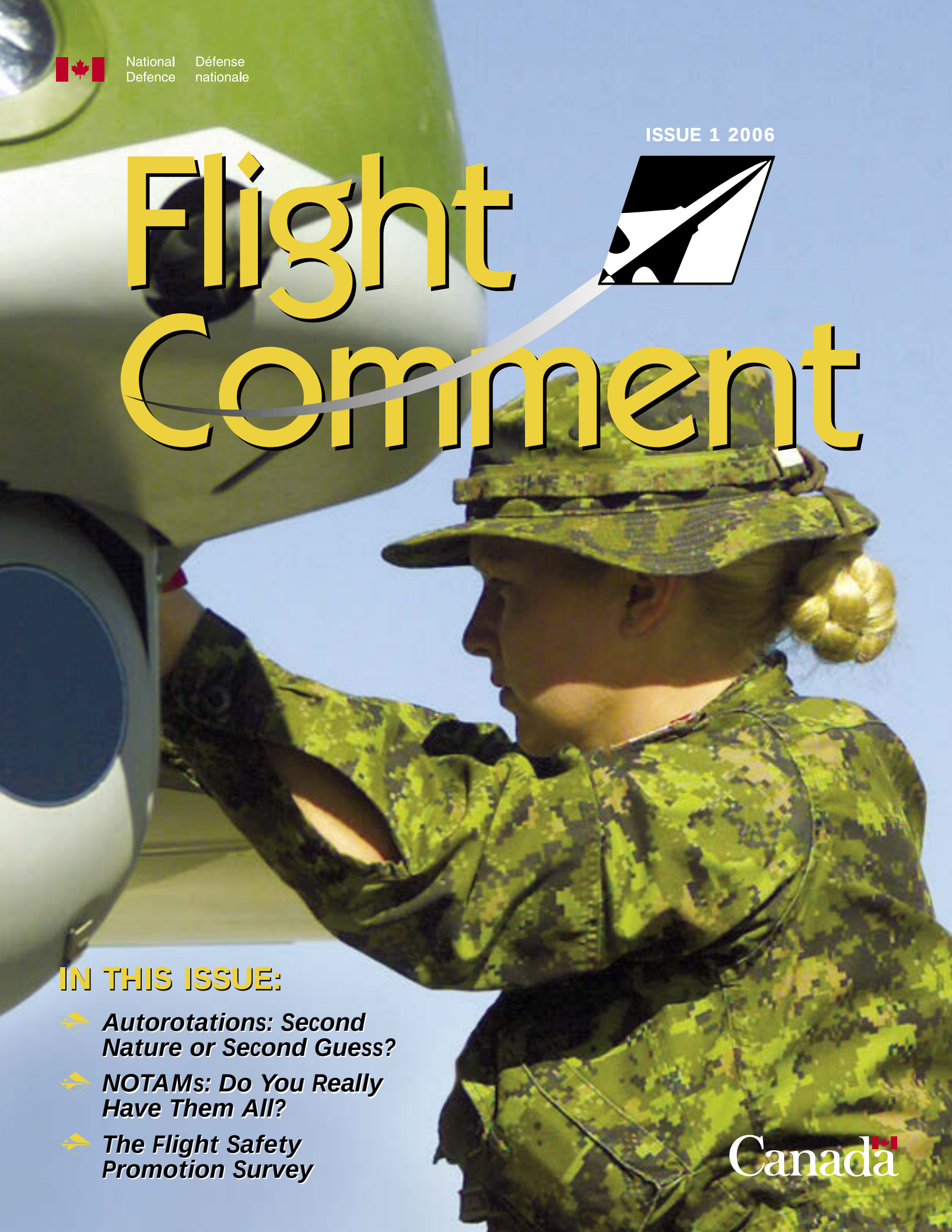
National Defence / Défense nationale

ISSUE 1 2006

Flight Comment



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Bombardier Marie Robert guides the Sperwer UAV onto the launcher.
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THE CANADIAN FORCES FLIGHT SAFETY MAGAZINE

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

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

Annual subscription rates: for Canada, $19.95, single issue, $5.50; for other countries, $19.95 US, single issue, $5.50 US. Prices do not include GST. Payment should be made to Receiver General for Canada.
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To contact DFS personnel on an **URGENT** Flight Safety issue, please call an investigator who is available 24 hours a day at 1-888-WARN-DFS (927-6337). The DFS web page at www.airforce.forces.gc.ca/dfs offers other points of contact in the DFS organization or write to dfs.dsv@forces.gc.ca.

ISSN 0015–3702
A–JS–000–006/JP–000
Art Direction: ADM (PA) DMCS
CS05-0274

Director Flight Safety

Views on Flight Safety

1959 and Holding!

We are at a critical stage in our accident program. Much of our equipment has been in use for several years and we are that many years away from our basic training in its operation. Introduction of new equipment could have an adverse effect on our accident rate unless adequate steps are taken to ensure that we are trained to handle it. To offset complacency with respect to old equipment, and to ensure safe handling of new equipment, a greater emphasis must be placed on supervision.

Supervision at all levels, the man on the hangar floor, the servicing supervisor, the flying supervisor, unit and station commanders, command staffs and headquarters staffs, everyone who has a directing responsibility connected in any way with the safe and efficient operation of our aircraft must make an extra effort.

A study of last year's accidents and incidents reveals that most of them could have been avoided. It points out the need for a new emphasis on supervision. It also suggests that a more efficient system of overcoming deficiencies in equipment and facilities, and that an examination of aircrew standards with a view to increased proficiency are needed.

Supervisors, experience has shown that your personal attention is indispensable, that an increased effort is essential, to reduce the unnecessary loss of personnel and equipment brought about by aircraft accidents. ◆

J. J. Jordan, Group Captain,
Director of Flight Safety - 1958-1961.

Good Show

For Excellence in Flight Safety

Mr. Ray King and Mr. Gary Kendell

During the past two years *Cormorant* CH149907 has consumed a large number of tail rotor half hubs and under specific taxi conditions exhibited excessive vibrations that were neither able to be duplicated nor rectified by applying procedures identified in the approved maintenance program. Crews reported severe vibrations, however, these unbalanced conditions referred to as "cobblestoning" could not be verified through routine rotor analysis diagnostic system (RADS) functional checks. In each of these cases RADS was unable to detect the excessive vibrations. This engineering/design condition has severely restricted *Cormorant* operations, and continues to this day.

Perplexed by the problem, Mr. Gary Kendell (Production Supervisor Comox) and Mr. Ray King (Crew Chief Comox) conducted an in-depth study of the issue and the associated RADS procedures. Realizing that the "cobblestoning" effect, while evident to the crew, did not register on the RADS equipment under normal operations, they proposed that additional measurements be taken utilizing the standard RADS kit, albeit under an unused menu mode. Using their extensive knowledge of the aircraft and vibration equipment, the duo surmised that during the "cobblestoning" phenomena, vibration readings might be detectable using the 135 V1, 135 V2 screen on the control and display unit. In an effort to prove their theory, Mr. King arranged to have *Cormorant* 907 taxi under similar conditions to those noted when the vibrations were detected. Once the "cobblestoning" became evident Mr. King reverted to the 135 V1 and 135 V2 screen, recording vibrations well beyond the allowable limits. As many as nine readings were recorded, all in excess of the allowable limit, but these readings were not evident on the normal RADS menu screen. Armed with this previously unrecorded evidence, the investigating team, supported by the Technical Airworthiness Authority, is utilizing these new readings to assist in their ongoing investigation. The capturing of this data provided the first concrete evidence that clearly demonstrated that the CH-149 *Cormorant* was susceptible to the "cobblestoning" effect that had previously only been identified with Merlin aircraft variants of the EH-101.

Mr. King and Mr. Kendell demonstrated concern and effort well beyond the call of duty. Their work will undoubtedly be a key factor in the ultimate resolution of the CH-149 tail rotor half hub problem. For their commitment and diligence in ensuring the safety of flight for the entire *Cormorant* community, they are highly commended. ◆

Mr. King (right) and Mr. Kendell serve at 442 Transport and Rescue Squadron, 19 Wing Comox.

Good Show

For Excellence in Flight Safety

Master Corporal Rick Geiger

In August 2005, Master Corporal Geiger was tasked to investigate a flight safety occurrence on *Aurora* CP140110 for venting fuel while taxing. The consensus in the crew room was that it was not abnormal to have venting fuel with a sixty thousand pound fuel load and that there was really nothing to investigate. The Squadron was at an alert fly state and under significant pressure to get the aircraft serviceable for the next day's missions.

While various trades worked the other snags on the aircraft, Master Corporal Geiger decided to review the aircraft fuel system in the Canadian Forces Technical Orders (CFTOs) and the aircraft's history in the ADAM system. He discovered that the aircraft had vented fuel while taxiing less than a month earlier. This previous snag had been traced to a fuel vent valve which had detached from the manifold and was found floating inside the number 1 fuel tank. Given this, Master Corporal Geiger decided that the tank would have to be opened in order to check all the fuel components and plumbing.

By the time the other trades finished fixing their snags and the power could be turned off to permit the fuel tank to be opened, Master Corporal Geiger's shift was over. Nevertheless, he agreed to stay late into the midnight shift to continue with the investigation.

The fuel tank 'manhole cover' was removed for access and on the first look through the tiny opening everything seemed in order - the aircraft could be made serviceable for the morning mission. Still not satisfied, Master Corporal Geiger went back to the CFTOs to get a better understanding of fuel valve and component placement in the fuel tanks. He then insisted on taking another look before the panel was closed up. When the second visual inspection revealed nothing amiss, to the

extend his arm could reach, he traced all the components and fuel ducting with his hand. At the very back of the tank he found an open pipe that felt like it had a threaded collar that was lock wired but that ended in an open tube. For the third time he went to the CFTOs to see if this was normal. Finally, after reviewing the diagrams and component descriptions, he discovered that the second fuel vent valve was missing.

The extra time and effort spent consulting the CFTOs the second inspection and then the 'feel' inspection are testaments to Master Corporal Geiger's excellent initiative and professionalism. His dedication is all the more noteworthy given his willingness to work late and the pressure to sanction an aircraft for a high priority operation. Without question, Master Corporal Geiger's efforts prevented another environmentally hazardous fuel spill and during flight manoeuvres, may have averted an even more serious flight safety occurrence. ◆

Master Corporal Geiger serves at 14 Air Maintenance Squadron, 14 Wing Greenwood.

Good Show

For Excellence in Flight Safety

Sergeant André Hotton and Corporal Stephan Leblanc

In August 2004, while aiding another crew member perform maintenance on a *Hercules* on the government ramp in St. John's, Sergeant André Hotton and Corporal Stephan Leblanc noticed a civilian water bomber starting up only 50 feet in front of their aircraft.

Within seconds a stream of fuel venting from the water bomber's near engine ignited and produced a six-foot diameter flash fire under the aircraft. Both members immediately ran to the front of the aircraft and attempted to get the attention of the lone crewmember. While Corporal Leblanc stayed in front giving the "fire" hand signal to the Flight Engineer (FE) of the water bomber, Sergeant Hotton proceeded to the open crew door to alert the FE. Realizing the FE did not understand the signal, Corporal Leblanc ran to the crew door to aid Sergeant Hotton in evacuating the aircraft. Now aware of the fire, the FE shut down the aircraft prior to all three exiting to safety. With the fire dissipating, the St. John's Airport Crash and Fire Service arrived.

The speed and skill with which Corporal Leblanc and Sergeant Hotton reacted to this grave situation was exceptional. They went above and beyond the call of duty and there is little doubt that their intervention prevented serious injury to a fellow aviator, prevented the destruction of a civilian aircraft and saved the nearby Canadian Forces *Hercules* from damage or potentially, complete loss. ◆

Sergeant Hotton (right) and Corporal Leblanc serve at 413 Transport and Rescue Squadron, 14 Wing Greenwood.

From the

Flight Surgeon

Individual Water Disinfectants (IWD)

Fact: The Puritabs® water purification tablets that have been in use for years as IWD are being phased out from the CF Health Services (CFHS) supply system. They have an expiry date of 30 June 2006.

Fact: The Micropur MP1® water purification tablets have been selected to replace the Puritabs® tablets and are being introduced into the CFHS supply system. They will be coming to CF-approved kits near you soon (of particular interest to you: aircraft Rigid Seat Survival Kits (RSSK) and aircraft survival kits)… if not there already!

So what, some of you will say. Well, some people have raised questions as to what the difference is between the two products. Others, more importantly, have raised concerns about the safety warnings associated with the newer product versus the perceived absence of such warnings with the older one. Let's try to decipher all this.

Background – the nasty bugs out there!

Acquisition of waterborne disease is a significant risk in a survival situation when one relies on natural surface water as a source of "potable" water. This is true in Canada, even more so abroad where the risk can become quite substantial. When forced into such a survival situation, reducing your risk of contracting waterborne disease is essential.

Infectious agents with the potential for waterborne transmission include bacteria, viruses, protozoa, and parasites. Natural surface water may also be contaminated with organic or inorganic material from land and vegetation, biologic organisms that reside in soil and water… not to mention industrial chemical pollutants.

The risk of contracting water-borne disease depends on the number of microorganisms consumed. This is, in turn, determined by the volume of water consumed, the concentration of the microorganisms in the water, and the efficiency of the "water treatment system". Of course, additional factors include the virulence of the microorganism (i.e. the degree of ability of a microorganism to cause a disease) and the defenses (i.e. the immune system) of the person. Some microorganisms – very nasty ones! – (such as *Giardia* species, *Cryptosporidium* species, *Shigella* species, hepatitis A virus, enteric viruses and entero-hemorrhagic *Escherichia coli*) may cause illnesses even when a small volume of contaminated water is consumed.

Estimations of water safety cannot be made reliably on the basis of the look, smell, and taste of water. When confronted with a survival situation, one will have no reliable information or resources for evaluating or determining the quality of surface water sources.

Peel it, cook it, boil it so they say… but when thirsty use your IWD!

Having said all this, it goes without saying that one needs a safe and efficient way to "treat" surface water in a survival situation, thereby reducing the risk of contracting waterborne disease and ending up in a situation worse then that confronted in the first place.

But how to "treat" surface water in a survival situation? That's where the Micropur MP1® water purification tablets come into play.

Safe and efficient treatment of drinking water has been among the major public health advances of the last century. Without it, waterborne disease would spread rapidly in most public water systems served by surface water. Individuals (and small groups of people for that matter) in a survival situation can use a few of the techniques used in large-scale treatment plants. The main water treatment methods that exist out there are filtration, sedimentation, granular-activated carbon, heat, halogenation (chlorine, iodine), ozone, chlorine dioxine, silver ion, UV rays, etc. Needless to say, not all of these are available in a survival situation!

In a survival context, optimal water treatment may require a 2-step process (e.g. filtration followed by halogenation). Heat is generally effective as a 1-step process, but it will not improve the aesthetics (and taste!) of the water. New techniques that use chlorine dioxide (ClO_2), namely, may prove to be effective 1-step techniques in several situations.

The active ingredient in Micropur MP1® tablets is chlorine dioxide. Chlorine dioxide is released from interaction within the tablet itself, and is generated from sodium chlorite (one of the "culprits" for the precautionary statement on the package, the other "culprit" being sodium dichloroisocyanurate… but we'll come back to that).

Chlorine dioxide is well established as a fast and effective disinfectant. It is used by many large cities worldwide in municipal water-treatment plants, but, until recently, it has not been available in a stable form for use in the field. Other than

ozone, it is the only disinfectant that has been demonstrated to be effective against *Cryptosporidium* and *Giardia* species in commonly used concentrations.

Micropur MP1® tablets

As alluded to above, sodium chlorite is a precursor of chlorine dioxide, i.e. it gets transformed into chlorine dioxide once in solution; sodium dichloroisocyanurate shortens the induction period for chlorine dioxide production, i.e. it initiates chlorine dioxide in the initial period and is mainly consumed in the process. When used properly (proper quantity of Micropur MP1® tablets, i.e. 1 tablet per litre of water, and proper contact time, which should be 30 minutes to 4 hours depending on the conditions of the water), one ends up with the active ingredient, chlorine dioxide, in solution in water at the proper concentration. Chlorine dioxide is NOT chlorine (although it has the word chlorine in its name), nor is there chlorine in "chlorine dioxide". One can see Micropur MP1® tablets as a stabilized form of chlorine dioxide; it contains no active chlorine or iodine.

Interesting differences between Puritabs® and Micropur MP1®

Puritabs® tablets kill bacteria and viruses, but are NOT effective against *Cryptosporidium* and *Giardia* cysts.

Micropur MP1® tablets kill bacteria and viruses and are somewhat effective, given the right conditions, against *Cryptosporidium* and *Giardia* cysts.

Micropur MP1® is the only US Environmental Protection Agency (US EPA) registered purification tablets on the market. The US EPA "signed off" on the bacterial, viral and cyst inactivation studies.

Chlorine dioxide leaves virtually no taste when used according to instructions and does not discolor the water. It can actually improve the taste and odor of treated water. Importantly, it does NOT present any concern regarding significant formation of trihalomethanes (TMHs), which can be a concerning bi-product in halogenated (e.g. chlorine) disinfection processes.

Presentation of Micropur MP1®

Each Micropur MP1® tablet is individually sealed (in foil packaging). The tablets are packaged in strips of 10 tablets (2 x 5), three strips per package, enough to treat 30 litres (each of the 30 tablets included per package treats 1 litre of water). Each strip is about 15 cm x 7 cm. It has a three-year storage life.

Directions for use

Directions for use that come in the Micropur MP1® package state:

For control of bacteria, viruses and cysts: use to kill bacteria, viruses and cysts (*Cryptosporidium* and *Giardia*) in water.

To use: Remove the tablet from its foil packaging with knife or scissors and quickly insert into litre of contaminated water. Allow appropriate time to react up to 4 hours in an area away from sunlight to generate a use solution of 4 ppm chlorine dioxide. The treated water is now ready for drinking.

Wait (contact) time

Wait (contact) time for Micropur MP1® is as follows: simply wait 15 minutes for viruses and bacteria in all water, 30 minutes for *Cryptosporidium* and *Giardia* in normal water under typical conditions (20ºC, clear water), and 4 hours for *Cryptosporidium* and *Giardia* in worst case water (4ºC, very dirty) before drinking.

That being said, the US EPA has required that the instructions allow 4 hours for treatment. Why? Fulfilling the role of protecting "consumers", the US EPA requires that Micropur MP1® packaging communicate how the product performs in the most challenging water conditions (water that is very cold and dirty). Although one can be reasonably comfortable with 30 minutes in all but the coldest and dirtiest water, labelling requirements include a 4-hour wait (contact) time for maximum "user" protection.

As a reminder, of course, water with high visible contamination concentrations should be filtered first in any case (not always obvious in a survival situation!), even if just to remove the largest contaminants with some cloth (or a coffee filter!).

Safety warnings associated with the newer product (Micropur MP1®) versus the perceived absence of such warnings with the older one (Puritabs®)

The Precautionary Statements included in the Micropur MP1® commercial package inform the reader/user that the content is corrosive. That is because the 2 ingredients in the tablets, sodium chlorite and sodium dichloroisocyanurate, are corrosive products. Hence the statements about the hazards associated with such corrosive products: may cause eye damage and skin burns; harmful if absorbed through the skin; harmful if swallowed; do not get in eyes, on skin or on clothing, etc. Such precautionary statements usually accompany the use of any corrosive product (including the ones used for chlorination of swimming pools for example).

It is important to realize that Puritabs® tablets, and their main ingredient, sodium dichloroisocyanurate, were no different in the sense that they, too, contained (and still do), as stated above, a corrosive product.

Tablets such as Micropur MP1® (and Puritabs® for that matter) should, once removed from their packaging (made of foil for Micropur MP1®), go directly into the water to be treated. Period. DO NOT consume/ingest/swallow the dry tablets right out of the packaging! Once in solution, at the proper concentration and after the proper contact time, the story (about the corrosive ingredients) becomes obviously different.

In conclusion

Normal "common sense" precautions when handling the Micropur MP1® commercial package, including the foil packaging that contains the tablets, should minimize the risk of coming in direct contact with the tablets (i.e. with the corrosive ingredients before they go in solution). When you actually need the tablets – i.e. when you need a drink! – as long as a reasonable level of caution is used when opening the package, there should not be any problem. If there is, follow first aid instructions (which are first aid instructions for corrosive products) that come with the product.

Bottom line: Puritabs® tablets should have been (and should still be!) treated with the same respect as Micropur MP1® tablets, and vice versa.

Use IWDs according to instructions, be careful when handling the tablets (as one should always be with any corrosive product)... and by all means, drink safely!

Given that aircrew and passengers confronted with a survival situation are unlikely to use this purification method for long periods, the risks of adverse health effects are minimal if used as designed. The risk associated with NOT using the Micropur MP1® tablets and drinking untreated water is much, much larger. ◆

Maj Martin Clavet,
DFS Flight Surgeon

Autorota
Second Nature?
or Second Guess


Photo: Mike Nowak

By Dan Megna.

Proponents and critics of training full-down versus power recovery autorotations have long argued the risks and benefits of each. But, which one is right for you?

It happened just the way everyone said it would -- when I least expected it. It was late at night and my partner, deputy (now sergeant) Jon Shellhammer, and I were heading back to our base. Flying for the San Diego County Sheriff's Department (SDSO), we had just spent several hours supporting public safety calls throughout the county. We were tired and ready to go home. Our route back to the airport took us over what we jokingly called "the black hole" -- a five-mile transition across a large expanse of canyons and closely spaced rolling hills that were completely undeveloped. The only lights we could see were from the city in the distance.

As we crossed the midway point, we were about 500 to 800 feet AGL and our MD 500D was scooting along at 100 knots. Suddenly -- without warning -- our Allison C20B flamed out. The horn wailed, panel lights lit up, and the machine yawed left. Interestingly, neither of us panicked. I recall feeling almost at ease as we entered autorotation. Descending through the blackness, the lights of the city disappeared behind the hills. Left with only the aircraft's landing light and searchlights to aid us, we picked our spot among the rolling terrain and boulders. It wasn't until we were safely on the ground that the adrenaline rush and reality of what had happened caught up with us.

Shellhammer had been flying at the time, and said, "I instinctively reverted to my training," when asked what he did upon recognizing the emergency. In spite of a rapid and clean entry into the maneuver, there were several challenges to deal with. "Halfway down, I noticed that my airspeed had dropped to 40 knots. I nosed the aircraft over to regain some airspeed. As I neared the ground, I flared, and realized my nose was yawed slightly left. As the helicopter's skids contacted the ground, I felt that we might rollover to the right as we had a slight right lateral drift. But, the aircraft contacted the ground and simply sat there." The following morning, a close examination of the landing site revealed that the helicopter's forward airspeed had apparently been zeroed in the flare and that the aircraft had slid to the right less than a foot.

Many people don't believe my claim of feeling "almost at ease" during the emergency, but Shellhammer had made it a point to take advantage of a department policy encouraging crews to practice and become proficient and confident in performing emergency procedures, including autorotations. We shot power recovery autos (PRAs) from just about every conceivable flight profile, daytime and night, to improved and unimproved sites.

The SDSO has also, for many years, contracted Western Helicopters of Rialto, CA, for an hour of touchdown autorotations (TDAs). In recent years, this has become a twice-a-year affair, providing pilots with an hour of TDAs at night too. Said Shellhammer: "I am a firm believer that my performance during that auto was because of my practice and our department's willingness to send us to full-down autos."

tions:

Are Power Recoveries the Safer Route?

Chin Tu, owner of Civic Helicopters, Inc., based at Palomar Airport in Carlsbad, CA, has over 19,000 hours in helicopters, of which over 14,000 are instructional. He shared his thoughts with *Vertical* on power recovery training: "When properly executing a power recovery autorotation, the pilot brings the helicopter in an autorotative state from an assigned altitude, all the way down to minimum airspeed and minimum skid height above ground without the benefit of engine power. Then, and only then, the pilot brings the engine power back to a normal setting to sustain the hover. This training affords the training pilot the opportunity to experience the entire autorotation maneuver to a three-to-five-foot hover above ground.... The training pilot can understand and learn the process of touchdown autorotation (building block learning process) without actually doing the more risky touchdown autorotation."

Tu told us that a student's ability to learn full-down autorotations depends on their perception of the maneuver. "If the pilot feels threatened while learning the touchdown autorotation, the perception does not lead to insight, and the learning process is weakened or stopped in its tracks. If the pilot enters the autorotation knowing this maneuver will end with a power recovery, there is the assurance of safety, and the pilot is able to devote more attention to learning the maneuver instead of worrying about a possibly unsafe outcome."

For some pilots, said Tu, full-down autorotation training is not necessary. Depending on the mission, and the make and model a pilot is likely to fly, the risks of damage may outweigh the benefits to be gained. "In most cases, good power recovery autorotation training is more beneficial to the pilot than touchdown autorotation training, especially when the pilots are relatively low-time or inexperienced." Tu does feel that TDA training would benefit most professional pilots regularly flying single-engine helicopters. Indeed, he would like to see TDA training incorporated into scheduled recurrency training.

A Mix of Both is Often Best

Joe Sheeran, a 12,000-hour helicopter pilot, DPE, and owner of Vortex Helicopters, a flight training school in Long Beach, MS, believes in the value of both PRAs and TDAs. "Training in both power recovery and touchdown autorotations has its place," stated Sheeran. "I think the FAA has it right by requiring CFI applicants to be proficient in touchdown autorotations. I also believe CFIs should be very proficient in power recoveries as well. After all, this is what they will be teaching most often." Sheeran agreed that the power recovery autorotation is very useful in teaching primary students the basic mechanics of the maneuver -- the entry, glide, RPM control, turns, and spot landings. He has found that it is also a great co-ordination maneuver. "All this can be taught with less risk than is associated with the touchdown autorotation."

For pre-solo students at Vortex, PRA training is an emphasis item. At the stage one phase check, students demonstrate a straight-in autorotation to a power recovery, without any assistance, and to within 100 feet of a pre-determined spot. In stage two, simulated forced landings to a power recovery become more frequent. This is also when the student is introduced to night flying. But, Sheeran was quick to point out: "We do not teach autorotations at night. I feel the risk involved outweighs the benefits." At stage three, students must continue to demonstrate proficiency as they did in stage one, and, at this point, the private, practical test is taken.

For those students continuing on to commercial and CFI ratings, Vortex maintains an emphasis on emergency procedures. All autorotation training, though, even at the advanced stages, are practiced with a flight instructor. Flight instructor applicants learn how to teach autorotations, and this is when the CFI candidate is exposed to touchdown autos. Sheeran is the only Vortex instructor teaching TDAs, and they are always done with extreme precision to a hard surface. Each candidate does anywhere from 80 to 120 TDAs.

The Case for Full-Down Training

Western Helicopters' chief pilot, Pete Gillies, stated that PRAs are very helpful in re-learning the glide and maneuvering characteristics of one's helicopter, and in practicing the art of the flare -- which is where most real autorotations are made or broken. But, TDAs should become part of every pilot's training if they wish to grow in proficiency, skill, and knowledge of emergency procedures. "Any helicopter pilot can get the ship down to three feet above the ground if the engine quits or the driveline fails, but from there to ground contact is where the problem occurs.... there is absolutely no substitute for training that takes the helicopter all the way to ground contact."

Gillies also stated that there is a dark side to PRAs. "All too often, an exceedance will occur during the power recovery phase. An over-torque, over-temp, or engine/rotor RPM exceedance can easily occur if the maneuver is not terminated properly. If this happens on a check ride, the examiner will often end the check ride right there, and an inspection of the helicopter may be required."

Mark Friskel, an instructor with MD Helicopters' plant in Mesa, AZ, has been training military and civil helicopter pilots for 26 years, much of it spent teaching TDAs. "Power recovery autorotation training serves a purpose," remarked Friskel, "but it is not a complete or replacement maneuver for touchdown autorotation training. Power recovery autos should be used as a lead-in for touchdown autos and for training in selecting suitable or most favorable landing areas for engine failures. During a power recovery autorotation, the pilot needs to be aware that as soon as the throttle starts back to the fly position, the maneuver is over. The rest is not representative of a touchdown autorotation. If Nr is above normal power on RPM, there is some training value until RPM is decreased to the point where N2/Nr are joined. This is probably just prior to the aircraft being leveled to a landing attitude. If the pilot can bring the aircraft to a hover without a large power spike and very little ground movement, it would probably have been a respectable auto. If there is a large power spike, large yaw, and large RPM droop, the pilot may have [had] to rely on the aircraft structure's ability to absorb impact and save his life."

At Bell Helicopters, chief flight instructor Marty Wright related to *Vertical* that his company believes single-engine pilots must master all the facets of the autorotative maneuver. "I admit that there is a great deal of value in terminating the maneuver with power at a hover, but any mystery about what would happen in the touchdown is gone after doing power-off autos, including those to the water.... It is difficult to quantify a pilot's confidence in himself and in his aircraft after he has done some touchdown autos, but it is genuine and it is valuable. This will instill, again, a greater pilot confidence in mastering the aircraft and controlling its systems...."
To mitigate the risks involved in full-down training, Wright recommends using a vendor who can provide qualified instructors experienced in training these maneuvers.

As far as Bell is concerned, the autorotation is, "the most committed maneuver" a pilot may be called on to perform. Said Wright: "If it ever happens to a pilot, he only gets one shot at doing the autorotation -- there will be no go-around if it isn't looking right." Because of this, he stated it is imperative that this skill be practiced annually, or it will deteriorate dramatically.

Wright also said that pilots regularly flying in darkness should have their annual training incorporate night time emergency procedures, including TDAs. However, he cautioned: "The night full-downs require that the instructors remain current and practiced in a very good standardization program to optimize their skill level and ensure the safety of the training."

Annual Training is Essential

Deteriorating skills are precisely what a Riverside, CA, Sheriff's Department pilot pointed to as contributing to her near disastrous autorotation following an in-flight engine failure. Deputy sheriff Linda Morelli was flying a MD 500E on a routine police call one day when a chip light illuminated during a descending left turn, followed shortly thereafter by a flameout. "I didn't believe it to be an engine failure because I didn't get the significant yaw I recalled in training," she said. However, once she recognized the emergency, she entered the auto. "Things were actually feeling pretty good until I flared, leveled, and pulled what remaining collective there was." But, Morelli said that the aircraft just didn't feel and respond like she remembered in training. She said that her reaction at this point was, "Oh shit, we're going to hit hard...." She and her partner sustained major injuries and the aircraft was destroyed.

What went wrong? Lack of experience doesn't seem to be a factor. At the time, Morelli had an estimated 5,000 hours PIC. An Army helicopter pilot since 1980, Morelli had logged quite a bit of time flying a number of machines, including the OH-58 and UH-1H. As well, when she was preparing for her new job with the Sheriff's Department, she attended factory emergency procedures training at MD Helicopters, shooting a power-off autorotation there.

When Morelli first joined the Sheriff's Department, ongoing and recurrent training was a priority. The chief pilot then was Leo Bell. Said Morelli: "He was one of the best I ever had the pleasure to fly for. We did regular auto training because he believed in it." To maintain pilot proficiency, Bell would routinely challenge pilots with simulated engine failures, shooting autos to cul-de-sacs and parking lots. However, Morelli stated that after Bell left the unit, recurrent and emergency procedure training fell low on the list of priorities. "Our training program was weak." Indeed, she believed that the lack of training provided after Bell's departure weakened pilots' proficiency and skills, and may have played a factor in her accident.

Not surprisingly, Morelli is an advocate for regular emergency procedures training, especially autorotations. She stated that she really appreciated the insight she received from having the opportunity at MDHI to shoot a power-off auto and experience the flight characteristics with absolutely no engine power. "A lot needs to happen in that final distance [the flare]_ and doing a power recovery doesn't teach the feeling of having no power."

Individual Needs Are the Key

Not everyone agrees with the logic of training full-down autos, though. Swede Gamble, who has spent 32 years as an FAA aviation safety inspector, and is a helicopter specialist for the FSDO in San Diego, CA, has mixed opinions on training autorotations. Rooted in years of military and civilian helicopter flying, Gamble stated that the average private helicopter pilot may need to see TDAs, but "to train them to proficiency is questionable. More aircraft have been damaged in practice full-down autorotation training than in actual emergencies."

On the other hand, he did state that professional pilots who fly on a regular basis, as well as CFIs, need to train to proficiency. He is opposed, though, to autorotation training at night, whether full-down or power recovery. The exception is for pilots who routinely operate at night.

In any case, for those who operate twin-engine machines, it is okay to practice power recovery autos, but "going full-down in a twin is ludicrous."

Gamble said that only the CFI Certificate requires demonstration of a full-down autorotation, and the FAA recognizes the high level of proficiency required of an examiner to test a CFI candidate. In fact, the FAA recently designated certain inspectors as a "national resource," and only those inspectors will conduct the flight proficiency test for a CFI Certificate.

So, full-down or power recovery? There appears to be no absolute answer. Each type of training has its merits and advocates, and in many cases the views are based on personal experience and the needs specific to individual pilots and organizations. Based on my own experience, I consider the two hours per year of full-down auto training I receive as an insurance policy of sorts. Looking back 13 years on that night over a pitch black canyon, I don't even like to imagine what might have happened had my partner not been proficient in his skills, confident in his abilities, and had we not trained together as a crew. But, I'm smart enough to acknowledge the reality... I've talked with Linda Morelli after all. ◆

This article was printed with the permission of Mike Reyno, the editor of Vertical magazine - www.verticalmag.com/. It originally appeared in the October-November issue of Vertical.

A Bad Smell Over Alaska

I recently returned from a five year posting to United States Air Force E-3s in Tinker, Oklahoma. While there, I was a Senior Director (SD) in the 960th Air Control Squadron. Essentially, the SD is the senior weapons controller aboard the *AWACS* and is responsible for the air battle management in a given area of responsibility.

In the spring of 2002 we were returning from Exercise Cope Thunder in Alaska. At 29,000 feet and 200 nautical miles out of Vancouver heading southbound a controller on the front console reported smelling something strange. I immediately forwarded the report to the flight engineer (FE) who verified that he too could smell something. The Mission Crew Commander (MCC) then ordered all crewmembers to get on oxygen and report in on the intercom. The aircraft commander (AC) ordered the forward firefighting team to investigate the noxious fumes, suspected to be emanating from the forward lower lobe. The firefighting team went down into the lobe and began to search for the source of the fumes.

While this was going on, the AC and the FE ran the checklist for smoke and fumes in the cabin. They reached the stage where the radar is to be turned off and the FE reported this to the MCC. The MCC responded that for operational reasons he did not want to turn the radar off and since all the radar equipment is located in the aft lower lobe the source of the fumes couldn't possibly be radar related. The AC, though quite worried about the noxious fumes, did not argue the point and told the FE to leave the radar on. Meanwhile, the firefighting team continued to search for the source of the fumes but without luck.

The forward lower lobe is crammed full of radio equipment and movement is severely restricted. In fact, only the smallest crewmembers are able to move around in that area of the aircraft. At this point the cabin was visibly full of smoke, the fumes were intense, and the AC declared an emergency with Vancouver Centre. In order to vent the aircraft we need to descend below 10,000 feet; the AC informed ATC of our intentions to descend and vent in order to reduce the intensity of the smoke and fumes. While descending, the firefighting team finally found the source - a radar relay switch had over heated and was melting. Upon hearing this, the MCC instructed that the radar be turned off. The smoke and fumes slowly dissipated.

As it turns out, there is one piece of radar equipment in the forward lower lobe - a relay switch! The MCC was unaware of this and pressed by "operational reasons" exacerbated a dangerous and threatening emergency.

One day I'll likely be in the MCC chair so I took away a few lessons:

1) never make assumptions;
2) never give technical advice unless you are the subject matter expert; and
3) checklists are tried and true - follow them to the end. ◆

Captain Scott A. Hoffman, A3 Aerospace Readiness, 1 Canadian Air Division, Winnipeg.

Be Aware of the Threat!

In my previous life, I instructed in the CH-146 *Griffon* helicopter Full Motion Flight Simulator. This 1998-vintage simulator replicates the *Griffon* helicopter cockpit, and allows aircrew to fly in mountainous, desert, and even arctic environments. It can also simulate enemy forces, such as aircraft, tanks, and ground troops.

Photo: Master Corporal Bob Earl, Land Aviation Test and Evaluation Flight, CFB Gagetown.

The CH-146 *Griffon* simulator at 408 Squadron, CFB Gagetown.

One of the advantages of the simulator is that you can expose crews to situations that would be extremely dangerous in real life. Typical mission profiles are daytime emergencies, instrument flight emergencies, night emergencies, and a tactical mission. While the emergency trips are straightforward, the tactical trip is not. Crews must fly to different areas on a composite mission.

I briefed one crew in particular that they would be flying in a hostile environment. When crews hear that someone might shoot at them, their first reaction is to cancel the trip. While this might be the best option, missions must often proceed regardless. Sometimes the threat level may be low, but someone might decide to shoot at you out of the blue. Wrong place, wrong time.

The full briefing I gave was - as part of a resupply mission, this crew was to land in several areas, dropping off supplies. They were told that the threat level was currently low, but that they would fly over armed troops. Twenty minutes into the flight, the crew nonchalantly flew straight down a valley at 500' AGL, and were promptly shot down by a Man Portable Air Defence missile (MANPAD). The aircraft shook and started to spin. The master caution panel lit up like a Christmas tree, indicating multiple failures. The cockpit was flooded with engine noise and warning tones. Despite the pilot's best attempts to control the aircraft, it crashed into the side of a mountain and then rolled over several times.

Inside the simulator.

During the subsequent debrief, the crew was asked how they could have survived. They suggested lowering the collective quicker and entering autorotation. Although these reactions can help, once a missile is inbound toward you, your options are very limited. The best defence in a situation like this is to avoid it.

Flying in a potentially hostile environment is much like walking through a crime riddled city - you need to avoid the dangerous parts of town; you need to ensure that you are not an attractive, nor an easy target; you must remain aware of where you are, and who or what is around you; and never walk alone through the back alleys humming along with your MP3 player.

Likewise, aircrew need to determine which areas of their track might be the most dangerous. A tactical helicopter is a high-value target, and must fly low, use contours and terrain, and even the cover of darkness to stay out of sight. The aircrew cannot afford to get lost, and must stay vigilant for areas that could hide possible enemy concentrations. They must always keep an escape route in mind.

The best defence is to fly cautiously, and maintain a very high situational awareness. You never know when someone may shoot at you. The best defence is to always fly carefully, and remain aware. ◆

Major Adam Cybanski, Information Technology and Training, Directorate of Flight Safety, Ottawa.

Photo: Master Corporal Andre Chayer, Land Aviation Test and Evaluation Flight, CFB Gagetown.

Good Deal on a Maglite!

Every maintainer knows the official policy concerning tool control and personal tools. That does not necessarily stop some from using tools that they have purchased and brought onto the flight line. An incident that happened to me many years ago caused me to examine the practices that I followed and moved me towards following proper tool control policy.

This incident occurred back when I was a private working on the CP-140 *Aurora* at 14 Wing Greenwood. It was a cultural norm within the squadron to go out and purchase a "Swiss Army Knife" and a "Maglite" pocket flashlight at the American exchanges while on deployment. I was no exception and during my first deployment I purchased a knife and flashlight at the exchange in Jacksonville.

Over the next 2 years I found my Maglite and Swiss Army Knife to be extremely handy. Instead of signing out a tool pouch I would just use my personal tools for checks and minor snags. I knew that this was against the CF tool control policy but I felt that I was just doing what everyone else was doing. Little did I know that my view on tool control was about to change?

One evening shift I was tasked to repair a cannon plug connecting to the Automatic Flight Control System (AFCS) control box. I went to the tool crib and signed out the tools required for replacing the plug. I did not worry about getting a tool pouch since I had my Maglite and Swiss Army Knife. I proceeded out to the aircraft and removed the AFCS control box from the center console. Since I was working on aircraft wiring, I made sure there was no power on the aircraft and used my flashlight to see what I was doing. I replaced the cannon plug and was about to reinstall the control box when my hand bumped my flashlight. To my horror I watched my Maglite fall into the hole in the center console where the control box had been.

I peered down into the hole in the center console and there, shining up at me, was my flashlight suspended between two control wires. I was extremely lucky. Where the flashlight was situated I was able to reach down the length of my arm and retrieve it. Had the light not landed where it had it would have fallen another two feet and been completely out of reach. This would have been a major snag requiring the airframe techs would to break the pressure seal of the aircraft in order to gain access to

the compartment. I reinstalled the AFCS control box and then went to my supervisor and informed him what had occurred.

I consider myself very lucky given the way things turned out. When the flashlight fell through the hole all the reasons why we had tool control flashed through my mind. Although there were no tragic consequences as a result of my actions, there was, and to this day there still is, a lasting lesson - not following proper tool control procedures can cause some nasty flight safety problems! Following his incident I left my Swiss Army Knife and Maglite home where they belonged and signed out the tools recommended and required for the job at hand. ◆

Master Corporal Paul Gairdner, 8 Air Maintenance Squadron Flight Safety, 8 Wing Trenton.

The Editor's Corner

The Chicken or the Egg

The chicken or the egg – which came first? Frankly, who cares… prepared in dozens of different ways they're both delicious! That was my clumsy segue into a comparison of our flight safety program and an egg. Let's start with an egg (think avian): geometrically, it is one of those perfect shapes - an ovate spheroid, an ellipsoid; biologically, it is a reproductive body, it is an element in the creation of new life and; structurally it is a protective layer, a shell that preserves, shields and safeguards it's contents.

So how exactly is an egg like the Flight Safety program? Well, in reverse order, the program is a shell, a layer of protection for aviation assets - both people and equipment. Like an egg, the program is both incredibly strong and extremely fragile. When following a simple rule – "hold this egg end-to-end and try to crush it" – you discover that the thin layer of protection is almost indestructible. But, without the instruction statement "end-to-end", without the rule, the egg is frail and easily destroyed.

Next, the program fosters regeneration. Broken aircraft are grounded, worked on and returned airworthy. Older, more experienced pilots, maintainers, controllers, drivers etc.… pass on their skills and knowledge to new personnel thus creating/generating a new cadre of capable, mission ready aviation professionals.

Last, the program is one of those almost perfect entities – it costs the individual nothing, yet it preserves limb, life and mechanical and structural assets. It's tenets of no blame and open reporting fosters a selfless cooperative team culture that has garnered praise and spawned duplication in safety programs around the world.

In summary, when understood, when followed, when employed properly, like an egg, the flight safety program is strong and protective. It is an element in the genesis and regenesis of aviation assets and in a system based world it's pretty darn perfect – if not tasty.

So on my behalf mark one for the egg.

Fly safe.

Correction:

In the Fall issue the photo of *Hawks* on pages 8-9 was incorrectly credited. Master Corporal Robert Bottrill of Combat Camera deserves the credit.

ON THE DIALS

NOTAMs: DO YOU REALLY HAVE THEM ALL? (PART 1)

The Instrument Check Pilot Flight, formally known as the ICP School, is once again pleased to grace the pages of Flight Comment. We plan to bring you the latest from the instrument flying world in our On the Dials piece. This first instalment, which is Part 1 of a two part series, was penned by our resident USAF Exchange Officer, Major Kevin McGowan. Kevin has travelled the world as an airlifter flying the mighty C-5 Galaxy. He talks about NOTAMs and before you pass this by because you already know all about them, I suggest you give a read…and maybe, just maybe, you might just be surprised.

Major Mike "Ruggy" Wolter, ICP Flight Commander

By: Major Kevin McGowan, USAF, ICP Flight

On October 5th, 2005, a Beech C23 Sundowner, after an uneventful flight, landed in Higginsville, Montana. Unfortunately, the pilot landed on a portion of the runway that was under construction and approximately 8 inches lower than the remainder of the runway. The subsequent impact with the existing runway not under construction resulted in the separation of all three landing gear from the aircraft. As it turns out, the pilot had not conducted a complete Notice to Airman (NOTAM) study and ultimately missed the fact that the runway was under construction. Luckily no one was injured in this mishap but the aircraft did sustain significant damage…

From day one of flight training, or at least shortly thereafter, we began to learn about the importance of checking the Notices to Airmen (NOTAMs) prior to flight. Over time it becomes a habit to ask ourselves "do I have all the NOTAMs?" Typically we say "Yes" else we wouldn't be stepping to the aircraft. However, before you enthusiastically exclaim that you've got them all, perhaps you should take a second look and verify that you do in fact have *everything* that you need from all the applicable NOTAM sources.

Of course, this begs the question, "What NOTAMs do I need to check?" and of course the follow-on question, "Where do I get them?" These questions may be a bit more involved than most might think.

As you're undoubtedly already aware, NOTAMs are a means of advising pilots of information "concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to personnel concerned with flight operations" (GPH 204B).

All CF aviators also know that getting the NOTAMs is a B-GA-100 requirement. Beyond satisfying the regulatory requirement, getting the NOTAMs can, at the very least, save you from embarrassment and at the very most, save your life. Mission Accomplishment is paramount and that includes getting your aircraft, crew, and passengers thru the mission in one piece. Thorough flight preparation is a key element in ensuring the successful accomplishment of the mission.

So, what does this mean to me, the operational pilot on the line? Simply put, you need to do your homework and ensure that you build enough time into your flight-planning schedule to do a complete NOTAM check. Unfortunately, however, there is no "one-stop shopping" option for this and the more airspace that you transit, and the more aeronautical information product sources you use, the more complicated the search process can be (especially if transiting multiple countries or using non DND products).

Why is it so complicated? The difficulty stems from the fact that the location in which NOTAMs are posted is dependant upon the products and/or facilities they are meant to service. As a result, pilots may have to consult a variety of sources to get all the applicable NOTAMs for the mission. To help ensure a successful mission, here's a list of NOTAMs that should be checked prior to departure:

a. Aerodrome NOTAMs,

b. Enroute NOTAMs,

c. Vendor Specific Product and FMS Database NOTAMs,

d. Attention Notices / Temporary Flight Restrictions / Special Notices (if appropriate),

e. FAA Notice To Airman Publication (if appropriate).

Lets break this down further by discussing each area of concern in turn.

Aerodrome NOTAMs:

Aerodrome NOTAMs are the given in any NOTAM search and needs hardly any further explanation. However, it's important to note that when a NOTAM from an aerodrome needs to be published, the information is submitted to the respective government's NOTAM system for publication. That government then formats it, typically in accordance with Aeronautical Information Regulation and Control (AIRAC) procedures and International Civil Aviation Organization (ICAO) Doc 8126, and enters the NOTAM into that nation's NOTAM system. Then, in most cases, they make it available to the general public and to the NOTAM systems of other

governments (such as the U.S. NOTAM system).

For those who fly internationally, it's important to note that several countries do not share all, or in some cases any of their NOTAMs with outside NOTAM systems. Canada is an excellent example of this practice. The inherent problem, of course, is knowing which countries, and in some cases aerodromes, publish all, some, or none of their NOTAMs in the international NOTAM systems. Luckily Annex 15 to the Convention on International Civil Aviation produced by ICAO dictates the who, what, when, where, and why of NOTAMs but this document is advisory in nature for "Contracting States" and thus a nation may opt to apply alternate procedures if so desired.

This latest point highlights a serious wrinkle in the acquisition of any NOTAMs, even when flying here in Canada or down south in the U.S. For example, because Canada does not publish all of its NOTAMs in ICAO NOTAM systems, using the DoD, or any other ICAO NOTAM database engine to retrieve the NOTAMs for your Canadian destinations will result in an incomplete list of NOTAMs being retrieved.

A list of the nations who either directly or indirectly share at least some of their NOTAMs with the DoD NOTAM system can be found in the FAA International Flight Manual (FAA IFM) which is available online at http://www.faa.gov/ats/aat/ifim/ifim0103.htm. A complete tabulation of International NOTAM exchanges among International NOTAM Offices (NOFs) and the areas of responsibility for each NOF is contained in ICAO Document 7383-AIS/503 in case you're interested. Moving south across the border, the U.S. system includes a series of NOTAMs known as "L" series,

or Local NOTAMs. Unlike "D" series, or Distant NOTAMs which may affect your ability to use an aerodrome and are published in the ICAO NOTAM system, the "L" series NOTAMs are distributed locally only and will include such data as taxiway closures, airport construction, runway obstructions, runway service condition, ground lighting system outages, etc.

Obtaining these NOTAMs may take a bit of effort and a bit more time. "L" NOTAMs can only be obtained by contacting the servicing Flight Service Station (FSS) or the airfield itself as they are not currently published in the DoD, FAA, or ICAO NOTAM systems. To help make this process a bit easier, the U.S. IFR Supplement and the Airport/ Facility Directory can be very helpful in determining the servicing FSS. In the Communications section of an aerodrome's entry, look for an entry that looks like "FSS-Riverside RAL-NOTAM RAL" in the IFR Supplement or "Riverside FSS" in the Airport/ Facility Directory. Next, call your local FSS (1-800-WX-BRIEF if your in the U.S. or 1-866-WX-BRIEF while still in Canada) and ask for the toll free phone number for the servicing FSS, in this case Riverside. Now all you have to do is call that FSS and ask for the Local NOTAMs for the aerodrome in question.

Now, will not getting these NOTAMs keep you from flying into an aerodrome? No, perhaps not, but it may keep you from leaving. For example, without the "L" NOTAMs, you could arrive at an uncontrolled aerodrome at night only to find that while pulling off the active onto the taxiway that you've always used, your aircraft falls into a recently dug ditch or hole. Or, perhaps you've pulled up to the self-serve gas pump only to find that it's no longer in service. And to make matters worse, you don't have enough fuel to hop to the next field with fuel. These aren't exactly killer incidents, but they certainly don't help mission accomplishment.

Now, while we're on the subject of aerodromes, you may already be familiar with the rapidly developing realm of RNAV approaches. These approaches have come a long way since the original GPS overlay approaches and now, effective October 27, 2005, WAAS approaches have made their way north into Canada. However, unlike other aerodrome approaches, NOTAMs for an aerodrome's WAAS approach may not be where you would expect them to be. If the WAAS outage will affect only a single aerodrome, the NOTAM will be posted in the applicable aerodrome's NOTAM file. If the outage will cover more than one aerodrome or a large geographic area, the NOTAM will be issued under the appropriate Flight Information Region (FIR) NOTAM file(s) instead. And to further complicate things, if the entire WAAS system or the accompanying WAAS monitoring system goes down, then a Canadian national NOTAM will be issued under the CYHQ identifier (the U.S. will publicize these outages in the U.S. Air Route Traffic Control Center (ARTCC) NOTAMs). Oh, and don't count on the controller protecting you on this one as there is currently no plan to notify ATC of WAAS failures unless the entire system goes down.

Enroute NOTAMs

Having checked the aerodrome NOTAMs, the next logical NOTAMs to check are the enroute NOTAMs. Checking the enroute NOTAMs means that you check the airway, ARTCC (Flight Information Region (FIR) and Upper Information Region (UIR)), enroute NAVAID facilities, airspace (including RVSM / DRVSM, Oceanic, etc.), and even the GPS NOTAMs if you intend to use GPS as a navigation source.

So what's the big deal about getting the NAVAID NOTAMs? Aren't they included in the ARTCC and aerodrome NOTAMs? Well, yes and no. To most people's surprise, internationally speaking, NAVAID NOTAMs are occasionally included in the ARTCC NOTAMs, but not always. Unfortunately, for the most part, the NAVAID NOTAMs must be obtained individually.

So how do we get them? Before we jump into how to retrieve them, lets talk about why it can be so challenging. NAVAIDs are broken into two basic categories, enroute and aerodrome NAVAIDs. NAVAIDs that are linked to an aerodrome will be included in that aerodrome's NOTAMs. This of course begs the question, which aerodrome is the NAVAID associated with? Well, if the NAVAID is located on an

aerodrome or is used for an IAP at an aerodrome, then it will be associated with that aerodrome. In which case, you will need to retrieve the NOTAMs for that aerodrome to see if the NAVAID is serviceable (even if you only intend to use it for enroute navigation).

If the NAVAID is not associated with an aerodrome and is only used for enroute navigation, then it will be included in the FIR NOTAMs. Well, actually, it will be in the FIR NOTAMs in Canada and some foreign nations but in the U.S., for example, the enroute NAVAID NOTAMs are not included in the FIR NOTAMs. In order to obtain these NOTAMs, you will need to add a "K" to the 3-character identifier for the NAVAID (SIE VORTAC becomes KSIE for the NOTAM search) and enter it into the NOTAM retrieval form just like any other ARTCC or aerodrome identifier.

If you're like most pilots, you're probably thinking that there has to be an easier way to do this and you'd be right, there is. Probably the easiest way to get the enroute NAVAID NOTAMs is to call your local FSS and tell them where you're going and then request all the enroute NOTAMs. The FSS should be able to tell you which NAVAIDs along your route of flight are inoperative. The next easiest way, assuming that you're flying in Canada or the U.S., is to perform a flight path NOTAM search.

For the segment of your flight that is in Canadian airspace, you'll need to use the NavCanada flight planning website (http://www.flightplanning.navcanada.ca) and click on the "Route Data" tab. Once there, enter your departure point, enroute points, destination, and alternate(s) into the Route Selection form. Then scroll down and select what types of NOTAMs and Weather Reports you want. A word of caution for those of you who cover long distances, this form will retrieve NOTAMs for all the facilities within 50 nm of either side of your track so be prepared for some reading. The beauty of this form is that it will find everything that may be of concern to you, even those NAVAIDs and towers that you probably wouldn't have found doing your normal NOTAM search.

Now, for the U.S. segment of your flight, you can use the DoD version of this form by using on the "Flight Path Search" or "Geographical Radius Search" options at the bottom of the new DoD NOTAM website (https://www.notams.jcs.mil). If you intend to remain within a set distance of your departure point then use the "Radius Search" option. Simply enter your departure aerodrome identifier (or a Lat Long) and a radius you want to search out to. This will then retrieve all the NOTAMs within that search area.

If you're leaving the local area, then use the "Flight Path Search" option. This form allows you to put in up to 5 points and a buffer distance. The ICAO waypoints can be either NAVAIDs or aerodromes but they must be identified with 4 characters. Then select what types of NOTAMs you want to retrieve. Of course, just like the NavCanada website, these engines will return everything you'll need for your flight but you may need to spend some time reading through it all to pick out the pertinent information.

Checking your enroute NOTAMs also means that you need to check the NOTAMs for the aeronautical information or FLIP products that you intend to use. While this latest point may sound a bit intimidating, it's really not that big of a deal. If you intend to use Jeppesen enroute charts, then check the Jeppesen Chart NOTAMs. If you intend to use the NavCanada charts or DoD charts, then checking the enroute NOTAMs in the respective NavCanada or DoD government NOTAM systems will highlight errors in these government-produced products. DoD Flight Information Publication (FLIP) errors can also be retrieved by clicking on the "DAFIF/Flip Chart Notices" button on the DoD NOTAM website.

As for worldwide ARTCC NOTAMs, they can be acquired by entering in the respective 4-character ARTCC FIR and/or UIR identifier(s) into the ICAO NOTAM Retrieval Form on the DoD NOTAM website and then clicking on the "View NOTAMs" button. If you don't know what the ARTCC identifier is, they can usually be found on the enroute charts along the FIR and UIR boundaries. If you're flying in the U.S., then you can scroll to the bottom of the page and then pick and choose which ARTCCs you want NOTAMs for. Or, if you're not intimidated by having lots of NOTAMs to read through, you can click on the "ARTCC TFRs" and

"FDC Notices" buttons to retrieve all the U.S. ARTCC NOTAMs.

Vendor Product and Database NOTAMs:

As military aviators, we're quite accustomed to flying with government Flight Information Publications (FLIP) such as those produced by NavCanada, the Department of National Defence (DND), Department of Defence (DoD), and the Department of Transportation (DoT). However, no agency is infallible and this goes for government agencies (such as those listed above) as well as commercial agencies (such as Jeppesen). And while we may be quite familiar with checking the government NOTAM systems, if you use private vender products, then you'll also need to check the NOTAMs published by these vendors for their products.

But errors on the Jeppesen products are published in the government NOTAM system, right? Yes and no. If the error on the chart is caused by a government induced change, then yes, the government NOTAM would also apply to and appear in the Jeppesen NOTAMs. However, while private vendors do want to ensure that their customers are aware of errors in their products, they **do not** publish NOTAMs identifying their own errors on the government or ICAO NOTAM systems.

This means that if you intend to use a product from a private vendor (such as Jeppesen), then you must obtain the NOTAMs for these products from that vendor directly. If you use a Jeppesen navigation chart or a Jeppesen Instrument Approach Procedure (IAP), then you need to check the Jeppesen NOTAM database for errors on each of these products (the Jeppesen NOTAMs can be obtained at: http://www.jeppesen.com/wlcs/index.jsp?section=resources&content=notams.jsp).

OK, so you already knew that you had to check the NOTAMs for your paper products, but did you know that NOTAMs are posted for FMS electronic databases as well? Just as IAPs and charts can have errors, so can your aircraft's FMS database. Some of these errors could be deadly if not caught. Let me take a moment to elaborate upon this latest point through an example.

Let's assume that you're flying an aircraft that's equipped with an FMS that utilizes a Jeppesen NavData database and you intend to fly from Ottawa, MacDonald-Cartier International (CYOW) to Toronto, Pearson International Airport (CYYZ). Upon your arrival you intend to fly the NDB (GPS) RWY 23 approach for training. You've checked the NavCanada NOTAMs for both locations and enroute and have found nothing that significantly affects your route of flight or the intended approach into Pearson Int'l. Unfortunately, however, by not checking the Jeppesen NavData NOTAMs you would have missed the following NOTAM:

"CYYZ, Toronto/Pearson Intl, Toronto, Ontario, LOC or (GPS) NDB Rwy 23 procedure not authorized."

Now, you may be thinking "So what? If it's not authorized then ATC won't let me fly it." Unfortunately, this is not the case. The approach is not authorized due to an error in the Jeppesen NavData FMS database and not because the approach itself has a problem. ATC assumes that you have the current and correct charts and as such, will clear you for the approach not knowing that the errors in your aircraft's FMS database could actually kill you.

The example below is an actual Jeppesen NavData FMS database NOTAM taken from the Jeppesen NOTAM site. As this error applied only to the Jeppesen FMS database, it did not appear in the government NOTAM system. Obviously, errors like this one could have serious safety of flight implications.

HAMILTON, AL; MARION CO-RANKIN FITE (FHAB) VOR or GPS RWY 18 [S18]

Incorrect Missed Approach Point Crossing Altitude

Jeppensen NavData for cycle 0511, effective 27 October 2005, contains an incorrect missed approach point crossing altitude at MAFTI waypoint on VOR or GPS Rwy 18 [S18] at Marion Co-Rankin Fite; Hamilton, AL (KHAB).

THEREFORE, THIS PROCEDURE IS UN-USABLE.

An example of where an approach is in the Jeppesen NavData database but has been NOTAM'd as un-usable on the Jeppesen NavData NOTAM website.

The aforementioned database error really drives home the importance of checking vender NOTAMs as well as completing a database check in accordance with existing procedures. The time to find these mistakes is on the ground and not in the air. NOTAMs like this make it very clear what the errors are and which approaches are unsafe to fly.

Of course, obtaining the NOTAMs does not absolve you of the requirement to check the aircraft database against a verified paper source but it does help ensure that you don't miss something that may not otherwise be so obvious in a busy cockpit. Take a look at the NavData NOTAMs and Alerts (which are also found at http://www.jeppesen.com/wlcs/index.jsp?section=resources&content=notams.jsp) and you'll notice that they're full of examples of incorrectly stored routings, altitudes, fix locations, etc. that could have a significant impact upon your flight. Items that you don't want to chance not finding when it really matters. Jeppesen posts alerts as required and then roles these alerts into a "pdf" NOTAM file every two weeks where they will remain until corrected in a future release of the NavData FMS database. To access the NOTAM file, scroll to the bottom of the "NavData Alerts and NOTAMs" page and click on the region that you're interested in.

It's also important to note that the Jeppesen NOTAM website doesn't include the normal government NOTAMs either. Although they may have a few of the same

NOTAMs (such as those defining a change in a federal airway because it will affect their charts as well), Jeppesen makes no claim that their system is all inclusive and as such, they expect the pilots to check the proper government NOTAM system as well before flying. With that being said, the Jeppesen Flight Planners will provide you with the government NOTAMs that you have requested in your account profile. Of course this means that you must have an account with Jeppesen and you must have a NOTAM profile already properly setup else you will be given only the basics. Furthermore, don't waste your time asking your local Flight Service Station (FSS) in either country to provide the NOTAMs for your non-government vendor products as they don't have access to these Notices.

Now, having said that, let me pass on one more word of caution. It is always a good idea to verify the integrity of your FMS database against a NOTAM verified paper product that was not produced by the same vendor as the FMS database. Of course, this is not always possible due to the very nature of our job but it is during these rare occurrences that we should be extra vigilant in our verification process.

If you use the DoD Digital Aeronautical Flight Information File (DAFIF) information to populate your FMS database, then these NOTAMs can be obtained on the DoD NOTAM website by clicking on the "DAFIF/Flip Chart Notices" button. Clicking on this same button will also provide you with the current Active DoD FLIP NOTAMs (charts, FIH, Enroute Supplements, etc.).

General Planning (GP), Area Planning (AP), Planning Change Notices (PCN), Change Notices (CN), and Terminal Change Notices (TCN):

Due to the frequency of publication of the U.S. FLIP, Planning Change Notices (PCN) for the GP and AP series, Terminal Change Notices (TCN) for the DoD IAPs, and Change Notices (CN) for the DoT/ FAA IAPs are published between cycles to cover changes and/or errors in their respective products rather than posting long term NOTAMs. Once the PCN, TCN, or CN is published, the correspon-ding NOTAMs may be removed from the NOTAM system. So, if you intend to use these products don't forget to verify that it is in fact current and that you have the necessary Change Notice(s). Failing to use a PCN, TCN, or CN that's effective will result in you flying an outdated and possibly erroneous IAP.

So, how do you know if there's a PCN, TCN, or CN in effect for your particular publication? Well, on the front cover of the GP and AP you'll find a PCN Effective date whereas on the DoD and DoT / FAA IAPs you'll find a TCN Effective date or a CN Effective date respectively. In the event that you don't have these products stuffed in your bag or in the mission planning area of your unit or neighbourhood FBO, the GPH series, and the accompanying PCNs, can be viewed online at https://164.214.2.62/products/digitalaero/index.cfm. The DoD IAPs (and TCNs) can be obtained online at https://164.214.2.62/products/digitalaero/index.cfm, and the DoT / FAA IAPs (and CNs) can be found at http://www.naco.faa.gov/index.asp?xml=naco/onlineproducts.

So, that's it. We can go flying now, right? Not quite. There are a couple of dark corners left to explore in our NOTAM world. We'll illuminate these in the next issue of *Flight Comment.* ◆

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

MAINTAINER'S CORNER

FATIGUE AND PERFORMANCE

One of the most insidious aspects of fatigue is the inability of the sufferer to recognize deteriorating performance.

This article is reprinted with the permission of Transport Canada's Aviation Safety Letter.

By Jacqueline Booth-Bourdeau, Chief Technical and National Programs, Aircraft Maintenance and Manufacturing, Transport Canada, Civil Aviation.

One of the most insidious aspects of fatigue is the inability of the sufferer to recognize deteriorating performance.

When we talk about fatigue in aviation, we usually think of pilots. We know that fatigue-induced human performance errors are a causal factor in many operational incidents and accidents. This realization has lead to a profusion of research and regulatory activity in the form of duty time regulation. The pilot fatigue equation is easy to grasp. Pilots face operational demands that can include trans-meridian travel, night work, shift work and irregular work schedules. We tend to focus on the pilot issue because of the immediate consequences of a fatigue-induced error. It's a simple formula; pilot falls asleep, aircraft crashes.

From the maintenance perspective, it's not quite as clear cut. The connection between fatigue and maintenance error is not as well defined, nor as well

documented. This is in spite of the fact that physiological challenges are still the same: shift work, night work and long working periods. The link between fatigue performance-impairment is somehow perceived as less critical because the maintainer is not seen as being on the front line. The fact remains, however, that many maintenance tasks are performed in the middle of the night when the propensity for human performance error is at its greatest. This assertion is borne out by a growing body of evidence documenting performance degradation at the circadian low point: the middle of the night.

Fatigue-related performance degradation is not just isolated to shift work and night work; it is also associated with long shift durations and the number of consecutive days worked. Professor Drew Dawson at the University of South Australia has equated fatigue-related impairment to alcohol impairment. His research has shown that after 17 hours of wakefulness, fatigue-related impairment is equivalent to a blood alcohol level of 0.05 percent. After 24 hours of wakefulness, this increases to 0.10 percent — well over the legally prescribed limit for operating a motor vehicle.

Perhaps one of the most insidious aspects of fatigue is the individual's inability to recognize when their own performance is deteriorating, and to take appropriate actions. Of course, in the 24-hour-a-day aviation industry, it's usually impossible to quit work when you are feeling tired. The economic considerations of the aviation industry demand that maintenance be completed in an expeditious manner, which often means continuing to work until the job is done. There may also be good safety reasons for the occasional extension of working hours. For example, it may sometimes be necessary to weigh the possible effects of fatigue against the potential for miscommunication in handing over a partially completed job to another person.

So, what are the options? From the perspective of the individual, there are measures that can be taken to manage fatigue. This might be as simple as improving your awareness of the symptoms of fatigue, or as complex as a night shift adaptation program. Fatigue management, however, is a shared responsibility between the employee and the employer. In effect, the employer should ensure that all work-related causes of fatigue are effectively managed, and the employee should ensure that all non-work-related causes of fatigue are minimized.

From the government perspective, the issue of fatigue management is not likely to be as simple as dictating duty time through regulation. After all, while duty time regulations do limit hours of work, it is impossible to regulate the hours that one sleeps. It is a common misconception that time off means restorative rest. Only sleep will restore alertness and only the individual can ensure that they get sufficient sleep. The responsibility is yours — take action against sleep deprivation and opt for a stable restorative rest period between shifts and family obligations. The short- and long-term benefits will reward you with a productive and fulfilling life. ◆

Photo: Sergeant Jeff DeMolitor, Land Force Trials and Evaluation Unit, CFB Gagetown.

EPILOGUE

TYPE: ***Hercules* CC130327**
LOCATION: **Kabul, Afghanistan**
DATE: **29 July 2003**

During a low-level egress out of Kabul on a mission in support of Op Apollo, the crew made a navigational error and unwittingly placed themselves in a mountain box canyon. In an effort to avoid rising terrain, course reversal was commenced during which the aircraft was overbanked in order to avoid previously unseen terrain. A combination of high bank angle and low airspeed resulted in the onset of aerodynamic stall. The pilot executed stall recovery procedures from which the aircraft recovered, clearing terrain by 250 feet. There were no injuries or aircraft damage.

The investigation determined that the crew, familiar with the area and confident in operating in the low-level environment, had reduced their mission planning efforts. This pre-departure deficiency eroded the crew's situational awareness once airborne, precipitating a navigational error. In dealing with this error, the crew entered a valley that proved to have steeply rising terrain. Part way through the turn to escape the valley, a ridge that was previously masked by shadow, was detected. The pilot increased bank angle and during this avoidance action, bank angle and airspeed ideals were compromised, resulting in stall buffet. The crew did not configure the aircraft flaps in anticipation of, or while manoeuvring in mountainous terrain. This oversight decreased the aircraft's stall margin.

The investigation also determined that fatigue factored into the crew's performance. Affected to some extent by acute fatigue ('jet-lag') and chronic fatigue ('sleep-debt'), the crew was operating while fatigued. The crew did not exercise their option of calling a "time-out" – they perceived a definite pressure to get the job done. The operational imperative emphasized at the time may have created a mindset in the crew to push personal limits, thus unwittingly promoting skewed decision-making processes. The crew did not advise their Chain of Command of their fatigued state in an effort to seek other risk mitigation strategies.

Recommended safety actions included a sleep/fatigue study on C-130 aircrew at Camp MIRAGE and an amendment to applicable orders pertaining to mountain flying training. Outstanding recommendations include the development of an Air Force pharmacological policy aimed at mitigating the risks associated with fatigue and an examination of the concept of developing a tactical risk assessment process. Additionally, further assessment of mountain flying training was recommended. ◆

EPILOGUE

TYPE: *Sea King* CH12419
LOCATION: HMCS CALGARY, Straits of Hormuz
DATE: 21 August 2003

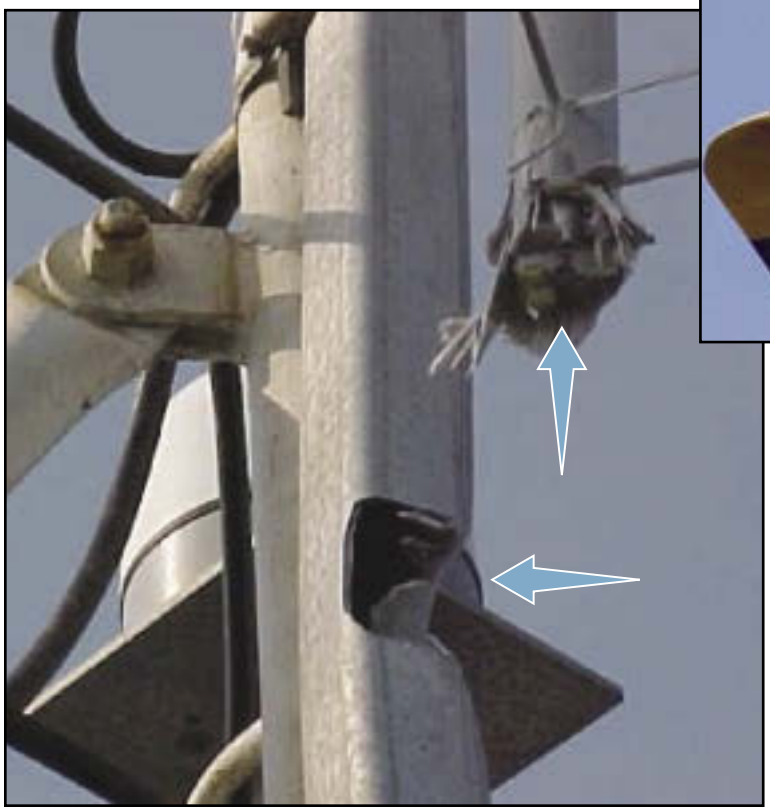
The crew was returning to HMCS CALGARY after conducting a second in-flight rotor smoothing for a main rotor blade change. Just prior to recovering on the flight deck, the aircraft flew down CALGARY's starboard side from stern to bow and, once abeam the bridge, commenced a left climbing turn across the bow. As the aircraft passed in front of the bridge, two main rotor blades struck an antenna and its mount on the starboard top-part of the bridge. The ship came to Emergency Flying Stations and the aircraft landed without further incident. The ship suffered minor damage to the guardrail and the antenna while the aircraft had "D" category damage.

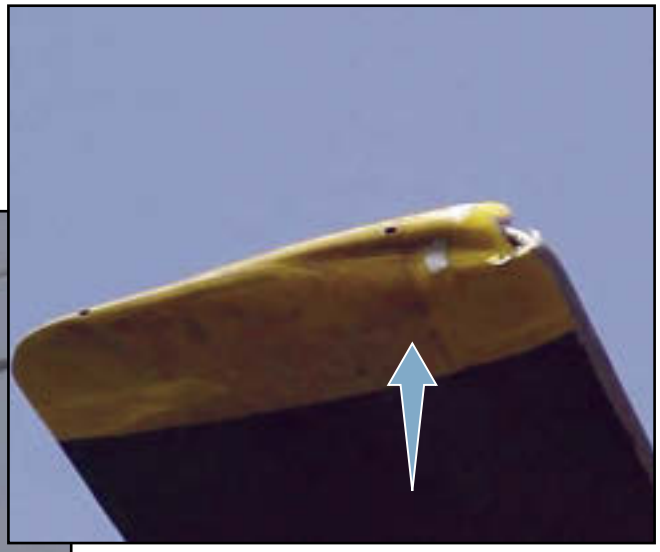
The aircrew assisted the ground crew with a main rotor blade change during the morning of the occurrence prior to the test flight. This activity was conducted in the non-airconditioned hangar during 35ºC temperatures and a humidex of 50ºC. During the afternoon test flight, the aircrew experienced prolonged exposure to even higher temperatures in the non-airconditioned *Sea King* cockpit.

The investigation determined that the prolonged exposure to high temperatures was a contributing factor to some degree of heat stress that resulted in a break down of intra cockpit communications and poor decision making. The investigation also determined that limited precautionary measures existed to protect those personnel involved in air operations in high temperature environments from heat stress.

Additionally, it was found that certain orders governing low-level flight operations in the Maritime Helicopter (MH) community are not clear, consistent, or practical.

The safety recommendations focused on the need to establish effective precautionary measures for HELAIRDET personnel operating in high temperature environments and the need to review existing orders governing low-level flight operations. ◆





EPILOGUE

TYPE: ***Griffon* CH146475**
LOCATION: **Goose Bay, Labrador**
DATE: **17 September 2003**

On 17 September 2003 the crew of *Griffon* 146475 was conducting Stokes litter hoist training within the boundaries of 5 Wing Goose Bay. This training involves transferring a litter from the ground to the aircraft while the aircraft is in a 50-foot hover. During Stokes litter hoisting, the SAR tech uses a rope to guide the litter from the ground. The flight engineer operates the hoist until the final recovery of the litter into the aircraft. At this point, control of the hoist is transferred to the non-flying pilot. This allows the flight engineer to manage the litter with both hands while the non-flying pilot operates the hoist.

In this accident, control of the hoist had just been transferred from the flight engineer to the non-flying pilot when the aircraft began to sink and yaw to the right. The flying pilot initiated actions for a suspected tail rotor failure that included rolling both throttles to idle and entering auto-rotation. The aircraft landed in a flat attitude and suffered "B" category damage. All of the crewmembers on board the aircraft suffered injuries due to ground impact forces (1 major and 3 minor injuries).

The investigation revealed that there were three main contributing factors to this accident. The first factor was that the non-flying pilot caused a power reduction by toggling the 'beep' switch instead of the intended hoist over-ride switch. The second factor was that the flying pilot misinterpreted a 'beep' down as a tail rotor failure, and finally, the last factor was an ineffective auto-rotation.

Recommendations include a re-design of the 'beep' and hoist over-ride switches to reduce the possibility of mis-identification of the switches and inadvertent beep switch activation. It is also recommended that simulator training be enhanced to include more, and varied, engine malfunctions from the hover. And finally, it is recommended that the realism and visuals of the CH-146 simulator be upgraded in the zero to fifty-foot range to increase the realism in the landing phase during emergency training in the simulator. ◆

EPILOGUE

TYPE: ***Griffon* CH146439, SAR Tech Para-Jump Injury**

LOCATION: **Lac St-Jean, Quebec**

DATE: **23 June 2005**

During a SAR para-jump training mission, the SAR Tech undershot the drop zone (DZ) and landed on rocks, sustaining serious injuries. He was evacuated by *Griffon* helicopter to the 3 Wing Bagotville hospital.

The investigation determined that the crew selected a DZ that was not in accordance with orders. The DZ, a beach surrounded by obstacles, was a confined area which the Level 1 qualified SAR Tech was not authorized to jump into. The crew's motivation to conduct the para-jump sequence at the beach, where there was a Squadron gathering, directly contributing to the use of an unauthorized DZ.

The crew conducted the para-jump sequence without following established wind assessment procedures. The crew was unaware of the mandatory requirement to dispatch wind drift indicators (WDI's) prior to conducting para-jumps. Additionally, some ambiguity existed in the Wing's Flying Orders (WFO) pertaining to WDI usage. The deviation from standard operating procedures was not detected by supervisory personnel.

The effects of the confined area's challenges, combined with inadequate wind assessment, overloaded the SAR Tech during his final approach to the DZ. In an effort to cope, some technique-based errors were made in para-landing procedures which contributed to his off-DZ landing and subsequent injuries.

Safety actions taken include the release of a message clarifying SAR Tech qualifications with respect to confined area operations. Outstanding safety recommendations include amendment to the WFO to address ambiguity pertaining to WDI requirements. ◆

FROM THE INVESTIGATOR

TYPE: ***Tutor* CT114120**
LOCATION: **Thunder Bay, Ontario**
DATE: **24 August 2005**

The accident aircraft was flying the "opposing solo" position for 431 Air Demonstration Squadron and was preparing to participate in an eight-plane display that was to take place at the Thunder Bay, Ontario waterfront. The "solos" were broken off from the main formation after take off to conduct a showline recce at the Thunder Bay harbour breakwater and to then conduct the pre-show "shakeout", a series of preliminary aerobatic manoeuvres designed to ensure the aircraft is set up properly before the formal start of the demonstration. One part of this sequence is for the aircraft to roll inverted and push about negative 2 "G".

Immediately after achieving the inverted flight position, number 8 heard a loud bang and felt immediate loss of thrust. The pilot depressed the airstart button and the aircraft was returned to upright flight with the engine RPM quickly decaying to between 2 and 3 percent. Other emergency procedures were ineffective so the pilot steered the aircraft towards an uninhabited area and he ejected. The aircraft impacted the ground 10 seconds later near some derelict vehicles in a field about nine kilometres north of the Thunder Bay airport and was destroyed.

The pilot landed about 1/2 kilometre northeast of the aircraft and was recovered with minor injuries sustained in the ejection sequence about 20 minutes later.

Post crash field examination of the wreckage revealed that one compressor blade was detached from the first stage rotor and had been ingested by the engine. Massive damage to the ensuing stages was evident. A tang failure at the blade attachment point is suspected as the reason for the blade separation.

Several Aircrew Life Support equipment anomalies were noted during the post crash inspections and all deficiencies were corrected prior to the squadron returning to flying status. As well, Special Inspections were completed on all CT-114 engines and several technical publications were amended regarding inspection procedures. ◆

For Professionalism

For Commendable Performance in Flight Safety

CORPORAL VERONIQUE BRASSARD-LAVOIE

In August 2004, Corporal Brassard-Lavoie was assigned to conduct an inspection of the bolts in the main controls of *Griffon* CH146474. As part of the inspection she had to replace the bolts in the pitch link. Though the bolts were properly lubricated none of them could be inserted without undue force. Corporal Brassard-Lavoie re-checked the part number and confirmed that it was correct. Feeling uneasy, she carefully examined the heads of the bolts and discovered that they were stamped with what looked like a heart instead of the normal planet shape. Corporal Brassard-Lavoie then checked the other three bolts and found the same heart design. She reported the situation to her superior who confirmed that the series of bolts did not conform to specifications.

The discovery gave rise to a special local inspection and a special inspection within 1 Wing. Many non-conforming bolts were found installed on a number of helicopters – they were subsequently replaced.

Corporal Brassard-Lavoie's notable professionalism and vigilance uncovered and eliminated a serious threat to flight safety on many *Griffon* aircraft across the CF. ◆

Corporal Brassard-Lavoie serves at 438 Tactical Helicopter Squadron, CFB St Hubert.

PRIVATE JASON KENNEDY

In July 2005, Private Kennedy, an Aviation Technician apprentice at 423 Maritime Helicopter Squadron, was tasked to aid fellow technicians with an inspection on *Sea King* CH124437. One of the tasks in this inspection is to grease the tail rotor hub assembly. While assisting with this task, Private Kennedy noticed what appeared to be de-lamination on several of the tail rotor blades in the root area. Concerned about the serviceability of the blades, he immediately alerted a senior technician. Together they researched the Canadian Forces Technical Orders and found four of the five blades to be unserviceable. Subsequently, all five blades were changed and the *Sea King* was returned to serviceable status.

In this case Private Kennedy's attention to detail was exceptional and beyond that expected of an apprentice with minimal training and experience. His meticulous inspection habits and outstanding initiative in researching a potential problem is consistent with the skill level of a technician with significantly more time on type. Private Kennedy is commended for his professionalism in identifying a serious fault that posed a grave threat to aircraft and personnel. ◆

Private Kennedy serves at 12 Air Maintenance Squadron, 12 Wing Shearwater.

For Professionalism

For Commendable Performance in Flight Safety

MASTER CORPORAL MELVIN GOUTHRO

Master Corporal Gouthro, an Aviation Technician at 403 Squadron, was performing an end-of-day check on a *Griffon* aircraft. A recent arrival on Squadron, Master Corporal Gouthro was not yet authorized on type and a qualified technician was observing his work. During his inspection of the swash-plate assembly Master Corporal Gouthro noticed that there appeared to be no jam-nut on the link assembly.

As Master Corporal Gouthro was aware that all rod-ends had to be secured he elected to investigate for further evidence of a locking system. His survey revealed that there was indeed a locking-nut, but that it had backed-off, was out of normal view, and had therefore been overlooked on previous inspections. He immediately advised his supervisor and the aircraft was grounded.

Though inexperienced on the *Griffon*, Master Corporal Gouthro displayed outstanding professionalism in finding an impending threat to flight safety and in preventing what could have been a catastrophic failure of the main rotor-head assembly. ◆

Master Corporal Gouthro serves at 403 Helicopter Operational Training Squadron, CFB Gagetown.

CORPORAL KENNETH THOMPSON

While carrying out a Supplemental check inspection on *Hercules* CC130311, Corporal Thompson, a non-destructive testing (NDT) technician at 413 Squadron, noticed a very slight discoloration on the number four-engine inboard lord mount. Suspecting that this could be a crack, Corporal Thompson cleaned the affected area, but no damage was evident. Not satisfied with these findings, he notified his supervisor and suggested that NDT be carried out to eliminate any chance of damage.

The NDT inspection was carried out and revealed a half-inch crack on the engine mount thus rendering this critical part unserviceable. Had this problem gone undetected, the mount may have failed and caused extensive damage to the engine and surrounding components.

Corporal Thompson's professionalism, attention to detail and unmatched willingness to go beyond normal maintenance requirements allowed him to find and correct a very serious threat to the safety of the aircraft, crew and passengers. ◆

Corporal Thompson serves at 14 Air Maintenance Squadron, 14 Wing Greenwood.

CORPORAL TONY JUSTASON

In November 2004, following a ground compass swing, Corporal Justason was tasked to carry out an after flight inspection on *Hercules* CC130320. An Aviation Technician in Trenton, Corporal Justason carried out a thorough inspection and noticed a drop of hydraulic fluid in the vicinity of the right hand rear tire/brake unit. Initially he thought the drop originated from a brake line but further investigation revealed no evidence of a leak. Not satisfied, he focused his attention on the hydraulic area in the upper wheel well where he found a minute bubble on the upper aft face of the rear oleo. Due to the oleo's proximity to the aircraft structure, this portion of the oleo is difficult to access. He wiped the area down and once again a small bubble appeared. He then advised his supervisors about a potential crack of the oleo and the non-destructive testing (NDT) duty technician was called.

The NDT inspection revealed a 32mm crack under the paint surface that necessitated a rear oleo replacement. Research revealed that this oleo had less than five hours of use since overhaul and that it was installed during a recent periodic inspection. A history check of the component indicated this oleo was returned to the repair/overhaul contractor following a brake overheat incident.

The oleo has been subsequently forwarded to Quality Engineering Test Establishment (QETE) for failure analysis.

Corporal Justason's attention to detail, while inspecting this hidden area in darkness, is commendable. His initiative, in continuing to investigate despite the fact that his initial suspicion of a brake leak was disproved, was exceptional. His dedication to safety and airworthiness, as demonstrated by this rigorous investigation, is exemplary. Corporal Justason's professionalism averted a potentially dangerous situation that could have seriously damaged the aircraft and endangered the lives of aircrew. ◆

Corporal Justason serves at 8 Air Maintenance Squadron, 8 Wing Trenton.

MR. LEONARD STEAD AND MR. VERN HODDER

In May 2005, IMP Aerospace technicians, Mr. Leonard Stead and Mr. Vern Hodder were preparing a *Cormorant* tail rotor assembly for installation. Mr. Hodder noticed excessive play between the mating surfaces of the inboard trunnion mount and flex half hub. These previously assembled parts were supplied by the original equipment manufacturer (OEM) and did not call for dimensional checks but Mr. Hodder felt uneasy. He consulted Mr. Stead who discovered that the new OEM supplied parts did indeed fail to meet design specifications. Mr. Stead placed the items in quarantine and raised a defective material inspection report to address future occurrences.

This area of the inboard trunnion mount is suspected as a contributing factor in numerous CH-149 *Cormorant* tail rotor failures. It was identified as a contributing factor in the investigation of a Royal Navy accident.

Mr. Hodder's and Mr. Stead's outstanding collaborative effort revealed a serious equipment flaw that, undetected, would have jeopardized the safety of 103 Search and Rescue Squadron personnel. They are commended for their professional attitude and attention to detail in averting a potentially catastrophic accident. ◆

Mr. Leonard Stead and Mr. Vern Hodder serve at 103 Search and Rescue Squadron, 9 Wing Gander.

For Professionalism

For Commendable Performance in Flight Safety

MASTER CORPORAL MIKE DONNELLY

Master Corporal Donnelly, a flight engineer serving with 403 Squadron, was performing a last-chance check on *Griffon* 146430 when he noted an anomaly in the installation of the door-gun.

A highly experienced Flight Engineer (FE) with past Aviation Technician experience, Master Corporal Donnelly discovered that the upper support-tube rod-end bolts were not connected through the door-gun mounts, leaving the gun-assembly secured by the lower support-tubes only. Realizing the seriousness of his finding, he immediately informed the aircraft captain and the aircraft was shutdown. Had the lower support-tubes become disengaged the complete gun-mount assembly would have fallen from the aircraft. Such an occurrence would have caused, significant aircraft damage and could well have resulted in serious injury to the FE and fatal injuries to ground troops. The subsequent investigation revealed that the incident aircraft had conducted a night flight and fired approximately 900 live rounds on the evening prior.

Master Corporal Donnelly is commended for his professionalism and extensive systems knowledge in discovering a serious mechanical defect that had gone undetected for over eighteen flight hours. His efforts led to the rectification of a flight safety hazard that threatened the aircraft, the aircrew and ground personnel. ◆

Master Corporal Donnelly serves at 403 Helicopter Operational Traing Squadron, CFB Gagetown.

CORPORAL COREY EDWARDS

The Flight Engineer (FE) section at 400 Tactical Helicopter Squadron was asked to carry out a 25-hour inspection on *Griffon* CH146454. While doing so, Corporal Edwards, a FE under training, was tasked to remove the cargo hook in order to disconnect a push-pull rod for the tail rotor controls believed to be in suspect condition.

Upon completion of this first task, Corporal Edwards took the opportunity to conduct an impromptu investigation in an unusually accessible 'hell-hole'. He found a rigid hydraulic line from the #2 accumulator to the #2 hydraulic pressure switch that was rubbing on an adjacent line fitting. Upon closer examination he discovered that the line was deeply nicked. He immediately brought this to the attention of his supervisor, who in turn took the matter to the appropriate maintenance authority. The line was removed and after a thorough cleaning, it was agreed that this line would likely have ruptured in the near future resulting in the loss of the #2 hydraulic system and a subsequent emergency condition for the aircrew.

Corporal Edwards went beyond what was called for and in so doing he discovered a failing aircraft component. His individual effort averted what would have likely degraded into a serious flight safety occurrence. ◆

Corporal Edwards serves at 400 Tactical Helicopter Squadron, CFB Borden.

MASTER CORPORAL NEIL THORNE

Master Corporal Thorne, a flight engineer serving with 408 Squadron, was performing a 100-hour airframe inspection on a *Griffon* when he noticed a long metal strip resting on top of a wire bundle passing under the floor of the aircraft. Even though the metal strip looked like an aircraft component and it appeared to have been in place for a considerable amount of time. Master Corporal Thorne decided to investigate further. This examination confirmed that the metal strap was a foreign object that had become lodged under the cabin floor.

The investigation revealed that the strap was sufficiently large to have interfered with the nearby control rods and autopilot actuators. Furthermore, the strap was sharp-edged and could have easily damage nearby electrical hardware. Either circumstance would have likely resulted in a serious in-flight emergency.

Master Corporal Thorne's diligence, attention to detail and professionalism are highly commendable. He detected a significant flight safety hazard in a poorly lit and not readily accessible area of the aircraft. Master Corporal Thorne's discovery removed a significant threat to safety of the aircraft and aircrew. ◆

Master Corporal Thorne serves at 408 Tactical Helicopter Squadron, CFB Edmonton.

MASTER CORPORAL GRAHAM WAREHAM AND CORPORAL KENNETH THOMPSON

While performing a supplementary inspection on a CC-130 *Hercules*, Master Corporal Wareham and Corporal Thompson were tasked to carry out a non-destructive testing (NDT) inspection in the right hand wing root area. During this check they noticed that two recently installed high lock fasteners were not properly seated on the lower wing surface. These fasteners were on an area of the wing that required no inspection during this scheduled maintenance and would not have been checked for at least another 450 airframe hours. Realizing the implications of having loose fasteners in such a critical area, Master Corporal Wareham and Corporal Thompson immediately brought this to the attention of the crew supervisor.

Master Corporal Wareham and Corporal Thompson's professionalism and keen attention to detail brought this serious situation to the attention of senior staff who are investigating further. Their extra effortis indicative of the flight safety culture necessary to maintain the mission capability of the Canadian Forces. ◆

Master Corporal Wareham (right) and Corporal Thompson serve at 14 Air Maintenance Squadron, 14 Wing Greenwood.

DFS Flight Safety Promotion Survey

1. What is your rank group?

- ❒ a. Pte-MCpl
- ❒ b. Sgt-CWO
- ❒ c. OCdt-Capt
- ❒ d. Maj/above
- ❒ e. Civilian DND
- ❒ f. Civilian Contractor

2. How would you describe yourself?

- ❒ a. Ops
- ❒ b. Staff
- ❒ c. CF Aircrew
- ❒ d. CF Maintainer
- ❒ e. AEC/ACOP
- ❒ f. CF Support Service (Heavy Equip/Med/Dent/Food)
- ❒ g. Foreign Military
- ❒ h. Contractor/Contractor Support Services
- ❒ i. Other

3. Have you ever read *Debriefing*?

- ❒ Yes
- ❒ No

4. Have you ever visited the DFS website?

- ❒ Yes
- ❒ No

5. How thoroughly did you read *Flight Comment* (check only the answer that most closely matches the amount of context you read)?

- ❒ a. I read it cover to cover.
- ❒ b. I read about 50% of the content.
- ❒ c. I read about 25% of the content.
- ❒ d. I skimmed it, perhaps reading 1 or 2 articles.

6. *Flight Comment* has a variety of features. Please indicate what you would like to see more or less of in *Flight Comment*.

	More of	Less of	Sufficient
a. In-depth articles > 3 pgs	❒	❒	❒
b. Short articles 3 pgs or less	❒	❒	❒
c. "*Good Show*"	❒	❒	❒
d. "*For Pro*"	❒	❒	❒
e. Views on Flight Safety	❒	❒	❒
f. Epilogue	❒	❒	❒
g. From the Flight Surgeon	❒	❒	❒
h. From the Investigator	❒	❒	❒
i. Dossier articles (Research/Technical)	❒	❒	❒
j. Lessons Learned articles (First Person experience)	❒	❒	❒
k. Maintainer's Corner	❒	❒	❒
l. From the Editor	❒	❒	❒

7. What other types of content would you like to see in *Flight Comment*?

a. Letters to the Editor/ Commentary:	❒ Yes	❒ No
b. Historical articles:	❒ Yes	❒ No
c. Cartoons:	❒ Yes	❒ No

d. Other: _____

8. Suggestions for or opinions of posters in *Flight Comment*.

_____

_____

9. Suggestions for or opinions of DFS annual calendar.

_____

_____

10. What is your favourite content or element of *Flight Comment*?

_____

_____

11. What is your least favourite content or element of *Flight Comment*?

_____

_____

12. Any other comments?

_____

_____

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