July / August 2002

VECTOR

Pointing to Safer Aviation

Airframe Icing

Historic Problems

GPS Approaches

Transponders – Keep Them On

CAA
CIVIL AVIATION AUTHORITY
OF NEW ZEALAND

VECTOR

Managing Editor, Cliff Jenks

Vector Editors, Pam Collings, Barnaby Hill, Jim Rankin.

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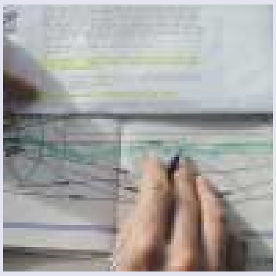

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Cover photo: The RNZAF Historic Flight Harvard and Tiger Moth in formation off the Manawatu Coast. Both aircraft are the subject of an article on page 10. Photo courtesy of RNZAF.

Airframe Icing

— Rules, Certification, and Flight in Icing Conditions —

This is the last in our series of articles on airframe icing. Previous articles have looked at the way in which different types of icing form and how to recognise conditions conducive to icing. Induction icing has also been covered. This article looks at the rules regarding flight in icing conditions and aircraft certification. It then discusses what to do should you inadvertently enter icing conditions.

CAA Rules and Aircraft Certification

Rules Requirements

Part 91 *General Operating and Flight Rules* of Civil Aviation Rules contains the following two rules with regards to aircraft icing. Firstly:

> **91.315 Operating in Snow and Ice Conditions**
>
> No pilot-in-command of an aircraft shall perform a take-off under VFR in an aircraft that has snow, ice, or frost, adhering to the wings, stabiliser or control surfaces.

and secondly:

> **91.421 Operating in Icing Conditions**
>
> (a) Except as provided in paragraph (b), a pilot-in-command operating an aircraft under IFR shall not–
>
> (1) perform a take-off in an aircraft that has–
>
> (i) snow, ice or frost adhering to any propeller, windscreen or powerplant installation, or to an airspeed, altimeter, rate of climb or flight attitude instrument system; or
>
> (ii) snow, ice or frost adhering to the wings, stabiliser, or control surfaces; and
>
> (2) fly an aircraft into known or forecast icing conditions unless the aircraft is certificated with ice protection equipment for flight in the type of known icing conditions.
>
> (b) A pilot-in-command may perform a take-off in an aircraft that has snow, ice or frost adhering to the aircraft if the take-off is performed in accordance with the aircraft Flight Manual, or instructions and data provided by the aircraft manufacturer, for take-off in such conditions.
>
> (c) If weather reports and briefing information immediately prior to the flight indicate to the pilot-in-command that the forecast icing conditions that would otherwise prohibit the flight will not be encountered during the flight because of changed weather conditions, the restriction in paragraph (a)(2) based on the forecast conditions shall not apply.

The prohibition on takeoff with snow, ice or frost on the wings is fairly obvious for most aircraft, whether IFR or VFR. Performance and control degradation may result from both the extra weight and the disruption to the airflow over the lifting surfaces. The aircraft centre of gravity might also be affected by accumulated icing, to the point where controllability is degraded.

A few aircraft (generally higher performance jet aircraft) are permitted to take off with some ice on their airframe, in accordance with rule 91.421 (b). Operators of those aircraft will be well aware of this aspect of their aircraft's operation. They should also be aware that overseas accident literature contains many examples of aircraft taking off with airframe icing where it has all gone wrong. Be careful!

"If icing is reported or forecast and your aircraft is not certificated for flight in those conditions, you cannot fly in that area …"

Note that, apart from this exemption for some aircraft, IFR aircraft are actually more limited with regard to taking off with airframe icing than VFR aircraft are. This is understandable given that the IFR aircraft may well spend the rest of the flight in IMC conditions. This could exacerbate any icing already present on takeoff. Pilots of IFR aircraft are also far more reliant on their instruments than VFR pilots are.

Continued over …

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Rule 91.421 (b) prohibits flight into known or forecast icing conditions unless the aircraft is certificated for flight in those conditions. The rule is quite unequivocal in this regard. If icing is reported or forecast and your aircraft is not certificated for flight in those conditions, you cannot fly in that area, either in the relevant height band or the forecast location.

Rule 91.421 (c) gives pilots an out in that a known change of weather may allow the pilot to fly into an area of previously known or forecast icing. Pilots should treat this option with some care. In obvious cases, where, for instance, a front has passed through, and the flight is to be conducted in an airmass with different characteristics, the icing conditions may well have cleared and are therefore unlikely to be encountered. If the general situation and airmass has not significantly changed, then just because a preceding aircraft does not encounter icing does not mean it is not present. Icing is like turbulence in this regard. Two aircraft can fly the same route within a short time – one might encounter severe turbulence while the other gets a better ride, having missed the worst bumps by chance. The atmosphere can be fickle. Don't leave it to chance.

Aircraft Icing Certification

The aircraft Flight Manual will clearly state what, if any, icing can be entered, and what equipment (eg, anti-icing or de-icing) must be serviceable and used to do so. Pilots of aircraft that are permitted to enter icing conditions will also have to take into account the extra fuel burnt or changes in performance that result from the use of anti-icing devices, such as bleed air from the engines.

The process by which aircraft are certificated for flight in icing conditions is complicated and outside the scope of this article. Further information can be found in the *Aircraft Icing Handbook* GAP available on the CAA web site (www.caa.govt.nz) by clicking on **Safety Information/Publications/Good Aviation Practice Booklets** or in hard copy from The Colour Guy (Tel: 0800 438 785).

Flight in Icing Conditions

Inadvertent Entry

It is possible that, despite all your careful planning and precautions, you could still encounter icing conditions in flight. The question then becomes how to best handle the situation. A simple answer might be to get out of the icing, but as with a lot of things in life and aviation there is more to it than that. Your response to a bit of light icing picked up at high altitude while in descent to VMC during an instrument arrival in a high-performance aircraft might be quite different from getting the same icing in a light single-engine aircraft without de-icing equipment while flying at MSA over mountainous terrain. The former happens fairly regularly in air transport operations – any icing not cleared by the de-icing system will usually rapidly clear as the aircraft descends out of icing-conducive conditions. The latter could turn into a really bad situation with an ice-laden aircraft descending below MSA in IMC.

"Pilots must be totally familiar with the types of icing and how they form if they are to be able to make reasoned decisions on the best way to proceed."

The author of this article once experienced exactly that while flying IFR in a light single-engine aircraft in the vicinity of Taumarunui. Icing was not forecast, but moderate icing was encountered. Performance degraded in a matter of minutes to the point that level flight was not possible. A break in the cloud enabled a descent in VMC conditions and the flight to be continued safely VFR below MSA. Not a pleasant experience!

Pilot Actions

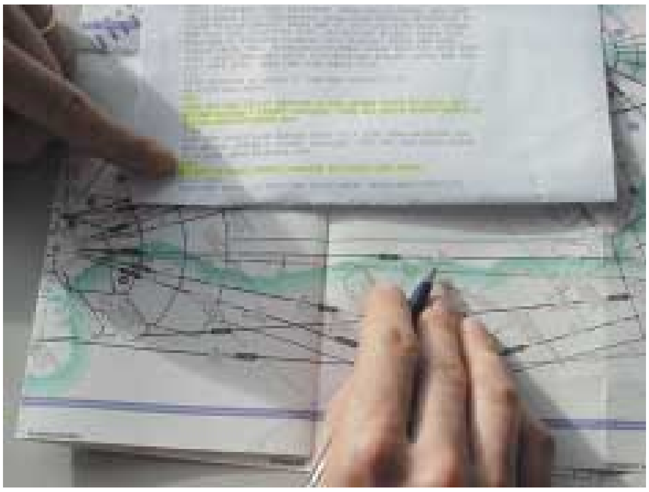
The actions taken by the pilot on encountering icing are very dependent on the situation as discussed above. One way of looking at the problem is to break it into the following three questions:

How do I get out of the icing?

An important consideration when trying to get out of icing conditions is the type of icing being encountered and the sort of cloud or conditions producing it. Flight in stratiform cloud around the freezing level, for example, may quickly lead to ice formation. An altitude change of only a few thousand feet, however, can take you out of the icing layer. In contrast, icing associated with cumuliform clouds can occur through a much wider temperature range, so an altitude change is less likely to take you out of the icing conditions. Cumulus clouds are, however, limited in horizontal extent. A change of heading, particularly out of a line of cumulus, may therefore be sufficient to get out of the icing conditions. If you know you are in an isolated cloud, or are taking the shortest distance through a line of clouds, then simply holding heading might be the best bet.

Pilots must be totally familiar with the types of icing and how they form if they are to be able to make reasoned decisions on the best way to proceed. If in doubt, then a change in altitude combined with a change of flight path may be the best way to proceed, with ATC in the loop.

A further part of the decision-making process is to determine whether to climb or descend out of icing conditions. Climbing has the obvious advantage of taking you away from the ground, and if you are already at or near MSA – it may be your only option anyway. Note, that if the power available to climb is already marginal, it takes very little ice accumulation to reduce your potential rate of climb to nil. Also note, that the use of carb heat will reduce the engine power available, but may be essential to keep it running at all – a neat Catch 22. A decision to climb must be made early. It is quite common in New Zealand to find stratus or stratocumulus layers up to around 6,000 to 8,000 feet with clear skies above. An early climb into



sunny conditions might be the fastest way of both getting out of the ice and helping to clear it.

Sometimes descending is your only option, particularly if icing has accumulated to the point that performance is impaired. Be mindful of the MSA. Ice can take a long time to clear when the aircraft has become 'cold soaked' and is being flown below a stratus layer. If an inversion is present, as is often the case in ice-conducive conditions, a descent may actually take you into colder air, also reducing the rate at which the ice clears.

Let ATC know as soon as you encounter icing, and if in difficulty, do not be afraid to say so. A Pan call advising of your situation may be warranted.

> *"... if the power available to climb is already marginal, it takes very little ice accumulation to reduce your potential rate of climb to nil."*

How do I get rid of icing?

It goes without saying that all your anti-ice and de-ice equipment should be employed to get rid of the icing as soon as possible. Once clear of icing conditions, the ice should eventually clear itself – although, as noted above, this can take some time if still flying in cloud or even in cold clear air without sunshine. Be aware that once the ice does start to clear, it may break off in chunks, with the potential to damage other parts of the airframe. Propeller ice can be a particular problem.

How do I cope with icing?

The key problems in coping with an ice build-up are retaining control and ensuring performance enables you to maintain MSA. There have been numerous studies in recent years into aircraft handling difficulties following airframe icing, particularly the possibility of upsets or loss of control due to ice accumulation on control surfaces. Most manufacturers recommend disconnecting the autopilot (if fitted), since the autopilot may mask any control problems encountered as the ice accumulates.

The author has once again had a nasty experience when an elevator froze in a light aircraft, apparently due to ice bridging the gap between the tailplane and elevator. The elevator was eventually freed with a strong jerk on the controls. Thereafter the control column was moved gently backwards and forwards, both to ensure control was still available, and to reduce the chances of ice forming there again. Obviously, moving the controls all the time makes IMC flight more difficult, but was in this case necessary.

Speed should be kept as close to normal as possible during an icing encounter, thereby ensuring that good control authority and a margin well above the stall are maintained. Icing will cause the stall speed to increase, sometimes significantly, and may also negate stall-warning systems – so you may not know that you are approaching the stall. Do not be tempted to raise the nose in order to maintain height at the expense of airspeed – it is likely to result in a stall or loss of control. When performance is limited, it may be necessary to lose height in order to maintain speed. What actions you take will depend on the circumstances.

The subject of handling ice encounters, particularly in larger aircraft, is comprehensively discussed in the *Aircraft Icing Handbook* GAP.

Reporting

Pilots should report any significant (moderate to heavy) in-flight icing encounters to ATC. Such pilot reports (PIREPs) are essential for ATC to be able to help pilots of other aircraft avoid these areas. PIREPs also help aircraft operators to form a picture of where icing is most likely to occur in the future, which is extremely useful information when flight planning. PIREPs are also passed to the MetService, who will use the information to update weather forecasts, and if necessary issue a SIGMET.

Whenever in-flight icing is encountered that has or could have an effect on flight safety, it should be reported to the CAA under Part 12 *Accidents, Incidents and Statistics*. That way any statistical icing trends may be identified by the CAA and fed back to the aviation industry.

Summary

If you fly in cloud long enough, then one day you will encounter icing. Depending on your aircraft type, it may be no more than an inconvenience. But on the other hand, it can also get **very** scary **very** quickly. Pilots must be fully aware of the mechanisms and conditions associated with ice formation, and how to recognise and, where possible, avoid them. They must be aware of the certification state of their aircraft and what they may and may not legally do when icing is forecast. Where a worst-case icing scenario is encountered, pilots must quickly decide what they intend to do about it, particularly if in lower-performance aircraft. Waiting and hoping for it to clear are not options. ■

Get out of it, get rid of it, and be prepared to cope with it.

GPS Approaches

The Incident

On the initial segment of a GPS approach into Queenstown, the aircraft's crew selected their Initial Approach Fix (IAF) on the GPS. The selected IAF then changed on being entered into the GPS unit's flight plan to reflect the current radial on which the aircraft was located. This was as it should be. Due to lack of familiarity with GPS DME arc approaches, however, the crew expected to see the selected IAF radial and not the current radial on which they were tracking.

Recognising that something was not quite right, the crew elected to discontinue the GPS approach and proceed visually to the aerodrome. The aircraft landed without incident.

Subsequent Investigation

The crew subsequently tried to duplicate what was perceived as being the problem both on the ground and in the air. The QUEENSTOWN GPS ALPHA approach was loaded into the GPS upon which varying IAF bearings were seen, which reflected the actual radial/bearing relationship to the QUEENSTOWN VOR. When conducting this check in the air, the constantly changing radial/bearing relationship to the QUEENSTOWN VOR gave rise to the thought of random changes to the IAF radial/bearing.

Several other technical experts were consulted in an effort to try and determine what the cause of the problem might be. All of them initially overlooked an extract in the GPS Pilot's Guide alerting crew to the potential problem.

The following is taken from *Allied Signal Pilot's Guide KLN 90B*, Pages 6–16, Para 6.1.8 Example Approach DME Arc:

> "… once an arc waypoint is chosen, the KLN 90B determines what radial of the reference VOR the aircraft is presently located on. A waypoint is created that is located at the intersection of the present radial and the DME arc. This waypoint is the first waypoint in the list of waypoints presented on the (airport) APT 8 page before loading the approach into the flight plan.
>
> **NOTE:** If the present radial from the reference VOR is outside the defined arc, then the KLN 90B will default to the beginning of the arc.
>
> **CAUTION: The KLN 90B does not take into account the geometry of the active flight plan when determining the arc intercept point. This point is defined solely on the present radial and the defined arc distance from the reference VOR. For this reason it better to delay selecting approaches that contain DME arcs until the aircraft is closer to the destination."**

The crew was very familiar with stand-alone GPS approach procedures, which they had been doing for nearly two years, but this was the first time they had flown a GPS DME arc procedure. Queenstown is the only GPS instrument approach published in New Zealand using the DME arc as part of the procedure. Since the cessation of local Twin Otter operations, there have been limited GPS IFR operations into Queenstown, and the reference flight for the incident was a first for the crew.

Lessons Learnt

With hindsight, it is easy to see how the crew concerned received information (correct information) that was at variance to what they expected to see. Full marks to them for recognising the problem early and taking decisive action by discontinuing the approach.

This incident does, however, highlight the need for crew to be totally familiar with the various modes and functions of their GPS unit (carefully reading the Pilot's Guide is a must), and to be well trained for operations into a new location using new procedures. ■

Fuel Containers Ignite

*This item was published in **Flight Safety Australia**, November 1998.*

Most people who fly ultralight or GA aircraft have been exposed to the hazards of transferring fuel.

Before I left home to go flying recently, I decided to transfer standard unleaded fuel from one plastic fuel container (approved type) to another of the same type.

The day was a warm 25°C, with humidity at 65 percent. I was in the shade – not exactly what you would call ideal static generating conditions. Suddenly – *whoomph!* – instantaneous combustion. Result: two burning containers plus myself from the knees down.

Fortunately I carry two BCF fire extinguishers in my aircraft trailer, the door of which happened to be open at the time.

So the 'inflammable man', mumbling "stay calm" and "kill the source" ran for the trailer and grabbed one of the extinguishers (mounted at the rear of the trailer, just inside the door) and with three squirts put out the containers and my burning legs.

–Name withheld by request.

Analysis

The Importance of Voltage

We all know that the little device screwed into the engine cylinder head has the all important function of igniting the fuel-air mixture in the cylinder – it provides a gap where high voltage from a coil or magneto is induced to spark across.

Unfortunately, nature can provide the same high voltage source; if there is the right kind of gap present during refuelling, then you risk ignition of the fuel.

In the same way that a comb brushed through dry hair produces static electricity, so does fuel sloshing around in a container. If the container is made from non-conductive material, for example, plastic or fibreglass, the static electricity can build up to a high charge.

Current Flow

The problem arises when the fuel in a container of high electrical charge comes close to something of a different charge – that is, there is a 'potential difference'. Electrical current will flow if it gets a chance.

If a solid electrical conductor is provided, such as an earthing strap, then the current will flow safely from one body to another.

However, if there is no conductor, and there is a big enough difference in the electrical potential, then a spark can bridge the gap.

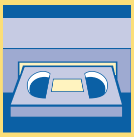
And if there is enough fuel-air mixture around, you risk ignition.

It is not hard to reduce the risk of fuel igniting.

You should consider:

- Sparks are a problem only when a fuel-air mixture is present.
- Metal and other conductive containers will reduce electrostatic build-up. If you must use a plastic container, make sure that it is one of the conductive types.
- Before you move fuel from one container to another, you should connect or touch the conductive bits together first, in an area that is not surrounded by fuel fumes – that is, connect the earthing straps before taking the caps off.
- If possible, have everything at the same electrical potential as the ground – that is, earthed to a ground spike.
- Minimise sloshing or splashing when moving fuel.
- Just in case all these precautions fail, have an effective fire extinguisher handy.

– Aussie Pratt, Airworthiness Inspector, CASA ■



New Video – Fuel Management

The CAA has a new safety video available on fuel management. The video is in two parts; the first looks at flight planning and in-flight fuel management, and the second covers basics such as refuelling, de-fuelling, and what to do if something goes wrong. The video is designed to complement the *Fuel Management* GAP, also produced by CAA.

Refer to the March/April 2002 issue of *Vector* for details on how to borrow or purchase this or other titles in the CAA safety video series. Alternatively, see the video list on our web site (www.caa.govt.nz) by clicking on **Safety Information /Videos**.

TRANSPONDERS
– Keep Them On –

Most of us are familiar with the use of transponders for identification by ATC in controlled airspace, for the safety aspect in squawking 7700 in an emergency situation, and for the tracking capability of ATC equipment in a search and rescue scenario. These uses are dependent on being in airspace where SSR radar surveillance is possible. SSR coverage is not available in some parts of the country.

There is another safety benefit, which is becoming increasingly available, wherever you are flying, as more aircraft are being equipped with TCAS equipment. Most new commuter and airline aircraft coming into the country are TCAS-equipped.

What is TCAS, and why is it of benefit to all aircraft in the air?

Traffic Alert and Collision Avoidance System

The Traffic Alert and Collision Avoidance System (TCAS) reduces the risk of mid-air collisions and so-called 'near-miss' incidents among aircraft. TCAS helps prevent disaster by presenting a display of surrounding aircraft and, when necessary, providing audible warnings and gentle manoeuvring instructions to help pilots of TCAS aircraft to avoid danger.

TCAS comprises a radio transmitter and receiver, directional antennas, a computer, and a cockpit display. TCAS sends out radio signals, called interrogations, similar to those from an air traffic control radar on the ground. When another aircraft's transponder receives an interrogation, it transmits a reply. The TCAS computer uses the time between the interrogation and reply to calculate distance. It uses information from the directional antennas to determine direction.

If the other aircraft has a transponder that provides altitude data, the TCAS displays the relative altitude of the other aircraft and shows whether it is climbing or descending.

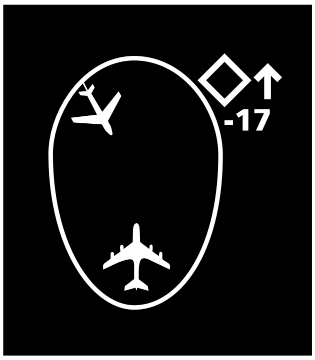
TCAS provides a traffic advisory (TA) whenever other aircraft come close. During a TA, a synthesised voice announces, "Traffic, traffic", and the symbol for the other aircraft changes shape and colour depending on its degree of threat. TCAS II will also provide a resolution advisory (RA) when the TCAS will command a manoeuvre such as "Climb, climb" or "Descend, descend" – or it may tell the pilot not to manoeuvre.

Safety Benefit

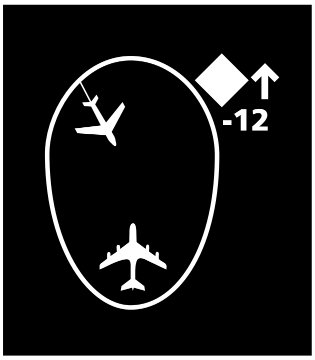
Obviously, TCAS-equipped aircraft have a reduced risk of a 'near-miss' or mid-air collision – but only if other aircraft have an operating transponder. The safety spin-off for smaller aircraft from this technology is that by keeping your transponder on at all times (whether within SSR coverage or not) you are given the added protection (beyond the use of your eyes) that a TCAS-equipped aircraft will 'see' you and will be prompted to take avoiding action if your flight paths are converging dangerously – thus protecting both of you.

We still need to keep a good lookout at all times, of course, as the first (and, in many VFR situations, the only) line of defence. The protection provided by TCAS technology could be especially helpful at unattended aerodromes that have scheduled airline traffic, where the mix of aircraft speeds and pilot experience in an uncontrolled environment create a higher potential for an incident.

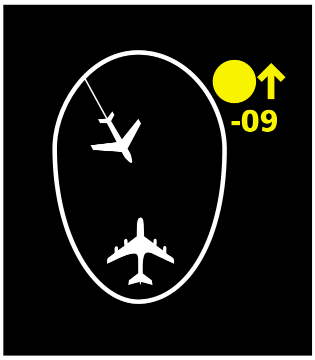
It takes two to have a collision or 'near-miss', but prevention of such a situation by the use of today's technology requires both to be using the appropriate equipment. So keep your transponder on at all times. ■



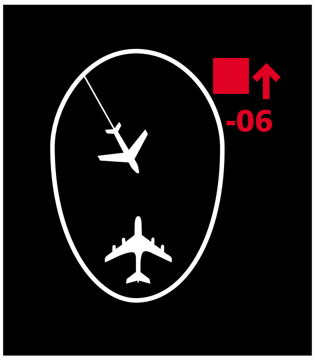
Non-Threat Traffic



Proximity Traffic



Traffic Advisory (TA)



Resolution Advisory (RA)

Watch Those Seatbacks!

Two events involving aircraft seatbacks have highlighted the need for operators and pilots to be aware that control column movement may be compromised if an unoccupied and unrestrained cockpit seatback suddenly falls forward towards the control panel.

In the first incident, a Piper PA-32-300 encountered turbulence while on short final approach, which caused the seatback of the unoccupied righthand seat to fall forward and restrict the control column sufficiently to allow only a partial flare on landing. The aircraft completed the landing without incident. The situation, however, could have easily ended very differently had the control column's movement been further restricted.

The second incident involved a Piper PA-28 where, at some time, the pilot's seat had been inadvertently transposed over to the passenger side. The passenger seat has a latch fitted that locks the seatback in the upright position. The pilot seat does not have this provision. Again, the potential existed for the passenger side seat (really the pilot's seat in this case) to fall forward and jam the controls.

In order to prevent this type of occurrence, operators need to ensure that unoccupied cockpit seats are positioned sufficiently aft that control column movement will not be compromised. With respect to PA-28 aircraft, operators should check to see that the front passenger seats are fitted with a seatback latch and are locked in the upright position. ■

New Posters Available

Cellphones

Two posters aimed at educating passengers to turn their mobile phones off when travelling on aircraft have been released.

An A4-size poster, *Get ready to switch off*, is intended for check-in counters to alert passengers to keep their cellphone on their person and not in their luggage – and to be aware they will have to turn their phone off when directed by ground or aircraft crew. An A3-size poster, *Your cellphone could do this!* featuring a head-on shot of a 737, is intended for use at the gate as a final reminder.

Both posters have been mailed out to all major aerodrome and commercial IFR aircraft operators along with an explanatory letter.

Potential Weapons

The array of potential weapons passengers can attempt to take on an aircraft is vast.

A poster displaying some of the more common examples aims to jog passengers' memories and to inform them of their options if they have a potential weapon in their possession. The poster clearly informs passengers that attempts to carry potential weapons on board will result in the weapon's confiscation, unless they can be posted to a New Zealand address for retrieval later. Some items, such as syringes, can be carried in genuine medical cases.

The prohibition on sharp items applies to all scheduled services, whether screened or not.

This poster, which is available in both A4 and A3 sizes, has been mailed out to all major aerodrome operators along with a covering letter.

If you did not receive any one of these posters, or would like additional copies, please contact the Safety Education and Publishing Unit.

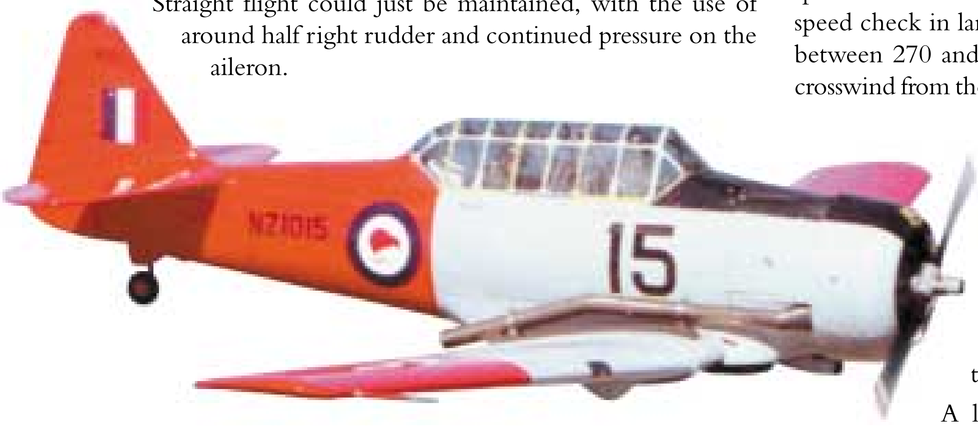
Safety Education and Publishing Unit
Civil Aviation Authority
PO Box 31-441, Lower Hutt
Tel: 0–4–560 9400
Email: info@caa.govt.nz

Historic Problems

We are fortunate to have on our editorial team, part-time, Jim Rankin, whose main job is as an RNZAF pilot. Jim leads the Red Checkers, but among his other flying he keeps current on the RNZAF's historical Harvard and Tiger Moth. Recently he experienced an incident on each of these types. He wrote up his experiences for an RNZAF audience in their safety magazine, but there are lessons for civilian pilots too, and the article has been adapted for publication here.

The Harvard Incident

The aircraft was on a solo low-level aerobatics display practice. At 2000 feet en route to Raumai an inverted check was carried out. On rolling upright a restriction was noted in the aileron that effectively made it impossible to roll to the right. The aircraft was rolled left to normal flight, where the restriction was confirmed. Elevator and rudder control appeared normal, but the aileron was being pushed left. Significant stick force was required to hold the aileron just left of neutral, with apparently free motion to the left, and no movement to the right. The aircraft was holding about five degrees left bank. Straight flight could just be maintained, with the use of around half right rudder and continued pressure on the aileron.



A MAYDAY call was made to Ohakea Control and the aircraft allowed to continue in a climbing lefthand turn back towards Ohakea. On reaching 3000 feet a lefthand orbit was established just to the south of Ohakea.

Once a safe bale-out height had been reached, an attempt was made to force the aileron to the right, to see how much control was available. The control column was effectively immovable to the right. The aileron was moved about one quarter deflection left, then back to neutral, to see if that resulted in any change. None was noted. Thereafter, the aileron was kept as close to the stick central position as could be managed.

"The control column was effectively immovable to the right."

The cockpit was checked for any articles that could be causing a restriction or for anything else abnormal.

A request was passed through ATC to get the aircraft engineer and a current Harvard pilot to the Tower to discuss options.

While waiting for them, the aircraft smoke system was turned on to empty the diesel tanks that sit behind the cockpit. Consideration was given to holding overhead to burn off fuel, but with full tanks that would have taken at least two hours, and the force required to maintain controlled flight was such that this was not a good idea.

A slow-speed handling check was carried out in a clean configuration, with speed progressively reduced to 90 knots, with no change to handling characteristics.

When the engineer came on the radio, advice was sought as to any possible tie up between aileron controls and the gear and flap. He confirmed that the systems should be entirely independent, and the control runs were sufficiently separated within the airframe that any interaction between the systems was unlikely. The aircraft was then positioned over an unpopulated area to the south, and gear and flap were progressively lowered. Gear produced no discernible change to handling. With flap down the controls appeared to stiffen up a little, but control authority remained unchanged down to 80 knots. Gear was left down, flap retracted to half to allow for better handling and reduced control force, and a gentle descent started towards Ohakea.

I decided to land on Runway 27, using full flap and an approach speed of 90 knots (10 knots above that achieved in the low-speed check in landing configuration). The wind was varying between 270 and 300 degrees at 10 to 15 knots, meaning a crosswind from the right. While a crosswind from the left would have been preferred for the control restriction, the crosswind component on Runway 33 was judged to be too much for the limited control available. The selected aiming point was the runway intersection; after that the area to the left of the runway is mostly unobstructed grass, and any loss of control on landing was likely to lead to a groundloop or roll left.

A long curving final approach was made, remaining clear of Sanson. Following selection of full flap on final, all electrics were turned off, Tower having first been advised on the radio. The canopy was opened to facilitate any ground evacuation.

The aircraft could just be held in straight flight on finals, albeit with high control force to the right and near full rudder required. Touchdown was actually quite nice, but as the aircraft slowed control authority was lost, and the aircraft did veer a little to the left of the runway. This was eventually controlled with brake, and the aircraft was brought to a halt and shut down.

I will admit to feeling quite calm throughout the incident, but about five seconds after shutting down the engine I suffered a small bout of 'shakes' and felt completely physically drained.

On inspection after landing it was found that the rear seat cushion had apparently come loose from the seat pan and wedged between the control column stub and the fuselage structure.

On arriving at the aircraft prior to the flight, I had confirmed with the groundcrew that the rear seat had been 'soloed' and that the diesel had been replenished and was turned on. As part of the pre-flight, I carried out an external visual examination of the rear cockpit to check that the canopy was closed and locked, the rear control column removed, and the

The seat cushion with the straps done up. The straps do not prevent the cushion from moving under negative G.

The seat cushion jammed between the fuselage and the control column stub. The rear control column is removed for solo flight. Note the angle at which the ailerons were jammed.

rear straps secured. I did not see the seat cushion in the seat pan; it is the same colour as the seat pan and would have been mostly obscured by the seat belts. I was at fault for not opening the rear canopy and physically checking the straps, in which case I would most certainly have noted and removed the offending cushion.

The Flight Manual includes a note to secure the rear cockpit prior to solo flight, including removal of the seat cushion. This task was not, however, to be found in the Despatch Servicing notes for groundcrew. The engineer who completed the despatch was new to the job and did not remove the cushion. Both the supervising sergeant and myself missed the fact that the cushion was still in place. At the end of the day it was my responsibility and my fault.

The Harvard Lessons

Apart from the obvious flight safety message about loose objects in the cockpit, and the benefit of inverted checks before display aerobatics, what other lessons can we learn from this incident?

I spent a lot of time after the incident analysing my own performance. In particular I wondered just how much my mind was on the pre-flight, or how much I might have already been thinking ahead to the display practice, or maybe distracted by other things. Those of us who are flying supervisors or squadron executives are particularly prone to distraction from other job pressures or issues. In our job we have to be mindful of the big picture – but always focus on the job at hand.

It is amazing how little things can catch you out. It is also amazing that after 50 plus years of Harvard operations, we had a potentially life threatening discrepancy between the Pilot's Notes and the Servicing Notes on how to prepare the rear cockpit for solo flight. Hindsight is a wonderful thing – the potential danger of a seat cushion the same colour as the seat had never even entered our minds. I wonder how many other latent failures are sitting out there – waiting – ?

If you listen to tapes of pilot responses during emergencies, the immediate response of most pilots when something goes wrong is *@#?! I believe that part of that expression actually translates to "This can't be happening to me." It was certainly a thought that flashed through my mind. It then takes a finite amount of time for this thought to pass before the pilot gets on to the job at hand, which is sorting out the problem and getting home safely. You will have heard the expression 'paralysed with fear'. This seems to characterise the response of some people to extreme situations. As pilots we cannot afford that, and we need to get over it very quickly. In my experience the time it takes for us to react depend on a few factors. Partly it is innate – the RNZAF accepts for training and subsequently passes, only those individuals who have shown that they have the ability to react appropriately. A lot of it is the training we give. But a big factor we sometimes neglect to mention is the mindset "Yes, it can happen to you."

"I wonder how many other latent failures are sitting out there – waiting – ?"

If you fly aircraft for long enough, particularly military aircraft, and even more so for single-engine types or helicopters, you will one day be faced with a life-threatening emergency. I will guarantee that. The sooner you accept that unpleasant notion, and plan accordingly, then the better prepared you will be mentally for the day it finally happens. It can happen to you, and it will happen eventually. Get ready for it.

I have had a number of *@#?! type incidents in my career – three forced landings and a variety of engine malfunctions and shutdowns, but this incident was easily the most frightening. Our emergency training tends to focus on engine failure. As pilots we take our control over our aircraft for granted. Take away that control and it feels very bad! Trust me. Our emergency training, particularly in single-engine aircraft, tends to focus on engine failure. I can honestly say that I would far rather cope with an engine failure than this sort of problem any day. This highlights the issue of mindset and training. Think about and prepare for all sorts of problems!

One thing you can't really practise is the adrenalin rush that accompanies this sort of emergency. The doctors assure me that the wasted feeling that I got once safely on the ground is quite normal. In this incident, part of the problem was fatigue caused by the sustained control forces required to keep the old girl under control. Also, you may feel quite calm during an incident, but all the time your body is accumulating all sorts of chemicals, and they have to go somewhere afterwards. I took the dog for his lunchtime run about an hour after this incident – and knocked about four minutes off my normal time. The adrenalin was definitely still flowing. Expect this sort of response and you will cope with it better.

A final factor I would like to mention is luck. I was very lucky that day. Had the controls been jammed even slightly further

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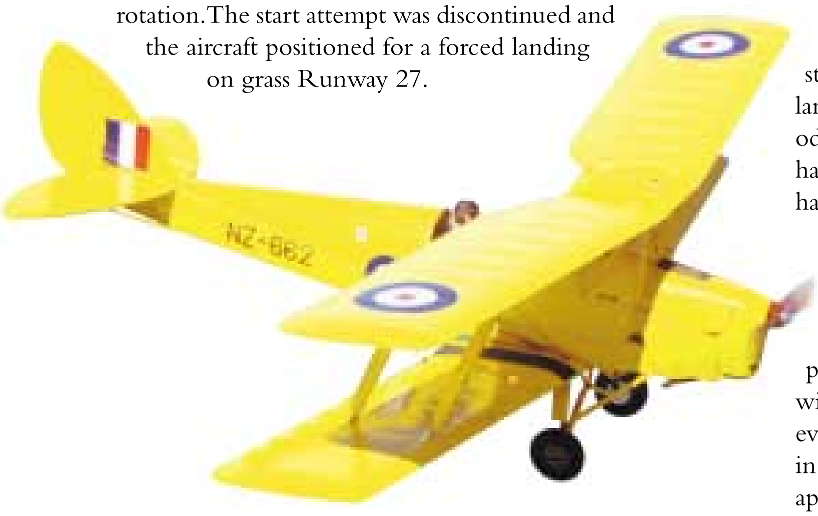
over the Harvard would not have been controllable. Had the wind been slightly stronger or more of a crosswind, then I might not have been able to keep her on the runway. It is a little bit sobering to realise just how much luck and chance can play a part in the successful outcome of what we do. The aim is of course to minimise this aspect, and instead rely upon good training, preparation and procedures. I know which I would rather depend on.

The Tiger Moth Incident

About a week after I had finished writing the Harvard article, I had another incident, this time in the Tiger Moth.

The aircraft was on a solo staff continuation sortie, flying aerobatics about 2 NM north of Ohakea between 2000 and 3000 feet. A series of manoeuvres had been flown, including stalls, a spin, loops and a stall turn right, all without incident. At the top of a lefthand stall turn the engine stopped without any warning.

The aircraft was turned towards Ohakea and a dive commenced to attempt an airload start. Passing 140 mph and with height approaching 1000 feet, the engine had shown no signs of rotation. The start attempt was discontinued and the aircraft positioned for a forced landing on grass Runway 27.



This was successful, with the aircraft touching down in the first 100 metres of the 600-metre long grass strip. The reduced drag of the stopped rather than windmilling propeller meant that the aircraft did not decelerate in the flare as much as normal. The aircraft stopped with about 20 metres of grass remaining, just as a deliberate groundloop was being contemplated.

After a successful engine ground run, a test flight was conducted to check the engine and airload starts. Three starts were carried out, with the engine starting at 115, 135 and 145 mph, with height losses of 800 feet, 1100 feet and 1500 feet respectively. The Flight Manual figure is 120 mph and 800 feet.

The Tiger Moth Lessons

In the Harvard article I was stupid enough to say I would rather have an engine failure than a control restriction. I got my chance! It wasn't really an engine failure, but rather an engine stoppage that I couldn't fix in time.

Engine stops in the Tiger are not unknown, particularly in exercises such as spins or stall turns. The conversion to type always includes a deliberate engine stop and airload restart for just that reason. Something we had not realised is just how variable the speed and height required can be. The Flight Manual is being amended to say 120 to 150 mph and 1000 to 1500 feet height loss.

It appears that the speed required depends very much on exactly where in a compression stroke the engine stops. Get right on peak compression and it is very hard to turn over, hence more speed required. One overseas expert I spoke to indicated that sometimes with a good engine (and ours is the best) they can be very reluctant to start at all! That is one bit of corporate knowledge that was lost many years ago and we have now rediscovered – by incident rather than accident. I can also guarantee that Tiger pilots will be more careful about the manoeuvres they fly and where they will do them.

"… these incidents … have served as timely reminders of the benefits of being prepared."

While this was a different emergency to the Harvard one, it does serve to reinforce some of the lessons of that incident. Training and preparation are high on the list. The reason why I was aerobatting just north of Ohakea was partly to do with the fact that, with a slow cruise speed, I prefer not to waste valuable aircraft hours transiting to and from the training area. The main reason, however, is that if the engine does stop I would far rather be over an airfield or other suitable landing area. It might happen, so you may as well stack the odds in your favour. The staying close to home because it might happen also helped the mindset and reaction time when it did happen.

This was only my third flight in the Tiger Moth for over four years, but the forced landing went off fairly smoothly, mainly because practice forced landings were high on my priority list, and I had practised them on every flight. It paid off. I nearly got caught by the improved glide performance with the stopped prop. I had expected it, but the effect was even more pronounced than I would have believed, particularly in the light winds on the day. I could adjust the glide on approach with s-turns and sideslip – and needed to – but once in the flare had little option but to wait for the tail to drop to get the skid on the ground for some drag. With the grass rushing by it seemed like an eternity! I wonder how many other emergencies we simulate that will actually be different enough in the real case to potentially catch people out?

After the Tiger Moth incident my wife asked me how I was feeling about flying. This was the first time in over 20 years together that she had ever expressed any concern over the job I did and the risks we accept. She is happy again now, but it does raise the issue of how your loved ones may react to any incident you may have, or maybe even their general appreciation of what you do. Something else for you to bear in mind if something goes amiss.

Conclusion

To conclude, if you fly for long enough then one day something bad is going to happen. Accept that, and get mentally prepared for it. Practise the things that might go wrong, not to the point of paranoia, but enough to be confident in your ability to handle an emergency if it happens. Stack the odds in your favour. I still love flying and these incidents have not put me off in any way, but they have served as timely reminders of the benefits of being prepared. I really do hope you don't have similar problems, but I would recommend that you assume you will, and plan accordingly. ■

Safety Seminars

— Weather Wisdom —

Dates and venues have now been set for the 2002 series of Av-Kiwi Seminars. This year the focus will be on understanding our weather from an aviation perspective.

Come along and listen to key presenter Erick Brenstrum from MetService speak on this topic. He will be supported by a local aviator (who will provide comment on local weather scenarios) and CAA staff.

Erick Brenstrum is the author of the highly acclaimed *New Zealand Weather Book*. In this very readable book, he clearly explains the weather, covering such things as how to interpret a weather map, and the wide range of weather patterns and processes that affect New Zealand.

The seminars will involve a mixture of presentations and practical work. The CAA will provide afternoon tea at each venue, and will also be providing all attendees with a copy of an interactive CD-ROM about assessing flying weather, so you can further expand your knowledge and skill using your home computer. A spot prize of a copy of the *New Zealand Weather Book* will also be awarded to one lucky person at each seminar.

Don't miss this opportunity to learn more about one of the most influential factors in our flying environment.

Seminar Venues

To be held on the following Sundays from 12:30pm – 4:00pm:

Christchurch Sunday 4 August
Commodore Airport Hotel, 449 Memorial Avenue

Taupo Sunday 11 August
Taupo Aero Club, State Highway 1

Auckland Sunday 18 August
Centra Auckland Airport, Cnr Kirkbride & Ascot Roads, Mangere

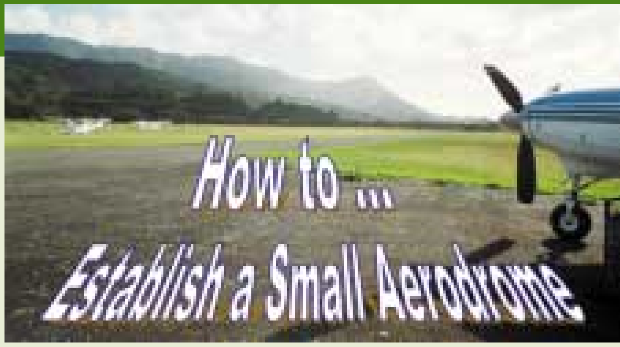
Wellington Sunday 25 August
Mercure Hotel, 345 The Terrace

Nelson Sunday 1 September
Beachcomber Motor Inn, 23 Beach Road

Queenstown Sunday 8 September
Rydges Queenstown, 38-54 Esplanade

Be there!

New *How-to…*



A new product in the How-to… series was launched on 28 June, called *How to Establish a Small Aerodrome*. This guide is available only on the CAA web site as the 'audience' would be too small for a normal print-run.

The guide is aimed at operators of non-certificated aerodromes catering for aircraft of 5700 kg MCTOW or less. Information is given on runway dimensions, approach and takeoff 'surfaces', visual aids, and publishing requirements.

The guide is intended as a pointer to relevant information in the Rules and Advisory Circulars. It is important that owners and operators are familiar with Part 157 *Notice of Construction, Alteration, Activation, and Deactivation of Aerodromes*. The recommended standards outlined are contained in Advisory Circular AC 139-07A.

This new How-to… booklet can be viewed on the CAA web site (www.caa.govt.nz) by clicking on **Safety Information/Publications/How-to… Booklets/How to Establish a Small Aerodrome**. ■

New GAP – Fuel Management

Fuel-related accidents continue to occur too frequently within general aviation in New Zealand. The most common causes of such accidents often relate to pilots' poor aircraft fuel systems knowledge, lack of pre-flight planning, failure to accurately monitor in-flight fuel consumption, and inability to take decisive action when faced with a low-fuel situation.

Fuel Management is the latest booklet in the CAA's Good Aviation Practice (GAP) series. It examines all of these factors, and others, and provides practical advice intended to make you more proficient at fuel management.

Regardless of what type of flying you do and how much experience you have, this booklet is worth reading. We strongly recommend that you obtain a copy (and also view the new two-part *Fuel Management* video) to learn new tips or remind you of good practices which you may be letting lapse. Don't become a part of the fuel incident/accident statistics.

See the May/June 2002 issue of *Vector* for details on how to obtain a copy of this, and other, booklets in the GAP series. ■

Aviation Safety Coordinator Training Courses

ATTENTION ALL AVIATION ORGANISATIONS

Two Aviation Safety Coordinator training courses are planned in August 2002. These two-day courses will be held in Auckland on 19–20 August and Wellington on 26–27 August (see details below).

An Aviation Safety Coordinator runs the safety programme in an organisation. Your organisation should have a properly administered and active safety programme.

If you are involved in commuter services, general aviation scenic operations, flight training, or sport aviation, this course is relevant for your organisation. Apart from the course content, you will receive a comprehensive manual, which you could adapt to suit your operation.

You may have had an ASC trained in the past who is now due for a refresher, or personnel changes may mean a new person should be trained.

There is no course fee. The cost of meals (except lunch), accommodation and transport is your responsibility.

Check the CAA web site (www.caa.govt.nz) for an enrolment form and further information, or contact Rose Wood, Tel: 0–4–560 9487, Fax: 0–4–569 2024
Email: woodr@caa.govt.nz

Course Venues

Auckland Mon 19 – Tue 20 August

Centra Auckland Airport, Cnr Kirkbride & Ascot Roads

Wellington Mon 26 – Tue 27 August

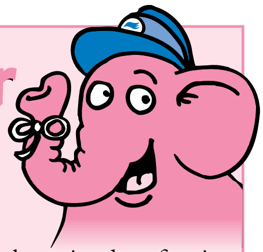
Mercure Hotel, 345 The Terrace

The course runs from 09:30 to 17:00 on the first day and 09:00 to 16:00 on the second.

Please enrol now to ensure a place on the course.

Remember

Don't be Late to Terminate



The new VFR flight plan system has been in place for six months now and is proving very popular. Its implementation, however, is causing a few problems, which we bring to your attention.

A considerable number of pilots (National Briefing Office staff report up to 15 in a day) are forgetting to terminate their flight plan or to amend their SARTIME prior to exceeding it. Some pilots are assuming that ATC will automatically terminate their flight plan upon landing at an attended aerodrome. Others are simply forgetting to terminate their plan – full stop.

Another reason for this unwelcome blip in the statistics is that pilots are not factoring a sufficient buffer into their nominated SARTIME to allow for the unexpected, and then they are forgetting to amend it accordingly en route. The increased number of flight plans being filed under the new system is also a contributing factor.

To avoid becoming part of the statistics and wasting valuable National Briefing Office and National Rescue Coordination Centre time and resources, please remember the following when operating on a VFR flight plan:

- To always ask for your flight plan to be terminated, whether landing at an attended aerodrome or not.
- That Search and Rescue action will commence **at the nominated SARTIME**. Amend it in time.
- That the provision of an ETA does not result in a change to your SARTIME – you must ask for the SARTIME to be amended.

The January/February issue of *Vector* contained a comprehensive article on the new VFR flight plan system. You may wish to refer back to it.

AIP Supplement Cut-off Dates

Do you have a significant event or airshow coming up soon? If so, you need to have the details published in an AIP *Supplement* instead of relying on a NOTAM. This information must be promulgated in a timely manner, and should be submitted to the CAA with adequate notice (within 90 days of the event). Please send the relevant details to the CAA (ATS Approvals Officer or AIS Coordinator) at least one week before the cut-off date(s) indicated below. Note: If your AIP *Supplement* requires an illustrated graphic you need to add another 5 working days to this date.

Supplement Cycle	*Supplement* Cut-off Date (with graphic)	*Supplement* Cut-off Date (text only)	*Supplement* Effective Date
02/10	01 Aug 02	08 Aug 02	03 Oct 02
02/11	29 Aug 02	05 Sep 02	31 Oct 02
02/12	10 Sep 02	17 Sep 02	28 Nov 02

Accident Notification

24-hour 7-day toll-free telephone

0508 ACCIDENT

(0508 222 433)

CA Act requires notification "as soon as practicable".

Aviation Safety Concerns

A monitored toll-free telephone system during normal office hours. A voice mail message service outside office hours.

0508 4 SAFETY

(0508 472 338)

For all aviation-related safety concerns

OCCURRENCE BRIEFS

Lessons For Safer Aviation

The content of *Occurrence Briefs* comprises notified aircraft accidents, GA defect incidents (submitted by the aviation industry to the CAA), and selected foreign occurrences that we believe will most benefit engineers and operators. Statistical analyses of occurrences will normally be published in *CAA News*.

Individual Accident Reports (but not GA Defect Incidents) – as reported in *Occurrence Briefs* – are accessible on the Internet at CAA's web site (http://www.caa.govt.nz/). These include all those that have been published in *Occurrence Briefs*, and some that have been released but not yet published. (Note that *Occurrence Briefs* and the web site are limited only to those accidents that have occurred since 1 January 1996.)

Accidents

The pilot-in-command of an aircraft involved in an accident is required by the Civil Aviation Act to notify the Civil Aviation Authority "as soon as practicable", unless prevented by injury, in which case responsibility falls on the aircraft operator. The CAA has a dedicated telephone number 0508 ACCIDENT (0508 222 433) for this purpose. Follow-up details of accidents should normally be submitted on Form CAA 005 to the CAA Safety Investigation Unit.

Some accidents are investigated by the Transport Accident Investigation Commission, and it is the CAA's responsibility to notify TAIC of all accidents. The reports which follow are the results of either CAA or TAIC investigations.

ZK-HVY, Bell (CDF) UH-1F, 15 Jan 01 at 09:45, Wellington. 1 POB, injuries 1 fatal, aircraft destroyed. Nature of flight, construction. Pilot CAA licence CPL (Helicopter), age 52 yrs, flying hours 9669 total, 89 on type, 40 in last 90 days.

The helicopter was shifting skips of earth from a construction site on Mt Victoria to a carpark at the summit, where the skips were emptied into waiting trucks. Approaching the carpark on the fifth load, the helicopter was observed to be flying erratically. The pilot placed the skip on the ground and jettisoned the longline. The helicopter yawed and rolled to the left, striking the ground near the summit lookout in a semi-inverted attitude. The investigation found that the helicopter had had a hydraulic system failure, leading to a loss of control.

A considerable quantity of hydraulic fluid was found on the road at the drop-off point, and a pressure line was later found with a fatigue crack in the vicinity of the tube end. The MS flareless fitting at the tube end had been grossly over tightened at some stage in its life, and this, combined with in-service flexing and reverse bending, had led to the failure. When and by whom the tube was over tightened could not be established, but it appeared that it may have been done before the helicopter arrived in New Zealand in 1995. It is also unlikely that it was performed by a licensed aircraft engineer, given that the characteristics of flareless fittings should be part of an engineer's basic training.

A full report is available on the CAA website.

Main sources of information: CAA field investigation.

CAA Occurrence Ref 01/44

ZK-FVR, Grumman American AA-1C, 28 Apr 01 at 09:10, Ardmore. 2 POB, injuries nil, damage substantial. Nature of flight, training dual. Pilot CAA licence type unknown, age not known, flying hours 1520 total, 1000 on type, 243 in last 90 days.

The aircraft veered off the taxiway while taxiing for the runway. Both pilots tried unsuccessfully to regain directional control through the application of the brakes. The mixture control was pulled to lean in an attempt to stop before a ditch. Unfortunately, the aircraft rolled on due to its momentum and the ground camber until it reached the ditch.

Main sources of information: Accident details submitted by operator and maintenance provider plus further CAA enquiries.

CAA Occurrence Ref 01/1770

ZK-CFT, Sud-Aviation Gardan GY80-150, 7 May 01 at 12:08, Springfield. 1 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence PPL (Aeroplane), age 53 yrs, flying hours 908 total, 68 on type, 47 in last 90 days.

The aircraft veered left on takeoff due to a crosswind, which the pilot attempted to correct with right rudder and aileron inputs. The aircraft became airborne, but its undercarriage caught a fence to the left of the airstrip, which dragged the aircraft down. The right wing impacted the fence posts and the landing gear collapsed on impact.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 01/1641

ZK-HSX, Bell (US Helicopter) UH-1H, 24 May 01 at 16:30, Tarawera Forest. 1 POB, injuries nil, damage substantial. Nature of flight, other aerial work. Pilot CAA licence CPL (Helicopter), age 50 yrs, flying hours 15642 total, 330 on type, 194 in last 90 days.

The helicopter was slinging logs to a skid site, using a long-line sling. As the pilot was lowering a log on to the skid site, he attempted to create enough slack in the line so the log would fall to the ground. The rate of descent of the helicopter, however,

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did not match that of the log, which caused a severe jolt through the long-line and hook assembly. The cargo hook was pulled aft, damaging the 'hell-hole' panel as well as causing a restriction to the cyclic, tail rotor, and synchronised elevator control runs. The lift beam and the structural panel forming the aft side of the transmission compartment were also damaged. The pilot, sensing abnormal control feel, made a precautionary landing at the skid site.

Main sources of information: Accident details submitted by pilot and operator.

CAA Occurrence Ref 01/1898

ZK-SJA, Schweizer G-164B-20T, 13 Jul 01 at 10:41, nr Feilding. 1 POB, injuries 1 minor, aircraft destroyed. Nature of flight, agricultural. Pilot CAA licence CPL (Aeroplane), age 56 yrs, flying hours 32850 total, 14000 on type, 140 in last 90 days.

The pilot was on his third and last load, on spraying operations near Feilding. The property was traversed by a set of high-tension power lines, and it was necessary to operate in close proximity to, and under, the wires. On the first two loads, the pilot had flown under them 10 times at a height of one or two metres above ground. Lining up to commence the third load, he decided to alter the spray pattern to avoid crosswind drift of the spray onto the windshield on subsequent runs. About 500 metres into the run, two paradise ducks rose from a creek in front of the aircraft, and the pilot reacted instinctively by climbing and turning left. The right wing clipped the lower conductor, causing the aeroplane to roll inverted and strike the ground.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 01/2412

ZK-DMA, Partenavia P 68B, 20 Jul 01 at 05:00, North Shore Ad. 1 POB, injuries 1 serious, damage substantial. Nature of flight, freight only. Pilot CAA licence CPL (Aeroplane), age 28 yrs, flying hours 706 total, 200 on type, 100 in last 90 days.

On Friday 20 July 2001, at around 04:50, Partenavia P68B ZK-DMA was abeam North Shore Aerodrome at 5000 feet in darkness and en route to Whangarei, when it suffered a double engine power loss. The pilot made an emergency landing on Runway 21 at North Shore Aerodrome, but the aircraft overran the end of the runway, went through a fence, crossed a road, and stopped in another fence. The pilot was the only person on board the aircraft and received face and ankle injuries.

The aircraft encountered meteorological conditions conducive to engine intake icing, and ice, hail or sleet probably blocked the engine air intakes. The pilot had probably developed a mindset that dismissed icing as a cause, and consequently omitted to use alternate engine intake air, which should have restored engine power.

Safety issues identified were the need to amend the aircraft Flight Manual warning concerning the use of alternate engine intake air, and the need to remind pilots about the Partenavia's in-flight vulnerability to engine air intake blockages by ice, hail, sleet and snow.

Main sources of information: Abstract from TAIC Accident Report 01-007.

CAA Occurrence Ref 01/2502

ZK-JME, Micro Aviation B22J Bantam, 7 Aug 01 at 11:20, nr Hamilton. 1 POB, injuries 1 fatal, damage substantial. Nature of flight, private other. Pilot CAA licence nil, age 62 yrs, flying hours unknown.

The microlight was on a local flight to the south of Te Kowhai. In the vicinity of Korumatua, it descended and clipped a roadside power line with its vertical fin. The microlight crossed the road, collided with a fence at the front of a house, and struck a tree with its right wing before coming to rest close to the house.

Main sources of information: CAA field investigation.

CAA Occurrence Ref 01/2660

ZK-TTD, Avtex Lancair 360, 20 Aug 01 at 15:00, Ashburton Ad. 1 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence PPL (Aeroplane), age 76 yrs, flying hours 350 total, 0 on type, 6 in last 90 days.

The pilot was taxiing the aircraft at speed testing a newly installed heater when its nosewheel departed. Directional control was lost and damage to the main undercarriage sustained. The reason for the nosewheel failure was not determined.

Main sources of information: Accident details submitted by pilot plus CAA engineering investigation.

CAA Occurrence Ref 01/2839

ZK-HIV, Hughes 269C, 3 Sep 01 at 16:30, Nr Inglewood. 1 POB, injuries nil, aircraft destroyed. Nature of flight, agricultural. Pilot CAA licence CPL (Helicopter), age 30 yrs, flying hours 1400 total, 1400 on type, 100 in last 90 days.

The helicopter was taking off with a load of spray, this being the first flight on the particular property. Several other properties had already been treated that day. The pilot said that the rotor rpm did not decay and that he had maximum available manifold pressure, yet the helicopter did not accelerate or climb as expected. Approaching a fence, the pilot decided to jettison the load, as the surface before the fence was too rough for a safe landing. After crossing the fence, clipping a post as it did so, the helicopter sank onto the ground and collided with a pile of spoil excavated from a nearby drain.

In his initial notification of the accident, the pilot reported a "following wind". A post-accident examination by an aircraft maintenance engineer did not disclose any pre-accident defect with the helicopter.

Main sources of information: Accident details submitted by pilot plus further enquiries by CAA.

CAA Occurrence Ref 01/2940

ZK-HKS, Hiller UH-12E, 25 Sep 01 at 17:00, Otorohanga. 1 POB, injuries nil, damage substantial. Nature of flight, agricultural. Pilot CAA licence CPL (Helicopter), age 45 yrs, flying hours 10500 total, 10000 on type, 70 in last 90 days.

While carrying out an agricultural operation, the helicopter incurred a partial power loss that necessitated an auto-rotational manoeuvre onto undulating terrain. As a consequence, the righthand skid gear collapsed and a main rotor strike was sustained.

Main sources of information: Accident details submitted by pilot and operator plus further enquiries by CAA.

CAA Occurrence Ref 01/3270

ZK-DJQ, Jodel D11, 30 Sep 01 at 16:30, Glenbervie. 2 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence PPL (Aeroplane), age 47 yrs, flying hours 463 total, 210 on type, 36 in last 90 days.

Having previously checked the private landing strip by overflying it, the pilot then commenced a low approach. While on approach, the pilot noted a cow move on to the strip. A go-around was ruled out, however, because of the upward slope of the strip and the low speed of the aircraft.

During the landing roll, another cow appeared and, while an attempt was made to guide the aircraft between the two, the right wing contacted one of the animals. As a consequence, the wing collapsed at a point outboard of the main landing gear strut.

Main sources of information: Accident details submitted by pilot plus further enquiries by CAA.

CAA Occurrence Ref 01/3312

ZK-JIC, Cessna 152, 3 Oct 01 at 13:30, Feilding. 1 POB, injuries nil, damage substantial. Nature of flight, training solo. Pilot CAA licence nil, age 35 yrs, flying hours 18 total, 18 on type, 15 in last 90 days.

While doing touch-and-go circuits, the student pilot failed to abort a takeoff that was commenced with insufficient runway remaining and consequently went through the fence at the end of the airstrip.

Main sources of information: Accident details submitted by operator.

CAA Occurrence Ref 01/3357

ZK-BCR, Cessna 175, 12 Oct 01 at 16:13, Taupo Ad. 1 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence nil, age 49 yrs, flying hours 76 total, 24 on type, 5 in last 90 days.

The pilot reported that the aircraft made a three-point landing but that the right wing had lifted suddenly causing the left wing to strike the ground. This resulted in a propeller strike and the aircraft turning through 180 degrees. A gust of wind was considered to be the cause of the loss of control.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 01/3447

ZK-BNO, Piper PA-18-150, 13 Oct 01 at 13:45, Whenuapai. 1 POB, injuries 1 minor, damage substantial. Nature of flight, towing. Pilot CAA licence PPL (Aeroplane), age 44 yrs, flying hours 1090 total, 230 on type, 6 in last 90 days.

The glider tug touched down in a three-point attitude whereupon the pilot applied the brakes. The tail began to lift, so the pilot released the brakes and held the control stick hard back. The aircraft rolled along in the 'wheel attitude', but with the tail higher than normal. It then abruptly pitched nose down, resulting in a propeller strike and the aircraft flipping over on to its back.

The accident was attributed to a pronounced wind change from a light westerly to a 15-knot easterly, which was confirmed by the controller on duty at the time.

Main sources of information: Accident details submitted by pilot plus further enquiries by CAA.

CAA Occurrence Ref 01/3448

ZK-IRC, Robinson R44, 15 Oct 01 at 10:30, Maungatua. 1 POB, injuries nil, damage substantial. Nature of flight, agricultural. Pilot CAA licence CPL (Helicopter), age 35 yrs, flying hours 1680 total, 180 on type, 200 in last 90 days.

The helicopter was on a gorse-spraying operation in 5 to10-knot wind conditions. The pilot had just completed his first spray run into wind and, after turning back for the second run, realised that the wind was too strong for a downwind spray run. He carried on past the targeted block of gorse, and in commencing a right turn, found himself in a worse downwind situation. Power settling was encountered with insufficient height or space to escape. The pilot aligned the helicopter for a run-on landing, but it rolled onto its side after striking the bank on the opposite side of the gully.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 01/3451

ZK-HON, Hughes 269C, 23 Oct 01 at 12:15, Mt White Station. 1 POB, injuries nil, damage substantial. Nature of flight, agricultural. Pilot CAA licence CPL (Helicopter), age 38 yrs, flying hours 403 total, 383 on type, 69 in last 90 days.

On approach for a spray run, the helicopter suffered what the pilot considered was a major power loss. The pilot jettisoned the load and entered autorotation. The helicopter struck sloping ground and rolled over.

During a subsequent test run, the engine failed catastrophically at full power. On stripping the engine for closer inspection, it was found that the No 3 conrod bolt had failed. Additionally, valve train damage, indicative of engine over-speeding was also present. The conrod bolt was metallurgically inspected, revealing damage consistent with a sudden stoppage. It is likely that the in-flight power loss was due to the inherent damage in the valve train, as the indications of the sudden stoppage tended to eliminate the possibility of the engine over-speed damage resulting from the accident sequence.

Main sources of information: Accident details submitted by pilot plus CAA engineering investigation.

CAA Occurrence Ref 01/3552

ZK-AKC, De Havilland DH 82A Tiger Moth, 3 Nov 01 at 12:05, Taieri Ad. 1 POB, injuries nil, damage substantial. Nature of flight, advertising. Pilot CAA licence CPL (Aeroplane), age 28 yrs, flying hours 537 total, 4 on type, 204 in last 90 days.

The operation involved towing a banner off runway 23 at Taieri Aerodrome using a Tiger Moth. On takeoff, the pilot experienced a wind shift at approximately 40 feet agl. The banner was lifting at the time, making it difficult for the pilot to hold a constant heading in the crosswind conditions. The banner caught on the ground, whereupon the pilot released it while endeavouring to recover from the ensuing stall.

During the recovery, the aircraft ended up in a downwind position causing the situation to further deteriorate. The pilot had almost effected a recovery when the aircraft landed heavily in the crosswind. The wind lifted the windward wings resulting in the righthand wing striking the ground. The aircraft then nosed into the ground, breaking the propeller and flipping on to its back.

Main sources of information: Accident details submitted by pilot plus further enquiries by CAA.

CAA Occurrence Ref 01/3681

ZK-END, North American Harvard 3*, 11 Nov 01 at 13:01, Tauranga. 2 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence ATPL (Aeroplane), age 71 yrs, flying hours 18000 total, 200 on type, 15 in last 90 days.

At the end of the landing roll the undercarriage retracted, causing major damage to the aircraft.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 01/3745

ZK-GLA, Schempp-Hirth Nimbus-2, 11 Nov 01 at 13:45, Omaka. 1 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence nil, age not known, flying hours 88 total, 3 on type, 10 in last 90 days.

During the takeoff roll, the glider's right wingtip caught in long grass, which launched it into the air prematurely. The tow was released, but the glider landed while sliding sideways, causing substantial damage to the fuselage, tailplane and skid.

The glider was taking off on grass vector 25, which had been mown to a width of approximately 12 metres. The 20-metre wingspan of the glider overlapped the long grass as a result. In general, the dragging of a wingtip during a glider launch is not an unusual occurrence, but it appears that recent vigorous grass growth, not seen in the area for some time, presented an unforeseen hazard.

Main sources of information: Accident details submitted by pilot plus further enquiries by CAA.

CAA Occurrence Ref 01/3776

ZK-HDM, Hiller UH-12E, 12 Nov 01 at 11:00, Wanstead. 1 POB, injuries nil, damage substantial. Nature of flight, agricultural. Pilot CAA licence CPL (Helicopter), age 35 yrs, flying hours 1200 total, 90 on type, 90 in last 90 days.

Returning to the loading area, the pilot made a steep downwind approach during which he was unable to arrest the rate of descent before landing. The helicopter struck the ground heavily, short of the landing area.

Main sources of information: Accident details submitted by pilot plus further enquiries by CAA.

CAA Occurrence Ref 01/3743

ZK-GLQ, Schleicher K7 Rhonadler, 17 Nov 01 at 14:00, Taupo. 2 POB, injuries 2 minor, damage substantial. Nature of flight, training dual. Pilot CAA licence nil, age 47 yrs, flying hours 671 total, 82 on type, 14 in last 90 days.

The glider was on a dual training sortie and had joined the circuit with the student flying. According to the club CFI, the instructor made a "downwind" call using an incorrect callsign, then made a second, correct, call. On base leg, at a height of about 400 feet agl, the instructor was advised by the duty pilot on the ground that GLQ was "number two". The instructor elected to carry out an orbit in an attempt to sight the other (non-existent) glider and, in doing so, found himself too far from the field to continue the approach. He decided to land in a field immediately below, but lacked sufficient energy to complete the manoeuvre. The glider stalled between 6 and 15 feet off the ground and landed heavily. A partial groundloop ensued.

The instructor stated that he was being particularly cautious with respect to other traffic, as there had been a minor mid-air collision between two gliders in the circuit only a few weeks earlier. The focus on locating the other glider distracted him from the task of managing his own approach.

Main sources of information: Accident details submitted by pilot and operator.

CAA Occurrence Ref 01/3804

ZK-CMK, NZ Aerospace FU24A-950, 20 Nov 01 at 10:30, Tokoroa. 1 POB, injuries nil, damage substantial. Nature of flight, agricultural. Pilot CAA licence CPL (Aeroplane), age 49 yrs, flying hours 8444 total, 6500 on type, 47 in last 90 days.

During spray operations, the pilot realised that he had taken longer than anticipated on the sortie and decided to return to the airstrip for fuel. En route to the airstrip, the fuel pressure gauge flickered, so he decided on a precautionary landing on a forestry road. During the landing roll the right wing struck a tree stump, causing the aircraft to swing off the road and into 4-foot high pine trees.

Main sources of information: Accident details submitted by pilot plus further enquiries by CAA.

CAA Occurrence Ref 01/4022

ZK-UTE, NZ Aerospace FU24-954, 20 Nov 01 at 16:30, Kohukohu. 1 POB, injuries nil, damage substantial. Nature of flight, agricultural. Pilot CAA licence CPL (Aeroplane), age 55 yrs, flying hours 14489 total, 13889 on type, 149 in last 90 days.

The aircraft was approximately one third of the way down the airstrip on its takeoff run when the pilot realised that the control lock was fitted. Attempts to remove the lock were unsuccessful. The rough surface of the airstrip, coupled with the nose-down force provided by the locked elevator, resulted in the collapse of the nose gear.

Main sources of information: Accident details submitted by pilot plus further enquiries by CAA.

CAA Occurrence Ref 01/3886

ZK-PHA, Beech 65-B80, 24 Nov 01 at 14:09, Paraparaumu. 1 POB, injuries nil, damage substantial. Nature of flight, freight only. Pilot CAA licence CPL (Aeroplane), age 61 yrs, flying hours 11450 total, 55 on type, 60 in last 90 days.

The aircraft made a normal approach and landing on runway 16 with all three green undercarriage lights illuminated. Approximately two thirds of the way down the runway, however, the 'undercarriage unsafe' warning horn sounded with both throttles in the retarded position. A check was made to ensure the undercarriage was in the DOWN position. The pilot could not subsequently recall whether the undercarriage lever was in fact in the DOWN and LOCKED position. With the gear horn still sounding, the aircraft was turned off the runway at which point the main undercarriage collapsed and the nose gear became unlocked.

Engineering investigation revealed no apparent defects with the undercarriage system, however a retraction test could not be carried out due to the damage sustained during the accident. The reason for the collapse could not be determined.

Main sources of information: Accident details submitted by pilot plus CAA engineering investigation.

CAA Occurrence Ref 01/3925

GA Defect Incidents

The reports and recommendations which follow are based on details submitted mainly by Licensed Aircraft Maintenance Engineers on behalf of operators, in accordance with Civil Aviation Rule, Part 12 *Accidents, Incidents, and Statistics.* They relate only to aircraft of maximum certificated takeoff weight of 5700 kg or less. Details of defects should normally be submitted on Form CAA 005D to the CAA Safety Investigation Unit.

The CAA Occurrence Number at the end of each report should be quoted in any enquiries.

Key to abbreviations:

AD	= Airworthiness Directive	**TIS**	= time in service
NDT	= non-destructive testing	**TSI**	= time since installation
P/N	= part number	**TSO**	= time since overhaul
SB	= Service Bulletin	**TTIS**	= total time in service

Bell 206B – Compressor stator defective

During unscheduled maintenance requiring removal of the engine, the compressor case halves were inspected. The fifth-stage stator was found to have rubbed a half-inch hole in the rotor hub. Significant wear was also noticed on the case halves. The last recorded inspection was in 1995, with inspection requirements of 300 hours or at 6-month intervals. The helicopter had flown 100 hours in the five years prior to its purchase by the new owner.

The submitter indicates that the defect had the potential to cause an engine failure and recommends that engineers maintaining helicopters with low utilisation ensure that the maintenance programme is carefully followed in this regard. TTIS 3079 hours.

ATA 7200 CAA Occurrence Ref 00/1646

Cessna U206F – Elevator jams

The pilot experienced a completely jammed elevator at approximately 100 feet agl while on approach to land. He managed to control the aircraft by use of throttle and trim making a safe, but firm, landing.

Engineering investigation revealed that the elevator static balance weight had come loose, jamming the elevator in neutral. It was subsequently determined that there had been an unapproved modification to the balance weight, possibly to make its installation easier at the time of aircraft re-painting. The weight vibrated loose over time and jammed the elevator.

ATA 2730 CAA Occurrence Ref 00/1860

Piper PA-23-250 – Landing gear light wire detaches

While approaching to land, the pilot reported that only two green undercarriage DOWN indicator lights (the nose and left main) were illuminated. The aircraft was held to the northwest of the airport while spotlights were rigged to facilitate a fly past and visual inspection. This showed that the righthand undercarriage leg appeared to be locked down. The aircraft landed safely.

Inspection revealed that a power supply wire had detached from the landing gear position light, rendering the light inoperative. TTIS 9965 hours; TSI 38 hours.

ATA 3260 CAA Occurrence Ref 00/1391

Piper PA-28-161 – Seat frames crack, P/N 79555-00

During inspection, the rear frames of the pilot and co-pilot seatbacks were found to be cracked. The braces on the frames were also found to be cracked.

The submitter recommends that in view of the age and the hours on the aircraft, similar seats should be inspected for such defects. TTIS 8285 hours.

ATA 2510 CAA Occurrence Ref 00/1011

Robinson R22 – Rear flex plate fails, P/N A9473

During a routine inspection, the tailrotor drive rear flexplate was found to have failed. Metallurgical examination revealed that it had most likely experienced a fatigue failure. Indications were that it had been operated in this condition for an indeterminate length of time.

The flexplate has a fail-safe device, which allows the drive to be transmitted to the tailrotor until the problem is identified during normal pre and post-flight checks. The flexplate can be visually checked during a pre-flight inspection. An additional check that can be made is to rotate the tailrotor assembly on the ground to feel for backlash caused by a failed flexplate. TTIS 1833 hours; TSI 21hours.

ATA 6510 CAA Occurrence Ref 00/1637

Schweizer 269C – Upper pulley bearings seize, P/N Z69A505078

The bearing races of the upper pulley bearing were found to be severely spalled. The ball cage had failed, possibly due to a heat build-up. Without the cage to correctly space the balls, they bunched up, momentarily seizing the bearing and splitting the outer race.

The bearings normally have a life of 3000 hours. To have failed so catastrophically at 270 hours indicates a serious defect. Had the pilot not landed as soon as he did, the total loss of drive to the transmission would have been likely. TTIS 21 hours.

ATA N/A CAA Occurrence Ref 00/1638

Lycoming O-540 Clarification

On page 19 of the May/June 2002 edition of *Vector*, under the heading "Lycoming O-540 – Cylinder Head Cracks", we referred to a company "Engine Components Inc (EC)". It was not made clear that this was an American company, and they are generally known as "ECI".

We received a letter from a New Zealand company, "Engine Components NZ (1997) Ltd", based in Hamilton, that uses "EC" as part of their trading identity. Their Quality Assurance Manager, Tony Lea, was concerned that people reading the article might believe that EC were involved in the O-540 cracking problem. Not so.

EC – the New Zealand company – has been overhauling, weld repairing, replacing barrels/heads, and chrome plating cylinders since the 1970s.