

POINTING TO SAFER AVIATION

# vector

May/June 2011



## Switch it Off and Get Out

Two Belts, No Braces

Callsign – Stop Transmitting – MAYDAY

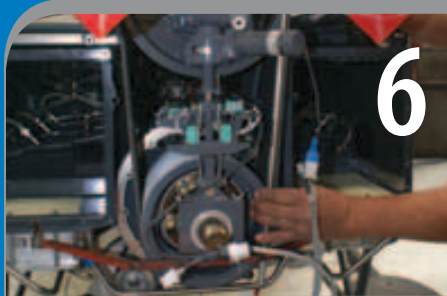
Pilotless Aircraft



3

## Switch it Off and Get Out

You've declared an emergency, and now there's many tonnes of fire appliance and a whole lot of firefighters outside your cockpit window. Here's what you can do to help them do their job.



6

## Two Belts, No Braces

A belt failure might not sound all that serious – except when the belt is the primary means of transmitting engine power to the rotor system. We emphasise the need for getting it right when installing these belts.



8

## Callsign – Stop Transmitting – MAYDAY

After the words, 'MAYDAY, MAYDAY, MAYDAY' pass your lips, what you say next could save your life. Find out what happens in the tower from the moment you make your transmission.



11

## Pilotless Aircraft

There are two types of pilotless aircraft – model aircraft and unmanned aircraft systems (UAS). We explain the difference, discuss the requirements, and remind pilots to check NOTAMs.

## In this issue...

Switch it Off and Get Out	3
Two Belts, No Braces	6
Callsign – Stop Transmitting – MAYDAY	8
CRM in the Wire Environment	10
Pilotless Aircraft	11
Swapping Hats	14
Out in the Cold	16
Transponder Mode S	18
Not a Traffic Ticket	20
New Products – <i>Survival</i> GAP	21
AvKiwi Safety Seminars – Emergency Landings	21
It's More than <i>Vector</i>	22
Rules Poster Update	22
Nominations for 2011 Director's Awards and Flight Instructor Award	23
Flight Instructor Seminars 2011	23
Meet CAA Chairman Nigel Gould	24
Aviation Safety Advisers	24
How to Get Aviation Publications	24
Planning an Aviation Event?	24
Accident Briefs	25
GA Defects	26
Free Aviation Safety Coordinator Training Course	28

**Cover photo:** Chief Fire Officer and Manager Airfield Operations, Peter Moore (standing), talks with Senior Firefighter Robert White, in the cab of Christchurch International Airport's Rosenbauer Airwolf 'Fire 1'. See article on Page 3.

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Christchurch International Airport's Rosenbauer Panthers 'Fire 3' and 'Fire 4'.

# Switch it Off and Get Out

In the early morning of 31 October 1979, 146 tonnes of C-141 Starlifter came barrelling down Christchurch's runway with its starboard undercarriage dangling by a hydraulic hose. Junior airport firefighter Peter Moore was on duty.



Christchurch International Airport Chief Fire Officer and Manager Airfield Operations, Peter Moore.

He and the rest of his crew had eight hours to anticipate the Starlifter's arrival after it damaged its undercarriage on takeoff from Antarctica. By its 3 am arrival at Christchurch, the firefighters had been in touch with the United States Air Force.

"They ran some calculations and came back with the advice that, 'He's got no chance'.

"We were like, 'okay, thanks for that'," Peter says.

These days, Peter is Chief Fire Officer at Christchurch International Airport, with 32 years' experience, and a squad of 34 firefighters under his jurisdiction.

"The pilot came in to land and the starboard wing tip dug into the ground on the side of the runway like a plough. It slewed round on a 45 degree angle and came to a stop.

"My job was to jump on the aircraft and make sure they all got out. The thing I remember most is all these Americans getting out and kissing the ground. Of course, they'd had eight hours to think about it too," Peter says.

It is most likely to have been a once-in-a-lifetime job for Peter. His crews respond to about 500 emergency calls a year. Last year just 20 of those involved an aircraft emergency. By far, the majority of calls are medical, and the team also responds

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to fuel spills, airport building fire alarms, and scrub and structure fires close to the airport.

Of the 20 calls last year involving aircraft, nine were examples of the fire crews' biggest bugbear.

"We had nine undeclared emergencies last year. It is really important for us that pilots do declare their emergency. It's not uncommon that pilots will call up the tower and say they've got 'ABC' wrong with the aircraft. The tower asks if they want to declare an emergency, and the pilot says 'No, no, I just thought you should know'. Well, where does that leave us? The tower will advise us anyway, and we then have to decide whether to respond or not.

"If there's anything wrong at all with you or your aircraft, declare an emergency. The modern airport fire service gets involved with a lot of operational work on the airfield. We're responsible for perimeter security, wildlife clearing, inspections, and our ongoing training, so we're not just sitting there waiting for an aircraft to fall out of the sky.

"We'd much rather you declare an emergency, we have time to organise our response and are there to watch as you land safely without any problem, than have something go wrong when we we're not expecting it.

"It's the emergency services mentality – we expect the worst and hope for the best."

An aircraft fire emergency might not happen very often, but the crews are expected to perform at a real event as though it were second nature.

"We do regular hot-fire training in real fire. We have to expose the guys to what the conditions on board a burning aircraft are really going to be like," Peter says.

Christchurch's training facility is used by other airports' rescue fire crews.

"We have a set-up of big boiler pipes welded together to simulate an aircraft body. Avgas is poured on and lit. It's real fire, and gets very hot."

While airline crews can look to their fire procedures and training in an emergency, a general aviation pilot with smoke showing in the cockpit has to make their decisions on the spot, depending on the circumstances.

"After you've declared your emergency, your job is to land and stop the aircraft as quickly as you can.

"We will try to anticipate where you will stop, and park upwind of you. We're not going to follow you down the runway, with all your smoke and sparks in our face."

Peter says pilots of light aircraft may be able to see the fire crews as they come in to land – but should not make any attempt to extend the landing roll to meet them.

"We'll come to you. Just stop the aircraft, and get you and your passengers out, if you can."

Peter says the most useful thing pilots can do on landing is to shut off the fuel and turn the Master off.

"If you can say to the fire crew, 'I'm the pilot, there's no passengers (or they're all out), the fuel's off and the ignition's off', then that's huge. Our guys do visit the aero clubs and are taught how to turn off the Master and the fuel, but aircraft types are different, and they're not doing it every day. In the heat of the moment, the firefighter could forget how to do it on that particular aircraft and have the prop burst into life again."





Rescue fire is staffed full-time at Christchurch airport, with a minimum of six firefighters on duty at all times. At a smoke-showing incident, a GA aircraft could expect to be attended by three trucks and a station wagon – with backup from city appliances and ambulance if required. The two larger appliances are operated by one driver/operator, who can direct foam or water onto your aircraft using monitors controlled from inside the cabin. The third appliance is manned by three crew, and these are the ones who will ensure you and your passengers are out of the aircraft, and will board it to fight the fire. The station wagon will be driven by the duty supervisor, who will be the best person to give your details to, and to take direction from, once you're clear of the aircraft.

"We have a range of extinguishing options, and we are very aware that some can make more of a mess of your aircraft than others. A hand-held CO<sub>2</sub> extinguisher might be all we need if you have a small fire in an enclosed space, but that's not going to be effective in a more open area.

"Hand-held dry powder is a lot more effective, but is messy, and can be very corrosive on certain aircraft systems. Still – a mess over the electrics is better than a complete hull loss."

For larger fires involving fuel, crews use foam in preference to water.

"Water is heavier than fuel, so the fuel floats to the top and keeps burning. If you add foam in, the foam makes the water lighter, so it covers the fuel and extinguishes the flame," Peter says.

And another tip – at our international airports, fire crews monitor the Ground frequencies.

"We train for the most likely eventualities, but every fire is different. If you need to tell the fire crews something in a hurry, use the Ground frequency. We'll be listening out."

*If there's anything wrong at all with you or your aircraft, declare an emergency.*

### Aircraft Rescue and Firefighting Service

Firefighting at New Zealand airports is managed by each airport company. The required level of service varies, depending on aircraft size and number of movements, and is detailed in Part 139 *Aerodromes – Certification, Operation and Use*.

Airports that receive jet aircraft, or that have more than 700 movements every three months, of aircraft with more than 30 passengers on scheduled operations, must have an aircraft rescue and firefighting service.

Auckland, Wellington and Christchurch International Airports provide a full-time service. Tauranga, Napier, Palmerston North, New Plymouth, Nelson, Queenstown, Invercargill and Dunedin all provide a service from the time of the first scheduled operation of the day to the time of the last. This is worth bearing in mind, as if you are forced to divert to one of these airports outside the hours of scheduled operations, there will be not be a firefighting service on duty. The sooner your MAYDAY is made, the sooner local domestic firefighting crews can be alerted and start heading towards you.

Aircraft firefighting services are provided at Blenheim and Ohakea by the Air Force. ■

# Two Belts, No Braces

A belt failure in the clothing context can be embarrassing, but when the belt concerned is part of a Robinson R22 drive train, the consequences can be devastating.

The Robinson R22 is by far the most popular two-place helicopter in New Zealand, employed on flight training, agricultural operations, hunting and various other roles, some initially undreamed of by the manufacturer. Occasionally, we see reports in the media about an R22 coming to grief, and the reasons for this are many and varied. Although mechanical failures are not high on the list, some accidents have resulted from a failure in the power train, which includes the drive belts. The drive belts are an important, and vulnerable, part of the drive train, and their failure history has been a cause of concern to regulators and operators alike.

The R22 power train comprises a rearward-facing Lycoming O-320 series (O-360 on the Beta 2) engine mounted horizontally in the airframe; a main rotor gearbox located above and forward of the engine; a multiple-grooved sheave (pulley) bolted directly to the engine crankshaft; two banded-pair V-belts to transmit power to an upper sheave, which incorporates a sprag-type overrunning clutch; and a clutch shaft to transmit power forward to the main rotor gearbox and rearward to the tail rotor gearbox. The overrunning clutch permits the continued rotation of the main and tail rotors in the absence of engine power.

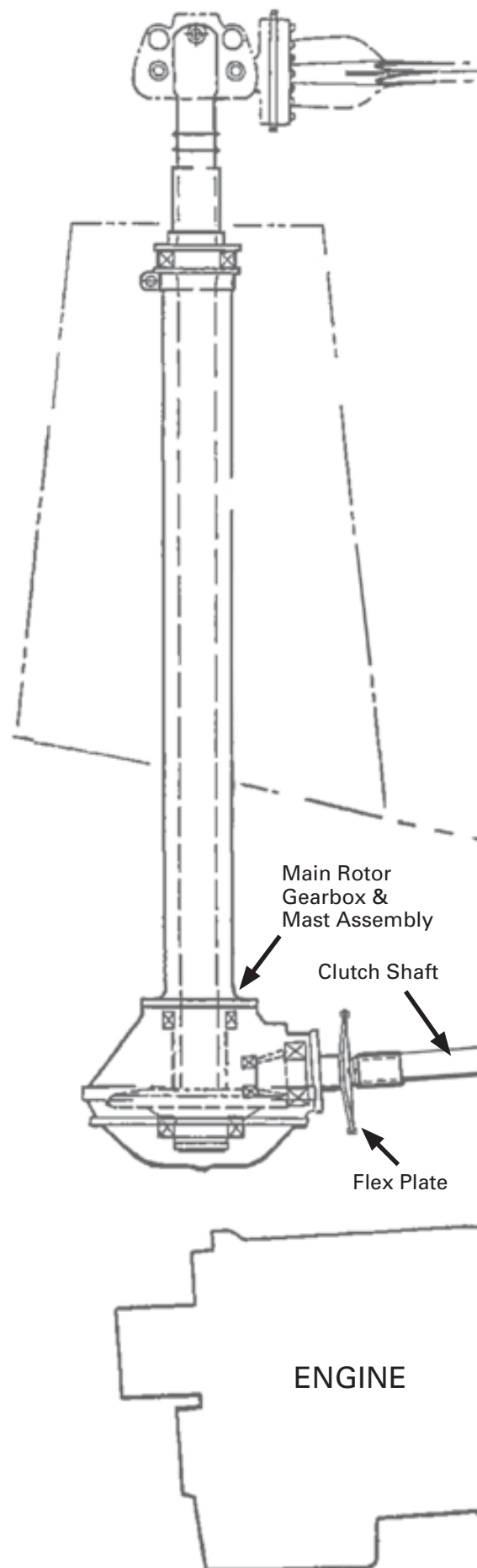
Before the engine is started, the drive belts are in an untensioned state, allowing the engine to start and run freely without the additional load of the main and tail rotors. The belts are effectively a slipping clutch, and are progressively tensioned on the sheaves by an electrically-driven actuator when the pilot engages the clutch switch.

The belt slack at start-up is normally such that the rotor blades will begin rotation within five seconds of actuator engagement. If the belts are too loose, they could roll off the sheaves at this point. Note – if rotor movement occurs on start-up with the belts disengaged, refer to Robinson Safety Notice SN-33.

The actuator is located between the upper and lower sheaves, and raises the upper sheave to increase the belt tension, switching off automatically when the correct tension is reached. A cockpit caution light illuminates whenever the actuator is engaging, disengaging or retensioning the belts.

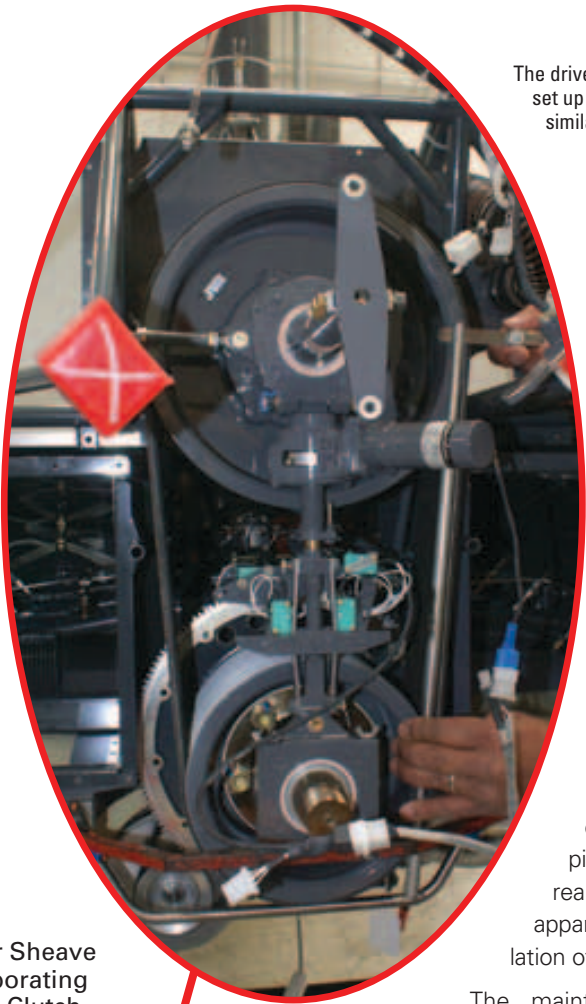
Even to the uninitiated, the V-belts stand out as a critical link in the drive train, and are sometimes humorously referred to as rubber bands. As in a bungy jump, if the rubber bands break, the consequences can be pretty dire. Fortunately, in most cases the helicopter pilot will be able to carry out an autorotational landing, success depending on altitude and airspeed at the time of the failure, and suitable forced-landing terrain beneath.

Belt failures do occur from time to time, with results ranging from a destroyed helicopter with fatalities, to a safe landing with no damage or injury. There are two main types of failure – an actual break, or the belts rolling off the sheaves. Breakage can be caused by a pre-existing defect in the belt, overstressing through exceeding limitations, or by a foreign object. For example, alternator belts have been known to break and become caught in the drive belts, causing them to fail or roll off. Even dropping a lockwire tail between a belt and the lower sheave could potentially





The drive belts on a Robinson R44 being set up at the factory. The process is similar to that for the R22.



cause damage to both items, with the results not becoming apparent until many flying hours later.

More importantly, belt failures can be caused by incorrect installation, as in incorrect tensioning, misalignment of sheaves, and not carrying out the prescribed belt 'break-in' procedure. While maintenance engineers will be familiar with the R22 maintenance manual procedures, pilots and operators may not realise what is involved in the apparently straightforward installation of drive belts.

The maintenance manual procedure consists of 20 steps, some with nested subroutines – for example, item 1 "Check engine shimming installation per Section 6.130" and item 12 "Check clutch sheave alignment per Section 7.230". These items themselves have an additional 13 and 8 steps respectively, and some of these include further subroutines – and so on.

Item 1 in itself is critical – unless the engine alignment is correct, there is no point in continuing on to the next step. Similarly, the sheave alignment must be within limits, and there are several other parameters to check and, if necessary, correct.

Part of the installation procedure mandates a half-hour hover, with further checks to be carried out afterwards.

By now, you should be getting the picture that installing new drive belts can be a long and involved business where getting it wrong is not an option. There can be no set time for the procedure – in one instance, everything goes according to plan, in another, every step requires adjustments, repeats, followed by further checks and adjustments. The last thing the engineer

needs is a pilot or operator continually seeking an update, or applying pressure to get the job finished.

As already stated, getting it wrong is not an option. Getting it right takes as long as it takes. What's cheaper – a few hours of the engineer's time, or the consequences of a belt failure out in the boonies?

For more information, see Continuing Airworthiness Notice 63-001 on the CAA web site, [www.caa.govt.nz](http://www.caa.govt.nz), under "Airworthiness Directives – Continuing Airworthiness Notices – Airframes". CASA Airworthiness Bulletin 63-006 also discusses drive belt issues, and is available on the CASA web site, [www.casa.gov.au](http://www.casa.gov.au).

## Busting the Limits

The main article alludes to exceeding limitations as a cause of belt failure. Robinson Safety Notice SN-37 (found in your R22 flight manual) discusses limitation exceedances in terms of metal fatigue, but the same basic principles apply to the drive belts. They are designed to transmit only so much horsepower to the rotors, and any time that horsepower limit is exceeded, such as when carrying excessive weight, a slight debit to the belt life can be incurred. Over time, these could add up to a premature failure.

## New Belts

Robinson have recently made available 'Revision Z' belts, and the feedback CAA has been receiving from industry is that they differ somewhat in construction and circumference from previous versions. They have a 'shiny' as opposed to 'sticky' feel, and maintenance providers have reported that although there is considerable readjustment required, the final set-up has a much better upper shaft final angular deflection than with the earlier series of belts. ■

Upper Sheave Incorporating Sprag Clutch

Tail Rotor Drive Shaft

V-Belts

Lower Sheave

Engine Cooling Fan

Actuator



Tauranga's Chief Controller, Michele Dumble, at work. Photos courtesy of Airways.

# Callsign – Stop Transmitting – **MAYDAY**

She's been controlling for 24 years, but Tauranga's Chief Controller, Michele Dumble, has had to use these words only a few times in anger.

The phrase 'Callsign – stop transmitting – MAYDAY' is what Air Traffic Controllers use to silence other radio traffic in the few precious moments after they have received a MAYDAY call.

Michele Dumble is one of Airways' most experienced controllers, and is also its Regional Manager Standards and Safety. She has heard just seven or eight MAYDAY calls in her time, and even fewer PAN PAN calls.

It's not that aircraft don't experience emergencies – it's just that they don't always declare them, and when they do, it's often in plain language, rather than with the correct terms.

Here's one that stands out for Michele.

"I was on duty in the tower and I heard 'MAYDAY, MAYDAY, MAYDAY . . . Ah, hang on a minute'.

"Then I'm thinking, 'Oh my god'. I couldn't do anything. You don't know which aircraft it is, where it is, or what the problem is."

A few moments later, Michele heard back from the pilot of that aircraft. He'd landed safely in somebody's back yard.

None of the MAYDAY calls Michele has heard have come out like text-book examples containing the required detail in the required order. But any MAYDAY is better than no MAYDAY.

One day an aircraft crashed into the sea, killing both people on board, while Michele was on duty, but totally unaware of any problem.

"The first I heard about it was from the police after a boatie had tried to pull them out of the wreckage.

"The thing we really need to know is where you are and what the problem is, but even with just a position report and nothing else, we can still get help rolling towards you," Michele says.

When controllers hear the words 'MAYDAY', things get very busy at their end. They may be the only person in the tower at the time, and may have several aircraft in the circuit, with more IFR traffic on the way.

"The first thing we do is glance over at the Direction Finder to get a bearing on the transmission."

If there is no position given in the MAYDAY, that bearing may be the only

clue as to the whereabouts of the aircraft. It is a precious, but fleeting piece of information. Bearings are constantly updated as transmissions are given and received. If you transmit straight after you have heard another aircraft give a MAYDAY call, your bearing will replace theirs.

At Tauranga, Michele can transfer the bearing to her radar screen, and may be able to deduce which aircraft is in trouble, but services at each tower vary.

The next step depends on the type of emergency. Controllers use Inflight Emergency Response Checklists (IFERCs), and Aerodrome Emergency Plans.

"We open the book to the page that best suits that emergency, and then go through the list. It will start with ringing 111, and alerting the Fire Service, or our own airport 'fireys'," Michele says.

The controller has to alert their supervisor, and the aerodrome manager, get in touch with the en route controllers for their sector to stem the incoming flow of traffic, and maintain control over the other aircraft they are responsible for. They may have to advise the Rescue Coordination Centre New Zealand.





"It's a very busy couple of minutes, and the distressed aircraft might not feel like they are getting a lot back from us, but we are working really hard to do everything we can for them," Michele says.

If you're in the control zone when another aircraft declares an emergency, you can help by immediately stopping any routine radio transmissions. Expect too, that the controller will want to slow everything in their airspace down in those first few moments. Depending on the circumstances, this might mean you are required to hold, extend downwind or to land as soon as possible. Pay extra attention to lookout, and try to put together an accurate mental picture of where other aircraft using the airspace are going to be.

"If the emergency is a forced landing, it's all going to happen pretty quickly and we have limited time to react. If other aircraft start using the radio, that's going to increase our workload," Michele says.

If the call is a PAN PAN, it may take a lot longer to resolve. A PAN PAN is an urgency call. It means the aircraft has a safety concern, or is aware of one involving another aircraft or person, but doesn't require immediate assistance.

Examples might be a lost aircraft, an engine that is intermittently running rough, or a query over the reading an instrument is giving, or whether the landing gear is fully down.

Michele has heard about three PAN PAN calls in her career. She says she's been told of about 20 situations that qualified for a PAN PAN call, but in which plain language was used instead.

"We really want pilots to use the phrases MAYDAY and PAN PAN. One of the main reasons is that if a pilot calls 'can you

check the gear', the aircraft practising stalls on the edge of the zone is not necessarily going to hear that, and be unaware there may be a potential emergency developing. Aircraft are mainly just listening out for their callsign. But they are going to hear 'PAN PAN, PAN PAN, PAN PAN'.

"Straight away then, we've got everybody on the same page. Radio traffic is going to slow down, and the controller will be freed up to focus on the aircraft that has the issue.

"We know that the media listen out to the radio frequencies, and that may deter pilots from wanting to transmit a PAN PAN, or even a MAYDAY, but we do not make public any details about the aircraft, its callsign, or the nature of the emergency.

"Nobody wants to be splashed across the front page – but that's not the most important thing. Your safety is."

As a brand new trainee private pilot, with only a few hours under her belt, Michele experienced her own urgency situation.

"I was in the Napier control zone, and every time I pulled back the power, the instruments didn't show the revolution change, and I was so new, I couldn't tell what the power setting was by the sound the engine was making. I told the tower I was having a problem, and I knew there was an instructor in the circuit, so I started talking to them about it on the radio."

She landed safely and later discovered a ladybird had lodged in a tube.

"And no, I didn't declare a PAN PAN then either, but I should have," Michele says.

"Pilots should know that once they've declared a PAN PAN, we'll do everything

we can to help them. Sometimes it's outside the square things like getting an instructor up to the tower to help out. If I have to step back from the radio so an instructor can help someone, I'll do it.

"If you're lost, we have good radar in a lot of the country, and we can help you get back on track, or if you're not sure your gear's down, we can organise to get you to do a fly past and at least be able to tell you if it's obviously not.

"We'll do anything we can to help. Just make it easier for us and everyone else using the airspace at the time and declare your situation with a PAN PAN or a MAYDAY."

PAN PAN and MAYDAY messages are detailed in *AIP New Zealand*, Vols 1, 2 and 4, pink pages. Where possible, state 'PAN PAN' or 'MAYDAY' three times before continuing with the name of the station you are addressing, your callsign, your position, the problem, your intentions, and any other useful information. The terms are repeated three times to give other radio traffic warning to stop transmitting. In at least one accident in recent years, a pilot has died after their MAYDAY was transmitted over and the details were lost.

In a MAYDAY situation, pilots should also squawk 7700 and activate the ELT.

The terms PAN PAN and MAYDAY originate from France in the 1920s. Pan comes from panne, meaning 'breakdown'. MAYDAY is a version of m'aider, from venez m'aider, meaning 'come here and help me'. ■

# CRM in the Wire Environment

Wires – they may be lifelines for many, but they can be potential death-traps for the unwary. Wirestrikes are a particularly unforgiving type of aircraft accident, and have claimed many lives in New Zealand alone. Training in wirestrike avoidance will help prevent needless injury and loss of life.

Low-level aircraft operations are commonplace in New Zealand, particularly in the agricultural sector. Topdressing and spraying are often conducted in close proximity to power lines, telephone lines or aerial cableways, usually with the pilot being aware of their presence. Yet, wirestrikes still occur, and sometimes involve the very wires that the pilot had been carefully avoiding beforehand. And then there are the 'wild cards' that nobody knew about – old electric fence or telephone wires, long since disused and forgotten.

An activity in which you would least expect a wirestrike is power line inspection, given that the pilot will be totally focused on the presence of the wires. Occasionally, however, strikes do occur, with a wire unrelated to the ones being inspected.

What can we do to avoid these costly and potentially harmful accidents?

Internationally-recognised safety expert Bob Feerst will again be running a series of wirestrike avoidance seminars in New Zealand, with the emphasis this year on crew resource management (CRM) in the wire and obstruction environment. This will be of particular interest to helicopter pilots who operate at low level with non-pilot crew members. Some of the course topics are:

- » Basic awareness required while operating in the wire and obstruction environment;
- » How to identify associated hazards;
- » Crew resource management – what the pilot and crew members need to do to act as a team;
- » Why the crew member is so important to safety; crew responsibilities; in-flight communication;
- » Dynamics of the wire environment; traps for untrained crews; forecasting presence of wires; illusions experienced in the wire environment;
- » The high wire reconnaissance. ■

The exact seminar dates, times and venues were not available at the time *Vector* went to print, but it is planned to hold one each in Auckland, Wellington and Dunedin during the week 8–12 August 2011. Details will be available from the seminar coordinator, John Fogden, of Total Aviation Quality, email: [john@totalaviationquality.co.nz](mailto:john@totalaviationquality.co.nz), or tel: +64 4 297 0772. They will also be posted on the CAA web site, [www.caa.govt.nz](http://www.caa.govt.nz), under "Seminars and Courses" as soon as available.



# Pilotless Aircraft

There are two types of pilotless aircraft – model aircraft and unmanned aircraft systems (UAS). So what's the difference? And is it possible to turn a hobby into a money-making business?

A pilotless aircraft is a model when it's flown in visual line of sight for recreational purposes. If it's used for commercial purposes, it becomes a UAS and can be flown outside line of sight under certain circumstances. Currently, the operational requirements in Civil Aviation Rules, Part 101, apply to both.

UAS can vary from a few grams in weight, through to full-size aircraft, and they can be powered by gas turbine, piston, or electric engines.

To operate a UAS in New Zealand you require an authorisation from the Director of Civil Aviation. Part 19 allows the Director to impose any conditions on the authorisation felt necessary in the interests of safety. These conditions will cover aircraft airworthiness, 'pilot' competence, and operational restrictions.

Authorisation holders who are approved for visual line-of-sight operations must maintain direct visual contact with the aircraft with the unaided eye (other than using corrective lenses). This may require a number of observers, depending on the nature of the operation, in order to manage the flight of the UAS, and meet collision avoidance responsibilities. If observers are used, they must be in direct contact with the 'pilot' controlling the UAS.

*Continued over >>*

Flight in uncontrolled airspace is based on the principle of 'see and be seen'. Even though many UAS are capable of fully autonomous flight along pre-programmed flight paths, the safety implications are too great to allow them to operate outside line of sight in airspace shared by other aircraft. The safety margins inherent in the see-and-be-seen system are eroded by 50 percent when only one of the parties in a potential traffic conflict has a set of eyes on board to see and avoid the other.

For this reason, out of line-of-sight operations are only permitted in segregated airspace. This means inside a Restricted Area, or Military Operating Area, to keep the operation separate from all other aircraft. This will remain the case until UAS have the technology to detect and avoid other traffic.

Three operators currently hold an authorisation to fly UAS in New Zealand. The largest UAS weighs in at 50 kg. This operator provides drone services to the Royal New Zealand Navy. Their UAS is flown out of line of sight in a Military Operating Area promulgated by NOTAM.

The other two authorisation holders provide photographic, 3D imaging, and geospatial information services to clients. They both use small electrically-powered fixed-wing UAS which were designed and built in New Zealand. The Kahu Hawk UAS is hand-launched and can fly either a radio-controlled flight profile, or semi-autonomously. It lands by parachute, and has two important safety features. The parachute automatically deploys if the Kahu Hawk goes outside set attitude parameters. It also has a return home mode. If it loses signal for five seconds, it will fly a holding pattern, and if it does not regain the signal after a further 10 to 15 seconds, it will return to a pre-determined location and deploy its parachute.



This hand-launched Kahu Hawk UAS is operated by Hawkeye UAV.

The two Kahu Hawk UAS in operation must also be flown in accordance with the current model aircraft rules in Part 101.

## In the Future

UAS have captured the imagination of people around the world, and the last five years have seen massive growth in this sector. Potential uses include traffic spotting, fish spotting, pipeline or powerline inspections, police work and agricultural work.

Here in New Zealand, the CAA regularly fields enquiries from companies and individuals wanting to operate UAS in the civil aviation system.

Some applications are not yet practicable in New Zealand, due to the requirement for either segregated airspace around the operation, or for observers to maintain line of sight with the UAS at all times. Powerline inspections, for example, could be cost prohibitive because an observer would be required every few hundred metres along the length of the powerline.

Overseas, however, agricultural work has been conducted for several years, and has the potential to be utilised in the current New Zealand environment. In 2010, 2300 unmanned helicopters were used for agricultural spraying in Japan by 12,000 operators. The Yamaha R-Max unmanned helicopter weighs 62 kg and carries 20 litres of spray.

In anticipation of further growth, new rules are necessary to ensure that UAS operators have sufficient understanding of the civil aviation system, particularly airspace and Civil Aviation Rules. Rules are also needed to cover operator competence, certification, flight operations, maintenance and continuing airworthiness of UAS.

The rules New Zealand develops will probably be similar to Australia's rules.

In terms of qualifications, CASA in Australia require commercial operators to either hold, or have held, a flight crew licence with a command instrument rating, an air traffic control licence, or the military equivalent of either. Alternatively, operators must pass both the Private Pilot Licence (PPL) written examination for either aeroplane or helicopter (depending on what type of UAS they fly), and instrument rating theory examination, and obtain a radio operator's certificate of proficiency.

Those planning to operate in visual line of sight by day can apply for an exemption from the instrument rating exam requirement.

Operators in Australia must also obtain a Class 2 medical certificate, have completed a training course in the operation of their UAS conducted by the manufacturer, and have experience of at least five hours operating UAS outside controlled airspace.

In New Zealand, CAA Manager Sport and Recreation, Rex Kenny, says he would like to see PPL Air Law and Flight Radiotelephony written examinations required, along with a training course in UAS operation, and five hours of flight experience in a fixed wing or rotary aircraft – not flying, but making the radio calls in both controlled and uncontrolled airspace.

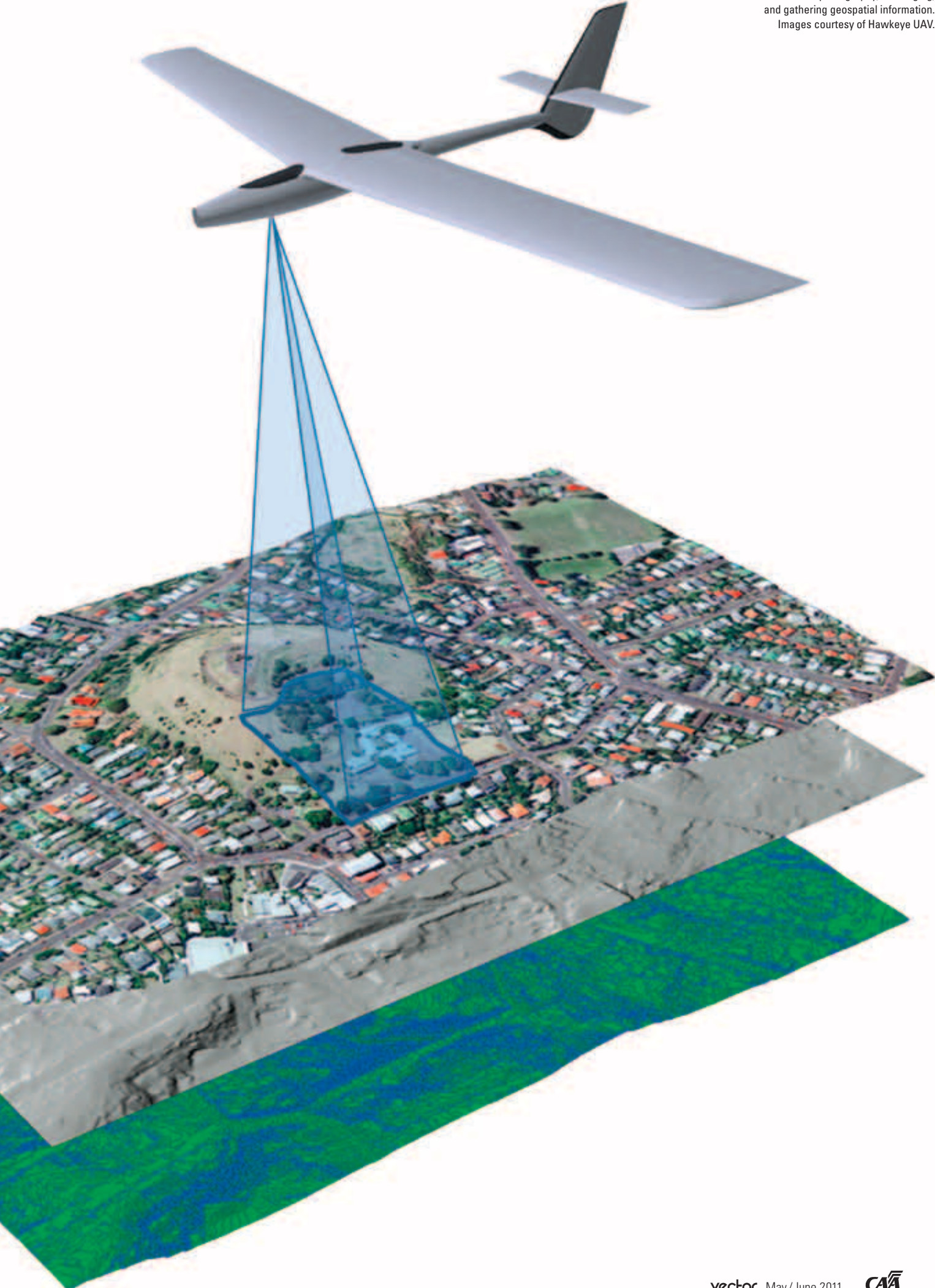
In the meantime, an Advisory Circular is being developed to clearly define the acceptable means of compliance for operators who fly UAS under an authorisation from the Director.

Keep an eye on the CAA web site, [www.caa.govt.nz](http://www.caa.govt.nz), for more information on UAS rule development. See "Sport and Recreation – Unmanned Aircraft Systems". ■





The Kahu Hawk UAS is currently used for photography, 3D imaging, and gathering geospatial information. Images courtesy of Hawkeye UAV.



# Swapping Hats

When an aircraft maintenance engineer carries out a Review of Airworthiness on your aircraft, they are putting on their 'audit' hat.

Only Licensed Aircraft Maintenance Engineers who hold a Certificate of Inspection Authorisation (IA) are certified to carry out Reviews of Airworthiness. This requires additional training, and approval from the CAA, and brings with it the significant responsibility of checking that operators are maintaining their aircraft in an airworthy condition.

The Review of Airworthiness and IA system were introduced in December 1996, as part of wider changes that vested more responsibility for safety with the aviation industry. It replaced a system which required operators to have the CAA thoroughly check their aircraft and its paperwork every four years. This survey was known as a 'C of A (Certificate of Airworthiness) renewal'. At that time, most aircraft had a terminating C of A, and the renewal process was expensive and unpopular with aircraft owners. These days the IA is, in effect, acting on behalf of the CAA when they carry out the Review of Airworthiness on your aircraft.

Reviews must be carried out annually (every 365 days) on Standard Category aircraft and biennially (every 730 days) on Special Category aircraft. No aircraft can be legally operated unless it has a current Review of Airworthiness, with two exceptions – an aircraft may be flown to a maintenance facility solely to have the Review carried out, provided all other maintenance is current; or if it has been issued with a Special Flight Permit.

There is a 36-day latitude period, to allow operators to arrange to have their Review done, but if you 'use it, you lose it', and the number of days your Review was overdue are deducted from the coming 365-day period. If an operator

uses this latitude, they must amend the aircraft Technical Log, detailing the extended Review expiry date.

As part of completing a Review, the IA sends a report to the CAA. One of the first things the CAA checks is the Review's due date. If it is overdue, the CAA starts enquiries as to whether the aircraft has been operated since the due date. While there are always aircraft that have been genuinely 'parked up' or that are under repair, there appears to be a recent trend of aircraft being operated outside their Review period.

If an aircraft is flown with a Review that is more than 36 days overdue for any reason other than a ferry flight to a maintenance facility, the operator could face enforcement action.

An aircraft operator was last year convicted and fined \$500 and \$440 in costs after operating an aircraft without a current Review of Airworthiness on 23 occasions. Another aircraft operator recently pleaded guilty to 12 charges of operating a helicopter without a current Review of Airworthiness, and was required to pay \$4000 as part of a diversion scheme.

Responsibility for ensuring an aircraft has a current Review of Airworthiness rests with the operator, not the LAME or the IA.

A Review of Airworthiness is a condition, conformity and compliance audit. It involves a thorough check of an aircraft's maintenance history against its current maintenance programme. The IA will check all the aircraft maintenance records dating back to the previous Review, as well as the aircraft's suite of maintenance log books and its Flight Manual.







*Responsibility for ensuring an aircraft has a current Review of Airworthiness rests with the operator, not the LAME or the IA.*

The Review also includes a check that the aircraft conforms to CAA requirements for the type, such as all applicable Airworthiness Directives, and confirms that any modifications have been certified and recorded correctly.

In many circumstances, the LAME and the IA are the same person. When carrying out a Review of Airworthiness, the IA must take off their 'maintenance engineer hat', and put on their 'auditor hat'.

This could put the LAME/IA in a position of professional conflict. The maintenance provider will want to give their clients a seamless, professional and competitive service, but this must not lead to compromise. The IA must put aside commercial pressures to stay onside with the operator, and report any defects found as they examine the aircraft and its documents. Review reports must be submitted to the CAA within seven days.

Another misconception among some operators, is that the Review is the same as a 100-hour inspection. This is not correct.

While many operators will aim to have the Review done at the same time as the aircraft's 100-hour inspection, the two are very different processes. The 100-hour inspection is a detailed, hands-on mechanical inspection. The Review is a check of all the relevant paperwork, and a general condition inspection.

Inspection Authorisation courses are held regularly by the CAA, and are open to current Licensed Aircraft Maintenance Engineers who have held their document for five years. Generally, the CAA holds at least one initial and one renewal course each year. Check the CAA web site, [www.caa.govt.nz](http://www.caa.govt.nz), "Seminars and Courses" for more information.

## Review of Airworthiness Requirements

Owners and operators are encouraged to be familiar with what the IA is required to cover during a Review of Airworthiness.

- » A check that the aircraft conforms to its type certificate data sheet or equivalent data.
- » A check that every instrument and item of equipment required is fitted.
- » A check since the last Review that every modification and repair has been correctly recorded and certified for release to service, and that the applicable technical data is referenced.
- » A check that all specified maintenance has been correctly recorded and certified for release to service since the last Review.
- » A check that every Airworthiness Directive relevant to the aircraft type and its components has been assessed, and the decision has been correctly recorded.
- » A check that every defect recorded in the Technical Log has been rectified, and the aircraft has been released to service, or the fault has been placarded where this is allowed.
- » A check that every release to service has been completed and correctly certified.
- » A check that the aircraft's weight and balance data reflects any changes to the aircraft, and that these changes are within published limitations for the aircraft.
- » A check that the Flight Manual is current, including any applicable supplements.
- » A check that the overhaul and finite life of each lifed component is recorded and is within the applicable manufacturer's limits. Where practicable, the IA will verify serial numbers with a physical inspection.
- » The IA will perform a general condition inspection of the aircraft, and must record any new defects that are found in the Technical Log and maintenance manual. ■

# Out in the Cold

Winter flying has unique rewards and challenges. In order to keep it safe, think ahead and be fully prepared before venturing out in the cold.

Winter weather often falls into one of two camps. Anticyclones can bring clear crisp days, with light winds, no cloud, and unlimited visibility after an early morning frost – perfect flying weather, I hear you say. In contrast, anticyclones can also bring cold miserable wet conditions, with a low cloud base or fog, and poor visibility – the sort of day you wish you'd stayed in bed.

The Handbook states that ice that accumulates while the crew waits for the AFM recommended thickness can be far more dangerous than inter-cycle residue ice.

*The first challenge is to get flight crews to activate de-ice systems early. A lot of the inflight, ice-related accidents and incidents are so vicious, it has become fairly apparent that they occur when de-icing systems are not used.*

## Icing

Induction system icing forms insidiously and affects both IFR and VFR aircraft, while airframe icing is primarily, but not exclusively, a problem that IFR pilots must manage.

Ice accumulation (on the leading edges or upper aerofoil surfaces) no thicker than a piece of coarse sandpaper can reduce lift by as much as 30 percent and increase drag by as much as 40 percent.

Despite new technology, training and procedures being developed over the years, accidents related to icing conditions continue to occur, because improved equipment and operating procedures do not in themselves guarantee safety. In order for them to be effective, they must be applied with understanding. Pilots, air traffic controllers, and ground crews, must have a thorough understanding of the effects of icing.

A resource to help pilots further enhance their knowledge of icing is the *Aircraft Icing Handbook*, available on the CAA web site, [www.caa.govt.nz](http://www.caa.govt.nz), under "Publications – Good Aviation Practice booklets".

This Handbook brings together a wealth of information on icing-related accident prevention issued by various international authorities. It gives an overview of both airframe and induction system icing, including the kinds of ice involved, their effect on flight, recognition and prevention. The preflight preparation section covers de-icing versus anti-icing decisions and techniques on the ground.

Inflight management of icing is also covered. For example, the best operating procedures for pneumatic de-ice boots in turboprop aircraft are discussed. The question posed, is whether to activate boots at the first indication of ice accumulation, or wait for ice to reach a thickness recommended in the Aircraft Flight Manual.

*In most of these incidents, the FAA suspect the flight crews were comfortable with some level of accretion and intended to delay the activation of their de-icing systems until they gauged that the ice had reached [the AFM] recommend thickness.*

*The authority [FAA] believes there is generally great danger in waiting – that pilots do not seem to appreciate the significantly increased drag, and loss of stall speed and manoeuvre margins, that develop from a seemingly innocuous frosting of ice.*

The *Aircraft Icing Handbook* has a section specifically on the New Zealand icing environment, as well as a helicopter icing section covering rotor system, engine and airframe icing.

Remember that if severe icing is forecast anywhere along your intended route at your intended altitude, you cannot go unless you receive first-hand information that severe icing will not be encountered (rule 91.421). First hand information could include a recent Pilot Report (PIREP), or ground-based weather radar information which indicates the icing conditions are less than severe and are within the certificated capability of the aircraft's ice protection equipment.

For more information on severe icing and PIREPs see the article "Full Circle" in the September/October 2010 issue of *Vector*.





## GA Winter Flying

The *Winter Flying* GAP booklet has a wealth of winter flying tips for the GA pilot – practical things you might not think about if you are used to the comfort of summer flying.

For example, you should have the heating and defrosting systems checked if it has been several months since they have been used. Make sure you have a current carbon monoxide (CO) detector so you can safely use your heater, and keep a cloth handy for demisting the cabin windows. Misting can be accentuated when warm bodies in damp clothing are on board – your demister may not be able to cope.

If you are wet, your body, especially your feet, can become very cold when you climb to altitude. Not only can this cause hypothermia, but it will also have a detrimental effect on your ability to fly the aircraft and make a safe landing. There have been cases where people with very cold feet failed to land safely because they were suffering from the early stages of hypothermia.

Remove wet clothing if possible, and try to keep your feet dry, especially if your heater does not work. It is a good idea to keep dry clothing inside the aircraft.

The booklet also includes sections on preflight preparations and what to expect during starting, taxiing, takeoff, inflight, landing and parking. It also covers ice protection systems.

Winter flying can be a spectacular experience, especially in the South Island's snow-covered Southern Alps, so get a copy of *Winter Flying* today, read up, and get out there and enjoy it.

*Winter Flying* is available on the CAA web site, [www.caa.govt.nz](http://www.caa.govt.nz), or email [info@caa.govt.nz](mailto:info@caa.govt.nz) for a free copy. ■





# Transponder Mode S

Buying a new aircraft, or upgrading the avionics? Now is the time to look at your transponder capability, and what will be required in the not too distant future.

**M**ode S transponders are in increasingly widespread use in New Zealand, and the associated ground facilities are being progressively upgraded as emerging air traffic management technologies are implemented. With the current secondary surveillance radar (SSR) equipment expected to reach the end of its operational life in 2020-2021, Airways have indicated an intention to deploy a network of ADS-B (automatic dependent surveillance – broadcast) ground stations. These will provide a surveillance facility with performance and coverage at least equal to that of the current radar-based system and with much greater flexibility for any new areas required. In some areas, ADS-B is already detected through multilateration (MLAT) systems, currently in use in the Queenstown area, and the one providing ground operations surveillance at Auckland International Airport.

The current SSR ground stations interrogate all transponders within line of sight, eliciting Modes A and C replies, which are translated by Airways' Skyline Air Traffic Management system into aircraft identification (where a discrete squawk code has been assigned in association with a flight plan) and altitude information. If there is no flight plan – and a SAR plan is not a flight plan – Skyline will not allocate a label to the target, other than the Mode A code and the Mode C altitude.

Mode S transponders are fully compatible with Modes A and C, so to the user there is no noticeable difference. A Mode S transponder, however, also transmits a unique 24-bit aircraft address assigned to the aircraft, and which is permanently programmed into the unit. Also included in the response is an additional identifier, known as flight identification (FLTID) or aircraft identification (ACID). This must be set to correspond with the aircraft registration or a company designator and flight number. In the near future, ADS-B transponders will eliminate the problem of limited availability of squawk codes. At a minimum, Mode S transponders are needed. This is consistent with ICAO changes, and, for example, with Australian and EU mandates for Mode S.

All Mode S transponders must have the 24-bit aircraft address programmed in at installation, and this may have to be updated if the equipment is moved to a different aircraft – this will depend on where the code is stored in the aircraft systems. While not difficult, the programming is normally performed by an avionics specialist, and the setting cannot be changed in flight. Note that there is a current Airworthiness Directive (DCA/RAD/43) applicable to Mode S transponders – it requires initial checking to ensure that the code is correctly

programmed, and that the check be repeated at each biennial avionics inspection in accordance with rule 91.605(e)(3).

Every aircraft on the New Zealand register is allocated an aircraft identification number by the CAA; this identification number forms the variable portion of the 24-bit Mode S address (refer to AC92-2 for further information). The address has two components – the nationality code assigned by ICAO, and a code corresponding to the identification number, selected from a block of codes also assigned to New Zealand by ICAO. To view the code allocated to a particular aircraft, go to the CAA web site, [www.caa.govt.nz](http://www.caa.govt.nz), select "Aircraft – Aircraft Register" and enter the registration. A table showing aircraft details is displayed, and the right-hand column, labelled "Mode S Code Country/Aircraft", will contain three lines of figures. The first of these is the binary code for New Zealand (110010000), the second binary line corresponds to the aircraft identification, and the third is both of these combined and expressed in hexadecimal format (NZ Mode S codes are between C80000 and C8FFFF).

This feature was recently added to the register in response to an increasing number of requests for code allocation, especially for new aircraft, so their codes could be entered at the factory. The number of codes allocated to New Zealand exceeds the number of aircraft ever likely to be registered in the foreseeable future.

The FLTID or ACID, not to be confused with the aircraft address, is set by the flight crew. Some panel-mounted Mode S transponders may be outwardly indistinguishable from a Mode A/C transponder, but the manufacturer's handbook will detail the method of entering the FLTID. Check whether the transponder will retain this in non-volatile memory when turned off. On some airline aircraft, FLTID is entered via the flight management system (FMS). As stated earlier, those aircraft using the registration as the normal RTF callsign will have the registration entered, eg, ZKABC. Note that there are no dashes, leading zeros or other characters, although some equipment may require spaces to be entered **after** the registration, to make up seven characters. The format of the FLTID entered is critical for the operation of the ground systems – if it is not in a valid format, the ground system will see the data message as corrupt and discard it, with the result that the aircraft will not be shown on the ATC displays.

The operator callsign and flight number are entered using the operator's three-letter ICAO designator (not the two-letter IATA code) followed by the flight number. Air New Zealand's,



for instance, would be in the format ANZ456. Although not yet mandatory, the FLTID entry will, in time, be required to correspond with the flight identification in Item 7 of the flight plan. This is already the case in Australian and European airspace. Currently, Airways equipment derives a radar target's flight identification label from the assigned squawk code, but the capability exists to 'drill down' to examine the received Mode S data or to obtain the FLTID from the ADS-B message.

Some aircraft in domestic airline service lack the means for the flight crew to enter FLTID – this will need to be addressed so that the aircraft transponder installation remains compatible with the developing ground systems in New Zealand. One possible option is checking if the aircraft registration can be entered in the same manner as the 24-bit address, and if so, confirming with Airways that this would be acceptable for data testing purposes. If an aircraft is equipped with a Mode S transponder, but will operate without the FLTID entered, the letter 'P' must be entered against Item 10 in the flight plan, rather than 'S' for fully functional Mode S. See *AIP New Zealand ENR 1.10, Flight Planning*.

Mode S transponders now have additional functionality beyond the basic Mode S features. In European airspace, there are requirements for Elementary Surveillance and Enhanced Surveillance. A further feature, Extended Squitter, provides the functionality for ADS-B. Transponders with and without these features are interoperable, but still need to comply with the requirements for their capability in that all data messages are correctly formatted and populated.

Although there are currently four international standards for ADS-B, it is proposed that alignment with Australian standards is appropriate. For ADS-B avionics guidance, the relevant CASA publications are a reliable guide to what will apply in New Zealand. These are available on the CASA web site, [www.casa.gov.au](http://www.casa.gov.au), and are as follows: CASA Discussion Paper *DP 1006AS* (the Annexes in particular); CASA Instrument 521/09 *Direction – use of ADS-B in foreign aircraft engaged in private operations in Australian territory*; and Advisory Circular *AC 21-45(0) Airworthiness Approval of Airborne Automatic Dependent Surveillance Broadcast Equipment*

For owners and operators of aircraft with Mode S transponders, now is the time to build the habit of ensuring that the FLTID is entered before every flight – inclusion in the checklist would be a first step to achieving this. This will ensure a seamless transition once the technology is made 'live' in the New Zealand system. ■





# Not a Traffic Ticket

An unexpected letter from the CAA may have you wondering, when its subject line is “Safety Occurrence Reported to the Civil Aviation Authority”.

**Y**ou read on, and the letter says that the CAA Safety Analysis Unit has received an airspace incident report from Airways Corporation, concerning the operation of an aircraft registered in your name. Your immediate reaction is probably the same as if you had received a traffic offence notice in the mail – but it needn’t be. There is a marked difference in the reason for sending the letter in the first place. Note the sender of the letter: the **Safety Analysis Unit**.

These letters are normally addressed to the person or organisation named on the aircraft registration certificate, and are sent as a follow-up to the initial airspace incident report to CAA by Airways. All airspace incidents observed by Airways are reported to CAA in accordance with rule 12.55(a)(2), and the type of incident may range from a simple entry into controlled airspace without clearance, to a loss of separation or near-collision.

In some cases, the letter recipient may have been an unwitting third party,

and so unaware that an incident had occurred. In others, the pilot may have been requested to telephone the Centre Supervisor, after landing, to discuss the occurrence. Where a pilot is aware that they have been involved in an airspace incident, they must notify the CAA as soon as practicable – if the incident is a serious one (rule 12.55(c)). How do you know if an incident is ‘serious’ or not? It’s sometimes hard to say, especially in the early stages, so if in doubt, treat it as serious and report it anyway.

Even though an incident may have been reported ‘as soon as practicable’, the involved parties are still required (rule 12.57) to provide the relevant details on a Form CA005, or by other acceptable reporting means within 14 days. The CA005 notification can be completed online by going to the CAA web site: [www.caa.govt.nz/report](http://www.caa.govt.nz/report).

The Safety Analysis Unit will normally wait 14 days from receipt of the Airways notification before sending a letter

requesting the relevant information. If this happens to you, don’t panic, just send in the information requested. You should be aware, however, that there are penalties for not reporting when required to do so.

The data is required for analysis purposes, and over time, a series of similar occurrences may lead to a procedure change, a chart amendment or even a rule change. A recent example of a chart amendment is the Rangiora Aerodrome MBZ. Currently depicted on the VNCs as 2500 feet, the MBZ upper limit is actually the lower limit of controlled airspace – and you will see on inspection that one part of the MBZ has an upper limit of 2500, and the other part 1500. It is located beneath a CTA step. The correct limits have been promulgated by NOTAM pending the issue of an *AIP Supplement*, and the VNCs will be amended next issue (17 November 2011). An improvement bought about by your reporting. ■



# New Products – **Survival GAP**



An airliner's passage through the sky is closely monitored, so if something serious happens, it will be noticed immediately. In General Aviation, things are not quite so rigid. Should something go wrong, it will take longer for a search to start, the search area is likely to be bigger, and the time it takes to find you will be greater.

In order to make it as easy and as quick as possible to be found alive, get your hands on a copy of the *Survival Good Aviation Practice (GAP)* booklet.

It covers the power of being prepared – the importance of a positive mental attitude, understanding the priorities of survival, undergoing survival and first aid training, and talking through how to handle a variety of situations. It also explains how to put together a survival kit.

Do you know how long you can survive without: air, shelter, clothing, rest, water, and food? Appropriate clothing, shelter options, how to deal with hypothermia, hydration tips, and the sort of food you should be carrying, are discussed in the booklet.

Specific advice is also given on surviving in New Zealand's different environments – the lowlands, the bush, alpine areas, and marine survival.

To get a copy, come along to an AvKiwi Safety Seminar on Emergency Landings, or email [info@caa.govt.nz](mailto:info@caa.govt.nz). ■



## Emergency Landings

**Gisborne Aerodrome**  
Monday 13 June, 7:00 pm  
Gisborne Aero Club

**Tauranga Aerodrome**  
Tuesday 14 June, 7:00 pm  
Tauranga Aero Club

**Taupo**  
Wednesday 15 June, 7:00 pm  
Suncourt Hotel & Conference Centre  
4 Northcroft Street, Taupo

**Hastings Aerodrome**  
Thursday 16 June, 7:00 pm  
Hawke's Bay & East Coast Aero Club

**Masterton Aerodrome (Hood)**  
Friday 17 June, 7:00 pm  
ATC Building



Photo: @stock.com/mrPiskin

# It's More than **Vector**

Thanks for letting us know your new address – we get a flurry of messages after every *Vector* mailing. But the wording of the emails clearly shows that many do not understand the legal obligations of holding a New Zealand aviation document.

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](mailto: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 organisations, whether based in New Zealand or overseas. The requirement is specified on relevant application forms.

If you live overseas, or plan to relocate overseas, you 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, you accept that delivery to that address is formal notification for the purposes of the Civil Aviation Act 1990.

If you use a separate postal address, that 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 also need to advise other organisations that you do business with, of your change of address. If you subscribe to *AIP New Zealand*, for example, you need to contact Airways. If you operate an aircraft with a 406 MHz distress beacon, you must notify RCCNZ of any changes to your contact details. ■



# Rules Poster Update

Enclosed in this issue of *Vector* is an updated *Civil Aviation Rules and Advisory Circulars* poster. The most up-to-date information on Rules and Advisory Circulars will always be on the CAA web site, [www.caa.govt.nz](http://www.caa.govt.nz), but this poster is useful to have on the office or briefing-room wall.

Make sure you replace old versions with this updated one (May 2011) – the colour is different to make updating easier.

You can request extra copies from [info@caa.govt.nz](mailto:info@caa.govt.nz). ■

## Civil Aviation Rules and Advisory Circulars

CAA  
New Zealand  
Civil Aviation Authority

All Rules and Advisory Circulars are available free on the CAA web site: [www.caa.govt.nz](http://www.caa.govt.nz). Refer to the monthly CAPRI, also on the web site, for updates.

**Part 1** Definitions and Abbreviations  
**Part 11** Penalties  
**Part 12** Accidents, Incidents, and Statistics  
**Part 13** Mandatory Occurrence Notification and Information  
**Part 14** Investigation  
**Part 15** Administration  
**Part 16** Flight Rules  
**Part 17** Acceptability of Parts  
**Part 18** Storage and Distribution of Aeronautical Supplies  
**Part 19** Test Pilot Approval  
**Part 20** Release Aircraft and Unmanned Aerial Systems  
**Part 21** Certification of Products and Parts  
**Part 22** Acceptability of Parts  
**Part 23** Storage and Distribution of Aeronautical Supplies  
**Part 24** Release Aircraft and Unmanned Aerial Systems  
**Part 25** Product Certification  
**Part 26** Product Certification – type certificates and type acceptance  
**Part 27** Product Certification – type certificates and type acceptance  
**Part 28** Product Certification – type certificates and type acceptance  
**Part 29** Product Certification – type certificates and type acceptance  
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# Nominations for 2011 Director's Awards and Flight Instructor Award

The Director of Civil Aviation is calling for nominations for these awards that are presented annually to an individual, an organisation, and a flight instructor with an overwhelming safety ethos.

These awards acknowledge the contribution of aviation community participants to improving safety performance. The awards recognise their skills and professionalism, and the fact that they set an example for others. The Director's Awards began in 1995, and the CAA Flight Instructor Award in 2005.

Here's your opportunity to nominate someone you think has made a difference to aviation safety. Send a few paragraphs on why your nominee should

be considered for these awards to CAA's Communications Manager, Bill Sommer.

Email: [Bill.Sommer@caa.govt.nz](mailto:Bill.Sommer@caa.govt.nz)

Fax: +64 4 569 2024

Post: PO Box 3555, Wellington 6140

## **Nominations close 13 June 2011**

The awards will be presented at the Aviation Industry Association annual conference on 8 July 2011, in Wellington. ■



## **Flight Instructor** Seminars 2011

THREATS AND ERRORS

The CAA Flight Instructor Seminars are held every two years and have become a significant forum for instructors. The presentations have raised awareness in some important areas and this year the topic is 'Threats and Errors'. Register now to secure your place at the seminars.

There will be presentations on the application of Threat and Error Management principles in a GA and Rotary context, and the threat posed by Unmanned Aircraft Systems, as well as other topics.

The seminars run from 0900 to 1630 hours and cost \$50 to register. Lunch and other refreshments will be supplied, courtesy of the seminar sponsors. All the seminar venues offer round-the-clock free transfers to and from local airports.

To see the programme and to register, check out the CAA web site, [www.caa.govt.nz](http://www.caa.govt.nz), "Seminars and Courses". ■

### **Wellington**

**Tuesday 9 August**

Brentwood Hotel  
16 Kemp Street, Kilbirnie

### **Christchurch**

**Tuesday 16 August**

Copthorne Hotel Commodore  
449 Memorial Avenue  
Christchurch Airport

### **Auckland**

**Tuesday 23 August**

Jet Park Airport Hotel & Conference Centre  
63 Westney Road, Mangere

# Meet CAA Chairman Nigel Gould

Wellington businessman Nigel Gould has been appointed as Chairman of the Civil Aviation Authority. A chartered accountant by trade, Mr Gould has broad experience of both the public and private sectors. He is a fellow of the Institute of Directors, the Institute of Chartered Accountants and the Institute of Management. He is a former chairman of the Wellington Regional Chamber of Commerce, and was last year appointed an Officer of the New Zealand Order of Merit for services to business and the community. He is also a recipient of the Wellington Civic Award for services to business.

Mr Gould served as Pro-Chancellor of Massey University from 1999 to 2002, and as Chancellor from 2002 to 2008. He was awarded an honorary doctorate from the University in 2010. Mr Gould established Comtex Group Ltd, an information technology and consulting group in 1986, and has held management roles with Broadlands Dominion Group and Fletcher Challenge. He is a former Managing Director of Andas Group Ltd, and was Chairman of the Wellington Harbour Board from 1986 until the establishment of CentrePort Ltd, which he then chaired until 2008. ■



## How to Get Aviation Publications

### AIP New Zealand

AIP New Zealand is available free on the internet, [www.aip.net.nz](http://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](http://www.aipshop.co.nz).

### Pilot and Aircraft Logbooks

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

### Rules, Advisory Circulars (ACs), Airworthiness Directives

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

## Planning an Aviation Event?

If you are planning any aviation event, the details should be published in an *AIP Supplement* to warn pilots of the activity. For *Supplement* requests, email the CAA: [aero@caa.govt.nz](mailto:aero@caa.govt.nz).

To allow for processing, the CAA needs to be notified **at least one week** before the Airways published cut-off date.

Applying to the CAA for an aviation event under Part 91 does not include applying for an *AIP Supplement* – the two applications must be made separately. For further information on aviation events, see AC91-1.

CAA Cut-off Date	Airways Cut-off Date	Effective Date
13 Jun 2011	20 Jun 2011	25 Aug 2011
11 Jul 2011	18 Jul 2011	22 Sep 2011
8 Aug 2011	15 Aug 2011	20 Oct 2011

See [www.caa.govt.nz/aip](http://www.caa.govt.nz/aip) to view the AIP cut-off dates for the year 2011.

## Aviation Safety Advisers

Aviation Safety Advisers are located around New Zealand to provide safety advice to the whole aviation community. You can contact them for information and advice.

### Don Waters (North Island)

Tel: +64 7 376 9342  
Fax: +64 7 376 9350  
Mobile: +64 27 485 2096  
Email: [Don.Waters@caa.govt.nz](mailto:Don.Waters@caa.govt.nz)

### John Keyzer (Maintenance, North Island)

Tel: +64 9 267 8063  
Fax: +64 9 267 8063  
Mobile: +64 27 213 0507  
Email: [John.Keyzer@caa.govt.nz](mailto:John.Keyzer@caa.govt.nz)

### Murray Fowler (South Island)

Tel: +64 3 349 8687  
Fax: +64 3 349 5851  
Mobile: +64 27 485 2098  
Email: [Murray.Fowler@caa.govt.nz](mailto:Murray.Fowler@caa.govt.nz)

### Bob Jelley (Maintenance, South Island)

Tel: +64 3 322 6388  
Fax: +64 3 322 6379  
Mobile: +64 27 285 2022  
Email: [Bob.Jelley@caa.govt.nz](mailto:Bob.Jelley@caa.govt.nz)

## Aviation Safety & Security Concerns

Available office hours (voicemail after hours).

**0508 4 SAFETY**  
(0508 472 338)

[isi@caa.govt.nz](mailto:isi@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)

[www.caa.govt.nz/report](http://www.caa.govt.nz/report)

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



# Accident Briefs

More Accident Briefs can be seen on the CAA web site, [www.caa.govt.nz](http://www.caa.govt.nz), "Accidents and Incidents".  
Some accidents are investigated by the Transport Accident Investigation Commission, [www.taic.org.nz](http://www.taic.org.nz).

## ZK-HBJ Bell 206B

Date and Time:	12-Feb-10 at 9:30
Location:	Wairoa
POB:	1
Injuries:	0
Damage:	Minor
Nature of flight:	Agricultural
Pilot Licence:	CPL (Helicopter)
Age:	45 yrs
Flying Hours (Total):	4054
Flying Hours (on Type):	470
Last 90 Days:	67

At the end of a spray run at low speed, the pilot removed his hand from the collective to look at load sheets. While doing this the helicopter descended. The pilot tried to arrest the descent by flaring and raising the collective but was unsuccessful and struck rising ground. The front right skid toe and spray gear were slightly bent from the ground contact. There was no other noticeable damage to the aircraft.

[CAA Occurrence Ref 10/872](#)

## ZK-HDF Robinson R22 Beta

Date and Time:	08-May-10 at 10:00
Location:	Paraparaumu
POB:	2
Injuries:	0
Damage:	Substantial
Nature of flight:	Training Dual
Pilot Licence:	CPL (Helicopter)
Age:	31 yrs
Flying Hours (Total):	1010
Flying Hours (on Type):	916
Last 90 Days:	130

During a simulated engine failure in the hover, the student mistakenly lowered the collective, with the helicopter striking the ground before the instructor could react. The left hand landing skid collapsed, and the tail rotor contacted the ground.

[CAA Occurrence Ref 10/1783](#)

## ZK-GVG Schempp-Hirth Ventus bT

Date and Time:	30-Jan-10 at 13:40
Location:	Papakura
POB:	1
Injuries (Minor):	1
Damage:	Destroyed
Nature of flight:	Private Other
Flying Hours (Total):	2491
Flying Hours (on Type):	841
Last 90 Days:	64

During a local flight, the glider continued downwind and went beyond gliding range of the aerodrome in an unsuccessful search for lift. Turning back into wind to return to the aerodrome, the pilot began to deploy the sustainer motor. However, with insufficient height remaining to complete the deployment of the dive started sustainer motor, the pilot reversed course downwind again, towards a row of trees adjacent to a suitable paddock. With a strong tailwind, insufficient airspeed was maintained during the final turn and the glider entered a spin at low level. The glider struck the ground and cartwheeled over a fence.

[CAA Occurrence Ref 10/296](#)

## ZK-EFW Stoddard-Hamilton Glasair III

Date and Time:	21-Jun-09 at 13:21
Location:	Whitianga
POB:	2
Injuries (Minor):	1
Damage:	Substantial
Nature of flight:	Private Other
Pilot Licence:	CPL (Aeroplane)
Age:	64 yrs
Flying Hours (Total):	1659
Flying Hours (on Type):	47
Last 90 Days:	134

The pilot failed to correctly identify the grass runway centreline position prior to takeoff. During takeoff, at approximately 60 knots, the aircraft entered an area of soft ground to the left of the runway. The nose wheel sank and dug in, causing a deep furrow for 40 metres, which ended when the aircraft flipped inverted. The pilot was uninjured while the passenger suffered minor injuries.

[CAA Occurrence Ref 09/2347](#)

## ZK-HKD Robinson R44 II

Date and Time:	11-Jul-10 at 8:30
Location:	Wellsford
POB:	1
Injuries:	0
Damage:	Substantial
Nature of flight:	Agricultural
Pilot Licence:	CPL (Helicopter)
Age:	57 yrs
Flying Hours (Total):	3382
Last 90 Days:	147

During an agricultural operation the helicopter struck power lines. It was on the third run of the morning. On contacting the wires the pilot entered autorotation. Damage to the main rotor blades, transmission, and tail rotor, resulted from the wires snapping at one end and catching up to the machine.

[CAA Occurrence Ref 10/2655](#)

# GA Defects

GA Defect Reports relate only to aircraft of maximum certificated takeoff weight of 9000 lb (4082 kg) or less. More GA Defect Reports can be seen on the CAA web site, [www.caa.govt.nz](http://www.caa.govt.nz), "Accidents and Incidents".

## Key to abbreviations:

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

## Cessna 172M

### Engine

Part Model:	O-320D-E2D
Part Manufacturer:	Lycoming
ATA Chapter:	8500
TSO hours:	1291
TTIS hours:	5712

Climbing through 500 feet AGL, with a glider on tow, the engine suddenly started running rough with an increasing loss of power. The glider was released from tow and moments later the engine came to an abrupt halt. Both the aircraft and glider landed safely. The engine was removed and transported to a maintenance provider where it was stripped down for inspection under CAA supervision. Internal examination of the engine determined that the number three cylinder big end bearing cap had detached from the con-rod, due to one of the retaining bolts failing. The bolt, together with the nut which contained a threaded portion of the bolt, were sent for metallurgical examination and testing. These tests found that the bolt met the required manufacturing specification and it had failed under tensile load. Due to the internal damage within the engine no other useful information could be gained from the engine parts. Ultimately the cause for the tensile overload of the con-rod bolt could not be determined.

[CAA Occurrence Ref 10/2516](#)

## Cessna U206F

### Induction airbox assembly

Part Model:	IO-520F
Part Manufacturer:	Continental
Part Number:	1250702-2
ATA Chapter:	7160
TSI hours:	45.9

During takeoff, as the aircraft was climbing through approximately 30-50 feet, the engine began to vibrate and lose power. The PIC immediately closed the throttle and landed ahead on the runway. At this point the engine was still running, although roughly on what was thought to be five of the six cylinders. The PIC vacated the runway and taxied to the apron where the aircraft was shut down and maintenance assistance sought.

Maintenance investigation discovered that a small section of the induction airbox duct had failed and entered the number four and six cylinders, causing some damage. These cylinders were removed. The number four cylinder was inspected and no damage found. The cylinder was reassembled, valves lapped, and reinstalled with new rings, gaskets, and seals. The number six cylinder was found to have a damaged piston, inlet valve, and pushrod. The cylinder was replaced with overhaul assembly and installed with new rings, gaskets, seals, and a new inlet pushrod. The airbox duct was repaired and reinstalled.

Cracking of the lower skin of the induction airbox duct is a known problem with Cessna 206 and 207 series aircraft. The ducts are subject to inspection every 100 hours IAW DCA/CESS206/133. The inspection on this airbox was carried out 45.9 hours prior to the failure. Although problems with the airbox duct are not often encountered, Engineers should remain vigilant when carrying out the visual inspection IAW the AD.

[CAA Occurrence Ref 10/3182](#)

## Pacific Aerospace Cresco 08-600

### Longeron

Part Manufacturer:	Pacific Aerospace
ATA Chapter:	5310
TSI hours:	82.06
TSO hours:	3070.13
TTIS hours:	1735.55

Both the left hand longeron, Part No. 243019-3L, and right hand longeron, Part No. 243019-3R, were found cracked at the rear strut mount vertical attachment bolt. The longerons were replaced with new items and modification PAC/CR/0433 was embodied. After embodiment of the modification, there is no requirement to carry out the 300 hr longeron inspection. The maintenance provider is continuing with the 300 hour inspection, however, until satisfied that longeron cracking is no longer an issue.

[CAA Occurrence Ref 10/2952](#)

## Pacific Aerospace Cresco 08-600

### Longerons

Part Model:	Cresco
Part Manufacturer:	PAL
Part Number:	08-11022-2
ATA Chapter:	5300
TTIS hours:	6581.8

During scheduled maintenance, the hopper was removed to comply with PACSB/CR/046 – Replacement of Hopper Beams. The left hand longeron W.L. 66.0 at Stn 118.84 was found cracked most of the way across the material cross section; 1" up the inbound leg of channel and 2" across longeron. Cracking had initiated in the bend radius of the longeron just forward of high



shear fasteners attaching the longeron to frame 118.84, and progressed almost to the edge of the inbound leg of the material. The longeron is 2.5" wide.

Cracking was also found on the RH longeron at approx Stn 107, initiated from an unused bolt or screw hole in the longeron.

A straight edge placed along the top of both longerons indicates that the longerons bend at Stn 118.84. With the left hand longeron removed and a straight edge placed along the tops of each of the frames, it was evident that the top of the frame at Stn 118.84 was higher than the rest of the frames by approx 1/8".

It is likely that during assembly the longeron has been fitted under tension due to the uneven heights of the frames. Fatigue induced by landing and flying loads has resulted in the frame cracking at the point of greatest tension along the longeron. A replacement longeron W.L.66.0 has been ordered from the manufacturer. The extrusion riveted to the top of frame 118.84 has been removed. With the new longeron fitted in place, the extrusion will be refitted to frame 118.84 in a position to ensure the longeron is straight along its length.

CAA Occurrence Ref 10/3754

### Piper PA-28-181

#### Aileron control chain

Part Model:	PA-28-181
Part Manufacturer:	Piper
Part Number:	62858-02 & 63404-00
ATA Chapter:	2711
TTIS hours:	6500.5

While pre-flighting the aircraft, the pilot found that the ailerons were unable to be moved. Maintenance investigation found that the aileron control wheel chain had jumped off its sprocket, jamming the ailerons. The chain and sprocket were inspected for condition. The chain was refitted and rigged as per the manufacturer's procedures and the aircraft released to service. It is suspected that the ailerons had been buffeted by the down draft from a helicopter that was operating behind the aircraft while it was parked at the fuel pumps.

CAA Occurrence Ref 10/3331

### Jabiru SK80 Microlight

#### Conrod

Part Model:	A2200
Part Manufacturer:	Jabiru
Part Number:	7100
ATA Chapter:	91
TTIS hours:	412

While on approach to land at approximately 700 feet, the pilot noticed some engine vibration. As the aircraft crossed the threshold the vibration got worse. After landing, and when safe to do so, the pilot shut the engine down and informed the Tower of the situation. Visual inspection of the engine by the pilot confirmed that a conrod had failed. The cause of the conrod failure was not determined.

CAA Occurrence Ref 10/753

### Piper PA-23-250

#### Servo fuel injector

Part Model:	RSA-5AD1
Part Manufacturer:	Precision Airmotive Corp
Part Number:	2524213-11
ATA Chapter:	7320
TSI hours:	17
TSO hours:	1416
TTIS hours:	7315

After a normal takeoff at approximately 200 ft AGL, there was a noticeable reduction in engine power being produced by the right engine. A significant yaw was also observed by the pilot. The right-hand propeller was feathered and a PAN PAN call made. The pilot made all turns towards the live engine and carried out a low level circuit and safe landing on the departure aerodrome.

Maintenance investigation found that the fuel servo injector on the right-hand engine was contaminated with a wax-like sludge causing a fuel flow restriction. The sludge was likely to have been formed by water. The fuel injector was replaced and fuel filters cleaned. The fuel tanks were inspected internally; no contamination was found. The source of the sludge could not be determined.

CAA Occurrence Ref 10/682

### Robin DR400/500

#### Propeller blade

ATA Chapter:	6110
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The aircraft took off with its towing bar still attached. On towing the aircraft from its hanger, the pilot was distracted when he noticed that the mower had a flat tyre. The pilot had completed a pre-flight on the aircraft the previous evening, and noticed that the nose wheel oleo was a bit flat. When the pilot started the aircraft, a bump was heard which was thought to be the oleo issue. During the takeoff the bumping noise was heard again. The pilot then heard a bang and thought the nose wheel had fallen off. The pilot phoned a friend at the aerodrome and that person confirmed his wheel was still there but there was something hanging off it. The pilot yawed the tow hook free onto the grass before landing safely.

CAA Occurrence Ref 10/1116

### Yakovlev Yak-52

#### Bearings

ATA Chapter:	8530
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In flight, the pilot noted a drop in oil pressure into the yellow range. NZNP tower was advised, and the aircraft made a precautionary landing. The oil filters were full of white bearing metal, which the engineers anticipate has come from the master rod bearing; this would explain the drop in oil pressure. The oil pump was removed and inspected and appeared to be fine, further supporting the master rod bearing as the probable cause. The operator has since fitted a replacement engine.

CAA Occurrence Ref 10/662

# Free Aviation Safety Coordinator Training Course

The number one function of any company is business success. Safety is critical to business success.

If your organisation operates commuter services, general aviation scenic operations, flight training, sport aviation, or engineering, you need an Aviation Safety Coordinator.

Attend this free two-day course to train new aviation safety coordinators, and to refresh and re-inspire existing ones –

- » you will get a comprehensive safety manual;
- » access to all of the latest CAA safety resources and support; and
- » lunch is provided (accommodation, transport and other meals are not provided).

## Wellington

**Thursday 23 and Friday 24 June 2011**

Brentwood Hotel  
16 Kemp Street, Kilbirnie  
Wellington

Check the CAA web site, [www.caa.govt.nz](http://www.caa.govt.nz), under "Seminars and Courses" for an enrolment form and further information. Places are limited and they fill up quickly, so enrol early.

Or contact Rose Wood,  
Tel: +64 4 560 9487  
Fax: +64 4 569 2024  
Email: [Rose.Wood@caa.govt.nz](mailto:Rose.Wood@caa.govt.nz)