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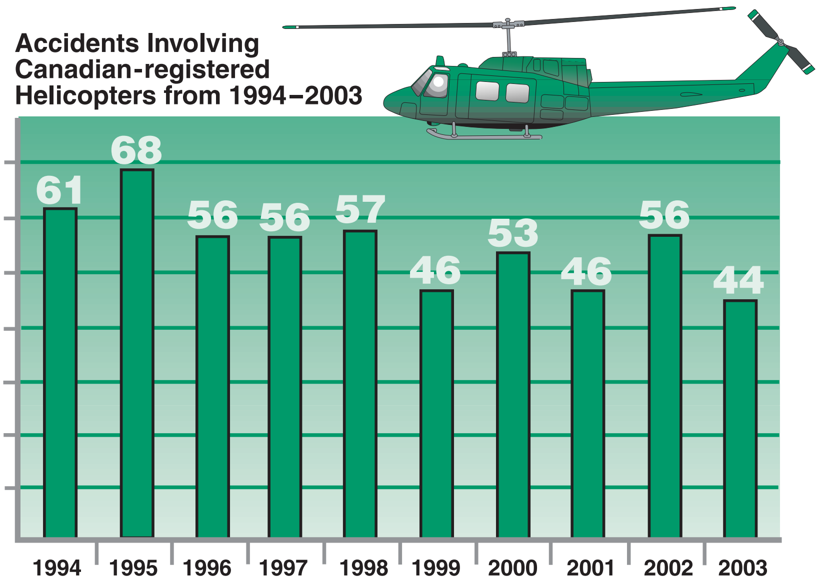
Aviation Safety

Vortex

Learn from the mistakes of others; you'll not live long enough to make them all yourself . . . **Issue 2/2004**

2003 Year in Review—On the Right Track

While putting together this article on our performance in 2003, I asked our statistics folks to send me the data for the past 10 years, just to see if there was anything interesting to report. Turns out there was, and congratulations are in order. In 2003, the Canadian helicopter industry saw its lowest accident rate in the 1994–2003 period, and that's good news. Here's how it looked.



The Numbers

Total accidents:

There were 44 helicopter accidents involving Canadian-registered helicopters in 2003, down from 56 the year before, and the lowest number in the preceding decade. In second place were 1999 and 2001 with 46 each. The 10-year average was 54.3 accidents per year.

Minor injuries:

There were 10 accidents where minor injuries occurred, with 16 injuries in total. The average over the past 10 years was 10.5 accidents, resulting in 17.8 injuries.

Serious injuries:

A total of 7 serious injuries resulted from 5 accidents. The 10-year average was 8.6 injuries in 6.2 accidents.

Fatalities:

The year 2003 had the best record of the decade for loss of life, with 3 fatal accidents and 6 fatalities. The 10-year average was 6.5 accidents and 12.7 fatalities.

Who and What? Accidents by Operation

Given that this year's fire season was a very active one, I was expecting a sharp spike in the number of fire-fighting accidents, but that was not the case. Six events listed fire-fighting/fire management operations as an event category, the same number as 2002. The best year was 1994, with only one accident listing; while the years 1997, 2000, and 2001 had 2 each.

There were 6 training accidents in 2003, with the 10-year average being 7.3. The best years were 1995 and 1996, with 4 accidents apiece; on the other side of the scale, 2000 and 2001 both had 11.

Six accidents involved sling operations, which is higher than the 4.4 average, but not as bad as 2000, when we had 10.

The skiers came in with a perfect score this year, as they did in 2002. The average was 1.6 per year over 10 years. The worst years were 1996, 1998, and 1999 with 3 accidents each.

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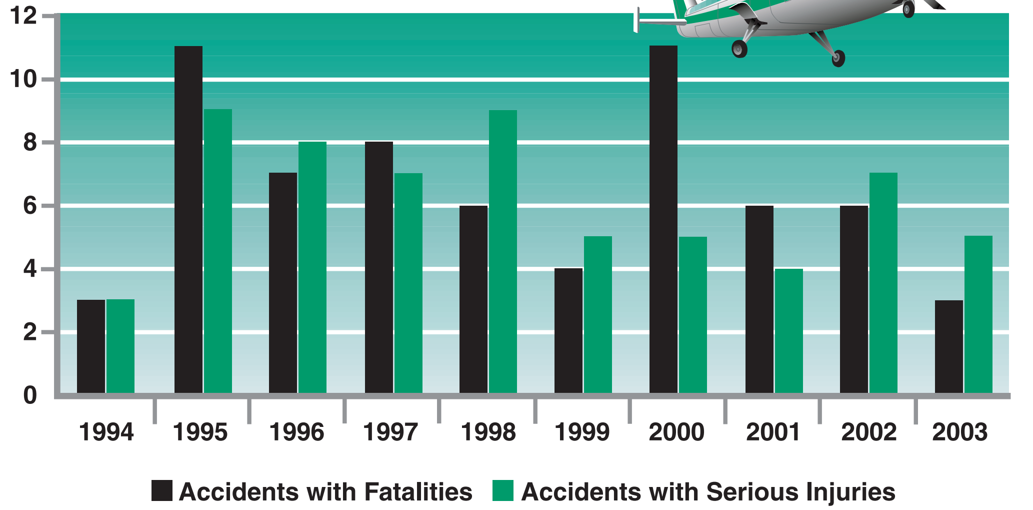
Canadian-registered Helicopter Accidents with Fatalities and Serious Injuries from 1994–2003



It was a slow year for logging with the softwood lumber crisis in full swing, but those who were active managed a zero accident rate for the year, down from 3 in 2002, which is the average for the sector.

The aerial application sector had two accidents, in line with the 10-year average of 1.7.

Where?

British Columbia had the lion's share of the activity, so they also had the most accidents—but the news was not all bad. Despite a fire season of impressive proportions, that spawned books and television shows; B.C. had its second best year in the past decade with 14 accidents—much better than the 19.2 average. The lowest year was 1999 with 12 accidents, the worst record was 1995 with 25.

How?

There was no real earth-shattering news on what types of accidents we had. Collision with object, collision with terrain, rollover, power loss, loss of control, etc.—all showed was up in roughly the same proportions as usual. What was interesting was that weather was mentioned as a contributing factor in only 2 of the accidents this year, the lowest in the period. Maybe the *don't push weather* message is having an effect?

Fires, seismic, and a healthy mining sector in the north, contributed to a busy year for many parts of the country. Without the benefit of precise data for hours flown, it was difficult to make an accurate assessment of the actual accident rate, but the statistics for last year showed a definite improvement. Let's see if we can carry that into 2004.

When?

Of course the busy summer season has the highest number of accidents, and this summer was no exception with 33 of the 44 accidents occurring between the start of fire season in May, and the end of September.

Accidents Involving Canadian-registered Helicopters by Province and Territory

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	1994-2003 Average
Newfoundland and Labrador	4	0	2	3	1	2	2	3	2	2	2.1
Nova Scotia	0	1	3	0	2	0	0	0	0	0	0.6
New Brunswick	0	0	0	0	0	0	0	1	0	0	0.1
Prince Edward Island	0	0	0	0	0	0	0	0	0	0	0
Quebec	11	11	11	11	3	3	4	6	10	7	7.7
Ontario	4	2	3	5	5	3	3	5	5	3	3.8
Manitoba	1	6	3	0	3	2	0	0	6	2	2.3
Saskatchewan	1	2	1	0	3	3	0	0	4	0	1.4
Alberta	9	5	3	10	10	15	15	9	12	10	9.8
British Columbia	23	25	22	22	22	12	23	14	15	14	19.2
Nunavut	0	0	0	0	0	0	2	2	0	0	0.4
Northwest Territories	4	6	4	1	3	2	3	4	0	3	3
Yukon	3	3	3	1	1	1	0	0	0	1	1.3
Outside Canada	1	7	1	3	4	3	1	2	2	2	2.6

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The **Aviation Safety Vortex** is published quarterly 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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Published VFR Routes and Reporting Points

by the Airport and Terminal Operational Procedures Division, Air Traffic Services, NAV CANADA

Have you ever stopped at a busy service station in a new city to ask for directions only to have the local gas jockey tell you to turn left at "Joe's"? Without knowing where or what "Joe's" is, you are probably going to stay lost, aren't you? This helpless feeling has been felt by most of us when we get directions that we don't understand or can't follow.

ATC MANOPS stipulates that controllers must know the distance and direction of each prominent landmark that may be used as a visual reporting point within a 25-NM radius of the airport. Controllers use these landmarks effectively to plan the traffic flow in and out of their airports, and managers ensure that the routes between these landmarks are published if controllers use these landmarks often.

On a busy day, there are occasions when a controller must issue a different route to a pilot—a route that is not displayed on any chart or, worse, a route with no familiar or recognizable landmark. If the pilot is unfamiliar with the area and is unable to ask for clarification because of frequency congestion, where do they fly their aircraft?

Experienced VFR pilots will normally prepare their flight into an airport by studying the airport layout and by referring to the VFR supplement or VFR charts. They normally know where and when to call for initial landing information and are most likely prepared to accept the published inbound route. If a controller-requested routing doesn't match a pilot's plan, they could get that same helpless feeling and might not respond the way the controller wants.

A good technique in airport control is the continuous use by air traffic controllers of the same phraseology for the same type of operation. This holds true for arrival and departure routes. These published routes are familiar to pilots and are expected by them. In fact, they provide for "a safe, orderly and expeditious flow of airport traffic."

Good work habits by controllers also include continuous use of standardized procedures.

Assigning the standard inbound and outbound routes to pilots can actually make the flow easier to manage. If the published routes cannot be used, the controller should ensure the pilot clearly understands where they are to direct their aircraft. Similarly, pilots should refer to a local geographic point only if it is published on a VFR chart or in the CFS.

Unusual reporting points may be very familiar to some, but it may not be to the person you are talking to. If in doubt, ask.

The preceding article was originally written for an air traffic control (ATC) audience, and has been slightly edited so it applies also to pilots. It is published to address the SATOPs (Safety of Air Taxi Operations) Task Force recommendations 18 and 19, which asked that Transport Canada (TC) publish an article to remind pilots, when making a position report, to refer to a local geographic point only if it is published on a VFR chart or in the CFS. —Ed.

In This Issue

Interview with Al Eustis

Serendipity is defined as "the faculty of finding valuable or agreeable things not sought for." The term comes from the ancient Persian tale The Three Princes of Serendip, *in which the heroes of the story always stumble into unexpected good fortune.*

That's what happened to me this past December while visiting the Canadian Helicopters Limited base in Les Cèdres, Quebec. It's always great when business and pleasure mix, and seeing my old friends and colleagues there is indeed a treat. On that day, I was sitting in the coffee room, talking helicopters with some of the gang, when the ever-smiling face of Al Eustis filled the doorway. We chatted for a while, and he told me that he was going to retire in January, and that this would be his last official trip east.

Of course, I was happy for him—retirement would mean that he could finally take his due and pursue other interests—but at the same time, there was the weird sense that the industry wouldn't be the same without him. Besides, I didn't think he had any other interests! Anyway, all I could manage to blurt out was that I'd like to interview him for Vortex, putting him terribly on the spot, but he graciously agreed.

For those who don't know him—Al Eustis has been a huge player in the Canadian industry for over 40 years. He has been universally respected in every position he held, but I think it was his latest role that suited him best—that of Vice President, System Safety for Canadian Helicopters Limited. What better position for a man with his wealth of knowledge, infectious personality, and the desire to share both? —Ed.

Vortex: What made you decide that you wanted to be in aviation?

AE: In my early teens, during the latter part of World War II, we lived on the south slope of Burnaby, B.C. (a suburb of Vancouver) with a great view of the Fraser River Delta and the Boundary Bay Airport, which, at the time, was a major RCAF [Royal Canadian Air Force] training centre. Identifying the various aircraft was a sport that was high on everyone's list, so the interest in aviation was sparked. A birthday gift of a flying lesson, and joining the RCAF Reserve during my final year in high school, firmly set the hook.

In the process of transferring from the Reserve to the Regular Force, I met one of aviation's classic marketing managers, the Recruiting Officer, who convinced me that if I agreed to the Aircrew selection process, I would surely be trained as a pilot. What he failed to mention was that the Air Force was experiencing shortage of Navigators and Radio Officers. A year later I was commissioned as an Aircrew Radio Officer (R/O).

The job of R/O was interesting, but not what I really wanted to do. It was also becoming redundant, with the major strides in technology allowing VHF communication directly from the cockpit.

But one of the benefits of the job was that it placed me in a group where the majority of the pilots were those who had elected to stay in RCAF, or had returned to peacetime flying following active service. Although some of their "off duty activities" would not be encouraged today, every one of them set a very high standard on the job, and provided much-needed mentoring to those of us who were far less experienced, and encouragement to pursue my desire to be a pilot.

Vortex: So, after the military?

AE: I got my civilian pilot license and went looking for a job, which wasn't much easier then than it is today.

Vortex: Any special memories of that time?

AE: While I was waiting for that "first break," I landed a job as a Dispatcher for Pacific Western Airlines (PWA). I remember standing on the PWA River Base dock in Vancouver when a float-equipped Beaver touched down smoothly in front of the dock and slid on by, then turned to begin the taxi back to the dock. I commented to the very senior pilot standing next to me, " that was nicely done." "Not really," he said, "He's a ***commercial pilot*** and should be doing his job properly—he should have touched down sooner and then turned into the dock, now he's just wasting time and money on a long taxi back to the dock." That was one of my first lessons on the realities of the commercial world, and I didn't even have my first job yet.

Vortex: When did you finally land your first job?

AE: I began flying commercially in 1959 at Campbell River B.C. for B.C. Airlines, a company that operated about 40 float and amphibian aircraft (Beaver, Norseman, C180, Pilatus Porter, Grumman Goose) on the west coast of B.C. from Vancouver to Prince Rupert.

Vortex: You eventually came over to the dark side and started flying helicopters—what prompted that decision?

AE: It really wasn't my fault. Vancouver Island Helicopters (VIH) sent a Bell 47G2 up to Campbell River to assist us in searching for one of our aircraft. VIH was training a new pilot, Bruce Paine, who went on to become very accomplished and well known in the industry. Bruce let me ride with him while he did some local circuits. In 1966, I succumbed to the burr under my seat as a result of the ride with Bruce, and joined Okanagan Helicopters.

Vortex: You must have been witness to many changes in technology over the years.

AE: The monumental improvements in technology and equipment would take volumes to describe. Better weather reporting, more powerful and reliable equipment, and better communication have certainly made life easier and safer for everyone.

Vortex: I'm always amazed at how things got done in the 'old days'—it's even changed substantially since I started flying, and sometimes I look back and wonder how we ever did it. Do you ever miss it?

AE: Oh yes, nostalgia is a powerful thing. Suffice it to say that you have missed something if you've not had the opportunity to sit behind a big Pratt and Whitney radial that kept your feet warm in the winter, or used a sun table to navigate in the Arctic, or heard the purr of four twelve-cylinder Rolls Royce *Merlin* engines, or listened to an approach on a Low Frequency Radio Range, a GCA [ground controlled approach] operator directing several aircraft to land in visibilities of 1/4 mile in snow, or searched for a fuel cache with only a lat/long and a topo map!

Vortex: What about on the human side? Am I correct in thinking we've come a long way?

AE: Definitely. Today we recognize how attention to lifestyle, diet, physical fitness, adequate rest, appropriate assignment and training play a significant role in any successful aviation operation. More importantly, we understand that should any of these elements be out of balance, the ability of both pilots and engineers to function at a safe and proficient level may be substantially reduced.

Crew resource management (CRM), pilot decision making (PDM) and Human Factors in maintenance training are without a doubt significant milestones in aviation safety. It is interesting to note that CRM existed long ago when multi-engine aircraft carried one or two pilots, a navigator, a radio operator, a flight engineer and perhaps three gunners. Everyone knew their routine and emergency tasks and had one objective.

As hardware replaced crew, problems developed and accidents occurred until the industry recognized that training was needed to bridge the gap created by technology.

Vortex: How about operators? Have you noticed any big changes over time in how they approach the business?

AE: In my opinion, the wealth of knowledge the industry now possesses, is significant. We know so much more about the physical and physiological factors that affect our ability to maintain and operate aircraft than we ever did before, and it shows. The majority of operators are more safety-conscious than ever, and truly believe that a helicopter company cannot be profitable unless it has a good safety record. That has been a very positive change.

Vortex: We've talked about positive changes in the industry, is it all good news?

AE: There is one area where it appears we have regressed rather than improved, and that's in training new pilots. It seems there has been a subtle slippage in the standard of primary training for helicopter pilots that varies substantially depending on the training school.

Entry-level flight crew who are seeking, and in some cases, gaining employment are *technically* qualified to operate a helicopter under ideal conditions, yet possess little knowledge or comprehension of their responsibility as captain of the aircraft. It is essential to have a clear understanding of one's responsibility for those onboard the aircraft and the equipment itself—this is the cornerstone of safe and efficient flight operations. If this understanding is not firmly grounded in primary training, the foundation for a successful entry into the industry is jeopardized.

I am of the opinion pilot and engineer responsibility is a "day-one" discussion at the training school.

Vortex: What do you think the biggest advance(s) in safety has been over the past 40 years?

AE: I see three major contributors: Transport Canada (TC), the industry itself, and improvements in safety equipment.

Vortex: Everyone is going to think this is a set-up. What positive impact have you seen from TC?

AE: No, it's not a set-up at all, and it's a two-sided coin. In my view, the subtle but significant changes in TC over the years have done a great deal to enhance safety awareness within the industry. In the past, industry's perception of TC, rightly or wrongly, was that of a regulator with little industry knowledge and rather narrow horizons. In recent years we have seen that position change to one of open and constructive discussion with industry and partnership through a variety of programs such as SATOPS, CARAC, PDM, CRM, HPIAM. Of significant importance is that the experience of TC inspectors now reflects the spectrum of those found in industry.

Vortex: I assume that the operators are the other side of that coin?

AE: Exactly. Operators in both the IFR and VFR segments of the industry are aware of the positive changes within Transport Canada, and recognize that close cooperation with them in support of improved safety awareness and company responsibility in operations can result in tremendous rewards for everyone.

Now, certainly more than in the past, most operators view a field visit from a knowledgeable TC inspector as *constructive* rather then a visit by the cops.

Vortex: Number three is safety equipment. Any specifics?

AE: Once again where does one begin? My favourites are: ELT, SARSAT, Shoulder harness and helmets, helmets, helmets.

Vortex: What are your plans for the future?

AE: Like most over-the-hill aviators, I'd like to keep my hand in for a few more years, and would be pleased to offer my assistance in safety or operational issues. But anything I take on now will be at a much slower pace—I'll leave ample time for fly-tying, skeet shooting, ham radio and those clear mountain streams.

Vortex: I know I speak for everyone who's ever had the privilege of meeting you in wishing you the very best in your retirement. And thanks for taking the time to do this.

Scary Departures

Rob Laporte, Civil Aviation Safety Inspector—
Helicopters, Ontario Region

For most helicopter pilots, night VFR and IFR takeoffs are challenging. This challenge is even greater when departing from remote helipads or offshore heli-decks.

On overcast and moonless nights it is virtually impossible to distinguish the surface, and all takeoffs must be done on instruments. During the initial take-off and acceleration phase, the pilot must fly on instruments at airspeeds below the published minimum instrument meteorological conditions (IMC) airspeed for the aircraft.

The departure profiles flown usually have a vertical component followed by a forward rotation and a linear acceleration. This busy sequence has all the physiological entrapments that can lead to spatial disorientation (SD).

The United States Air Force (USAF) defines SD as: A failure to sense correctly the position, motion or attitude of the aircraft or the pilot within the fixed coordinate system provided by the surface of the earth and the gravitational vertical.

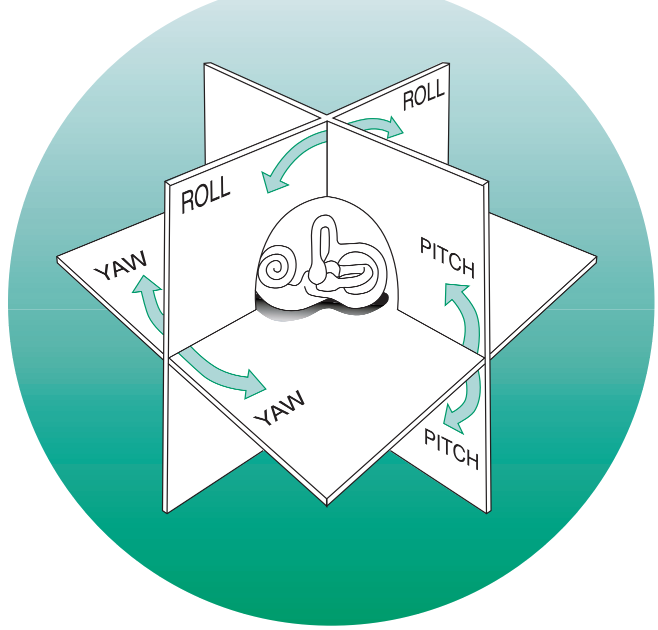
The human body was designed for ground-based operations and maintains its orientation primarily through visual cues. In the absence of visual cues, the body relies on the vestibular system, and to a lesser extent, the proprioceptive system for its orientation. This allows us to walk about in the dark or maintain spatial orientation with our eyes closed.

Though a healthy vestibular system performs flawlessly on the ground, its basic design features can cause problems for flight crew. The fundamental shortcoming of the system is its inability to differentiate between the force of gravity and the forces generated by the centrifugal and linear accelerations of flight. The vestibular system's performance can be degraded by illness and alcohol.

The vestibular system, located in each inner ear, contains motion- and gravity-sensing organs. The semicircular canals sense angular acceleration while otolith organs sense gravity and linear acceleration. There are many illusions associated with the vestibular system; for brevity this article will focus on only the pitch-up and coriolis illusions.

Three semicircular canals are located in each inner ear. They are situated in three planes corresponding to the pitch, roll, and yaw axis of an aircraft. The canals are filled with a fluid (endolymph). When a pilot banks, pitches, or yaws an aircraft, the inertia of the fluid causes the fluid to lag behind the movement of the canal. This causes the sensing hairs at the base of the canal to deflect, and movement about that axis is sensed. There is a rotational threshold limit of 2.5° per second; rotation rates less than this are not sensed. (see Fig. 1)

The semicircular canals of the inner ear



The inner ear is like a gyro, detecting movement in the roll, pitch and yaw axes.

Figure 1

The otolith organ, located inside the vestibule of each inner ear, is used to sense gravity and linear accelerations. It consists of the otolith membrane, which is supported above the macula by sensory hairs and surrounded by a gelatinous fluid.

When the head is upright, the sensory hairs are at rest and the head's position is registered as upright. When the head tilts forward or backward, the hairs are bent, sending a signal to inform the brain of the new head position.

Somatogyral illusions are caused by angular accelerations or decelerations sensed by the s-emicircular canals. The coriolis illusion is the most dangerous of all vestibular illusions. It happens when the body is in a stable rotation about one of the three axis. Movement of the head perpendicular to the rotational plane will cause movement of fluid in all three semicircular canals. The pilot will feel an overwhelming sensation of tumbling. The classic example of coriolis illusion is a pilot in a prolonged turn tilts their head forward to change a radio frequency or program the GPS.

The somatogravic, or pitch-up, illusions are caused by changes in linear accelerations and decelerations or a change in gravity (G) forces. The classic example of a somatogravic illusion is, as an aircraft accelerates after takeoff, the otolith shifts back, causing the pilot to sense a false pitch-up illusion. The pilot then has a tendency to counter-act the false pitch-up illusion by pitching forward causing further acceleration and possibly impacting the ground (see Fig. 2). Past issues of the *Aviation*

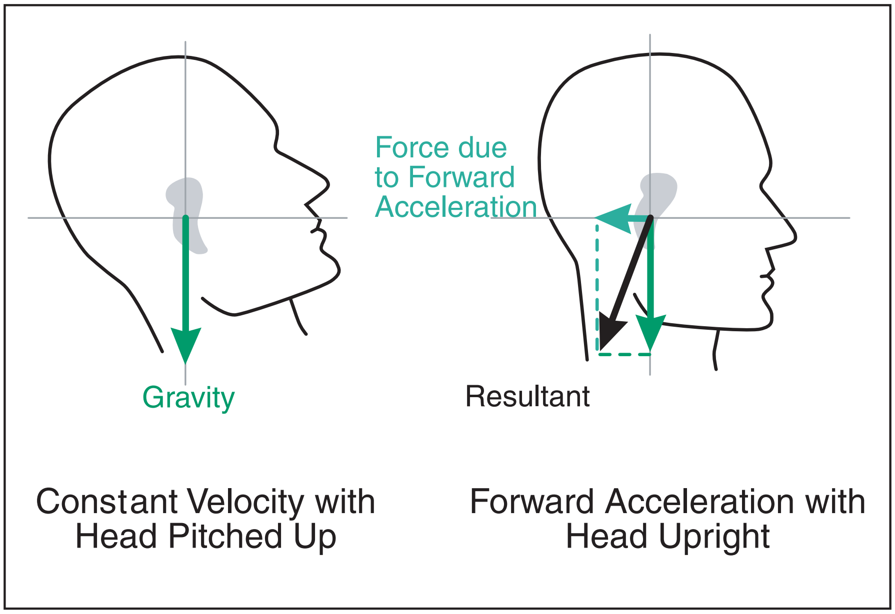


Figure 2

Safety Letter have many examples of accidents where the pitch-up illusion was a causal factor.

SD is a flight hazard that aircrews must be aware of and overcome. Pilots engaged in night VFR and IFR operations need strong instrument flying skills, effective crew resource management (CRM) and workable standard operating procedures (SOPs). Even a well-trained two-pilot crew is no guarantee. Human physiology dictates that the conditions present to develop SD in the pilot flying (PF) are also capable of developing SD in the pilot not-flying (PNF).

On departure, the PF must monitor the flight instruments; the PNF must assist the PF by monitoring the flight instruments, the progress of the flight, and call out any deviations. The PNF must also be ready to assume control should the PF become disorientated.

Enough SD theory…lets review a real-world SD incident involving a Sikorsky S76C aircraft departing the Trent Oil Platform in the North Sea. The following incident took place December 9, 2002 and is compressed from the UK's *Aircraft Accident Investigation Branch (AAIB) Bulletin* No. 7/2003. The complete version is available on-line at: www.dft.gov.uk

Synopsis

On a night departure from the Trent Oil Platform, with the commander as handling pilot, the co-pilot became concerned at a reduction in airspeed coupled with the vertical speed indicator (VSI) indicating a slight descent. After two requests to assume control, the co-pilot executed a positive recovery to regain the normal departure flight profile. As the helicopter was climbing through 500 ft, the commander reassumed control. Following interrogation of the on-board Integrated Health and Usage Monitoring System (IHUMS), which indicated that exceedences had been recorded on six systems, the crew decided to return to their base at Humberside in order for the helicopter to be checked. One conclusion resulting from the operating company in-house investigation was that the helicopter was potentially close to entering a "vortex ring" state when the recovery to normal flight was effected.

History of flight

Weather: ceiling > 2 000 ft, wind 100°M at 25 kt.

Initially, the commander lifted into a hover, turned into wind and then began a "towering" takeoff. At about 15 ft radio altimeter height above the deck, the commander applied forward cyclic control. The co-pilot considered that the aircraft made a positive rotation in response to this control input. Both pilots recalled seeing 50 kt indicated on their respective airspeed indicators (ASI) and the commander saw a momentary indication of 70 kt. In response to this airspeed indication, the commander checked back on the cyclic control. The co-pilot saw the airspeed decreasing and the VSI indicating a slight descent. He called "airspeed decreasing" and then "rate of descent," and the commander applied more rearward cyclic to arrest the descent. By now, the airspeed was indicating close to zero and the co-pilot called "I have control." He was not aware of any response from the commander and could now see the lights of the platform appear over his left shoulder; the co-pilot's impression was that the platform deck was substantially higher than the helicopter. Aware that the helicopter now appeared to be drifting backwards, he again called "I have control." The commander handed control to the co-pilot, who executed a positive recovery by increasing power, selecting a more nose down attitude, increasing speed and then establishing a climb. As the helicopter passed 500 ft above sea level (ASL), the commander re-assumed handling duties and levelled the aircraft at 1 500 ft ASL. The crew then interrogated the IHUMS warning on the cockpit display unit (CDU) and discovered that exceedences had been recorded on six systems. They decided to return to Humberside for the helicopter to be checked and informed the passengers of this decision. An uneventful run-on landing was made at Humberside.

Flight recorder information

No information was available from the cockpit voice recorder (CVR), as it was overwritten by the time the investigation was initiated.

Scary Departures *(continued from page 7)*

Analysis of the digital flight data recorder (DFDR) data by the AAIB, indicated that the helicopter lifted into a low hover for about 6 seconds, during which time the pitch attitude remained between approximately 3° and 7° nose-up and the heading changed from 025°M to 050°M. Over the next 6 seconds, the radio height increased steadily to 31 ft with the pitch attitude decreasing to about 2° to 3° nose-up and the heading changing from 050°M to 068°M. Over the next second, the radio height increased to 160 ft, with the pitch attitude increasing, as the aircraft crossed the boundary of the deck. During the subsequent 5 seconds, the radio height slowly increased to 175 ft, with the pitch attitude reaching 17° nose-up and the heading changing to 080°M. The pitch attitude then reduced momentarily to 12° nose-up, before increasing to 19° over the next 6 seconds. Heading increased further to 110°M and the radio height reached 210 ft. At this point, the pitch started to reduce and reached 0° after 8 seconds; the aircraft descended to 180 ft and stabilised on a heading of 123°M. The collective pitch was increased and the engine torques increased to approximately 107%. Pitch was then reduced to 15° nose-down. Up to this point, there was no indication of airspeed above the recording cut-off level of 10 kt. However, the airspeed as sensed by the DFDR uses an independent transducer, which in some installations can be regarded as unreliable below about 30 kt, and would not have recorded the actual airspeed displayed to the pilots.

Then, as the aircraft descended to 160 ft radio height, the DFDR-recorded airspeed started to register and the main rotor speed reached its minimum value of 100%, with heading remaining constant. Airspeed then increased quickly to 70 kt and radio height increased to 500 ft. At that height, the rate of climb reduced and the airspeed further increased before the aircraft climbed away at approximately 0° pitch attitude and turned left onto a heading of 085°M.

Both pilots considered that the departure was normal until just after a nose-down attitude was selected at about 30 ft. Both pilots described the selection of the nose-down attitude as a positive manoeuvre but the pitch attitude of the helicopter during this rotation did not go below 0° nose down, compared to the normal target of 10° to 15°. Then, with an airspeed of 50 kt noted by both pilots and called by the co-pilot, the commander raised the nose of the helicopter to initiate a climb. Evidence from the DFDR, however, was that the airspeed was unlikely to have exceeded 10 kt and, with a surface wind of 100°/25 kt in that condition, the helicopter would have been travelling in a rearward direction. With the co-pilot confirming a rate of descent, it was obvious that positive correction action was required. There was a short delay following the initial call from the co-pilot that he wanted to take control. The commander was still trying to evaluate the instrument information but the co-pilot could see the platform close to the left side of the helicopter. The co-pilot had a much clearer appreciation of the potential dangers of the developing situation and made a correct and positive move to assume control; although the co-pilot considered that the helicopter was lower than the platform deck, DFDR evidence indicated that the helicopter always remained above this level. Sensibly, and in accordance with two-crew procedures, the commander handed over control. The subsequent recovery manoeuvre was positive. Once the helicopter was established at a safe altitude, the crew evaluated the situation. The helicopter appeared serviceable but, with indications that some system parameters had been exceeded, the commander made the correct decision to recover to Humberside Airport for a full examination.

There was some confliction between the nose-down attitude during the rotation of the “towering” takeoff as recalled by both pilots, who described it as positive, and the DFDR evidence which showed that it was at least 10° less than normal. This may be an indication that neither pilot was referring to the primary attitude instrument sufficiently during the rotation phase. Both pilots were also certain that their respective ASIs indicated at least 50 kt, whereas the DFDR recorded that the airspeed remained below 10 kt until the pitch attitude had been lowered below 10° nose down for some 2 to 3 seconds. This anomaly could not be resolved. Post-incident checks of the ASI sources and instrumentation revealed no faults. Additionally, the DFDR airspeed appeared accurate during the subsequent flight of the helicopter following the incident. The performance of the helicopter during the incident would also indicate that the airspeed as recorded by the DFDR was accurate.

The commander stated that he turned the helicopter into wind during the initial low hover. However, DFDR information indicated that the helicopter was turning right at a fairly constant rate from initial lift-off up to about when the co-pilot took control. This continual movement over a period of about 28 seconds could have contributed to some SD in the handling pilot. The co-pilot reportedly made no comment during the takeoff of this change in heading.

Follow-up action

Following the incident and investigation, the company conducted a review of their procedures and training to identify possible shortcomings and improvements. Amongst other aspects, this included the importance of the handling pilot selecting and maintaining the correct attitude and heading during night departures and for the non-handling pilot to closely monitor and call any divergence.

VFR Charts (VNC, VTA, WAC) Printing Plan

	Air Number	Title	Edition Number	Air Date	Edition Number	Planned Air Date
VTA	AIR1900	TORONTO VTA	30	Aug-03	31	Apr-04
	AIR1901	VANCOUVER VTA	27	Sep-03	28	Jun-04
	AIR1902	WINNIPEG VTA	29	Aug-03	30	Apr-04
	AIR1903	MONTREAL VTA	28	Sep-03	29	Apr-04
	AIR1904	EDMONTON VTA	9	Oct-03	10	Jun-04
VNC	AIR5000	TORONTO VNC	21	Aug-03	22	Apr-04
	AIR5001	SAULT STE MARIE VNC	17	Jul-03	18	May-04
	AIR5002	MONTREAL VNC	16	Sep-03	17	Apr-04
	AIR5003	MONCTON VNC	17	Jul-03	18	May-04
	AIR5004	VANCOUVER VNC	15	Sep-03	16	Jun-04
	AIR5005	CALGARY VNC	14	Oct-03	15	Jun-04
	AIR5006	REGINA VNC	17	Jul-03	18	May-04
	AIR5007	WINNIPEG VNC	19	Aug-03	20	Apr-04
	AIR5008	THUNDER BAY VNC	17	Nov-03	18	Jun-04
	AIR5009	TIMMINS VNC	11	Nov-03	12	Nov-05
	AIR5010	CHICOUTIMI VNC	10	Jul-03	11	Jul-05
	AIR5011	ANTICOSTI VNC	10	Jul-03	11	Jul-05
	AIR5012	GANDER VNC	16	Nov-03	17	May-04
	AIR5013	KITIMAT VNC	9	Aug-02	10	Aug-04
	AIR5014	PRINCE GEORGE VNC	10	Sep-03	11	Sep-05
	AIR5015	EDMONTON VNC	15	Aug-03	16	Jun-04
	AIR5016	FLIN FLON VNC	10	Dec-03	11	Dec-05
	AIR5017	BIG TROUT LAKE VNC	9	Aug-02	10	Aug-04
	AIR5018	JAMES BAY VNC	10	Mar-04	11	Mar-06
	AIR5019	WABUSH VNC	9	Oct-03	10	Oct-05
	AIR5020	GOOSE BAY VNC	8	Dec-03	9	Dec-05
	AIR5021	ATLIN VNC	8	Dec-03	9	Dec-05
	AIR5022	FORT NELSON VNC	8	Jul-03	9	Jul-05
	AIR5023	LAKE ATHABASCA VNC	10	Nov-03	11	Nov-05
	AIR5024	WOLLASTON LAKE VNC	9	Dec-03	10	Dec-05
	AIR5025	HUDSON BAY VNC	9	Oct-03	10	Oct-05
	AIR5026	INUKJUAK VNC	7	Nov-02	8	Nov-04
	AIR5027	UNGAVA VNC	8	Mar-04	9	Mar-06
	AIR5028	WHITEHORSE VNC	7	Sep- 02	8	Sep-04
	AIR5029	FORT SIMPSON VNC	8	Sep-03	9	Sep-05
	AIR5030	YELLOWKNIFE VNC	8	Oct-03	9	Aug-05
	AIR5031	RANKIN INLET VNC	8	Nov-02	9	Nov-04
	AIR5032	COATS ISLAND VNC	7	Nov-02	8	Nov-04
	AIR5033	FROBISHER BAY VNC	6	Jul-02	7	Jul-04
	AIR5034	KLONDIKE VNC	4	Oct-00	5	Oct-05
	AIR5035	GREAT BEAR LAKE VNC	4	Jun-99	5	Jun-04
	AIR5036	BATHURST INLET VNC	5	Jan-04	6	Jan-09
	AIR5037	BAKER LAKE VNC	4	Jan-04	5	Jan-09
	AIR5038	FOXE BASIN VNC	4	Jan-04	5	Jan-09
	AIR5039	CUMBERLAND PENINSULA VNC	4	Jan-04	5	Jan-09
	AIR5040	MACKENZIE DELTA VNC	3	Aug-00	4	Aug-05
	AIR5041	AMUNDSEN GULF VNC	3	Jul-00	4	Jul-05
	AIR5042	CAMBRIDGE BAY VNC	4	Dec-99	5	Dec-04
	AIR5043	BOOTHIA VNC	4	Jul-99	5	Jul-04
	AIR5044	BAFFIN BAY VNC	4	Jan-00	5	Jan-05
	AIR5045	BANKS ISLAND VNC	4	Dec-99	5	Dec-04
	AIR5046	RESOLUTE VNC	4	Aug-00	5	Aug-05
	AIR5047	DEVON VNC	4	Jun-00	5	Jun-05
	AIR5048	HAZEN STRAIT VNC	4	Aug-00	5	Aug-05
	AIR5049	ELLESMERE VNC	4	Jul-00	5	Jul-05
	AIR5050	ALERT VNC	3	Aug-00	4	Aug-05
	AIR5099	ALASKA HIGHWAY	24	Jul-03	25	Apr-04

Updated April 1st, 2004

List of Current Aeronautical Charts

In late 2001, it was decided that the index and list of current Canadian aeronautical charts (VNC, VTA, and WAC) would only be available on the Web, and no longer be published as a paper copy or appear in the *A.I.P. Canada*. This was announced to pilots in an *Aviation Notice* entitled “Change in the Monthly Publication of the List of Current Canadian Aeronautical Charts,” dated April 18, 2002.

The Web site listed in the *Aviation Notice* (http://sat.nrcan.gc.ca) no longer has this information, as the service has been taken over by NAV CANADA. All of their contact information is listed here.

PRODUCTS:

Publications issued every 56 days:
Canada Flight Supplement (CFS)
Canada Air Pilot (CAP)
Enroute High/Low Altitude Charts
Terminal Area Charts

Publications revised as required:
VFR Navigation Charts (VNC)
VFR Terminal Area Charts (VTA)
World Aeronautical Charts (WAC)

Publications issued annually:
Water Aerodrome Supplement (WAS)

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On this tear-off, you will find the list of current charts, with the next planned revision, effective April 1, 2004. Tuck it in your flight bag to use as a reference guide over the summer.

VFR Charts (VNC, VTA, WAC) Printing Plan

	Air Number	Title	Edition Number	Air Date	Edition Number	Planned Air Date
WAC	WAC A05	WAC A05	5	Mar-96	6	
	WAC B07	WAC B07	6	Apr-96	7	
	WAC B08	WAC B08	6	Sep-96	7	
	WAC C09	WAC C09	7	Jul-95	8	
	WAC C10	WAC C10	6	May-95	7	
	WAC C11	WAC C11	5	Mar-95	6	
	WAC C12	WAC C12	6	Jun-95	7	
	WAC D12	WAC D12	10	May-94	11	
	WAC D13	WAC D13	9	Jul-95	10	
	WAC D14	WAC D14	8	Jan-93	9	
	WAC D15	WAC D15	8	Jun-95	9	
	WAC E15	WAC E15	10	Apr-98	11	
	WAC E16	WAC E16	11	Jan-95	12	
	WAC E17	WAC E17	8	Jan-95	9	
	WAC E18	WAC E18	8	Feb-94	9	
	WAC E19	WAC E19	7	Aug-93	8	
	WAC F21	WAC F21	7	Jan-97	8	
	WAC F22	WAC F22	6	Aug-96	7	

Updated April 1st, 2004