



## Aviation Safety

# Vortex

Learn from the mistakes of others; you'll not live long enough to make them all yourself . . . Issue 3/2000

## Accidents Never Change—Only People Change

The 407 departed its home base on the morning of the accident and flew 100 mi. to the job site. The helicopter was being used to install marker balls on a power line using a piece of equipment that was slung beneath the machine. The pilot would fly slowly just above the wires as the markers were installed. The installation equipment was prepositioned at the job site by truck. On board the helicopter that morning were the pilot, the mechanic and two support personnel.

The trip was uneventful and, on arrival at the site, the pilot landed on a 16-m<sup>2</sup> concrete pad. The truck containing the marker installation equipment was positioned to the left front of the helicopter, just off the pad. The pilot rolled the throttle to idle but did not shut down. He then got out with the mechanic and support people to install the mission equipment. He applied some cyclic tension (about half the available tension was applied). The helicopter was equipped with a force trip system but it was inoperative.

Many trips were made by the pilot and his crew between the helicopter and the truck. During one trip, the pilot stated that the right front door needed to be



removed before the flight could commence. The mechanic was unfamiliar with the 407, so the pilot went back to the helicopter with him to explain the door removal procedure. The pilot then returned to the truck as the mechanic started to remove the door.

First the nuts for the hinge bolts were removed, followed by the lower bolt of the door closer air spring. Then the hinge bolts were removed, and the door, with the door closer air spring attached, was removed and carried away from the helicopter by the mechanic.

The pilot then began walking from the area of the truck toward the helicopter to retrieve hardware from the luggage compartment that was required to attach the

slung load. As the pilot approached, he was struck in the head by the rotor tip and he fell to the ground, dead.

The person at the accident site who secured the helicopter observed the cyclic to be to the left front of the centre position before he shut down the engine. Personnel flew in from the company facility to examine the helicopter, but prior to moving any controls a mark was made for future reference on the cyclic friction knob and surrounding structure. The helicopter was later started without changing the cyclic tension and left to run at idle for about 20 min—the cyclic stick did not move.

Further examination of the helicopter was carried out and no anomalies were detected. The helicopter attitude on the skid gear was normal, and there was no visible yielding of the cross tubes. When the battery was turned on, movement of the cyclic verified proper operation of the cyclic centring light.

### **Analysis**

A re-enactment of the procedure used to remove the right front door revealed that while removing the lower door closer air spring, the mechanic's left shoulder could easily come in contact with the cyclic.



With the hydraulic system on and the cyclic friction set at about the midpoint (the way it was found after the accident), the cyclic position could be displaced forward and to the left during door removal with minimal effort. Left forward movement of the cyclic would lower the disk in the exact area the pilot approached from.

The pilot had approached from that area many times during preparation for the mission with ample and perceived clearance. He was likely more conscious of the clearance on his first trip than he was on his third or fourth.

We do a number of things by rote and the more we do them the more comfortable we feel about doing them. We've all been somewhere or done something we didn't feel very comfortable about. If we "get lucky" and nothing gets bent or nobody gets

hurt, life goes on. And guess what happens the next time the same set of circumstances crops up, we feel more comfortable from the start because we did it before, and the more we do it the better we feel, till we get a very comfortable false sense of security. With this overconfidence comes inattention to detail (like checking for the blade path on each trip to the helicopter) and, as Chas Harral states in "Color Code System for Total Control—The Secret of Staying Safe," *operating in condition WHITE*.

Every year we break a lot of machinery and hurt far too many people by leaving aircraft running unattended. The common excuse is "I'm only going to be a short time" followed later by "it will only be a minute or two more." It will be a lot longer if you or one of your passengers walks into a turning blade.

The safest practice by far is never to leave the helicopter unattended. How much time are you really saving by not shutting down? There are companies in the industry who have a very clear policy on leaving their aircraft running without a pilot at the controls and that policy is—do it and you're fired. 🚁

Issue 2/2000 ran an article called "Are Helmets a Good Investment" in which we failed to inform our readers what make of helicopter was involved and what caused the bang. For the record, it was a Robinson R22 Beta and the bang was caused by the tail rotor coming in contact with the power lines.



The **Aviation Safety Vortex** is published every two months by Civil Aviation, Transport Canada, and is distributed to all Canadian licensed helicopter pilots. The contents do not necessarily reflect official policy and, unless stated, should not be construed as regulations or directives. Letters with comments and suggestions are invited. Correspondents should provide name, address and telephone number. The Vortex reserves the right to edit all published articles. Name and address will be withheld from publication at the writer's request.

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## ***They Were Just Little Problems—Nothing Major***

The investigator was carefully picking over the pieces of what had once been a well-designed and well-constructed aircraft. Little remained that looked worthwhile. There was no obvious reason for the crash, and the detective work was going to take some effort. That's what he got paid for, he mused.

A bystander at the perimeter of the roped-off area had been standing there quietly for some time, and the investigator noted a reasonably relaxed, but slightly nervous, air—not your normal gawker.

When the investigator left the crash site for a moment, the bystander approached him, not anxiously but with a purpose.

After a few pleasantries, the bystander shuffled slightly and said "I don't know how to put this, whether I should say anything or not, or if it might help. I don't want to be named or held responsible for anything."

Assured that anything might help in the crash and that there was no danger of getting in trouble, the bystander relaxed slightly and continued.

"I flew this aircraft a lot, you know, over the last few


years, and it had some peculiar habits. Everyone just put it down to being different, and no one ever formally wrote it up—we all knew about the problems."

"Oh? What sort of problems?" the investigator asked.

"Lots of little ones; none of them seemed to be really enough to cause us to complain. The only one that scared me was the time the electricians all went off, but they came back on again almost immediately. In fact, they came back on before I had time to do anything about the problem."

"Had this happened to anyone else that you know of on this aircraft?" the inspector asked, doing his best to keep his voice calm and level.

"Never mentioned it to anyone else, and they didn't say anything to me either. Well, glad if any of this helped," he said, then he turned and walked away.

The investigator shook his head. The accident happened at night in poor weather to a pilot brand new to the operation and this aircraft. 

*Shawn Coyle  
Ottawa, Ontario*

***The least experienced press on while the more experienced turn back to join the most experienced, who never left the ground in the first place.***

## Transport Canada Commits to Safer Skies—Flight 2005

In its latest Civil Aviation program charter, *Flight 2005—Raising the Flight Level*, Transport Canada Civil Aviation has made a firm commitment to improving the level of safety over the next five years.

Canada's aviation industry is among the largest in the world. Total licensed personnel and registered aircraft rank second only to the United States, while the manufacturing side of the aerospace industry ranks fifth in the world, accounting for

- 50% of the commercial turbine market;
- 35% of the business jet market;
- 33% of the small turbine market; and
- 60–75% of the market for environmental systems, landing gear systems and commercial simulators.

Transport Canada regulates an ever increasing number of people and organizations throughout the aviation community. There are over 100,000 people and organizations who hold some form of approval documentation issued by Transport Canada.

Transport Canada delivers its civil aviation program through 1400 personnel, over 700 of whom are inspectors and engineers, from 35 centres across the country.

Global aviation activity will more than double over the next 10 to 15 years and if the accident rates are maintained the reality is that the total number of accidents per year will show a dramatic and unacceptable increase. If Transport Canada, along with the aviation stakeholders, is to maintain or even reduce the number of

accidents involving Canadian aviation resources, we must find innovative methods to attack the problem.

The helicopter industry is going to grow as rapidly as the rest of the industry with more involvement in instrument flight rules (IFR) and off-shore operations. The advent of the tilt-rotor aircraft and global positioning system (GPS)/IFR helicopter approaches will place new and challenging operational and safety demands on the helicopter community. Growth in the industry has the ability to exceed the production of new pilots and so the overall experience level will undoubtedly decline. The challenges are there, and it's up to the aviation community and Transport Canada Civil Aviation to work together to improve safety in the industry. ✈️

### ***I Thought He Was Playing Chicken!!!***

I was reading one of your Vortex articles the other day and it caused me to think of an incident that occurred 17 years ago that almost cost me my life. I was working in Africa, along with a fixed wing aircraft, on a spraying contract. On the day of the incident, the weather was poor with low visibility and I had lost contact with the other aircraft, who was working a few miles away. I had just started a spray

run when I saw a flash and heard the roar of an engine off my right side. I swung my head to the right just in time to see the Pilatus recovering from what was probably a 90° high g turn. I continued with the spray contract but did not see or speak to the other pilot for a couple of days.

When we finally got together (over a beer), he said he had seen me from quite a distance but did not alter heading because he

thought I was holding heading to play chicken with him. Fortunately for both of us he eventually did the correct thing and altered heading just in time to avoid a collision. He turned a light shade of white and had many more beers when I told him that I hadn't seen him till he had taken evasive action.

*Assuming that the other aircraft has you visual just because you can see it could be a deadly error in judgment.—Ed.* ✈️

## Occurrence Synopses

The following information may change as investigations progress

**02 Sep. 1999**                      **Lac Matonipi, Que.**                      **Bell 206B**                      **C-FPQR**

*TSB Report A99Q0168*

The pilot landed on the shoreline and shut down but, before the rotor stopped, the helicopter tipped backward and the tail rotor hit the ground, causing considerable damage. Major component changes were required before the helicopter was returned to service.

**19 Sep. 1999**                      **Fort Liard, N.W .T.**                      **Bell 205A-1**                      **C-FNMQ**

*TSB Report A99W0178*

The pilot landed on a log pad that he had used many times in the previous few days and got out, leaving the helicopter running (100% RRPM). The helicopter yawed to the right, fell off the pad and tilted to the rear, driving the tail rotor into the ground. The tail boom broke off, both skids were damaged, and a tree stump was driven through the right side of the fuselage. Damage to the helicopter was substantial. There were no injuries.

**24 Sep. 1999**                      **St. Leon Creek, B.C.**                      **Bell 214B**                      **C-GTWF**

*TSB Report A99P0134*

The 214 was in a hover over a rigger, pulling about 60% torque with its nose facing a hill, when the low-rotor-RPM warning horn sounded and the light illuminated. The pilot reported hearing the engine decelerating after fluctuating briefly. As the blades slowed, the helicopter began to shake. After checking for the ground crew, the pilot landed and attempted to hold the aircraft on the hillside until the rotor RPM bled off. When the helicopter hit the ground, the left skid broke off and the aircraft rolled to the left. The main blades then hit the ground and the helicopter rolled down the hill, coming to rest on its side. The pilot and co-pilot escaped uninjured. Preliminary investigation revealed that the accessory drive bevel gear (p/n: 2-080-040-01 H) that drives the fuel control unit (FCU) had failed. Investigation into the cause of the failure continues.

**24 Sep. 1999**                      **Capstan Island, Nfld.**                      **AS 350D**                      **C-GCDN**

*TSB Report A99A0127*

The AStar was en route from Mary's Harbour to L'Anse-au-Clair when flight visibility began to deteriorate rapidly in fog. The pilot elected to continue flight at 500 ft, following a road along the shoreline. As the helicopter approached Capstan Island, it entered a fog bank, and the pilot lost control when he lost visual references. The machine came out of the fog and crashed on the road directly in front of oncoming traffic. The helicopter was heavily damaged, but the pilot and his passenger escaped injury.

**24 Oct. 1999**                      **Brampton, Ont.**                      **AS 350D**                      **C-GHAQ**

*TSB Report A99O0253*

During a practice hover autorotation, the helicopter landed very hard, causing substantial damage to the tail boom. The instructor and student both escaped injury.

**24 Oct. 1999**                      **Fort Liard, N.W .T.**                      **AS 350D**                      **C-FRGK**

*TSB Report A99W0199*                      **15 mi NW**

The helicopter crashed, causing heavy damage to the machine and seriously injuring the pilot. The pilot, who was not wearing a helmet, suffered serious head injuries. He was airlifted to hospital in Fort Nelson.

The helicopter was operating out of a remote site about 15 mi. northwest of Fort Liard. It had been delayed on a scheduled passenger flight because of freezing rain. After the rain

had stopped, the pilot elected to fly the route by himself prior to taking the passengers. About 30 min after he left the camp, an over-flying aircraft heard the ELT and the wreckage was located shortly after.

The investigation is ongoing, but initial indications are that the engine may have been at low power when the helicopter crashed. Fuel samples taken from the helicopter and a pump and filter assembly found in the baggage compartment showed water and particulate contamination.

Fuel drums at the point of departure—where the helicopter had fuelled the previous night—contained water, paint chips, drum liner material, and other debris.

The drums had been refilled at the nearby airport and transported to the area as they were required. They were not sealed nor was a record kept as to when they were filled or if they had been cleaned.

No mechanical anomalies that could have caused the accident were found.

**29 Oct. 1999**                      **Fox Creek, Alta.**                      **R22B**                      **C-FMRI**

*TSB Report A99W0203*

The helicopter was on short final to a parking area at the Fox Creek airport when the pilot spotted a power line. The violent manoeuvring required to avoid the wire resulted in a loss of control and a very heavy landing, causing considerable damage to the helicopter but no injuries. The pilot was attempting to land his customer near his car.

**29 Oct. 1999**                      **Portage la Prairie, Man.**                      **Bell 206B**                      **C-FTHV**  
*CADORs 1999C0926*                      **2 mi. N**

The helicopter was on a local training flight when it landed very hard, spreading the skids and damaging the tail boom. There were no injuries to the instructor or student.

**06 Nov. 1999**                      **High Level, Alta.**                      **Bell 206B**                      **C-GOPL**  
*TSB Report A99W0208*                      **40 mi. S**

Power was rolled to ground idle and the passengers were off-loading when the helicopter began to bounce. The pilot rolled the throttle up and lifted-off to avoid contact with the passengers. The helicopter started spinning and control was lost. The machine climbed to about 200 ft and then crashed back onto the road it had lifted-off from, seriously injuring the pilot and destroying the machine.

The pilot stated that he pulled maximum collective to get clear of the people on the ground. There were no injuries to people on the ground.

**09 Nov. 1999**                      **Springbank, Alta.**                      **R22B**                      **C-FLTW**  
*TSB Report A99W0210*

An instructor and a student were practising autorotations in a local training area when the student allowed the rotor RPM and airspeed to get very low. The instructor took control and tried to salvage the landing, but the helicopter hit hard with considerable forward speed. The right skid dug into the ground, causing the Robinson to roll and come to rest on its right side. The occupants were uninjured, but the helicopter was heavily damaged.

**10 Nov. 1999**                      **Chilliwack, B.C.**                      **S-61N**                      **C-FMAY**  
*TSB Report A99P0166*                      **8 mi. S**

The helicopter was in a low hover, doing a logging support crew change, over a 206-sized helipad, when a piece of a tree limb came through the co-pilot's overhead window, striking him in the head (helmet). The helicopter was returned to service area for inspection and repairs. The co-pilot was not injured and, after the main rotor was inspected for damage and the window was replaced, the machine was returned to service.

**01 Dec. 1999**

**Golden, B.C.**

**Bell 206L-3**

**C-GALL**

*TSB Report A99P0174*

The engine failed as the helicopter was nearing Golden, B.C., on a ferry trip from Calgary, Alta. The ensuing autorotation to the side of a mountain resulted in a rollover, causing considerable damage to the machine but none to the pilot.

The ELT was activated and the pilot radioed a Mayday, which was picked up by an overflying Boeing 737. The message was relayed to search and rescue, and a Buffalo aircraft was dispatched from CFB Comox, B.C. The downed helicopter's ELT signal was localized but a rescue could not be attempted because of poor weather. The helicopter pilot was contacted by radio and his rescue was planned for early next morning.

The pilot was rescued the following morning and transported to hospital in Golden where he was treated for mild hypothermia.

The pilot, after encountering poor weather in a mountain pass, had elected to do a 180° turn and return to a ski lodge where he would wait for better conditions. Shortly after turning, the machine lost power and crashed on the mountainside.

**15 Dec. 1999**

**Calgary, Alta.**

**MD 500N**

**C-FCPS**

*TSB Report A99W0232*

The 500 was just coming light on the skids, taking off from a dolly, when the pilot heard a loud bang coming from the rear of the helicopter. He immediately put the helicopter back on the dolly and shut down. Inspection quickly revealed a broken left rear gear strut.

Examination of the component at the Transportation Safety Board Engineering Laboratory in Ottawa determined that the fracture was the result of low cycle fatigue cracking originating in the centre of three rivet holes, which attach a bracket for the gear leg fairing (Laboratory Report 130/99). The service difficulty report (SDR) database contained four similar failures. Newer models of gear legs eliminated the rivet hole at the failure site. The helicopter manufacturer has issued a service bulletin to directed non-destructive testing (NDT) of the rivet hole at specific intervals.

**14 Jan. 2000**

**Fort Ware, B.C.**

**R22B**

**C-GRUK**

*TSB Report A00P0007*

Shortly (15 min) after departing Fort Ware, the pilot noticed rapidly decreasing oil pressure and a loss of engine power. Shortly after the aircraft entered an autorotation, the low-oil warning light illuminated. The landing was successful but very firm, resulting in no further damage. Visual inspection found oil covering the engine cowlings, tail boom and tail rotor and only a trace of oil in the crankcase. During the last portion of the flight, the pilot noticed a burning smell.

Further examination revealed an eight-inch plug of ice in the engine crankcase breather tube.

**20 Jan. 2000**

**Downton Lake, B.C.**

**SA 315B LAMA**

**C-FJJW**

*TSB Report A00P0010*

**NE of Revelstoke**

The Lama was in cruise flight with the pilot and an apprentice engineer in the front and another engineer in the back when the engine lost power. The pilot managed to get to a nearby clearing but, during the flare prior to touchdown, the tail hit the ground with sufficient force to separate from the helicopter. The machine then rolled end-over-end with the cabin and transmission sections remaining intact. The engine broke free, coming to rest just forward of the cockpit.

The pilot escaped with minor injuries while the left front-seat passenger was seriously injured. None of the three occupants was wearing a shoulder restraint. Both forward occupants were wearing helmets, but the apprentice lost his during the crash. The back-

seat passenger (left side) was cut across the nose by flying Plexiglas.  
The accident is still under investigation.

**05 Feb. 2000**                      **Foremost, Alta.**                      **Bell 206L-4**                      **C-FMPK**  
*TSB Report A00W0029*                      **6 mi. NE**

The 206 with two police officers on board was engaged in a high-speed, low-altitude pursuit of a stolen car when one of the helicopter's skids caught a power line. Although badly damaged, the helicopter was successfully landed near the wires. There were no reported injuries.

A stolen police cruiser, driven by an armed and dangerous suspect, led the helicopter and up to six cruisers on a 180-km-per-hour chase for over an hour before it finally left the road and drove into a farm field. The chase continued through the field and, as the helicopter manoeuvred to follow the cruiser, its right skid snagged a power line. The helicopter began to spin out of control to the left and right. The wire finally broke, allowing the pilot to regain control and safely land the machine over 100 m from the wires.

Both main rotor blades were damaged when they hit the vertical fin on the left horizontal stabilizer. In addition to the blade damage, there was wrinkling on the right side of the fuselage.

The helicopter was fitted with a wire-strike protection kit; however, the kit was ineffective because the wire contacted the right side of the skid gear. The compression wrinkling on the right side of the fuselage is considered to be the result of engine over torque that occurred as the pilot was attempting to regain control of the helicopter.

**10 Feb. 2000**                      **Nitnat Lake, B.C.**                      **S-61N**                      **C-FHFS**  
*TSB Report. A00P0021*                      **50 mi. NW of Victoria**

The No. 1 engine failed as the helicopter was in transit to the logging site. The grapple and long line were released, and the 61 made an uneventful landing at the servicing area. Investigation revealed that the No. 1 engine had oversped and shut down when the input drive spur gear in the transmission failed. Time since overhaul (TSO) on the transmission was 27 hr.

**10 Feb. 2000**                      **Albert Canyon, B.C.**                      **Bell 205A-1**                      **C-GPWT**  
*TSB Report A00P0017*                      **NE of Revelstoke**

As the 205 approached the snow-covered landing area, the tail rotor struck a tree, causing much noise, a shudder and a violent yaw to the right. As the skids contacted the ground, the main rotor hit a snow ridge. The helicopter stayed upright, suffering no further damage. There were no injuries to the people on the ground, but the pilot suffered a neck injury. Immediately after departing, having dropped off a load of heli-skiers, the pilot radioed the guide that he was returning because of bad weather. The tail rotor hit a tree during the descending turn back to the landing area.

**21 Feb. 2000**                      **Prince George, B.C.**                      **Schweizer 269C**                      **C-GFJO**  
*TSB Report A00P0026*                      **20 mi. S**

The Schweizer with the owner and an instructor on board was en route from Williams Lake to Prince George when, about 20 mi. from destination, the instructor decided to give the owner a simulated engine failure. Power was applied as the machine neared the ground and, as it climbed away through 300 ft at 50 kt, the helicopter yawed to the left and started to shake, and the engine lost power. The instructor took control and autorotated into a treed area. During the flair for landing, just as the helicopter contacted the tops of trees, the engine power returned. The helicopter was landed in a nearby clearing without further damage.