National Defence / Défense nationale

FLIGHT COMMENT

1/1997

A Seaking helicopter (12405) carrying out an emergency cradle recovery exercise at 12 Wing Shearwater

Canada

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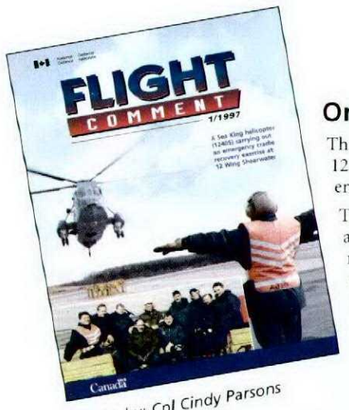

Photo by: Cpl Cindy Parsons

On the Cover:

The emergency cradle recovery exercise was directed by the 12 Wing Flight Safety Office. 423 MH Squadron maintainers and aircrew were the respondents in the exercise.

This emergency procedure is designed to enable Seaking aircraft and crew to be recovered safely in the event of a main landing gear extension problem. There are designated recovery spots at both Shearwater and Pat Bay complete with tie down capabilities allowing the cradles to be erected and securely fastened to the ground. All Canadian Naval ships designated to support Sea king operations carry emergency cradles and the ships Hel Air Det is trained in the use of them. During the training phase the aircrew bring the aircraft into a stable hover over the cradles but do not settle into them.

In August 1996 12 Wing Shearwater had cause to carry out this procedure in a real life situation (issue 4/1996 page 14). It was late evening, aircraft 12407 was carrying out practice autorotations and in their last autorotation the aircraft came in contact with the ground causing severe damage to its landing gear. An emergency was declared and HT 406 Squadron maintenance response crew rigged the cradles and directed the aircraft to a safe recovery.

Although the Sea king community has not had to employ the emergency cradles very often in real life situations, the few times they have been called upon has resulted in a 100% success recovery rate, a fact directly attributable to good and realistic emergency response training. Personnel involved in the exercise are as follows.

The Maintenance Recovery Crew: Cpl Roy(IET), Cpl Robertson(AFT), Cpl Pritchett(IST), Cpl Hinks(AFT), Cpl Boulanger(AWST), Cpl Arsenault(IET), MCpl Arsenault(CRST), MCpl McHarg(IST), MCpl Cloney(AWST), Sgt Oatway(AET)

Crew of 12405: Sgt Davidson(AESOP), Sgt Aucoin(AESOP), Capt Eng(TACCO), Capt Bowell (Pilot), Capt Brooks(Pilot)

FLIGHT COMMENT

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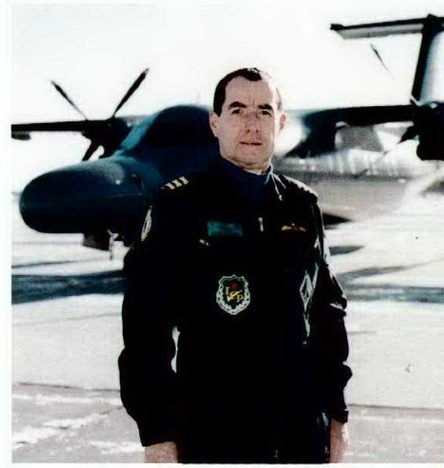
As I See It



Flight Safety is the highest form of Quality

We have all learned in Crew Resource Management Training or courses such as FP 97 about the concept of synergy where the whole is greater than the parts. This is especially true at 402 Squadron where Flight Safety permeates every facet of our Total Force Operation.

As a Total Force Unit, 402 "City of Winnipeg" Squadron integrates the mix of talents and experience of both the Regular and Reserve personnel. This mix of personnel extends its benefits throughout the entire organization; from the hangar floor, through the orderly room, to the cockpit. The Squadron routinely transports high ranking VVIPs such as the Prime Minister, Minister of National Defence and senior political and military officials and Royalty from around the world. 402 Squadron is also closely aligned with the Canadian Forces Air Navigation School (CFANS) to provide navigation training flights with four CT142s. The unit's proud 63 year history and enviable flight safety record is testimony to its heritage of flight safety as a Squadron culture, not merely as a priority.

To be a safe operation, a Total Force Squadron has the same requirements as any other Squadron in the CF. Specifically a necessity for well trained and qualified personnel with high morale, a transparent organization with clearly defined roles and responsibilities plus adequate material and financial resources. A safe operation must include managed risk and decision makers who actively promote a Squadron culture where flight safety and risk management permeate through every facet of the operation. Our Squadron quest to epitomize flight safety is never ending and only our people can get us there.

OP PHOENIX and in particular its implementation of the AF 9000 quality methodology has significantly enhanced flight safety within the maintenance organization. Additionally the maintenance organization benefits from inclusion of Reserve personnel who bring their extensive and broad experience from civilian occupations to 402 Squadron. Many Reserve personnel are employed in complementing occupations with local aerospace firms and airlines. Without first class maintenance personnel, both Regular and Reserve, and a commitment to quality, our flight safety record could not begin.

Although not always visible, the orderly room personnel contribute significantly to the Squadron culture. Their behind the scenes support functions are recognized as critical success factors in the Squadron's quest for quality and overall effectiveness of the Flight Safety program.

Professionalism and quality is further enhanced by Reserve aircrew that have served in the Regular Force. They contribute significantly because of their F-86, CF-100 and CC130 experience. 402 SQN has some of the best Pilots, Flight Engineers and Flight Stewards in the Air Force. Not only do they have a high level of experience, they also bring a fresh perspective to flying because most have a full-time profession unrelated to flying. Just as the Air Force went to the civilian sector for change management experience, we use these crew members' ideas and experiences from their everyday life to enhance our flying missions. Because of this fresh input, we believe we can do our job with more quality and operate safer.

402 Squadron has some of the most experienced, professional personnel in the Air Force. Our pilots that fly for major airlines or are employed with Transport Canada bring their civil aviation experience and knowledge to our Squadron along with thousands of Reserve flying hours. As well, our Maintenance personnel who work in the aerospace industry bring their civil aviation maintenance prowess and knowledge to the Squadron. Many Flight Safety initiatives such as Crew Resource Management and Human Factor Resource Training were initially developed by the major airlines and we use this additional experience to continually strive to improve our quality.

Flight Safety success is about good team work. Each and every person in our Squadron has a vital role to play and the quality in which they conduct their tasks has a direct impact on Flight Safety. Quality and Flight Safety go hand in hand and a safe operation is the highest form of quality we can offer to the Air Force. ◆

by LCol P.G. Rawlings Commanding Officer 402 Squadron (Sep 95 – Jan 97) 17 Wing Winnipeg

*Human Factors Training ** 19 Wing Comox*

In the fall of 1994 the 19 Wing Flight Safety Office invited Gordon Dupont and Bill Foyle from Transport Canada and the British Columbia Institute of Technology respectively, here to Comox. They were invited to introduce us to a new flight safety program for use with aircraft maintainers called "Human Performance in Maintenance", and little did I realize how this would impact my life. I was an old snarly Flight Engineer who had little time for "hug me, hold me" scenarios and looked upon this as nothing more than an attempt by others as another "make work" initiative. Now, when I look back, I feel somewhat embarrassed by this response.

I took early retirement from the Regular Canadian Forces but was immediately hired back on in the Reserves as the Deputy Wing Flight Safety Officer. One of my primary functions was to start a Human Performance in Maintenance (HPIM) workshop for the aircraft maintainer working here at the Canadian Forces Base Comox, on Vancouver Island, British Columbia. My boss shared in the implementation of this HPIM program in Canada whilst serving as member of the Industrial Relations Committee, chaired at that time by Gordon Dupont. My initial reaction to my task was somewhere between "What am I doing here, ah well, it's a job," to "Well lets get on with it, but what do I do, and how do I do it?". The latter reaction seemed to fit the bill and slowly, with significant help form Gordon Dupont, we built up a handbook, a presentation and facilitator notes. Two others helped with the course development: Sgts Jim Harper and John Stewart. They spent an enormous amount of hours in their spare time wading through military boards of inquiries to find suitable case studies for us to use. Additionally both had taken the seminar from Gordon and Bill and helped my understanding of the course.

When the required documents were compiled, we looked at how best to facilitate the program. Following my belief, "if it ain't broken, why fix it?" we decided to emulate the existing seminar. After all, they had run numerous successful seminars with their time-proven approach. We practised among ourselves the required dialogue, as well as the little skits included in the seminar, checking for cohesion and time requirements. A number of concerns rested heavily on our minds. Would the Wing Commander approve of the use of first names and wearing civilian clothes? We wanted this to be an open and frank discussion and felt that the deference to rank would impede the free flowing dialogue so vital to this seminar. The Colonel agreed. (He did tell me he would attend one day; that's when we used "sir!".)

They were invited to introduce us to a new flight safety program for use with aircraft maintainers called "Human Performance in Maintenance", and little did I realize how this would impact my life.

Our seminars kept a format similar to that of Transport Canada. We discuss twelve human factors (the "dirty dozen") which affect the aircraft maintainer. These twelve are: communication, complacency, knowledge, distraction, teamwork, fatigue, resources, pressure, assertiveness, stress, awareness and norms. We carry out a behavioural analysis to determine a person's characteristics and discuss how "we are what we are". Further, we attempt to demonstrate how we can strive to be the perfect "assertive" maintainer. In between, we conduct case studies to determine the actual causes of an aviation occurrence and the safety nets we would put into place to ensure a similar occurrence would not happen again.

The more we got involved, the more we learned, and eventually, we became very comfortable with our seminars. In all, we have trained over 250. We have had visitors attend from six other Canadian Forces Bases and three have started their own program. We even had two lads from the Canadian Navy take part and, although they had no aviation experience, they were an integral part of the class discussion. They went back to their home base intending to start a naval-oriented program. As word of our seminar spread, we attracted attention from many interested groups such as the Aero Medical Training School, Instrument Check Pilots School and the Canadian Forces School of Aeronautical Technology and Engineering. Their feedback was very positive and they have requested further slots on future seminars. Recently the US Navy has been showing interest in the program and has requested further information. We have also taken our show "on the road" and held seminars at four other locations. One thing I have learned from the many positive critiques we have received, is the universal need for this human performance training. Time and time again, the aircraft maintainer tells us they wish they had taken this seminar years ago, had it been available. To ensure future maintainers will not share this lament, new recruit maintainers are being instructed in human factors in their basic technical courses.

It is obvious, although official causes of aviation accidents are available to all, very little information in aviation investigation reports tell us exactly what was going through a maintainer's mind at the time he/she allowed it to wander. Did that fastener not get done up correctly because the maintainer was still smarting at the bawling out his boss gave him, or maybe it's because of family or financial problems that took his mind off the important task at hand? Or, how about the guy who works all night to complete a maintenance function and is suffering from pressure or fatigue? Accident investigation reports must dig keeper into finding the root cause of errors. Simply putting the cause as "inattention" may satisfy the record books, but why was the maintainer inattentive? That's where we must focus and then build on this information.

We, like those in industry, have difficulty finding the funds to keep up to date and run the seminars, but, we have found the actual cost of the seminars can be run for as little as $125.00 for supplies and material for the entire class, including a handbook for each student. The seminar can be successful with at minimum of fifteen people (this ensures enough interaction and personal experiences which are vital to this class) and a maximum of around thirty. Refresher training in the future is a must and should be anticipated and budgeted for during initial planning for human factors training.

None of the Comox instructors have had any "formal" training, either as facilitators or in psychology. A couple of interested individuals can be taught how to facilitate a similar HPIM seminar in very little time. The secret is to get people talking and once that happens, the rest falls into place. We hope that you are able to start an HPIM seminar of your own and begin to see the benefits.

Editor's Note: CWO Paul Jenkins, Sgt Jim Harper and Sgt John Stewart were awarded a Commander's Commendation for their development and implementation of HPIM. ◆

*by CWO Paul Jenkins * DIWFSO 19 Wing Comox*

Ironing..... No... I mean Pressing

During the early stage of my flying career, being tasked to go and participate at an airshow as a static, was something everyone of us at the unit was seeking for obvious reasons. There I was one morning, my flight commander tasked me and my old time "buddy" to go and participate at an airshow in *our hometown*.

Needless to say that the motivation was at the maximum from our parts. The transit to the airshow, and the airshow itself were uneventful. The return trip back home was a different story first we were "stuck" in Sault Ste Marie for 24 hours because of the weather. The next morning we got to the airport the weather was still really bad, fog and 0 visibility. We drove to the airport anyway because we both thought, after talking to the "Boss" the night before about spending the nights in the "Soo," that we were very much expected back. We had been on the road for four days. We both woke up that day and said to ourselves we have got to get back home today otherwise!... So we did. After waiting for a few hours, so we could be "legal" to takeoff, we ended up overtemping an engine on departure out of Sault Ste Marie. For many reasons, yes, we were guilty, we both screwed up that day. We could have anticipated the situation a little more. We were in our first year at the Sqn. We ended up taking the blame for what happened that day.

Looking at that today, I have a very different version or perception of what happened. We pressed the weather that day for one reason because we felt the pressure from our home unit that we had to get back home that very same day.

Thinking about it now, I realize that we should have been told to **

** not press the weather

** wait until all the conditions were acceptable to *us* considering experience level

One more night and day in the "Soo" full T.D. was certainly a lot cheaper that an engine change on the road involving a Hercules and 7 techs. ◆

Good Show

Sergeant Ronald J.W. O'Reilly, Master Corporal Leonard Furlotte, Captain Guy Ridler, Master Corporal Emilio deChantal

On 22 February 1996, a CC115 Buffalo aircraft, callsign RESCUE 456, from 442 Squadron Comox was launched to search for a sail boat which was possibly in distress in the Georgia Strait off Vancouver Island.

After discovering that this boat was not in distress RESCUE 456 was tasked to search for a second vessel. During this search the right frequency inverter failed and caught fire sending smoke into the cockpit. Shortly thereafter smoke was also noticed coming from the left frequency converter. Having pulled the gang circuit breakers for both converters, the aircraft was now without numerous AC powered systems including the loss of many primary flight instruments, engine instruments and navigational aids. Throughout this time the weather had been deteriorating, darkness was approaching and the aircraft was required to remain in visual flight conditions(VFR). To do so the crew was flying at 300 feet above the water in heavy rain and snow showers with emergency oxygen masks donned because of the smoke in the cockpit. The crew coordinated with air traffic control a diversion plan to Vancouver International Airport which was below VFR conditions, however, by using ground references and crew coordination the aircraft landed safety. This electrical failure left the crew in a highly unusual and extremely hazardous condition which could easily have led to the loss of an aircraft and six crew members.

Sgt O'Reilly, MCpl deChantal, MCpl Furlotte, Capt McSorley, Capt Ridler and Capt Foley are commended for their professionalism, outstanding skill and superior crew coordination in recovering the aircraft safely. ◆

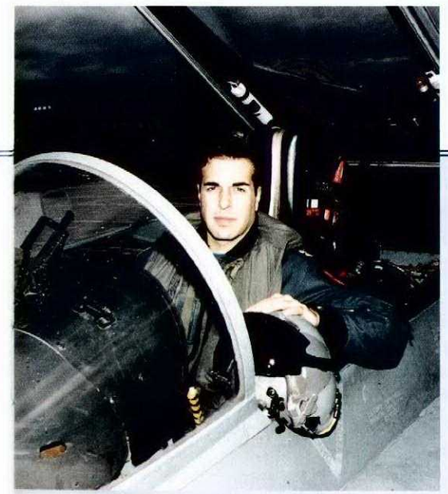
Captain Pat McSorley

Captain Terry Foley

Capt Toussaint and Capt Girard, pilots from 3 Wing Bagotville in a dual CF18, were leading a four-ship formation for a landing at the Thunder Bay airport.

As their main wheels touched down, the aircraft veered to the right with a simultaneous cockpit indication of a landing gear malfunction. Having experienced the same situation six months earlier, Capt Toussaint, in the front seat, recognized the seriousness of the situation and carried out an overshoot. With insufficient fuel to reach an alternate airport for an approach end cable engagement, Capt Toussaint discussed at length with Capt Girard all applicable considerations and prepared themselves for an emergency landing at Thunder Bay. Although directional control was severely degraded on touchdown and ejection was considered, Capt Toussaint was successful in keeping the aircraft on the runway. The aircraft came to a complete stop 4000 feet from the threshold of the runway with minimum damage. Investigation revealed a planing link failure of the right main landing gear which caused the pronounced directional control problem on touchdown.

Capt Toussaint and Capt Girard's professionalism, outstanding crew coordination and their calm and accurate reaction to the situation led to the safe recovery of the aircraft. ◆



Captain Didier "DIDS" Toussaint

Captain Eric "GIGI" Girard

Almost Shocking ..... Static Electricity

During a Search and Rescue (SAR) training sequence a SAR Technician (SAR Tech) received a significant electrical shock as soon as his feet came in contact with the snow while being hoisted out of a CH146 Griffon helicopter. This discharge lasted 10 to 15 seconds and resulted in the SAR Tech becoming partially incapacitated. He was unable to unhook or signal the Flight Engineer operating the hoist as his body was in an uncontrollable spasm. The SAR Tech's helmet visor was broken as a result of the spasm otherwise he was uninjured. Investigation revealed that the flight conditions (cloudy, light snow showers, temp -2 degrees, dew point -4 degrees) were ideal for a large static electricity build-up on the aircraft as the helicopter was hovering within a loose, dry snow, snowball. Loud crackling could also be heard over the intercom system during the hover. Even though the SAR Tech did not use a grounding cable for this hoist, it is unclear whether a grounding cable would have helped in this particular case as the snow cover was approximately 2 feet deep. Discussion? ◆

Talk about a Stink!?!

It was a beautiful day to go flying, and the task was a simple co-pilot Annual Proficiency Check. The aircraft was a Sea king helicopter and the crew was prepared for another uneventful flight. HA! No sooner were we airborne than the co-pilot questioned an unfamiliar odour in the aircraft (*How in the hell did the Aircraft Captain simulate an electrical fire with a real odour?*). The smell was quickly confirmed by the rest of the crew, a definite *electrical acidic burning odour*! The aircraft was in no immediate danger so we began to trouble shoot. The smell was coming from the back of the aircraft and a cabin check revealed no culprit? The pilots went over the checklist response for an electrical fire and as a crew we decided to return home! Our return was uneventful and after shutting down number 2 engine (*proud of our reation to the whole incident!*) we informed the ground crew of the problem. We were told the *noxious odour* came from the *"new bathtub"* (a rubber "bathtub shaped" covering used to protect the interior of the helicopter from seawater when hoisting personnel) installed in the aircraft that morning. Oh! The shame of it all!! Nuff said! ◆

MORAL: Don't get caught!!! What you think is an electrical fire may be the "STINKY" Bathtub in the back but what you think is a "STINKY" Bathtub could be a fire!!!

Better safe than sorry.
DON'T TRIVIALIZE UNFAMILIAR "ODOURS" IN THE AIRCRAFT!!!

For Professionalism

Corporal Mike Keeping

Cpl Keeping, an Airframe Technician on 441 Squadron Cold Lake, was installing a number 2 hydraulic reservoir on a CF18 when a technician assisting him discovered a crack in the number 4 fuel cell retaining wall during his Foreign Damage(FOD) and security check.

When Cpl Keeping became aware of this potentially dangerous situation, he immediately ceased all maintenance activities on the aircraft and notified his supervisor. Upon ensuring the aircraft was free of any immediate danger, he began an in-depth study to determine the extent and seriousness of the structural failure. Further investigation revealed the fuel bladder was protruding through the crack and signs of wear were evident. Cpl Keeping was instrumental in performing an accurate informal inspection on the remainder of the squadron aircraft and presenting a effective report to his supervisor. This assisted greatly in determining if this was an isolated failure.

Cpl Keeping's professionalism, dedication and attention to detail averted a possible serious flight safety occurrence. ◆

Corporal Will Brunskill
Corporal Rod Funk

Cpl Brunskill and Cpl Funk, Instrument Electrical Technicians at 442 Squadron Comox, identified serious problems with the operation of the frequency converters in the CC115 Buffalo aircraft.

Prior to their identification of these problems, the left hand frequency converter of an aircraft had caught fire when ground power was applied during post-periodic inspection checks. The left frequency converter was replaced. Two days later there was still a burning smell in the aircraft and Cpl Brunskill detected excessive heat coming from the right hand frequency converter. Working as a team, Cpl Brunskill and Cpl Funk carried out an independent investigation and established that there had been an inordinate number of recent frequency converter malfunctions. This in turn allowed them to identify serious problems with the converters which a field team from the Aerospace and Telecommunications Engineering Support Squadron(ATESS) was able to resolve. Through diligent efforts they had detected an unsafe condition in the CC115 fleet.

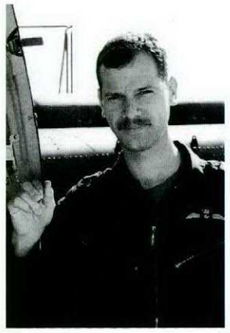
Cpl Brunskill and Cpl Funk's professionalism, dedication, and attention to detail brought a very serious and hazardous situation to the attention of higher headquarters. ◆

Captain Peter Scheidler

Capt Scheidler, a CH146 Griffon helicopter pilot working with the Land Aviation Test and Evaluation Flight (LATEF) at CFB Gagetown, was driving to work when he noticed a Griffon departing from the helipad.

A bright slash of colour caught his eye and he realized that the departing aircraft had an open panel on it's side. He immediately contacted the tower who passed the message to the aircraft captain. The aircraft landed uneventfully and was found to have an engine panel open. The panel's hinges were in imminent danger of failure which would have led to the panel flying off the aircraft possibly into the tail rotor. Had the engine panel come off and struck the tail rotor during a critical phase of flight, the results could have been catastrophic.

Capt Scheidler's professionalism, attention to detail and immediate action prevented a possible serious flight safety occurrence.



Corporal Gail Roesler

Cpl Roesler, an Airframe Technician with 14 Air Maintenance Squadron Greenwood, was conducting a close out inspection after brake rigging maintenance on an Aurora aircraft.

While performing the inspection she found the rudder cable off its pulley in the vicinity of the forward floor area of the aircraft. The pulley for the rudder cable is positioned behind a floor support rib and not in the direct line of vision required for this particular inspection. Cpl Roesler immediately recognized the serious nature of her discovery and reported it to the Maintenance Team Leader.

Cpl Roesler's professionalism, initiative and attention to detail prevented a possible serious flight safety occurrence. ◆

Corporal
Robert W. Hogenbom
Corporal Kevin White

Cpl Hogenbom, an Airframe Technician, and Cpl White, an Aero Engine Technician, of 442 Squadron Comox noticed a small amount of fluid on the hangar floor beneath the left wing of a CC115 Buffalo.

Upon investigation they identified the fluid as fuel and determined that it was leaking from the left hand air driven fuel pump exhaust port. The air driven fuel pump on the Buffalo aircraft is driven by high temperature engine bleed air. This engine bleed air is supplied at temperatures up to 287 degrees Celsius and would have vaporized the leaking fuel(JP4 boiling point is 150 degrees Celsius) possibly resulting in an engine fire. This particular aircraft was on Search and Rescue(SAR) standby, had recently been "B" checked and a Flight Engineer's Pre-Flight inspection had been completed.

Cpl Hogenbom and Cpl White's professionalism, high degree of initiative and concern for flight safety prevented an undetected defect from becoming a serious flight safety occurrence. ◆

Major Dave Holden,
Captain James Fedevich,
Captain Andy Childers (USAF)
Sergeant Ian Scourse
Sergeant Mike Hope

On the 7 November 1995 the crew on board a CC130 Hercules aircraft, callsign ATLAS 17, from 8 Wing Trenton was conducting pilot and flight engineer conversion training in the local area.

While in cloud during a right seat flown TACAN non-precision approach, the landing check was initiated. During flap extension the utility hydraulic system ruptured spraying fluid throughout the cargo compartment and eventually depleting the system. Working together the crew of ATLAS 17 mechanically lowered the gear and prepared for a flapless pilot monitored approach back to Trenton. A coordinated effort by all crew members on the flight deck in handling a complex emergency was instrumental in the return of the aircraft to base without further incident.

Sgt Hope, Sgt Scourse, Capt Fedevich, Capt Childers(USAF) and Maj Holden are commended for their professionalism and skill in recovering the aircraft safely back at their home base. ◆

Corporal Grant T. Krygsveld
Master Corporal Richard Bruce Gregory (Photo unavailable)

MCpl Gregory and Cpl Krygsveld of 4 Wing Cold Lake were tasked to rectify an Automatic Throttle Control(ATC) system degrade condition on a CF18.

Intensive "de-snagging" had been unable to correct the deficiency over the previous month. Through a tenacious, detailed investigation they were able to locate a shorted plug which was caused by a chafed Kapton insulation wire in a connector backshell. Other wires in the area were also found to be chafed. The seriousness of these findings resulted in a CF18 local Special Inspection(SI) with three additional aircraft requiring repairs. As a result of the squadron's findings, a fleet wide SI was recommended.

MCpl Gregory and Cpl Krygsveld through perseverence, professionalism and attention to detail were able to prevent a possible serious flight safety occurrence. ◆

Master Corporal Del Badiuk

MCpl Badiuk, an Aero Engine Technician at 17 Wing Winnipeg, was performing Flight Technician duties (AB check) on Dash 8 aircraft in Kelowna, British Columbia.

Following the copilot's discovery of a screw on the ramp behind the aircraft, MCpl Badiuk conducted a thorough inspection of the aircraft to determine the origin of the screw. When he was unable to discover anything following his initial inspection from the ground, MCpl Badiuk obtained a stand to inspect the upper surface of the wing. It was discovered that the leading edge of the stress panel covering the auxiliary fuel tank was missing 37 screws with a further 72 screws being loose. After maintenance consultation, MCpl Badiuk spent several hours in extremely hot conditions repairing the panel with replacement screws. Had the panel departed in flight some loss of structural integrity would have occurred and auxiliary tank fuel would have vented over the engine exhaust.

MCpl Badiuk's professionalism, perseverance and attention to detail averted a potentially serious flight safety occurrence. ◆

Terrain Avoidance over the Ocean

The crew of a CP140 Aurora had completed their on station checks and were proceeding on patrol northwest of Vancouver Island near Cape Scott. They determined their position to be 35 nm from the mainland and commenced a descent to investigate multiple radar contacts that were assumed to be fishing boats. The weather in the area at the time was an overcast layer of cloud between 300 and 400 feet Above Sea Level(ASL) with a visibility of 1 to 2 nm in moderate rain.

At approximately 2 miles from the contacts Visual Meterological Conditions (VMC) were gained and the aircraft was descended to 200 feet ASL. Approaching 2 miles from the contacts the pilots determined they were homing an island and initiated a climbing turn.

During the initial portion of the transit from Port Hardy to leaving the coast the Navigator/ Communicator (NavCom) was transmitting on HF completing the "On Station" message and was not monitoring the aircraft position. Once the aircraft had crossed the coast the radar operator began to compile a surface plot. There was considerable difficulty doing this through the rain and weather. The radar operator was forced to use Mode I because he found Mode II was not providing useful information.

While Mode I is adequate for detecting surface contacts, it is not the recommended mode for mapping and weather avoidance. Radar identified a small group of targets approximately 35 nm northwest of Vancouver Island which were designated as a group of fishing contacts. They were in fact Triangle Island (spot height 675 feet ASL) and the smaller islands that surround it! As the aircraft passed abeam the islands and prepared for descent to investigate the contacts the pilots requested the nearest point of land from radar. The radar operator stated 35 nm on what he perceived the aircraft's position to be relative to Vancouver Island by referencing his map. Subsequent to that the NavCom was also queried by the flight deck for the nearest point of land, which was also stated as 35 nm.

There is an anomaly on the Vancouver VFR navigation chart (1:500,000 scale) that places Triangle Island within the legend panel of the map between two lines of text separate from the rest of the depictions. The NavCom had the map folded with the legend panel down and as a result did not see the small area of the map (Triangle Island) that extended onto the panel. This is believed to have been the reason for the NavCom not seeing the island when asked for the nearest point of land. Once the flight deck was informed that the nearest point of land was 35 nm they became somewhat less vigilant in the monitoring of their position and did not in fact verify the land call against the maps they had available on the flight deck. The aircraft continued a descending left turn approximately 10 nm from the islands during which time the radar was not able to hold contact. As the aircraft levelled at 300 feet ASL and 7 to 8 nm back the radar reacquired the contacts and the "homing" was continued. The pilots elected to descend from 300 feet to 200 feet in an attempt to improve forward visibility. The aircraft closed to approximately 2 nm when the pilots identified what they perceived to be waves breaking on the shore! At that time they initiated a climbing turn to avoid the island. Following the avoidance action the maps were re-examined and the land mass was identified as Triangle Island.

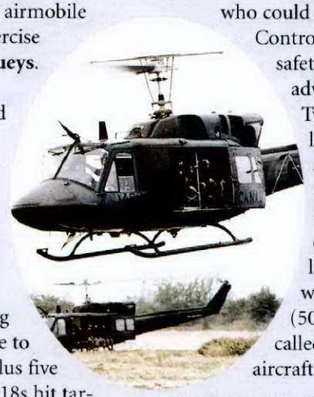
This is an example of a "chain" of events that could have resulted in the loss of both an aircraft and crew when crew coordination and communications break down. Fortunately the "chain" was broken. *AVIATE ... NAVIGATE ... COMMUNICATE.*

Captains Comment: Maritime Patrol Standard Operating Procedures (SOP's)assist in providing a safety margin in all aspects of flying the Aurora particularly in operating within close proximity of land or whilst conducting a radar vector to a contact. Whilst operating close to land these SOP's provide a further margin of safety by ensuring that we do not operate closer than 3 nm from land or 1/2 nm to a surface contact during night or under Instrument Meteorological Conditions(IMC). The SOP's provide a further margin of safety by prohibiting a radar vector which is perpendicular to land allowing the aircraft room to safely manoeuvre away from this hazard. As mentioned above, the incident involved a multitude of small errors which each by its self would not constitute a hazard. The "chain of events" which resulted in this incident and the potential loss of the aircraft were thwarted by the limited visual meteorological conditions obtained by the pilots in their run in to the "radar contact". Had conditions been such that Visual Meteorological Conditions(VMC) could not be obtained it is likely that SOP's would have protected the crew as they turned away from the "surface contact" at 1/2 nm non-the-wiser of their near collision with terrain. However, the margin of safety at this level is in my opinion uncomfortably reduced. It is not my intention to offer any recommendations to have the SOP's changed to increase the safety margin. The SOP's as they are, are the best compromise between operational effectiveness and flight safety and they should so remain. My intent in offering my comments and in filling this safety report is to educate all aircrew of the potential for disaster should they inherently make the same mistakes that we made and they be under circumstances less fortunate than we were. Learn from the mistakes of others because you'll never live long enough to make all your own. ◆

Editor's note: Compliments to the crew for reporting this occurrence so that others may learn.

HELICOPTERS AND MORTARS!

427 Squadron was conducting airmobile support to a "**live fire**" exercise with **four CH135 Twin Hueys**. Live fire was provided by 81mm mortars and F18s. The exercise fire plan designated two targets. Target one was situated 750 meters west of the planned landing zone and the second target was the objective which was 1000 meters west of the landing zone. The CF18s were to provide covering fire for the ground forces by hitting target one at H-Hour minus one minute. The helicopters were to land in the landing zone(LZ) at H-Hour and the mortars were to engage the objective from H-Hour to H plus five as the ground forces advanced to it. The F18s hit target one approximately 10 Minutes early (H-11 vice H-1). The exercise director who is with the ground forces contacted air safety on the exercise safety net (FM freq) and advised that he wanted to adjust mortar rounds onto target one. This would have been to re-establish covering fire for ground forces. Air safety, a Twin Huey monitoring the airmobile, told the exercise director that the only one who could engage target one was the Forward Air Controller/Air Operations, C/S 28. At H-2 air safety called C/S 28 on UHF frequency and advised that target one was unsafe as the Twin Hueys were on approach into the landing zone. At H-Hour plus 40 seconds a mortar smoke round followed by a High Explosive(HE) round impacted approximately 400 meters directly infront of the helicopter formation which had landed in the landing zone. This was within the the specified safety distance (500 meters) on the landing zone Air safety called "check fire" on the safety net and the aircraft departed without further incident.



It is determined that the exercise director modified the fire plan to adjust rounds onto target one without notifying air safety or the FAC/Air Op. All aircrew have been briefed that when working with ground forces on live fire airmobiles it is necessary to brief the implications of changing a fire plan. ◆

September 1994

Boy ..... Am I Ever Tired!

Fatigue in Air Operations

(Guantanamo Bay, Cuba, 1993) The DC-8 freighter collided with terrain approximately one quarter mile from the approach end of the runway after the captain lost control of the airplane. Flightcrew had experienced a disruption of circadian rhythms and sleep loss; had been on duty about 18 hours and had flown approximately nine hours...Captain initiated turn from base leg to final at airspeed below calculated Vref of 147 knots...and he allowed bank angles in excess of 50 degrees to develop...there was no evidence to indicate that the captain attempted to take proper corrective action at the onset of stick shaker...Probable cause; the impaired judgement, decision-making, and flying abilities of the captain and flightcrew due to the effects of fatigue.

-from the files of the United States National Transportation Safety Board.

Introduction

The insidious effects of fatigue almost killed the three man crew of that DC-8 freighter; they survived, albeit with serious injuries. Fatigue can be a problem in any high-tempo air operation, whether in war or peace, and can set us up for a fatigue-related accident. Long duty days, operational pressures, irregular hours; flying across time zones and poor quality sleep all contribute to levels of individual fatigue which can compromise flight safety and operational effectiveness.

In Part 1, this article will look at fatigue, what it is and how it affects the human being in air operations. Part 2 will look at how to fight fatigue, how fatigue interacts with sleep and circadian rhythms and what this all means for performance and safety.

PART 1 – Fatigue

Fatigue has many faces. Everyone is familiar with tired and aching muscles, exhaustion and the difficulty of completing that fiftieth push-up! That is **physical fatigue**, a sense of muscular tiredness caused by exertion which results in a decrease in physical performance. It is related to an accumulated oxygen debt and the build up of lactic acid in the muscles. **General fatigue** is that sense of weariness or boredom that develops after the repeated performance of monotonous tasks. Monotony can bring on feelings of drowsiness and sleepiness within minutes. Monotonous activities, such as flying on auto-pilot on a long over-water leg, are likely to bring on general fatigue. The good news is that general fatigue can be shaken off when a demand is made on the individual. For example, when an engine quits, you suddenly become wide awake! (Too bad you missed the dropping oil pressure for the previous fifteen minutes.) Lastly, there is phasic fatigue, which is short-term fatigue felt as a result of prolonged vigilance activity, such as flying on instruments, monitoring a radar screen or installing a particularly finicky part on an aircraft. Why do you feel so drained after a two hour instrument check ride? Why is an instructor "beat" after a trip with a student? The instructor may only have touched the stick once or twice the whole trip, yet the requirement to monitor everything that went on and be ready to jump in and take control extracts a mental toll which results in fatigue.

The total fatigue felt by an individual is a combination of physical, general and phasic fatigue. The way people perceive their fatigue differs widely from one individual to another, and indeed, from one situation to an other. Psychological factors such as motivation, mood, the novelty of the situation and your attitude toward the task can all affect how "tired" you feel. This is a benefit because we can sometimes "wake up" and respond to an unforeseen demand when required, but it can also be dangerous because individuals are often poor judges of just how fatigued they really are.

Consequences of Fatigue

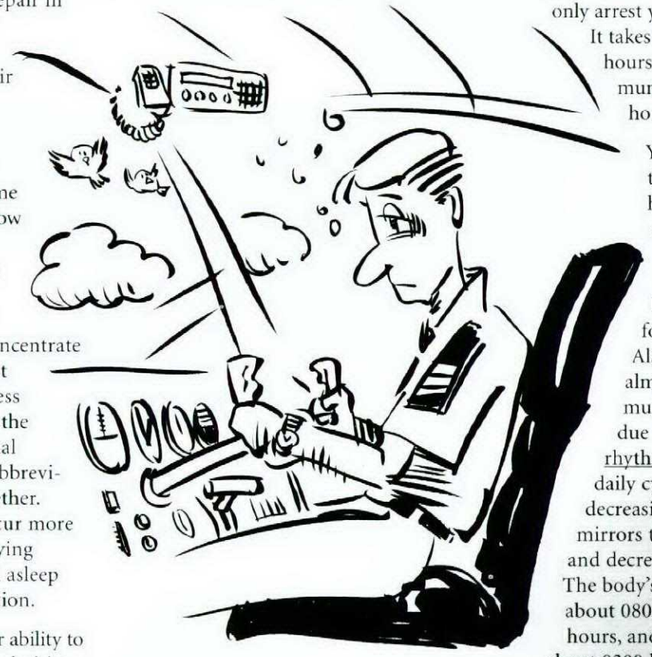
Several things happen when you become fatigued. The perception of exertion increases. If you are loading boxes onto a truck, the fiftieth box seems to be a lot heavier than the first. This is not only because your muscles are getting exhausted, but also because the task is boring and repetitive. Willingness to exert effort also diminishes. Given a choice, fatigued people will do less than others. They tend to accept greater risk in return for savings in time or effort. Tired technicians may not follow the CFTOs for a repair in favour of a "shortcut" perceived to hasten a repair and lessen their workload.

Cockpit studies have shown several fatigue effects. As pilots become more fatigued they allow larger deviations to occur before making a correction, and their corrections are larger. Tired pilots tend to concentrate more on primary flight instruments and pay less attention to others on the periphery of their visual scan. Checks may be abbreviated, or skipped altogether. Errors of omission occur more frequently, and non-flying crewmembers may fall asleep due to lack of stimulation.

Fatigue also affects your ability to think, reason and make decisions. Reaction times decrease and performance on logical reasoning tasks, such as decoding messages, assessing situations and issuing orders deteriorates steadily as fatigue increases. Those most affected will be those whose jobs require a high degree of alertness and swift reaction, and those who have demanding mental requirements for making decisions and organizing activities (ie; supervisors and commanders at all levels). Simple, well learned tasks such as firing a weapon, are least affected by fatigue. The insidious thing about fatigue is that self-assessment of abilities in a fatigued state can be very unreliable. Although you may feel fine and capable of handling the mission, in reality fatigue has made you much less capable.

PART 2 – Fighting Fatigue

You have probably heard the old saying, "a change is as good as a rest."For certain types of fatigue, this is true. General fatigue, and to some extent phasic fatigue, can be alleviated by taking a break,



engaging in some light physical activity or simply by doing something different for a while. A cup of coffee can increase alertness and vigilance, because the caffeine in the coffee is a mild stimulant. Duties can be scheduled during long flights to break periods of monotony. In extreme cases, amphetamines and other drugs have been used to maintain alertness, although their drawbacks can be considerable.

There is only one proven antidote for fatigue: sleep. Young adults require seven to nine hours of sleep per night, older ones six to eight. Failure to get this amount results in a "sleep debt," that accumulates to where it is the same as if you had missed a night's sleep. The only way to repay this debt is to get your head down and get a good night's sleep. Failing that, getting almost any sleep is good, and helps restore you. If we were half as smart as cats, we too would sleep whenever the opportunity presented itself. But naps alone will not return your normal level of performance; rather they will only arrest your decline for a while. It takes a minimum four to five hours sleep to restore minimum performance. Eight hours is ideal.

Yet, sleep is a funny thing. Although you can have a sleep debt, you cannot "bank" extra sleep (ie; 12 hours sleep one night won't let you get away with four hours the next). Also, when you sleep is almost as important as how much sleep you get. That is due to the body's circadian rhythm. This is the natural daily cycle of increasing and decreasing alertness which mirrors the body's increasing and decreasing core temperature. The body's temperature rises from about 0800 hours until 1700 hours, and then decreases until about 0200 hours. Generally, our mental performance mirrors the circadian rhythm; that is to say, our performance increases during the day, rapidly in the morning, as our body temperature increases, and then falls off during the evening. A period called the "circadian trough" occurs from 0230 hours until 0600 hours, when the body's temperature is at its lowest and our mental performance is at its worst. (While this is generally true, there are significant individual

Continued on page 14

From the Investigator

Aircraft Occurrence Summary
Type: Aurora CP140104
Date: 28 May 1996
Location: Comox, British Columbia

Circumstances
During a left-seat short field landing sequence, the aircraft departed Runway 11 and came to rest at the edge of an abandoned taxiway about 400 feet to the left of the runway and 3200 feet from the threshold. Damage was assessed as D category and there were no injuries.

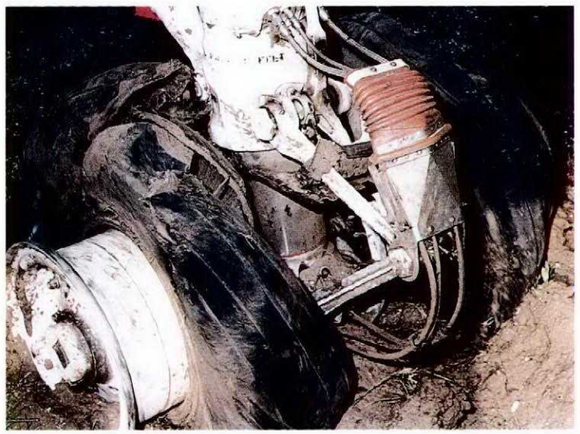
"Overview of the occurence site looking west toward the threshold of Runway 11."

Investigation
The aircraft was configured normally and the First Officer flew a stabilized, on-speed approach. Immediately after touchdown, excessive left brake was applied and both tires on the left landing gear failed. The Aircraft Captain, in the right seat, took control but was unable to keep the aircraft on the runway.

"Left main landing gear and No.2 engine nacelle."

DFS Comments
This inadvertent brake application on touchdown in the Aurora is not an isolated case. However, it has now made us aware that blown tires can create a situation beyond the ability of a pilot to keep the aircraft on the runway.

On a secondary issue, this incident has once again highlighted the dangers of aircrew riding unharnessed in the cockpit during take off and landing. The risks of unharnessed personnel must be weighed against the benefits BEFORE someone is hurt. ◆



"Close up of left main landing gear."

Type: CT114080
Date: 7 October 1996
Location: Little Rock Air Force base, Arkansas, USA

Circumstances
The mishap aircraft was #2 of a formation of four Tutors arriving at Little Rock AFB for a fuel stop. The formation split up into a section of three aircraft (("vic")and a single ship (#4) for landing. On landing the mishap aircraft's right landing gear struck sandbags securing a temporary lighting fixture designating a displaced threshold. The impact damaged the landing gear actuator rod and the shock strut causing the right gear to collapse. The right external tank and wing tip were scraped as the speed decreased and the aircraft settled. After coming to a stop the crew egressed uneventfully. The damage has been assessed as "C" category.

Investigation
All crews were aware of a NOTAM advising that the first 6200 feet of the 12,000 ft runway was closed. While in the pitch Tower advised lead that the displaced threshold was "just beyond the midfield taxiway where all the C130s are sittin". In the landing flare lead and #3 noticed obstacles ahead and pulled up slightly to extend. At this point #2 had glanced ahead to check for drift. When he looked back he noted that lead had pulled up unexpectedly. He then touched down. One to two seconds later he was surprised by a large bang and jolt to the aircraft. From across the formation #3 advised him that his gear was collapsing. Lead interpreted the information that Tower had given him to mean that the displaced threshold was at the intersection and so he planned a touchdown just past it. In fact the displaced threshold was nearly 1000 ft beyond the intersection. The lights marking the actual threshold were not easily discernable and the runway markings were not in accordance with USAF guidelines for temporary thresholds. The USAF corrected the problem immediately afterward.

DFS Comments
We were fortunate in this case that the damage was not more serious and there were no injuries. Vigilance must always be exercised, especially when operating away from home where accents and local terminology can change the meaning of a phrase. ◆

Damaged landing gear

Sand bags and temporary lighting fixture of displaced threshold

Resting place of aircraft on the right side of runway

Continued from page 12

differences: everyone knows a "night-owl" who starts to hoot and holler just when everyone else wants to go to bed!) We naturally want to sleep during the period of falling body temperature, and this is also when sleeps does us the most good. A two hour nap taken from 0200 to 0400 hours is much more restorative than a nap taken from 1000 to 1200 hours.

Significant problems happen when we run counter to our body's circadian rhythm by working at night or by flying across time zones (jet lag). Both activities can affect the quality and quantity of sleep, and both contribute to fatigue. The body adjusts to a new time zone at the rate of 1 to 1.5 hours per day, and it will take three nights to restore normal sleep after a westbound flight and up to seven days after an eastbound flight crossing several time zones. Until adjustment occurs, it is difficult to get full value from sleep.

Changing from day to night operations also presents a problem, as it takes up to 12 days to adjust circadian rhythmns to a night shift. As it usually is not practical to make a full adjustment, more often a rapidly rotating shift schedule is used, and the effects of being "out of phase" are simply accepted. Daytime sleep presents problems for some people no matter how good the sleeping accommodations are, and most day sleepers average two hours less sleep per day than night sleepers. In a field location when 24 hours flying operations are in progress, quality and quantity of day sleep is probably pretty low and fatigue levels increase.

Safety

How do we manage the fatigue risk? Everyone in air operatons has a responsibility to ensure they and their buddies are alert and fit for duty. Each air group has orders detailing the length of crew days, daily flying times, and accumulated duty and flying times over specified periods for different types of aircraft and missions. Observe them! Authority to exceed these limits is retained at high levels to ensure that the increased risk is justified by the operational necessity.

On an individual level, getting a sufficient quantity of good quality sleep is a must. Without it you can expect your performance to drop, so get someone to double check your work. Remember that you are a poor judge of your own abilities when you are fatigued, so watch your buddies for signs of fatigue and get them to watch you. If the opportunity for a nap presents itself, then take it. (I know this conflicts with some notions of military discipline, but it is time we got rid of those!) If your lack of sleep presents a hazard to the mission, admit it, or at least accept it if someone else points it out to you. Don't make matters worse by going to excess with alcohol, coffee or drugs of any description.

For supervisors, the old adage of knowing your people was never more true. Watch your people for deviations in performance that might indicate fatigue. Be aware of their schedule and what is going on in their life that might be causing a fatigue related problem. Represent your people to higher authority when necessary to ensure that sufficient rest is provided during continuous operations. Last, know when to take a break yourself! Studies show consistently that leaders are the ones who need sleep the most but are the least likely to get it. Develop your 2I/C to where he/she can spell you off and you can get the rest you need.

For units, review establishments, orders and operating procedures to ensure that they provide for sufficient people to do the job, and that scheduling permits adequate rest even in periods of high tempo operations. Think about how things are done: is everyone woken up at 0600 hours in the field, regardless of whether they are needed or not? Can crews eat when it is convenient for flying operations, or do they have to choose between sleep or food? If so, it is time to re-think the situation.

Conclusion

Fatigue is a problem that must be managed effectively for safe air operations. Fatigue is insidious in that personnel may not realize that their performance has fallen off. While some fatigue can be countered by a change of activity or some mild stimulation, serious fatigue can only be solved by getting good quality sleep. Countering fatigue related problems is everyone's business, from the individual to the highest headquarters. Sound sleep management practices can make air operations safer, so know them and practice them in your unit, because failure to stay on top of fatigue can bring you that much closer to that accident that nobody wants. ◆

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by Major C.R. Shelley, Assistant-Professor, Department of Mlitary Psychology and Leadership, Royal Military College of Canada

References

Holding, Dennis. (1983). Fatigue. In Stress and Fatigue in Human Performance. *Robert Hockey, ed. Chichester: John Wiley and Sons. 145-168.*

Krueger, Gerald P. (1991). Sustained military performance in continuous operations: combatant fatigue, rest and sleep needs. In Handbook of Military Psychology. *Reuven Gal and A. David Mangelsdorff, eds. Chichester: John Wiley and Sons 255-278.*

Monk, Tim and Folkard, Simon. (1983). Circadian rhythms and shiftwork. In Stress and Fatigue in Human Performance. *Robert Hockey, ed. Chichester: John Wiley and Sons. 97-122.*

FLIGHT COMMENT

Flight Comment would like to hear from you !!!

We know there are some great experiences out there waiting to be told, so how about writing them down. How are you accomplishing your job or mission safely? Do you have a "Lessons Learned War Story" that others may benefit from? Any new technological advances or new equipment that makes your job or workplace safer? Anything else you can think of that will help "get the word out"! Pictures and/or slides with your submission are appreciated. Do any Wings/ Bases/ Units/ Squadrons/ Sections/ etc. want to be featured on the cover?

We can be reached by fax, mail or telephone as listed on the inside front cover.

Let's hear from you !!! ◆

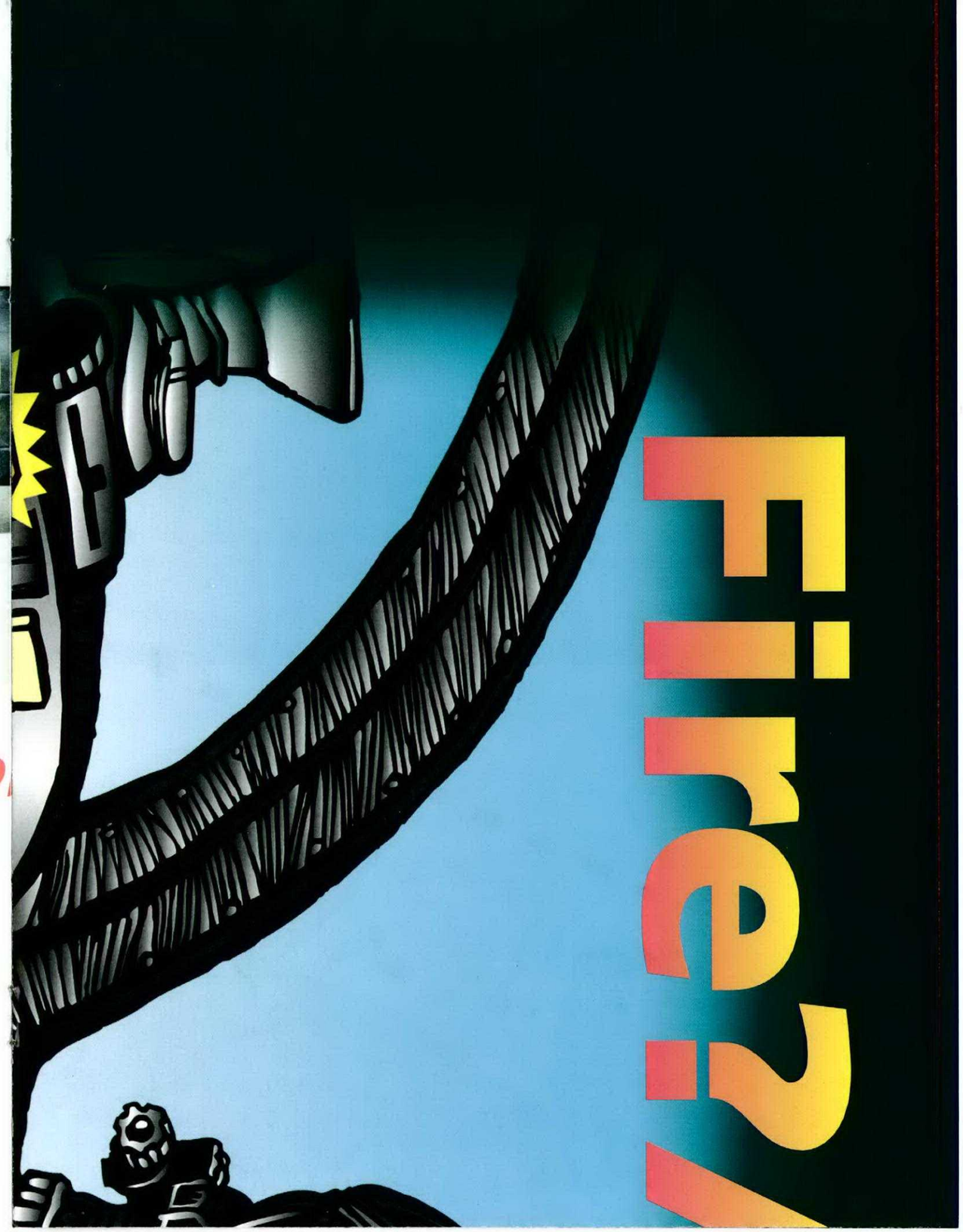
Hawker Typ

Hawker Typhoon MK. 1B JP149 of No. 440 (FB) Squadron Royal Canadian Air Force 1944 (the aircraft serial number should be MP149).

The Typhoon was powered by the massive 2,180 horsepower Napier Sabre IIA horizontal H piston engine. With a maximum gross weight of 11,400 pounds and a maximum speed of 374 miles per hour at 5,500 feet the Typhoon was a fighter bomber par excellence.

The Typhoon is part of the CANNAV collection donated to Air Command by Larry Milberry. ◆

research by Capt Jay Medves, 4 Wing Cold Lake



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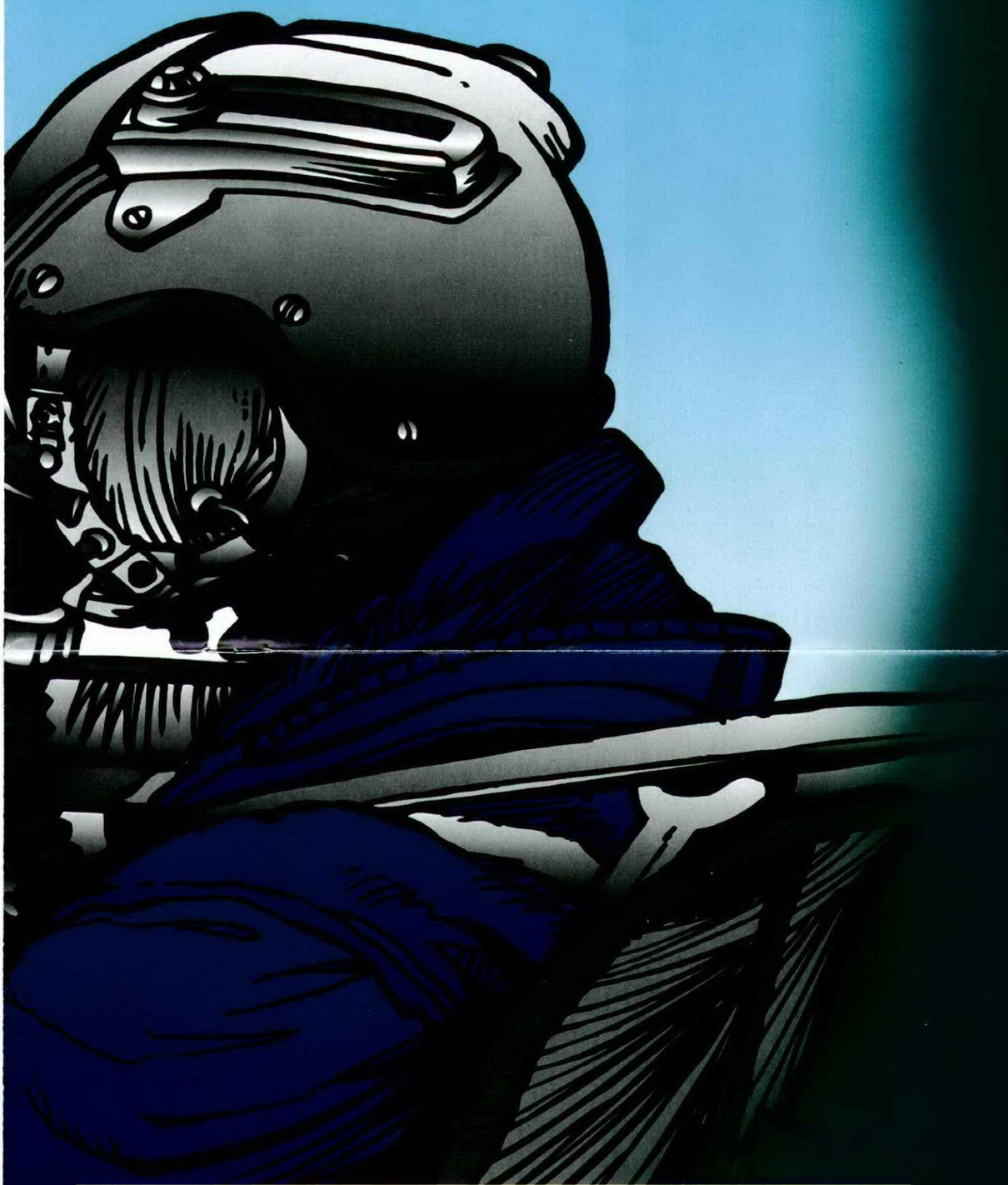

1. Garder le contrôle de l'aéronef
2. Évaluer la situation
3. Prendre les actions corrective de la liste de vérification

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