March / April 2008

VECTOR

POINTING TO SAFER AVIATION

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VECTOR

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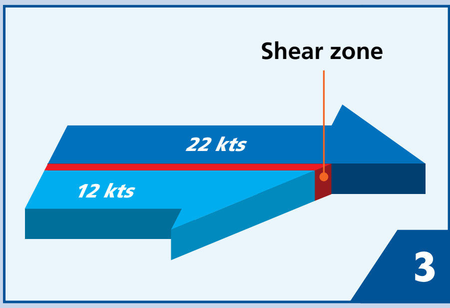

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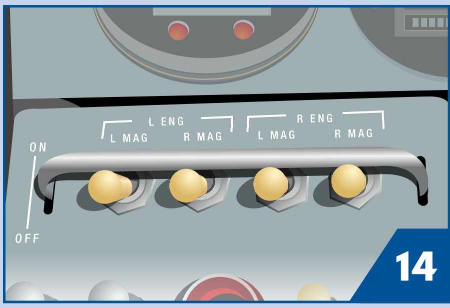
Autogyros are classed as microlight aircraft. They must meet legal airworthiness requirements, and pilots must hold a certificate. They have different flying characteristics to aeroplanes and helicopters, and this makes appropriate training essential. We outline the basic legal requirements to operate and fly an autogyro.



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Magneto Check Basics

For something as basic to piston-engine operation as magneto checks, it is surprising how much misunderstanding exists. It is essential that pilots understand aircraft magneto systems. Here is a reminder of the basics.

CORRECTION

Lake Tekapo AvKiwi Safety Seminar

Friday 18 April, 7:00 pm

Air Safaris, Tekapo Aerodrome

Cover: *This is a paramotor and you require a New Zealand certificate in order to fly one legally here. See the article* Hang Gliders, Paragliders, and Motors *on page 8. Photo by iStock.*

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WINDSHEAR

for the Private Pilot

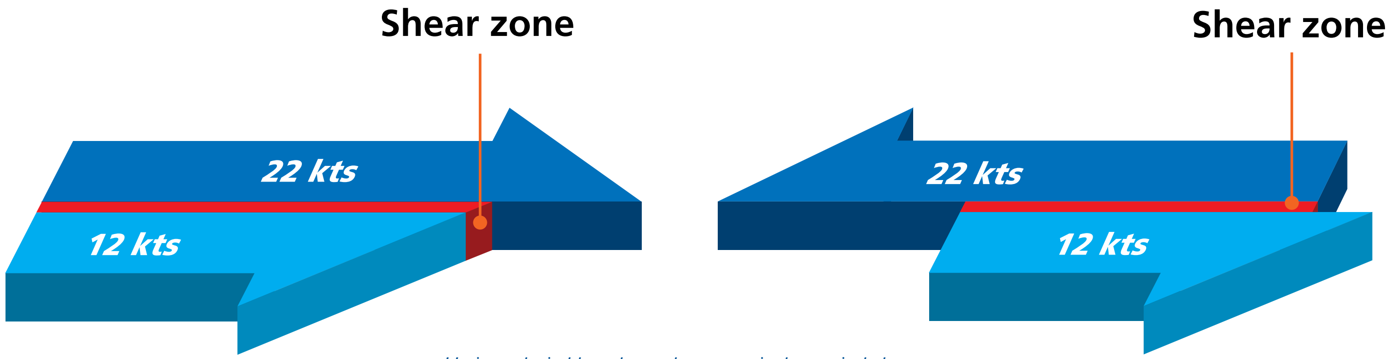
Windshear is a change in wind speed, wind direction, or both. In New Zealand, there are nine reported incidents involving windshear per year on average. Most of these incidents occur in or around the takeoff or landing phases of flight and involve all classes of aircraft from wide-body jets to microlights.

Modern, sophisticated aircraft have technology that can warn pilots of the possibility of windshear, but the recreational pilot must anticipate the likelihood of windshear. For all pilots, the same inherent dangers exist if windshear occurs close to the ground.

There are two types of windshear, horizontal and vertical. Horizontal windshear has a change in direction or speed at the same height, while vertical windshear has a change in direction or speed between two heights.

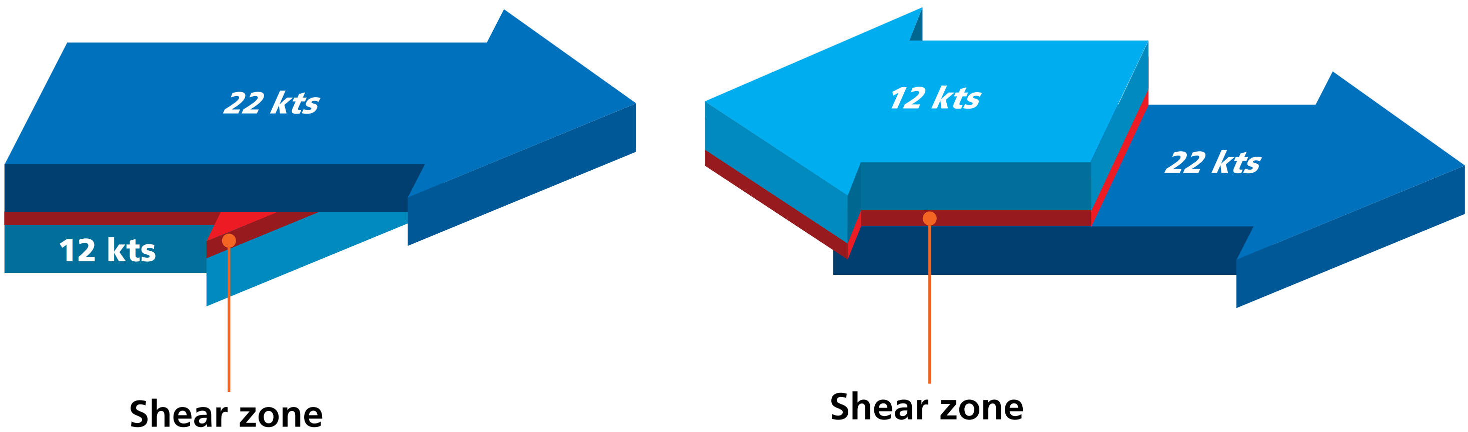
If you encounter a high sink rate near the ground or a significant loss of airspeed, full power is called for without hesitation, whether after takeoff, on approach, or at any other time while flying at low level.

Horizontal Windshear



Horizontal windshear has a shear zone in the vertical plane.

Vertical Windshear



Vertical windshear has a shear zone in the horizontal plane.

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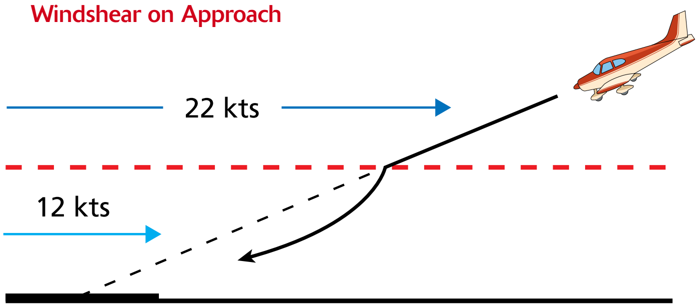
If an aircraft descends into the wind through a vertical windshear zone, with lighter wind below, the aircraft's airspeed will reduce, its angle of descent will steepen, and its rate of descent will increase. This is a dangerous position to be in with limited height to recover, such as during landing.

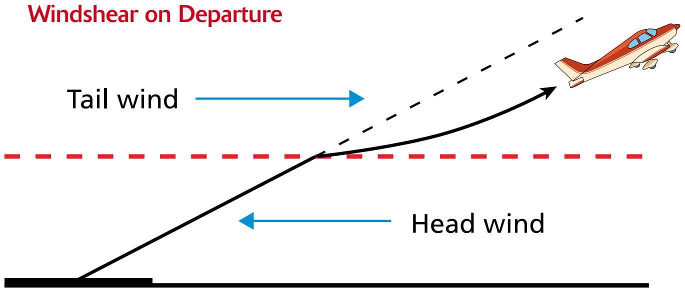
Windshear on Approach



Fly the appropriate approach attitude, and add power to reduce rate of descent.

If an aircraft encounters a reduced headwind or a headwind that turns to a tailwind during takeoff, the aircraft will have an increased takeoff run, reduced rate of climb, and a shallower climb angle. This is also a dangerous position to be in if you need to out-climb terrain.

Windshear on Departure



Maintain the aircraft's best rate of climb attitude (V_Y). Use the aircraft's best angle of climb (V_X) if there are obstructions in your climb-out path.

Causes of Windshear

The common causes of windshear are:

- Thunderstorms
- Downbursts
- Gust fronts
- Surface obstructions
- Frontal activity
- Sea breezes

Thunderstorms

Thunderstorms can produce a range of windshear related hazardous to aircraft, including localised strong and gusty winds, downdraughts, downbursts, gust fronts, and tornadoes.

Downbursts

A *downburst* is defined as a strong *downdraught* which produces an outflow of damaging winds on or near the ground.

A *microburst* is a small *downburst*, having a horizontal range of between 400 m and 4 km. Microbursts normally reach their maximum shear values after 5 to 10 minutes of reaching the ground and usually dissipate within 20 minutes. The danger of microbursts is that the vertical velocity can be as high as 6000 ft/min, and that they are not always obvious or easy to detect.

In general, New Zealand does not have the type of climate that favours microburst activity – but they do happen, as recent tornado activity in Taranaki showed.

Gust Fronts

The *gust front* is the leading edge of the cold dense air from a thunderstorm *downdraught*, which reaches the ground and spreads out in all directions, undercutting the surrounding warmer and less dense air. The gust front is usually located up to 15 NM ahead of the thunderstorm parent cell and travels in the same direction. There is a marked horizontal windshear at ground level following the passage of the leading edge of the gust front. The change in wind surface direction is often as much as 180 degrees, and the wind speed can exceed 50 kt. Such a sudden change in the surface wind, some distance from the storm, can take pilots completely by surprise.

Surface Obstructions

Probably one of the more serious concerns, both in severity and in its likelihood of being encountered, is windshear created by the wind flow around obstacles. By obstacles we mean anything from large hills to isolated buildings, from mountain chains to rows of trees. The effects worsen as windspeed, and the angle at which the wind strikes the obstruction, increase.

Frontal Activity and Sea Breezes

The severity of windshear generated from natural wind patterns such as weather fronts and sea breezes will generally not create unflyable conditions. Special caution is required however, if you are operating the aircraft at low speeds or altitudes, such as for takeoff and landing.

Frontal windshear severity will hinge to some extent on the nature of the front and the associated wind changes. Flying in bad weather configuration (low and slow) at the critical point of the passage of a front should be done with caution.

Coping with Windshear

What windshear does to an aircraft is complex. Obviously, downdraughts and updraughts will have effects, but the loss of airspeed – the loss of lift – can accentuate these effects and, in the worst case scenario, make recovery impossible.

Recognise

The first defence is to develop the ability to recognise the likely presence of windshear before flying into it. Clues which may be available to the pilot include the following:

- Thunderstorms should always be assumed to have the capability of producing hazardous windshear.
- Areas of dust raised by wind, particularly when in the form of a ring below convective clouds, can indicate the presence of a downburst.
- Roll cloud, rolling at the base of a thunderstorm and advancing ahead of the associated rain belt indicates the presence of a gust front.
- Shelf or wedge shaped cloud attached to the base of the storm cloud.

- Look for the effects of wind 'dumping' on trees and crops, or in the ripple and spray patterns on water surfaces.
- When virga (precipitation that evaporates before reaching the ground) is associated with a 20 degree difference between temperature and dewpoint, so called 'dry microbursts' may exist.
- Lenticular cloud (smooth lens-shaped altocumulus) indicates the presence of standing waves, usually downwind from a mountain range, and usually with associated rotors (eddies) which produce strong updraughts and downdraughts.
- Strong, gusty surface winds, especially where an aerodrome is located near hills, or where there are comparatively large buildings near the runway, indicate the probability of local windshear and turbulence. Study such obstacles and visualise what effect they may be having on the air (visualise air as a fluid) flowing around them. Be particularly careful using airstrips carved out of a forest; the wind below the tree tops will almost certainly be markedly different to that above them.
- Wind socks indicating different winds are an unmistakeable sign that windshear exists.
- Smoke plumes can indicate windshear by graphically showing the shear effect, possibly with upper and lower sections of the plume moving in different directions.
- TAFs provide the surface and 2000 ft winds. Any variation between the two provides an indication of possible windshear.
- Finally, a most important clue that windshear is present, is a report from another pilot. If you experience significant windshear, pass on details without delay. Give your location, your aircraft type, and the effects of the windshear (eg, the change in airspeed).

Avoid

If any of these occur during the takeoff or landing phase, the likely outcome would have to be assessed on a case-by-case basis, including consideration of how close the windshear is to the takeoff or landing path.

Local knowledge for operating at a particular aerodrome can be useful in making judgement calls. If the winds are strong and the aerodrome is unfamiliar, ask advice from other pilots or air traffic services (but remember, the decisions are still yours).

Some windshear is simply impossible to fly through at low level without serious danger. Microbursts often fit into this category.

Learn to recognise the likelihood of hazardous windshears and avoid them. Make an early decision to avoid an encounter by going around or by delaying the approach or takeoff until conditions improve. If the windshear is strong and is likely to persist – eddies from obstacles for example – do not takeoff or, if you want to land, choose an alternative aerodrome.

Prepare

In New Zealand when there is wind, windshear will be present in one form or another. Pilots should be prepared for windshear and ready to take the appropriate action the instant that it is required.

When taking off, configure the aircraft for maximum performance. Use all of the runway length available. If runway length permits, delay your rotation until you have reached a higher airspeed. When required, do not reduce power too soon after takeoff. Plan the after-takeoff path to avoid having to climb above high obstacles.

On approach, use a higher than normal airspeed. As a general rule, add half the amount that the wind is gusting, to your approach speed. Typically, no more than 20 kt, higher if runway length permits. Maintain the increase until the flare.

If at any stage of flight you recognise the presence of windshear, then by taking preventative or precautionary action, you are far less likely to need to take any recovery action.

Recover

If windshear is encountered unexpectedly, or is more severe than anticipated, the appropriate recovery action should be started without delay. The earlier windshear is recognised, the easier it will be to take adequate recovery action.

How do you know if you've encountered windshear? Sudden uncommanded variations in airspeed of plus or minus 15 kt, and in vertical speed of plus or minus 500 ft/min are some indications of severe windshear. If while on approach you need to significantly increase or decrease your throttle setting, then this can also be an indicator of windshear.

To recognise less severe windshear, pilots should be in the habit of flying a stabilised approach.

The stabilised approach concept has much to offer the general aviation pilot in addition to improving the ability to cope with windshear. The technique involves, as far as practicable, establishing the aircraft on the glide slope in the landing configuration as early as possible and flying the appropriate constant airspeed, pitch attitude, and rate of descent by the smooth application of power and elevator control down to the flare.

If a stabilised approach is your normal routine, then you will find it much easier to recognise any abnormal deviations in airspeed, glide slope, descent rate, or power requirements caused by windshear.

If strong windshear conditions are evident, and you experience deviation above the normal glide slope, be cautious about reducing power. If the deviation is caused by an updraught, chances are you may soon encounter an equally strong downdraught, which should position you back on the glide slope.

If you encounter a high sink rate near the ground or a significant loss of airspeed, full power is called-for without hesitation, whether after takeoff, on approach, or at any other time while flying at low level.

If at any stage of flight you recognise the presence of windshear, then by taking preventative or precautionary action, you are far less likely to need to take any recovery action.

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Local Knowledge

At many aerodromes around New Zealand, in strong wind conditions, low-level windshear exists. These are caused from either local topography (sand dunes, buildings, trees), or sea breezes.

It is very important to anticipate local windshear and have an exit plan.

Here are some examples of conditions at aerodromes where windshear is more common.

Dunedin

Mechanical turbulence resulting from airflow over the nearby hills and ranges (Maungatua Ranges) occurs in conditions of very strong winds from between 320 and 010 degrees. In situations with an increasing northwesterly airstream aloft, there can be a short period just prior to the surface wind becoming northwest when strong low level shear can exist.

During periods of strong northwesterlies at 1000 ft with surface winds variable or northeast less than 10 kt, strong windshear has been reported.

Some low-level windshear can also occur in westerly conditions at about 1000 to 2000 ft with gusty northwest winds at the aerodrome surface.

Pilots have also reported low-level windshear at 1000 to 3000 ft during periods of unstable southwest airstreams, and in the presence of cumulonimbus clouds.

Wellington

Extremely strong and gusty wind conditions aside, there are two types of windshear that affect Wellington: mechanical and sea breeze.

On occasions when the pressure gradient is very weak over central areas of New Zealand and there is sufficient surface heating, a sea breeze can be expected at Wellington aerodrome. As the sea breeze develops, more often than not, there will be a southerly at the southern end at the same time that there is a 5 to10 kt northerly at the northern end. The sea breeze is a shallow phenomenon and there can be a marked difference between the upper air mass and the sea breeze.

In Wellington there is a close relationship between wind direction and turbulence. If a westerly is being broadcast on the ATIS, moderate windshear can be expected.

Moderate to severe windshear is common when the surface wind across Cook Strait is between 250 to 290 degrees and greater than 30 kt. A strong shear zone between 500 and 1000 ft occurs, and is often accompanied by severe turbulence.

Nelson

Significant low-level windshear and turbulence occurs at Nelson when a fresh southwesterly surface wind is replaced by the northeasterly sea breeze. The southwesterly wind continues aloft and there will be a strong windshear, typically between 1500 and 2000 ft. ■

Aerodrome meteorological information supplied courtesy of the New Zealand Meteorological Service.

More About Piston Engine Maintenance

All operators need to be aware of how recent rule changes regarding engine escalations apply to them.

The Rule Changes

On 1 March 2007, Part 91 *General Operating and Flight Rules*, changed to require operators to comply with the applicable engine manufacturer's recommended overhaul periods. The following paragraphs from rule 91.603 *General maintenance requirements* are relevant:

(c) Except as provided in paragraphs (d) to (f), the operator of an aircraft must ensure compliance with the manufacturer's recommended overhaul intervals.

(d) Products and components may be operated beyond the manufacturers recommended TBO if the operator complies with TBO escalation procedures that are detailed in a maintenance programme that is accepted under Part 119 or approved under rule 91.607.

(e) In spite of paragraph (d), a piston engine fitted to an aircraft that is not used for hire or reward operations may be operated beyond the manufacturers recommended TBO if the piston engine is maintained in accordance with an engine TBO escalation programme that is acceptable to the Director.

Manufacturer's Recommended TBO

So where do you find the "manufacturer's recommended TBO"?

Let's consider the Textron Lycoming piston engine, since it is by far the most common piston engine chosen by helicopter manufacturers.

See the Textron Lycoming web site, www.lycoming.com, and follow this path: "Support – Publications – Service Instructions". This list includes Service Instruction 1009AS, which is the document containing all the TBO period information for the various Lycoming piston engine models.

The Service Instruction has a number of important conditions that must be considered when determining the TBO period for any particular engine. One of these conditions is especially relevant to operations involving any, "crop dusting or other chemical application flying".

Lycoming Service Instruction 1009AS limits the TBO of such engines to 1500 hours. This is considerably less than the published engine TBO that applies to engines not involved in, "crop dusting or chemical application flying".

The economic effect of the 1500 hour reduced TBO needs to be considered by any operator. For example, a private owner having the appropriate agricultural and chemical ratings, and choosing to set up to do their own farm work, would need to consider the increased hourly cost of operating the helicopter with the reduced engine TBO. The value of the helicopter for re-sale is also a consideration.

If you were to consider purchasing a helicopter for air transport operations, you would need to find out the engine hours accumulated in the agricultural roles mentioned in the Lycoming Service Instruction to determine any additional engine maintenance and TBO limits that may apply.

Other commonly used piston engine helicopters often selected for such agricultural flying in New Zealand have Lycoming engines with a TBO of 1500 hours, so these helicopter engines are not subject to a reduced TBO for such operations.

Engine Escalations

Rule 91.603 (d) provides for the operator to develop an "escalation programme" for their engine(s). The escalation programme must be developed from staged, substantive engine condition and dimensional inspection of "exhibit engines", for commercial operations. See the article, "Piston Engine TBO Escalations" in the January/February 2008 *Vector* for more information.

Take, for example, an engine that was granted approval from the CAA for "temporary escalation". At the end of that period the engine would undergo a complete overhaul. The engine will be dismantled and subjected to a detailed condition and dimensional inspection.

The condition and dimension inspections carried out would be documented and compared to the manufacturer's published service limits. Providing the inspections supported an incremental increase in TBO, the engine could have an escalated TBO to a "new" period, for example, 1650 hours.

Note, however, that the condition and dimensional inspection would involve additional work. It is common for engine manufacturers to mandate replacement of many items at engine overhaul. Common items replaced are pistons, exhaust valves, etc. The overhaul facility would normally reject such items without any condition inspection or measurement, but in the case of an escalation programme being prepared, condition inspection and dimensional checks would be required. Many operators also opt for new cylinder assemblies to be installed, to reduce labour, down time, and enhance the likelihood of the engine achieving full TBO. For a TBO escalation, the condition and dimensions of the cylinders removed would need to be evaluated and documented.

Part 119 air transport operators must include their escalation programme(s) in their exposition. Other operators must include their escalation programme(s) in an approved maintenance programme under rule 91.607.

You may have documented data from engines that have achieved TBOs above the manufacturer's recommended periods before the March 2007 rule changes (or transition period). In this case, you can use this information as part of your application for an escalation programme.

The CAA is working on an Advisory Circular (AC) that will detail approved means of compliance for the additional maintenance to operate an engine beyond the manufacturer's recommended TBO.

Private Operations

For purely private operations, continued engine operation beyond that recommended by the manufacturer is still an option provided for by rule 91.603(e). AC43-5 *Engine and propeller overhaul and testing* provides "acceptable data" that must be complied with in order to operate an engine in this regime. The CAA intends drafting an AC that will specifically address the private operation of piston engines to periods beyond the manufacturers published TBO recommendation.

Remember

It is the operator's responsibility to ensure the aircraft is in an "Airworthy Condition" at all times (rules 91.101 and 91.603).

It is the operator's choice to operate on an escalation programme.

It is the responsibility of the engineer doing the "Release to Service" to ensure that the inspection parameters forming the escalation programme are complied with. ■

DRAFT Part 66 AME Licensing Syllabuses Advisory Circulars

These are now on the CAA web site for consultation.

Licensing Reminder for PPL Applicants

This is a reminder that examination pass slips that were issued prior to 11 May 2006 will not be accepted for either PPL issue, or for any other purpose that requires a person to hold a valid PPL examination credit, after 11 May 2008.

Details of the legislative provisions are contained in Civil Aviation Rule 61.17(f) *Written examinations – prerequisites and grades*, and details of two associated approved equivalents for examinations are in Advisory Circular 61-1 *Pilot Licences and Ratings - General*.

Note that rule 61.105(a)(8)(ii) *Solo flight requirements*, requires student pilots to hold a valid PPL written exam credit before undertaking a solo cross-country flight.

Hang Gliding, Paragliding and Motors

Photo courtesy of Ross Gray

Hang glider

In order to fly a hang glider, paraglider, paramotor, or powered hang glider in New Zealand, pilots must be a member of a hang gliding organisation and hold an appropriate pilot certificate. The certificate must be issued by an organisation that has been delegated the power to issue pilot certificates by the Director of Civil Aviation.

There is currently only one organisation with the delegation to issue these pilot certificates, the New Zealand Hang Gliding and Paragliding Association (NZHGPA). For this reason, pilot certificates issued overseas do not meet the requirements for flying here.

Ratings issued by the NZHGPA (such as Novice, PG1, and Instructor) constitute a pilot certificate. Currently, the only people in the organisation with the delegated authority to issue pilot certificates are the Chief Executive Officer, and Administrator.

Pilots must comply with the privileges and limitations of their certificate and ratings, and also comply with the operational standards and procedures of the NZHGPA (Civil Aviation Rules, Part 106.5 *Pilot requirements*). These can be found on the NZHGPA web site, www.nzhgpa.org.nz.

When flying, pilots must comply with Civil Aviation Rules, Part 91 *General Operating and Flight Rules*. Part 106 *Hang Gliders – Operating Rules* must also be understood by hang glider, paraglider, paramotor, and powered hang glider pilots, as this sets out rule requirements that are additional to Part 91. For example, rule 106.59 states that only launch sites authorised by the NZHGPA may be used. The process for having a launch site authorised is set out in the NZHGPA Operations and Procedures Manual.

Part 106 also sets out exceptions from Part 91 for the operation of hang gliders, paragliders, paramotors, and powered hang gliders. Pilots are not subject to the Operator Maintenance Requirements set out in Subpart G of Part 91, however anyone operating a hang glider, paraglider, paramotor, or powered hang glider must ensure it has a current Warrant of Fitness issued by a hang gliding organisation (rule 106.17).

Paraglider

The NZHGPA's Part 149 Certificate authorises them to issue pilot and instructor certificates, set operational standards for hang glider and paraglider pilots, and standards for pilot safety equipment. They can also authorise launch sites, issue Warrant of Fitness certificates, and provide pilot identification numbers.

Ross Gray, Chief Executive Officer of the NZHGPA, says there are many benefits to being a member of the Association.

"The NZHGPA provides the formal structure for pilot and instructor certification plus it sets standards and best practice for operational procedures.

"There are 14 clubs throughout New Zealand which are affiliated to the NZHGPA. This is the most direct and useful way for pilots to access the NZHGPA. Many clubs run both flying and social events, and make sure local takeoff and landing sites are authorised for use and remain accessible to members.

"Clubs also appoint local Safety Officers who know and understand local sites and conditions, making them a good source of advice for beginners and visiting pilots. Safety Officers also facilitate

Trikes (left) and powered parachutes (right) are not administered by NZHGPA as they are not foot launched. These are microlight aircraft and are administered by other Part 149 organisations. Rule Parts 103 and 91 apply to them.

Paraglider launching

local glider inspections so that members can have their gliders independently inspected and issued with a Warrant of Fitness. Local clubs are also a good source for buying second hand equipment.

"A popular aspect of the NZHGPA is competition flying. Competitions provide pilots with an extra edge that comes from taking on a challenging task and pitting one's skills against other pilots. This not only allows pilots to gauge how good they are, but also lets them improve their skills by learning from other pilots' techniques.

Paramotor

"The NZHGPA also publishes a magazine, *Airborn*, with regular, riveting articles about flying, competitions, developments, new products, second hand equipment for sale, plus official notices and safety information.

"NZHGPA members also have the benefit of public liability insurance coverage maintained by the Association", says Ross Gray.

For more information about the NZHGPA visit their web site, www.nzhgpa.org.nz. Hang glider, paraglider, paramotor, and powered hang glider pilots can subscribe to receive a free copy of *Vector* magazine by completing form 24149/02, available on the CAA web site under "Sport and Recreation". ■

Part 149 Organisations

The New Zealand Hang Gliding and Paragliding Association, as a Part 149 certificated aviation recreation organisation, is responsible for the day to day administration of hang gliding and paragliding.

As part of the certification process a Part 149 organisation must have a comprehensive exposition approved by the CAA. This explains exactly how they will do business.

The holder of a Part 149 aviation recreation organisation certificate may issue the certificates and ratings that are specified in their exposition, and for which a senior person in the organisation holds a delegation. They can organise aviation events, or carry out other privileges if these are specified in their exposition.

In order to issue pilot certificates or ratings, organisations must have procedures for assessing the competency of applicants, including holders of equivalent qualifications, such as overseas pilot certificates. They must also have procedures for reviewing and maintaining the competency of those holding certificates or ratings issued by the organisation.

Part 149 organisations are held to a high standard by the CAA. They must have an internal quality assurance system, including: safety policies and procedures, a procedure to ensure quality indicators are monitored to identify existing or potential problems, procedures for corrective and preventive actions, an internal audit programme, and management review procedures.

Any changes an organisation may wish to make to their delegation holders, procedures for personnel assessment and certification, and the principal locations at which activities may be carried out, require the approval of the Director of Civil Aviation.

The CAA retains oversight of Part 149 organisations. They are required to undergo inspections and audits of their activities, including facilities, documents, and records, as the Director considers necessary in the interests of safety and security. Part 149 certificates are granted for up to 5 years, at which time they must be renewed. The Director has the power to revoke an organisation's Part 149 certificate as well as the ability to suspend and revoke pilot certificates, even though they have been issued by a Part 149 organisation.

Autogyros

Autogyros are classed as microlight aircraft. They must meet legal airworthiness requirements, and pilots must hold a certificate.

They are also called gyroplanes or gyrocopters, and fly differently to both aeroplanes and helicopters.

The rotor on an autogyro is not powered. It is spun by the aerodynamic force of the air moving through the rotor disk. When spinning at the right revolutions per minute, the rotor provides lift. Forward thrust comes from an engine-driven propeller.

The Eagle autogyro

The earliest models flew in the 1920s, and in the years to follow they were used to deliver mail and for transport in the United States.


A single seat open cockpit autogyro

Regulation

Currently, autogyros are administered on behalf of the CAA by two national bodies that hold certificates under Part 149 *Aviation Recreation Organisations – Certification*. They are the Sport Aviation Corp, and the Recreational Aircraft Association of New Zealand.

These bodies provide flight instructors and issue pilot certificates, however the specialist organisation, the New Zealand Autogyro Association (NZAA) is the best place to start. Although it cannot issue pilot certificates, the NZAA can provide information, support and advice, as well as contact information for instructors.

President of the NZAA, Stephen Chubb, says, "Flying an autogyro is one of the fastest growing aviation activities in New Zealand at the moment. Formal instruction has changed the stigma once held over these machines, and we would encourage anyone interested to get in touch with us, so that we can help and advise them."

Airworthiness

As they are microlights, all autogyros must be registered with the CAA, and changes of ownership must be notified. Those with one seat are registered as Class 1 microlights. Those with two seats are registered as Class 2 microlights and require a Flight Permit. Class 2 microlights also require logbooks for the aircraft, engine, propeller, and Airworthiness Directives.

Both Class 1 and Class 2 microlights must also pass an Annual Condition Inspection, conducted by an authorised microlight inspector, or appropriately qualified licensed aircraft maintenance engineer. Both of the Part 149 national bodies can provide contact details for microlight Inspection Authorities. Once inspected, a sticker will be placed in a visible position on the aircraft.

Pilots

Autogyro pilots must hold a certificate issued by a Part 149 organisation that covers autogyros. This will involve sitting a written examination and passing a practical flight test.

Pilots must also hold a medical declaration issued by a General Practitioner. For the standards and validity of the declaration, contact one of the Part149 organisations, or see their web site.

If you are unable to pass your medical, you cannot hold a pilot certificate, but may still fly with an instructor.

Instruction

As autogyros have some different handling characteristics to either aeroplanes or helicopters, specific training is essential, even for pilots already qualified on other aircraft.

Tauranga based autogyro flight instructor, Tony Unwin, says one of the most essential skills is learning to manage the rotor rpm during the spin-up while still taxiing the aircraft.

As autogyros have some different handling characteristics to either aeroplanes or helicopters, specific training is essential, even for pilots already qualified on other aircraft.

"If the spin-up is not correct during the takeoff roll then blade flap can occur, which may cause violent shaking of the machine and control stick, making the machine unflyable. In the worst case scenario this may cause structural damage and injury.

"Typically, autogyros can be flown to heights of about 6000 ft, and can cruise at up to 100 mph. The world altitude record exceeds 20,000 ft.

"On one tank of gas, a modern autogyro can travel 500 km," Tony Unwin says.

While autogyro pilots must follow most of the same airspace and flight rules as pilots of other aircraft, there are some exceptions – See Civil Aviation Rules Part 91 *General Operating and Flight Rules*, and Part 103 *Microlight Aircraft – Certification and Operating Rules*.

Receiving instruction from a Part 149 certificated organisation will ensure that you are made aware of these requirements.

The Xenon autogyro has a fully enclosed cockpit.

Type Ratings

Type ratings are conducted in a similar manner to conventional aircraft, and involve performance studies, training and check rides. Pilots transitioning into single seat autogyros are supervised directly from the ground.

To Learn More

www.autogyro.org.nz – New Zealand Autogyro Association

www.raanz.org.nz – Recreational Aircraft Association of New Zealand

www.sportflying.co.nz – Sport Aviation Corp

www.caa.govt.nz – Autogyro pilots can subscribe to *Vector* magazine for free. See, "Sport and Recreation". ■

From the Enforcement Files

An autogyro pilot pleaded guilty to two charges of operating an aircraft without the appropriate civil aviation documentation.

The charges were laid after the autogyro was involved in an accident in Central Otago in 2006.

After spending 18 months building the autogyro, the pilot decided to conduct a series of test flights. A total of four test flights were conducted while remaining in close proximity to the aerodrome.

The pilot was aware that to conduct such flights he needed to hold an appropriate microlight pilot certificate and medical declaration, and that the aircraft needed a certificate of registration, flight permit, and an annual condition inspection sticker. None of these documents were held.

On completion of the fourth circuit, the pilot landed and permitted a passenger to board the aircraft for one further flight.

After takeoff the aircraft experienced mechanical problems which led the pilot to make a 180 degree turn to land back at the aerodrome. During the landing which followed, the aircraft bounced on the runway and rolled over. This caused the rotor blades to come into contact with the ground resulting in extensive damage to the aircraft.

Fortunately, neither the pilot nor the passenger sustained any physical injuries as a result of the accident.

As a result of these events, the pilot was convicted of operating an aircraft without holding an appropriate current aviation document, and of operating an aircraft in a manner causing unnecessary danger to another person.

During sentencing the judge referred to the circumstances of the flight and concluded that the pilot had acted, "recklessly and foolishly". The following penalties were imposed:

For operating an aircraft in a manner causing unnecessary danger to others, fined $1000, plus solicitor and court costs totalling $880.

For operating an aircraft without holding a current aviation document, fined $750, plus court costs totalling $130.

Meteorological Changes

It is important that pilots are kept up to date with changes to the way meteorological information is gathered, communicated to the aviation community, and interpreted. This article covers a range of current meteorological issues that pilots and operators should be aware of.

AUTO METARs

MetService are expanding their automated weather observation network. Over the next two years AUTO METARS will be introduced at 29 domestic aerodromes as Automatic Weather Stations (AWS) are either upgraded or new AWS are installed. Two new wind sensors are also being added in the Christchurch and Dunedin areas.

This programme will fill gaps in the current observation network by providing more complete observations (including cloud, visibility, and present weather information) 24 hours a day, 7 days a week, at aerodromes in most regions.

As the AWS are upgraded or installed at each aerodrome, manually produced METARs (currently issued hourly) will be replaced with automated METARs (AUTO METAR). Automated METARs will be produced every 30 minutes; on the hour and half hour, day and night. Due to the frequency of these reports, SPECIs will no longer be issued at AUTO METAR locations. This is in accordance with ICAO standards and recommended practices. Pilots need to be aware that, with the disappearance of SPECIs, there will no longer be an obvious flag when conditions deteriorate at these aerodromes.

Here is an example of an AUTO METAR:

METAR NZWB 011400Z AUTO 35004KT 310V010 29KMNDV -SHRA OVC048/// 19/16 Q1021

There will be several small differences in the format of AUTO METAR reports, compared with the manual METARs currently produced. These are because the sensors used to determine visibility, present weather, and cloud layers, are unable to scan the sky in the way that a human observer does. "NDV" will appear at the end of each AUTO METAR visibility group to indicate that directional visibility variations are not reported. When the AWS does not sense a reportable present weather condition, rather than the field being left blank, two strokes "//" are inserted in the present weather field. When the AWS does not detect cloud, NCD (No Cloud Detected) is used instead of SKC (Sky Clear), and when cloud is detected by the AWS, three strokes "///" are placed at the end of each cloud layer group to indicate that the AWS cannot identify TCU or CB cloud types.

Ceilometer and present weather sensor at Invercargill.

The first two aerodromes to be upgraded will be Woodbourne and Napier. By 1 April 2008 their existing AWS will be upgraded, and manual METARs will be replaced with AUTO METARs. The next group of aerodromes to be upgraded and changed over to AUTO METARs will be Tauranga, Gisborne, Rotorua, Paraparaumu, Nelson, Hokitika, and Invercargill by 1 July 2008.

The five aerodromes to receive new AWS installations will be Kerikeri by 1 July 2008, Pukaki by 1 December 2008, and Masterton, Kaitaia, and Chatham Islands by 1 December 2009.

New wind, temperature and humidity sensors have been installed at Sugarloaf, near Christchurch, and at Swampy Summit, just north of Dunedin. From 1 April 2008, hourly wind data from these sources will be added to the Christchurch and Dunedin METARs respectively as a remark (in the same manner that Kaukau wind data is included in the Wellington METAR).

Information on lightning from an independent lightning detection network will be used to provide additional data for AUTO METARs on the presence of CB activity.

There is currently no plan to change to AUTO METARs at Auckland, Wellington, and Christchurch international airports.

Alignment of TAF, METAR and SPECI Codes

The CAA's policy is to ensure that New Zealand is fully compliant with ICAO practices and procedures for international air navigation, unless there is a sound reason for non-compliance.

In 2007 the CAA reviewed the differences between New Zealand's METAR, TAF and SPECI codes and ICAO Annex 3 – *Meteorological Service* requirements. After consulting with the aviation community on the continued need for New Zealand's code differences, the CAA found there was a good case for aligning with ICAO requirements and no strong case for maintaining the existing differences.

There are three code differences to be aligned with ICAO requirements. Target dates for the implementation of these changes are currently being developed by the CAA and MetService.

The first difference is that Annex 3 requires that cloud only be included in a TAF, METAR or SPECI if it is of operational significance. This means only giving the height of a cloud base below 5000 feet or below the highest minimum sector altitude, whichever is greater.

In New Zealand, cloud is currently included irrespective of operational significance.

The term CAVOK is not currently used in New Zealand TAFs and METARs. Annex 3 requires that CAVOK be used when the following occur, or are expected to occur, **simultaneously**:

a) Visibility of 10 km or more;

b) No cloud of operational significance;

c) No weather of significance to aviation (eg, precipitation, fog, mist, sand/dust storms, thunderstorms, etc).

The third change is that Annex 3 requires visibility of 10 km or more to be indicated in TAFs, METARs and SPECIs by the use of 9999. Currently visibilities greater than 10 km are reported in New Zealand. The rationale behind the Annex 3 requirement is that aerodrome meteorological information pertains only to a radius of 8 km around the aerodrome centre point. Any further visibility is therefore not relevant to aerodrome conditions.

The following examples show how TAFs and METARs are currently presented in New Zealand, and how they would be presented in compliance with Annex 3.

TAF Examples

Current TAF

TAF NZCH 302230Z 010024 02010KT 30KM SCT180 BKN300

TAF with CAVOK

TAF NZCH 302230Z 010024 02010KT **CAVOK**

TAF with 9999 to indicate visibility greater than 10 km

TAF NZCH 302230Z 010024 02010KT **9999** SCT180 BKN300

METAR Examples

Current METAR

METAR NZCH 010600Z 04016KT 25KM SCT170 BKN280 17/12 Q1021

METAR with CAVOK

METAR NZCH 010600Z 04016KT **CAVOK** 17/12 Q1021

METAR with 9999 to indicate visibility greater than 10 km

METAR NZCH 010600Z 04016KT **9999** SCT170 BKN280 17/12 Q1021

Recent ICAO Annex 3 Changes

Three changes to ICAO Annex 3 practices (made in November 2007) have been adopted by New Zealand. The practice of reporting prevailing visibility in TAF, METAR and SPECI will be implemented here. Before this takes place, a full definition of prevailing visibility will be added to *AIP New Zealand*. The term vicinity (VC) will be used in METAR and SPECI to indicate that reported weather is between 8 and 16 km from the aerodrome reference point. Finally, tropical cyclone (TC) and volcanic ash (VA) SIGMETs prior to November 2007 included a 12-hour outlook. This has now been deleted from TC and VA SIGMETs. The forecast position of a TC centre or VA cloud will still be included.

Area Forecasts

Area Forecasts (ARFORs) are an essential tool for en route flight planning. There are 17 area forecasts covering New Zealand. These forecasts are issued at 1730 and 2230 UTC (1 hour earlier during NZDT). Each ARFOR comprises forecast winds up to 10,000 feet, cloud, freezing level, visibility, and significant weather conditions such as turbulence and ice.

From 1 September 2008, ARFORs will no longer be available on the Airways IFIS web site, www.ifis.airways.co.nz. Pilots on VFR and IFR private operations at or below 10,000 feet will need to use the MetFlight GA web site, http://metflight.metra.co.nz, to obtain a complete weather briefing.

Plain Language

The CAA is aware of a growing demand for easily understandable meteorological information, especially from the sport and recreation sector of the aviation community. The CAA is currently evaluating this issue, and looking at products that decode meteorological information. The objective is to find a practical and low cost way to meet the demand for plain language weather information.

Progress on this project will be reported in *Vector*. In the meantime, the *Weather Information Interpretation* card available from the CAA is an excellent tool to assist pilots in understanding the extensive meteorological information available on the CAA-sponsored MetFlight GA service. ■

For a free copy, email: info@caa.govt.nz

Planning an Aviation Event?

If you are planning an event, large or small, such as an airshow, air race, rally, or major competition, the details should be published in an *AIP Supplement* to warn pilots of the activity.

The published cut-off dates for the AIP are listed below, but you must advise the CAA **at least one week** before those dates, to allow for inquiries and processing. Note that, even if you have applied to the CAA for an aviation event authorisation, this does not automatically generate an *AIP Supplement* or airspace request.

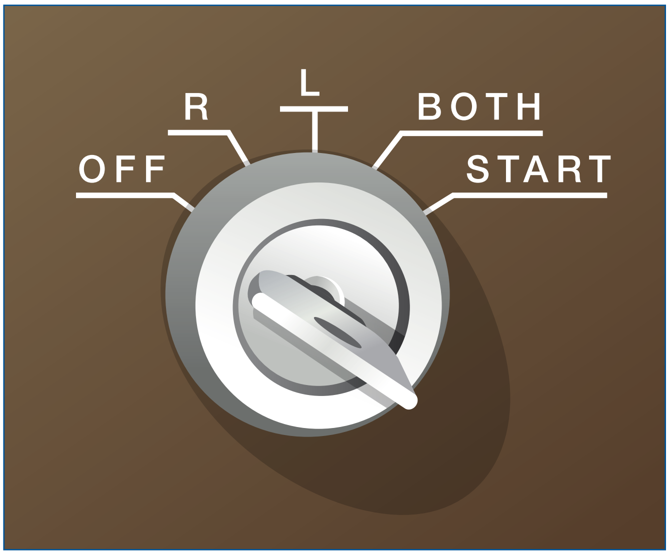
Email the CAA, aero@caa.govt.nz. Further information on aviation events is in AC91–1.

Effective Date	*Cut-off Date With Graphic*	*Cut-off Date Without Graphic*
5 Jun 08	27 Mar 08	3 Apr 08
3 Jul 08	24 Apr 08	1 May 08
31 Jul 08	22 May 08	29 May 08
28 Jul 08	19 Jun 08	26 Jun 08

Magneto Check Basics

For something as basic to piston-engine operation as magneto checks, it is surprising how much misunderstanding exists. It is essential that pilots understand aircraft magneto systems. Here is a reminder of the basics.

Practically all current piston-engine aircraft have dual ignition systems, ie, two sets of spark plugs, each set supplied with electrical power by its own associated magneto (which is normally designated 'left' or 'right'). The engine controls will include some form of switch system with which the magnetos can be switched on and off, individually or together. The type of switch varies from aircraft to aircraft, but is usually either a set of toggle switches (one for each magneto) or a rotary switch (which may be key operated). The rotary switch has four settings, eg, OFF, RIGHT, LEFT, and BOTH.



A typical key magneto switch used in many light aircraft.

Now for some standardisation of terminology – an important aspect because we are certain this is where some of the confusion arises. Magneto checks are normally carried out only on the ground, and there are three distinct types.

Dead cut check – One magneto is switched off in order to see if the engine will run on the other one. If not, the result will be a dead cut.

Live mag check – Both magnetos are switched off momentarily in order to ensure that the engine does cease running. If it continues to run then one of the magnetos must be continuously electrically live.

Mag drop check – Each magneto is switched off in turn to ascertain and compare the drop in rpm that occurs when running on each individual magneto.

Dead Cut and Live Mag Checks

There appears to be some confusion between the dead cut check and the live mag check. This may be because both are usually done at the same point in the aircraft checklist, and also because the live mag check should in fact produce a 'dead cut'.

Dead cut checks and live mag checks are usually done around 1000 rpm. Dead cut checks are normally carried out at some stage before the engine runup, and again just before shutdown.

Live mag checks are carried out at both these times, at neither of these times, or just during the pre-shutdown check. There are different opinions on this, so consult the information supplied by the engine/aircraft manufacturer, or the owner/operator of the aircraft you are using.

Before Runup

The primary purpose of the dead cut check after start up is to ensure that both magnetos are delivering sufficient electrical energy to the spark plugs – an important fact to establish before carrying out the mag drop check. Why is it important? Imagine for a moment that one magneto is completely dead and that this was not discovered before the runup. With the engine at high power, you carry out a mag drop check and – instant silence! Now this is not the way to treat an engine, but if you are a normal human being you are probably about to do something worse to it. The usual reaction to the silence is to immediately switch the magnetos back on, and this is when the engine can suffer substantial damage.

A live mag check after start up can uncover more subtle dangers, and if one magneto is found to be live when switched off, then the flight must not proceed. For one thing, it will not be possible to carry out a meaningful mag drop check during the runup. The real danger, however, lies in the possible causes of the magneto being live. These may be benign, but they could also include a loose lead, which could arc and start a fire.

Some manufacturers may advise against the live mag check, stating that it could cause damage to the engine. This would be the case if the switch was held too long in the OFF position or the check was done at an rpm setting that was too high.

Before Shutdown

The main purpose behind both dead cut and live mag checks before shutting the engine down is to enable early discovery of any fault that may have developed during the flight. Such a fault is better discovered at this stage than during the pre-runup check on the next flight. In addition, there is a good safety reason for the live mag check before shutdown; if one magneto is live, then the propeller can be lethal until the fault is rectified. Even though you may treat the propeller as 'live' at all times (and you do, don't you?) there are others who may not.

The Mag Drop Check

The mag drop check is carried out to ascertain if either magneto is equally capable of sustaining ignition at typical in-flight power settings.

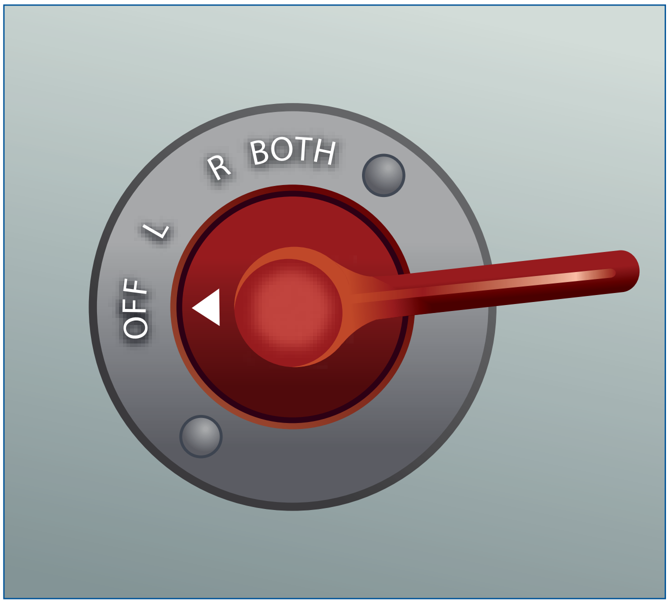
The particular rpm setting at which the check is done is not very important for the purposes of the check, but other engine handling considerations will usually mean a recommendation from the engine or aircraft manufacturer for an rpm setting from the low end of the cruise power range. From the magneto checking point of view, the important aspect is that the check on any particular aircraft should be done consistently at the same rpm, so that any trend can be monitored. There is little to be gained, for example, in comparing today's 150 rpm drop at 2000 rpm with yesterday's 100 rpm drop at 1700 rpm.

... if one magneto is found to be live when switched off, then the flight must not proceed.

For horizontally opposed engines, the amount of rpm drop is not as important as the difference in the drop between the two magnetos. A drop of 175 rpm on each should be of no concern, if the drop is smooth, is similar for each magneto, is consistent with previous engine runs, and is within the range stated by the manufacturer. How much variation can you accept between the two rpm drops? The answer will vary – and you should check the manufacturer's handbook – but 50 rpm difference, at most, would be a typical figure. Once again, trend monitoring may give a better guide to the health of the two ignition systems.

Magneto Checking Techniques

The dead cut and live mag checks are done at low rpm setting and should do no harm to the engine. Once the desired effect (continued running for dead cut, engine cutting for live mag) has been noted, however, proceed without undue delay to the next switch setting.



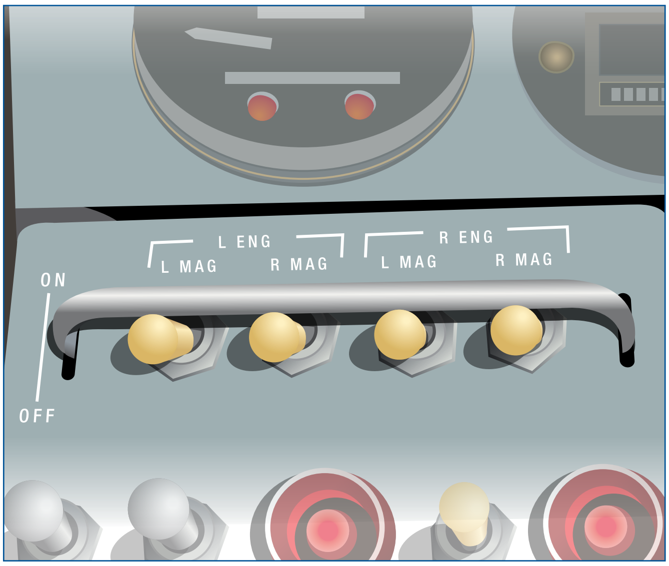
A rotary type magneto switch used in a Piper Super Cub.

(In the following discussion, when we refer to a rotary type switch, we assume it to have the layout shown in our illustration of a key-operated switch. The lever-operated switch illustrated, from a Super Cub, has R and L in the opposite sequence, and our comments would need to be transposed.)

Dead Cut and Live Magneto Checks

Combining both dead cut and live mag checks, the sequence for a **rotary type switch** should be:

- BOTH (normal)
- LEFT (no dead cut – engine runs on left mag)
- RIGHT (no dead cut – engine runs on right mag)
- OFF – momentarily (engine stops – there are no live mags)
- BOTH (back to normal)



Toggle switches

For **toggle switches**, it doesn't matter which mag you test first, but again do the checks without undue delay:

- First magneto OFF (no dead cut – engine runs on second mag)
- and ON (back to normal)
- Second magneto OFF (no dead cut – engine runs on first mag)
- and ON (back to normal)
- Both magnetos OFF – momentarily (engine stops – there are no live mags)
- and ON (back to normal)

The live mag check may be omitted if it is against manufacturer's recommendations. In this case, remember to check for a live magneto when doing the mag drop check.

Magneto Drop Check

The mag drop check must be done differently from the other checks. It is done at a higher rpm setting – and at no stage are both magnetos switched off. Also, as the size of the rpm drop is being noted and remembered by the pilot for comparison,

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there will be a tendency – and a need – to run the engine for a longer period on each individual magneto. This is fine, indeed the time should be sufficient for the rpm to stabilise. At the other end of the scale, however, do not run on one magneto for extended periods, as the fouling of the dead set of spark plugs with fuel and oil may reach an unacceptable level.

The other major difference between a mag drop check and the other two checks is in the sequence of switching.

For a rotary type switch it should be:

- BOTH (normal)
- LEFT (rpm drops, after a few seconds note reading)
- BOTH (pause)
- RIGHT (rpm drops, after a few seconds note reading)
- BOTH (back to normal)

For toggle switches:

- First magneto OFF (rpm drops, after a few seconds note reading)
- and ON (back to normal)
- Pause
- Second magneto OFF (rpm drops, after a few seconds note reading)
- and ON (back to normal)

The reason for returning to BOTH with a rotary switch (and an equivalent pause with both magnetos ON for a toggle switch system) is primarily to let the engine stabilise at normal rpm. This gives each magneto a common starting point, making comparison of the two rpm drops valid. Also, the short period on BOTH lets the oil and fuel burn off the first set of spark plugs that were shut down.

Finally, a caution for those who carry out mag drop checks using rotary switch systems. When moving from BOTH to RIGHT, the switch must pass through the LEFT position; it is easy to overshoot to OFF. Our advice is that you practice the switching sequence with the engine not running until you get the feel of the switch installation. If you do inadvertently overshoot to the OFF position during runup, try to overcome the natural reaction of immediately switching it back on. Having to restart the engine is not as embarrassing as having to rebuild it.

Conclusion

In summary, pilots should carry out both dead cut and live mag checks, both after start and before shutdown.

The rpm setting at which mag drop checks can be carried out should be consistent for each individual aircraft and should follow the manufacturer's recommendation. In the absence of a recommendation from the manufacturer, pilots should follow recommendations from the owner or the operator of the aircraft they are using. ■

young eagles RNZAC

Young Eagles News

A record number of 18 applications were received for the 2008 Ross Macpherson Memorial Scholarships. The five winners are each entitled to $2000 worth of flying through their local aero club.

The scholarships were awarded to:

Nicholas Ashley – *Canterbury Aero Club*

Shelley Hasseldine – *Marlborough Aero Club*

Nicholas Monk – *New Plymouth Aero Club*

Andrew Hayes – *Tauranga Aero Club*

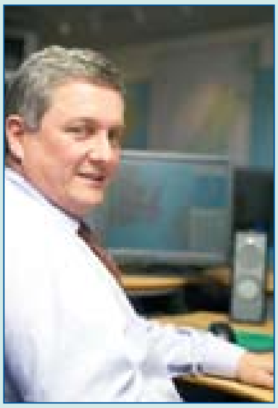
Ben Reid – *North Shore Aero Club*

Back row: Shelley Hasseldine, Andrew Hayes.
Front row: Nicholas Ashley, Nicholas Monk, Ben Reid, Kevin Lloyd.

All five scholarship winners attended the Flying NZ National Championships held in Timaru, 7 to 9 February 2008, where they competed for the Pickard Memorial Trophy. The Young Eagles spent a day increasing their aviation knowledge with Leader Kevin Lloyd.

In the afternoon they sat an aviation questionnaire and a general knowledge questionnaire to determine the trophy winner, who was Andrew Hayes from Tauranga. On Saturday, the Young Eagles were treated to a flight over the South Canterbury region. ■

New Manager for Rescue Coordination Centre



The new Group Manager of the Rescue Coordination Centre New Zealand (RCCNZ) is former Tornado pilot and Wing Commander, Nigel Clifford.

Nigel joined RCCNZ in February following a 25-year career with the UK's Royal Air Force (RAF). He retired from the RAF in December 2005 to take a role with the Royal New Zealand Air Force (RNZAF) working on options for new training aircraft, and projects for buying and refurbishing current types.

"During my time with the RAF, I had been posted to Ohakea on an exchange with the RNZAF. The family and I loved New Zealand and loved the people, so we took the opportunity to move here permanently," Nigel says.

He spent half of his RAF career flying the Tornado fighter bomber all over the world, and the other half training pilots on fast jets. He commanded 208 Squadron, the biggest fast-jet training squadron in the RAF, which completes about 10,000 sorties per year.

"It's a phenomenal way of life. You spend a lot of time at high speed, very close to the ground," Nigel says.

Nigel also represented the RAF on the four-nation, $20 billion project to develop the Eurofighter Typhoon aircraft.

He says running RCCNZ will be an interesting challenge.

"New Zealand is responsible for one of the largest search and rescue regions in the world – some eight million square miles, extending from just south of the equator to the south pole and from half way to Chile in the east to halfway to Australia in the west. This vast area is covered with a relatively small number of people and with aviation and marine operators who typically do search and rescue work as a secondary part of their business.

"RCCNZ is already providing a very good quality service and my focus will be to take it forward and develop it further.

"I would like us to be more proactive and to work more closely with the aviation operators and other providers who deliver the service. I'd like to create opportunities to improve liaison and understanding – putting faces to names.

"We have been a little short of people to do that until now, so the three to five year vision is to secure more funding and use that to increase the team size, upgrade our infrastructure and equipment, and to develop our relationships with providers," Nigel says.

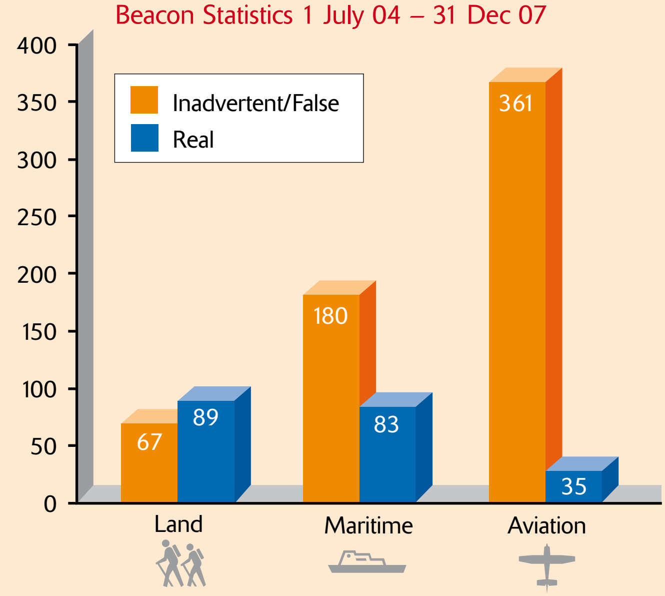
RCCNZ, based at Avalon, Lower Hutt, responds to about 1200 incidents per year, and is a part of Maritime New Zealand. The centre is responsible for 24/7 coordination of Class III land, sea and air search and rescue operations. This includes all searches triggered by the activation of a distress beacon, and operations that involve coordination with the military or with other countries.

Class I searches are carried out by the Police, and Class II searches are handled by the Police with assistance from other organisations. ■

ELT Activations

False ELT (Emergency Locator Transmitter) activations waste resources and can divert attention from genuine emergencies. Figures from the Rescue Coordination Centre (RCCNZ) show that aviation is the worst sector for false ELT Activations (see graph).

Beacon Statistics 1 July 04 – 31 Dec 07



Here are some aspects about ELTs that keep coming up:

- Always take care to ensure your ELT is properly secured and connected, and always check on 121.5 MHz before start up, and before shut down, for any signals.
- If you set off your beacon accidentally, reset it immediately, and let RCCNZ know without delay by telephoning 0–4–577 8030 (24-hour number). There is no penalty for this – RCCNZ will thank you for your call.
- Make sure your 406 MHz ELT is registered with RCCNZ, (go to www.beacons.org.nz) before installation.
- It is notable that false 406 MHz activations are increasing in number, and these often turn out to be activations when installation is taking place. If you are installing a beacon, call RCCNZ beforehand, with the beacon serial number, and if it is accidentally activated during installation RCCNZ will know immediately and can contact you.
- The deadline of 1 July 2008 for 406 MHz beacons to be fitted to most aircraft is fast approaching, and registrations are showing that there are still many hundreds of aircraft that have not installed (or registered) new beacons. ■

Safety Targets Update

In July 2005, the CAA set safety targets for each sector of the aviation industry to reach by 2010.

The targets measure the social cost of accidents – not just numbers of accidents. They incorporate statistical values for fatalities ($3.05 million per life), serious injuries ($305,000), and minor injuries ($12,200), as well as the value of the aircraft destroyed.

Industry Growth

General aviation in particular continues to grow. In 2007 a further 85 sport aircraft, 45 helicopters and 30 small aeroplanes were added to the New Zealand register. In the last quarter of last year (October to the end of December) there were 17.5 percent more aircraft movements at certificated aerodromes than for the same period in 2006 (where data is collected).

Safety Target Structure

Total Safety Cost

Public Air Transport

Any passenger or freight operation where a member of the public can buy the service "over the counter".

- **Airline Operations — Large Aeroplanes**
  All operations (other than Part 137 agricultural) using aeroplanes that must be operated under Part 121 when used for air transport.
- **Airline Operations — Medium Aeroplanes**
  All operations (other than Part 137 agricultural) using aeroplanes that must be operated under Part 125 when used for air transport and aeroplanes conducting SEIFR passenger ops.
- **Airline Operations — Small Aeroplanes**
  Transport and transport support (training, ferry, etc) operations using aeroplanes that must be operated under Part 135. Also includes ambulance/EMS.
- **Airline Operations — Helicopters**
  Transport and transport support (training, ferry, etc) operations using helicopters that must be operated under Part 135. Also includes ambulance/EMS.
- **Sport Transport**
  Transport and transport support (training, ferry, etc) operations using sport aircraft (including microlights, balloons, parachutes, gliders, etc.)

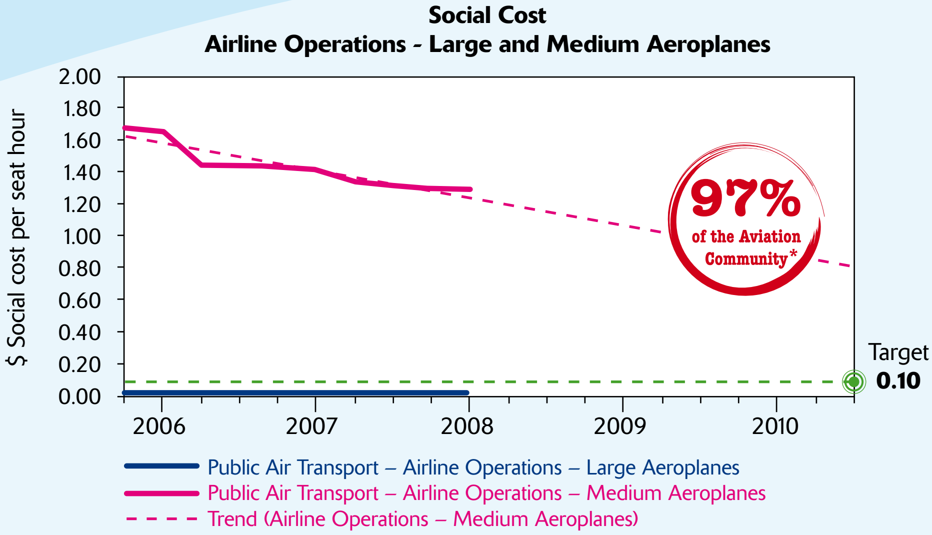
Other Commercial Operations

- **Commercial Operations — Aeroplanes**
  All non-public transport ops for hire or reward or as part of any commercial activity.
- **Commercial Operations — Helicopters**
  All non-public transport ops for hire or reward or as part of any commercial activity.
- **Agricultural Operations — Aeroplanes**
  Agricultural ops, ferry and training for Ag ops.
- **Agricultural Operations — Helicopters**
  Agricultural ops, ferry and training for Ag ops.
- **Agricultural Operations — Sport**
  Agricultural ops, ferry and training for Ag ops.

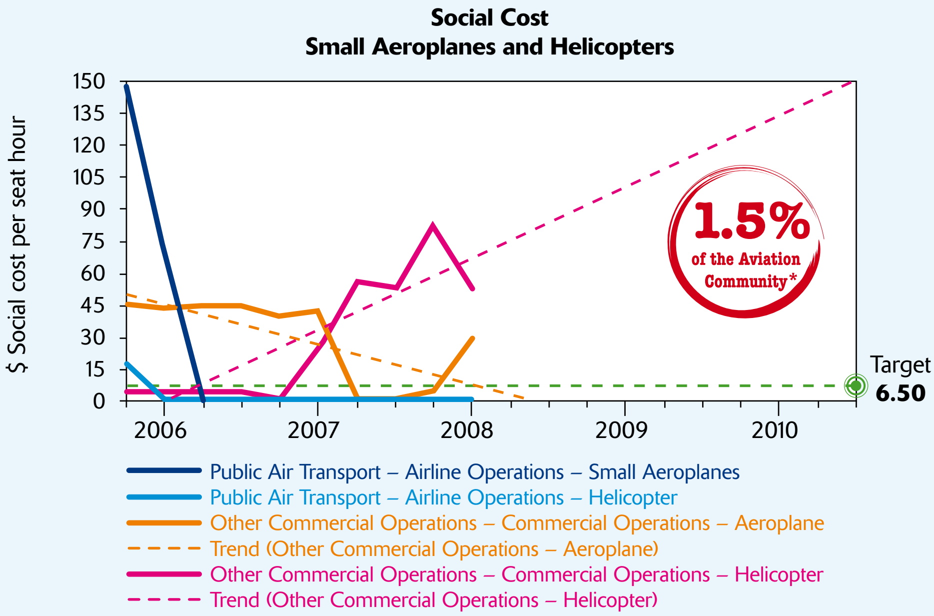
Non-Commercial Operations

- **Private Operations — Aeroplanes**
  Aircraft owned or hired for private or cost sharing use, including glider towing.
- **Private Operations — Helicopters**
  Aircraft owned or hired for private or cost sharing use.
- **Private Operations — Sport**
  Sport aircraft (including microlights, balloons, parachutes, gliders, etc.) owned or hired for private or cost sharing use.

Results for the first 30 months (to December 2007)



Large aeroplanes are well below their target level of $0.10 per seat hour. Although trending down, the medium aeroplane sector will not be able to meet the target by 2010. This is because of the relative size of this sector (just 1.3 percent of seat hours). There have been no serious injuries or fatalities involving large and medium aeroplane sectors over the six months to the end of December.

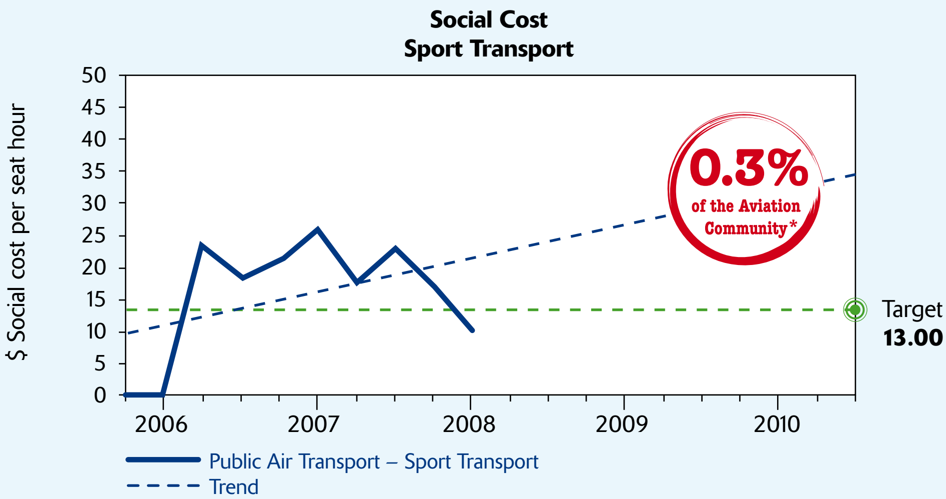


Small aeroplanes used for airline operations are below the target level of $6.50 per seat hour.

Helicopters used for airline operations remain level at $0. There were no fatal or serious injuries in this sector from 2003 to 2007.

Aeroplanes used for non-airline commercial operations are above the target due to one fatal and one serious injury in the last quarter of 2007 (October to December).

Helicopters used for non-airline commercial operations are well above the target level, although beginning to improve. There were two minor injuries involving this sector in 2007.

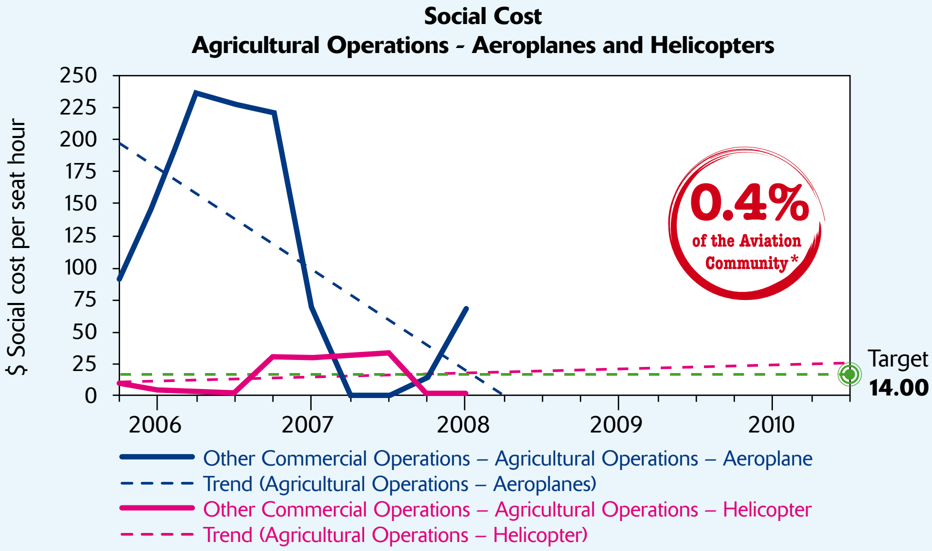


This sector is now below its target level of $13 per seat hour. There were four serious injuries in this sector in 2007.

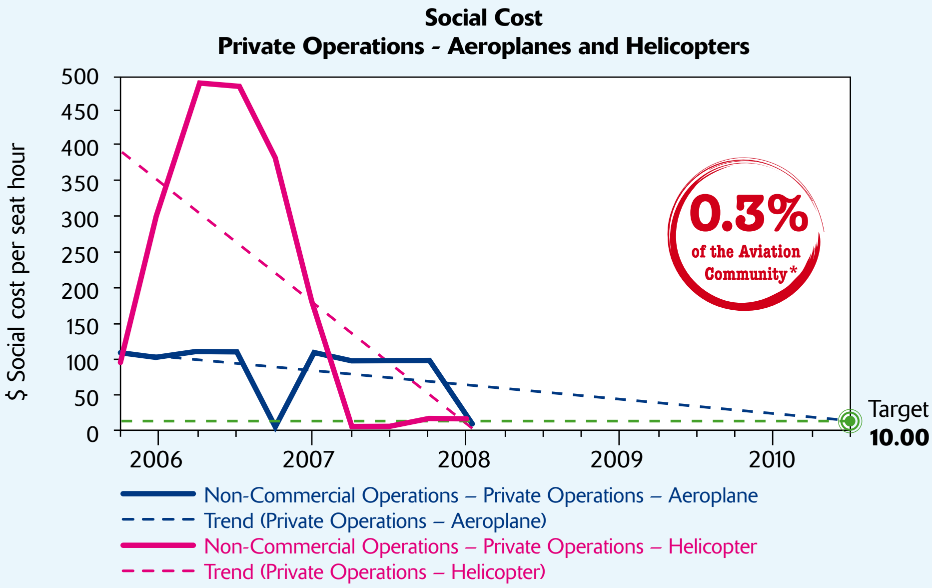
Continued over...

* Based on seat hours

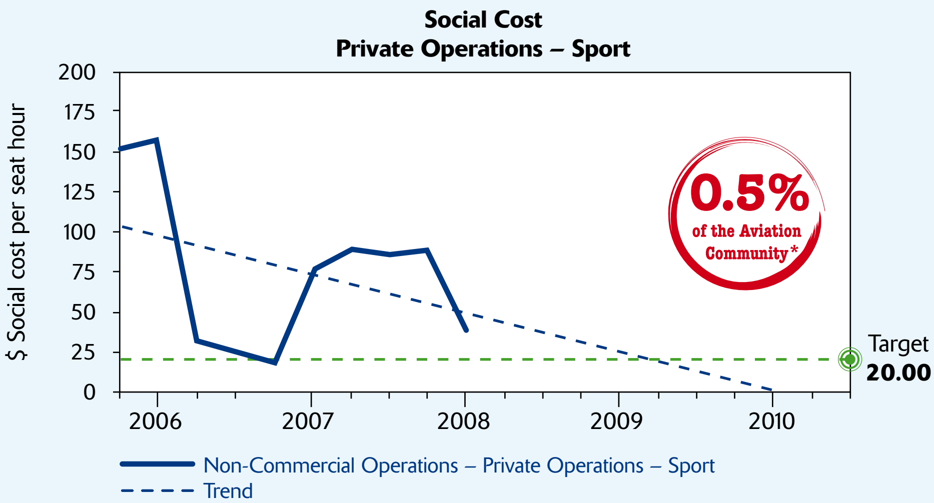
... continued from previous page



The sector involving aeroplanes used for agricultural operations now exceeds the target level of $14 per seat hour following a fatal injury in the last quarter of 2007. There have been no fatalities or serious injuries involving helicopters used for agricultural operations, and this sector is now below the target.



Aeroplanes used for private operations remain above the target of $10 per seat hour. Helicopters used for private operations had almost reached the target as at the end of December 2007.

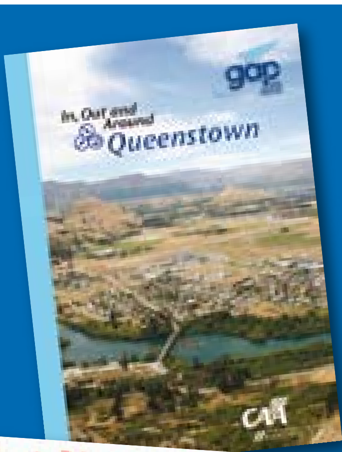


This sector is trending downward, and could reach its target of $20 by 2010. There were two fatal, seven serious and six minor injuries in this sector during 2007.

The expressions "Non-Commercial Operations", "Other Commercial Operations", and "Public Air Transport" are used to explain in a simple way the groupings that are used in the analysis of data. These expressions do not reflect the legal definitions in the Civil Aviation Rules or the Civil Aviation Act 1990.

* Based on seat hours

New Products



In, Out and Around Queenstown

The Queenstown GAP booklet has been revised to reflect recent airspace changes (throw away old copies of this booklet). Many of the photographs have been updated, and they show more Visual Reporting Points.

Is that Mod Approved?

The centrefold from the January/February 2008 *Vector* is available as an A3 poster. It is a reminder of the steps required by rule Parts 21 and 43 for repairs and modifications. It is ideal for engineering and maintenance organisations to display.

To obtain any of the above products, see your local Field Safety Adviser (see below right), or email: info@caa.govt.nz.

How to Get Aviation Publications

Rules, Advisory Circulars (ACs), Airworthiness Directives

All these are available for free from the CAA web site. Printed copies can be purchased from 0800 GET RULES (0800 438 785).

AIP New Zealand

AIP New Zealand Vols 1 to 4 are available free on the internet, www.aip.net.nz. Printed copies of Vols 1 to 4 and all **aeronautical charts** can be purchased from Aeronautical Information Management (a division of Airways New Zealand) on 0800 500 045, or their web site, www.aipshop.co.nz.

Pilot and Aircraft Logbooks

These can be obtained from your training organisation, or 0800 GET RULES (0800 438 785).

Aviation Safety & Security Concerns

Available office hours (voicemail after hours).

0508 4 SAFETY
(0508 472 338)

info@caa.govt.nz

For all aviation-related safety and security concerns

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".

Field Safety Advisers

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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 available on CAA's web site. 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-FQD, Micro Aviation B22 Bantam, 22 Feb 99 at 9:30, Whitianga. 2 POB, injuries nil, damage substantial. Nature of flight, training dual. Pilot CAA licence PPL (Aeroplane), age 52 yrs, flying hours 201 total, 189 on type, 10 in last 90 days.

During circuit training, the undercarriage failed on landing. The instructor reported that previous two landings had been "heavy, but not excessively so".

CAA Occurrence Ref 99/652

ZK-JET, Steen Skybolt, 16 Mar 99 at 17:00, Ardmore Ad. Injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence PPL (Aeroplane), age 34 yrs, flying hours 219 total, 31 on type, 18 in last 90 days.

The pilot reportedly landed the aircraft too fast, and, nearing the runway end, the aircraft ground-looped. The propeller and undercarriage were damaged.

CAA Occurrence Ref 99/619

ZK-SSI, Campbell Sky Ski, 10 Jul 99 at 13:00, Pegasus Bay Beach. 1 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence nil, age 48 yrs, flying hours 104 total, 95 on type, 12 in last 90 days.

While flying along the coast of Pegasus Bay, the pilot noticed a moderate airframe vibration in a turn. He elected to make a precautionary landing on the beach below, but on touchdown, the aircraft ran into some soft sand. It swerved uncontrollably towards the water and the pilot applied power to attempt a climb away. The undercarriage struck a wave, causing the aircraft to land in the surf. The initial vibration had been caused by the muffler contacting the airframe.

CAA Occurrence Ref 99/2037

ZK-KJR, Zenair CH701 STOL, 13 Mar 00 at 12:00, Lake Coleridge. 2 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence nil, flying hours 167 total, 3 on type, 15 in last 90 days.

After flying overhead the strip, the pilot decided to carry out a closer inspection, as the strip showed no sign of recent use. During the inspection fly-by, the pilot found that the strip gradient was steeper than anticipated, and the aircraft was unable to outclimb the terrain. It collided with a fertiliser bin at the top of the strip and rolled over, coming to rest about 15 m past the bin.

CAA Occurrence Ref 00/618

ZK-OOO, Ultravia Pelican "Club" GS, 21 Sep 00 at 6:07, Orini. 2 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence nil, age 62 yrs, flying hours 250 total, 190 on type, 2 in last 90 days.

The microlight aircraft was landing at a farm strip, towards the setting sun. The pilot experienced difficulty with visual reference and landed heavily, bounced, then stalled heavily on to the ground again. Neither occupant was injured.

CAA Occurrence Ref 00/3089

ZK-HWP, Robinson R22 Beta, 27 Nov 04 at 9:00, Taumarunui. 1 POB, injuries 1 serious, aircraft destroyed. Nature of flight, agricultural. Pilot CAA licence CPL (Helicopter), age 31 yrs, flying hours 4000 total, 1000 on type, 65 in last 90 days.

The helicopter crashed into a paddock after takeoff during agricultural operations. One main rotor blade had separated in flight and was found some distance from the main wreckage. The pilot experienced an in-flight vibration, which was not as severe as described in the applicable Airworthiness Directive. On the flight preceding the accident, the pilot reported a mild out-of-track vibration that had not been present the day before. He shut down the helicopter and visually inspected the rotor blades and rotor head. Although NZ AD DCA/R22/40A requires a 10X visual plus eddy current examination, he did not believe the AD applied, as the onset of vibration was not "sudden or severe" as detailed in the AD. In the CAA investigation, a metallurgical analysis has been completed, and the specialist report concluded that the main rotor blade failed due to fatigue cracking that initiated at the edge of a bolt hole in the blade root fitting. It was concluded that the helicopter had been operated in such a way that the loading on the blade was frequently higher than that expected by the manufacturer. There was no evidence of mechanical damage or corrosion contributing to the failure.

CAA Occurrence Ref 04/3712

ZK-PIW, Piper PA-23-250, 21 Dec 06 at 14:00, Ardmore. 2 POB, injuries nil, damage minor. Nature of flight, ferry/positioning. Pilot CAA licence ATPL (Aeroplane), age 63 yrs, flying hours 13190 total, 61 on type, 37 in last 90 days.

On Thursday 21 December 2006, Piper PA23-250-E, registration Aztec ZK-PIW, was part-way through a training flight when, after an intermediate landing, the pilots observed an indication warning of a possible fault with the nose landing gear. The fault was rectified and the aircraft diverted to Ardmore at the request of an engineer. During the flight to Ardmore, a second landing gear indication fault occurred, this time with the right landing gear.

The pilots were satisfied that the right landing gear was down and locked, so continued to land at Ardmore. During the landing roll the right landing gear collapsed and the right wing came in contact with the ground. However, the pilots were able to keep the aircraft on the runway. There was minor damage to the aircraft and no injury to the pilots.

CAA Occurrence Ref 06/4752

ZK-WNZ, Britten-Norman BN2A-27, 28 Dec 06 at 10:00, Tauranga. 1 POB, injuries damage substantial. Nature of flight, ferry/positioning. Pilot age 40 yrs.

The pilot was ferrying the aircraft from Tauranga to a Hamilton maintenance facility when one of the engines failed. The pilot elected to turn back to Tauranga but, shortly after, the remaining engine failed. The pilot carried out a forced landing into a tidal estuary. The aircraft incurred substantial damage to the nose landing gear. Subsequent CAA safety investigation determined that on an earlier flight, the aircraft's electrical system incurred a defect that rendered several electrical components unserviceable, including the two tip/main fuel tank selector valves. No engineering inspection or rectification ensued and the operator ferried the aircraft from Great Barrier Island unaware that the engines were being fed from the tip tanks only. The operator departed Tauranga for Hamilton under similar circumstances, reaching the vicinity of the Kaimai Ranges when the tip tanks became empty.

CAA Occurrence Ref 06/4799

ZK-MAL, Ultravia Pelican "Club" GS, 2 Feb 07 at 13:30, Mandeville. 2 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence PPL (Aeroplane), age 43 yrs.

It was reported that the microlight weather-cocked due to a gust of wind and ground-looped over a fence.

CAA Occurrence Ref 07/260

ZK-IAP, Robinson R44, 20 Mar 07 at 13:40, Matawai. 1 POB, injuries, damage substantial. Nature of flight, agricultural. Pilot CAA licence CPL (Helicopter), age 46 yrs, flying hours 7737 total, 400 on type, 137 in last 90 days.

The pilot reported that, while turning downwind for the next spray run, the helicopter began losing power and descending rapidly. The horn came on and the machine struck the ground heavily; the skids broke off before it rolled onto its side. The pilot felt the cause may have been that he flew into his own rotorwash.

CAA Occurrence Ref 07/859

ZK-ROY, Rans S-6ES Coyote II, 21 Jul 07 at 12:03, Nelson Ad. 2 POB, injuries nil, damage substantial. Nature of flight, private other. Pilot CAA licence nil, age 64 yrs.

The left wheel collapsed on landing.

CAA Occurrence Ref 07/2624

ZK-GFQ, Slingsby T.53B, 15 Oct 07 at 13:10, Drury. 1 POB, injuries 1 minor, damage substantial. Nature of flight, training solo. Pilot CAA licence nil, flying hours 47 total, 7 on type, 7 in last 90 days.

During a crosswind landing the aircraft was observed to weathercock into wind, exit the runway, then come to rest against the runway boundary fence. The student pilot, who was sole person on board, received minor injuries. Subsequent CAA enquiries found that, given the forecast weather conditions and the actual wind velocity experienced at the time, it was considered that the glider flight should not have proceeded.

CAA Occurrence Ref 07/3708

ZK-VCM, Cessna 172N, 21 Nov 07 at 10:24, Wellington Ad. 2 POB, injuries 1 minor, damage substantial. Nature of flight, transport passenger A to B. Pilot CAA licence CPL (Aeroplane), age 21 yrs, flying hours 520 total, 64 on type, 72 in last 90 days.

While taxiing across wind to line up for takeoff, a sudden gust of wind lifted one wing of the aircraft and caused it to start skipping sideways. The pilot tried pointing the aircraft downwind, but the aircraft nosed over and the tail lifted, causing the aircraft to completely flip over on its back. It is possible that prop wash from the recently departed aircraft had contributed to increasing the intensity of the wind gust.

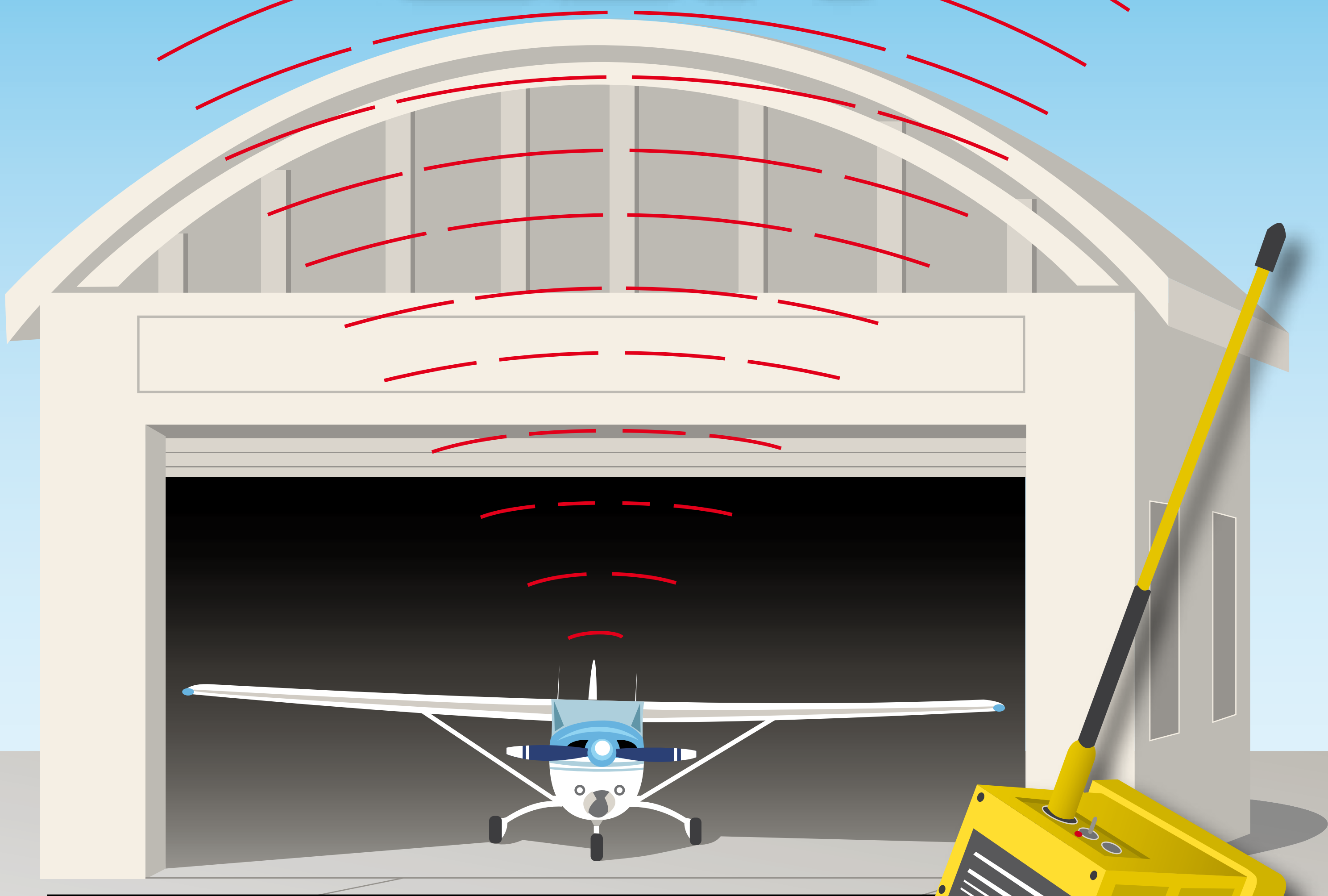
CAA Occurrence Ref 07/4172

ZK-IFM, Robinson R22 Beta, 26 Nov 07 at 22:52, Mangamaire. 2 POB, injuries nil, aircraft destroyed. Nature of flight, private other. Pilot CAA licence PPL (Helicopter), age 50 yrs, flying hours 287 total, 285 on type, 30 in last 90 days.

During high-altitude high-temperature operations, the helicopter lost rotor rpm. Because of the terrain and high trees, there was insufficient height for recovery action. The pilot elected to settle into the trees under some degree of control.

CAA Occurrence Ref 07/4234

Checked your ELT?



BEFORE START UP
and again
BEFORE SHUT DOWN

LISTEN OUT ON 121.5 MHz

If beacon operating:

- **SWITCH IT OFF** then
- **ADVISE RCCNZ ON 0-4-577 8030, or THE NEAREST ATS UNIT, or THE POLICE BY DIALLING 111**

CAA
CIVIL AVIATION AUTHORITY OF NEW ZEALAND

Promoting Aviation Safety