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Flight Comment

ISSUE 2, 2018

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Cover – Aircraft Technicians from 436 Transport Squadron out of 8 Wing Trenton, Ontario, look on a CC-130J Hercules aircraft taxiing to take off for a medical supply delivery scenario during RIMPAC 16 at Joint Base Pearl Harbor-Hickam, Hawaii on July 13, 2016.

Photo: MCpl Mathieu Gaudreault, Canadian Forces Combat Camera

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Photo: Cpl Jax Kennedy

Views on Flight Safety

Managing Airworthiness Risk in Support of Royal Canadian Air Force Operations

by Bhupendra Patel, Team Leader for the DTAES Risk Management Center of Excellence, DGAEPM

Airworthiness is, in general terms, the measure of an aircraft's safety and fitness for flight. To be airworthy, an aircraft must remain in conformance to its design requirements. Any deviation from these design requirements could result in an airworthiness risk that requires timely action to be taken. Royal Canadian Air Force (RCAF) and Assistant Deputy Minister (Material) (ADM(Mat)) staff play a critical role in managing this risk and are routinely challenged to make decisions directed at maintaining the continued airworthiness of Canadian military aircraft.

In-service issues that could result in an airworthiness risk can be detected at all levels of aircraft operations and support, from flight crew and maintainers in operational units, to Aircraft Engineering Officers (AEOs) and Life Cycle Materiel Managers (LCMMs) within Weapon System Management (WSM) offices. Their coordinated approach in swiftly dealing with risks as they arise allows the RCAF to retain primacy of operations and continue flying at a level of safety which is accepted by appropriate authorities.

The following illustrates how an apparently minor malfunction, discovered during a routine technical check, had the potential for catastrophic consequences, had it not been assessed and addressed according to the RCAF's rigorous Airworthiness Risk Management (ARM) process.

During an inspection of the life raft system release cables on a CC130J aircraft, the 436 Squadron maintenance staff noticed the cables hanging lower than normal. This discovery triggered a more thorough inspection of the complete life raft system where it was determined that both sides of the rigging from the fuselage were out of specification and the life raft CO2 release cable length was abnormal.

At that point, it was not obvious how the improper rigging could affect the flight safety of the CC130J; however, the squadron Senior Aircraft Maintenance Engineering Officer (SAMEO) was concerned and immediately brought the issue to the attention of the WSM Senior Design Engineer (SDE). It was at this point that the ARM process was initiated.

The SDE formed a Risk Management Team (RMT), by reaching out to Engineering Officers and LCMMs from the WSM cell, to Subject Matter Experts (SMEs) from the Directorate of Technical Airworthiness and Engineering Support (DTAES), and specialists from Lockheed-Martin, the Original Equipment Manufacturer (OEM), and together they performed an Airworthiness Impact Assessment (AWIA).

The team quickly determined that the improper rigging could result in an un-commanded in-flight inflation and release of the life raft, which could then become entangled in the empennage, and result in complete loss of control of the aircraft. The hazard severity and probability were assessed and, based on the RCAF ARM process guidelines, it was determined that this issue posed a "MEDIUM" airworthiness risk for the CC130J fleet.

The CC130J SDE issued a Risk Alert Notification (RAN) for the fleet within hours of the original assessment, informing the operational chain of command, which allowed for a decision on continued operations while the risk process continued. Less than 24 hours later, the SDE followed up with an Airworthiness Risk Alert (ARA), which documented the issue in greater detail, including immediate mitigation activities. The ARA content was jointly approved by the SDE, on behalf of the Technical Airworthiness Authority (TAA), and the Divisional Operational Airworthiness Manager (DOAM), on behalf of the Operational Airworthiness Authority (OAA) and the risk was accepted by the Operational Command Risk Acceptance Authority (OCRAA).

As part of the ARA risk mitigation actions, a Special Inspection (SI) was issued on all CC130J aircraft to determine how widely, if at all, the issue was spread throughout the entire fleet. By managing the risk, it was possible to assign a 30-day compliance time, which minimized impact on operations. Upon successful completion of this SI, the fleet was returned to an Acceptable Level of Safety (ALOS).

Even with the fleet returning to ALOS on SI completion, there was more work to be done and a need to transition the ARA to a Record of Airworthiness Risk Management (RARM). The RARM was now focused on determining the root cause of the issue and the actions necessary to prevent this risk from reoccurring. In this case, the investigation determined that the original delivery configuration of the aircraft was not in accordance with the design specification, causing the OEM to launch a formal quality assurance investigation into their manufacturing procedures.

While this example offers a snapshot of what goes on behind the scenes to develop, document and resolve airworthiness risks, RCAF staff deals with these issues on a regular basis. Their likelihood is accepted as inherent to our operations and mitigation measures are not always economically practical. This is why managing airworthiness risk in military aviation requires a structured, systematic and comprehensive organization-wide approach.

Every issue that might pose a risk brings together Risk Management Teams specific to the hazard at hand to review its probability and severity. RCAF technical and operational staff are mobilized, within hours, to make effective and informed operational and technical safety decisions, guided by a robust Airworthiness Risk Management process.

Regardless of the origin of the risk, the RCAF Airworthiness Risk Management process is a critical component of the DND/CAF Airworthiness Program, on which the RCAF relies to ensure that military fleets operate as safely as possible in fulfilling their assigned missions.

The Editor's Corner

How quick we are to judge. I include myself in that "we." My editor's education has chiefly come from studying other flight safety related publications. Neat photos and interesting articles get filed away for later use... with the appropriate permissions of course. Several days ago a publication created by the Flight Safety Department of the Swiss Air Force, Flight Safety Bulletin 1-2018, came across my desk. I read it from both an aircraft accident investigator and an editor's perspective; assessing the content of the articles and also the layout and visual appeal of the images. There were several photos in the Cats and Dogs section of this magazine that struck my funny bone chord and I went around the office showing them to my peers.

Apparently I was not only reading the magazine from an editor and investigator's perspective but also as an ex-helicopter pilot's viewpoint. One photo showed a vehicle parked on a helipad with the shadow of a helicopter "obviously" trying to land in the right frame of the photo. The second photo showed a "funny" note on the vehicle's windscreen presumably left by the unimpressed aircrew of the helicopter. Our immediate reaction was to comment about the stupidity and laziness of the vehicle driver since the photo shows plenty of empty parking spots available for use. We discussed what we would have done had we been the aircrew in question and some of us stated that we would have landed anyway. It would have served the driver right if their vehicle ended up getting sand blasted.

24 hours later, I'm sitting in a bus, commuting in to work and reading the book The Field Guide to Understanding 'Human Error' by Sidney Dekker as recommended by the Director of Flight Safety (see the book review in the Dossier section of this magazine). I made it to page three when I became really uncomfortable about my initial reaction to those photos. Under the header of "Bad People in Safe Systems, Or Well-Intentioned People In Imperfect Systems?" Sidney Dekker states:

At first sight, stories of error seem so simple:

- Somebody did not pay enough attention;
- If only somebody had recognized the significance of this indication, or of that piece of data, then nothing would have happened;
- Somebody should have put in more effort;
- Somebody thought that making a shortcut was no big deal.

And then he goes on to say:

Given what you know after the fact, most errors seem so preventable. It might prompt you, or your organization to do the following things:

- Get rid of Bad Apples;
- Put in more rules, procedures and compliance demands;
- Tell people to be more vigilant (with posters memos, slogans);
- Get technology to replace unreliable people.

Sidney Dekker then states, in greater detail, the reasons why these proposed remedies don't improve the situation and why they may actually make things worse.

As a previous aircraft accident investigator, I should have known better. I let my pilot bias get in the way and cloud the fact that I had no factual information beyond the images to provide context to the situation. It was too easy to pass judgement on the vehicle driver. What if we had been the investigators in this occurrence and discovered that this parking lot actually belonged to a hospital whose parking was congested throughout most of the day? What if the vehicle owner had driven frantically to the hospital because a family member was in medical distress and had parked in the nearest available space, next to other cars that were already parked there? What if this photo was taken much later in the day when cars had departed the lot making it look like spaces were available? What if the vehicle owner was from another culture and did not recognize the significance of a large H in a circle? Where were the systems in place to prevent vehicles from parking in this space in the first place? Why was there not a fence preventing access to the site? What was to prevent others (perhaps children) in the parking lot from running out into the landing site? My list of questions could go on and on.

Yes, in the end, by understanding the proper context, we might have proven that the driver had been an *#$%#$% as the second photo states but a proper investigation might have uncovered a whole raft of other possibilities. Our leap to assume, place blame and judge the driver as a "Bad Apple" prevented us from learning from this situation and creating preventive measures that might actually have been effective. Perhaps the note left on the windscreen should have been directed towards us, the upholders of the flight safety mantra – Assign Cause, Not blame.

Mea culpa. I obviously need to keep reading Dekker's book. Perhaps you might be interested in doing the same?

Major Claire Maxwell

Good Show

For Excellence in Flight Safety

Lieutenant-Colonel Forrest Rock

On 6 Dec 2017, LCol Forrest Rock was piloting a CF188 Hornet on a Maintenance Test Flight in the Cold Lake Air Weapons Range. To verify the functionality of the cross-bleed start when airborne, the right hand (RH) engine was deliberately shut down. When the left hand engine was used to initiate the cross-bleed start, the RH engine failed to re-start. After multiple unsuccessful attempts to re-start the RH engine, LCol Rock declared an in-flight emergency and returned to base with approximately twenty-five minutes of fuel remaining.

Since the RH engine provides hydraulic pressure to the flight and auxiliary controls, the required hydraulic pressure for the normal landing gear system and brakes ceased. This issue resulted in the need for LCol Rock to conduct an emergency gear extension and to plan for the engagement of the arrestor cable during landing. During the return to Cold Lake, LCol Rock actioned the emergency gear extension checklist but ran into further difficulties when, after approximately one minute, he received a down and safe indication for only the nose wheel and the right hand main landing gear. LCol Rock then turned away from the airfield to troubleshoot the unsafe left hand main landing gear. To remedy the situation, LCol Rock accelerated and climbed, successfully applying a series of lateral and vertical forces to extend and lock the left hand main landing gear. LCol Rock then conducted a single engine, straight-in, half flap landing with a successful cable arrestment.

Despite the compounding emergencies, LCol Rock displayed a superior understanding of the CF188 systems and, through his professional, calm, and superior execution, directly prevented the loss of an aviation resource. LCol Rock is most deserving of this Good Show award.

Photo: Cpl Manuela Berger

Good Show

For Excellence in Flight Safety

Captain Eileen Carter

Captain Eileen Carter and Cadet Paige Renisson (seated).

Photo: Capt Carlee Glendenning

The Air Cadet Gliding Program (ACGP) operation at Smiths Falls Airport operates concurrently with a local flying club, local flying school and itinerant traffic. On 22 Oct 2017, Captain Eileen Carter, tasked as Launch Control Officer, was responsible for ensuring the safe flow of ACGP aircraft with other air traffic as required by the Smiths Falls airport operator.

Throughout the day, a civilian home-built aircraft was performing flight tests and, on one approach, stated an intent to land but performed a go-around in the flare. During this sequence, Captain Carter observed that while the nose gear was down, the main gear had remained retracted. The civilian aircraft pilot returned for another approach and, with the aircraft approximately 15 feet above the ground, only the nose gear was seen to be lowered. Captain Carter alerted the pilot, who applied power and performed an overshoot. The pilot was able to correct the gear problem at altitude, and returned for landing without further incident. After landing, the pilot approached the gliding operations staff and informed them that his intent was to land as his instruments showed no abnormal condition.

Captain Carter's situational awareness and timely communication to the civilian pilot averted the aircraft from being landed with only the nose gear deployed and likely prevented the aircraft from sustaining serious or catastrophic damage with the corresponding potential for injury. Captain Carter is very deserving of the Good Show award.

For Professionalism

For commendable performance in flight safety

Captain Matthew Hart and Major Andy Feltrin

On 7 November 2016, the Snowbirds were transiting to their training area in Southern Saskatchewan as part of a five plane formation mission. During the rejoin after a shake-out manoeuvre, Captain Matthew Hart experienced a stuck throttle on his CT114 Tutor when he conducted a rapid deceleration from trail into close formation. Capt Hart commenced an overshoot and advised Snowbird Lead that he was "off" the formation. Capt Hart and his co-pilot, Major Andy Feltrin, assessed the situation and noted that the engine rpm remained at 103% regardless of throttle position. Capt Hart set the aircraft up for a forced landing and, during their return to Moose Jaw, the two pilots carried out a pre-ejection check. Once overhead the airfield, Capt Hart secured the engine by shutting it down and proceeded to fly a dead stick forced landing. The aircraft was landed without further incident.

Capt Hart and Maj Feltrin demonstrated superior crew coordination throughout the emergency and used their high level of experience to bring themselves and their aircraft safely back to base. Due to their skill, professionalism and teamwork, Capt Hart and Maj Feltrin are most deserving of this For Professionalism award.

Photo: DND

Photo: DND

Second Lieutenant Jordan Racine

Photo: LS Louis-Philippe Dubé

On 4 Oct, 2017, a CT114 Tutor avoided a gear up landing due to the vigilant situational awareness of Second Lieutenant Jordan Racine, an air traffic control tower trainee at 15 Wing Moose Jaw. 2Lt Racine noticed something suspicious about a Tutor preparing to land and voiced his concern to other personnel in the tower. Realizing that the Tutor's gear door was open but the gear was not down, the tower controller advised the pilot to check their gear while they were making their final turn. Noting a conflict between the position of the gear handle and the state of the landing gear, an overshoot was conducted by the pilot. After re-entering the landing pattern, the landing gear was recycled successfully and, with a confirmation of the landing gear down and locked, the Tutor was landed without further incident. 2Lt Racine was the only person in the tower that noticed the initial landing gear malfunction.

Demonstrating exceptional vigilance and situational awareness well beyond his trainee status, 2Lt Racine identified an issue with a Tutor that was preparing to land and makes him most deserving of this For Professionalism award.

For Professionalism

For commendable performance in flight safety

Master Corporal Tyler Bedard

Photo: Cpl Zebulon Salmaniw

On 16 Nov 2017, MCpl Tyler Bedard of 436 (Transport) Squadron was preparing Hercules CC130J617 to conduct live paratroop drops with the Canadian Army in Pembroke, Ontario. During the pre-flight checks, MCpl Bedard noticed that the calculation of the empty aircraft's centre of gravity seemed excessively tail heavy. Once out at the aircraft he confirmed that the actual configuration of the aircraft matched the aircraft maintenance records and entered the aircraft weight and balance data into the aircraft CNI-MU (Communication / Navigation / Identification – Management Unit). This validation check confirmed his original concern that there seemed to be an error with the provided weight and balance data.

MCpl Bedard immediately informed the squadron maintenance unit and the Aircraft Commander of his findings. The mission was cancelled and a thorough investigation of the weight and balance data was conducted revealing an aircraft entry error resulting in a change of six inches to the center of gravity vice the correct 0.2 inches. Since this entry was over two years old, this weight and balance error may have resulted in the aircraft being flown out of flight limits without the aircrew's knowledge.

MCpl Bedard's attention to detail and perseverance in identifying and rectifying a potential hazard to flight safety is indicative of commendable extra effort and he is therefore deserving of this For Professionalism award.

Corporal Marc-André De-Serres

Corporal Marc-André De-Serres, an aircraft structure technician with 431 Air Demonstration Squadron, was completing a pre-flight check on a CT114 Tutor in Abbotsford when he noticed that the lap belt could connect without the arming key. This introduced the risk of the lap belt disconnecting while airborne during dynamic maneuvering.

Upon further investigation, Cpl De-Serres recognized that there were two loose screws in the back plate of the lap-belt manual release assembly. After seating the screws correctly, he proved that the arming key was now functioning properly and that the lap belt could not fully connect if the arming key was not properly in position.

This unusual lap-belt connectivity capability prompted Cpl De-Serres to check if this could occur on any other aircraft. He immediately advised his supervisor and subsequently detected four other aircraft that had the same issue. A fleet wide inspection was then conducted and the resulting survey raised serious safety concerns regarding whether or not the lap belt could be trusted to function correctly.

Cpl De-Serres' attention to detail and his efforts to understand the cause and scope of the issue demonstrate a superior professional attitude and significantly reduced the threat posed by this potential hazard. He is truly deserving of this For Professionalism award.

For Professionalism

For commendable performance in flight safety

Corporal David Peterson

Photo: DND

On 1 Nov 2017, Corporal David Peterson, a 443 (MH) Squadron aviation systems technician, was performing a Consolidated Corrosion #2 Inspection on CH12405 Sea King when he decided to inspect the inboard engine mount of the #1 engine, even though this is not a required inspection item.

During this additional inspection he detected an abnormal gap between the silver soldered and press-fit bushings. He immediately informed his supervisors and as a result the engine was removed to gain access to these bushings. A detailed inspection revealed that the bolt, which sat within these bushings, was degraded by 26.4 per cent of its normal thickness causing it to be shaped like an hour glass. An additional inspection revealed elongation of the forward mount and worn forward and aft bushings.

The forward inboard engine mount is one of three mounting points for the engine to the airframe and this particular bolt mount is the only main support for the forward end of the 340lb engine. A Special Inspection was issued to ensure no other aircraft were affected but wear and looseness of the mounting hardware was not detected on any other airframe.

Had this defect gone un-detected, the bolt would have eventually sheared, causing a drop of the forward end of the engine resulting in severe vibrations. It is highly probable that this condition could have compromised the integrity of the driveshaft system and cascaded into a scenario possibly involving an emergency landing or ditching at sea.

Cpl Peterson's conduct is clearly indicative of commendable extra effort. The completion of an additional inspection, coupled with his perceptive recognition of the gaps in the bushing, resulted in the quick identification and rectification of a possible forward engine mount failure. His dedication, level of professionalism and initiative to go above and beyond the expected inspection requirement makes him highly deserving of this For Professionalism award.

Mr. Andrew Loder

Photo: Mr. Terry White

Mr. Andrew Loder is a relatively new aviation systems technician at 103 Squadron but this has not hindered him from becoming a valuable member of the flight safety team. While completing work on the CH149 Cormorant landing gear system, Mr. Loder noticed that the nose landing gear hydraulic lines for the Emergency and Down Normal actuators were the same size and could easily be installed incorrectly. Raising his concern to the senior technician, the maintenance documents were further investigated and it was discovered that there was a vague caution against mixing up the lines as it could cause strain on the line during the extension and retraction of the gear. Mr. Loder took it upon himself to inspect all remaining 103 Squadron aircraft and discovered an incorrect hydraulic line installation on one of the aircraft.

A CH149 Cormorant fleet wide Special Inspection was generated and sent out to all main operating bases and repair facilities. The result findings confirmed another aircraft's hydraulic hoses were also installed incorrectly. A flight safety was raised and the investigation found that the maintenance publications lacked emphasis on the potential issue of incorrect hydraulic line installation. Although new to Gander and still undergoing OJT, Mr. Loder's close attention to detail and professional approach has resulted in this problem being corrected. His actions have contributed to the high standard of the CH149 maintenance program and makes Mr. Loder deserving of this For Professionalism award.

For Professionalism

For commendable performance in flight safety

Mr. Brian Peddle

Photo: Mr. Terry White

Mr. Brian Peddle is an experienced aviation systems technician working on the CH149 Cormorant at IMP in Gander and also has previous experience as a military flight engineer on the CH149. While inspecting the engine compartment area during a daily inspection on Cormorant 911, Mr. Peddle noticed that the inboard and outboard engine vertical links for the No. 3 engine appeared to be rotated incorrectly. On further investigation it was revealed that the vertical links were installed 180 degrees out in both the No. 2 and 3 engines. If these links are installed incorrectly, contact with the engine can occur resulting in a cascading effect of restriction of movement, vibrations and/or eventual component wear and damage of the engine.

A fleet wide Maintenance Alert was issued and incorrectly installed links were noted on other CH149 Cormorants. The flight safety investigation revealed that the maintenance documents provided insufficient instruction for the removal and re-installation of engine vertical links. The unclear direction in the maintenance documents were noted in hundreds of other instances and a further fleet Maintenance Alert was raised bringing attention to the misleading direction. Mr. Peddle's vast technical experience coupled with his close attention to detail corrected a fleet wide deficiency and ensured the availability of a critical search and rescue platform. He is truly deserving of this For Professionalism award.

Maintenance IN FOCUS

Location, Location, Location

by Captain Zhindra Korfman, Deputy Squadron Aircraft Maintenance and Engineering Officer (D/SAMEO) / Quality System Officer (QSO), 443 Maritime Helicopter Squadron

At 443 Maritime Helicopter (MH) Squadron (Sqn) we strive to be innovative in the way we operate and are always searching for ways to improve and become more efficient. Our uniqueness is influenced by having a naval base rather than an air base providing us with administrative support and, because we are located in Patricia Bay, British Columbia, we are geographically separated by an entire country from our east coast wing. This physical isolation occasionally means we need extra effort to communicate or conform to our wing standards yet this separation also gives us the autonomy to try something new at the squadron. This is the case with our snags desk that is located in the main area of the hangar.

I have always heard positive comments when a visitor comes to the unit and spots our snags desk. It seems like a common sense thing to me to have a desk on the floor that is staffed by a supervisor who can go through the Maintenance Record Set and assign tasks to individuals on the floor. The snags desk is the nerve centre of maintenance. Nevertheless, the comment comes up time and time again, "Look at that snags desk, what a great set up!"

It made me wonder why our snag desk is so unique. Indeed there are other units with supervisors located on the floor or having a similar set up. Interestingly, this set up wasn't included in the design of our hangar being built to hold the new CH148 Cyclones. When this discrepancy was identified, it showed that the location of the snags desk was considered as an integral part of unit functionality in the previous hangar. Noting this, the hangar design was amended and the snags desk was added to the floor plan during the construction of the new hangar. This example shows how important the snags desk is to the Squadron Aircraft Maintenance and Engineering Officer (SAMEO) organization at 443 (MH) Sqn.

Continued on next page

Photos: DND

443 (MH) Sqn is like any other aviation unit; it has a servicing desk which is staffed by an aircraft technician who has a level C release signing authority* and possibly also staffed by a technician who is a level C trainee. The 443 (MH) Sqn servicing desk is cordoned off in the corner of our building, not at all connected to the hangar floor, and is separated from the canteen by a wall. At times it can be hectic with crews changing over, hot refuelling being coordinated and aircrew briefing personnel about the aircraft. It's feast or famine in terms of how busy it is and it's not within the control of the level C technician at the desk. This is not a productive environment when trying to address routine or long term maintenance issues. Combining the snags and servicing desks, may work at other units but it's not the way we do it at 443 (MH) Sqn.

Here it is thought that co-locating the snags and servicing desks causes the level C releaser to become distracted by other concerns. Additionally, due to the remote location of the servicing desk from the hangar floor where the helicopters are maintained, it is difficult to provide direct supervision over the hangar floor activities or for technicians to have easy access to their supervisor for guidance or support in their tasks. By having a snags desk whose function is split from servicing and located in the area where the actual work is being conducted, the unit has reduced the level C releaser's distractions , increased supervision and improved mentorship on the hangar floor. The set up also creates an appropriate place to discuss snags, rather than the social area of the canteen or the hectic servicing desk. The snags desk is the perfect setting to troubleshoot and come up with solutions away from the pandemonium that is often found in servicing.

An external agency has asked if the location of the snags desk could make members feel like they are being micromanaged. The fact is that the hangar is large with several bays so there is still physical separation between supervisors and subordinates. At 443 (MH) Sqn we also believe that there should be a collaborative environment fostered between supervisors and subordinates. If someone is supervising, checking work and asking questions, they are verifying results rather than mistrusting a technician's skills. In the auspice of airworthiness, verification is important and it not only protects the unit and the people in the aircraft but the technicians as well. Overall, 443 (MH) Sqn technicians I have canvassed don't attribute any micromanagement to the location of the desk.

One challenge that has been noted is the bridge between servicing and snags as the servicing person in charge (IC) still must be apprised of the status of the aircraft as it pertains to operations. The mitigation to this challenge is that the snags desk IC must make an effort to keep the servicing desk IC informed. Communication is key and over time, the snags desk ICs at 443 (MH) Sqn have become adept at sharing this information.

Overall having the snags desk on the hangar floor has been positive and it has been well received by both supervisors and maintenance technicians. Its location adds to the overall productivity of the unit, creates a good environment to troubleshoot, research and discuss snags away from the servicing area and allows the level C releaser to maintain focus on the task at hand.

* Weapon System Release (Level C) is the authority granted to an Aircraft Technician to certify a release of an aircraft following the performance of servicing, elementary work or maintenance, or a scheduled maintenance inspection. C-05-005-P03/AM-001, Ch 8, Para 31, Page 1-21, 2018-05-31.

Risk and Leadership

by Colonel (Retired) Chris Shelley, C.D.

Chris Shelley joined the Canadian Forces in 1973. After graduation from Royal Military College he trained as a pilot, flying some 3800 hours with 424 Squadron and 408 Squadron on CH135 and CH146 aircraft. He flew on operational deployments in Central America (1990) and Bosnia (2001). He commanded 408 Squadron and 1 Wing before serving as Director of Flight Safety from 2006 to 2008. Retired since 2008, Chris retains a lively interest in aviation history and flight safety.

Photo: Library and Archives Canada

Figure 1. RCAF Station Torbay

Is Flight Safety a peacetime "thing?" Are the rules and procedures designed to prevent accidents and the unnecessary loss of aviation resources mere obstacles to mission accomplishment in wartime? Surely the stakes in wartime are high enough to make "risk management" irrelevant? Doesn't being at war mean that missions must get accomplished, no matter the cost? What about the Second World War: did the concept of risk management even exist back then? Mission acceptance and launch authorization – can we afford that kind of bureaucracy when our nation is locked in a death struggle? Looking back at an operational accident from 1943, when the RCAF in Canada was at war, can help us explore some of these issues.

In the summer of 1943, the RCAF in Canada was doing more than just training aircrew; it was fighting a war against German U-Boats. In the North-West Atlantic and the Gulf of St. Lawrence, the squadrons of Eastern Air Command launched daily patrols to defeat Germany's intention of strangling the flow of supplies from North America to Great Britain. It was a bitter struggle with no quarter asked or given. Crews flew long boring patrols, broken only occasionally by a contact and even more rarely by an attack on a U-Boat. Weather in the operational area was often atrocious and success was elusive. But, by mid-summer of 1943 the combined efforts of Canadian, American and British forces had borne fruit. Germany withdrew her U-Boats from the North-West Atlantic to regroup. Despite the pause in the action, Eastern Air Command could not afford to relax. Convoy escorts and offensive sweeps remained the order of the day in the sure knowledge that the Germans would strike again as soon as conditions favoured them.

Therefore, it was "operations normal" for Eastern Air Command to task 145 Bomber Reconnaissance Squadron of RCAF Station Torbay, Newfoundland (Fig. 1), to carry out four convoy escort missions on 5 August 1943 using its Ventura General Reconnaissance Mark V (GR-V) aircraft (Fig. 2). The twin-engine Lockheed Ventura GR-V was a recent addition to the RCAF's fleet. Bigger, faster, better armed and better equipped than the Lockheed Hudson it had replaced, the Venturas of 145 Squadron were used for convoy escorts and anti-submarine sweeps. The standard crew was one pilot, one navigator/radar operator and two wireless operators/air gunners. Fitted with two extra fuselage tanks,

Continued on next page

Figure 2. Ventura GR-V 2183

two wing tanks, six depth charges (Fig. 3) and a full internal fuel load (a maximum war load of 31,000 pounds), the Ventura had to be handled carefully to get airborne safely in even the best conditions. When dealing with poor weather, as was often the case, the crew faced even greater challenges.

The weather on 5 August was poor, with ceilings of 200 feet and visibility varying from one and one-half miles to zero, although forecast to improve somewhat. At 0545 hours GMT the first tasked aircraft, Ventura GR-V 2169, began its roll down Runway 26 to take off into a pitch-black night and low clouds aiming to be in contact with convoy HX-250 at first light. Observers on the flight line followed its navigation lights as the Ventura accelerated along the runway and heard the roar of its engines increase as the pilot advanced the throttles to full power. The aircraft used the full length of the 5000-foot-long runway to get airborne and then climbed only slightly. Mere seconds later a flash of light split the night followed by a large ball of flame. American soldiers from a nearby anti-aircraft battery rushed to the scene only to be driven back by an intense fire. They discovered the pilot some distance away, thrown clear of the aircraft. He was conscious, but incoherent. The station crash tender arrived and ordered the soldiers back from the wreckage, as the six depth charges onboard the aircraft remained unaccounted for and presented a deadly hazard. An ambulance evacuated the pilot to the US Naval Hospital in St. John's where he died shortly after arrival without being able to provide any details about the accident. Once all the depth charges had been found clear of the aircraft, scattered along the debris trail, the station firefighters extinguished the flames at the main wreckage and confirmed the death of the remaining three crewmembers. In view of the prevailing weather, squadron operations cancelled the three other tasked missions.

Eastern Air Command convened a Court of Inquiry into the accident immediately. As well, the RCAF's Accident Investigation Branch (AIB) (forerunner of the Directorate of Flight Safety) had its Inspector of Accidents at Eastern Air Command carry out a parallel investigation and act as an expert advisor to the Court. Authorities at RCAF Station Torbay took measures to preserve the accident scene until the arrival of the investigator and the Court. Photographs were taken, and witness statements obtained. It did not take long for an accurate picture of events to emerge.

One witness that night was the pilot of the Ventura tasked for the next mission. He had delayed his take-off in the hope that the weather might improve. Wishing to gauge the height of the ceiling by seeing when Ventura 2169 would disappear into the clouds, he had watched the take-off. He testified that the slow build-up of engine noise told him that the pilot of Ventura 2169 had opened the throttles slowly and this hesitation had forced him to use all the runway on take-off. He also stated that the pilot had held the nose down for an unusually long time presumably to achieve 100 knots indicated airspeed prior to climbing. The result had been that the Ventura had climbed only slightly before striking the ground about one-half mile off the end of the runway. Other witnesses confirmed the impressions of the pilot witness.

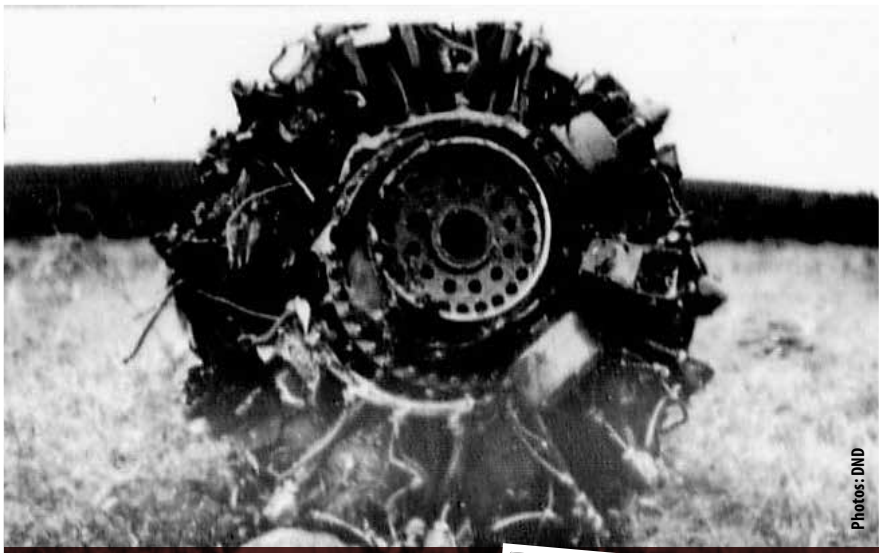
The physical evidence supported the eyewitness statements. The aircraft had carried on past the runway end for only half a mile before first

Figure 3. 250 lb anti-submarine depth charge

striking the ground at point 40 feet higher than the runway. Then the aircraft had carried on along track for another 750 feet before finally stopping and catching fire. Ground strikes had torn off the engines and tree stumps had ripped open the bomb bay, scattering the six depth charges along the debris trail. The fuel tanks were ruptured, and the fuselage had burned out completely. Examination of the engines (Figs. 4 and 5) by the aircraft maintenance officer indicated that they had been developing full power when the propellers struck the earth. The position of the throttle, pitch and mixture levers seemed to confirm this (Fig. 6). The flaps were found in the "full-up" position, a standard setting for take-off in the Ventura. No faults were found with control surfaces, cables or linkages.

The investigators focused in on the pilot and the weather. The pilot, a Warrant Officer, had 876 hours total flying time with 255 hours on the Lockheed Hudson and 159 hours on the Lockheed Ventura. His total night time was only 28 hours, while his instrument flying time was 119 hours. By the standards of the day, he was experienced. His squadron commander regarded him as better than average but admitted that he had been nervous about night flying in the Ventura. As a result, the squadron commander had flown 3.5 hours night dual with the occurrence pilot and considered that practice to have restored his confidence. He stated that the pilot could have asked for and received more night flying practice at any time. The pilot who had witnessed the take-off stated that the occurrence pilot was average in skill, but had a bit of difficulty judging height, and this had caused him to run off the end of the runway during a previous training trip. Nothing suggested the occurrence pilot had not slept well or had anything bothering him that might have affected his performance that morning. All agreed that the pilot had been slow to advance the throttles to full power and had held the aircraft's nose down too long before climbing up into the overcast.

Then there was the weather. The ceiling had been very low, and the visibility limited.



Photos: DND

Figure 4 and Figure 5. Wrecked engine from Ventura 2169

Shortly after the crash, the visibility had decreased to almost zero. The Operations Controller had briefed the pilot on the mission requirements for covering the ocean-going convoy and had tasked the aircraft to be on station at first light. When asked by the investigators why the pilot had been allowed to take-off in such poor weather, the Operations Controller replied that it was not his job to tell the pilot if the weather was good enough for take-off. "He was advised that if he did not like the weather he had the option of coming back." It was up to the pilot.

Then the investigators asked the squadron commander whether, "in adverse weather conditions do Operations instruct the pilot to takeoff or leave it to the pilot's own discretion?"

"That depends on the importance of the job. In this case I believe it was left up to [the pilot]. It was a convoy escort. The ceiling was given to him as 200 feet and he was told that he could suit himself about taking off."

The pilot who had delayed his take-off confirmed the statements of the Operations Controller and the Squadron Commander, that it was up to the pilot to make the final decision about taking off in bad weather:

"Were you going out on convoy patrol that morning if the weather had been satisfactory?"

"Yes."

"Who makes the final decision as to whether you will or will not go if the weather is somewhat in doubt?"

"The pilot makes the final decision."

Since everyone evidently adhered to the doctrine of "it's up to the pilot to decide," it was logical for the Court of Inquiry to conclude that the occurrence pilot had caused the

Continued on next page

accident by not opening the throttles quickly enough on take-off. The Court made no recommendations for preventing future accidents. Eastern Air Command's Inspector of Accidents concurred, noting that poor visibility was a contributing factor. Eastern Air Command added only a recommendation that lead-in lights be installed for each runway to provide guidance for landing and take-off during periods of reduced visibility. Eastern Air Command evidently expected that its pilots would take note apply power a little more briskly on dark and cloudy nights. Other than that, it was ready to put the crash of Ventura 2169 behind it and carry on. After all, there was a war on, right?

RCAF Headquarters in Ottawa took a different view and said as much in a letter to Eastern Air Command:

"We don't feel altogether happy about the crash of Ventura No. 2169... and would be very glad if you could give it your personal consideration."

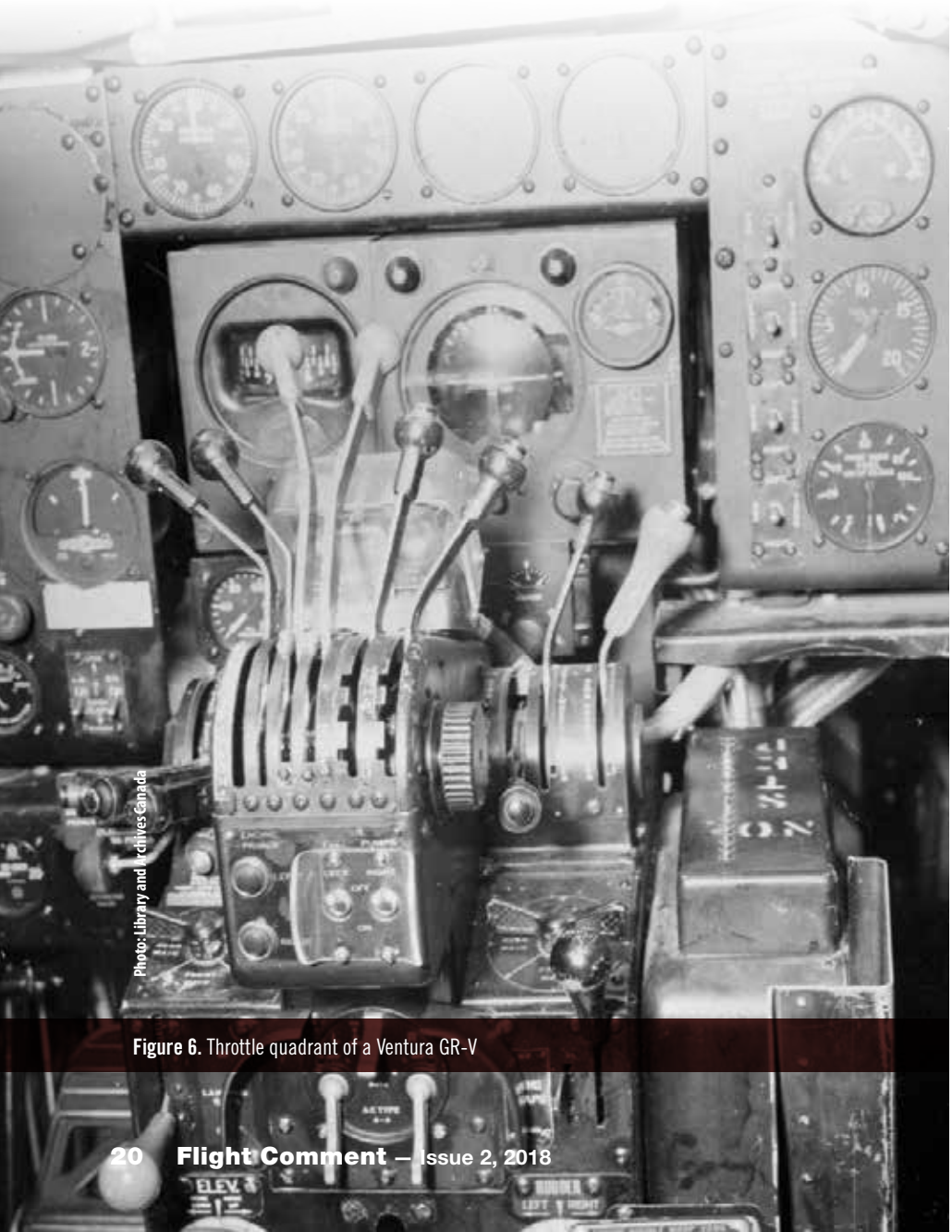


Photo: Library and Archives Canada

Figure 6. Throttle quadrant of a Ventura GR-V

What was it about Venture 2169 that had made headquarters unhappy? Serious accidents were depressingly common in 1943, with fatalities averaging 12 per week, yet most investigations got only a cursory review at the national level. Something made the case of Ventura 2169 stand out to the staff officer responsible for Bomber Reconnaissance Operations. Why had the pilot been allowed to take off in such weather? Why was the decision to take off left completely up to the pilot? Why did Eastern Air Command not follow the practice of Trans Canada Airlines on similar equipment and add a second pilot to the crew to assist the pilot-in-command in such weather? Bomber Reconnaissance Operations passed his concerns to the Deputy Member for the Air Staff. The Air Vice Marshal agreed that the chain of command could have done more to reduce the risk and that change was needed. The letter he sent to Eastern Air Command makes an interesting read:

"It is perfectly true," he wrote, "that the convoy was an important one, and certainly the idea is to cover important convoys if at all possible, even though the weather may be a bit sticky...the doubtful point, I think, is whether the pilot should be allowed to take off in a Ventura with no second pilot to help him, by night, when the conditions are as bad as they were and when he is not likely to break into clear weather for some time."

"Admittedly, it would hardly be fair to say that the pilot crashed because he could not see, for even on a clear night he could probably see nothing once he had left the end of the flare path; but don't you think it was the consciousness of taking off under a low ceiling and with poor visibility that led him to open his throttles slowly and cautiously, and to be over-enthusiastic about holding her down to gain speed after take-off."

"...I wonder whether in this instance the decision to get off and cover the convoy at all costs was beyond the borderline of keenness and into the region of rashness."

"...I should think that a Ventura, with high power, heavy loading, and no second pilot can't be the ideal machine for an instrument take-off for any pilot except the most experienced."

There was a lot more behind the comments of the Deputy Member for the Air Staff in this letter than just the loss of Ventura 2169 and its crew. Easter Air Command had struggled for three years to improve its operational effectiveness and in the opinion of RCAF headquarters, Ventura 2169 could be evidence of some serious backsliding.

The first point was that Eastern Air Command needed to conserve its airpower resources. True, the production of aircraft and crews was at record levels, but strategic priorities meant that the RCAF had great difficulty getting allocations of modern aircraft and trained crews for Eastern Air Command. It had taken immense pressure by the Canadian Government to obtain Very-Long-Range (VLR) Liberators for the RCAF to close the mid-ocean gap in April 1943. In fact, the Royal Air Force's (RAF) Coastal Command had considered that the RCAF lacked the expertise, doctrine and discipline to use VLR Liberators effectively and it had taken high-level strategic direction at the Casablanca Conference in January 1943 to seal the deal. With respect to Venturas, the RCAF had to compete with the RAF and the United States Navy for them, while the priority for experienced crews went to European operations, not Canada. Neither was easy to replace. Eastern Air Command needed to hang on to the aircraft and crews it had for what was most important: killing U-Boats.

Which led to the second point: convoy escorts were low priority missions. Experience had shown that to win the Battle of the Atlantic, U-Boats needed to be destroyed, not just deterred. Operations Research had shown that convoy escort missions had the least chance of detecting a U-Boat. Intelligence-led targeting of known U-Boat locations had the highest success rate. That did not mean that convoy escorts were useless, but in this case the potential results did not justify the risk 145 Squadron had taken in allowing the pilot of Ventura 2169 to take-off in such bad weather. Moreover, despite the chain of command being aware of the risk, it had done nothing to mitigate it by adding a second pilot or delaying the take-off until weather improved. Indeed, it seems as if the chain of command felt it had no role at all in managing risk. That burden had belonged to the pilot, who had probably not been in the best position to judge whether the risk was justified or not.

"The RCAF came by this doctrine and these procedures through long and often bitter experience, and they represent our best efforts at balancing mission accomplishment with the preservation of resources."

Finally, the occurrence highlighted continued weakness in Eastern Air Command with respect to doctrine, tactics and training. Inspection teams from RAF Coastal Command continued to remark on unevenness across the Eastern Air Command squadrons, the inexperience of crews and leaders at all levels, as well as the lack of effective coordination with the Royal Canadian Navy. Coastal Command also noted that Canadian crews often took excessive risks by flying in atrocious weather when the chance of a visual engagement with a U-Boat was virtually nil. Across the command, there were vast differences from one squadron to another in terms of aircraft camouflage, patrol heights, tactics, and mission success rates – all within the same command! The crash of Ventura 2169 did not inspire confidence at RCAF headquarters that Eastern Air Command was finally getting right – quite the opposite!

Unfortunately, the files do not reveal exactly what changes occurred in Eastern Air Command due to this criticism from above. Eastern Air Command did work very hard to make good its deficiencies, such that when the U-Boats did return to the North-West Atlantic in the fall of 1943, the RCAF was ready. Much hard fighting lay ahead, but with more experienced leadership and crews, improved equipment and modernization of tactics the RCAF defeated the U-Boat menace.

It would be too much to say that the crash of Ventura 2169 represented a significant catalyst for change in Eastern Air Command. The RCAF in 1943 lacked the kind of risk management doctrine that is enjoyed by today's RCAF. The conceptual basis for such a doctrine had yet to be written. For example, the words "flight" and "safety" had yet to appear together in the same sentence. Even senior RCAF officers had very little experience in either flight operations or combat in 1943, but they would prove to be quick learners. Ventura 2169 served more as a brief flash of awareness to leadership that leaving risk management solely up to the pilot was not the best approach, and that Eastern Air Command had to do better. Fortunately, it succeeded.

What about today? The RCAF has doctrine for risk management, it has a Flight Safety program, it has procedures for mission acceptance and launch authorization and they exist so that whether in peace or in war (or somewhere in between) aerospace resources will be used efficiently, effectively and without wasteful losses. The RCAF came by this doctrine and these procedures through long and often bitter experience, and they represent our best efforts at balancing mission accomplishment with the preservation of resources. Unlike Eastern Air Command in 1943, we do not have to figure out best practices for risk management while fighting a national battle for survival. If ever we should feel like dismissing our risk management doctrine as nonsense, perhaps it would be wise to give a thought to the crew of Ventura 2169 who died that dark night in Torbay, on the 5th of August 1943 and think again.

ON TRACK

This article is the next instalment of a continuous *Flight Comment* contribution from the Royal Canadian Air Force (RCAF) Instrument Check Pilot (ICP) School. With each "On Track" article, an ICP School instructor will reply to a question that the school received from students or from other aviation professionals in the RCAF. If you would like your question featured in a future "On Track" article, please contact the ICP School at: +AF_Stds_APF@AFStds@Winnipeg.

This edition of On Track is written due to a discussion about Spot Heights and Maximum Elevation Figures raised in a recent ICP Course. The answer comes from Captain Michael Girard, ICP Instructor.

As a helicopter pilot, I have flown a lot of cross country under Visual Flight Rules (VFR) at relatively low level, encountering bad weather on more than a few occasions. Whenever bad weather was encountered, one of the key pieces of information that we as a crew would look at in trying to make a go/no go decision was the Maximum Elevation Figure (MEF) on our VFR Navigation Chart (VNC).

Although crews regularly look at the MEF to help in making critical flying decisions, I have found that many don't understand exactly what it means. Some think it is the same as an Area Minimum Altitude (AMA), providing 1000 feet (2000 feet in mountainous regions) of obstacle clearance. Some think it is the height of the highest obstacle in the quadrant. Some think it is the height of the highest obstacle plus 300 feet. The truth, as this article will explain, is somewhere between the latter two.

A lack of understanding of obstacle heights can have dire consequences. In 2010, a civilian B206 Jet Ranger with two company pilots on board took off from North Bay for Kapuskasing on a VFR flight plan. They encountered unexpected low ceilings and visibility enroute. While trying to "murk" through the bad weather, they hit a grey steel 79 foot tower. (Figure 1) The debris field of the Jet ranger was spread out over more than 500 feet and both pilots were killed. There were two functioning GPSs being used, and two VNCs open to the correct area of the map. Presumably the pilots were relatively certain of their location. Yet they still managed to hit one of the highest obstacles in the area. Although the tower was likely constructed sometime in the 1950s, it was not published on the VNC. That fact, plus its grey, hard-to-see colour were likely factors in the crash.

With that in mind, let's begin by discussing how spot heights and obstacles are depicted on VNCs. Only "known obstructions 300' or higher and known significant obstructions below 300' are shown."[1] This is why the tower that was involved in the crash, despite its age, was not on the VNC. Due to many factors, including contour intervals, not all spot heights are shown on the map. VNCs can also have up to a five year revision cycle, meaning newer large towers may also not be on map. So, there could be a 20 year old 200' tower or a four year old 1000' tower on top of a height of land that is not on the map because it is just lower than the next contour interval.

According to the VNC Legend, "The MEF represents the highest feature in each quadrangle... Pilots need to provide a margin for ground and obstacle clearance and for altimeter error." It is clear the MEF does not provide obstacle clearance, so it is definitely

Figure 1.

not the same as the AMA. Why then do so many think it provides 300 feet of obstacle clearance? The answer to that is the way in which the MEF is calculated, and the fact that the MEF often appears to be around 300 feet higher than the highest point height depicted in that quadrangle.

The S-ASM-103 VFR Chart Specifications published by Nav Canada states the MEF is calculated using the highest known spot height or obstruction. If based on a spot height (terrain), the MEF will be the height of the terrain plus 328 feet (100 metres (m)), then rounded up to the next 100 feet. In Figure 2 the MEF is 1700 feet, and the highest spot height in the quadrant is 1305 feet.

Spot Height

1305 feet (Above Sea Level (ASL))
+ 328 feet (100m)
= 1633 feet

Raise to the next higher hundred foot level = 1700 feet

Maximum Elevation Figure = 1^{7}

The 328 feet is meant to account for unknown obstacles such as towers less than 300 feet high. It is definitely not intended to ensure a safe obstacle clearance altitude.

If the MEF is based on a known obstruction such as a tower, the calculation includes the height of the tower, plus the vertical accuracy of the source material, then rounded up to the next 100 feet.

See the below example:

Elevation of obstruction's top 1827 feet (ASL)
Vertical accuracy value + 33 feet
= 1860 feet

Raise to the next higher hundred foot level = 1900 feet

Maximum Elevation Figure = 1^{9}

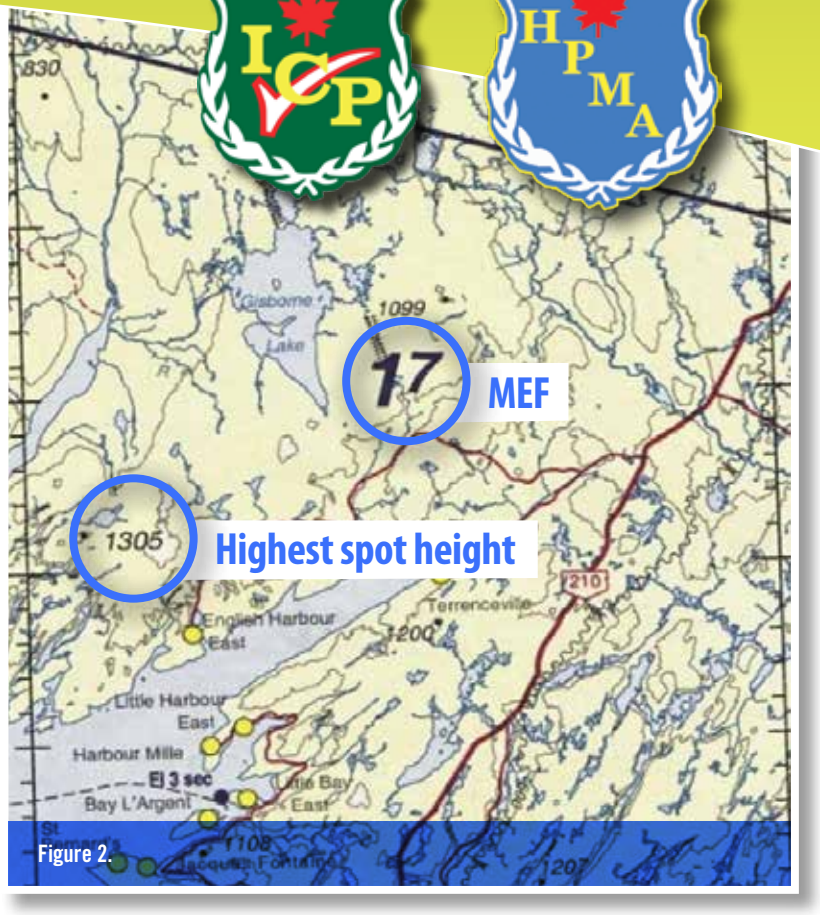


Figure 2.

Therefore, when the MEF is based on an obstruction such as a tower, it will provide less than 100' of obstacle clearance. Factor in altimeter error, and you can see how this is definitely not a guaranteed safe altitude at which to fly.

In summary, the MEF is meant to depict the altitude of the highest obstacle in the quadrant with some safety factors added in. Flying at the MEF does not ensure obstacle clearance. Additionally, due to the age and accuracy of the data used to create VNCs, depicted heights should be taken with a grain of salt. Therefore it is always important to check the NOTAMs and the Planning section (section C) of the GPH 205 for new towers, and ensure you are flying in weather conditions that will permit you to see and avoid the hard-to-see obstacles such as grey steel towers.

Note, the MEF depicted on Sectionals in the United States are calculated in a very similar manner. They are not to be confused with the Off Route Obstacle Clearance Altitude (OROCA) which are found on US Lo Charts and are the same as an AMA.

If flying at night, it is important to be aware that towers are often now lit with LED lights that are invisible in the NVG Spectrum.

For more information on the accident mentioned in this article, I highly recommend reading the Transportation Safety Board Accident Investigation Report A10o0145, found at http://www.tsb.gc.ca/eng/rapports-reports/aviation/2010/a10o0145/a10o0145.asp.

References

1. VFR Navigation Chart Legend

2. S-ASM-103 VFR Chart Specifications

3. Transport Safety Board Accident Investigation Report A10o0145

DOSSIER

BOOK REVIEW | Sydney Dekker's: *The Field Guide to Understanding 'Human Error'*

by Colonel John Alexander, MSM, CD

Colonel Alexander, a Tactical and Special Operations Aviation Pilot, is currently the Director of Flight Safety and Airworthiness Investigative Authority, Royal Canadian Air Force Headquarters, in Ottawa, Ontario.

How often have you encountered a situation where something went wrong and your first instinct was to ask "How could X have made such a bad decision? Why didn't X follow the clear, known procedure?" The instinct to ask these questions is natural. But it represents an "old school" way of viewing errors in decision-making within an organization, what Sydney Dekker refers to as the "bad apple theory" of human error. More appropriate is to ask, "How did X's assessment and action make sense to X at the time, given the circumstances that surrounded X?" This change in focus allows investigators to examine the possibility that human error is not the cause of an accident but, rather, a symptom of broader organizational weakness.

Sidney Dekker acknowledges from the outset that safety is never the only goal of any organization. Want to eliminate aircraft accidents? Easy – don't launch the aircraft. Of course, one can quickly appreciate the ludicrousness of such a suggestion.

Organizations are constantly weighing the risks inherent in the conduct of their operations against many other organizational goals. "Safety is created by people in a thicket of multiple goals, divergent demands and complexity, and that failures are an inevitable by-product of the pursuit of success under those circumstances." Further, when an accident does occur, seldom does one find that an individual or individuals set out to cause the accident intentionally. No one comes to work planning to have a bad day.

These two observations – that complex organizational systems are a balance among competing (often contradictory) interests and that individuals generally do not intend to have a bad day – have implications for how we should approach accident investigations. In particular, as Dekker explains, they suggest that a focus on the errors of the individual can fail to unearth systemic vulnerabilities. Whenever an investigator seeks to find the individual at fault for having caused an accident, whether the individual failed to act or acted improperly, the investigator is actually seeking out the "bad apple" in the organization. In seeking out the "bad apple", there is an implicit assumption that the organizational system is perfect and, had the individual only adhered to the SOPs, the accident would not have occurred.

The problem with this approach is that it fails to examine and therefore reveal the organizational circumstances that may have led to the accident in the first place.

In today's environment of increased operational tempo and pressures, coupled with a major influx of new personnel with lower experience levels, it is essential that we address accident investigations with an openness to a self-examination of our organizational systems as well.

Sidney Dekker proposes a model of investigation applicable to virtually any military investigative process. The key is to attempt to place oneself in the position of those making the decisions, at the time the decisions were made, with the same information available to them, and without falling into the trap of hindsight bias. This perspective allows investigators to better identify the systemic vulnerabilities that may be behind individual errors.

Dekker's *The Field Guide to Understanding "Human Error"* is an enjoyable, easy read. This book will enhance your leadership skills by allowing you to see the dangers of focusing on the individual when investigating accidents and by giving you the tools to examine the vulnerabilities in your organizational systems more clearly.

Photo: DND

Fangs Out!

Lessons Learned From My First Accident

by Captain Gary Fleming, 427 Special Operations Aviation Squadron

Photo: DND

As I look back over a 5,000 hour flying career spanning 38 years and counting, my mind often slips back to a traumatic, albeit formative flying experience. Not many aircrew get the chance to experience a near-catastrophic accident that shapes their view on flight safety so early in their career. Although I didn't feel it at the time, I was lucky to go through this misadventure and emerge unscathed and wiser.

Flying the mighty CH136 Kiowa in 1984 was an amazing experience. From your aerial perch, you controlled artillery fire and fighters, guiding bombs and howitzer rounds onto target with deadly precision. Your only protection was your ability to fly low... really low. Keeping your aircraft four feet above the terrain, you were able to stay hidden from the many weapons systems that could shred your soft aluminium skin. These "Nap-of-the-Earth" flying techniques were demanding, especially for a 22 year-old flying solo with just 200 hours under his belt!

The halcyon days of 1984 were marked by a fast-disappearing cadre of experienced pilots, being replaced by fresh "pipes" from the training system (fast-forward to 2018... sound familiar?). In the single pilot arena, much needed cockpit leadership was provided by a slightly more experienced section lead. On my fateful day, I was flying wingman for my deputy flight commander. We decided to finish off our standard training flight with the Kiowa reconnaissance skills exercise called "Hounds and Hares". We split the section and flew to opposite corners of a 6 Km x 3 Km box. The objective was to approach the other aircraft's location and spot them before they saw you. You would then call in their eight figure grid via the inter-plane frequency. If the target grid was within 100 metres, then the game was won. On this occasion, both my observer (combat arms NCM) and I felt our "**fangs go out**." We were determined to beat lead, so employed all of our limited flying skills. We aggressively flew to the absolute clearance limits of our craft, using every fold in the terrain and tree cover to mask our approach. Then, we saw the "enemy"... a glint of rotor flash along a treeline, they were dead meat. We were both so focused on calling out the grid, until... BANG! A definite thump and a subtle change in rotor pitch...

We quickly realized that "something" had happened to our Kiowa. Realizing that we were less than two minutes away from the squadron helipad, we opted to fly directly home. Congratulating ourselves on our derring-do and quick decision making, our hearts sank as we shut down. There was a definite whistling noise coming from the rotor system. Instead of the beautiful swept rotor tips at the end of the blade, there was now just a shorter, blunt end with the internal structure of the rotor clearly visible. Maybe our quick decision to come home wasn't the right move? Maybe saving the aircraft (and consequently our lives) by landing right away was the cautious approach? After all, the technicians would only have to drive 15 minutes to our location. Was winning the game so important that I was willing to risk damage and injury? I felt very sheepish as my Flight Commander pointed these things out to me and what might have gone terribly wrong.

I flew again the same day, then twice the next day. Quickly, the incident was forgotten and forgiven by my squadron mates. The aircraft was repaired and returned to service. The Flight Safety report was filed. Compared to the detail and analysis seen in today's flight safety reports, mine was pure vanilla. "Personnel/Pilot/Inattention...unit briefed to maintain obstacle clearance". However, those personal lessons stayed with me for the next 4,800 hours. As a flight commander, I used my story on many occasions to mentor the next generation of aviators. While I had many other in-flight emergencies over my career, this first one gave me my most valuable lessons:

- When the aircraft is telling you something – listen!
- If you think you should land – Land!
- Never get too wrapped up in the game... flying the aircraft always comes first!

Photo: Cpl Dan Bard

AGAINST THE GRAIN

by Captain Chelsey Llewellyn, Helicopter Operational Test and Evaluation Flight, Shearwater

Operational deployments are a rite of passage that every fresh Maritime Helicopter co-pilot hungers for. These deployments gives one extra flying hours, free travel and a mission but the opportunity to go on an operational deployment is limited and you may not see one in your first tour. Deployments can also be draining with long periods away from family and constrained by cramped quarters which can create unique strain on detachments. In my first year on squadron, I was not selected for an operation, but a surprise was in store for me, along with a lesson.

Three months into OP ARTEMIS there was a call for a relief pilot, so imagine my excitement when I was selected to go. I met the ship in Dubai and was eager for my first mission. During the walk-around, I was met with a nasty surprise. In the tail of the Sea King helicopter, I discovered a bunch of oily rags. I double checked that the B check ("Before" flight check) had been signed off. It had. The closest technician was the detachment sergeant, so I informed him about the rags and they were removed. The B check was redone, and with a slight delay to allow the sergeant time to chew on the technicians a little, we were airborne. No worries; or so I thought.

> ***"While going against the grain, especially as a junior and/or temporary team member may not make you popular, it is a potentiality which everyone has to be prepared for when entering a new environment."***

When I returned to the ship the other co-pilot took me aside and informed me that on this ship we only report "issues like missed rags" to the corporals who do the B checks because morale was so low that the technicians couldn't take another lecture. I nodded and walked away, but the issue kept nagging at me as I lay in my rack that night. Was poor morale responsible for the missed rags in the first place? Was it my call as the "newbie" to question the current crew's standard operating procedures? Had I just lowered morale on my first day? Was this practice of selective reporting really improving morale or was it compromising the safety of flight?

I had unintentionally stymied a practice that had developed in an isolated environment but would I have made that decision had I been briefed prior to finding the rags? While going against the grain, especially as a junior and/or temporary team member may not make you popular, it is a potentiality which everyone has to be prepared for when entering a new environment. You may well be called upon to be the voice of reason- the voice of Flight Safety.

The Voice of Reason

by Captain K. Colette Kenney, Combined Aerospace Operations Centre Detachment Joint Task Force North, Yellowknife

While in the climb out of Eureka on the C130 Hercules, I felt the familiar tingle of my fingers thawing after being in the cold. Or was it? Shortly after climbing through ten thousand feet altitude, the Aircraft Captain (AC) noticed that we weren't pressurizing. I recognized I was experiencing the initial signs of hypoxia and, as I reached for my oxygen mask, the AC simultaneously began directing the crew to don masks and the load master (LM) to check the cabin.

Earlier we had departed Iqaluit to drop off passengers in Eureka. We were now leaving Eureka to go to Resolute Bay where we were going to remain overnight before heading to Alert. Weather was at minimums in Resolute Bay and could change in an instant in Eureka. We had enough fuel out of Iqaluit, to fly to Eureka, offload passengers and gear, fly to Resolute Bay, conduct one approach and, if required, head to our alternate of Iqaluit.

Continuing in the climb out of Eureka, our cabin altitude steadily increased as well. Neither the LM nor the flight engineer (FE) could find the cause of our pressurization problem. With our limited fuel state, descent wasn't a viable option and a return to Eureka would steer us into wind and the uncertainty

"While in the climb out of Eureka on the C130 Hercules, I felt the familiar tingle of my fingers thawing after being in the cold. Or was it?"

of whether the weather would permit us to land there again. We decided to press on to Resolute Bay with the weather at minimums. After a successful first attempt at landing into Resolute Bay, the FE continued to trouble shoot the issue with the aircraft. The AC contacted our Air Operations Centre and home base and, with complete support for any decision he would make, we were to begin flight planning a safe route to Alert that would keep us below ten thousand feet.

The next day, with marginal weather throughout the north, the First Officer and I looked at safe routings above Ellesmere Island to include emergency outs in case of inadvertent weather. As the morning progressed, I didn't have the confident feeling I normally have when flying low level. I turned to the AC and asked if he would take this airplane on a search and rescue mission if we were tasked back at home. He replied, "No." I then asked him, "Why are we going to take it to deliver a treadmill?"

We flew home the next day, below ten thousand feet.

Photo: DND

Photo: Pte Lightowler

Fatigue

by Sergeant James Brown, 402 Squadron, Winnipeg

Crew rest, need I say more? As a new sergeant, I'm keenly aware as an organization we have rules set down to ensure that pilots and aircrew get the required rest necessary. This rest period is critical to achieve an optimal level of performance and safety in squadrons and flight operations. My question, what about the maintainers?

As a technician we are all familiar with shift work and the necessity to work long hours at all times of the day. As a new private in 402 Squadron many years ago I was confronted with the very real dilemma of balancing the needs of the squadron and the time necessary to rest and recover. Things really came to a head when insufficient sleep, long shifts and alternating schedules took their toll on me. I was falling asleep at red lights going to and coming from work. In fact I was pulled over by the police and warned that it could be determined that I was driving while impaired. I also noticed my quality of work was deteriorating, the crew as a whole was on edge and due care when completing checks and maintenance became a secondary concern. I was fortunate enough to have an exceptional master corporal who had the foresight to realize what was happening and who took steps via the chain of command to ensure members of the crew received the recovery time necessary. This recovery was achieved by directing people home and making maintenance secondary in importance. Our priority was changed.

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In conclusion, as supervisors we have responsibility to look after people and if possible change priorities when necessary. Fatigue has real life consequences such as generating flight safeties, restricting operations and causing negative effects in one's professional and personnel lives. Fatigue as a whole has the same effect as alcohol impairment but without an easy method to measure. We would never let someone who is drunk fix a plane, so why is fatigue being treated any differently?

Photo: Sgt Frank Hudec

Rung Out to Air

by Lieutenant Colonel Chris Bowen, Curriculum Officer, Joint Command and Staff Programme, Canadian Forces College

On 5 Dec 1997, I was tasked as a 4th crew member on a delivery of CP140121 from Greenwood to Halifax. I had about 2600 hrs CP140 Aurora experience as an Acoustic Sensor officer, Navigator/ Communicator, Tactical Navigator, and Maritime Patrol Crew Commander but, due to a year-long ground tour, I was not yet back to full CP140 flying qualifications and was just making my way at the Maritime Proving and Evaluation Unit (MP&EU).

My job was to do the final walk-around outside the aircraft; checking for pins not removed or panels open and ensuring the bomb-bay doors were clear for the pilot to close them on the ground. Once completed, I was supposed to enter the aircraft, secure the main cabin door ladder, close the main cabin door and then report the aircraft ready for start.

The aircraft was a CP140A Arcturus that had been stripped of some operational gear making it much lighter than a CP140 Aurora. The mission was to fly to Halifax, a less than 30 minute flight, so the corresponding fuel load was rather small. These factors led to a very light all-up-weight and it was a cold day. Performance would be extraordinary on take-off.

I performed my walk around, closed the main cabin door and a ground technician moved the air stairs away from the aircraft. I reported the aircraft ready for start and observed all four engine starts from the aft bubble windows. This task required me to repeatedly move about the rear of the aircraft, all in the vicinity of the main cabin door and aircraft ladder. I then strapped in to the starboard aft crew seat, facing backwards as per normal procedures, and prepared for take-off.

Predicting that the take-off performance would be significant due to the light weight and cooler temperature, the flight deck crew decided to conduct a maximum performance take-off, holding the brakes until horsepower was set. In my mind, I was now just a passenger, but I was quite intrigued to watch the take-off

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Rung Out to Air ...Continued

roll. The flight deck released the brakes and we jumped off to a very fast take-off roll. I believe we were airborne after a 700 foot roll – quite extraordinary, from my experience.

However...

While the aircraft rapidly rolled down the runway, I saw the main cabin door ladder flashing by me at great speed. The ladder's trajectory carried it through the galley (a tight space) and it came to a stop when it impaled the aft pressure bulkhead of the aircraft. It became very loud due to the air rushing through the gaping hole in the bulkhead and the engineer was having little success pressurizing the aircraft as we climbed rapidly. The pilot had to muscle the aircraft towards Halifax, as we had taken off in a direction opposite to Halifax. It was a bit chaotic, to say the least.

I walked up to the flight deck, told them that we had a bit of an issue, and we eventually landed in Halifax without further incident. I do note that, post-flight, it took four people a bit of time to get the ladder out of the galley, and that on its initial way through it hadn't even really scuffed the walls.

Why had the ladder gone backwards when we had gone forwards?

The ladder had obeyed Newton's First Law of Motion as it applies to inertial resistance versus frictional force. The force of gravity was greater than the force of friction from the aircraft floor causing the ladder to remain stationary in relation to the Earth but not in relation to me. Unwittingly, I became the magician that yanks the tablecloth off the table leaving the dishes upright when I forgot to secure the ladder in its floor tracks during my walk around.

> ***"I saw the main cabin door ladder flashing by me at great speed. The ladder's trajectory carried it through the galley and it came to a stop when it impaled the aft pressure bulkhead of the aircraft."***

During ground operations, technicians would move the ladder out of its floor tracks and therefore out of the way so they could easily get gear in and out of the main cabin door. In some cases the ladder would be pinned to a small securing point to ensure it did not fall over if bumped but, because this pin was small, it was not to be used for flight ops. Thankfully on this day, the ladder had not been pinned because, rather than travelling directly aft as it did, the pinned ladder would have rotated at a relatively high speed, likely on to me, causing a potentially serious injury. It was my day.

All-in-all, it was one of the more exciting 0.6 hours of my 3600 hour CP140 career. This accident was a result of my inattention to the state of the aircraft ladder, a piece of equipment that I had routinely spent time checking as part of the Tactical Navigator's pre-take off check list. That day, I had completely ignored the ladder, despite multiple times walking by this piece of equipment when observing the engine starts. It just goes to show, no matter how big the piece of equipment, or how many hours flying experience you have, you can still make mistakes. I submit this as a perfect example of my inattention with the hope that it never happens to you.

Photo: WO Serge Peters

From the Investigator

TYPE: Bellanca Scout (C-GSSV)
LOCATION: Gimli, MB
DATE: 17 July 2018

The accident flight was part of the Air Cadet Gliding Program and in support of the summer glider pilot training. The Scout aircraft is used to tow gliders to altitude where the glider would release from the tow plane and conduct their training mission.

After the second successful tow flight, the tow plane pilot completed the pre-landing checks and joined the circuit in preparation for landing. Once established on base leg, the pilot noticed that the aircraft was slightly higher than normal but was still manageable at this point by adjusting flap selection. While on final, the pilot noticed that the rate of descent was not sufficient to maintain a normal approach angle. After selecting full flaps early in an attempt to correct the glide path, the pilot realized that the plane could not get back to the normal glide path and therefore moved the aim point further down the landing strip. Not able to make the original aim point the pilot then focused entirely on a specific landmark as a final stop point. Upon touchdown the pilot applied excessive braking, enough that the aircraft rotated forward allowing the propeller to contact the ground. The aircraft then rotated past vertical and ended up on its back.

The aircraft sustained very serious damage and the pilot was treated for minor injuries.

The investigation did not reveal any evidence of technical issues with the aircraft and is now focusing on human factors.

Photos: Capt Brittany Schneider

Epilogue

TYPE: Schweizer SGS 2-33
LOCATION: 19 Wing Comox
DATE: 15 August 2016

On 15 August 2016, a cadet student pilot was conducting the eighth solo training flight under the Royal Canadian Air Cadet Gliding Program at Comox Airport.

The student pilot released from the tow plane in the practice area west of the airport, and practiced stalls and turns before re-joining the left hand downwind for landing on the grass Runway 30, known as the primary landing area.

After an uneventful downwind leg, the student pilot initiated a late turn to base leg. Rolling out on base leg the student pilot was observed to be slightly below the ideal glide profile but well within range to reach the primary landing area...

After the student pilot turned final, the launch control officer and solo monitor assessed the glider to be flying too slow and below glide profile. Upon direction from the launch control officer, the solo monitor instructed the student pilot via radio to pitch forward; however, the radio call went unheard by the student pilot. The student pilot sensed the glider speed was slow and pitched the nose of the glider forward to correct, but did not cross-check the glider's indicated airspeed. Very shortly thereafter, the student pilot raised the glider's nose in an attempt to reach the primary landing area. The glider stalled and impacted the ground short of the primary landing area.

Emergency responders arrived on scene very shortly after the impact. First aid was provided to the student pilot, who was then extricated from the cockpit and transported to the Comox General hospital. The student pilot received serious injuries; the glider was very seriously damaged.

The investigation concluded that the student pilot reverted to previous performance weaknesses and became task saturated on approach, dropping critical elements from the crosscheck. The student pilot did not maintain a safe airspeed in an attempt to reach the primary landing area and as a result the glider stalled on final, short of the runway.

It was also noted that the glider restraint system had not been modified to ease the tightening of the lap belt. This could have resulted in the restraint system being too loose, allowing the lap belt to rise above the ideal position around the waist during the ground impact.

Recommendations were made to clarify the engineering processes for glider modification procedures, as well as improving solo monitor training.

Photo: MS Roxanne Wood

Epilogue

TYPE: Griffon CH146432
LOCATION: Opa-Locka, Florida
DATE: 28 February 2018

The occurrence involved a Griffon helicopter from 424 Transport and Rescue Squadron (search and rescue configuration) with a six person crew operating out of the Opa-Locka airport, near Miami, Florida. The mission was part of Exercise Southern Breeze and was flown as a pilot proficiency flight and an air lesson plan training flight for an under-training flight engineer. The mission consisted of mostly over-water hoisting work.

Approaching the Opa-Locka airport control zone after the mission, the crew commenced the pre-landing checks when the life raft inadvertently departed the aircraft. The raft was visually tracked by the instructor flight engineer as it fell from approximately 500 feet above ground level and was seen to impact the roof of a house. The crew circled the helicopter back overhead the house to mark its location, then continued to the airport for landing.

The incident was reported to local police who assisted Royal Canadian Air Force personnel in recovering the life raft from the house. There were minor injuries sustained by an occupant of the house, and the house sustained damage to the roof and a bedroom. There were no injuries to the crew or damage to the aircraft.

The investigation focused on how equipment is secured in the aircraft during a mission. The exact reason the lap belt securing the life raft became unsecured could not be determined. The preventive measures focused on the securing of equipment and securing procedures, as well as aircraft configuration when flying over built up areas.


Photo: DND


Photo: Maj Andy Haddow

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