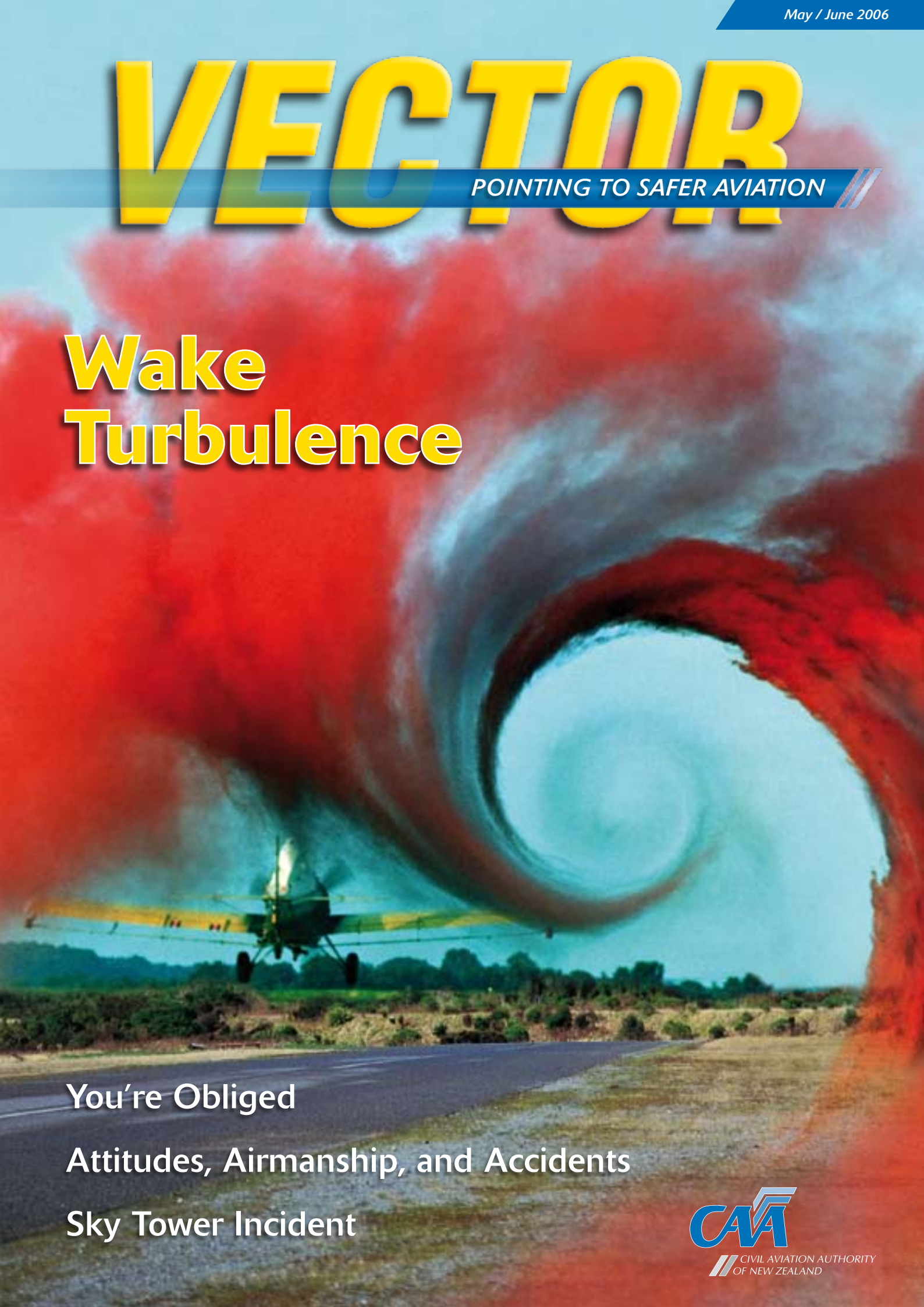
May / June 2006

VECTOR

POINTING TO SAFER AVIATION



Wake Turbulence

You're Obliged

Attitudes, Airmanship, and Accidents

Sky Tower Incident

CAA
CIVIL AVIATION AUTHORITY
OF NEW ZEALAND

VECTOR

Wake Turbulence

Wake turbulence affects aircraft of all sizes and therefore all pilots need to be aware of it. Wake turbulence incidents are not just confined to operations involving heavier aircraft. There are incidents involving a wide range of aircraft types.

You're Obliged

When we remind you to tell us if you change address, it's not just a matter of receiving your *Vector*. If you hold a New Zealand aviation document, you are obliged by the Civil Aviation Act 1990 to inform the Director of a physical "address-for-service" in New Zealand, and to keep this current.

Attitudes, Airmanship, and Accidents

The recent series of AvKiwi Safety Seminars discussed pilot attitudes, the situations pilots sometimes find themselves in, and the role that these factors have in aircraft accidents.

Sky Tower Incident

Don't think it can't happen here – on 17 September 2005 New Zealand experienced an aviation threat to public safety that had all the signs of a terrorist incident – we report on the consequences for the pilot involved, and on Page 22 we give you advice on enhancing GA aircraft security.

In this issue...

COVER: Wake vortices generated behind a light agricultural aircraft (Thrush Commander) in a wake vortex study conducted by NASA. Photo courtesy of NASA Langley Research Center.

Published by
The Communications and Safety Education Unit of the Civil Aviation Authority of New Zealand, P O Box 31–441, Lower Hutt, New Zealand.
Tel: +64–4–560 9400, Fax: +64–4–569 2024, Email: info@caa.govt.nz. Published six times a year, in the last week of every odd month.

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Design
Gusto Design & Print Ltd.

Publication Content
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Vector is distributed automatically to all New Zealand flight crew, air traffic controllers, aircraft maintenance engineer licence holders, aircraft owners, most organisations holding an aviation document, and to certain other persons and organisations interested in promoting safer aviation.

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WAKE TURBULENCE

An Invisible Enemy

Photo: Paul Bowen

All pilots need to be aware of wake turbulence. Depending on the type of aircraft, the phase of flight, and the weather conditions, the potential effect of an aircraft's wake turbulence on other aircraft can vary. Encountering wake turbulence can be especially hazardous during the landing and takeoff phases of flight, where the aircraft's close proximity to the ground makes a recovery from the turbulence-induced problems more difficult.

Wake turbulence accidents are not just limited to light-weight aircraft flying into the wake turbulence of heavier aircraft. Worldwide, there have been a number of wake turbulence incidents between light-weight aircraft. For example, a Flight Safety Foundation study of 130 wake turbulence accidents in the United States over the period from 1983 to 2000, revealed that 22 percent of the accidents involved small aircraft that were flown into the wake turbulence of other small aircraft. The aircraft in the study weighed 2300 kilograms (5000 pounds) or less. If these statistics are hard to believe, the cover photo illustrates very clearly the wake turbulence generated by a light-weight aircraft.

Wake Turbulence Categories of Aircraft
(ICAO-DOC 4444 PANS ATM)

Heavy (H) – all aircraft types of 136,000 kilograms or more*.

Medium (M) – all aircraft types less than 136,000 kilograms but more than 7000 kilograms.

Light (L) – all aircraft types of 7,000 kilograms or less.

* The B757 is categorised as heavy when applying following distances.

What is Wake Turbulence?

All aircraft produce wake turbulence[1] (more correctly called wingtip or wake vortices) which consists of wake vortices formed any time an aerofoil is producing lift. Lift is generated by the creation of a pressure differential over the wing surfaces. The lowest pressure occurs over the upper surface and the highest pressure under the wing. Air will always want to move towards the area of lower pressure. This causes it to move outwards under the wing towards the wingtip and curl up and over the upper surface of the wing. This starts the wake vortex.

The same pressure differential also causes air to move inwards over the wing. Small trailing edge vortices, formed by outward and inward moving streams of air meeting at the trailing edge, move outwards to the wingtip and join the large wingtip vortex. Swirling air masses trail downstream of the wingtips. Viewed from behind, the left vortex rotates clockwise and the right vortex rotates counter-clockwise (see Figure 1).

Typically, a vortex develops a circular motion around a core region. The core size can vary in size from only a few centimetres in diameter to a metre or more, depending on the type of aircraft. The speed of the air inside this core from larger aircraft, can be up to 100 metres per second.

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[1] The definition of wake turbulence also includes jet blast, propeller wash, and rotor wash.

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The core is surrounded by an outer region of the vortex, as large as 30 metres in diameter, with air moving at speeds that decrease as the distance from the core increases (see Figure 2). Wake vortices can persist for three minutes, or longer in certain conditions.

Intensity and Persistence

The initial intensity of the wake vortices is determined by the weight, speed, configuration, wingspan, and angle of attack of the aircraft. The most important variables in determining the intensity of the vortex beyond a distance of 10 to 15 wingspans from the aircraft, are atmospheric stability, wind strength and direction, ground effect, and mechanical turbulence.

The strongest vortices are produced by heavy aircraft flying slowly in a clean configuration at high angles of attack. Considerable wake vortices can also be generated by manoeuvring aircraft, for example, during aerobatics. Aircraft with smaller wingspans generate more intense wake vortices than aircraft of similar weights and longer wingspans.

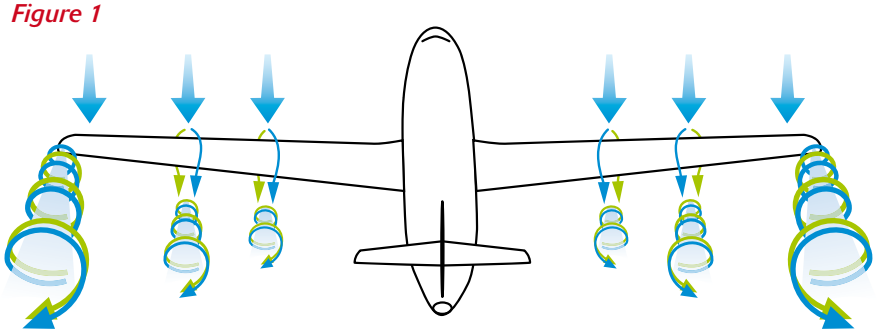
Wake vortices near the ground are most persistent in light wind conditions (3 to 10 knots) in stable atmospheric conditions. Light crosswinds may cause the vortices to drift. A 3 to 5 knot crosswind will tend to keep the upwind vortex in the runway area, and may cause the downwind vortex to drift toward another runway. Atmospheric turbulence generally causes them to break up more rapidly.

Helicopters

Depending on the size of the helicopter, significant wake turbulence can be generated. Helicopter wakes may be of significantly greater strength than those from fixed-wing aircraft of similar weight. The strongest wake turbulence can occur when the helicopter is operating at lower speeds (20 to 50 knots). Some mid-size or executive-class helicopters produce wake turbulence as strong as that of heavier helicopters.

The majority of wake turbulence accidents that involve helicopters and small aircraft occur when small aircraft are taking off or landing while helicopters are hovering near the runway or flying in the circuit traffic pattern.

Figure 1

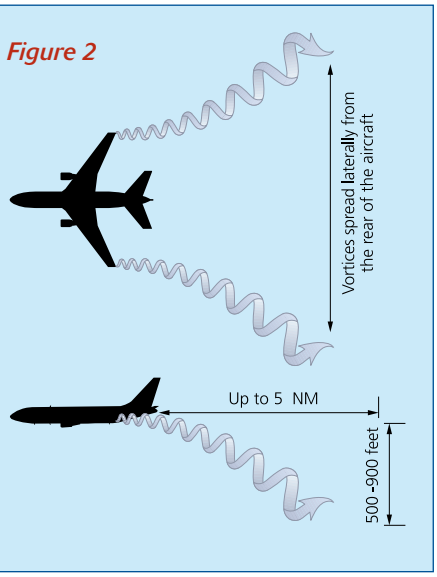


Viewed from behind the generating aircraft, the left vortex rotates clockwise and the right vortex rotates counter-clockwise.

Helicopter wake turbulence takes different forms, depending on how a helicopter is flown:

- During a stationary hover, or a slow hover-taxi, a helicopter generates considerable downwash – high velocity outwash vortices that extend to a distance three times the diameter of the rotor (Figure 3). The outwash vortices circulate outward, upward, around, and away from the main rotor (or main rotors) in all directions. It is recommended that pilots should not operate small aircraft within three rotor diameters of a helicopter in a stationary hover or a slow hover-taxi.
- During forward flight, a helicopter generates a pair of spiralling wake vortices from the rotor blades (Figure 4). Wake turbulence also occurs in the rotating air beneath the helicopter. In this situation the wake vortices are similar to those of larger fixed-wing aircraft. It is, therefore, recommended that small aircraft exercise caution when in the vicinity of a helicopter in forward flight.

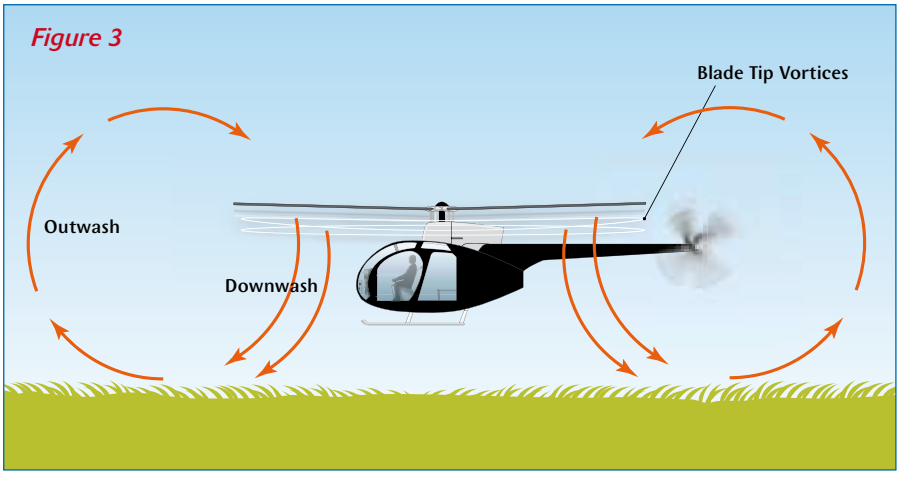
Figure 2



Wake vortices spread laterally away from the aircraft and descend approximately 500 to 900 feet at distances of up to five miles behind it. These vortices tend to descend at approximately 300 to 500 feet per minute during the first 30 seconds.

Flight tests conducted by the FAA found that wake vortices are generated differently, depending on whether the helicopter was climbing or descending.

Figure 3



Simplified flow pattern around a helicopter during a stationary hover close to the ground.

Figure 4

Simplified wake vortices generated from a helicopter in forward flight.

The vortex cores were observed to be closer together during ascents and further apart during descent. The wake vortices also did not sink in a predictable manner and in some cases remained at a similar altitude to where they were generated.

The area affected by the wake turbulence of a helicopter is larger than the area affected by the wake turbulence of an aeroplane of comparable size and weight, especially at speeds below 70 knots.

A flight test by the FAA using a Bell UH-1H (weighing 9500 pounds) flying at slow speeds and a Beechcraft T-34C (4300 pounds, a military trainer), resulted in the Beechcraft being rolled between 30 degrees and 75 degrees while flying between 3 and 5 NM behind and below the helicopter. At several test points, the effects were much more pronounced and led to a loss of control of the Beechcraft.

Light Aircraft Occurrences

A Fletcher pilot, some years ago, made a low-level pass along the airstrip to clear the strip of stock and turned back onto a reciprocal heading for the approach to the airstrip. On the approach, low to the ground the pilot lost control of the aircraft and crashed beside the airstrip. The investigation found that one of the contributing factors of the accident, was that the pilot lost control of the aircraft when it flew through the wake turbulence generated from its previous low pass along the strip.

There are several other accidents and incidents involving light-weight aircraft where wake turbulence may have been a contributing factor. Ask other pilots about their wake turbulence experiences, and you could be surprised to find that some have had some unexpected encounters of wake turbulence behind light-weight aircraft.

Separation

ATC will apply wake turbulence separation standards as shown by Table 1 and Table 2, **except** for:

- Arriving VFR aircraft following a medium or heavy-weight aircraft.
- IFR aircraft on a visual approach, where the pilot has reported sighting the preceding aircraft, and has been instructed to follow or maintain visual separation from that aircraft.

Note that controllers will give a wake turbulence caution in both situations.

Table 1 shows the wake turbulence radar separation applied to aircraft in all phases of flight when an aircraft is operating directly behind (1/2 NM laterally) another aircraft, or is crossing behind another aircraft, at the same level or less than 1000 feet below. Note that whenever the distance between a lead aircraft of a heavier wake turbulence category, and a following aircraft at the same level or less than 1000 feet below, is less than the equivalent of two minutes flying time, radar controllers should issue a caution of possible wake turbulence.

Table 1

Leading Aircraft	Aircraft Following or Crossing Behind	Minimum Separation Distance
Heavy	Heavy Medium Light	4 NM 5 NM 6 NM
Medium	Light	5 NM

Table 2 shows the non-radar separation standards for **arriving** aircraft using the same runway (or parallel runway separated by less than 760 metres) or if the projected flight paths are expected to cross at the same altitude or less than 1000 feet below.

Table 2: Arriving Aircraft

Leading Aircraft	Following Aircraft	Minimum Time
Heavy	Heavy Medium Light	2 Minutes 2 Minutes 3 Minutes
Medium	Light	3 Minutes

Table 3 shows the non-radar separation standards for **departing** aircraft using the same runway (or parallel runway separated by less than 760 metres), or if the projected flight paths are expected to cross at the same altitude, or less than 1000 feet below.

Table 3: Departing Aircraft

Leading Aircraft	Following Aircraft	Minimum Spacing at Time Aircraft are Airborne	
		Departing from same takeoff position	Departing from intermediate takeoff position
Heavy	Heavy Medium Light	2 Minutes	3 Minutes
Medium	Light	2 Minutes	3 Minutes

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These separation standards are the **minimum,** and the effects of wake turbulence may still occur even beyond these distances. For example, recently there was a wake turbulence incident between a Boeing 757 (200 series) and an Airbus 340 (500 series), en route at separation standards greater than the minimum required. The 757 experienced a violent and uncontrollable roll of 45 degrees accompanied by a 400-feet loss of altitude, caused by the preceding Airbus climbing through its level. At the time of the incident the separation was 1000 feet vertically and 9 NM.

If you consider wake turbulence separation standards are inadequate in controlled airspace, you can request increased separation. This may be achieved by vectoring, a change of flight path, or a change in the requested altitude to be above the suspected wake turbulence. There is also the option that you can take responsibility for your own wake turbulence separation and request a waiver from the wake turbulence separations. This option should be treated with caution – you will be reminded by the controller of the category of the other aircraft.

In New Zealand, there are no wake turbulence separation standards between two medium-weight category aircraft or between two light-weight aircraft. In these situations it is **entirely** up to the pilot to ensure adequate wake turbulence separation.

In light wind conditions, it is prudent to ensure greater wake turbulence separation if you are flying a light-weight aircraft and the leading aircraft is a heavier aircraft in the light-weight category. For example, if you are in a light single-engine aircraft and are following a Metro 3, Jetstream 32, Islander, or a Nomad. In these situations it would be wise to maintain the medium to light-weight separation standards as indicated in Table 1, 2 and 3. Additionally, it is recommended that two medium-weight aircraft apply separation standards similar to that between medium and light-weight aircraft.

At uncontrolled aerodromes it can be easy to forget about wake turbulence. There are, however, a number of uncontrolled aerodromes around New Zealand where relatively heavy-weight aircraft mix with light-weight aircraft. In situations where wake turbulence is a danger, for example, during light wind conditions, the prudent pilot will apply increased separations on takeoff and during the approach. As a guide refer to Tables 1, 2 and 3.

Some Important Facts

- Overseas studies indicate that more wake turbulence accidents occur during the approach and landing than during the takeoff phase.
- Most wake turbulence accidents occur below 200 feet agl.
- The majority of wake turbulence accidents occur in light wind conditions.
- The most persistent wake turbulence occurs in light crosswind conditions (3 to 10 knots).
- Wake turbulence will persist for longer periods of time during stable atmospheric conditions.
- Wake vortices are further apart behind an aircraft flying in a clean configuration (gear and flaps retracted) than during the landing configuration. For example, the vortex spacing behind a B767 is 123 feet in the clean configuration compared with 80 feet in the landing configuration.

How to Avoid Wake Turbulence

The following are guidelines to avoid wake turbulence. For more information refer to the *Wake Turbulence* GAP booklet.

- **Takeoff**. Strong wake turbulence will occur at the rotation point and during the climb, as the leading aircraft will be flying slowly and at a high angle of attack. Therefore, observe the separation standards as identified in Table 1, 2, and 3. For light-weight category aircraft, depending on the size of the leading light aircraft, it is advisable to observe the medium to light separation in light-wind conditions. Don't be afraid to request a longer period of separation from the Tower if you feel it is necessary.
- **Climb**. After takeoff, if you cannot out-climb the leading aircraft's flight path, turn off the extended centreline as soon as possible. If you cannot deviate significantly from the leading aircraft's flight path, climb slightly upwind and parallel to the preceding aircraft's course.
- **Crossing.** If you must cross behind the leading aircraft, try to cross above its flight path (preferred) or, terrain permitting, at least 1000 feet below.
- **Approach.** Most wake turbulence accidents occur in visual meteorological conditions. Therefore, think twice before accepting a visual approach behind a large aircraft, as you then become responsible for maintaining your own wake turbulence separation. When flying a visual approach, do not assume that the aircraft you are following is on the same or lower flight path. If possible, during a visual approach stay away from the localiser centreline, as the larger aircraft are more likely to be there. Offset your flight path slightly to the upwind side of the localiser path. VFR pilots of slower light aircraft need to be especially wary of wake turbulence when flying at busy aerodromes with heavier aircraft on the approach.
- **Landing**. Land well before the departing aircraft's rotation point. When landing behind another aircraft stay above its flight path and land beyond its landing point if possible. Research has identified that wake vortices in ground effect do not necessarily move laterally away from the runway, but can rebound after reaching the ground, to the height of twice the wingspan of the aircraft. Be wary of this possibility when passing over the previous aircraft's landing point.
- **Crosswinds**. Crosswinds may affect the position of wake vortices and can be very dangerous during parallel runway operations. Adjust takeoff and landing points accordingly.

For light aircraft, be aware of the effects of wake turbulence from other light aircraft when operating in the following situations:

- **Takeoff and Landing**. Be aware of wake turbulence during stream takeoffs in light wind conditions, or landing in close proximity to other aircraft.
- **Gliding**. Wake turbulence can be experienced by glider pilots in certain tow positions behind the tow plane.

- **Formation Flying**. It is advisable to have training in formation flying to avoid unexpected encounters with wake turbulence – especially in a formation takeoff.
- **Confined Area**. Several aircraft operating in a confined area during calm conditions.

Effects of Wake Turbulence

The greatest hazard from wake turbulence is induced roll and yaw. This is especially dangerous during takeoff and landing when there is little altitude for recovery. Aircraft with short wingspans are most affected by wake turbulence.

The effect of wake turbulence on an aircraft depends on many factors, including the weight and the wingspan of the following aircraft and relative positions of the following aircraft and wake vortices. In the mildest form there may be only rocking of the wings, similar to that of flying through mechanical turbulence. In the most severe form a complete loss of control of the aircraft may occur. The potential to recover from severe forms of wake turbulence will depend on altitude, manoeuvrability and power of your aircraft.

In general you can expect induced roll and yaw. Small aircraft following larger aircraft most often have degrees of roll in excess of 30 degrees. Depending on the location of the trailing aircraft relative to the wake vortices, it is most common to be rolled in both directions.

The most dangerous situation is for a small aircraft to fly directly into the wake of a larger aircraft. This usually occurs flying beneath the flight path of the larger aircraft. In this situation, flight tests conducted have shown that it is not uncommon for severe rolling motions to occur with loss of control. In other instances, if the aircraft is flown between the vortices, high roll rates can coincide with very high sink rates in excess of 1000 feet per minute. Depending on the altitude the outcome could be tragic.

Flight tests conducted by pilots attempting to fly into the vortex at a slightly skewed angle resulted in a combination of pitching and rolling, which typically deflects the aircraft away from the wake. Research shows the greatest potential for a wake turbulence incident occurs when a light aircraft is turning from base to final behind a heavy aircraft flying a straight-in approach. The light aircraft crosses the wake vortices at right angles, resulting in short-lived pitching motions that can result in structural damage to the aircraft from a sudden increase in load factors.

A CX 747-200 on approach to Kai Tak airport, Hong Kong.

Taken from the chequerboard at a time when there was a fire in Kowloon City, thus making the vortices very visible.

Photographs, Cathay Pacific 'Crews News'.

Recovery Techniques

If you unfortunately find yourself in wake turbulence, your recovery will depend on a number of factors but the following technique is suggested by Fighter Combat International (US).

POWER – Increase the power especially at low altitudes or slow speeds.

PUSH – Unload the wings or "push" on the control column until you are slightly "light in the seat." This reduces the angle of attack of the wings, which gives you better roll control with the ailerons. It also reduces the drag on the aircraft for better acceleration and, if you are rolling over, slows your descent towards the ground.

ROLL – If possible, roll in the direction that will reduce the loading on the wings (this will depend on the direction of the roll of the vortex) or roll to the nearest horizon. If there isn't a nearest horizon, or if you have rolling momentum, continue to roll (unloaded) in that direction to the horizon. If there is induced yaw, prompt rudder inputs will also be required.

Note that this technique is primarily designed for wake turbulence encounters for aerobatic aircraft manoeuvring in tailchase or dogfight conditions. It may work when flying at altitude, but the ability of a pilot to 'unload' or 'push' may not be that great when operating close to the ground, during takeoff or landing.

If you encounter wake turbulence, it should be reported in accordance with Civil Aviation Rules, Part 12 *Accidents, Incidents and Statistics*. This is important to ensure that there is an ongoing improvement in the knowledge and awareness of wake turbulence incidents in New Zealand.

Summary

Wake turbulence affects aircraft of all sizes and therefore all pilots need to be aware of it. Wake turbulence incidents are not just confined to operations involving heavier aircraft. There are incidents involving all aircraft types.

In general, the risk of unexpected wake turbulence is greatest during the approach in visual conditions where all aircraft are maintaining their own wake turbulence separation.

Be aware of the situations where wake turbulence may be encountered, and take measures to avoid it. ■

You're Obliged

If you are reading this issue of *Vector*, you are probably a pilot, engineer, air traffic controller, or run an aviation organisation. This means you will hold an 'aviation document' – your licence or certificate. This is a reminder of an important obligation for all New Zealand aviation document holders.

Section 8 (2) of the Civil Aviation Act 1990 requires every applicant for a New Zealand aviation document to supply an "address for service" in New Zealand including, where applicable, telephone and facsimile numbers.

The Act also requires aviation document holders to notify the Director promptly of any changes to the address for service, telephone number or facsimile number. You can do this by emailing info@caa.govt.nz.

An "address for service" is a physical address. You can have mail sent to a different address if you like, but maintaining a current physical address for service with the CAA is a legal requirement under the Act. This applies to both individuals and to organisations, whether based in New Zealand or overseas. The requirement is specified on relevant application forms.

If you do not provide a New Zealand address for service in your application for an aviation document, it will be declined until one has been provided. This is considered so serious that Section 20 of the Act might be used to revoke an existing aviation document if the holder fails to provide a New Zealand physical address. So it is not just the *Vector* magazine you could miss out on!

If the applicant or document holder resides overseas, or plans to relocate overseas, they must nominate a physical address in New Zealand. This could be the address of a lawyer, a family member, or an aviation organisation. In doing so, the applicant accepts that delivery to that address is formal notification for the purposes of the Civil Aviation Act 1990.

If you use a separate postal address, it can be a New Zealand address or an overseas address, but be aware that *Vector* magazine is sent only to New Zealand postal addresses.

Applicants under the Trans-Tasman Mutual Recognition Act also need to comply with the Civil Aviation Act 1990, and the relevant forms (24061/09 and 24061/10) reflect this.

You are also reminded that you need to advise separately other organisations of your change of address if you do business with them, for example, Airways New Zealand and Aviation Services Limited. If you operate an aircraft with a 406 MHz distress beacon, you must notify RCCNZ of any changes to your contact details. ■

Maintenance Controller Course

Each year the CAA runs courses for people who are designated as the Maintenance Controller for a Part 119/135 aviation organisation. The course is also suitable for those with an interest in the planning and direction of maintenance.

The course is in two parts.

Part One is a pre-workshop self-paced learning module. The aim is to introduce you to, or refresh your knowledge of, the Rules that provide the foundation for aviation safety in New Zealand. You will require access to the CAA web site for the pre-workshop module.

Part Two is a two-day workshop. This is designed to be hands-on and practical. Both parts complement each other and will enable you to get the most out of the Maintenance Controller Course.

The New Zealand Qualifications Authority (NZQA), in conjunction with the Aviation, Tourism and Travel Training Organisation (ATTTO), have written 'Units of Learning' for the course. All participants who are assessed as 'competent' in the required Units, will be issued with a National Certificate in Aeronautical Engineering (Maintenance Controller).

Courses in 2006

June 15 and 16	**–**	**North Shore**
July 6 and 7	**–**	**Palmerston North**
July 27 and 28	**–**	**Christchurch**
August 17 and 18	**–**	**Queenstown**

Each course will be limited to a maximum of 12 people. Additional venues could be arranged if the number of people who register exceeds this maximum.

A registration form is available on the CAA web site, www.caa.govt.nz, under "Safety information – Seminars & Courses". All registrations must be accompanied by a $100 registration fee. ■

For further information, contact either:
John Bushell, GA Airworthiness Coordinator,
Tel: 0–4–560 9427, Email: bushellj@caa.govt.nz

or Paul Elton, GA Airworthiness Inspector,
Tel: 0–4–560 9472, Email: eltonp@caa.govt.nz.

Aircraft Type Certificates and Modifications

Type Certification

The Airworthiness Authority of the United States – the Federal Aviation Administration (FAA) – will grant a Type Certificate (TC) to an aircraft manufacturer when that manufacturer has designed, constructed and tested an aircraft, engine, or propeller that meets a set of minimum design standards for the type of aircraft. These design standards are detailed by the applicable part of the Federal Aviation Regulations (FAR), and in the case of light General Aviation (GA) aeroplanes, these are contained in FAR Part 23, and for helicopters, FAR Parts 27 and 29. These can be found on the FAA web site, www.faa.gov. (Note that the US system is used as the prime example in this article, owing to the predominance of US-manufactured aircraft in the New Zealand GA sector.)

The TC number will always be marked on the aircraft, engine, or propeller data plate, or on some propellers, on the hub. As part of the TC, there will be TC Data Sheets (TCDS) issued, which have a formal description of the aircraft, engine, or propeller. They list limitations and information required for the Type Certification, including for example: airspeed and weight limitations, permissible engine and propeller installations, control surface travels, and fuel and oil capacities.

Supplemental Type Certificate

The Supplemental Type Certificate (STC) is the means by which a company, or person other than the original manufacturer, can produce a design change different from that of the original aircraft configuration. It is the FAA approval to modify an aircraft from the original design. The design change may be for many different reasons, but is generally to improve the performance, maintainability, or a specific field of use in some manner.

The CAA master Flight Manuals for the AS 350 series contain 144 Flight Manual Supplements for STC and Form 337 modifications developed by companies other than the original aircraft manufacturer.

Examples of aeroplane STCs are: a different engine, propeller, instrumentation, auto-pilots, seating, cargo pods, skis, floats, and performance kits. Helicopters are also prime candidates because of their special role capabilities. Some common helicopter STC examples are: panniers, cargo pods, mirrors, snow shoes, wire strike kits, and emergency medical service equipment.

The STC, which incorporates by reference the related TC, approves not only the design change, but how that change affects the original design. Once a design change has been developed and has gone through the full approval process, the STC kits can be sold to industry and installed by organisations other than the STC originator.

In New Zealand we are probably more used to the term 'modification', but for most purposes, the terms modification and design change are synonymous. In the US, lighter GA aircraft such as Piper, Cessna and Beechcraft are likely to have available a large number of STCs that have been developed over many years. The same applies for helicopters. If you wish to search for STCs that have been developed for your particular aircraft, you can find these on the FAA web site and do the STC search by entering your aircraft TC number. Popular fixed and rotary-wing aircraft will generally have quite a large number of STCs already available, so purchase of a ready-made kit may save time and possibly additional expense over the local development option.

The New Zealand Civil Aviation Rules (CAR) Part 21, Appendix D, lists US STCs as 'Acceptable Technical Data'. In most cases, STCs can be incorporated without any further CAA approval or action being required. For STCs requiring a completely new flight manual or major power plant changes, however, the CAA Aircraft Certification Unit would need to be consulted before incorporation of such an STC. Guidance material is in Part 21 and in the associated Advisory Circular AC43-9A.

After a design change has been developed and the STC issued, the STC holder then assumes the responsibility of ensuring that any information required for the continued airworthiness of the STC is made available to the end user. This is done by means of Instructions for Continued Airworthiness (ICA). Normally this means the purchaser would have to give the

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aircraft registration and serial number in order to obtain the STC. The STC document will detail what specific models and serial numbers qualify for the STC incorporation. This is very important for many reasons, not the least of which is that only the listed range of aircraft will have been tested for the STC issue. Another prime reason for the information is the safety of the aircraft should the STC holder become aware of an STC-related safety issue. Registering the aircraft with the STC holder will also ensure that the user has gone through the correct legal process. In the US, this is Federal Law, and it carries a substantial penalty for fraudulent use.

It would also be wise for any purchaser to check with their maintenance provider to ensure that the STC would be acceptable within the New Zealand system, because some STCs do not automatically qualify, as mentioned earlier.

Our STC process is similar to the American system. There are not many CAA-approved STCs at this time, but they are on the increase with such design changes as cargo pods, spray tanks and spray systems. Some of our STCs have been successful in finding markets overseas.

Local Modifications

We have covered the background on TCs and STCs. What about a New Zealand locally-raised design change? We use a similar process to the FAA's, although it differs in that we use the 'Form 337' process.

Only the company or person listed on the CAA 337 can incorporate the design change. No, you cannot plagiarise the number from another aircraft's document, copy and construct the item and have it installed on your aircraft. This would be fraud.

An aircraft owner would expect to see all the original 337 documentation, with a CAA approval signed and stamped, and listing the registration to ensure that the design change is acceptable for the aircraft. The modification must be directly applicable and appropriate for the current modification status of the aircraft. Generally this should not be an issue, but New Zealand is not immune from the 'cuckoo' syndrome where using someone else's work is easier than following the correct process. In some cases this has not been deliberate, but has perhaps resulted from operator pressure and/or insufficient knowledge of the correct path. This has resulted in a few problems over the years.

Major Modifications

An important requirement is sometimes missed. If any design change, be it by STC or 337, is considered to be 'Major', it must have input from, and conformity certified by, the holder of an 'Inspection Authorisation Certificate' (commonly known as an IA). The design change is to be considered major if, when embodied, it could potentially result in one or more of the following:

- structural collapse;
- loss of control;
- failure of motive power;
- unintentional operation of, or inability to operate, any systems or equipment essential to the safety or operational function of the aircraft;
- incapacitating injury to any occupant;
- unacceptable serviceability or maintainability.

As you can appreciate, these cover a wide range of possibilities – engineers, if in doubt, liaise with your chosen IA before undertaking the design change (modification).

If the design change is major, an IA must ensure that the design change is completely applicable and appropriate to the aircraft by type, make, model and serial number, and that the design change has been properly embodied in accordance with the STC or 337 documentation. If the design change is **not** considered major, then IA action will not be required. Engineers, please remember that in certifying a release to service for the embodiment of the design change to the aircraft, you are stating that the work required was in accordance with the Civil Aviation Rules, and therefore is **Acceptable Technical Data** as listed in Part 21 Appendix D.

There have already been local cases where these statements have been found to be incorrect, so please exercise due diligence when certifying.

What About a Design Change for my Non-US manufactured Aircraft?

This can be a little more difficult, as some national airworthiness authorities do not readily make available the design standards to which the aircraft were certificated. In such cases, find the identification of the type certification under which the aircraft was accepted on to the New Zealand system. This can be found in AC21-1.2. An approach should then be made to a design organisation holding a Part 146 certificate, or to the CAA Aircraft Certification Unit. A list of design organisations can be found on the CAA web site www.caa.govt.nz under "Aircraft – Organisation Certification Statistics – Part 146 Design Organisation."

Design Changes for Non-TC Aircraft

For these aircraft, there may be only limited design data to work from, so a good starting point would be to work through the applicable Part 21 Advisory Circular: AC21-3A *Product certification — Airworthiness certificates in the special category;* or AC21-4 *Special – Experimental category airworthiness certificates, amateur built aircraft.*

The Special category includes ex-military, historic, or amateur-built aircraft, and this group will have an **Experimental** airworthiness certificate. For modifications to an aircraft having an Experimental certificate**,** there are two options:

- have the modification approved under Part 21 Subpart C, where the airworthiness requirements would be those applicable at the time of issue of the airworthiness certificate, or the civil airworthiness requirements that **would** have applied when the aircraft was manufactured, **if** it had been type certificated;
- apply for a re-issue of the airworthiness certificate to return the aircraft to a flight evaluation programme, commensurate with the complexity of the modification. This is to determine that the aircraft is controllable throughout

the flight regime, and that it has no hazardous operating characteristics or design features.

Warbirds

Warbirds have been designed to a standard, even though it may not be an FAR standard. The CAA Aircraft Certification Unit expects that these aircraft will continue to maintain their original build standard with respect to maintenance and any design changes, and that some design approval work may be required.

Amateur-Built Aircraft

Any modification that is considered to affect the aircraft's airworthiness requires consultation with the CAA Sport and Recreation Unit. If the modification is considered 'Major' (as defined earlier in this article) then it will need to be justified, rather than formally approved. The best way of doing this is to get the aircraft designer's support 'up front'. The proving of the modification is generally by an agreed period of in-flight evaluation.

Class 2 (two-seat) Microlight Aircraft

Any modification that affects the airworthiness of these aircraft **must** be approved by a Part 149 certificated microlight organisation. If the engine or propeller type is changed, the CAA Sport and Recreation Unit must be advised, as the aircraft flight permit will need to be reissued.

The 'Bottom Line'

Incorrect incorporation, applicability and/or authorisation of any design change can, and does, raise safety issues. If a such a problem is discovered at some later time during the aircraft's ownership, it can be costly and embarrassing to owners, operators, engineers and the sales personnel, so getting it right the first time is the best option.

It is also important to remember that the **operator** has the responsibility of ensuring that the aircraft is maintained in an airworthy condition. The operator's responsibilities regarding aircraft maintenance are detailed in CAR 91.603 *General maintenance requirements*, and this rule is well worth a read. ■

New Products

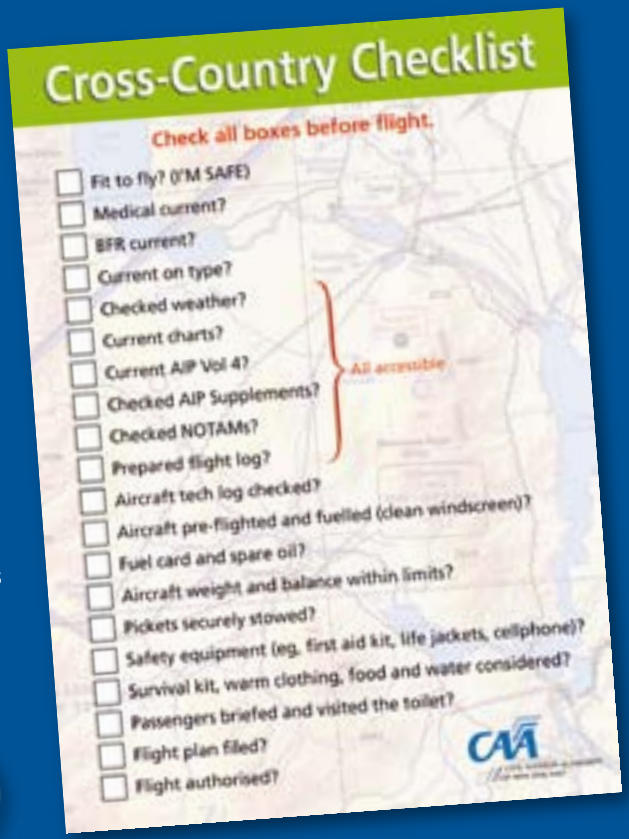
New Zealand Cloud Types Poster

The cloud poster has been modernised and freshened-up with this revision. So, if your copy of the cloud poster is looking a bit tired, contact us for a new one.

The poster describes the 16 cloud types that are most relevant to New Zealand aviation. It also has weather charts that indicate where some of the more common cloud types occur within different pressure systems, and cross-sections of idealised cold and warm fronts. It is a useful training aid for new students, as well as a helpful refresher for more experienced pilots.

Cross-Country Checklist Pads

The VFR cross-country checklist has been updated.



Key Ring

A new key ring has been produced with the message "Amend SARTIME or Terminate Flight Plan" on it. It is a reminder to contact an ATS unit or the National Briefing Office to terminate your flight plan. Attach it to your aircraft or car keys. This could be the trigger needed to prevent unnecessary search and rescue action being initiated.

All of these products are available free from your local Field Safety Adviser or by emailing **info@caa.govt.nz**.

Attitudes, Airmanship, and Accidents

The 2006 AvKiwi seminar series discussed the issues of pilot attitude, the situations pilots sometimes find themselves in, and the role that these factors have in aircraft accidents.

Attitudes

Have you ever known an individual you would describe as 'an accident waiting to happen'? What was it about that person that made you think they might have an accident? Most people when asked these questions will readily acknowledge that they have known such a person, and most will also say that the reason for their being an accident in waiting was a 'bad attitude'.

What determines an individual's attitudes, good and bad? How was your attitude developed to life, the universe and everything – including flying? There is undoubtedly a genetic influence on our attitudes, just as there is a genetic influence on our physical and mental traits and abilities. These traits are, however, moulded by our life experience – what we have seen and done. A big part of this is what is sometimes called 'cultural immersion'. We are, to a certain extent, a product of the culture in which we live.

Culture

A simple definition of culture is, 'how we do things here'. Different countries, different organisations, companies, schools, industries – any group – all have different ways of doing business, and so have different cultures. Some of these differences are small – there isn't really a big difference between how one airline operates from another. Some differences can be large – the culture of the airline industry is quite different from that of, say, the 'ag' industry. That culture has an effect on the way individuals within that industry behave.

How would you describe the culture in your flying organisation or industry? Is it conducive to safety? Note that cultures, like attitudes, change over time. What is the New Zealand culture and attitude towards drink-driving like now, compared with say, 20 years ago?

Behaviour

It is often easy to confuse behaviour with attitude. It is actually relatively easy to get someone to change their behaviour, but changing attitudes does not normally happen overnight. It takes a long time to mould attitudes.

For example: a young C-cat instructor turns up at the aero club after a hard night out. He is wearing a shirt that looks like he slept in it. His shoes look like he has been wearing them to muck out the horse paddock. The CFI gives him a bollocking, sends him home, and tells him to come back better presented. He turns up the next day in shiny shoes and neatly ironed shirt. His behaviour has changed. Has his attitude changed? Probably not. If anything he probably just thinks his CFI is a @#%*. Over time, when he sees everyone neatly presented, and realises the benefits of presenting a professional image, his attitude may change.

The Hazardous Attitudes

Researchers have put together a list of 'hazardous attitudes' – those most likely to get an individual into strife:

Anti-Authority –
The rules do not apply to me.

Impulsiveness –
I must act now.

Invulnerability –
It won't happen to me.

Macho –
I'll show you how good I am.

Resignation –
I cannot change things.

Denial –
It is not as bad as 'they' say.

Deference –
It must be okay if you say so, or if others do it.

Carlton Campbell conducting the AvKiwi Safety Seminar at Invercargill.

You may well look at this list, nod wisely, and note that none of them apply to you. Really? Ask yourself a simple question. How often do you exceed 100 km/h when driving on the open road in New Zealand? Most people will admit to doing so, so you are not alone!

Why would you knowingly break the law, and do something demonstrably likely to increase your chances of an accident? People come up with all sorts of reasons – "It's safe", "The speed limit is too low", "I'm a good enough driver to go faster", "Everyone else goes faster than 100, so it's okay", "I was in a hurry to get to a rugby match". We've heard all of these reasons. Most can be linked back to the hazardous attitudes.

There is no doubt that these attitudes are factors in many aircraft accidents. The trick is to recognise the potential for these attitudes to sneak up on you, and actively work at keeping them at bay.

Situations

Not all accidents have attitudes as obvious causal factors. Many accidents appear to stem from the situations pilots find themselves in. The fact is that any of us can do some fairly random things when placed in the right situation – things that other people might look at and say, "I'd never do that", or "How could they be so stupid?" Do you think you are immune from this? Think again.

Researchers did a lot of investigation into the situational nature of human

behaviour, particularly after World War 2. There was a general disbelief that supposedly ordinary people could somehow commit heinous acts. Researchers were in for a shock – literally. A number of experiments were conducted to investigate why people did what they did, including:

- **The Prisoner and Guard experiments**. Take a random group of people. Arbitrarily make some of them guards and others prisoners. What happens? The guards quickly tend to become authoritarian and start to abuse their prisoners. The prisoners tend to take on the traits of real prisoners. Some of these experiments had to be stopped because of the anarchy that was developing.
- **The Shock Learning experiments**. People can be coerced into giving other people supposedly painful and near-lethal electric shocks in controlled learning experiments.
- **The Good Samaritan**. A group of theology students (trainee priests) at a Seminary was told to prepare a sermon on the Good Samaritan. Half were then told they were late for their presentation, and to hurry to the venue. The other half were told to make their way to the venue when they were ready, and there was no time pressure. On the way they passed – you guessed it – someone in need of assistance. The half in a hurry tended to race on by, while those with time to spare were the ones that tended to stop and help. The situation had largely determined the reaction of the people.

Aviation Situations

Research has shown that a number of aircraft accidents are caused when normally responsible pilots find themselves in situations that lead them to do stupid things. Most of these can be classified as either situations outside the experience and training of the pilot, or those where the pilot was under some pressure to do something. Pressure is an insidious contributor to accidents. Typical examples include:

- Pressure from your passengers ("I've got to get home by tonight", "I don't feel well", "I need to take all these bags and can't leave any behind", etc).
- Environmental pressures (It's getting dark, the weather is getting bad, the wind is not what was forecast, etc).
- Organisation expectations ("We need the plane back today", "If you won't do it we'll find someone who will", "The engine will be okay, bring it home and we'll fix it here").

The Role of Attitudes and Situations in Accidents

Consider an accident caused by an engine failure. Engines **do** fail. An accident or incident caused by an engine failure is therefore not something the pilot has much control over, so that would be a situational accident, wouldn't it?

Sometimes that would indeed be the case – say 300 ft agl after takeoff with no suitable forced landing area in front (and there are quite a few runways in New Zealand where that is the case). But pilot attitude can have a significant bearing on the result when engine failures occur. The pilot chooses the flight route, the altitudes flown, and thus the proximity to suitable forced landing areas.

For instance, a flight from Paraparaumu to Wanganui can be flown as a straight line over the water at 1500 ft – and for most of the flight an engine failure will leave you swimming. Alternatively you can follow the coast. It adds a few more track miles, but an engine failure then will leave you much better placed to conduct a forced landing. Logic would dictate that all pilots (of single-engine aircraft at least) would follow the coast. Many don't. Why? Are the hazardous attitudes playing a part here? ("Engines don't fail", or "it won't fail on me", or "the other aircraft are going direct so that should be okay", etc).

A rule of thumb for any flying is that you **always** have options available to you – in mountain flying the phrase is to always have an escape route. Do not allow your own attitudes to lead you in to bad situations.

Summary

Our behaviour, not just as pilots but in all things, is influenced by both our attitudes and the situations we find ourselves in.

Our attitudes are in turn influenced by the culture in which we operate. A good culture helps to generate good attitudes. A poor culture can cultivate the hazardous attitudes. We can all exhibit some of these attitudes at times, how fast will you drive to work tomorrow? Beware of the insidious effect that such attitudes can have on safety.

Beware also of situations that could lead you astray – always have an escape route. That is another way of saying, "keep your options open". Do not allow external pressures to unduly affect your decision-making. ■

AvKiwi Safety Seminars

The final AvKiwi safety seminar for 2006 was held in Queenstown on 4 May, and it was attended by 52 people – that's a good turn-out and reasonably typical of attendance numbers at other venues. Thanks to everyone who made the effort to attend – your participation made the seminars a great success. Jim Rankin and Carlton Campbell enjoyed presenting the 22 seminars (from Kerikeri to Invercargill), and if we didn't come to your town this year, hopefully we will get there next year.

We are already thinking about possible topics for the next series, and have appreciated your feedback about topics you would like covered in the future. Watch *Vector* later in the year for an announcement of the 2007 series.

Thank you to Airways New Zealand who have generously sponsored the spot prizes of a full set of the 2005 VNCs, **or** an *AIP New Zealand Vol 4* with a 12-month amendment subscription for each winner.

Spot Prize Winners

Blenheim	Richard Gorman
Nelson	Barry Chapman
Motueka	Golden Bay Flying Club
Wellington	Kris Ericksen
Masterton	Cliff McCann
Rangiora	Colin Marshall
Ashburton	Alan Wright
Oamaru	Sharyn Price
Dunedin	Peter Dean
Invercargill	Jacques de Reeper
Queenstown	Lachlan Falconer

Part 67 Medical Standards and Certification

The new Part 67 came into effect on 1 May 2006. Here are the answers to some frequently asked questions about medical certification under the new rule.

Definitions

General Directions

A General Direction (GD) is a legal instrument issued by the Director to provide for:

- the conducting of examinations and the reporting of results,
- exceptions for temporary medical conditions,
- specifying the requirements of examinations or other clinical matters.

When a General Direction is proposed there will be consultation about it with interested parties. Once approved by the Director, General Directions will be placed on the CAA web site, and included in the Medical Manual for MEs.

Classes of Medical Certificate

Class 1 – Required for a CPL, ATPL
Class 2 – Required for a PPL
Class 3 – Required for an ATC licence

Classes of Medical Examiner

ME 1 – They can examine for Class 1, 2, or 3 Medical Certificates, and most have the delegation to issue all classes of medical certificate.

ME 2 – Many are still in transition from the old system, so there are variations. ME2s can examine for Class 2 medical certificates, and in some cases examine for all classes, and in some cases they can issue Class 2 certificates. Otherwise, Class 1 and 3 applications must be sent to an ME 1 for assessment and issue.

How are applications made prior to 1 May 2006, but assessed after 1 May 2006, handled?

If an application was received by the Director (or delegate) before 1 May 2006, but not determined before the new rule came into force, the certificate must be issued in accordance with Part 67 as it applied before 1 May 2006. (In other words the assessment would be made under the old Part 67). This is in the transitional provisions contained in rule 67.351.

How long is a general examination valid for?

A general examination and other reports are valid for 90 days, unless otherwise specified in a GD.

Does the new Part 67 change the requirements for tests and examinations?

The GDs will specify the types of tests and examinations required to meet the medical standards.

The first of these is the "Timing of examinations" (GD/GEN/ 01/04). This GD prescribes which examinations and tests are required, and when. The frequency of some general examinations has changed because, under the new Part 67, the duration of medical certificates for some age groups has changed. In addition, there is now a requirement for lipids and glucose determination. Class 2 certificate holders also require regular audiometry. If no audiometry is done, however, it is possible to endorse a Class 2 medical certificate with the wording "not valid for IFR flights".

Does the new Part 67 change the medical standards?

While the standards are written in a slightly different form, this should not, by and large, affect the outcome of an application for a medical certificate. The ME will have to decide if an applicant meets the standards as before. General Directions will progressively become available to assist MEs in making this determination. There is a consultation process for making General Directions and interested parties will have the opportunity to comment.

Does the new Part 67 fix the 'creep factor' problem, which results in a loss of validity when one presents before the expiry date of a medical certificate?

Yes. The new rule makes provision for slightly longer certificate duration to allow the next expiry date to match the previous expiry date, providing the certificate is issued within 30 days of the previous expiry date, and the certificate has not been extended. In practice, this will mean that a certificate issued within 30 days prior to the expiry date of an existing certificate will generally carry the same calendar expiry date.

For example:

- Certificate expires on 20 May 2006
- New certificate issued for one year on 5 May 2006
- New certificate valid until 20 May 2007

Can a Class 1 medical certificate holder aged over 40 still obtain a one year certificate with extended currency?

No. The concept of extended currency is no longer in the rules. Instead rule 67.61 now authorises the issue of a Class 1 medical certificate for up to 12 months for most aviation operations. The exception is for pilots aged 40 years or over conducting single pilot air operations with passengers; the period is 6 months.

Will it be possible for an agricultural pilot to continue being issued with a one year medical certificate when age 40 or over?

The medical certificate may now include two durations for Class 1 medical certificate holders, as enabled by Rule 67.61(e). Pilots who are over 40 yrs of age, and are operating as agricultural pilots or instructors, will be able to obtain a certificate of up to 12 months duration, provided that the ME issuing the certificate considers it safe to do so.

Will the medical certificate look different?

Class 1 certificates for those over 40 years of age may now include two expiry dates [rule 67.61(e)], and will look different, as will any combined Class 1 and other classes of certificates. The address has been removed from the certificate as it is not required. Licence holders are reminded of their obligation to provide the Director with an address for service, and notify the CAA of any change to that address. This must be a physical address in New Zealand (see Page 8).

What do I do if my medical certificate is lost or stolen?

Rule 67.65 deals with this question. You need to apply for a replacement certificate on the prescribed application form. This is available on the CAA web site, under "Medical". The form also requires you to make a statutory declaration and pay a fee. If the certificate is only damaged, no statutory declaration is necessary but the damaged certificate must be returned to the CAA to facilitate replacement.

Does a Medical Examiner need to have an exposition?

Yes, at all times. Rule 67.155 requires applicants for an ME certificate to submit an exposition at the time of application. To help with the transition to this system, MEs who already have an ME certificate on 1 May 2006 are required by rule 67.351 to provide an exposition no later than 1 Nov 2006 (six months from the time the new Part 67 came into force).

How does a Medical Examiner fill in an exposition?

To assist in completing the exposition, the CAA is establishing an online facility. MEs will be advised individually of how it may be accessed. This will also include a checklist of the items that are required under rule 67.163. We recommend that MEs print out this checklist in advance, to allow collection of the relevant information, prior to completing the exposition.

Are Accredited Medical Conclusions (AMCs) still going to be required?

Yes. An AMC may be needed if the ME determines that an identified medical condition does not meet the standard prescribed in the rules under Part 67. There is no longer a mismatch between the old rules and the amended Civil Aviation Act. This means that some conditions previously requiring an AMC will be able to be assessed without this process (for example, the use of contact lenses).

What sort of ID can be presented as proof of identification?

Rule 67.56 requires **one** of the following documents to be presented as proof of identity:

- Current New Zealand Passport.
- Current New Zealand Driving Licence.
- An equivalent form of photographic evidence that is acceptable to the Director. These are (as listed in Advisory Circular AC 67-1.1):
  - A current photographic identity Card issued by the New Zealand Defence Force, New Zealand Police or the New Zealand Fire Service, or
  - A current CAA Airport Identity Card, or
  - A current New Zealand Firearms Licence, or
  - A current foreign passport, or
  - A current photographic national identity document issued by a foreign State.

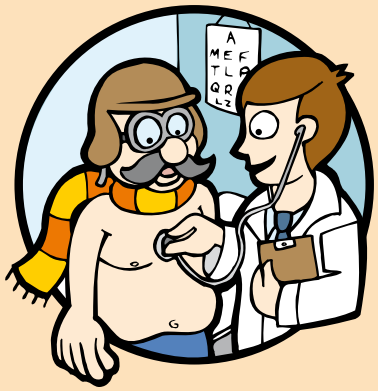
What do I need to bring to my ME when I present for an examination?

Rule 67.56 sets out the requirements. An applicant must provide the Medical Examiner with:

- proof of identity as mentioned above; and (where applicable),
  - the licence held for which the Medical Certificate is required, and
  - the most recent Medical Certificate, and
  - the most recent Medical Assessment Report.

Can I continue to see my existing ME1 as before?

Yes. You may also, however, consult any ME who is currently certificated as such by the Director. To verify the details and availability of your nearest ME please consult the "Directory of New Zealand Medical Examiners" on the CAA web site under "Medical". ■



Here is a useful reminder:

The ideal medical applicant ….

- Arranges their medical about six weeks before certificate expiry date.
- Completes the application form prior to their appointment with their ME.
- Keeps a record of dates and important medical history.
- Brings a means of paying with them.
- Asks their ME in advance if any special tests, for example blood tests, audiograms, and heart traces, are likely to be required, and if they can be carried out at the time, or should be completed in advance.

For more information see the CAA web site:

www.caa.govt.nz

CAA Medical Helpdesk:
Tel: 0–4–560 9466
Fax: 0–4–560 9470
Email: med@caa.govt.nz

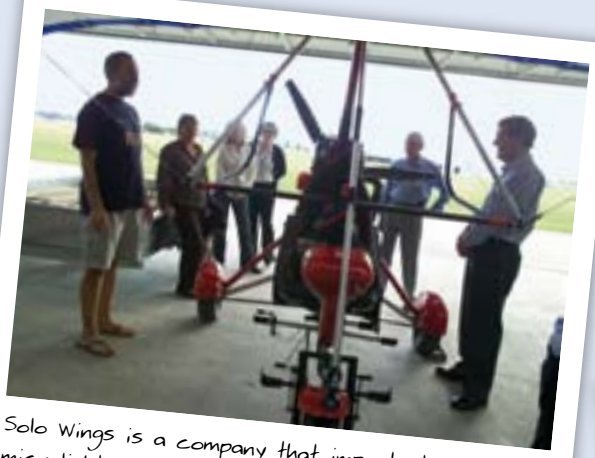
The Authority Visits the Bay of Plenty

Jean Batten sculpture at Rotorua Airport

Members of the Authority visited several aviation organisations in the Bay of Plenty in March 2006. This gives aviation participants an opportunity to talk about issues directly, and keeps the Authority members current with industry concerns. Included in this visit to Rotorua and Tauranga were: Helipro, Helicopters Services (BOP), Volcanic Air Safaris, Rotorua Regional Airport, Solo Wings, Star Aviation, and Tauranga Aero Club. A social evening was hosted in the splendid new museum and café complex at Tauranga, Classic Flyers (www.classicflyersnz.com). At this function, John Jones, Director of Civil Aviation, spoke about the safety targets being based on social cost, and illustrated recent trends in safety performance.

From its Lake Rotorua base, Volcanic Air Safaris operates helicopters and floatplanes, including this DHC-3 Otter.

Inside the Otter, Volcanic Air Safaris CEO Phill Barclay (left) discusses water taxiing with (from left): Hazel Armstrong, Robyn Reid, Ron Tannock (Chairman), Susan Hughes, John Lanham, and John Jones (Director of Civil Aviation).



Solo Wings is a company that imports trike microlight aircraft and services microlight engines. CEO Colin Alexander (left) discusses the aircraft with (from left): Hazel Armstrong, Robyn Reid, Susan Hughes, Terry Knight, and John Lanham.

Barry Vincent, Rotorua Operations Manager for Helicopter Services (BOP), discusses the Rotorua air ambulance helicopter.

Greg Best (right) runs Star Aviation at Tauranga, providing Part 43 maintenance. Listening to Greg are (from left): Hazel Armstrong, Susan Hughes, Robyn Reid, Ron Tannock, John Jones, Terry Knight (obscured).

Fit and Proper

If you are in aviation you will have heard about the fit and proper person assessment. Here is some guidance on the process.

In simple terms, anyone holding or applying for an aviation document, or anyone who has control over the exercise of the privileges of an aviation document, must satisfy the Director that they are a fit and proper person to do so. This is a requirement of the Civil Aviation Act 1990, Section 9. An aviation document includes, for example, a licence, a rating, or an air operator certificate.

Fit and proper person assessments are made on a case-by-case basis. There is no 'one size fits all' universal standard to live up to in order to be deemed fit and proper. The Civil Aviation Act 1990, Section 10 (1), sets out the criteria to be considered by the Director when determining whether or not a person is fit and proper. The relevance and weight given to any particular matter (or information), however, may vary, depending on the document that has been applied for, ie the level of involvement in the aviation system. It is entirely possible that a person may be fit and proper for one level of involvement in the civil aviation system, for example to hold a private pilot licence, but not fit and proper for a higher level of involvement in the system, such as holding a commercial pilot licence or a senior person position.

The criteria for the fit and proper person test are:

- The applicant's conviction record for transport safety offences.
- The applicant's experience in the transport industry.
- The applicant's knowledge of aviation regulatory requirements.
- The applicant's history of compliance with transport safety regulatory requirements.
- The applicant's history of physical or mental health or behavioural problems.

The Director is not confined to considering the criteria specifically listed in Section 10 (1) and may take into account any other relevant matters, and consider information obtained from any source. This means the Director may ask for a full criminal conviction history if this is deemed necessary and appropriate.

Criminal Convictions

An applicant's conviction history is only one of the many things that may be considered during a fit and proper person assessment. The circumstances under which the Director may require information relating to criminal convictions vary from case to case. For example, dishonesty convictions may be very relevant if the privileges being sought depend on accurate record keeping. It is important to note, however, that disclosing convictions will not necessarily mean you fail the fit and proper person test.

Disclosing convictions will not necessarily mean that you fail the fit and proper person test.

There are people with previous criminal convictions, who have made an honest declaration to the CAA, and they have gone on to make great contributions to the aviation industry. Convictions may not be a major issue in several situations. It will depend on whether the convictions are deemed to be relevant to an applicant's safe participation in the civil aviation system.

The Director and CAA staff are bound by legislation to protect the confidentiality of information supplied by an applicant. This includes any information provided by an applicant in respect of previous convictions.

The fit and proper process is reliant upon applicants providing truthful and honest answers. On the other hand, providing false information, or failing to disclose information relevant to granting an aviation document, is taken very seriously and is an offence under the Civil Aviation Act 1990, Section 49. The CAA takes a number of steps to verify the information given on application forms. If it is discovered that an applicant has been dishonest, there will be no hesitation in pursuing strong action. The maximum penalty that may be imposed for non-disclosure, or providing false information, is imprisonment for up to 12 months, or a fine of up to $10,000. For a body corporate the maximum penalty is a fine of $50,000. In 2005, the CAA prosecuted a pilot who failed to disclose a number of previous convictions when applying for senior person positions in an organisation. The pilot faced a total financial penalty in excess of $3000.

The Obligation Continues

It is important to remember that, once an aviation document has been granted, participants in the aviation system must continue to satisfy the fit and proper person test – see Section 9 (3) of the Act. Failure to notify the Director of any information that could affect your fit and proper person status could call into question the validity of your licence or position. Honesty is the best policy. The fit and proper person system depends on your truthfulness and integrity.

If you have any questions when filling out an application form for an aviation document or a senior person position, do not hesitate to contact the CAA. We are happy to talk issues through with you. ■

You can see a CAA compilation of the Civil Aviation Act on the CAA web site, **www.caa.govt.nz**, under "Rules & more – Civil Aviation Act".

For all Government legislation refer to **www.legislation.govt.nz**.

To contact the CAA:
Tel: 0-4-560 9400
Fax: 0-4-569 2024
Email: info@caa.govt.nz

New Rules

Three rule projects on the current Rules Programme have now been completed. The Minister for Transport Safety signed rule amendments for the Part 61 Stage 1, and Part 93 (right-hand circuits) rule projects on 10 April 2006, and these amendments were effective 11 May 2006. The Minster also signed rule amendments for the Part 67 *Medical Standards and Certification* Project that became effective on 1 May 2006 (see article on Page 14).

Part 61 *Pilot Licences and Ratings* Stage 1

The following Civil Aviation Rules have been amended as a result of this rule project:

- **Part 1** *Definitions and Abbreviations*, Amendment 30
- **Part 19** *Transition Rules*, Amendment 8
- **Part 61** *Pilot Licences and Ratings*, Amendment 7 (Reissue)
- **Part 104** *Gliders – Operating Rules*, Amendment 3
- **Part 121** *Air Operations – Large Aeroplanes*, Amendment 12
- **Part 125** *Air Operations – Medium Aeroplanes*, Amendment 7
- **Part 135** *Air Operations – Helicopters and Small Aeroplanes*, Amendment 12

These amendments are designed to address:

- Identified problems in the previous Part 61,
- Concerns about pilot training and competency from within the Civil Aviation Authority (CAA), along with industry comment and feedback from aviation representative groups,
- New technology and industry requirements, and
- Compliance with International Civil Aviation Organisation (ICAO) standards and recommended practices.

These rule amendments are the first stage of a three-stage implementation of changes to Part 61 personnel licensing requirements that address issues of pilot training.

Part 93 *Special Aerodrome Traffic Rules and Noise Abatement Procedures*

The following Parts have been amended as a result of this rule project:

- **Part 71** *Designation and Classification of Airspace*, Amendment 3
- **Part 91** *General Operating and Flight Rules*, Amendment 13
- **Part 93** *Special Aerodrome Traffic Rules and Noise Abatement Procedures*, Amendment 3

These amendments give the Director the power to determine and withdraw right-hand aerodrome traffic circuits for aerodrome runways for aerodromes published in the *AIP New Zealand*.

They also amend the special aerodrome traffic rules for Paraparaumu Aerodrome, contained in Subpart E, to reflect the withdrawal of Aerodrome Flight Information Service (AFIS). The restrictions regarding the use of paved and grass runways when gliding is in progress are removed. The rule regarding commencing takeoffs from runway thresholds at Paraparaumu Aerodrome is clarified to reflect that this requirement does not apply to touch-and-go manoeuvres.

In addition, the amendments reflect that the area south of Kapiti Road is now a residential area in respect to helicopter operations.

Further details on the amendments in these rule projects can be seen on the CAA web site, www.caa.govt.nz, "Rules & more – Rules Index".

Pending Rules

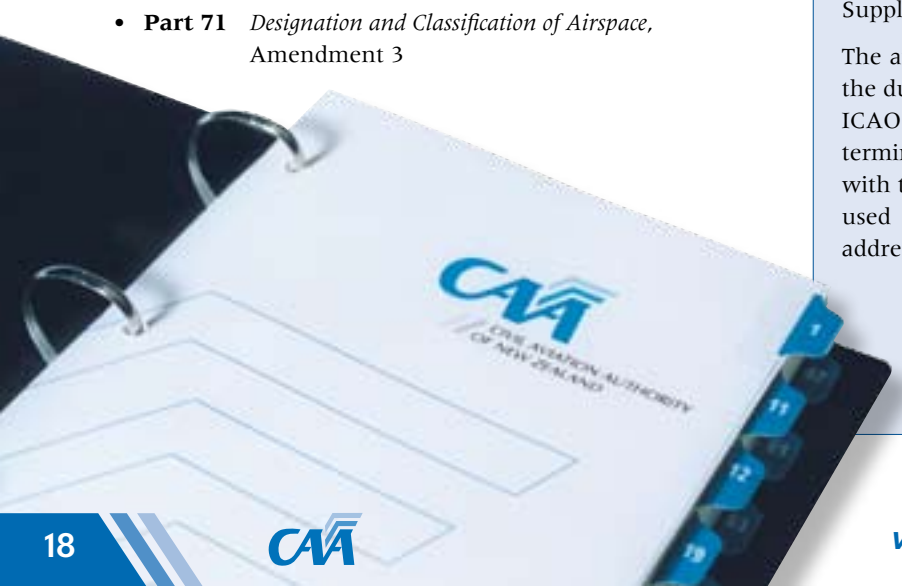
Three more Rule Projects are close to completion, with rule amendments for Part 139 Runway End Safety Areas, Part 43 General Maintenance, and Omnibus Rules Fix Up Projects currently awaiting the signature of the Minister for Transport Safety. ■

NPRM 06/02 Supplement

On 11 May 2006 the CAA issued a supplement to the NPRM titled "Omnibus 2 Rules Fix Up". The NPRM Supplement is to notify an amendment to Part 67.

The amendment is to correct rule 67.61(a)(1) regarding the duration of a Class 1 medical certificate to reflect the ICAO Annex 1 standards for medical certificates. The terminology used in the ICAO Annex is not consistent with the applicable definitions for the same terminology used under New Zealand Rules, and this supplement addresses the difference.

Interested persons are invited to comment on this proposal. Closing date for submissions is 8 June 2006. The NPRM Supplement is available for viewing on the CAA web site.



First-Aid Kits

In the March/April 2006 issue of *Vector* we explained that Civil Aviation Rules require first-aid kits to be carried on aircraft used for air transport operations, and on any aircraft with 10 or more passenger seats.

In addition to Civil Aviation Rules, the Health and Safety in Employment Regulations 1995 place a duty on employers to take all practicable steps to ensure first-aid facilities are provided at every place of work under the control of that employer. Every aircraft that a pilot is employed to fly is deemed to be a workplace, therefore aircraft being used for commercial transport operations and agricultural operations, for example, are also required to carry a first-aid kit.

For full details, refer to the Health and Safety in Employment Regulations 1995, Part 1, General Duties of Employers, 4. Duties in respect of facilities at every place of work.

Water Bottle Caution

Following our article "Need a Drink?" on the dangers of dehydration in the November/December 2005 *Vector*, a reader has written in with a caution. In cockpits with a lot of visibility, plastic drink bottles can focus sunlight in a way similar to a magnifying glass. The reader gave a couple of examples. One instance of this only resulted in melted plastic, but the other resulted in a passenger receiving a significant burn.

First-Aid Signs

The first-aid kits article in our last issue did not address markings of first-aid containers. We have heard criticisms of people who still mark their first-aid-kit container white with a red cross.

The red cross emblem belongs to the International Committee of the Red Cross, as does the red crescent, and these are the only two emblems recognised under the Geneva conventions. Relief workers and ambulances bearing these symbols are protected under international law. In war zones or disaster regions, they must be granted free access to people in need of help.

This is not the domain of environmental health and safety.

There is no universal standard for a first-aid sign, but that used by the European Agency for Safety and Health at Work (92/58/EEC) is similar to our Australian and New Zealand standards. Without question, the New Zealand standard should apply within New Zealand. The "Australian Standard: Safety signs for the occupational environment" has been adopted by New Zealand as NZS / AS 1319–1994.

In the Standard, the sign meaning "First-Aid" is a green rectangle with a white border and a white cross (confusingly referred to as a "green cross" in some quarters). The green colour may vary depending on whether it is back-lit, reflectorised, painted, vinyl, etc. For those who are familiar with printing ink colours, the standard is PMS 349C. The sign printed here in *Vector* is to the New Zealand standard, using PMS 349C.

So, anyone stowing a first-aid kit would need this sign on the container and, if necessary, an indicator of where the kit is stowed (inside, etc), using arrows if necessary.

For a few dollars you can buy a first-aid box label in self-adhesive vinyl at any of a number of shops throughout New Zealand. Look under "Safety Equipment & Products" in the *Yellow Pages*.

Ground Operations at Night

A safe flight begins and ends with ground operations. It can, however, be an important part of a flight that is overlooked. At night, the movement area can look significantly different than during daylight, especially if there is relatively limited lighting. If you are unfamiliar with the aerodrome layout, taxiing at night can be disorientating.

You Are Not Alone

At larger aerodromes it is not just aircraft using the movement area – there are also vehicles (of different sizes, from golf carts to fuel tankers) and people associated with ground handling and airfield operations. While it is standard aerodrome practice for aerodrome personnel to wear high-visibility vests, there can be a significant number of other people, such as passengers, who may not be easily seen. Additionally, there can be engineers and ground handlers anywhere around the aircraft. Be especially vigilant during pushback situations.

To assist in the safety of vehicles operating on the movement area, it is important that aircraft follow the yellow taxiway lines to ensure predictability in aircraft movements. This assists ground support staff in anticipating aircraft movements. Additionally, adjust taxi speed around the movement area for the safety of others. Remember to park your aircraft in the designated parking area.

Think carefully about the use of lights on the movement area, there is a delicate balance between being easily visible (especially during low light conditions) and not destroying the night vision of people in the area. For example, strobes can be harmful to the night vision when used in close proximity to other aircraft and vehicles, but it can assist in making the aircraft more visible from a distance.

Aerodrome Layout

It is important to study the aerodrome layout to be aware of all movement areas. Consider also any significant hazards that may exist in the vicinity, for example, drains. Additionally have the information for the aerodrome easily accessible, in case there is a change of plans, eg, using a different holding point than anticipated.

It is very important to understand the aerodrome lighting to minimise disorientation while taxiing. Refer to the *AIP New Zealand* for more information. Always check the NOTAMs before flight to determine the status of an aerodrome's taxiway and runway lighting. If you are unsure, contact the aerodrome operator for more information. Occasionally, segments of taxiway lighting may be difficult to see. For example, if there are missing 'cats eyes' or lights. Use caution, and adjust taxi speed to ensure you can follow the taxiway lines.

Incidents

There have been several incidents where aircraft have hit runway edge lights at night. In one incident a pilot reported striking FOD on the runway during takeoff. After the incident the runway inspection found that four runway edge lights had been broken, and FOD had been spread over a wide area.

Taxiway line at Christchurch.

An investigation revealed that the runway lights had been broken from an earlier departure, where an aircraft hit the lights during the takeoff.

In another incident, at Auckland at night, an aircraft struck a runway edge light with one of its wheels during the takeoff. This incident was attributed to pilot disorientation. The pilot was entering the runway from one of the high-speed taxiways and had left the lit taxiway guidance line and inadvertently lined up on the runway edge lighting.

Auckland is unlike other aerodromes around New Zealand, as it has runway centreline lights. These are inset white lights, which are the same colour as the runway edge lighting. If you leave the lit taxiway guidance line, there is the possibility of incorrectly lining up on the runway edge lighting, or between the runway centreline and the runway edge lighting.

Both incidents highlight the importance of following the taxiway guidance lights. Caution is required at aerodromes where the taxiway guidance lighting does not take you to the centre of a runway, as you have to work out where the centreline is. This can be difficult in bad weather. To assist, double check that the gap between the position of the aircraft and the runway edge lights is the same. At aerodromes where there is a lit runway centreline, such as Auckland, this check can be used to ensure that the runway edge lights are outside of the centreline lights.

Summary

If you are unfamiliar with an aerodrome and its lighting facilities, study the *AIP New Zealand* before your flight. Keep a sharp lookout at all times for other aircraft, obstacles, and other aerodrome users that may not be easily visible, such as passengers.

To assist in the safety of your aircraft and ground personnel follow all taxiway lines and remain on lit taxiways – avoid the temptation to take shortcuts. Avoid unnecessary cockpit distractions while taxiing. It is important to keep a sharp lookout at all times. Remain alert until the aircraft is shut down and you and any passengers are safely in the terminal. ■

Not Just Hijacking

AIP New Zealand contains several references to "Unlawful Interference" and the procedures to be followed. It is a widely-held belief that unlawful interference is synonymous with hijacking, but the definition in Civil Aviation Rules Part 1 quotes six categories of unlawful interference, the first of which is: "violence against a person on board an aircraft in flight if that act is likely to endanger the safety of that aircraft."

Unruly passengers and instances of 'air rage' can fit into this category and there have been several cases in New Zealand where unruly or disruptive passengers have found ground transport awaiting them at their destination – not your normal taxi service, but the special service with the red and blue lights, uniformed driver and two-on-one personal attention. Complimentary wrist-wear can also be provided on loan.

Where an unruly passenger does pose a threat to aircraft safety, the pilot-in-command is entitled to request priority in accordance with *AIP New Zealand* ENR 1.13 *Unlawful Interference*. While setting the relevant transponder code in this case is probably optional, it could serve as a 'heads-up' to Air Traffic Control, with further details being passed in plain language as time and circumstances permit. Airways advise that priority will be granted on request, and will raise awareness amongst staff of the definition of unlawful interference. See also *AIP New Zealand* ENR 1.1 Section 10 *Traffic Priorities*. ■

How to get Rules, Charts, AIP, etc

0800 GET RULES (0800 438 785) – Civil Aviation Rules, Advisory Circulars, Airworthiness Directives, CAA Logbooks and similar forms, Flight Instructor's Guide.

CAA web site, www.caa.govt.nz – Civil Aviation Rules, Advisory Circulars, Airworthiness Directives, CAA application forms, CAA reporting forms. (Note that publications and forms on the web site are free of charge.)

Aeronautical Information Management (AIM), 0800 500 045 – *AIP New Zealand* Volumes 1 to 4 and all aeronautical charts.

AIP Online, www.aip.net.nz – *AIP New Zealand* is available free on the Internet.

GA Aircraft Security

I could have sworn I parked it here… maybe it was towed away? You have probably had this thought cross your mind a few times when looking for your car, but it could just as easily apply to your aircraft.

The theft of General Aviation aircraft does happen, and the potential misuse of light aircraft is not confined to terrorist activities. Both in New Zealand and overseas, GA aircraft have been stolen and used for illegal purposes in a range of situations. In order to prevent the intentional misuse of GA aircraft, it is important for pilots, aircraft owners, and operators to plan and implement measures that will stop their aircraft being stolen. It isn't hard to take a few extra precautions - it is similar to securing your car.

The diverse nature of the GA environment and the range of security risks out there make it impossible to create one standard recipe for GA security. Recognising this, here is a range of suggested security measures. They will not all be relevant or practical for your personal situation, depending on the nature of your operation and the type of aircraft involved. If you identify relevant measures, and apply them in a practical and common-sense manner, it can significantly help to minimize risk.

Suggested Security Measures:

- Confirm the identity of anyone hiring or leasing an aircraft by asking for photo ID, unless you are already aware of the hirer's identity. In addition, examine their pilot licence and medical certificate for any indication of tampering or falsification.
- To confirm the identity of new students, training organisations should require them to gain a medical certificate before starting a continuous course of training.
- When aircraft are unattended, take the keys out and put them somewhere secure. A good way to secure keys is to place them in a lockable container; this prevents them from being readily available to someone breaking into a building.

This pilot is prepared – he shows his licence to airport security staff.

- Many aircraft can be started without their key, if you know what you are doing. So it is a good idea to immobilise aircraft in some other way (in addition to locking them and keeping the keys secure) to stop them from being flown by an unauthorised person. Suitable ways of doing this can be as simple as locking your aircraft in a hangar, or chaining and padlocking it to a permanent tiedown point. Other methods include: wheel locks or clamps, lockable control locks, and throttle locks. These measures need to be clearly visible and implemented in a way that does not compromise safety. Theft happens because of opportunity – it is hard to take off while chained to the ground!
- If airside access can be gained through your organisation's premises, it is important to have an established access policy. Make sure that access is controlled and monitored, and that members of your organisation are prepared to challenge strangers who attempt to gain access through your premises.
- Heightened security can be achieved just by using your eyes and ears. Get to know your airport community. Introduce yourself to your airport neighbours, and get to know the aircraft they fly. It is a good idea to advise others if your aircraft is going to be away overnight, so they know it is not missing without reason. Also let people know if it is out of service, or you won't be using it for a period of time, so neighbours can challenge any movement of your aircraft.
- Introduce yourself to new faces and itinerant pilots, and query unknown people on the airfield.
- Be aware of suspicious people, behaviour and incidents. Examples of these are:
  - People hanging around parked aircraft for extended periods, or in other areas that seem inappropriate;
  - Pilots who appear to be under the control of another person;
  - People wishing to hire an aircraft without presenting proper credentials or identification;
  - People who appear to have a valid licence and medical certificate but lack the corresponding level of aviation knowledge;
  - Any pilot who makes threats or statements inconsistent with the normal use of an aircraft;
  - Events, circumstances, or behaviour that does not fit the pattern of lawful, normal aviation activity.

Promptly report any suspicious situations to the Police, or if you are at a security designated airport, notify the Aviation Security Service (AvSec).

Security Designated Airports

Security designated airports are surrounded by high fences and secured with locked gates and doors; only approved people are allowed in. The Aviation Security Service (AvSec) is responsible for patrolling New Zealand's eight security designated airports. These are Auckland, Wellington, Christchurch, Hamilton, Palmerston North, Dunedin, Rotorua and Queenstown.

There are additional security requirements for pilots to be aware of when operating at a security designated airport. Civil Aviation Rules require anyone in a security area to display an airport identity card on the front of their outer clothing. The only exceptions are for pilots on private operations, who must carry their pilot licence and produce it if requested, and airline passengers holding a valid boarding pass.

Under the same rules, a person authorised to be in a security area may remain there only as long as they are carrying out a legitimate function. For pilots, this means while embarking, disembarking or servicing an aircraft. They must leave the area as soon as their tasks are completed.

Pilots involved in private operations to and from security designated airports are responsible for their passengers, and they must escort them between the aircraft and the terminal in a safe and timely manner. ■

Sky Tower Incident

In 2005, a high-profile aircraft theft occurred at Ardmore aerodrome in South Auckland. This incident is a reminder that a casual attitude towards GA aircraft security could result in both the loss of a prized aircraft, and the general public's safety being put at risk.

At 8:00 pm on 17 September 2005, a pilot decided to steal a Piper Warrior II aircraft. He opened the unlocked aircraft door and found the keys sitting on the dashboard. He took off and flew around the Auckland area for approximately 1 hour and 20 minutes. During the flight the pilot flew through the Auckland Control Zone twice without contacting Auckland Tower to obtain a clearance. When he did contact Auckland Tower, he advised them to "evacuate the Sky Tower". On receiving this information, Sky Tower management immediately evacuated the area. The pilot orbited the Sky Tower for a period of time, before eventually deciding to crash land the aircraft in the water 100 metres from shore at Kohimarama Beach. The pilot then swam to shore.

As a result of these events the pilot was convicted of unlawfully taking an aircraft, operating an aircraft in a manner that caused unnecessary danger, breaching minimum heights for VFR flight, two charges of failing to obtain an air traffic clearance, and failing to disclose information to the Director. On 27 January 2006, at the Auckland District Court he was sentenced to two years and three months imprisonment.

Reminder

Owners of light piston-engine helicopters are reminded of the article in the last *Vector* (March/April 2006, page 16). This relates to some pending rule changes that will affect these operators with respect to the overhaul life of components. If you own one of these aircraft, please make sure you are familiar with the new requirements. The article can also be seen on the CAA web site, www.caa.govt.nz, see "Safety Information – Publications".

Planning an Aviation Event?

Do you have an event such as an airshow, air race, rally or major competition coming up soon? If so, you need to have the details published in an *AIP Supplement* to warn pilots of the activity in a timely manner. The information should be submitted to the CAA with adequate notice. (Refer to AC 91–1 *Aviation Events*.)

Please send the relevant details to the CAA (ATS Approvals Officer or AIP Editor) **at least** one week before the appropriate cut-off date indicated below.

Supplement Cycle	***Supplement Cut-off Date (with graphic)***	***Supplement Cut-off Date (text only)***	***Supplement Effective Date***
06/09	22 Jun 2006	29 Jun 2006	31 Aug 2006
06/10	20 Jul 2006	27 Jul 2006	28 Sep 2006
06/11	17 Aug 2006	24 Aug 2006	26 Oct 2006

OCCURRENCE BRIEFS

LESSONS FOR SAFER AVIATION

The content of *Occurrence Briefs* comprises notified aircraft accidents, GA defect incidents, and sometimes selected foreign occurrences, which we believe will most benefit operators and engineers. Individual accident briefs, and GA defect incidents are now available on CAA's web site **www.caa.govt.nz**. Accident briefs on the web comprise those for accidents that have been investigated since 1 January 1996 and have been published in *Occurrence Briefs*, plus any that have been recently released on the web but not yet published. Defects on the web comprise most of those that have been investigated since 1 January 2002, including all that have been published in *Occurrence Briefs*.

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 CA005 to the CAA Safety Investigation Unit.

Some accidents are investigated by the Transport Accident Investigation Commission (TAIC), and it is the CAA's responsibility to notify TAIC of all accidents. The reports that follow are the results of either CAA or TAIC investigations. Full TAIC accident reports are available on the TAIC web site, **www.taic.org.nz**.

ZK-GSH, Schempp-Hirth Janus, 5 Feb 00 at 16:00, Kaikohe. 2 POB, injuries 1 serious, damage substantial. Nature of flight, private other. Pilot CAA licence unknown, flying hours 200 total, 15 on type, 8 in last 90 days.

The glider was downwind for Runway 35, when the pilot was asked to make a "hangar landing". He decided to land on Runway 31, at which point the winch driver advised him that the winch cable was laid out on Runway 35. The pilot attempted a low-level 360-degree turn to lose height. During the latter stages of the turn, the left wingtip struck the ground, cartwheeling the glider on to its nose.

The aircraft was substantially damaged and the pilot was seriously injured. The rear-seat passenger was uninjured.

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

CAA Occurrence Ref 00/282

Paraglider, 25 Nov 03 at 13:30, Flight Park. 1 POB, injuries 1 minor, damage nil. Nature of flight, private other.

The pilot of a powered paraglider suffered minor injuries when he landed heavily downwind.

Main sources of information: Accident details submitted by operator.

CAA Occurrence Ref 03/3351

ZK-CTD, Cessna 150H, 25 Oct 04 at 15:05, Lottin Point. 1 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence CPL (Aeroplane), age 38 yrs, flying hours 990 total, 631 on type, 16 in last 90 days.

During the cruise, the engine began to run rough and altitude could not be maintained. The pilot carried out a forced landing into a paddock but incurred substantial damage to the aircraft.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 04/3397

ZK-HOY, Hughes 269C, 13 Dec 04 at 09:30, Puketitiri. 1 POB, injuries nil, damage substantial. Nature of flight, agricultural. Pilot CAA licence CPL (Helicopter), age 43 yrs, flying hours 1409 total, 120 on type, 47 in last 90 days.

The helicopter's skid hit the ground during a spray run when the pilot found the aircraft had insufficient power remaining to climb clear. The aircraft came to rest on its tail section.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 04/3935

ZK-HHT, Hughes 369D, 22 Dec 04 at 13:00, Wanganui River, Westland. 4 POB, injuries nil, aircraft destroyed. Nature of flight, transport passenger A to B. Pilot CAA CPL (Helicopter), age 40 yrs, flying hours 3455 total, 415 on type, 40 in last 90 days.

The helicopter was carrying a party of three kayakers into the upper reaches of the Wanganui River, South Westland. The party's kayaks and paddles were suspended in a cargo net underneath the helicopter. As the helicopter flew up the river, the net swung back and struck the tail rotor, resulting in an immediate loss of tail rotor control.

The pilot regained control by promptly entering an autorotation and made a successful, but heavy, forced landing on to the riverbed. An ensuing fire destroyed the helicopter, but all four occupants escaped with minor scratches and bruises only.

Main sources of information: Abstract from TAIC Accident Report.

CAA Occurrence Ref 04/4054

ZK-MBB, Piper PA-34-220T, 25 Jan 05 at 18:40, Palmerston North. 3 POB, injuries nil, damage substantial. Nature of flight, training solo. Pilot CAA licence PPL (Aeroplane), age 19 yrs, flying hours 180 total, 30 on type, 19 in last 90 days.

It was reported that the aircraft touched down heavily and bounced several times on the runway. Damage was done to the left hand propeller blades as they contacted the runway.

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

CAA Occurrence Ref 05/259

ZK-BSU, Cessna 172, 29 Jan 05 at 09:30, Ruahine Corner. 1 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence PPL (Aeroplane), age 58 yrs, flying hours 916 total, 400 on type, 40 in last 90 days.

The aircraft failed to get airborne while taking off at 4000 feet amsl into a light headwind. The pilot was not injured but the right undercarriage leg was torn off and the propeller damaged.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 05/180

ZK-THK, Tim Bygate Tiger Hawk, 6 Feb 05 at 11:30, Ashburton Ad. 1 POB, injuries nil, damage substantial. Nature of flight, private other. Flying hours 91 total, 61 on type, 7 in last 90 days.

It was reported that during landing, the aircraft's propeller struck the ground and the undercarriage collapsed.

Main sources of information: Accident details submitted by Rescue Coordination Centre.

CAA Occurrence Ref 05/236

ZK-DUW, Piper PA-28-140, 6 Mar 05 at 09:25, Canterbury Aero Club. 2 POB, injuries nil, damage minor. Nature of flight, training dual. Pilot CAA licence PPL (Aeroplane), age 45 yrs, flying hours 101 total, 23 on type, 2 in last 90 days.

It was reported that the aircraft failed to get airborne due to a lack of airspeed. The propeller then struck a wooden marker board.

Main sources of information: Accident details submitted by Rescue Coordination Centre.

CAA Occurrence Ref 05/661

ZK-JHE, Sabre Sabre 503, 5 Jun 05 at 10:00, Hawera aerodrome. 2 POB, injuries 1 minor, aircraft destroyed. Nature of flight, private other. Pilot CAA licence PPL (Helicopter), age 42 yrs, flying hours 132 total, 24 on type, 10 in last 90 days.

The microlight aircraft had joined downwind for Runway 02 and was proceeding onto finals for landing on Runway 02. Meanwhile a Cessna 152 aircraft was operating on Runway 32, flown by a student pilot completing solo circuit consolidation training. When the microlight was on short finals for Runway 02, the Cessna began rolling on Runway 32 for takeoff. The pilot of the microlight then made avoiding action to the left of Runway 02. The microlight's left wing contacted the ground.

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

CAA Occurrence Ref 05/1772

ZK-NRG, Stoddard-Hamilton SH-2 Glasair RG, 4 Aug 05 at 11:40, Ardmore. 1 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence PPL (Aeroplane), age 55 yrs, flying hours 5000 total, 762 on type, 6 in last 90 days.

The aircraft's nose landing gear collapsed during landing. The pilot reported that three green lights were evident prior to landing.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 05/2443

ZK-EJV, Cessna A152, 18 Aug 05 at 10:00, Taieri aerodrome. 2 POB, injuries nil, damage substantial. Nature of flight, training dual. Pilot CAA licence CPL (Aeroplane), age 21 yrs, flying hours 316 total, 263 on type, 29 in last 90 days.

The dual training exercise was a simulated glide approach onto Runway 11.

The aircraft became established on a high approach. During the flare, the instructor took over control from the student pilot and the aircraft touched down well into the grass runway. Braking was applied but insufficient runway remained for a full stop landing, a ground loop was attempted but the aircraft passed the lip of a boundary bank and came to rest in a small creek after having turned through 180 degrees.

The aircraft sustained substantial damage but there were no injuries.

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

CAA Occurrence Ref 05/2611

ZK-GGZ, Glasflugel Standard Libelle 201B, 10 Sep 05 at 13:55, Otaki Gorge. 1 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence nil, flying hours 350 total, 25 on type, 14 in last 90 days.

After experiencing heavy sink the glider carried out an out landing in a paddock. Shortly after touch down, the right wingtip struck a rock on a slight raised piece of ground. This caused the glider to ground loop through 90 degrees and the undercarriage collapsed. Substantial damage occurred to the tail end of the fuselage, undercarriage, and leading edge of the right wing.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 05/2916

ZK-BQV, Piper PA-18, 27 Jan 06 at 14:45, Ardmore. 1 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence PPL (Aeroplane), age 55 yrs, flying hours 913 total, 225 on type, 14 in last 90 days.

While the pilot was taxiing the aircraft to the runway in gusty wind conditions, a gust lifted the right wing and flipped it onto its back.

Main sources of information: Accident details submitted by pilot.

CAA Occurrence Ref 06/170

GA DEFECT INCIDENTS

The reports and recommendations that follow are based on details submitted mainly by Licensed Aircraft Maintenance Engineers on behalf of operators, in accordance with Civil Aviation Rules, Part 12 *Accidents, Incidents, and Statistics*. They relate only to aircraft of maximum certificated takeoff weight of 9000 lb (4082 kg) or less. These and more reports are available on the CAA web site, www.caa.govt.nz. Details of defects should normally be submitted on Form CA005 or 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

Aerospatiale AS 355 F1
Accessory gearbox

During departure from a heli-ski pick up in the mountains, the number two engine chip light illuminated. The climb was continued to vacate the unfavourable terrain. After about 45 to 60 seconds into the climb, the engine began producing a loud high pitched noise. The emergency engine shutdown procedure was begun; the engine was bought back to ground idle and a single-engine descent was planned. After another 45 seconds the engine lost all power. The cause was accessory gear failure in the accessory gearbox. An isolated case.

ATA 7260 CAA Occurrence Ref 05/2698

Bell 206B
Voltage regulator wiring

During flight a strange smell was noticed in the cockpit. All systems seemed to be functioning normally, but after landing the smell had not disappeared. It was tracked to the battery compartment. Both batteries were found to be extremely hot. After extensive trouble-shooting, the voltage regulator base ground wire was found to be pulled from its terminal, allowing overvoltage to 36 volts. The wire was replaced and the system tested serviceable. It appears also that the specified overvoltage protection system was not fitted at a previous rebuild.

ATA 2430 CAA Occurrence Ref 05/2806

Cessna 172M
Magnetic compass

The compass card would not change heading during turns. A stripdown of the compass revealed that it had been filled with paraffin as a damping fluid. The unit was cleaned and refilled with approved fluid, Airpath AP1000.

ATA 3422 CAA Occurrence Ref 05/2929

Cessna 402B
Battery relay

The pilot could not bring the main battery on line. When the master switch was turned on, nothing happened and no electrics were available. Trouble-shooting confirmed the fault was in the main battery relay. The relay was removed and found to have corrosion around the control terminal. Cessna recommend to inspect starter relays every 400 hours; the investigating engineer suggested that the battery and external power relays are also checked every 400 hours. TSI 28 hours.

ATA 2400 CAA Occurrence Ref 05/3142

Cessna A152
Starter motor

After completion of the third aerobatic manoeuvre, a stall turn, a smell was noticed, along with the ammeter indicating +50 Amps. It was decided to return to the airfield. While en route the radios failed. Investigation revealed that the starter motor had not disengaged once the engine had started. This meant that the starter motor was now acting as a generator, back-feeding current through the electrical system, destroying the alternator, solenoid and wiring.

ATA 8010 CAA Occurrence Ref 05/3622

Diamond DA20-C1
Propeller blade

During a pre-flight inspection, a two-inch long portion of the urethane leading edge was found to have detached from the blade. The damage was attributed to possible in-service impact damage. The propeller was returned to the agent and a replacement one fitted. TTIS 40 hours.

ATA 3060 CAA Occurrence Ref 05/2116

Hughes 369HS
Fuel control unit

The helicopter was coming in to land when there was an abnormal decrease in rotor and engine rpm. The fuel control unit had failed.

ATA 7320 CAA Occurrence Ref 05/1875

Micro Aviation B22 Bantam
Carburettor

Shortly after takeoff, the aircraft lost power and carried out a successful forced landing in a paddock. The power loss was due to wear on the carburettor needle, caused by vibration that weakened it where the circlip sits. The needle broke and blocked the fuel. The needle was replaced and an O-ring placed on top of the needle to minimise vibration.

ATA 8500 CAA Occurrence Ref 05/2352

Pacific Aerospace Cresco 08-600
Stabilizer attach bolt

The horizontal stabilizer rear spar attachment bolt was found to be broken in two places, and the fuselage rear frame bush, P/N 08-03101-12, was found loose in the frame. The new fuselage rear bulkhead installed to PAC (modification 411) eliminates

this type of installation. A fleet check of all attachment bolts was carried out and no further bolts were found loose. TTIS 16940 cycles, TTIS 1482 hours.

ATA 5500 CAA Occurrence Ref 05/2442

Pacific Aerospace Cresco 08-600
Fin leading edge

During scheduled inspection of a Cresco, the fin leading edge skin was found to be cracked at the top of bulkhead P/N 242305-2 attachment. The skin was repaired with an approved repair scheme and the aircraft returned to service. Investigation found that the cause may have been the cable deflector modification PAC/CR/0051 that was installed; it could have had the cable tension too high, exerting a load on the fin. TSI 102 hours, TTIS 7157 hours.

ATA 5500 CAA Occurrence Ref 05/2942

Partenavia P 68B
Spar tapered doubler

The wing was under repair and the spar was dismantled. Extensive intergranular corrosion was found on the spar doubler. This was not obvious when the spar was assembled, and SB 120 had just been carried out. TTIS 12048 hours.

ATA 5710 CAA Occurrence Ref 05/2645

Pilatus PC-6/B2-H4
Main landing gear v-strut

The previously repaired area of the lefthand landing gear V-strut was found cracked diagonally (approx 80 mm) and continuing radially forward (approx 25 mm). The cause was suspected to be the result of the high sideways loading on skis during takeoff or landing, this assessment being supported by the damage (distortion and cracking) found to the ski top forward surface. The repairs involved replacement of the V-strut with a quick exchange ski assembly and new attaching hardware. TSI 42.1 hours, TSO 723 hours, TTIS 5596 hours.

ATA 3210 CAA Occurrence Ref 05/3741

Piper PA-23-250
Landing gear selector lever

The landing gear selector lever broke. It was replaced with a more robust one, P/N 761213, as specified in Airworthiness Directive DCA/PA23/155A. TSI 8 hours, TTIS 9673 hours.

ATA 3200 CAA Occurrence Ref 05/2641

Piper PA-28R-201
Cylinder base studs

The pilots noticed a small vibration and a different engine tone while downwind for landing. An engineering investigation revealed that on number two cylinder, two of the upper forward hold down studs had sheared, the number three nut was loose and stretched, and the lower forward studs were sheared. The two aft bolts were tight. The cylinder was removed, inspected and replaced with new studs, through bolts and hardware. All other cylinders were check tightened and found satisfactory. An engine ground run and flight test were carried out and the aircraft returned to service. TSI 36 hours, TSO 1632 hours, TTIS 3617 hours.

ATA 8530 CAA Occurrence Ref 05/2617

Pitts S-2A
Tail wheel spring

During an inverted spin demonstration, a loud bang was heard from behind the student pilot. The instructor recovered from the spin (and re-secured the radio, which had come free). During the subsequent landing the tailwheel spring failed.

ATA 3270 CAA Occurrence Ref 05/3639

Robinson R22 Beta
Tail rotor gearbox

The pilot reported a tail rotor gearbox chip light. The chip detector was inspected and found contaminated with metal. During removal of the gearbox from service, it was observed that the intermediate flex plate shimming was incorrect. There was in excess of +.130 inches preload on the drive shaft, when the limit is -0.014 to + 0.015 inches. This preload could have accounted for the premature failure of the gearbox. At some previous drive train replacement intermediate flex plate shimming had not been carried out correctly. The tail rotor drive shaft was visually inspected for condition and reinstalled. Flex plates were visually inspected and reinstalled. Intermediate flex plate shimming was carried out IAW R22 Maintenance Manual (Section 7.330).

ATA 6510 CAA Occurrence Ref 05/2904

Robinson R22 Beta
Engine oil system

The aircraft had an oil leak around the left magneto area. Investigation revealed that the aluminium oil pressure line to the oil cooler had fractured half way around the pipe, at the rear edge of the fitting (SB-48). A stainless steel oil line was fitted as a replacement. The manufacturer has been progressively changing out the old lines for the new stainless version at 2200 hours. TTIS 1349 hours.

ATA 7730 CAA Occurrence Ref 05/3208

Rockwell 114
Exhaust valve

The aircraft was operating in the vicinity of the aerodrome when the pilot advised ATC he was experiencing a rough running engine. An emergency was declared and the aircraft landed safely. An engineering investigation revealed that the number 3 cylinder exhaust valve head had separated from the stem. The cylinder was sent for repair and the other cylinders inspected. This engine was operating on condition and had exceeded the manufacturer's TBO. TTIS 2200 hours.

ATA 8530 CAA Occurrence Ref 05/3269

Schweizer 269C
Exhaust valve spring

During the 100-hour engine inspection, the number 1 cylinder was found to have a high leak rate, which was traced to the exhaust valve. An engineering investigation revealed a broken exhaust valve spring, with a piece found in the rocker box cover. All valve springs when inspected were found badly corroded and were replaced. The cause of the corrosion was attributed to the engine sitting around for six months after a bulk strip without being correctly inhibited. TSI 93 hours.

ATA 8530 CAA Occurrence Ref 05/3296

CAA
CIVIL AVIATION AUTHORITY OF NEW ZEALAND

NOTICEBOARD

Nominations for Director's Awards and Flight Instructor Award

These awards are presented each year to an individual, an organisation, and a flight instructor with an overwhelming safety ethos. The winners have gone out of their way to do the right thing. Their actions have directly resulted in safety standards being raised, and they have encouraged others in the aviation industry to do the same.

Anyone can nominate an individual, an organisation, or an instructor to receive an award. Nominations close on 20 June 2006 and should be sent to Manager Communications, Bill Sommer, email sommerb@caa.govt.nz, with a few paragraphs on why your nominee should receive an Award.

Aviation Safety Coordinator Course

Your organisation should have a properly administered and active safety programme run by an Aviation Safety Coordinator. Each year the CAA runs a course for Aviation Safety Coordinators – there is no charge to attend but travel and accommodation are your responsibility. (Note that we are only holding one course this year.)

When: Thursday 7 September – Friday 8 September 2006 (full 2 day course)

Where: Brentwood Hotel. Wellington

Further details will be advised in the next issue of *Vector* and on the CAA web site, www.caa.govt.nz, see "Safety Information – Seminars & Courses."

Maintenance Controller Courses in 2006

June 15 and 16 – North Shore
July 6 and 7 – Palmerston North
July 27 and 28 – Christchurch
August 17 and 18 – Queenstown

See page 8 in this *Vector* for more information.

TOURIST FLIGHT OPERATORS NEW ZEALAND
Dedicated to Safety and Quality

National Conference

Nelson 6 to 7 July 2006

Refer to Vector March/April 2006 for contact details

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Accident Notification

24-hour 7-day toll-free telephone

0508 ACCIDENT
(0508 222 433)

The Civil Aviation Act (1990) requires notification "as soon as practicable".

Aviation Safety Concerns

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

0508 4 SAFETY
(0508 472 338)

For all aviation-related safety concerns