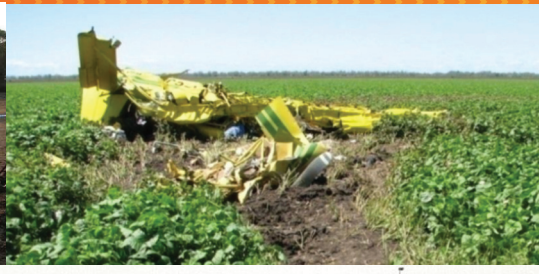
Australian Government
Australian Transport Safety Bureau

Avoidable Accidents No. 6

Experience won't always save you

Pilot experience is not always a protection against an accident



Australia's national transport safety investigator

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Experience won't always save you: Pilot experience is not always a protection against an accident

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Introduction

As pilots, we are familiar with well-publicised events of aircrew who, as a result of their experience and exceptional airmanship, avoided what could have been a disaster and a tragic loss of life. Pilots, such as Captain 'Al' Haynes in command of a United Airlines Douglas DC-10 on a flight from Denver to Chicago in July 1989, that had the fan wheel of its number two (centre) engine disintegrate, causing a loss of all three of its hydraulic control systems — an unprecedented problem that made the aircraft nearly impossible to fly or land. Captain Haynes and his crew figured out how to gain some control of the plane and were eventually able to get the severely disabled airliner to the Sioux City, Iowa airport, where they crash-landed. The aircraft broke apart during the landing and although there were 112 fatalities, a remarkable 185 people survived the crash.

More recent events, such as the US Airways Airbus A320 under the command of Captain Chesley Sullenberger, an experienced pilot, who together with his co-pilot, successfully ditched their stricken aircraft in the Hudson River after both its engines lost power following multiple bird ingestion on takeoff from New York's La Guardia airport in January 2009. All the passengers and crew were rescued from the floating aircraft without injury. Then there was the effort of Captain Richard de Crespigny and his crew after the Qantas Airbus A380 they were flying experienced an uncontained engine failure just after departing Singapore's Changi airport in November 2010. They guided the heavily damaged aircraft back to a safe landing at Singapore, averting what could have been a major catastrophe.

There have been many other individual acts of outstanding airmanship where 'experience' clearly played a part in the safe outcome. At the same time, a closer analysis of events suggests that things other than experience alone had a hand in the outcome. Good training, focussed preparation, a readiness for the unexpected and good crew interaction also had a significant part to play. Unfortunately, those other factors go mostly unreported in our media and the impression is created that mostly it is an individual's experience that makes the difference.

In the same way, in those tragic cases where the outcome was a fatal accident, many factors were in play. Naturally, media interest in an accident is heightened when it involves an experienced pilot who is also a well-known aviation identity. Although this adds a human interest aspect to the tragedy, the subsequent media reports often do little to assist a thorough understanding of the circumstances that led to the accident.

The following selection of occurrences, taken from the Australian Transport Safety Bureau (ATSB) archives[1] over the previous 20 years, bears testimony to the fact that experience alone is not necessarily a protection against vulnerability to an accident.

1 Includes accident investigations made by the Bureau of Air Safety Investigation before its incorporation into the ATSB in July 1999.

Key messages

Fatal accidents can and do happen to experienced pilots, as the following examples illustrate. In some of these occurrences, very experienced pilots were undertaking flying that involved much higher risk, and as a consequence found that, in those circumstances, their flying experience alone, was unable to help them avoid disaster. Other accidents involved experienced pilots who may have allowed factors other than their experience to influence their actions. Yet in other accidents, the pilot's vast experience may have even led to decisions that, in hindsight, were associated with more risk than necessary.

The report provides some insight as to why experience alone will not always prevent a pilot from having an accident and provides awareness of the following.

- Experience alone can never compensate for high risk activity.
- Sound decision-making and experience are not necessarily synonymous.
- Using pilot experience as mitigation for potential operational risks is inadvisable. If the risks are unacceptable for a qualified and competent pilot, there should be no reason for an experienced pilot to find it otherwise.
- Attend to the three Cs — compliance, communication and complacency, and all the other human performance considerations. Experience cannot overcome the mental and physical limitations of humans.

Can experience help a pilot avoid an accident?

This frequently asked question infers that safety and experience are synonymous. Yet sadly, this is not always the case. Occasionally, experienced pilots are involved in accidents.

An experienced pilot is considered to be an expert, characterised by a combination of knowledge, skill and proficiency. One who displays good airmanship and discipline, and applies those attributes safely and effectively to their flying. In his book *Flight Discipline* (McGraw-Hill 1998), Tony Kern describes expert aviators as those who '...understand the capabilities and limitations of themselves, their team, their aircraft, the physical, regulatory, and organisational environment, and the multiple risks associated with the flight.' The introduction above mentioned just a few examples of how experience, teamwork and a thorough understanding of the aircraft, its systems and the environment in which it operates, can be invaluable in an emergency.

However, as can be seen in some of the accidents appearing in this report, experienced pilots who accept higher risks may not be as safe as a pilot with much less experience flying comfortably within the limits of his or her competency. In others, very human shortcomings such as complacency, distraction, misjudgement and oversight are apparent. Rarely, if ever, are these accidents just plain bad luck. An understanding of the circumstances leading to those accidents will benefit any pilot who might think that experience alone will afford protection from ever having an accident.

A pilot's thoughts on experience and accidents

As a young and inexperienced pilot, the aircraft accidents that left the greatest impression on me were the ones that occurred to 'experienced' pilots with many more hours in their log book than myself. I rationalised that there would be a period in my early flying career where I would be exposed to greater danger because I was less skilled and less confident of handling a situation than an experienced pilot. Despite my training, I was aware that should an emergency occur, I could be easily overwhelmed, unlike, I imagined, an experienced pilot would be. I was constantly worried about making wrong decisions, especially under stress.

I really believed that once I had gained experience, I would be far less vulnerable because I would possess greater skills and knowledge that could be used to avoid accidents. Certainly, as I gained experience and qualifications I was able to dispel many anxieties that I had harboured about accidents. I had heard other pilots describe escapes from near disasters and realised that many of these had been stories, no doubt embellished by each telling, in order to impress others of their skill or courage in the face of danger or their good fortune.

However, the accidents that happened to experienced pilots stripped away that illusion of protection that I believed an experienced pilot possessed, and left me with a nagging doubt that perhaps it was fate and not experience or ability that determined a pilot's vulnerability [to an accident]. As I read the accident reports and articles about aviation safety, I developed a better understanding of the causal factors that led pilots, both experienced and inexperienced, to accidents.

Then later in my career there came a new approach to understanding those issues. It was termed 'human factors'. I first read about this in a book 'The Human Factors in Aircraft Accidents' by a British author and then current international airline pilot, Captain David Beatty. It was written by a pilot, for pilots. Reading that book was like a revelation and I was able to understand the reason for the seeming paradox of why some experienced pilots also had accidents. Despite all the knowledge gained about human factors (it is even an examinable subject in pilot studies today), about 80% of aircraft accidents remain attributable to human factors, some of which involve very experienced pilots.

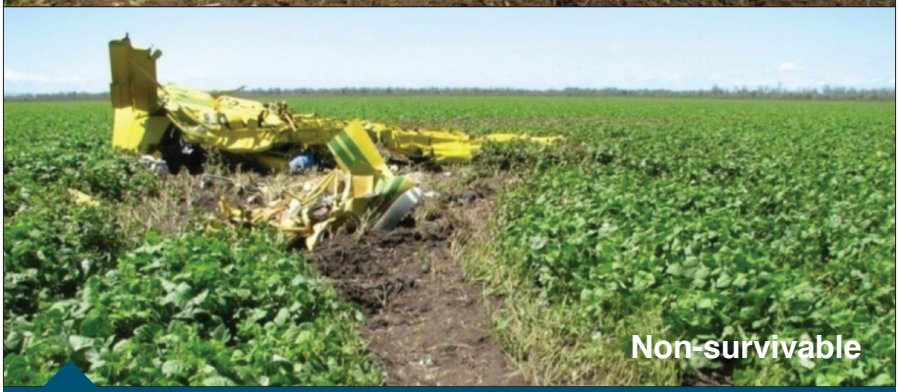
Armed with the 'wisdom of years' and a better knowledge and understanding of accident causation, I now realise that experience alone will not guarantee me from becoming involved in an accident. That each and every flight should be approached, not with the anxiety that I had when still very inexperienced, but with a similar level of respect for the risks and hazards present.

Fatal encounter

Investigation AO-2008-014

A midair collision between two Air Tractor 502 aircraft, 10 km NE of Wee Waa, New South Wales, on 26 February 2008, illustrated how chance and not experience can influence an outcome.

The pilot of one Air Tractor was an experienced agricultural pilot with over 14,000 hours flying experience accumulated over a career spanning 35 years or more. He was engaged in aerial spraying of a field that was 3 km away from another agricultural operator's airstrip. Unbeknown to the pilot, the other agricultural pilot was operating from the airstrip that morning. About half way into his second spraying flight, the pilot was performing a procedure turn at the southern end of a spray run, when he collided almost head-on at about 200 ft above ground level with the other Air Tractor that had only moments before departed from the nearby airstrip. The pilot was fatally injured and the pilot of the other aircraft (also experienced with over 8,800 hours) was seriously injured. Both aircraft were destroyed by collision and ground impact forces.



The two aircraft as they came to rest in adjoining fields Source: ATSB

Although visibility at the time of the accident was reported as 'good', neither pilot had seen the other aircraft in sufficient time to avoid a collision. Agricultural pilots engaged in aerial application a few metres above the ground have no opportunity to visually scan for conflicting traffic. Even during procedure turns, where the aircraft is at 200 to 300 ft above ground level, pilots are concentrating on accurately aligning the aircraft for the next swath run and are not looking around for other aircraft. Basically, they rely on pilots of other aircraft to remain clear of their application area during aerial spraying operations.

The pilot of the departing aircraft did not know that the other pilot intended spraying operations near his airstrip that morning and unfortunately neither he, nor his loader, had seen or heard the aircraft operating nearby. He had kept his aircraft's engine running during the turnaround, while both he and his loader attended to refuelling and replenishing the aircraft. Consequently they did not see or hear the aircraft spraying nearby, in the direction of his intended flight path. The pilot may have thought that the possibility of a traffic conflict was unlikely because he was not operating near the end of the runway of the other operator's airstrip. Unfortunately experience does not compensate for a lack of situational awareness.

The midair collision rendered both aircraft completely uncontrollable and no amount of flying skill would have enabled either pilot to regain even some semblance of control in order to survive a ground impact. It was just by chance that one aircraft impacted the terrain in such a way that its structure afforded a survivable impact and the other aircraft did not. Although with any severe impact, the ability of a human body, even one fully restrained and protected, to withstand the deceleration forces depends on the health, fitness, strength and age of the person.

Observation

Even experienced pilots are vulnerable to midair collisions and it could be argued that the more time spent in the air increases one's chances of being involved in such an event. Flying, even as a single-pilot, requires a dependence on others, many of whom may have considerably less experience, but who share the same airspace and ground facilities.

Although the chance of encountering another aircraft may seem very unlikely at times, there is always a possibility that other aircraft may be about. If you can fly there, so can someone else. Communicate your intentions to others and try not to rely on just one method of traffic avoidance. Alerted 'see and avoid' can be achieved by means other than use of radio broadcasts.

Check flight tragedy

Investigation 200300224

On 7 February 2003, an Approved Testing Officer (ATO) was conducting a multi-engine command instrument rating flight test of a former airline pilot in a twin-engine Beech 76 Duchess at night. Soon after becoming airborne from a touch and go landing at Camden, NSW, the ATO simulated an engine failure. The candidate could not achieve adequate climb performance from the aircraft, and called for the ATO to reset full power. Moments later, the aircraft's right wing clipped a tree at the departure end of the runway, and the aircraft descended to the ground where it collided with steel and concrete structures. Although the impact was not severe, the fuel tanks ruptured and caught fire. The two pilots evacuated but were forced to escape through an intense fuel-fed fire. Although seriously burned, the candidate survived, but the ATO later died in hospital as a result of his burns.

The burnt remains of the Duchess

Source: ATSB

The ATO was a very experienced pilot and held an Air Transport Pilot Licence (ATPL). He had logged over 40,800 hours total flight time in a career that spanned over 45 years. His flying comprised both military and civil flying that ranged from jet transport to rotary-wing aircraft. He held a Grade 1 flight instructor rating as well as a testing officer approval and numerous training and checking approvals. The candidate also held an ATPL and had over 16,000 hours total flying experience, much of which had been gained in airline flying.

The investigation determined that the simulated engine failure was conducted from a height where it was not possible to ensure a safe flight path, because visual reference with obstructions could not be achieved. In darkness there was insufficient illumination to see and avoid obstructions. By the time the ATO restored full power to the other engine, the aircraft had diverged from the runway centreline and it was too low to avoid a collision with a tree that was well outside the obstacle clearance surface for that runway.

The investigation found that simulated engine failure at night at low-level was contrary to the pre-flight briefing given by the ATO and was also contrary to the *Aeronautical Information Publication* that provided guidance recommending against low-level asymmetric operations at night. That safety advice resulted from a number of previous fatal accidents that occurred during low-level, asymmetric, night training.

Observation

Experience alone can never substitute for sound risk management. Safety rules and guidance are written for all pilots. It is a fallacy to think that experience compensates for operating outside the constraints of well established safety parameters.

Disastrous decisions

Flight into deteriorating weather and darkness can be a fatal combination, even for experienced pilots. The following examples demonstrate that even experienced pilots can become victims when they attempt to pit their experience against this deadly combination of conditions.

No alternative plan

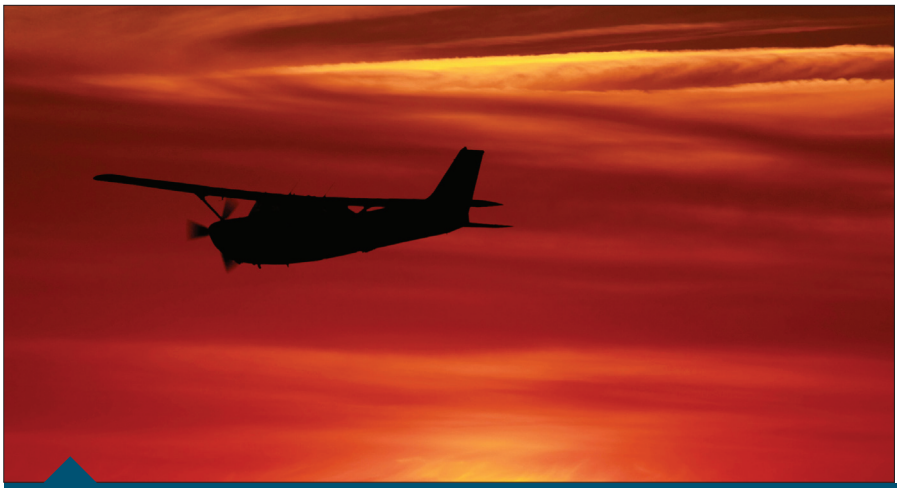
Investigation 200003233

On 8 August 2000, a Cessna 206 disappeared from radar over water just north of Cairns, Queensland, while the pilot was being radar vectored for an approach to land in poor weather and darkness.

The pilot was an experienced Grade 1 flight instructor with over 13,000 hours of flight experience, much of it gained in more than 22 years of mostly visual flight rules (VFR) flying training and charter flying in the North Queensland area. He held a night-VFR rating and although he had held a command instrument rating, endorsed for non-directional beacon instrument approaches only, it had not been revalidated.

The pilot was to fly from Cairns to Margaret Bay, Queensland and return with a cargo of live seafood, intended to meet a connecting international flight from Cairns later that night. The flight was planned in accordance with the visual flight rules, however, the forecast indicated marginal VFR conditions along the route with a further deterioration expected for the Cairns area on the return flight.

The pilot landed at Lockhart River for fuel, where he was asked to take a passenger with an injured hand to Cairns for medical attention. He then flew to Margaret Bay to



Flying at last light

Source: Thinkstock

rendezvous with the fishing boat and transfer its seafood catch. The arrival time was planned to coincide with low tide to permit a landing and takeoff from the beach.

Due to loading delays, the departure from Margaret Bay was later than the planned time that permitted a return to Cairns in daylight. However, the pilot departed with the stated hope that he could probably make better time in more favourable winds at lower altitude. The pilot continued flying toward Cairns, passing the aerodrome at Cooktown where conditions would have permitted a landing in daylight to be made. South of Mossman the aircraft was observed flying above the shore at very low-level, in approaching darkness and in conditions of poor visibility in light rain.

The pilot contacted air traffic control north of Cairns, requesting a VFR airways clearance with an estimated time of arrival of 10 minutes after last light. Weather conditions at Cairns were already well below the minimum for VFR flight with a low cloud base and visibility reduced in rain. The controller assessed the situation and because of the weather conditions and there being no suitable alternate landing areas in the vicinity on which the pilot could land in darkness, instructed the pilot to proceed coastal to Cairns.

Although the pilot was provided with radar guidance to the runway he was unable to see the approach or runway lighting and land. During positioning for a third attempt to land the aircraft disappeared from radar over the water. People on the shore heard the aircraft and an impact with the water. A search found the body of the passenger later that night, but failed to locate either the pilot or the aircraft.

About 3 months later, the wreckage of the aircraft was found in shallow water and some of the components recovered. Damage to the recovered aircraft parts suggested that the aircraft had impacted the water heavily and that the accident was not survivable. The circumstances of the accident were consistent with the pilot experiencing spatial disorientation and subsequent loss of control while manoeuvring the aircraft in darkness and poor weather without adequate visual cues.

Once the flight departed Margaret Bay, the pilot was committed to delivering a valuable and perishable cargo. The acceptance of an injured passenger may also have added to the pilot's sense of urgency to complete the flight. The investigation found that the pilot had no contingency plan should darkness and poor weather conditions force him to land at other than his planned destination.

Catastrophic change of mind

Investigation 200503265

On 8 July 2005, a Piper PA-31 Chieftain disappeared while attempting to land in the Victorian Alps at Mt Hotham in poor weather conditions and failing daylight.

The pilot had been flying for 30 years and operated his own small aviation company, consisting of a few multi- and single-engine charter aircraft. He had a total of 4,770 hours flying time of which 235 hours were recorded as instrument flight time and held a valid command instrument rating (multi-engine aeroplanes) endorsed for global navigation satellite system (GNSS) instrument approaches. The pilot was making a

The snow-covered wreckage of the Piper Chieftain Source: ATSB

charter flight with two regular clients as passengers, travelling to Mount Hotham to spend a few days on the ski fields.

The destination forecast predicted icing conditions in the Mount Hotham area and indicated that conditions could be expected to be below the landing minima. In the two telephone discussions with the Mount Hotham airport manager, prior to departing Essendon, the pilot was advised of low cloud, poor visibility and snow showers in the vicinity of the Mount Hotham aerodrome. During a conversation between the pilot and his chief pilot prior to departing Essendon, consideration had been given to deferring the flight until the weather at Mount Hotham improved, but the pilot reportedly advised that his passengers were adamant that if possible, they would like to fly to Mount Hotham that afternoon.

The flight was initially planned to proceed from Essendon Airport to Mount Hotham. However, the pilot revised his destination to Wangaratta due to the weather. While en route, the pilot requested that the Flightwatch[2] operator contact the Mount Hotham Airport Manager by telephone and obtain a report of the actual conditions. The manager advised that in the existing conditions the aircraft would be unable to land. The Flightwatch operator passed that information to the pilot who, despite the advice,

2 Flightwatch provided on-request radio services, initial in-flight emergency response and search and rescue time management services to pilots. Its functions have since been absorbed into sector controllers' duties.

responded '…our customer is keen to have a look at it' and he diverted the aircraft to his originally intended destination, Mount Hotham.

The pilot subsequently reported to air traffic control that he was overhead Mount Hotham. He changed the flight category from visual flight rules to instrument flight rules and advised his intention to conduct a GNSS non-precision instrument approach to runway 29. The pilot advised the Mount Hotham Airport Manager by radio that he was on final approach for runway 29 and although it was still a few minutes before the predicted end of daylight, asked the manager to switch on the runway lights. After doing so, the manager attempted to tell the pilot that the lights had been switched on, but received no response.

Subsequent attempts to contact the pilot by radio were also unsuccessful and a search was commenced. Because of hazardous weather conditions over the following two days, the search for the aircraft was primarily conducted on foot and horseback. The aircraft was located on a tree covered ridge, partially covered by snow. It had flown into trees in a level attitude, slightly banked to the right. Initial impact with the ridge was at about 200 ft below the elevation of the Mount Hotham aerodrome.

The aircraft had broken into several large sections and an intense fire had consumed most of the cabin. The occupants had been fatally injured. The investigation determined that the aircraft systems had been operating normally. The aircraft was not equipped for flight in icing conditions, nor had the pilot flown in accordance with the instrument approach procedure.

Observation

Why do experienced pilots continue to fly into known poor weather conditions, with such an unacceptable attendant risk? Neither of these experienced pilots misjudged the weather conditions, which were forecast and reported to be below the minimum required for their respective operations.

Commercial considerations and self-imposed motivations can be powerful influences in decision-making and can distort a pilot's judgement.

A pilot's total flying experience is not necessarily an indication of good decision-making ability. In some instances, that experience and familiarity can persuade a pilot to take greater risks in the belief that it will enable them to achieve an objective, despite the improbability, that a less experienced pilot would not even contemplate.

Testing to destruction

Test flying aircraft adds a level of unknown risk beyond normal flight. The following examples demonstrate how pilot experience is no substitute for careful planning for, and continual reassessment of, potential risks specific to each flight.

No time for risk assessment

Investigation AO-2007-066

On 7 December 2007, the pilot of an Air Tractor AT-802 was testing an experimental in-flight water collection system using skis attached to the aircraft's main landing gear. During one of the test runs across the surface of the lake, the aircraft pitched sharply nose down, then overturned and sank. The aircraft was substantially damaged and the pilot, who was rendered unconscious in the impact, drowned.

The pilot was an experienced agricultural pilot, who had recorded over 29,800 total flying hours in over 50 years of flying. He was attempting to develop a water 'scooping' technique for use in fire-bombing, using skis of his own design, installed to land-based agricultural aircraft. The concept was developed from the technique used by seaplanes engaged in fire-bombing, and offered an alternative to the use of dedicated seaplanes in this role.

The investigation concluded that the right experimental ski breached the surface of the water which caused a substantial amount of drag to act on the right side of the aircraft, and as a consequence, it became uncontrollable.

The investigation also found that the process of the development and testing of the skis lacked appropriate consideration of risk and was a factor in the development of

The damaged aircraft during recovery from the lake Source: ATSB

this accident. The project had been managed by the pilot, with minimal input from an aeronautical design engineer. As project manager, the pilot ignored several suggestions and warnings about the design and testing of the experimental water collection system made by his own staff, the design engineer and the Civil Aviation Safety Authority.

The lack of any risk assessment for the concept, design and testing of the water recovery system, despite the inherent risks involved, was a significant shortcoming in the process. That omission was directly attributed to the desire of the pilot to progress the development of the skis quickly, using mostly empirical methods. Furthermore, basic rescue equipment and trained water rescue personnel were not present for the water tests conducted on the lake.

Risk not assessed

Investigation 200206005

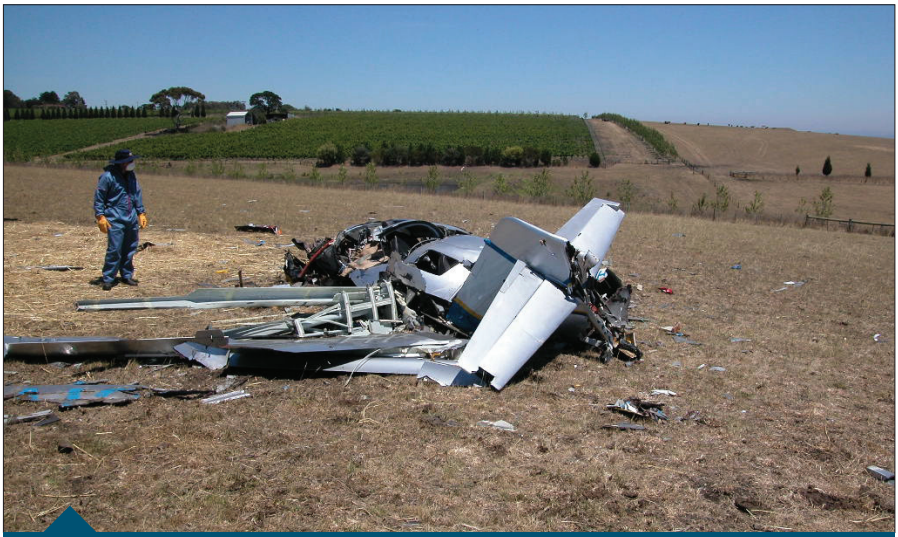
On 20 December 2002, a modified turbo-propeller Lancair IV amateur-built aircraft, operating under an experimental certificate of airworthiness, was being flight tested by an experienced pilot as part of a test flight program. The pilot and the owner/builder departed Point Cook, Victoria in the aircraft to conduct flight testing that included stall[3] behaviour, over the Bellarine Peninsula, at altitudes between 5,000 ft and 6,000 ft. Witnesses reported seeing the aircraft flying in the Drysdale area before descending steeply toward the ground. It subsequently impacted an open field, killing the two occupants.

Recorded flight data from recording devices aboard the aircraft indicated that the aircraft had entered a stall at an altitude of 6,200 ft and rolled at the initiation of the stall. It continued to roll as it descended rapidly, accelerating to approximately 150 kts and descended at an angle of approximately 40 degrees from the horizontal, with low engine power that increased shortly before the aircraft impacted the ground.

The pilot in command was an experienced ex-military pilot with 6,500 hours total aeronautical experience, including experience over many years in military and civil aircraft with a wide range of performances. He held an Air Transport Pilot Licence, a Grade-1 instructor rating and was endorsed to fly turbine-powered aircraft and most single-engine general aviation aircraft.

The Lancair IV kit plane had been extensively modified from the original kit. The owner/builder replaced the high-performance piston engine with a turbo-propeller engine and had sought assistance from a number of people to redesign the aircraft to accommodate the new engine installation. During construction, the experimental designation concept was developed and the aircraft construction was subsequently changed and completed in accordance with the 'Experimental' designation that required less design justification for the changes. Those changes included a reduction in length to the three propeller blades and repositioning the wing further rearwards. Those design changes were likely to have changed the performance and handling characteristics of the aircraft, the cumulative effect of which would have been almost impossible to predict without the benefit of a skilled aeronautical engineering team.

3 An aerodynamic stall occurs when a wing is no longer producing enough lift to support an aircraft's weight.



The wreckage of the Lancair Source: ATSB

Although a flight test schedule had been developed in accordance with the guidelines recommended in the test flight Advisory Circular produced by the Civil Aviation Safety Authority, there was no evidence that any significant re-evaluation of risk had been made during subsequent flight testing. Such a risk assessment process could have examined the results of test flights for hazards that became apparent from analysis of the observations and data from the previous flights.

This could have allowed for a considered assessment of any risk mitigators for their likely impact on the aircraft's safety during subsequent test flights, as the aircraft flight envelope was expanded. For example, if unexpected handling characteristics had been encountered during a stall sequence, then previously identified mitigation procedures, such as moving the centre of gravity forward, could have been considered.

During previous test flights, flown by another pilot, the aircraft had been stalled and he noted that it 'becomes laterally unstable below 80 kts'. Prior to those initial flights, he conducted an operational pre-flight briefing with the owner that included hazards and potential actions. It was not known if the test pilot for the accident flight conducted similar operational pre-flight briefings.

The investigation found no evidence that any significant risk assessment was undertaken during construction of the aircraft and in the development of the test flight program.

Observation

Developmental and test flying calls for a careful evaluation of the risks and the adoption of appropriate measures to reduce those risks. As the above examples demonstrate, flying experience alone cannot be relied upon as the only option to reduce those risks.

The safe development and testing of aircraft and aircraft systems usually requires the knowledge and skills of specialists from several disciplines, including design staff and test pilots, working as a team. Experienced pilots, regardless of their total flight hours, still require the careful and disciplined approach of a test regime. The skill sets possessed by an experienced pilot may not necessarily be the most appropriate for the overall task of developing a test programme and managing the attendant risks.

Turning back to tragedy

Investigation 200102253

On 23 May 2001 the co-owners of a Piper Twin Comanche aircraft, both of whom were pilots, were conducting a late afternoon flight to test a newly fitted left propeller governor, from Archerfield Aerodrome, Queensland. The aircraft had been refuelled immediately before the flight. Just after the aircraft became airborne from runway 10R the tower controller advised that there appeared to be smoke coming from the left engine. One of the pilot's responded '...we're shutting it down and request a left turn back for landing'. Witnesses observed a cloud of what appeared to be 'greyish black smoke' coming from both sides of the left engine. The aircraft was seen to yaw sharply left and right just after becoming airborne and then commence a left circuit at very low level, estimated to have been 100 ft above ground level. The landing gear remained extended throughout the circuit. Approaching the western boundary of the airport, the aircraft entered another left turn, passing low over some buildings. Part way through the turn, the aircraft's angle of bank suddenly increased and it descended rapidly into the ground. Both occupants were fatally injured.

The pilot in command was an experienced commercial pilot, Grade 1 flying instructor with multi-engine training approval and had over 10,200 hrs total flying experience, of which 626 hrs were on the Twin Comanche. The other pilot held a Private licence and had 2,586 hrs total flying experience, of which 120 hrs were on type.

The two left fuel caps were later found along the runway and the investigation found that neither had been secured after the refuelling. The refueller reported that after filling the tanks he had placed the caps in the filler necks but not secured them and informed one of the pilots present that the caps were not secured.

The wreckage of the Piper Twin Comanche Source: ATSB

The aircraft had impacted the ground inverted and rolling to the left. Ground contact marks and the condition of the propeller blades indicated that the right engine was developing significant power at impact while the left propeller was rotating at impact but that the engine was not developing power. The landing gear was locked in the extended position and the wing flaps were fully retracted - the takeoff configuration. There was no evidence of fire in the left engine.

While an unsecured fuel cap should have been detected and secured before flight, failure to do so should not have led to an accident with such tragic consequences. The investigation was unable to determine which pilot had been flying the aircraft but regardless of that fact, either pilot should have been able to handle the situation. The loss of fuel from an unsecured fuel cap did not represent an impending emergency, and required the pilot flying to either immediately reject the takeoff or continue the takeoff and climb to a safe height and speed. In any event, there was nearly 800 m of runway and overrun ahead on which to land before the aerodrome boundary.

Although the controller reported the problem to the pilots using the word 'smoke', the pilots should have been able to visually determine that the cause was not an engine fire, but fuel being siphoned from the open filler necks. Although it could not be determined if the mention of 'smoke' might have generated a conviction that the aircraft was on fire, the pilot's subsequent response was inappropriate. The left turn resulted in a turn away from the operating engine and with the aircraft not configured for optimum engine-out performance (the left propeller not feathered and the landing gear extended). Attempting to turn a multi-engine aircraft at a very low altitude and toward the inoperative engine is especially hazardous. The final flight path and impact attitude of the aircraft were consistent with what might be expected following loss of control when airspeed is allowed to decay below the minimum single engine control speed.

Observation

This event demonstrated that experienced pilots can be caught out when normally thorough procedures are not followed, are rushed or are interrupted. Initially, the unsecured fuel caps should have been discovered during the pre flight inspection. Secondly, the subsequent aircraft handling following the controller's warning did not follow the usual emergency procedure.

Any takeoff requires a well disciplined response to an emergency. Pilots of multi-engine aircraft are expected, during their pre takeoff briefing, to anticipate engine failure and mentally prepare to either reject the takeoff or to continue according to the aircraft's speed, altitude and performance. When confronted with an abnormal event like this, an experienced pilot should be able to handle the situation without any undue difficulty or increased risk, in much the same manner as an engine failure. An in-flight fire is probably most pilots' worst nightmare and requires a prompt response, but not at the risk of losing control of the aircraft. Had an engine fire actually existed, it should have been possible to climb the aircraft to a safe height, carry out the engine fire in-flight drills and return for a landing.

It is seemingly paradoxical that experienced instructors, used to simulating emergencies, can be caught off-guard in an actual event. An explanation could be that as an instructor 'conditioned' to deliberately initiating 'simulated' emergencies, they may not be mentally prepared for an actual emergency.

Conclusion

> *'Human beings, who are almost unique in having the ability to learn from the experience of others, are also remarkable for their apparent disinclination to do so.'*
>
> Douglas Adams

Experience, used wisely, can be extremely useful for avoiding accidents and invaluable in an emergency. Experience also allows a pilot in normal operation to anticipate events, allowing more time to review and monitor a flight without having to 'sweat' the details. However, as can be seen, experience does not give a pilot immunity from an accident.

Experienced pilots will no doubt be familiar with many of the events discussed in this report and should not assume they are any less vulnerable than the pilots involved in the accidents reported on these pages. Less experienced pilots can learn to avoid the pitfalls that can develop with their increasing experience. A pilot, no matter what level of experience, should never be beyond learning from the experiences of others.

About the ATSB

The Australian Transport Safety Bureau (ATSB) is an independent Commonwealth Government statutory Agency. The ATSB is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers. The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through excellence in:

- independent investigation of transport accidents and other safety occurrences
- safety data recording, analysis and research
- fostering safety awareness, knowledge and action.

The ATSB does not investigate for the purpose of apportioning blame or to provide a means for determining liability.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and, where applicable, relevant international agreements.

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