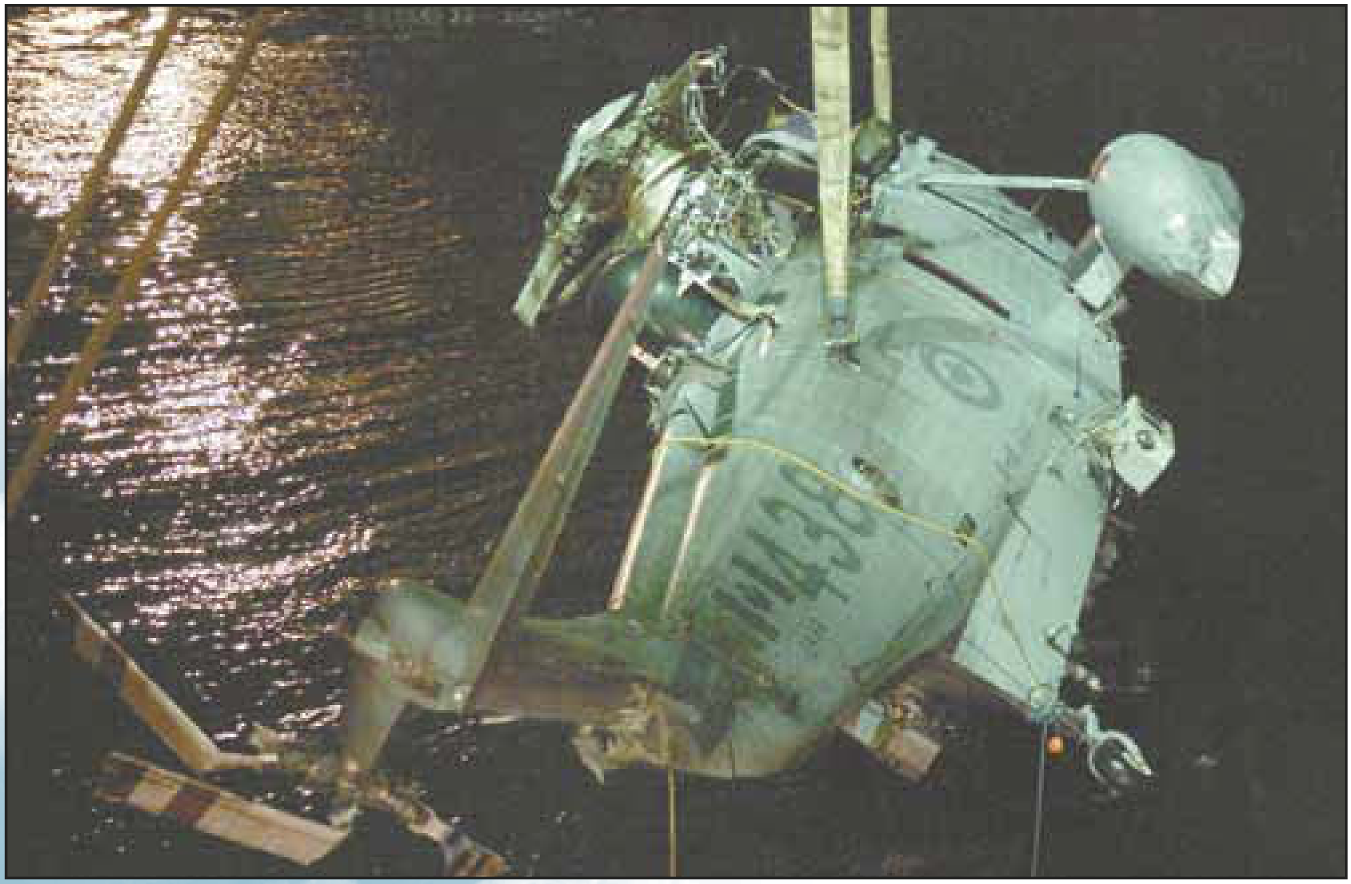
The engine oil pressure fluctuations were caused by a faulty connector which had failed due to a cracked oil pressure transmitter bracket. False oil pressure indications have resulted in approximately 15 single-engine landings over the past five years. Recommendations include a re-design of the transmitter bracket, and modifications to the inspection procedures. ◆

FROM THE INVESTIGATOR

TYPE: **CH12438 *Sea King***
LOCATION: **30 NM East of Aalborg, Denmark**
DATE: **02 February 2006**

The five crewmembers onboard the *Sea King* helicopter were returning to Her Majesty's Canadian Ship ATHABASKAN after having completed circuit training at Aarhus, Denmark, when the accident occurred. On completion of one radar controlled approach to the ATHABASKAN, the crew commenced an overshoot and entered the visual circuit to land. On short final, at approximately 30 meters on the ATHABASKAN's port quarter, the helicopter's rear fuselage and tail rotor contacted the water. The helicopter pitched forward, became airborne again, and began to yaw right. The helicopter then impacted the water in a near level attitude and, while still yawing right, rolled left. Water flooded the helicopter almost immediately as it rolled inverted. All five crewmembers then egressed and were recovered to the ATHABASKAN by zodiac within approximately 15 minutes. Four crewmembers encountered difficulties while egressing the inverted helicopter. One crewmember received minor injuries. The aircraft sustained "A" category damage after sinking in 16 meters of water one hour after the accident.

The preliminary investigation has indicated that the helicopter suffered no mechanical problem prior to impact. The investigation will focus on Aerospace Life Support Equipment and human factors. Human factors investigation is focused on human night vision capabilities and organizational issues such as currency and training. ◆



FROM THE INVESTIGATOR

TYPE: **CU161009 *Sperwer***
LOCATION: **Kandahar, Afghanistan**
DATE: **06 May 2006**

The accident occurred during a day mission conducted in the vicinity of Kandahar Airfield in support of Op ARCHER. During the recovery phase of flight, the parachute failed to deploy. The air vehicle (AV) descended freely, impacted the ground at high speed and exploded. The AV was consumed by post-impact fire and sustained 'A' category damage. There were no injuries.

The flight was without incident up to the recovery phase at which point the parachute failed to deploy. The investigation will focus on areas associated with parachute system design and parachute rigging. ◆

FROM THE INVESTIGATOR

TYPE: **CC130311 *Hercules***
LOCATION: **CFS Alert, Nunavut**
DATE: **25 April 2006**

The five crewmembers aboard the *Hercules* aircraft were arriving in Alert on a fuel re-supply mission in support of Operation Boxtop. Following a Radar Approach to runway 23 True, the aircraft landed long and the crew experienced difficulty in maintaining runway centreline control. Deceleration efforts were reduced while efforts to regain directional control were attempted. The aircraft departed the end of the runway, coming to rest approximately 80 feet beyond the runway threshold. There were no injuries and the aircraft sustained 'D' catgegory damage.

The Alert runway was covered with hard-packed snow and ice at the time of the incident and the crew was authorized to conduct an overweight landing. The preliminary investigation did not reveal any mechanical problems associated with the aircraft prior to runway departure. The investigation will focus on the human factors element of flying operations to include crew proficiency and training. ◆

FROM THE INVESTIGATOR

TYPE: ***CH149914 Cormorant***
LOCATION: **Chedabucto Bay, near Canso, Nova Scotia**
DATE: **13 July 2006**

The accident involved a *Cormorant* Search and Rescue (SAR) helicopter with a crew of seven. The crew had assumed SAR standby duties and was authorized to conduct a training mission to practice night boat hoists from the fishing vessel *Four Sisters No. 1*, a member of the Canadian Coast Guard Auxiliary. The cockpit crew consisted of a co-pilot in the left pilot seat, a pilot acting as Aircraft Commander (AAC) in the right pilot seat and a pilot who was the actual Aircraft Commander (AC) seated in the cockpit jump seat. The remainder of the crew occupied the cabin area. They comprised of a Flight Engineer (FE), a Flight Engineer under training (FEUT), a SAR Tech Team Lead (SAR Tech TL) and a SAR Tech Team Member (SAR Tech TM).

The crew departed Greenwood, NS at 2120L hrs and completed an uneventful transit to the Port Hawkesbury, NS airport, where they stopped to conduct a required tail-rotor inspection. While on the ground in Port Hawkesbury, the crew contacted *Four Sisters No. 1* to confirm that the weather in the area was suitable for the training scenario. The Captain of the *Four Sisters No. 1* stated that the weather was clear, visibility was good and the water was calm.

The aircraft departed Port Hawkesbury just before midnight on 12 July 2006 to rendezvous with the *Four Sisters No. 1* at approximately 2 nautical miles (NM) north of Canso, NS on Chedabucto Bay. After locating the ship, the helicopter used the "Over Water Transition Down" procedure and proceeded to the "rest" position, which is 100 ft above the water and a safe distance from the ship just off the hoisting position from which the crew would start the boat hoisting procedure.

At this point, the helicopter descended to 60 feet and the AC directed the flying pilot to go-around. The pilot acknowledged the go-around command and initiated the go-around procedure. During the overshoot attempt, the helicopter entered a nose-low attitude and seconds later the aircraft impacted the water at approx 30 to 50 knots in an 18 degree nose-down attitude with maximum torque being developed by the main rotor. Upon water impact, the front portion of the aircraft was destroyed while the cabin area aft of the forward part of the cargo door remained relatively intact; the aircraft immediately filled with water and rolled inverted. The crew of *Four Sisters No. 1* made a "Mayday" call at approximately 0030L hrs 13 July 2006. The aircraft sustained "A" category damage.

The three pilots and the SAR Tech TL were injured but survived the crash. The two flight engineers and the SAR Tech TM were unable to egress the aircraft and did not survive.

No pertinent technical deficiencies have been discovered to date and the investigation is focussing on environmental and human factors. Several human factors need to be further examined including: proficiency, crew resource management, situational awareness, crew pairing, use of night vision goggles and organizational issues such as currency and training. Additionally, several Aviation Life Support Equipment and egress issues will be investigated. ◆

FROM THE INVESTIGATOR

TYPE: ***SZ2-33A Schweizer* C-FACY**
LOCATION: **Valcartier, Quebec**
DATE: **10 September 2006**

The accident glider pilot was participating in the Air Cadet fall familiarization gliding program. The cadet had recently graduated from the summer Air Cadet Gliding Program and was in the process of building up gliding time. Runway 04 is divided into two landing lanes with lane 1 being the left lane (near the trees). The gliders were landing on lane 1 of runway 04.

On the day of the accident the pilot had already flown three dual trips and seven solo trips. The accident occurred on the eighth solo flight of the day. The aero-tow and upper air work of the accident flight were uneventful. On final approach the pilot encountered a left crosswind which required the application of a sideslip (left wing down with application of right rudder) to maintain the centre-line of the runway. The left crosswind abruptly ceased as the glider descended below the height of the trees that line the left side of the runway. This caused the glider to drift left towards the forested area and lose airspeed. The glider also encountered some downdrafts. The pilot attempted to correct back to the runway centre-line, however, the glider's left wing contacted some trees at 23 feet above ground level. The glider pivoted 90 degrees to the left and fell almost vertically. The pilot sufferred serious injuries. The glider sustained 'B' category damage.

The investigation is focussing on the proximity of the trees to the landing area and the localized wind shear phenomenon that is well known by Valcartier pilots. The proximity of the trees to the landing area allows for only 18 feet of clearance between the glider's wingtip and the trees when landing on lane 1. The condition which is conducive to the development of wind shear is a left crosswind on runway 04, or a right crosswind on runway 22.

Immediate preventive measures include moving the main landing area to lane 2 which is further from the tree line. All pilots will be briefed on the local wind shear phenomenon, and this information will included in the Regional Flying Orders. ◆

For Professionalism

For Commendable Performance in Flight Safety

CORPORAL LENA WAGNER

In March 2004, while conducting preventative second-line maintenance on a new modernized CF-188 *Hornet* control stick grip, Corporal Wagner noticed that the internal Electro-Magnetic Interference (EMI) shielding was not within specifications. She repaired the unit and returned it to service. Within a couple of weeks she discovered the same deficiencies on a second stick grip.

Concerned that there may be similar defects with the remainder of the fleet's modernized stick grips, she proactively drew two additional units from supply in order to prove or disprove her concern. Indeed, both of these units had the same defects. Corporal Wagner immediately quarantined the stick grips and briefed her chain of command. An Operational Restriction of all modernized CF-188 aircraft was initiated pending the findings of a Special Inspection (SI).

Sacrificing several personal commitments, Corporal Wagner worked diligently over a two-week period to conduct the SI. She discovered, recorded, and rectified defects found on 100% of the 40 modernized stick grips. Unserviceable conditions included improper EMI shielding, heavy internal FOD from previous maintenance actions and/or unserviceable switches. Had these defects gone unnoticed there could have been serious ramifications such as, premature release of selected and armed weapons, inadvertent engagement of nose wheel steering, or adverse control inputs to the longitudinal and lateral aircraft trim actuators. With a *Hornet* conducting ops at low altitude the last of these could have lead to uncommanded roll with potentially fatal consequences.

Corporal Wagner's attention to detail, foresight and dedication prevented a variety of stick grip defects, in modernized CF-188s, from becoming a serious aircraft or weapons accident. ◆

Corporal Lena Wagner is an avionics technician serving with 1 Air Maintenance Squadron, 4 Wing Cold Lake.

MASTER CORPORAL DAVE REES

During a Standing NATO Maritime Group deployment on HMCS Halifax in November 2005, Master Corporal Rees was replacing a main gearbox high-speed shaft input seal on a *Sea King* when he noticed metal filings in the area of the rotor brake assembly. Investigating further, he found the assembly mounting nuts loose allowing the rotor brake assembly to lean against the rotor brake disc. He also found that the brake lining puck in the left-hand brake housing was completely worn away, rendering it unserviceable and extremely dangerous.

Master Corporal Rees' attention to detail, initiative and awareness in finding and repairing a fault in an area he was not required to inspect prevented a potential serious in-flight emergency. ◆

Master Corporal Dave Rees is an aviation technician serving with 423 Maritime Helicopter Squadron, 12 Wing Shearwater.

For Professionalism

For Commendable Performance in Flight Safety

MASTER CORPORAL STEPHEN CHAPPELL

Master Corporal Chappell was performing a 25-hour/30-day inspection on a *Griffon* when he noticed a very small and faint, dark spot on a large wire bundle concealed deep within the nose compartment. The wire bundle is located behind the cockpit console and is barely visible behind numerous other components.

In order to conduct a more detailed investigation, Master Corporal Chappell removed most of the components in the mid-electronics shelf. Upon reaching the area of concern, it became apparent that the spot was the result of several wires having rubbed through their protective shielding and having subsequently arced on an adjacent control box. This arcing could easily have caused an electrical fire in an area not accessible to the aircrew while in flight.

The combination of Master Corporal Chappell's keen eye, attention to detail and diligence, resulted in the discovery and repair of a significant flight safety hazard that, unfound, would have jeopardized the safety of the aircraft and crew. ◆

Master Corporal Stephen Chappell is an avionics technician serving with 408 Tactical Helicopter Squadron, Canadian Forces Base Edmonton.

MASTER CORPORAL DENIS CLOUTIER

While conducting a 25-hour 30-day inspection on *Griffon* 146408, Master Corporal Cloutier was examining the main rotor head and flight controls system when he noticed that both drive links were just slightly out of position. Upon closer investigation, he observed that both drive link washers were actually missing. These washers align each of the drive links and prevent the drive link-bearing end from wearing into the swashplate. In this case, due to the damage, one on the two drive links had to be completely replaced.

The ensuing investigation revealed that these washers had been missing since the completion of the 2500-hour inspection, 210 operating hours ago. During that time the aircraft had undergone two separate 100-hour inspections, many 25-hour/30-day inspections and untold pre-flights without the fault being detected. Because the drive links have a normal operating life of 5000 hours it is probable that the deterioration of the bearings would have progressed unnoticed for some time.

Had Master Corporal Cloutier not taken the extra time to investigate this slight anomaly, and uncover the missing parts, the continuing damage to the drive links may have progressed sufficiently to lead to a catastrophic flight control failure with equally catastrophic results for aircraft and crew. ◆

Master Corporal Denis Cloutier is an aviation technician with 408 Tactical Helicopter Squadron, Canadian Forces Base Edmonton.

CORPORAL TROY GRAHAM

While deployed to 443 Maritime Helicopter Squadron to carry out a recertification of the Non-Destructive Testing (NDT) Operators for Ultrasonic Inspections on the CH-124 *Sea King*, Cpl Graham was notified that two additional individuals required recertification in Liquid Penetrant Inspections (LPI) prior to a HELAIRDET deployment to sea. As this was not part of the initial request, Cpl Graham did not bring the necessary equipment and resources to carry this out but quickly ascertained that a Squadron employing *Sea King* NDT operators should have all the necessary equipment to carry out the requested extra training. While setting up for the Liquid Penetrant training, Cpl Graham noticed that a vital piece of test equipment, a Radiometer, was not a part of the resources available at the Squadron. A radiometer is utilized to verify that the Ultraviolet Lamp meets the current written standards prior to an inspection being carried out. Cpl Graham immediately ceased training until the appropriate test equipment could be acquired, as this is an essential quality control step prior to carrying out any LPI examination. Cpl Graham also realized that the inspections being carried out at that unit were not in compliance with the written procedures, as the serviceability of the Ultraviolet Lamps could not be verified without this type of meter. Cpl Graham provided 443 Sqn with all the necessary information to acquire a radiometer and later followed up on the status of this equipment. The NDT Operators carry out LPI on secondary and tertiary structures and also hold an additional qualification, for deployments, on a primary structure, the T-58 forward engine mount. This engine mount is critical and its failure could cause catastrophic loss of the engine and aircraft.

Cpl Graham's diligence in carrying out the extra steps of verifying test equipment resources and amending local work processes has allowed the Squadron to comply with the inspection techniques standard. As this is a vital quality control step, and had Cpl Graham not intervened, there was a definite potential that a critical crack may have gone undetected. ◆

Corporal Troy Graham is a non-destructive testing technician serving with 19 Air Maintenance Squadron, 19 Wing Comox.

MASTER CORPORAL HORST HENSEL

Master Corporal Hensel was assigned to assist with a 600-hour inspection on a *Griffon* helicopter in order to complete his pre-type training course requirements. Not having previous rotary-wing experience he often used his free time to walk-around the helicopter to increase his familiarity and type knowledge.

During one of these walk-arounds Master Corporal Hensel perceived a problem that he immediately reported to the snags desk coordinator. Ten feet above the ground, the tail rotor retaining nut lock did not appear locked down. This nut is less than two inches in diameter and its locks are only one-eighth inch indentations. On inspection, the tail rotor retaining nut lock was indeed not secure. Records showed that the tail rotor assembly had been installed, checked, independently checked and pre-flight checked. The aircraft had been ground run and was being prepared for flight. Had this situation gone unnoticed the retaining nut could have backed off creating the potential for a failure or even the complete loss of the tail rotor.

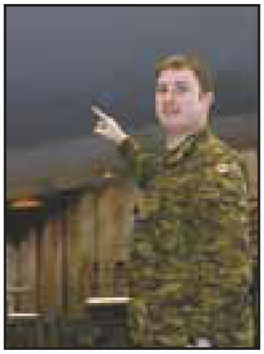
A potential for catastrophe was averted through the attention to detail, dedication, professionalism and overall airmanship of Master Corporal Hensel. ◆

Master Corporal Horst Hensel is an aviation technician serving with 408 Tactical Helicopter Squadron, Canadian Forces Base Edmonton.

For Professionalism

For Commendable Performance in Flight Safety

PRIVATE MYCAEL MCGRAW



While carrying out a B check on *Aurora* 140103 on 15 February 2006, Private McGraw noticed something abnormal under and just right of the rear dinette window along the fuselage of the aircraft, approximately seven feet above his head. He investigated further and discovered that three rivets along one of the main airframe formers had lifted away from the aircraft skin. Closer inspection on his part revealed a white powdery substance bleeding from around the rivet holes. When he touched the rivets the heads fell off. The rivet heads had been sheared for some time and had caused minor damage to the aircraft skin allowing corrosion to rapidly advance in that area. The adjacent rivets also required replacement.

Private McGraw immediately informed the maintenance control office of his findings, processed the proper reporting documentation and recommended that ACS Techs carry out a more extensive and in-depth inspection to see if there was sub-surface damage.

Private McGraw's superior attention to detail during a B-check arrested an advancing threat to the structural integrity of an aircraft. In detecting the corrosion Private McGraw prevented more extensive sub-surface damage and averted the possibility of a catastrophic inflight failure. ◆

Private Mycael McGraw is an aviation technician serving with 14 Air Maintenance Squadron, 14 Wing Greenwood.

CORPORAL KEVIN JOHNSON

While carrying out a routine teardown of a CC-115 *Buffalo* propeller for a leak at the propeller blade root, Corporal Johnson realized the guide sleeve within the dome assembly was loose. The guide sleeve is normally held motionless during the removal of the pitch lock assembly and is not part of the prescribed teardown inspection procedures. Upon further inspection, he determined that the guide sleeve-locking ring, located in an obscure and hard to inspect area of the dome, had broken into multiple pieces, essentially becoming FOD in the dome assembly.

Because the Squadron does not carry out repairs on the dome assembly, the Life Cycle Maintenance Manager was promptly informed of the situation and the propeller was shipped to third line for repair and further investigation.

Through careful attention to detail and pride in work, Corporal Johnson was able to detect a significant defect in the propeller dome assembly. This defect had the potential to cause an in-flight failure of the component, possibly resulting in an engine shutdown. Corporal Johnson's diligence, and professionalism is an essential ingredient in maintaining 442 Squadron's search and rescue capability. ◆

Corporal Kevin Johnson is an aviation technician serving with 442 Search and Rescue Squadron, 19 Wing Comox.

MASTER CORPORAL GARY KEIR

In November 2005, Master Corporal Keir was paged for a search and rescue (SAR) mission with the standby *Hercules*. On reviewing the Aircraft Basic Weight Change Record form, he noticed that there was a discrepancy in the aircraft's basic index number. Though assured correct by the servicing desk controller, Master Corporal Keir continued to research the problem concluding that the basic weight index was high compared to the other 413 Squadron Hercules aircraft having roughly the same configuration.

Master Corporal Keir informed the aircraft commander of his findings. He quickly computed the aircraft's weight and balance and found that the centre of gravity (C of G) showed tail heavy. Of note, during SAR operations a partially completed weight and balance template is used in order to save time. It is neither routine nor necessary for the loadmaster to produce one for every mission. In fact, this particular aircraft had been flown several times prior to the error being found. He then searched maintenance record set change records and discovered that the third-line contractor had removed an item from compartment "O" but had not subtracted the moment figure. This explained the inflated basic index figure.

With the index starting point already high, had a fuel load of between 60,000 to 62,000 lbs been required, the aircraft's C of G would have been pushed well out of limits for take-off. This would have resulted in the aircraft having to be defueled thus delaying and jeopardizing the SAR mission response time. Master Corporal Keir's experience, eye for detail and tenacity ensured the safety and effectiveness of a critical search and rescue asset. ◆

Master Corporal Gary Keir is flight engineer serving with 413 Transport and Rescue Squadron, 14 Wing Greenwood.

PRIVATE DAN STASIUK

In February 2006, eight *Tutor* aircraft had just landed on runway 29L at 15 Wing Moose Jaw. They were rolling to exit the runway at taxiway "Bravo" when a *Harvard* aircraft, at the post for runway 29L, requested take-off clearance. The *Harvard* was told "negative, taxi to position and wait", which the pilot read back. The aerodrome controller was scanning the runway waiting for the remaining *Tutors* to exit. Private Stasiuk, the duty ground controller, noticed that the Harvard aircraft had started its take-off roll and was already over 1000 feet down the runway with three *Tutors* not yet exited. Private Stasiuk immediately alerted the Aerodrome Controller who instructed the *Harvard* to abort the take-off in sufficient time to avert a potential disaster.

Though the runway was under the aerodrome controller's supervision, Private Stasiuk's vigilance and scanning skills permitted a quick and critical intervention likely saving aircraft and lives. Private Stasiuk's actions represent the importance of, and the need for, a team approach in ensuring aviation safety. ◆

Private Dan Stasiuk is a ground controller serving with 15 Wing Moose Jaw.

For Professionalism

For Commendable Performance in Flight Safety

PRIVATE BERNIE WALTON

In October 2005, Private Walton, an Avionics Systems Technician was tasked to fix an unserviceable jump light on *Hercules* CC130305. While performing the repair, he observed that part of the ramp rail assembly was missing. Private Walton immediately alerted the Flight Engineer and his supervisors and the scheduled mission was cancelled.

The pursuant flight safety investigation revealed that the missing component had departed the aircraft due to a hung load during a heavy equipment drop conducted several days earlier. Private Walton's keen observation had been missed by several aircrew and by more experienced technicians during their checks. Private Walton got qualified as a journeyman only a few weeks before. Private Walton's unfamiliarity with the aircraft structure, the obscure location of the damage, and his relative inexperience makes his observation all the more remarkable.

This incident revealed the potential for serious personnel injury and equipment damage and ultimately resulted in 8 Wing revisiting their heavy equipment drop procedures. Private Walton's actions undoubtedly averted further aircraft damage and potentially the catastrophic loss of a CC-130 *Hercules*, aircrew lives and the lives of ground troops. ◆

Corporal Bernie Walton is an avionics systems technician deployed to Camp Mirage.

SERGEANT LOWELL O'KEEFE

In October 2005, Sergeant O'Keefe, a flight engineer (FE) on the CP-140 *Aurora*, was conducting an external pre-flight inspection when he noticed a crack on the nose wheel steering cylinder nut. The nose gear area had accumulated dust and dirt over time, masking this particular crack. Many technicians and FEs who had worked in and inspected this area had missed this defect. Although the FE external pre-flight inspection of the nose wheel area includes several steps, there is no mention to inspect the nose wheel cylinder.

Closer inspection revealed that the crack was 8 inches long. The nose wheel cylinder nut, normally installed with 800-1000 inch lbs of torque, required very minimal force to be removed indicating failure was likely imminent.

Following testing at the Quality Engineering Test Establishment, it was determined that the fault in the nut was a progressive fatigue crack that had been present for quite some time. In light of this incident, nose wheel steering cylinder nuts are now inspected for fatigue cracks at 3rd line overhaul.

Sergeant O'Keefe's thoroughness and keen eye averted a serious incident or even accident and this discovery has enhanced the inspection regime fleet wide. ◆

Sergeant Lowell O'Keefe is a flight engineer serving with 404 Squadron, 14 Wing Greenwood.

Tearsheet - Mission Planning Checklist
(As Required Depending Upon Route)

General:
AIF, Aircraft & Aircrew Publications
Customs (Notify and Verify Entry Requirements)
File Flight Plan (Acknowledgment Message)
Aircraft Performance (Takeoff & Departure Data)

Weather: *(In Accordance With B-GA-100,* NA)
Departure Weather
Destination Weather
Alternate Weather (Departure Alternate, Arrival Alternate)
Enroute Weather (Charts, Hazards, Volcanic Ash, ETP, PSR)

NOTAMs:
Aerodrome (Departure, Arrival, Departure & Arrival Alternate Aerodromes)
Enroute (ARTCC, Airspace, RVSM, RNP, NAVAID, GPS, Volcanic Ash, etc.)
Vendor Specific (FMS, Enroute Charts, IAPs)
Change Notices (PCN for AP & GP, TCN for DoD IAP, CN for DoT/FAA IAP)
Specials (Special Notices, Temporary Flight Restrictions, Attention Notices)

Diplomatic Clearances: *(Verify for next and all subsequent flights)*
General Info (Valid Times and Dates, Tail Number, Call Sign)
Hazardous Cargo (Special DIPs, Special Routing)
Departure (Departure DIP, Slot Time, Departure Window)
Enroute (Overflight DIP, National Entry / Exit Waypoints and Times)
Destination (Landing & Departure DIP, Arrival and Departure Window)

Route:
Slot Time
Route Verification (Verify Flight Plan & Jetplan Route against charts)
Preferred Routing *(GPH 205, GPH 270, RAF Planning Handbook)*
National Procedures *(GPH 270, Airspace Restrictions / Procedures, etc.)*

Airfield Study: *(Departure, Arrival, Alternate Aerodromes)*
Restrictions *(Flight Supplement(s), AP)*
PN, PPR, Operating Hours, Preferred Arrival / Departure Routing, Fuel, etc.
Approach Review / Selection (DND, TC, DoD, Host Nation, Jeppesen, RCAP)
NA, and Terrain Study (OPC, GNC, JNC, TPC, VNC, Sectional, VTA)
RWY, TWY, Apron (Width, PLR, PCN, LCN, Condition, Obstacles, etc.)
Security (Airport Security, Area Stability, etc.)
Ethnic / Regional Customs & Behaviours (Alcohol, Attire, Behaviour, etc.)
Local Knowledge (Airfield Data Reports, Airfield Familiarization Manual, etc.)

NOTAMs:

NavCanada:	http://www.flightplanning.navcanada.ca
DoD:	https://www.notams.jcs.mil
FAA NTAP:	http://www.faa.gov/NTAP/
GPS:	http://www.navcen.uscg.gov/ADO/GpsActiveNanu.asp
Jeppesen NavData:	http://www.jeppesen.com/wlcs/index.jsp?section=resources&content=publications_notam.html
Jeppesen Chart:	http://www.jeppesen.com/wlcs/index.jsp?section=resources&content=publications_notam.html
RAF:	http://www.ais.org.uk/aes/login.jsp
RAAF:	http://www.airservicesaustralia.com/brief/
Canadian Ash:	http://www.flightplanning.navcanada.ca
Worldwide Ash:	http://www.ssd.noaa.gov/VAAC/

WEATHER:

NavCanada: http://www.flightplanning.navcanada.ca
ADDS Icing Products for CONUS and S. Canada http://adds.aviationweather.noaa.gov/icing/
NOAA: http://aviationweather.gov
U.S. ASOS: http://www.faa.gov/asos/index.htm
U.S. Duats: http://www.duats.com
Int'l Weather: http://www.aviationweatherbrief.com

PLANNING:

DND DFLIP http://1cadgeo.winnipeg.mil.ca/DFLIP/launch.pdf
GPH 270, DoD IAP http://164.214.2.62/products/digitalaero/index.html
FAA/DoT IAP http://www.naco.faa.gov/
CARs http://www.tc.gc.ca/CivilAviation/RegServ/affairs/cars/menu.htm
TC AIM http://www.tc.gc.ca/CivilAviation/publications/tp14371/menu.htm
FAA FARs http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgFAR.nsf/MainFrame?OpenFrameSet
FAA AIM http://www.faa.gov/ATpubs/AIM/index.htm
Jetplan http://www.jetplan.com/
FAA's Int'l FIM http://www.faa.gov/ats/aat/ifim/
Host Nation Regs http://www.eurocontrol.int/ais/links/world.htm

NOTAMS: (As Required For Route Of Flight and Materials Used)

Aerodrome Departure, Arrival, Departure & Arrival Alternates
Enroute ARTCC, Airspace, RVSM, RNP, NAVAID, GPS, ASHTAM, etc.
Vendor Specific (Jeppesen, Host Nation) FMS, Enroute Charts, IAPs
Change Notices PCN for AP & GP, TCN for DoD IAP, CN for DoT/FAA IAP
Specials / Miscellaneous Special Notices, Temporary Flight Restrictions, Attention Notices, FAA NTAP