

# vector



## Uncontrolled Aerodromes and Drones



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Good Instructors**

**Summer Flying**

**Parapara... um...?**

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Cover: With increasing drone activity, Ardmore and North Shore aerodromes have taken proactive steps to protect their circuits.

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Fax: +64 4 569 2024,  
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**Manager Communications and Safety Promotion** Mike Richards.

**Editor** Peter Singleton.

#### The *Vector* Team

Charlie Brimmicombe, Aaron Hailwood, Pen Mackay, Bridget Tunnicliffe, Rose Wood.

**Design** Gusto.

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# Taking Ownership of Risk

Preparation for the next Sector Risk Profile is under way. This one focuses on medium and large aircraft operations and we welcome the involvement of those interested in improving safety in this area.

Two Sector Risk Profiles (SRP) have already been completed:

Part 137 *Agricultural Aircraft Operations*, in 2013, then Part 135 *Air Operations – Helicopters and Small Aeroplanes*, last year.

SRP project manager, Dominik Gibbs, says SRPs are about capturing the knowledge, experience, and perceptions of sector participants, including the CAA. The results are combined with evidential data to help identify and manage safety risks, and then the causes and treatments of the risks.

The current SRP includes medium and large aircraft operations: Part 121 *Air Operations – Large Aeroplanes*; Part 125 *Air Operations – Medium Aeroplanes*; Part 129 *Foreign Air Transport Operator – Certification*; and operations conducted in New Zealand under the Australia New Zealand Aviation agreement.

The CAA's Deputy Director Air Transport and Airworthiness, Mark Hughes, says the Authority has identified seven safety and security focus areas and four of them relate directly to this sector.

"An SRP approach is the next logical step to focus our efforts."

Mark believes there have been some advances in safety as a result of the first two SRPs, and this SRP will build on that previous work.

"The focus of previous SRPs was the identification of safety risks. We're stepping this risk profile up to the next

level. We will work with industry to determine new or enhanced controls for managing those risks identified."

Dominik says there will be a phased approach, starting with the collection of safety data, including surveying participants.

"At the end there will be a treatment implementation plan, and an opportunity for people to take ownership of these risks. This work will help to inform Safety Management Systems (SMS) and assist the CAA in improving the aviation system."

The CAA has begun inviting sector participants to get involved. The first phase will include identifying the hazards and associated risks.

Dominik says an independent risk management facilitator will advise the project and lead workshops early next year, involving industry operators, the CAA, and other stakeholders.

"We prefer this collaborative approach. We want to create an environment where everyone 'in the room' has the opportunity for free and frank discussion, which is usually how you get the best information."

The CAA's Sector Risk Profile Lead, John McKinlay, says developed nations are increasingly going down the path of sector risk profiling.

John, who has been in contact with some of the CAA's international equivalents, believes we can leverage off their work.

"What we are doing aligns very well with the UK CAA's approach to performance based regulation, which focuses on risk management. Like CASA (Australia), we believe working with industry is the way to go. This includes jointly identifying safety priorities, and the best mitigation controls or treatments."

The CAA is putting together draft policy and procedures around sector risk profiling. Stakeholder feedback will help refine it, providing a good model for future SRPs.

"The owner of the profile is essentially the sector being profiled. It's important they take ownership of the risk mitigations – that way the sector has a real opportunity for improving safety," says John.

Air New Zealand's General Manager Flight Operations, Stephen Hunt, says the airline looks forward to collaborating with stakeholders.

"Air New Zealand has been on the risk profiling journey for some years now. Notably, the Queenstown night operations safety case was one of the biggest collaborative industry exercises seen in recent times.

"This demonstrated the advantages of all stakeholders exploring the safety risks together, and collectively identifying how to manage those risks to benefit all aviation participants in the region."

For more information, go to the CAA web site, [www.caa.govt.nz](http://www.caa.govt.nz), "Aviation Info > Safety Info > Sector Risk Profiles". ■

Photo: Above Ground Level



# Uncontrolled Aerodromes

Two of the country's busiest aerodromes have developed plans to deal with the surge of drone users, demonstrating how seasoned aviation participants can work with newcomers to ensure everyone's safety.

Over the last 18 months, Ardmore and North Shore aerodromes have seen a dramatic increase in drone activity. This increase has prompted both aerodromes to work closely with drone operators in their vicinity.

Recreational users haven't been too much of a problem for North Shore says Daryl Gillet, CFI at North Shore Aero Club.

"Most of the time, Part 101 operators are flying low and aren't much concern. Many of them seem to be aware that they need our permission to operate within 4 km of the aerodrome, and that's encouraging," says Daryl.

However, both aerodromes are on the outskirts of different sides of Auckland,

and the city is spreading with new developments edging closer to the aerodromes.

"Almost all the drone operations near North Shore Aero Club are commercial in nature," says Daryl. "And with lifestyle blocks near us in the \$2 million plus category, most of those operators are filming on behalf of real estate agents."

Daryl says the issues come down to three things: ignorance, incorrect interpretation, and lack of communication.

The rules specify that drone operators must have knowledge of airspace, but Allan Bostock, General Manager, Ardmore UNICOM, says that some users are often lacking that.

Allan says, "Part 101 operators should have a Wings badge from MFNZ, which demonstrates that they have some understanding about airspace.

"The airspace around Ardmore is complex with a multitude of bona fide low level operations, including low-level helicopter approach sectors.

"Without a real knowledge of the airspace around the aerodrome, drone operators can really put our pilots at risk."

Richard Milner, a helicopter pilot, drone operator, and instructor, echoes this sentiment.

Richard says that the better the communication with aerodromes and drone operators, the easier it will be for both industries to mould together.

"If I had a photography job as a helicopter pilot in Auckland control, I'd talk to them prior to the job – not just go into IFIS and hope for approval. I'd ring the tower with the details and ask if it's a suitable time, because I'm not going to be able to do it while there's aircraft stacked up in a holding pattern – it's not going to work, is it?"

"The same thinking that pilots have should be applied to drone operators."

Richard runs a training organisation certificated under Part 141 and passes on his extensive knowledge gained as a pilot in both helicopter and drone operations. His organisation also provides training to potential operators to help them prepare their expositions when applying for Part 102 certification with the CAA.

Both Daryl and Allan have worked closely with Mark Houston, CAA's Senior Technical Specialist, Unmanned Aircraft and Recreational Aviation, to develop plans to deal with drone operations near their aerodromes.

"To be certificated under Part 102, operators need to show us that they have developed a risk management

Photo courtesy of Richard Milner.



Richard Milner (left) pictured with Daryl Gillet operating a DJI Inspire 1 Pro outside North Shore Aero Club.

# and Drones

system that includes a pre-flight risk assessment," says Mark. "Part of that assessment involves showing us that they have consulted aerodrome operators in areas where they're planning to fly.

"Having a Part 102 certificate isn't a free pass for the certificated operator to fly wherever and whenever they like. They need to ensure they're sticking to what they've agreed to do in their exposition."

Allan says one of his key issues is the amount of warning some Part 102 operators are giving Ardmore.

"Ideally, we'd like at least 48 hours' notice to ensure we can mitigate risks and notify all users where there may be drone activity. Unfortunately, sometimes we get as little as 15 minutes.

"We still do the best we can with that, but realistically, that's not enough time for us to give notice to pilots."

Both Allan and Daryl say that the key for drone operators and aerodromes working together is timely communication.

Allan says, "We had one user who wanted to operate at 400 ft, just over 1 km from our threshold – the altitude that aircraft are at on approach.

"However, explaining to him how that would conflict with aircraft, we agreed on 200 ft, and I alerted all our aircraft that drones were being flown in the area."

Both Daryl and Allan recommend that operators arrange for a NOTAM. For Part

102 operators, this may be an actual requirement of their certification.

While NOTAMs alert pilots that drones are operating in the area, Allan says some drone operators don't appreciate the timeliness needed.

"Operators need to allow time for pilots to see a NOTAM in their pre-flight planning," says Allan. "So issuing a NOTAM out 15 minutes prior isn't going to cut it. By this point, aircraft are either in the air or taxiing out and won't be aware that a NOTAM has been issued."

However, Daryl and Allan both say most of the Part 102 operators are actually pretty good in communicating with them.

"One operator is now emailing me about activity well outside Ardmore as he understands that it can still conflict with our traffic," says Allan. "For example, he has an operation at Pokeno, 10 miles south of Ardmore, where a lot of our aircraft go to practise simulated forced landings. They're coming down to 500 ft agl, and as he's operating at 800 ft, it creates the potential for conflict. But he always lets us know in plenty of time,

Drone is the popular term for these aircraft, but the current official (ICAO) name is Remotely Piloted Aircraft Systems (RPAS). These include remotely controlled model aircraft.

where he's operating and we can let our pilots know where to avoid."

Richard Milner agrees good communication between operator and aerodrome makes everything smoother for everyone.

"We've filmed regattas on the harbour that require us to fly within 500 metres of the Mechanics Bay heliport, but we have a good relationship with them. By working with them, we can ensure we can get our work done safely, without impacting on the heliport's operations.

"One time, Whenuapai held the Hercules and Orion so that we could quickly finish our operations!" ■



# In Praise of **Good Instructors**

Following the CAA's eye-opening Dual Flight Training Review of 2014, the key to avoiding such accidents in the future may be valuing more highly the job flight instructors do.

In 2014 it was safer to fly solo than with an instructor. That was the bald finding of an investigation into a spike of dual lesson accidents over that year.

The investigators examined the logbooks of the instructors involved in those accidents. They found that when the instructors themselves were students, they were poorly supervised by their chief flying instructor and senior instructors. There was inadequate management of their training programme, and record keeping was below par.

The instructors had also received far too little tuition in preparation for their type ratings.

With the airlines on a recruitment drive, and the probability they will draw their new pilots from the pool of the most experienced and capable instructors, the CAA is concerned the number of dual training accidents may rise.

"It usually does," says Bill MacGregor, CAA's Principal Aviation Examiner, and one of the Flight Training Review investigators.

"When airlines recruit, shortly afterward there's a rise in such accidents. Then, as that new generation of instructors becomes more experienced, the accident rate falls again. Then the whole cycle begins again with the next round of airline recruitment."

That's why Bill and other senior CAA staff are working with industry to try to create a circuit-breaker.

## **It Begins with Governance and Management...**

"Instructing is the very heart of the aviation industry," says Bill, "but it's not often regarded like that."

Marc Brogan, CAA Flight Examiner, recalls witnessing a conversation between a commercial pilot and his former instructor, where the CPL asked her, "When are you going to do some real flying?" She replied, "You get to do commercial flying only because I taught you so well."

"Instructors are professionals," says Bill. "Not just in the sense of being paid and not amateur, but in the sense of possessing specialist skills, of being highly competent, of complying to technical and ethical standards, of working with integrity."

Marc, himself an A-cat, says a good instructor is a real 'teacher'.

"Teachers inspire, motivate, and excite their students. We're all reliant on them doing their job well for the future of aviation safety in New Zealand."

Bill thinks it would be great to see more organisations value those qualities more highly.

"It's not rocket science that people who feel valued by their employer are going to take more pride in what they do, and have a commitment to doing it well," says Bill.

One way is ensuring that instructors are remunerated fairly, acknowledging the critical role they play in aviation safety as professional aviators.

"If training organisations do it right," says Bill, "they'll have a much better product to sell."

"A 'race to the bottom' is no good for safety, or, in the end, for business," he says.

Bill says treating instructors poorly incurs costs that may not be obvious, such as those associated with high staff churn.

"It takes thousands of dollars to recruit and train someone new and get them to an effective standard. If organisations can encourage their instructors to stay, it will, in the end, save them money."

Even if an organisation cannot increase what they pay an instructor, they can show they value instructing work in other ways: putting a professional development plan into practice, taking an interest in the instructor's career, encouraging them to add to their skill set, acknowledging good work, and having a transparent pathway of promotion.

*"It's not rocket science that people who feel valued by their employer are going to take more pride in what they do, and have a commitment to doing it well."*

The benefits of such professional development would be two-fold: the instructor would feel excited and motivated by their organisation taking such an interest in them, and they would become a better instructor.

Jeremy Anderson, Chief Flying Instructor with Nelson Aviation College, and recipient of the 2014 CAA Flight Instructor Award, explains, "Continuous training is the key to a good instructor and this should extend beyond our C-cats."

"I think that, at times, organisations assume that once an instructor passes a B-cat flight test, no further training is required. That's not the case. B-cats have more privileges and therefore more responsibility, which means they should, in some ways, have more training and supervision than an experienced C-cat. The same applies to new A-cats. Nobody knows everything."

Bill emphasises there are some great training schools throughout New Zealand.

"They treat their instructors with the respect and encouragement they deserve, and while the sirens' song of airline jobs will always be a temptation, those schools have fewer problems retaining their staff."

Marc Brogan says holding on to staff is key to muting the rise in accidents after an airline recruiting drive.

"If organisations can retain at least some of their more experienced staff for just a few months longer, even a year, it will have a significant downstream effect on the accident rate."

### **...But it Relies on Good Instructors**

Bill and Marc have taken their 'Aviators as Professionals' presentation around New Zealand over the last six months.

Their chief concern is the lack of instructors coming on stream at a time when experienced ones are moving on to the airlines.

"We're going to have some very inexperienced people entering the instructing pool," says Marc. "That in itself raises the risk of dual flight accidents happening.

"But if those instructors are conscious about continually raising their game, and about 'being professional', that alone will help to mute any spike in the accident rate.

"We need people with not just great flying skills, but with the talent and desire to pass those on; people with superior airmanship; people wanting, not just to conform to standards, but to surpass them; and people with a commitment to their current organisation and its students, even if their end goal is a job with the airlines.

"We need only one generation of instructors working with integrity, and dedication to their students' progress, for that instructing culture to be handed down from then on.

"And any good instructor will tell you," says Bill, "there's huge reward in doing it well." ■

# Summer Flying

Coming out of flying hibernation this summer? Here are some tips for you to ensure both you and your aircraft are fit to fly again.

## Grass Aerodromes

Grass grows faster in spring and summer so if you're landing on a grass runway, the grass may be longer than you think. Clovers thrive at this time and they have a different effect on braking action than normal grass – it's easier to skid on clovers, especially if wet from rain or overnight dew.

## Charts Up-to-Date

New visual navigation charts (VNCs) are effective from 10 November 2016, so you should already have them by now. If not, head to [www.aipshop.co.nz](http://www.aipshop.co.nz). There are often changes to airspace, and this year has seen the most in many years. See the September/October 2016 issue of *Vector* for an overview of the biggest changes. And don't forget to check your AIP Supps and NOTAMs every time you head out.

## Increased Traffic

There are more people flying around in summer than winter, and there are therefore more accidents. So keep a vigilant lookout for other traffic. Check out the busy spots on the back cover of this issue of *Vector* so you're in the know.

## Daylight Saving

With the warmer months comes longer evenings. This also means you have to factor in that extra daylight saving hour when converting from New Zealand Standard Time and Coordinated Universal Time (UTC). To make it easier to convert, use the CAA's free *Weather Card* which incorporates a conversion chart. Email [info@caa.govt.nz](mailto:info@caa.govt.nz) for a copy.

With more hours of daylight there's more flying time. And with more flying time comes a greater risk of fatigue. Make sure you stay well rested.

## Carb Icing

Air temperature and relative humidity are the key factors in carb icing. When humidity is higher, there's a greater risk of icing. It's a problem any time of year, especially when there is moisture content in the air. At the right temperature, this moisture can freeze in the carburettor throat. So don't get complacent about carb icing in summer. Have a read of the "Icing" article in the March/April 2016 issue of *Vector* for more information.



## Animal Nests

While your plane's been hibernating, there's a chance that wildlife has been hibernating in your plane. Do a thorough check for bird and rodent nests in your aircraft – take off the cowlings to have a closer look. Remember, engine bungs won't necessarily stop a bird from moving in. Bird droppings and bits of vegetation on the ground or even snagged in your aircraft are an obvious sign of nesting activity. For more information, see "Birds Can Invade Your Plane Overnight" in the January/February 2016 issue of *Vector*.

## Hibernating Aircraft

Many pilots don't fly much in winter because of poor and unpredictable weather. This means they're not necessarily as current as they could be, and possibly neither are their aircraft. If your aircraft has been hibernating for the winter, then a more thorough preflight will be required. And maybe have a check flight yourself as well.

Pull out your tech log and check that there is no outstanding maintenance required. Remember, some maintenance is based on hours, and others on calendar months. For example, if your oil needs to be changed every four months or 50 hours (whichever comes first), then that four month requirement applies, whether or not you've used your aircraft.

## Your Airworthiness

The aircraft might be in perfect condition, but are you? Remember the I'M SAFE checklist:

**Illness** – Are you suffering from any illness which might affect your ability to fly?

**Medication** – Are you currently taking any drugs (prescription or over-the-counter) that might affect your ability to fly?

**Stress** – Are other factors worrying you?

**Alcohol** – As the land transport advert says, "if you drink, then drive, you're a bloody idiot." The same applies to flying!

**Fatigue** – Have you had enough rest?

**Eating** – Being hungry can cause you to lose focus, so eat up and stay hydrated. Longer summer days and warmer cockpits mean dehydration can creep up very quickly.

Also, check out "Personal Preflight" at [www.caa.govt.nz](http://www.caa.govt.nz), "Quick Links > Seminars and Courses > AvKiwi Safety Seminars" for a refresher on preparing yourself for flight.

## Are You Current?

Is your medical current? If it's close to expiring, you may need to allow some extra time to complete any necessary tests.

Is your BFR current - three takeoffs and landings on type in the last 90 days? Get one of our logbook reminder bookmarks to help you keep track of your currency. Email [info@caa.govt.nz](mailto:info@caa.govt.nz) for a free copy.

As mentioned before, if you haven't flown for a while, it's a good idea to have a check flight with an instructor.

If you need to renew your medical certificate or licence, please get your applications in early if you want them processed before the holiday period. December and January are the busiest times for the CAA's licensing team.

## CAA Products

And finally, for some light summer reading, why not pick up a few of the CAA's *GAP* and *How To...* booklets to refresh yourself? We've recently updated *New Zealand Airspace*, *Wake Turbulence*, *Fuel Management*, *How to Report Occurrences*, and *Navigating the Rules*. You can check out the full list on the CAA web site, [www.caa.govt.nz](http://www.caa.govt.nz), "Quick Links > Publications". Email [info@caa.govt.nz](mailto:info@caa.govt.nz) and we'll send them out to you. ■

# Know Your Software

Treating software on aircraft systems the same way you would a hardware part could save you a lot of headaches.

Most aircraft these days have some form of equipment with software in it, whether it be navigation/communications equipment, flight/engine instruments, or fuel control systems. Many of these systems can have a direct impact on the safe flight and landing of the aircraft.

That's why software configuration management is becoming more critical, says Andrew Rooney, CAA Team Leader Avionics.

Operators and maintainers need to ensure the correct software is installed and that appropriate updates are made.

Advisory Circular AC43-15 & AC91-18 *Aircraft Software Configuration Management* provides guidance on how to manage software and its configuration and control.

Andrew says the AC hasn't changed but it's becoming more prevalent.

"Even though we've recently introduced a streamlined process for Part 91 operators to get their navigation approvals, software control and management is still crucial. As they're applying for their approval we're asking 'who's looking after your software?' It's a really good opportunity for us to check companies' policies and plans."

## What are the Pitfalls?

Andrew says operators tend to get caught out because either they don't keep their software current or they apply a software update that isn't suitable.

"We have had instances where people have inappropriately updated their

software and it's invalidated their navigation approval. We even had one instance where it caused aircraft to violate operating limits."

Clayton Hughes, CAA Avionics Support Engineer, says be aware of what you're buying and installing.

"A classic example would be navigation equipment that's sat on a shelf for a long time. It then gets installed but it could have an old software version that's no longer approved or does not have the updates installed to correct discrepancies."

Software manufacturers will send out update alerts, but the updates aren't always compatible.

"For example, even though you might have equipment made by Manufacturer X and Manufacturer X comes out and says 'update the software' the updates may not work with your aircraft or your particular configuration," says Andrew.

He says people also need to be aware that there are different levels of software.

"Some systems will have the operating system, a database of information, and possibly unique configuration files particular to that aircraft and that operation."

## When a Third Party is Involved

Andrew Rooney says an operator can contract someone to take care of their software, but they need to be mindful of a couple of things.

"What we would want to see is a contract or similar agreement between

the parties and we would also review the configuration management policy of the third party that's looking after the software management."

Clayton Hughes says operators can also get caught out when sending parts away for repair.

"There have been occasions when software has been updated during the repair, with no one noticing. One way to negate this is to ensure the operator is made aware of any changes, or stipulate up-front that software changes are not to be made without letting the operator know."

## Treat it Like a Part

Andrew says there needs to be a process for controlling software configuration, receiving and assessing updates, and checking and maintaining the configuration.

He recommends dealing with software the way you would a regular part.

"If you're updating a part in your aircraft, you go through a design change process to make sure that you understand the changes, the consequences of them, and if your aircraft remains safe to operate."

So test any software change before you go into a risky environment.

He says a good practice is to mark units onboard with their hardware part number, software part number, and in some cases a configuration part number.

Additionally, the maintenance records should identify the software status of all equipment fitted. ■

# Performance Based Navigation Progress

As PBN procedures continue to roll out in New Zealand airspace, new guidance is available for GA pilots with instrument ratings on how to get approved to fly RNP1.

The mid-North Island aerodromes of Tauranga, Rotorua, Hamilton, Ohakea, Whanganui and Palmerston North are the latest to offer their customers Performance Based Navigation.

And as the number of PBN-equipped airports in New Zealand increases, revised Advisory Circulars are available on the CAA web site, to help General Aviation IFR pilots get approval.

Steve Kelly, Navigation Systems and Project Specialist with the New Southern Sky programme, says for everyone to take advantage of the system efficiencies offered by PBN, between 70 and 80 per cent of the IFR-equipped traffic at those aerodromes will need an approval.

“Anything less and we’re going to have ‘mixed mode’, with some people flying to the VOR and others flying the RNAV,” says Steve.

Airways’ PBN Implementation Programme Manager, Phil Rakena, says ‘mixed mode’ operations will be accommodated, but it will make air traffic management significantly more complex.

“Non-PBN procedures will be kept at many places, allowing for contingency, onboard equipment failure, and non-PBN traffic.

“But the sooner aircraft operators become PBN-capable, the sooner they, and the wider aviation community, will experience its full benefits.”

Phil Rakena says those benefits include improved air traffic flow management – including safer management of higher traffic densities – fewer holding delays and diversions, and environmental benefits associated with fewer track miles and better fuel efficiency.

“The most important of those benefits may be to safety. PBN has enabled one-way circular flow flightpaths between cities – rather than the head-to-head two-way routes of the past.

“ICAO data indicates that a straight-in approach is 25 times safer than a circling approach. An approach with vertical guidance is eight times safer than a lateral-only approach.”

The CAA has approved Massey’s School of Aviation to carry out Required Navigation Performance (RNP1) operations on its 12 Diamond DA40 single-engine trainers.

A well-attended New Southern Sky national roadshow in September was held in 12 locations from Auckland to Invercargill.

“It was the first opportunity that pilots and Airways staff have had to ask questions about PBN, and its benefits to General Aviation,” says Steve Kelly.

“We had bumper turnouts everywhere: about a fifth up on what we had anticipated. So clearly the interest is there.

“It was a great opportunity to talk to pilots about RNP1 because the existing Advisory Circular gave them ‘grandfather rights’ to do RNAV1, RNAV2 and RNP Approach, but they have been excluded from RNP1.”

David Harrison, CAA’s Training Standards Development Officer, says Advisory Circular AC91-21 has been updated, improved and simplified to help GA IFR pilots and their aircraft get approval to fly RNP1.

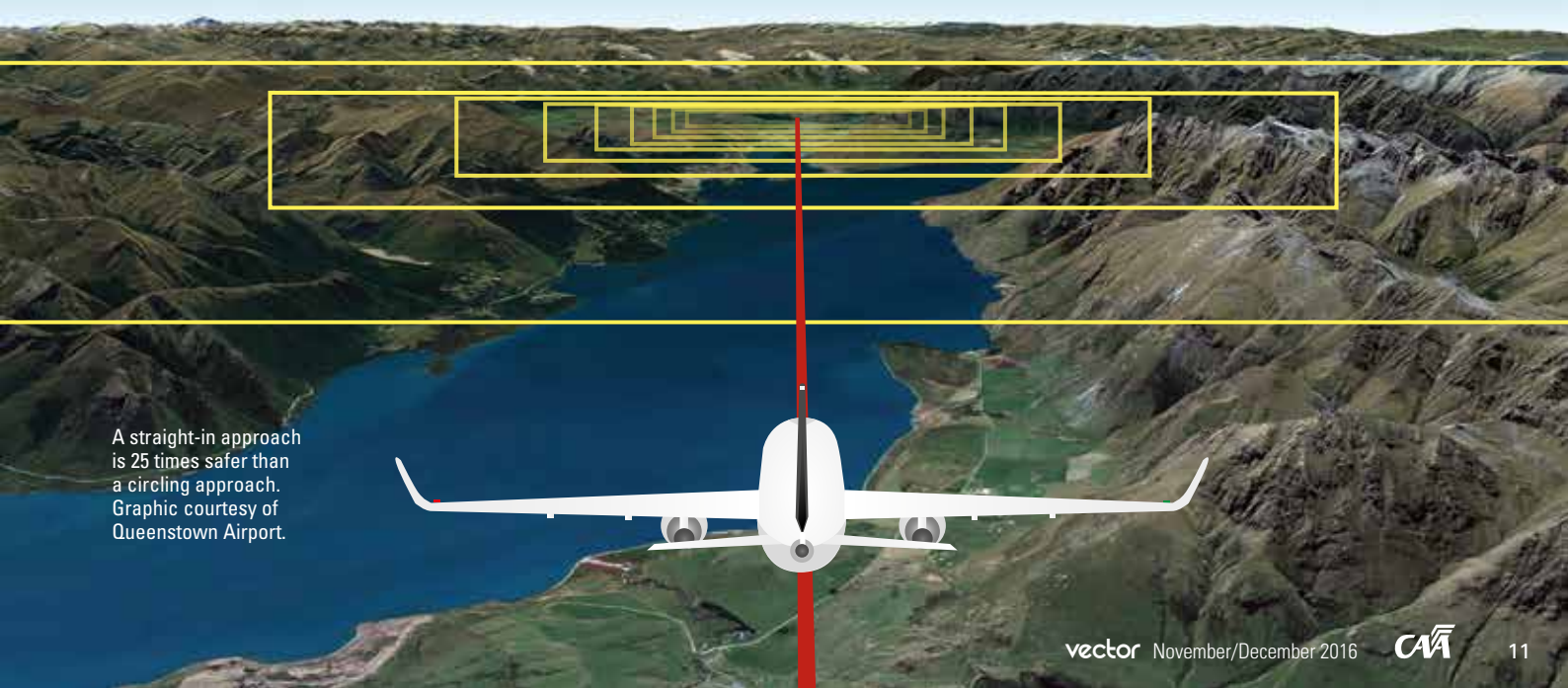
“It’s accompanied by a revised AC61-17. Together, these provide guidance to a Part 91 operator on how to certify their aircraft for RNP1, and it also allows pilots to add RNP1 to their instrument rating.

“The new AC effectively says if you’re a pilot who holds a current GNSS rating, then we’ll let you do RNP1. Of course, that is as long as your aircraft is also certified to do RNP1.

“But during your next competency demonstration, you’ll fly an RNP1 procedure to maintain the privilege.

“We decided that the risks associated with that move were acceptably low and that’s led to this practical approach.”

To help you, all the information has been put together, see [www.caa.govt.nz](http://www.caa.govt.nz), “Aviation Info > Pilots”. ■



A straight-in approach is 25 times safer than a circling approach. Graphic courtesy of Queenstown Airport.

# Into the Dark

Get-home-itis and complacency left this pilot struggling in the dying light, and at risk of having to make a forced landing, or crashing.

I had originally intended to stay another day at the airshow, but an old mate camping next to me is leaving, so I decide suddenly to head home a day early.

Packing up the under-wing camp takes an hour or so, and we miss the takeoff slot before an aerobatic display.

While packing all the gear into my little one-seat amateur-built, I ask my mate for the time of last light. After a quick mental calculation I'm sure there's ample time for the long flight, provided the refuelling stop is pretty slippery.

We've both filled up from a mobile tanker the previous day, so with gear stowed and pre-flight done, we farewell the small gathering of well-wishers, start engines and taxi towards the duty runway.

The long taxi allows my engine to warm up properly and I'm impatient for the display to finish so we can take off.

There's nothing like the thrill of joining a queue of aircraft lining up to head into the wild blue yonder! It takes a lot of focus to be across radio traffic, pre takeoff checks, watching for other aircraft, and keeping a taildragger in line on a windy strip.

The bloke in front is off the ground and it's my turn. Check for anyone on final, fuel pump on. Make call entering runway and

departing to north. Gently ease throttle open, keep on the centre line as she gets to full power. A little back on the stick and off we go. A few seconds in ground effect to pick up speed then pull up into a 1000 ft per minute climb out. Boost pump off, steep left turn giving great view of the airshow, then off to the north.

After being tossed about on climb, what a relief to get above the turbulence and cruise in silky smooth air. I have some fun flying hands free. Little plane is trimmed so well I can make subtle course corrections by moving my head.

Flying north into the sun, I realise I should have cleaned the screen. Peering through a layer of bugs for a couple of hours is hard on the eyes. There's no traffic to see, except one aircraft thousands of feet below me on the same heading. He slowly pulls ahead and lands for fuel before me. We have a short yarn at the bowser. I don't get around to cleaning the screen, I don't think it should be an issue on this leg because the sun will be behind me.

After a quick check of the aircraft, I'm off. The sun is low in the sky, but home is only an hour away. After climbing to cruise level, I can see the sun setting behind me and suddenly notice how dark it is up ahead. I'm still a long way from

home and night is coming on faster than I expected. Whoops. This is not good.

I fly on for a few minutes while I take in my predicament.

What are my options? Turn back and camp the night at last airport? Not very safe. There's still lots of traffic around and I'd be flying into a red sunset with a dirty screen.

Divert to somewhere close by? Damn! The local chart is in the luggage bay, I forgot to swap maps when I landed. My ERSA\* has slipped out of reach ...

Keep calm and think. I remember that my phone's tracking app is transmitting breadcrumbs so my wife can see where I am. She must be worried.

OzRunways\*\* to the rescue. I look up a nearby airport I've never been to. Switch radio channels then make a dramatic 90-degree turn and head for the mountains that mark its location. Can't see the town in the gathering dusk. Bit worried. Little plane is nudging VNE as I trade height for speed – probably safe in this smooth air.

Open Google Maps™ to make sure I'm on the right heading. A slight correction, then after a few nervous minutes I see the street lights. The strip should be four miles south of town. There it is, lucky to see it in this light. What a relief. Make a downwind call and a fast, sweeping approach, then the smoothest landing, and nobody to see it.

Taxi up to a group of buildings, looking around with my landing lights. Shut down outside the deserted terminal, climb out – a bit shaky – and tie down, fumbling with the ropes.

I phone my darling wife to tell her that I'm safely on the ground. Instead of relief and gratitude, I cop an earful. She's been watching my progress on her computer. It's after dark and

she's been worried sick. Seeking a little compassion I tell her I'm starving. I missed lunch in the rush to get home to her. Here I am facing a hungry night at a lonely airfield. There's no sympathy. I've got myself into this mess, so I'm on my own. (I phone town to have a pizza delivered. Well worth the \$30.)

She's right. I'd stuffed up big time.

What a fool I'd been. I'd made several stupid errors – a hurried departure without careful planning, and not getting an accurate time for last light. I didn't organise a viable alternate airfield. I didn't ensure I had the correct chart before takeoff. I hadn't kept ERSA within reach. The screen was dirty.

I'd proven the statistics – the most dangerous time is after a pilot has become 'proficient'. Complacency had crept in and could have killed me.

I could have pranged my plane in some isolated clearing – or worse. But I'd been lucky, very lucky. I could have missed all the great things in my life since that day.

As often said, aviation safety lessons have been written in blood. Mine could have been added, needlessly.

Learn from the mistakes of others they say – you won't live long enough to make them all yourself. ■

\*ERSA – En Route Supplement Australia

\*\*OzRunways – electronic data provider

This article first appeared in *Flight Safety Australia*, in May, 2015. Reproduced here with the kind permission of CASA.

# “Parapara... um...?”

To avoid floundering on the radio, plan your calls well in advance. In an MBZ, especially one as busy as Paraparaumu’s, communicating is essential.

We covered mandatory broadcast zones (MBZs) in the July/Aug 2014 *Vector*, but recent occurrence data shows a number of aircraft are still transiting the Paraparaumu MBZ without broadcasting intentions. Some of this confusion might stem from the fact that Paraparaumu Aerodrome has an Aerodrome Flight Information Service (AFIS) in the middle of the MBZ.

The requirements for operating in an MBZ are set out in rule 91.135, and summarised in AIPNZ, GEN 5.3. Even though Paraparaumu’s MBZ is unique, the associated reporting requirements aren’t. In essence a pilot is required to report:

- » position, altitude, and intentions on entry, and at prescribed intervals while in the MBZ;
- » when joining the circuit of an aerodrome in an MBZ; and
- » before entering a runway for takeoff within an MBZ.

As Paraparaumu has an AFIS, a pilot intending to operate at the aerodrome must communicate with the AFIS unit prior to doing these manoeuvres, irrespective of the MBZ.

## To Paint the Picture

As part of your pre-flight planning, check out the MBZ detail on Visual Navigation Chart (VNC) C2 – it has some tricky features, including three different upper limits.

The Paraparaumu MBZ extends up to 4 NM beyond Kapiti Island to the west from Paraparaumu to Pukerua Bay. High ground makes skirting the eastern boundary in an attempt to bypass the MBZ difficult. But transiting shouldn’t be a hassle if you know how an AFIS functions, and know the radio requirements.

The Paraparaumu MBZ is transponder mandatory down to 1500 ft, but regardless of altitude, it’s best practice to operate your transponder in Mode C at all times.

## What’s an AFIS?

An AFIS may be provided at an aerodrome where, despite not being busy enough to warrant an air traffic control service, it’s still busy enough that some safety oversight is required.

There are only two AFIS units in the country and Paraparaumu, or “Paraparam” on 118.3 MHz (where syllables are a precious commodity) is the busier of the two. Milford Sound hosts the other AFIS, but Paraparaumu’s movements (21,500 in 2015) far exceed Milford’s, even with the recent cessation of gliding activity and associated disestablishment of general aviation area NZG673. Daily GA movements can be in the hundreds, with extensive flight training taking place, and scheduled IFR operations every day, including Air New Zealand Q300s.

Don’t be fooled by the presence of the tower, the AFIS is not a control service. The resident flight service operators won’t issue clearances or instructions to separate you from other aircraft. They will provide pertinent flight information about known traffic, including type, direction, level, and position so you can sight other traffic and maintain a good distance. For IFR operations, AFIS staff may relay clearances from Wellington air traffic control for adjoining airspace entry.

## Radio Requirements

When establishing communications with the AFIS, use this phraseology:

*“Paraparam Flight Service, Alfa Bravo Charlie” (for example).*

The AFIS will reply with *“Alfa Bravo Charlie, Paraparam Flight Service”*.

After that you can continue with your call sign, aircraft type, position, intentions, and POB.

Make sure you maintain your AFIS etiquette by keeping the four Cs in mind.



### **Clear**

When you're transmitting on the radio, speak slowly and clearly. The AFIS communications equipment has a function that allows the operators to repeat the last transmission received, but as soon as another transmission is made, the previous one will be overridden.

### **Consistent**

Be consistent by using standard phraseology, and also give the information in a specific order – it makes it much easier for the listener when they're expecting the information in a specific format.

### **Concise**

Transmit only for the minimum time necessary to get your intentions across. Remember, after establishing communications, you can save radio time with "copy conditions" or "copy traffic" if you've already picked up the weather, runway or traffic information from a previous transmission. That saves the AFIS specialist repeating themselves unnecessarily.

### **Correct**

Position reports are important whether addressed to the AFIS or not, as the AFIS provides information to departing aerodrome traffic about other known MBZ traffic. These reports need to be correct. Avoid vague phrases like "abeam Kapiti Island". Try to be as accurate as possible with your report, for example, "1 NM south of Kapiti Island".

### **Unattended Radio Calls**

If you're transiting the MBZ and your flight path doesn't take you near the vicinity of the aerodrome and its circuit, you don't have to establish communication with the AFIS. However, you do have to make the mandatory broadcasts to "Paraparaumu traffic".

Similarly, if you have left the vicinity of the aerodrome, and are established in a training area within the MBZ (typically between Waikanae and Otaki, or around Kapiti Island), you don't need to direct your calls to the AFIS anymore; just "Paraparaumu traffic" or "Otaki traffic".

If you want further information on good radio practice, a *Plane Talking* online course and GAP booklet are available, see: [www.caa.govt.nz/avkiwi](http://www.caa.govt.nz/avkiwi).

## **Acronym Soup**

New to aviation? As with any specialised field, it can sometimes feel like you need a Garmin G5000 to navigate your way through the jargon.

In this article, we're discussing the AFIS, not to be confused with the ATIS or IFIS. The ATIS (Automatic Terminal Information Service) is used to broadcast aerodrome weather information. The IFIS (Internet Flight Information Service) is a pre-flight information and flight planning service for those within the New Zealand Flight Information Region.

## **A Couple of Reminders**

Here's an occurrence from the files:

*Aircraft called rolling off runway 34 after being advised of a glider on final approach. This resulted in a simultaneous parallel operation.*

Simultaneous parallel operations are not permitted at Paraparaumu – the grass and paved runways 16/34 aren't far enough apart to provide the required safety margin. Aircraft taking off or landing on paved or grass runways 16/34, or the helicopter TLOF must ensure there is adequate spacing between other aircraft taking off or landing on a parallel runway/TLOF. Horizontal spacing of at least 600 metres between aircraft is advised.

VFR pilots should be aware of IFR aircraft typically making their arrivals on an RNAV approach – the RNAV16 involves a very long final approach for Runway 16 from outside the MBZ between Kapiti Island and the coastline. The RNAV34 involves a descent towards Pukerua Bay from the west before a left turn abeam Paekakariki, with continued descent to intercept a long final approach for Runway 34.

Paraparaumu aerodrome is inherently busy with various types of aircraft activity and many radio transmissions. Make sure you are familiar with applicable NZPP pages in the AIP, are up to date with local weather, Supps and NOTAMs, and maintain a high standard of airmanship and situational awareness. ■



# Unapproved Aircraft Seat Modifications

What you can, and cannot do, to modify aircraft seating.

Over the past twelve months, the CAA has become increasingly concerned about the extent of modifications to aircraft seats.

This is particularly so with regards to 'dynamic' seats – those compliant with TSO C127 (series), or the Federal Aviation Administration (FAA) airworthiness requirements of FAR 2X.562.

Dynamic seats can be found in most aircraft from General Aviation to air transport, including helicopters.

The CAA has invested a significant amount of research into the issue, aimed at better understanding, and if possible, simplifying current international guidance on dynamic seat modifications. That involved much discussion with the FAA and EASA, which both reaffirmed the safety benefits of dynamic seats, and reinforced the need for the proper validation of all dynamic seat modifications.

In the past, aircraft seats have traditionally been designed to comply with static strength requirements (FAR 2X.561). Compliance with those standards establishes a baseline level of impact protection by assessing the strength of the occupant/seat tie-down chain.

In the late 1980s, the dynamic seat performance standards (FAR 2X.562) were adopted to further improve occupant survivability, and address the crashworthiness aspects of aircraft.

Like the static requirements, the dynamic performance standards assess the structural strength of the occupant/seat tie-down chain (although in a different environment), while also going beyond a strength assessment to evaluate the potential for occupant injury.

The dynamic standards require seats to comply with a number of criteria during two distinct dynamic test conditions that simulate the decelerations most likely experienced in emergency landings, and in which the occupant is reasonably expected to survive.

The main focus of the first test is to evaluate the means provided to reduce spinal loading and injury during a crash event. The second test assesses the occupant restraint system and seat structural performance. This type of testing is an extremely intensive, lengthy, and expensive process.

The pass/fail criteria of the tests ensure that the occupant/seat/restraint system responds in such a way that reduces injuries and fatalities in survivable crash events.

The main criteria involve limitations regarding:

- » maximum tension loads in upper torso straps (chest injuries)
- » maximum compressive load in the spine of the ATD (spinal injuries)

- » restraint straps remaining in place (occupant flailing)
- » maximum head injury criteria (head injuries)
- » maximum compressive loads in the femur (leg injuries)
- » seat remaining attached at all points (preserving occupant survival space)
- » seat structural deformation that would prevent occupants evacuating quickly.

It's the performance of the seat system that's evaluated, which includes the seat structure, seat track fittings, energy-absorbing mechanisms, cushions and upholstery, and restraints. These are all components of the seat system that, when combined into a unique seat combination, meet the above criteria. The system as a whole has been carefully designed, analysed, and tested to demonstrate compliance with the criteria of the FAR 2X.562 regulations.

## TSOs vs Airworthiness Requirements

A TSO is a set of minimum performance standards (MPS) issued by the FAA for specified materials, parts, processes, and appliances used on civil aircraft.

The main TSOs relevant to seats are TSO C39 series (Aircraft Seats and Berths) and TSO C127 series (Rotorcraft, Transport Airplane, and Normal and Utility Airplane Seating Systems).

TSO C39-compliant seats must meet the MPS outlined in National Aircraft Standard (NAS) Specification 809 Specification – Aircraft Seats and Berths, which requires that the seat structure be protected from deterioration/loss of strength, that the seat be statically tested, and that the covering and upholstery meet fire protection requirements.

TSO C127 requires seats to meet the MPS detailed in Society of Automotive Engineers, Aerospace Standard Document No. AS8049 "Performance Standards for Seats in Civil Rotorcraft and Transport Airplanes", as amended by Appendix 1 of the TSO document. Many of the requirements in AS8049 are the same as those in FAR 2X.562.

It's important to understand that TSO compliance is not the same thing as an approval to install and use the seat in the aircraft. TSO compliance means only that the seat meets the MPS of that specific TSO. Further demonstration may be needed to show that the installation of the seat meets the applicable airworthiness requirements of the aircraft.

For example, although TSO C127 requires that head injury criteria (HIC) and femur loads be measured and recorded, it doesn't require those values to meet criteria listed in FAR 2X.562: for example, HIC < 1000, femur loads < 2250 lb.



So, when modifying and installing a seat into an aircraft, there are two separate but related issues that must be considered: compliance to the seat TSO, and compliance to the applicable airworthiness requirements.

## Guidance Regarding Modifications

As mentioned earlier, it's the total seat system that's been demonstrated to show compliance with the criteria specified in the dynamic FAR 2X.562 requirements or the TSO MPS. If one (or more) of the seat system elements is modified, even by seemingly simple modifications and repairs, the dynamic response of the seat may be affected, possibly invalidating the TSO and making the seat non-compliant.

Seats are often modified by people other than the original equipment manufacturer, therefore the detailed design and substantiating data for the seat is not always available. As seats have developed into complex energy-absorbing systems, it can be difficult to truly understand what effect modifying one element of the seat may have on its overall performance.

The CAA recently wrote to all Part 145, 146, and 148 certificated organisations with guidance for modifying aircraft seats, for instance, changes to upholstery.

Continued compliance to the TSO MPS must be demonstrated for any modification made to a TSO C127 series seat.

In addition to maintaining TSO compliance, any modification to an aircraft seat must also continue to meet the applicable airworthiness requirements of the aircraft.

Fabric changes may be considered a minor design change, provided they don't have fibre fill/backing foam/trim foam, and require a Part 146 design approval. For any other proposed change to a dynamic seat, such as changes to the foam squabs, the CAA can help interpret whether the change is considered major or minor, and it can also help determine what level of compliance must be demonstrated. Please contact the Aircraft Certification Unit, [airlines@caa.govt.nz](mailto:airlines@caa.govt.nz).

## Acceptable Technical Data

Installing any design change onto an aircraft, including modifications to seats, requires the use of acceptable technical data, which is listed in CAR Part 21 Appendix D. Without acceptable technical data, the article cannot be legally installed onto a New Zealand-registered aircraft.

The modified items should have part numbers and markings to indicate the acceptable technical data that approves the change. The acceptable technical data that was used should also be recorded in the modification section of the aircraft logbook.

The CAA, or a Part 146 design organisation, should be contacted for advice before repairs or modifications are carried out on a TSO C127 series seat.

If the seats in your aircraft have been modified through the use of unacceptable data and/or appear to be lacking the proper documentation and paperwork, please notify the CAA. It's important that all design changes to aircraft seats are fit for purpose and approved correctly to ensure the safety of the aircraft occupants. ■



It's important that the Anthropomorphic Test Device (the dummy) used in dynamic testing be as realistic as possible, like this dummy getting ready for testing at the FAA CAMI lab in Oklahoma City. There are detailed specifications that must be met for everything from the dummy's clothes to his shoes.

# Wires – Got a Whole Heap Down

This time last year, *Vector* wrote about twin crusades to persuade farmers to remove their treacherous electric feeder wires, and disused telephone and television cables. As a result, potentially killer lines have been coming down around the country.

In December 2015, Parliament's Grand Hall was spellbound as Shannon Carr – daughter of helicopter pilot Peter Robb, who'd been killed in a wire strike in Whanganui in 2014 – spoke about her father's death, and pleaded for the farming community to respond meaningfully to the danger posed by aerial wires.

Shannon, now CEO of her father's company, Hill Country Helicopters, is one of 30 'ambassadors' of the NZ Agricultural Aviation Association's (NZAAA's) *Down to the Wire* campaign, launched in 2013.

"The ambassadors are sector leaders," says NZAAA Chair, Allan Beck, himself a wire-strike survivor, "who promote the aims of *Down to the Wire* in their local areas, coordinate its activities, and act as 'first responders' to farmers' queries."

CAA data shows that between 1979 and 2016, 38 people died, hundreds were injured, and aircraft worth many millions of dollars were destroyed in 69 accidents where an aircraft hit an unseen wire.

"Unseen wires present the greatest risk to agricultural aviation, particularly to spray pilots," says Allan.

"Lines can run across gullies, or be attached to obscure poles, or even trees. To make it worse, some manufacturers even produce green covered wire."

Allan says about 100 farmers have now been recognised with an NZAAA Certificate of Appreciation for tying their wires to an

existing fence, making sure those wires don't extend above that fence, or for removing their unused wires completely.

Allan says *Down to the Wire*, which is dedicated to the memory of Peter Robb, is getting some international attention.

"Our Facebook page has received interest from as far away as Switzerland, Austria, and the United States. The campaign has been covered by both American and Australian aviation magazines. All these places have wire-strike issues as well."

The Australian entrepreneur, Dick Smith – himself a keen aviator – is one of the campaign's five patrons. Allan Beck says his involvement will help the campaign receive more global attention.

Peter Robb's death triggered a second wire safety drive in 2014, *Let's Get 'Em Down*, spearheaded by his friend, farmer, and fellow helicopter pilot, Dean Lithgow.

*"I've received calls from operators and farmers from all over the country complimenting our campaign, particularly the use of Richie McCaw and Greg Murphy to champion the cause."*

In 2002, a wire marking trial was begun across the Hutt River in the Hutt Valley. Red, yellow, and white balls of varying sizes were installed on the span.

Dean is also a wire-strike survivor.

As the two campaigns gather momentum, the aims of each have been the subject of numerous articles in local farming publications and national media.

Dean – who estimates the campaigns have brought down about 50 wires on central North Island farms – says the self-funded *Let's Get 'Em Down* has tried to saturate as many areas as possible with information.

"We estimate our advertisements have appeared about two million times in farming media. We've created *Keep us safe on your place* highway billboards, and that slogan has been printed on 600 chiller bags, being distributed from Aerowork bases to farmers throughout New Zealand.

"The same signage is on the back of stock trucks, acting as travelling billboards."

There's also a YouTube video *Let's Get 'Em Down*, produced by Dean's teenage sons, Casey and Stafford.

"I've received calls from operators and farmers from all over the country complimenting our campaign, particularly the use of Richie McCaw and Greg Murphy to champion the cause."

CAA's Manager of Safety Investigation, Jim Burtenshaw, is coordinating the regulator's response to wire-safety issues.

"It's not just farm wires that are the issue," he says. "Of the 116 wire-strike accidents since 1979, 54 have been with power or phone cables."

Jim believes the success of the two campaigns is due to the fact they're industry-led.

"People from inside both the farming and helicopter sector trying to improve safety, means other people in those sectors are more willing to support them, and more willing to commit, in concrete terms, to the aims of their campaigns.

"The passion of the people leading the campaigns is also a factor. Others are inspired by that."

Jim believes the new Health and Safety in the Workplace Act 2015 has brought a greater awareness of each person's responsibilities.

"Those responsibilities are better defined. For instance, a farmer obviously has obligations to keep the pilot safe, but so too does the operator and the pilot themselves.

"People have a clearer idea of that, and I think everyone is aware of the stronger penalties for failure."

Although Jim is gratified by the success of both *Down to the Wire* and *Let's Get 'Em Down*, he says the problem is complex because of all the different participants involved (ie, farmers, pilots, operators, power distribution companies, landowners) and it will be "a long game".

"The CAA's aim is to reduce wire-strike accidents to zero," he says.

"Education (of pilots) will *reduce* the number of accidents. If your aim is to *eliminate* them, you have to get the wires down. That's the only way.

"Human error will always be with us, and people flying aircraft will continue to have accidents when there are wires in the skies.

"With many past accidents, the pilots *knew* the wires were there, at the time of the accident, but they were so loaded up with tasks they just forgot. It simply wasn't at the front of their brain – wire, wire, wire – because they were busy operating an aircraft and maybe also carrying out a spray operation."

Allan Beck says that because it has the official backing of the CAA and Federated Farmers, that it is now a national programme, and industry-led, *Down to the Wire* will continue to flourish, as new, younger, equally enthusiastic people take up the reins.

"Because they know the value in removing the danger," he says.

Dean Lithgow says the success of his campaign is very satisfying.

"It's really just myself and my family, doing this. We're not a large organisation or corporate.

"We just want to make a difference to safety in two industries we are involved in and passionate about." ■



*Down to the Wire* ambassadors in Parliament's Grand Hall, from left: Jim Burtenshaw, Bruce Peterson, John Funnell, Jim Guerin, John Sinclair, Andrew Hogarth, Tony Michelle, Sue O'Dowd, Allan Beck, Lloyd Matheson, Shannon Carr, Davin Mudford, Paul O'Dowd.

Photo: Stacey O'Dowd.

# Avoiding Thunderstorms

No one should be flying through a thunderstorm. But with good planning and decision making, and free access to MetFlight GA, thunderstorms are easily avoided.

## Wind, Icing, and Lightning

All the wind formations you don't want to deal with as a pilot, such as microbursts, wind shear, and tornados can feature in cumulonimbus (Cb) clouds.

With strong updrafts and downdrafts, severe turbulence will occur inside a Cb. Vertical movement can be in excess of 5000 ft per minute in New Zealand – sufficient to tear the wings off an aircraft.

Strong winds, variable in direction and strength, are common at surface level in the vicinity of a Cb. These can be particularly hazardous to aircraft on takeoff or landing.

Flying through a thunderstorm will often lead to moderate to severe icing, especially in the cloud immediately above freezing level.

Only a small percentage of Cb clouds generate lightning, but it can travel a very large distance from its parent cloud.

"If you choose to fly in the vicinity of Cb clouds, say within five kilometres, you risk the possibility of taking a lightning hit," says Greg Reeve, Meteorologist with MetService, based at Ohakea.

"The damage to your aircraft can range from nothing (buy a Lotto ticket!) to complete destruction in worst-case scenarios."

## Getting Wet

With a thunderstorm comes precipitation: rain, sleet, snow, and hail. This reduces visibility significantly. It will affect runway surfaces for takeoff and landings. Hail can be a major

hazard to aircraft. While hail in New Zealand is rarely larger than 10 mm, hail stones the size of tennis balls are not unheard of, and they could do significant structural damage to your aircraft.

## Planning

The best defence against a thunderstorm is to avoid flying into one in the first place. Fortunately, they're relatively easy to avoid and with free access to MetFlight GA, there's no excuse to be oblivious about where they are.

"While predicting exactly when and where a thunderstorm will occur is based on probability, MetService forecasters know how to recognise the conditions that will trigger the formation of Cb cloud," says Peter Lechner, CAA's Chief Meteorological Officer.

"MetFlight GA will give you the likely timing and location of Cbs, so you know where not to fly."

If there's likely to be Cbs near your destination, or the route you plan to take, decide if you really need to go. If you do, make sure you have an escape plan so you can alter your route to avoid forecast Cb activity. This means carrying extra fuel should you have to divert.

## Identifying Thunderstorms

Being able to identify conditions that lead to a Cb forming, recognising the three different stages (cumulus, mature, anvil), and size of a Cb will help you avoid inadvertently flying into a thunderstorm.

The initial (cumulus) stage of Cb development involves updrafts only. Turbulence is light to moderate and most other Cb hazards won't have materialised, although light rain is possible during this stage.

"There is, however, one hazard that may become severe during this stage," says Greg. "And that's airframe icing due to the large super-cooled liquid water droplets being carried aloft into the cloud by the updrafts."

In the mature stage, all the hazards associated with thunderstorms may now exist. At this stage, there will be heavy precipitation at the surface and an anvil will start to form at the top of the cloud.

Once the anvil starts to become glaciated, the Cb has entered its final stage.

"At this point the updrafts cease and the hazards quickly weaken and disappear, often leaving only the anvil behind. This remaining cloud is benign," says Greg.

"Each stage lasts about half an hour, so the total life cycle of an upright, stationary Cb is around 1.5 to 2 hours. However, a thunderstorm rarely forms in isolation. There are usually others in the vicinity at different stages in their life cycles."

## Don't Be Afraid to Turn Back

If you get caught en route, and can't fly around a thunderstorm, then either turn around, or land at an alternative aerodrome until the storm passes.

"And thanks to your earlier good planning, you'll have plenty of fuel to get to your alternate aerodrome," says Peter Lechner.

"If the storm is over your destination aerodrome, then hold off, or divert."

Greg Reeve adds, "While many aircraft have been successfully flown through thunderstorms in New Zealand and overseas, there is also a very large number of aircraft that have crashed during the attempt. The MetService's advice is simple: Avoid! Avoid! Avoid!"

## Check the Weather

Log in free to Metflight GA to get up-to-date weather information so you can avoid thunderstorms and other weather nasties. ■

## Progress on ADS-B

The New Southern Sky project of shifting aircraft flying in controlled airspace to ADS-B is moving quickly. Here's an update.

If you're a regular reader of *Vector*, you'll already know that New Zealand's ageing radar systems will have reached the end of their useful lives by 2021, and are to be replaced with ADS-B (Automatic Dependent Surveillance – Broadcast) technology.

ADS-B will transmit more information more often from each aircraft to air traffic controllers, allowing them a more complete picture of who is doing what in controlled airspace.

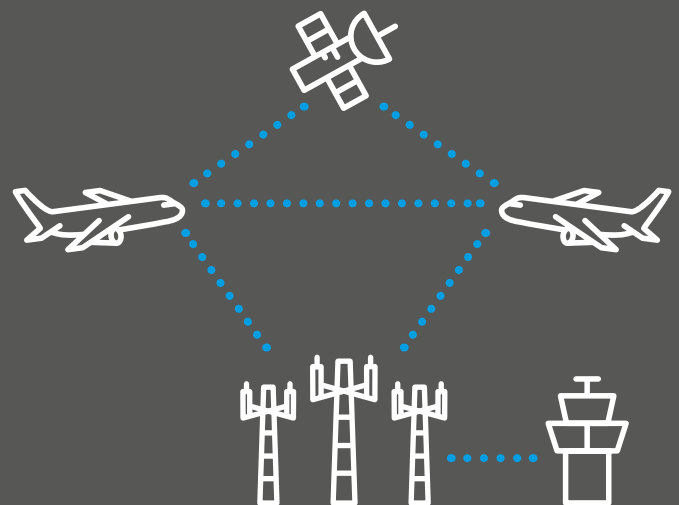
If you fly in controlled airspace, we suggest you read the new FAQs page at [www.nss.govt.nz](http://www.nss.govt.nz), "Guidance and Advice". It covers everything from the whats and whys of ADS-B through to installation and operational requirements, and offers advice on what to do if you want to equip now.

The CAA is developing a discussion document going out for public feedback in 2017 on the proposed ADS-B mandate for all controlled airspace below FL 245 from 31 December 2021.

The discussion document will consider options for reducing costs as much as possible for General Aviation, and examine the implications for operators with unique concerns, such as gliders, and other aircraft with size, weight, and electronic restrictions.

Airways recently signed a contract with a French company, Thales, to install ground equipment for the \$12 million ADS-B network. Installation work will begin in early 2017.

Cabinet has agreed on the publication of a Notice of Proposed Rule Making (NPRM) for a rule requiring all aircraft flying above FL 245 to be equipped with operational ADS-B from 31 December 2018. If you want your say on the NPRM and associated Advisory Circular, register with our email notification service at [www.caa.govt.nz/subscribe](http://www.caa.govt.nz/subscribe). ■



An on-board transponder broadcasts an aircraft's position, altitude, and velocity directly to air traffic control. Richer and more accurate information than that from current transponder systems means more efficient traffic management and improved safety.

A line-up of amateur-built aircraft at a fly-in of the Sport Aircraft Association – contact them for advice if you're considering building your own aircraft, [www.saa.org.nz](http://www.saa.org.nz).



# Experimental

The experimental airworthiness certificate is not an operating category in itself, or a means of skirting around the rules. It's a step to achieving airworthiness compliance.

A special category experimental airworthiness certificate can be issued to any aircraft for the purpose of flight evaluation, research and development, or showing compliance with the rules.

For type-certificated aircraft, a special category experimental airworthiness certificate is needed when the aircraft is not in an approved configuration, and therefore cannot be released to service. This usually means they have an unapproved modification embodied, which is being developed and needs flight testing to complete the process.

For all special category aircraft (except light sport aircraft), a period of flight testing is required to show they have no unsafe characteristics, before they are issued with a non-terminating airworthiness certificate in their specific category. This flight testing is carried out using a special category experimental airworthiness certificate.

CAA airworthiness specialist, John Bushell, thinks some confusion has arisen around the experimental and amateur-built categories because the FAA (United States) system uses the 'experimental' category as the non-terminating equivalent of New Zealand's amateur-built category.

And, of course, it used to be like that here as well. But in December 2009, Part 21 was changed, creating six special category airworthiness certificates: experimental; exhibition; amateur-built; primary; light sport aircraft (LSA); and limited.

"Our experimental airworthiness certificate is only a stepping stone, issued for a set period of time, aiming to move an aircraft up to a more permanent airworthiness certificate," says John.

The experimental certificate will also contain a range of conditions and limitations, which will include an area of operation, limit the number of people who may be carried, and

require both an approved test pilot and a flight test schedule.

Amateur builders need to be aware of the requirements for the initial issue of a special category amateur-built airworthiness certificate.

Among other things (see rule 21.197 *Special category – amateur-built certification*), the approval of a maintenance programme in accordance with rule 91.607 *Approval of maintenance programmes* is required.

Then, at the beginning of the maintenance programme – that is, before your aircraft flies – it must be inspected in accordance with rule 43.303 (1).

## Modifications

The amateur-built category is very flexible, allowing an amateur builder a great deal of freedom to design and build their own aircraft. It is only applicable where the builder has constructed at least 51 per cent of the aircraft themselves and for their own education and recreation, not for commercial purposes.

Because the aircraft airworthiness is proven solely by flight test – after inspection by the CAA for workmanship and good design practice – then any subsequent change to the aircraft must be re-assessed.

Before making any modifications, the CAA recommends that the constructor engages the services of a qualified aeronautical engineer, or consults with the designer of the plan or kit.

You must notify the CAA before flying your aircraft after any major modification or repair is embodied. They will decide if further inspection or flight testing is required. The maintenance implications of a design change will also be considered.

For more information on the certification of amateur-built aircraft, see AC21-4. ■

# The Boiling Frog – How's That Heat?

The myth of the boiling frog can help aviators, operators, and engineers look at their work objectively, and just maybe identify where they're going dangerously wrong.

**H**eaded about the boiling frog? It's a fable about a frog placed in cool water, with the water temperature turned up regularly, but so slowly the frog doesn't feel discomfort.

It gets used to each temperature before the heat rises again – until it's too late.

The story is used to illustrate some people's inability to recognise a risk that evolves gradually.

CAA inspector of helicopter flight operations, Mitch Jones, regularly uses the analogy with operators, "because it illustrates very easily what I'm seeing in their operation.

"If I talk about the 'normalisation of deviance' and how they need to apply critical thinking, and objectivity, and carry out root cause analysis, people's eyes roll back. I don't blame them!

"But if I ask 'are you the frog in the pot?' They immediately understand what I'm saying and some have said thoughtfully, 'we might well be, we might well be.'"

Mitch says the boiling frog analogy can be applied across a gamut of aviation activities.

"It could be a pilot who takes off into iffy weather, and it gets just a little bit worse, which they get used to, and it gets a little bit worse, which they get used to, and so on, until it's too late to 'jump out of the pot'.

"Or it could apply to an engineering workshop where corners are being cut, but they seem to get away with it, so they cut a few more, and get away with it, and so on, until there's an accident created by that corner-cutting."

To make the fable useful to operators, Mitch introduces a second frog to the story.

The boiling frog story is used to illustrate some people's inability to recognise a risk that evolves gradually.

"If that frog is outside the pot and jumps into what is now very hot water, it will jump right out again, while its mate sits in the water wondering what the problem is.

"But the second frog, coming from outside, knows the water is too hot to be safe.

"Let's take that pilot flying in deteriorating weather. Right now, they're in the pot of heating water. But they can also take the role of the second frog by, figuratively speaking, stepping outside the cockpit and looking, as objectively as possible, at their own decision-making, 'Is what I'm doing right? Really?'"

An operator who has enlisted the services of a 'second frog', is Mosgiel-based HeliOtago.

The company regularly calls in Neil Scott from Garden City Helicopters, and Peter Turnbull from Northland Emergency Services Trust, to check over HeliOtago's processes and procedures.

Chief Pilot and CEO, Graeme Gale, says both men have the experience, knowledge, and professional attitude to assess all his company's areas of operations.

"They conduct annual instructor, agricultural, Part 135, Part 133, night vision goggles, instrument, and flight competency checks. The minimum standard of competence they expect in all those areas means HeliOtago is kept up to scratch.

"Their words of wisdom over a cuppa about our approach to things like training, checking operational matters, and SOPs, are invaluable.

"We're actually privileged to have their expertise."

PS: In actual experiments, no frog has ever boiled to death, but inevitably, has found a certain temperature intolerable and jumped out.

Someone inadvertently in IMC may not have that option. ■



# Introducing HUGO

Reporting health and safety events just got a whole lot easier.

**H**UGO is the new, free, health and safety reporting software, provided by the CAA.

"It's a fast and convenient way to report to the operator a death, injury, or illness," says Mike Impey, CAA's Health and Safety Manager.

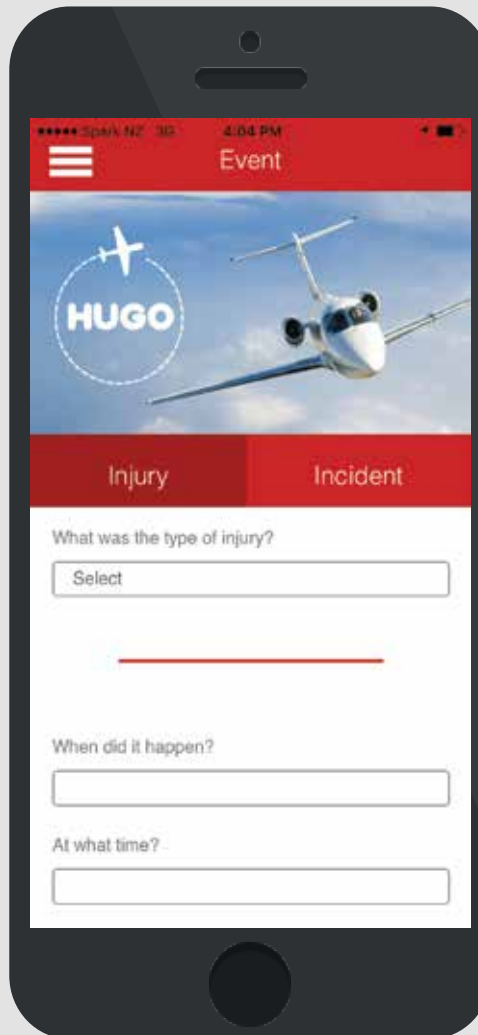
"Participants can also report a near miss, make a safety suggestion, or give someone a health and safety 'high-five'."

This is how HUGO works:

A certificated operator registers with HUGO at [www.hugosafetyapp.co.nz](http://www.hugosafetyapp.co.nz). This will create an online place where they can manage their reports.

The operator's employees and contractors can then report events using their mobile devices, on the downloaded HUGO app (Android or iOS), available from the same web site. The operator can see and manage their information from within their portal. No other operator (or the CAA) can see this detailed information.

The same information, *without any identifying characteristics*, is held in the main HUGO database, allowing the CAA and other operators also signed up to HUGO, to see general trend data, by sector and region.



"That also allows each operator to assess how their health and safety is measuring up against that of others," says Mike Impey.

"Operators can notify the CAA of any event, but there is a legal requirement to notify the CAA about certain events that happen while the aircraft is in operation. If the notification is done through HUGO there's no need to also complete a paper notification, or an online report.

"HUGO's portal can actually help, as it can recognise notifiable injuries from the event report. It then tells the operator 'you have a notifiable event', with a flag. The operator needs to check the details are correct and submit it to the CAA," says Mike.

"This locks the event in the system, and allows the CAA to see the details."

Note that Part 12 reporting is a separate requirement, and can be done using, [www.caa.govt.nz](http://www.caa.govt.nz), "Quick Links > Report Occurrences Online".

All certificated operators will shortly receive this information by email, from the CAA's Health and Safety Manager, but can go ahead and register today. ■

## Applications for **Safety Improvement Scholarship** Now Open

A \$5000 fund is available to someone who can "demonstrate a tangible contribution to improving New Zealand's aviation safety".

Airways and Christchurch Airport are offering a \$5000 scholarship to a person or project helping to create greater aviation safety in New Zealand.

Applications for the Jilly Murphy Memorial Scholarship for Aviation Safety are now open. Anyone, not just Airways' staff, is eligible to apply.

The scholarship can be used for learning, resources, or equipment, for a person focused on aviation safety. A project could be research, or development of a

process or a product.

Past winners include Hadley Cave, Dunedin Chief Controller, who created an electronic tool to reduce the workload on controllers during busy times. Airways' Safety Advisor and Investigator Kate Cook, last year's winner, is using the scholarship to pay for study on the role of human factors in safety.

The scholarship was created in 2013 in honour of Jilly Murphy, Christchurch Airport-based air traffic controller, who

died in the Christchurch earthquake in February 2011. Jilly worked for Airways for 20 years and was passionate about aviation safety.

Applications close on 22 December 2016 and the winner is announced on 22 February 2017.

Go to [www.airways.co.nz/supporting-our-community](http://www.airways.co.nz/supporting-our-community) to download an application form. Email [communications@airways.co.nz](mailto:communications@airways.co.nz) for more information. ■



# It's More than **Vector**



Thanks to those who have told us about their new address. Here's a reminder of 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. The Act also requires aviation document holders to notify the Director promptly of any changes to the address for service and any additional information supplied. You can do this by emailing [info@caa.govt.nz](mailto:info@caa.govt.nz).

An "address for service" is a physical address. The requirement applies to both individuals and organisations, whether based in New Zealand or overseas.

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. Applicants under the Trans Tasman Mutual Recognition Act also need to comply with the Civil Aviation Act 1990, and the relevant forms reflect this.

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. ■

## 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**

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 GroupEAD (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	GroupEAD (Airways) Cut-off Date	Effective Date
9 Nov 2016	16 Nov 2016	2 Feb 2017
21 Dec 2016	28 Dec 2016	2 Mar 2017
18 Jan 2017	25 Jan 2017	30 Mar 2017

See [www.caa.govt.nz/aip](http://www.caa.govt.nz/aip) to view the AIP cut-off dates for 2016/17.

## Aviation **Safety Advisers**

Contact our Aviation Safety Advisers for information and advice. They regularly travel the country to keep in touch with the aviation community.

### **Don Waters**

(North Island)

Mobile: +64 27 485 2096

Email: [Don.Waters@caa.govt.nz](mailto:Don.Waters@caa.govt.nz)

### **John Keyzer**

(Maintenance, North Island)

Mobile: +64 27 213 0507

Email: [John.Keyzer@caa.govt.nz](mailto:John.Keyzer@caa.govt.nz)

### **Carlton Campbell**

(South Island)

Mobile: +64 27 242 9673

Email: [Carlton.Campbell@caa.govt.nz](mailto:Carlton.Campbell@caa.govt.nz)

### **Steve Backhurst**

(Maintenance, South Island)

Mobile: +64 27 285 2022

Email: [Steve.Backhurst@caa.govt.nz](mailto:Steve.Backhurst@caa.govt.nz)

## Report Safety and 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".

# Fatigue – Time for a Review

Twenty years after the current fatigue rules came into effect, a discussion document is asking for your ideas on how to update them.

After two decades, the Civil Aviation Rules surrounding fatigue are looking a bit, well, tired.

A discussion document has now been released asking for participants' ideas about how to improve the current rules.

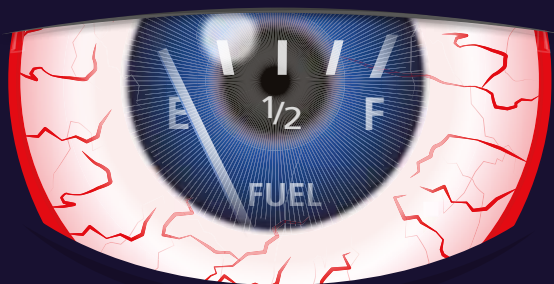
Through its Fatigue Risk Management Panel, the CAA has been working on the issue for some time with participants, and specialists from the scientific, medical, and aviation communities.

Fatigue at work, especially in aviation, is complex, and doesn't have simple solutions. But the panel has so far identified a mix of issues that suggests a multi-pronged approach would be the most effective. We want to know your thoughts on these ideas, and any other suggestions you might have:

- » Prescriptive flight and duty time limitations, rest periods for flight and cabin crew, and scheduling limits for air traffic controllers
- » Performance-based standards for the management of fatigue-related risk, including an option for Fatigue Risk Management Systems (FRMS)
- » Educating the aviation community about how to manage fatigue, and increasing participants' capability to monitor, report, and analyse fatigue-related occurrences.

You can see the discussion document here: [www.caa.govt.nz/fatigue](http://www.caa.govt.nz/fatigue).

Or contact [Xavier.Ruch@caa.govt.nz](mailto:Xavier.Ruch@caa.govt.nz), or 04 560 9647.



# 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).

## 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

## ZK-WRG Zenith Zodiac CH 601-XL

Date and Time:	23-Aug-2015 at 17:12
Location:	Stratford
POB:	2
Damage:	Substantial
Nature of flight:	Private other
Age:	58 yrs

The aircraft was returning to Stratford aerodrome, and was well south of Mokau, when it encountered a wall of cloud that prevented the flight from continuing down the coastline. The pilot decided to divert inland, and climbed up to about 6000 feet to have a look at conditions. He saw what he thought was a route under the cloud, descended, and continued the flight towards Stratford.

He encountered marginal weather in the area to the west of Whangamomona. He knew from his navigation app that Stratford was only 18 NM away, and this area was where he had done his flight training, so he felt comfortable enough to continue.

He radioed Stratford and advised a colleague that he was 18 NM away and "we'd be there soon". He was flying above the hill tops, but beneath the cloud layer, so he slowed the aeroplane down to about 40 mph. Soon after, he found himself trapped by cloud below the hill tops in a narrow valley and that his way ahead was also blocked.

He immediately realised that his only option was to make a 'controlled crash'. He closed the throttle, pulled the nose of the aeroplane up, and within a few seconds everything came to a stop. The aircraft had slid down a steep slope and came to a stop with the nose resting in a creek.

CAA Occurrence Ref 15/4097

# 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".

## Partenavia P 68B

### Engine Mount

ATA Chapter: 7100

During 50 hour Periodic Inspection the left-hand engine starter cable was found to be shorting on the engine mount. This caused a large hole to be burnt in the engine mount frame.

Starter cable found ty-wrapped between the engine mount and fuel line. Engine and mount removed, engine mount repaired.

[CAA Occurrence Ref 15/5721](#)

## Robinson R44 II

### Plug

During sling load operations, the load of building supplies was released from the cargo hook. The pilot isolated the cargo hook by pulling the system's circuit breaker, and the cargo handling system was restricted from use until the next scheduled inspection.

The engineering investigation found that the connector that supplies power to the cargo hook was not safety wired, and was not tightened properly. The engineer cleaned the plug, connected it, and installed safety wire. The cargo hook system was checked for operation by the engineer and avionics technician, including ground function and load tests and in-flight function. No faults were found, and the cargo hook system was cleared for use.

Civil Aviation Rules, Part 43 General Maintenance Rules, require a duplicate check for control systems (rule 43.113 Duplicate safety inspection of control system). While not required in the rule; engineers should consider duplicate checks for other systems that could create a hazard to third parties, such as external load handling systems.

The participant has emphasised the importance of conducting a thorough preflight of each component of the cargo handling system prior to conducting operations, and is conducting this training with its pilots.

[CAA Occurrence Ref 16/3464](#)

## Pacific Aerospace Cresco 08-600

### Elevator Torque Tube

Part Model: 08-600  
Part Manufacturer: Pacific Aerospace  
Part Number: 242837/242646  
ATA Chapter: 2700  
TTIS Hours: 17700

In flight, the pilot became aware of limited aileron control to the left.

Maintenance investigation found the right elevator torque tube had broken, and a section was bent sufficiently to interfere with aileron operation. Metal fatigue was suspected, coupled with pilots standing on the torque tube to enter and exit the cockpit. A replacement was installed.

Following the reporting of a second cracked elevator torque tube to the CAA, Emergency Airworthiness Directives DCA/CRESCO/20 and DCA/FU24/184 were raised, requiring inspection for cracking and repair or replacement as required.

[CAA Occurrence Ref 16/3217](#)

## Eurocopter AS 350 B2

### Missing Attachment Hardware

Part Model: Arriel 1D1  
Part Manufacturer: Turbomeca  
Part Number: 0292808710  
TTIS Hours: 8022.4

During pre-flight checks for an unscheduled heli-ski flight, the pilot observed two loose 12-point bolts on the engine compartment deck. An engineer was dispatched to the aircraft, and identified that the bolts were from the exhaust duct/containment shield attachment flange.

The engine was last serviced by an overseas Turbomeca authorised Level 3 facility in 2011 at 7726.18 hours. The fault was identified at 8022.45 hours, and no torque checks were required to be completed during this time. The next requirement to torque these bolts would have been during module replacement. It is suspected that these bolts were not torqued appropriately by this facility prior to releasing the engine to service. Vibration and corrosion are suspected as contributing to the migration of the bolts.

The engineer checked for damage, and replaced the bolts. On checking the torque of the remaining bolts, others were identified to have less than the specified torque applied. All of the bolts were torqued to the manufacturer's specification. The torque of these bolts installed on similar models within the company were checked with no faults found.

[CAA Occurrence Ref 16/4120](#)

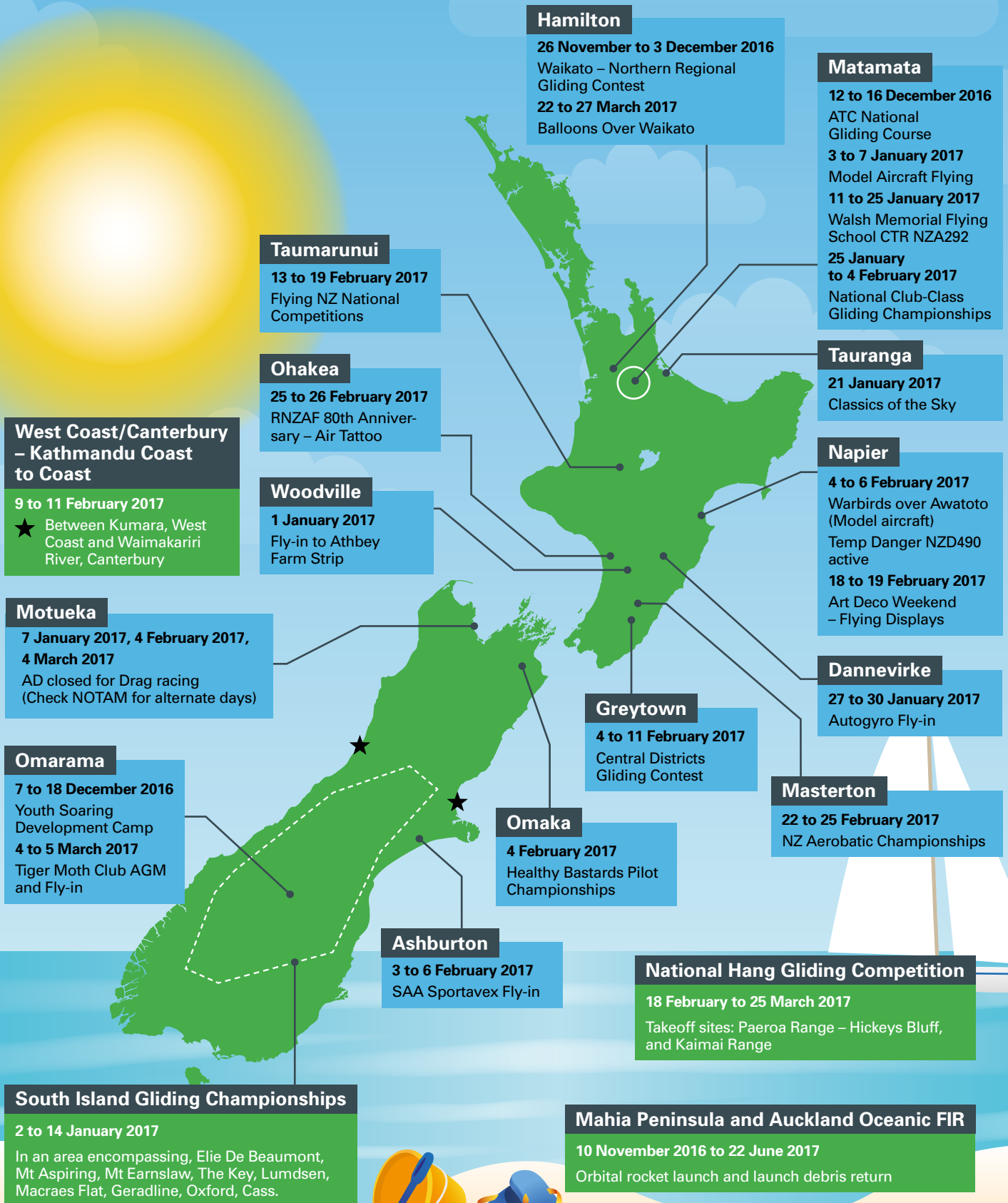
It's easy to report occurrences

Just go to:

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

# Summer Traffic Busy Spots

Don't inadvertently fly into an aviation event – always check AIP Supplements and NOTAMs. You can download AIP Supplements from [www.aip.net.nz](http://www.aip.net.nz) and NOTAMs from [www.ifis.airways.co.nz](http://www.ifis.airways.co.nz). This map shows the known flying events between late November 2016 and late March 2017.



Keep these events in your calendar

