

# vector

## Warbirds Over Wanaka 2016

Manufacturing Safe Drones

Turbine Gas  
Path Washing

Birds Can Invade  
Your Plane Overnight





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### Warbirds Over Wanaka 2016

Flying to Warbirds? *Vector* gives you all the must dos and should dos so you don't get caught with your head down in the cockpit, or become an unwitting and unwelcome part of the air show.



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### Manufacturing Safe Drones

*Vector* chats with two New Zealand-based, world-leading manufacturers of remotely piloted aircraft systems (RPAS), and discovers a "proper aircraft engineering approach" is producing top safety features.



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### Turbine Gas Path Washing

Token washing of the engine will not prevent corrosion and sulphidation, potential parts replacement and even engine overhaul. Follow the manufacturer's instructions to make sure your engine remains airworthy.



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### Birds Can Invade Your Plane Overnight

Who would believe that an aircraft, safely hangared for just 12 hours, could become the new home of nesting birds? But it has happened. Why a thorough pre-flight check may prevent an engine fire, control cable problems, and/or a seized engine.

Cover: One of only a handful still flying today, this UK-based Messerschmitt Bf 109 is coming to Warbirds Over Wanaka 2016. See article on page 4. Photo courtesy of John M Dibbs.

Inset: The Aeronavics Skyjib drone, see story on page 6. Photo courtesy of Aeronavics.

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Safety Promotion Unit of the Civil Aviation Authority of New Zealand, PO Box 3555, Wellington 6140.

Tel: +64 4 560 9400,  
Fax: +64 4 569 2024,  
Email: [info@caa.govt.nz](mailto:info@caa.govt.nz).

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**Manager Safety Promotion** Bill Sommer.

**Editor** Peter Singleton.

#### The *Vector* Team

Charlie Brimmicombe, Lakshmi Guda,  
Aaron Hailwood, Pen Mackay, Rose Wood.

**Design** Gusto.

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# Holding Back on the Herbals



Photo: istockphoto.com/amnarj2006

If you're thinking of trying out any herbal treatments, make sure you talk to your aviation Medical Examiner first. Those seemingly innocuous tablets may be incompatible with flight safety.

**N**atural remedies sound very appealing, but Dr Rajib Ghosh, a CAA Senior Medical Officer, says they should be approached in the same way that all medications are in aviation.

"People often think that because something is 'natural' it's going to be completely safe with no side effects. And that's not always the case."

Your Medical Examiner is specifically trained in the special requirements of aviation medicine.

"That's why it's important to discuss herbal treatments with your Medical Examiner and not just your GP, or even your clinical specialist," says Dr Ghosh.

"A GP or specialist may prescribe you something in good faith, and it may be the best course of action in normal circumstances. However, without specialist knowledge, the aviation safety implications may not have been considered."

Fatigue management is an example.

"We know most pilots have to manage fatigue at some time. Performing any safety-critical task, like flying, can be challenging when tired. That is doubly so for pilots on early starts, late finishes or shift work."

There are many natural treatments for fatigue management on the market. Some even advertise that it is safe to operate machinery or aircraft while you are on a course of

these treatments. That isn't necessarily true, and exactly why Dr Ghosh says you need to discuss any herbal treatments with your Medical Examiner.

"Some of the ingredients used may not be safe for aviation activities."

However, Dr Ghosh says that it's not always the case that herbal treatments will interfere with standard medicine or, as some believe, are ineffective.

"Just because something is herbal or natural doesn't mean it can't be useful. The important thing is whether there's scientific evidence to back up the claims."

For example, olive leaf extracts have been used for centuries to aid in the treatment of diabetes. But it's only recently that a clinical trial at the Liggins Institute at Auckland University has shown that an extract of fresh olive leaves appreciably reduces some risk factors for developing type 2 diabetes.

If you do want to use a herbal treatment, instead of, or in addition to, standard medicines, discuss that with your Medical Examiner. They will be able to go through the treatment options with you, how your treatment will be monitored, and whether it may affect your ability to keep flying. ■

# Warbirds Over Wanaka 2016

Over Easter, a significant number of aircraft will converge on central Otago. Now's the time to do your homework so you don't become an unwitting part of the air show.

This year's Warbirds Over Wanaka takes place from 24 to 28 March. Before flying to Wanaka this Easter, study all the possible routes and make sure you've read and understood AIP Supplement 35/16.

AIP Supplements are available free online at [www.aip.net.nz](http://www.aip.net.nz).

For information on the airshow, see the Warbirds Over Wanaka web site, [www.warbirdsoverwanaka.com](http://www.warbirdsoverwanaka.com).

During airshow practices and displays, NZR998 will be activated and the Wanaka CTR/D deactivated. For detailed airshow times, see AIP Supplement 35/16.

Airways will provide an aerodrome control service within the Wanaka CTR/D when it's active. Approach control services will not be provided.

## Warbirds Checklist

This isn't a comprehensive checklist; just a few basics to get you started.

- Understood AIP Supplement 35/16 and NOTAMs
- Alternates planned
- Arrival procedures handy
- Aircraft tie-downs and survival gear (check these are in your weight calculations)
- Weather checked
- Flight plan filed

(Note that Wanaka Tower will not be accepting VFR flight plans or SARTIME terminations. You can terminate either by phone after arrival, or while still airborne and within coverage of Christchurch Information)

- Mountain flying skills up to scratch
- 30 minutes extra holding fuel
- Neck stretches (You want to be ready for all that scanning!)

Make contingency plans so that you don't fall victim to the insidious 'get-there-itis'. On the day, fully brief yourself on weather conditions and check for NOTAMs – any changes to airshow times will be notified by NOTAM.

NOTAMs are available on Airways' Internet Flight Information Service (IFIS) web site, [www.ifis.airways.co.nz](http://www.ifis.airways.co.nz).

## Wanaka Airspace

To manage the increased traffic, a 5 NM radius control zone centred on Wanaka (Wanaka CTR/D) and temporary restricted area (NZR998) will be created. These extend from the surface to 7500 ft.

## See and Be Seen

When the temporary control zone and/or restricted area is not in place, make sure you follow unattended aerodrome procedures.

Be on alert for high-performance aircraft operations, as well as slower non-radio equipped (NORDO) vintage aircraft.

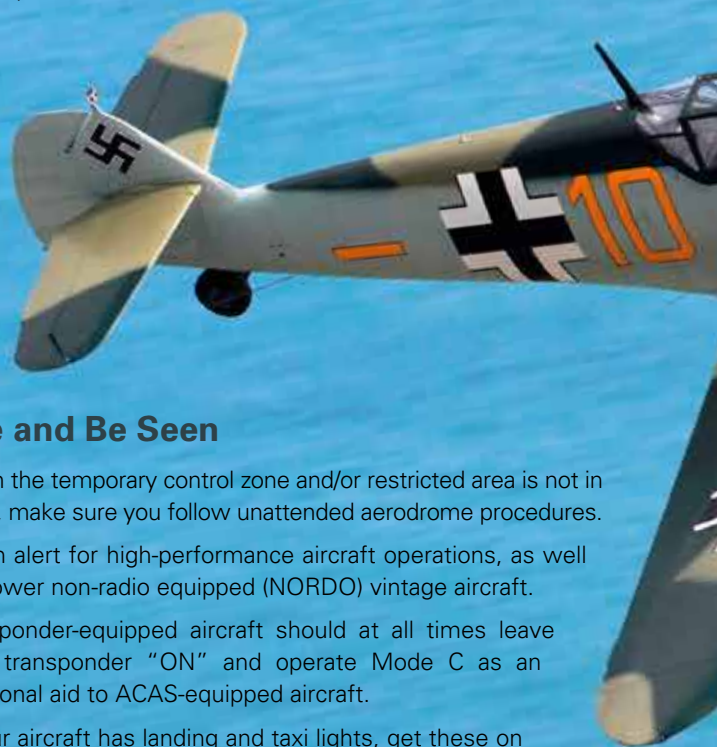
Transponder-equipped aircraft should at all times leave their transponder "ON" and operate Mode C as an additional aid to ACAS-equipped aircraft.

If your aircraft has landing and taxi lights, get these on early. You must have anti-collision lights on in the CTR/D unless told otherwise.

## Frequencies

Make sure you listen to the ATIS on 127.6 MHz before entering the Wanaka Control Zone. During ATC hours of watch, you'll need to determine the runway in use and associated arrival procedure before entering the control zone. If you find yourself out of the ATIS range, the responses from preceding traffic may give you a clue.

The Wanaka Tower frequency (120.1 MHz) will be very busy, so try to avoid adding any 'ummmms' and 'ahhhhs' into the mix. Your radio calls need to be accurate and concise to reduce clutter. Make sure your radio skills are up to scratch well before your flight. The GAP booklet *Plane Talking* will give you some good advice. Email [info@caa.govt.nz](mailto:info@caa.govt.nz) for a free copy.



If the Wanaka Tower frequency is congested, use the secondary frequency 118.9 MHz.

Wanaka ground frequency 118.9 MHz and Wanaka Tower will issue taxiing instructions for aircraft on the manoeuvring area when ATC is on watch.

Be aware that all frequencies have coverage limitations due to terrain.



## Available Alternates

In the event that a landing in Wanaka is not possible, or is perhaps in the too-complicated basket, here are some alternatives.

### Queenstown

Prior permission: For non-regular air transport operations and general aviation operations with aircraft that exceed 5700kg MCTOW, a movement request must be submitted via their web site, [www.queenstownairport.com](http://www.queenstownairport.com).

General: On entering Queenstown Information's area of responsibility (as shown on the South Island FISCOM Chart in the AIP), contact them on 128.9 MHz and advise your intentions. Queenstown Information (QN info) will provide aerodrome information and any anticipated delays due to increased traffic. Prior to entering Queenstown controlled airspace, contact Queenstown Tower (118.1 MHz) for an entry clearance.

Essential information on Queenstown can be found in *AIP New Zealand*, Vol 4, and there is further guidance in the *In, Out, and Around Queenstown* GAP booklet. Email [info@caa.govt.nz](mailto:info@caa.govt.nz) for a free copy.

The Messerschmitt Bf 109 is the most produced fighter of all time (33,000 produced). However, only a handful still fly today.

Fees: Landing fees apply.

Parking space: Light aircraft and helicopters must park in their respective designated parking areas, as indicated in the AIP.

Fuel: Avgas and Jet A1 available (Air BP).

### Cromwell Racecourse

Prior permission: Not required.

General: Terrain and weather can make this a challenging aerodrome. Takeoff is prohibited on Runway 27, and landing is prohibited on Runway 09. Both grass runways have variable surface conditions. Beware of rabbit holes and, if possible, avoid heavy braking.

Fees: Landing fees apply.

Fuel: None available.

### Alexandra

Prior permission: Not required.

General: Alexandra has parallel paved and grass runways 14/32, both 1200 metres long, and a much shorter crossing grass runway 01/19. All vectors have good clear approaches and overshoot areas. In westerly and north-westerly conditions there can be considerable turbulence off the Dunstan Range. The grass surfaces are rough, so watch out for rabbit holes.

Fees: Landing fees apply.

Fuel: Avgas and Jet A1 available (Z Energy).

### Omarama

Prior permission: Not required.

General: Omarama has a very long grass runway with good approach and overshoot areas. Aim to land on the irrigated grass, but watch out for movable irrigation pipelines and rabbit holes. Intensive gliding activity occurs here daily.

Fees: Landing fees apply.

Fuel: Avgas available (Z Energy).

### Makarora

Prior Permission: Required from the operator.

General: You should have appropriate training or considerable strip experience to land at Makarora. This is a relatively short grass strip with considerable slope and undulations. The approaches to Makarora are often affected by windshear, up and down draughts, turbulence, and crosswinds for landing. Neighbouring trees and bush make this an intimidating aerodrome. Stock, vehicles, and pedestrians may be on the runway at times.

Parking space: Very limited area to picket aircraft.

Fuel: None available.

### Haast

Prior permission: Required from the operator.

General: Haast has a gravel runway of variable surface condition. There are good approaches and overshoots for both runways 16 and 34. Stock is occasionally grazed on the field.

Fees: Landing fees payable.

Fuel: Avgas available (Z Energy). ■

# Manufacturing Safe Drones

Drones, RPAS, UAVs... Whatever you call them, they are a growing technology that many Kiwi companies are embracing for myriad tasks. *Vector* chatted with two of the manufacturers in New Zealand to find out how they aim for the highest safety standards.

**Q**ueenstown-based company, Shotover, had been producing fittings for helicopter filming, when it identified a market for specialist filming drones.

"We have pilots and engineers in our team as well as filmmakers," says Brad Hurdell, Shotover's General Manager, and a former aircraft technician in the Royal New Zealand Air Force.

"We therefore know what customers want from a filming point of view, but also what will work from an aviation point of view.

"As aviators, we understand the importance of safety and it's at the forefront of what we plan with our products."

Some of the safety features included in the U1, Shotover's first drone, are a parachute, dual battery systems, and an innovative motor system.

"We have eight motors, but they are in pairs, so look like four, and have counter-rotating coaxial shafts," says Brad. "Having multiple motors allows the craft to continue to operate if a couple of engines fail."

Linda Bulk from Raglan-based Aeronavics echoes Shotover's commitment to safety.

"It starts with the airframe," says Linda. "Everything has to be the best quality – we use aircraft-grade aluminium, industrial composites, and high-quality carbon fibre.

"The propulsion systems need to be high-quality and smooth. We check that the parts manufacturers we work with have excellent ratings and that every part we use is reliable and well-tested."

Aeronavics' co-founder, Rob Brouwer, is a former commercial pilot, and Linda says that this helps bring aviation safety to the forefront of the business.

"I think it's very much in the blood of aircraft pilots to be aware of safety.

"And we're looking at this technology in the same way – manufacturing procedures need to be highly conscious of safety."

For Aeronavics, this safety culture isn't limited to just the manufacturing side. When they're testing their craft, they also ensure the highest safety standards are met.

"If we're testing an aircraft, which we do on one side of the building, a flashing light indicates to others not to approach the area where it's flying and the controllers are in a protective cage. Only well-tested aircraft are

demonstrated to clients, and pre- and post-flight checks are always carried out."

The fully stabilised mode means that if the controller gets confused or lost, the drone will just hover while it isn't receiving any inputs, until the problem is solved.

"If something goes wrong, or your batteries are low, you get an alert. If you ignore the alert, it will eventually come back and land.

"If there's a loss of signal with the controls, it will also automatically come back to where it was launched and land," says Linda.





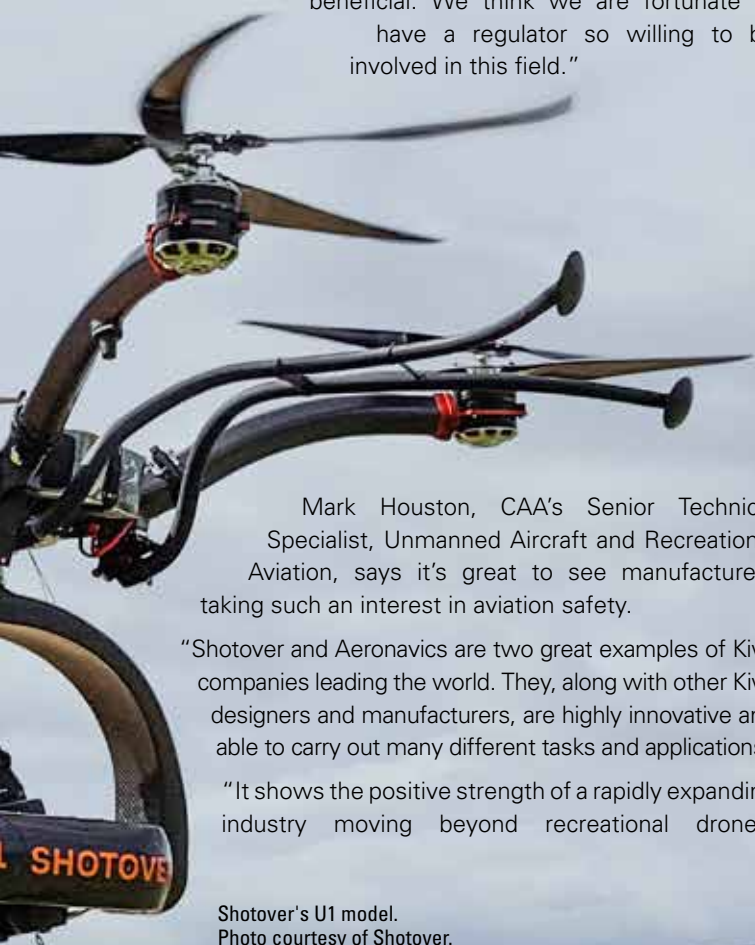
Aeronavics' SkyJibX4 flying beside a wind turbine.

Both Aeronavics and Shotover drones have multiple motors, and will still fly if they lose a motor or two.

Parachutes are also fitted to slow them down if they should ever plummet.

Both companies have worked closely with the CAA. Shotover has been authorised to manufacture and alter aircraft under 25 kilograms, and Aeronavics is in the process to do the same. Previously, only Model Flying New Zealand was allowed to do that.

"We want to set high standards that are fit for purpose," says Linda, "and that's why working with the CAA has been so beneficial. We think we are fortunate to have a regulator so willing to be involved in this field."



Mark Houston, CAA's Senior Technical Specialist, Unmanned Aircraft and Recreational Aviation, says it's great to see manufacturers taking such an interest in aviation safety.

"Shotover and Aeronavics are two great examples of Kiwi companies leading the world. They, along with other Kiwi designers and manufacturers, are highly innovative and able to carry out many different tasks and applications.

"It shows the positive strength of a rapidly expanding industry moving beyond recreational drones;

Shotover's U1 model. Photo courtesy of Shotover.



The coaxial propulsion arrangement on the SkyJibX4.

demonstrating just what benefits are available through pasture management, food production, ecological management, and resource development."

Brad Hurdell adds, "One of the hardest things for people in this industry, is that it is all so new, and rules and regulations are still catching up to this fast-changing industry.

"Our thoughts are that if we take a proper aircraft engineering approach to this, and do full analysis and reliability testing, then we will exceed any new regulations when they're in place."

Safety is at the forefront for these manufacturers – not only because a safer drone is more reliable for their customers – but because they understand the risks of operating above people and property.

"Having a background in aviation, we know the risks," says Brad. "You can't just pull over to the side of the road and wait for help if something goes wrong. It's potentially a life and death situation."

And that's probably the lesson here. Shotover and Aeronavics take safety seriously – all aviation participants need to.

"You need to be constantly thinking about the environment your drone is flying in and what you're going to do if something goes wrong," says Mark Houston. "Where can it land? Is it still in your line of vision?"

"It all comes back to good airmanship. A drone is an aircraft and the same skills apply – knowledge of the aircraft, environment, and the risk."

For more information on drones, see the CAA web site. ■

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

# Turbine Gas Path Wash

When it comes to engine health, cleanliness is next to airworthiness. To prevent turbine engine corrosion and sulphidation, you should follow the manufacturer's washing recommendations.

'Corrosion' is the gradual destruction of materials (usually metals) by chemical reaction.

'Sulphidation' affects metallic components when they are exposed to compounds containing sulphur and sodium chloride within a hot environment – a regular occurrence during flight.

Every turbine engine has a maintenance manual that contains rinse or wash requirements to prevent sulphidation. These requirements must be followed, unless an operator has an alternate means of compliance stated in their approved maintenance programme.

Pratt & Whitney Canada (P&WC) publish recommended time periods between gas path washes based on geographical region. The entire New Zealand region is listed as a "salt-laden environment".

"To prevent damage, operators need to review the manufacturer's requirements and make sure their wash programme conforms," says CAA Air Transport Inspector (Airworthiness), Steve Shaw.

"Most manufacturers recommend the compressor (gas path) to be rinsed or washed after the last flight of the day to remove salt deposits when operating in a corrosive environment.

Vector is using the P&WC PT6A engine as an example here, because it is the most common small turbine engine in New Zealand fixed-wing aircraft, being used in everything from skydiving to air ambulance operations – CAA records show there are approximately 120 PT6A engines of various models in use in New Zealand.

However, the advice contained in this article can equally be applied to other turbine engine models, in both fixed-wing and rotary operations. As you'd expect, the manufacturer's instructions will differ from engine to engine, so it's important that you fully understand the maintenance requirements. For example, the Rolls-Royce M250 maintenance instructions specify both rinse and wash regimes.

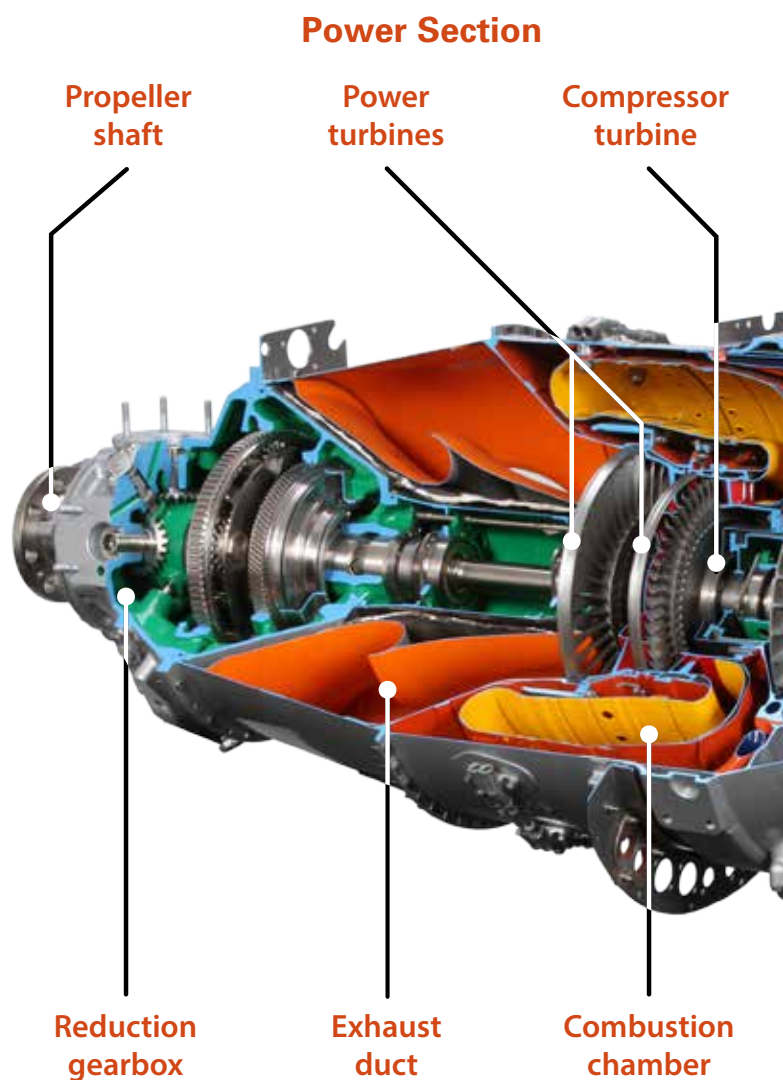
New Zealand's Pratt & Whitney representative, Stephan Heep, says some operators talk about 'compressor washing', but fail to realise that the compressor wash, and compressor turbine wash, are separate processes.

"Typically, you have two washing schedules. The external wash to remove corrosive elements from the engine's external surfaces, and the other in a broader sense, is the full gas path wash.

"I like to be a little bit cautious and use the terminology 'gas path wash', because then we know we're talking about washing the entire gas path, from inlet case through to the power turbine. Some operators get stuck on the fact they are doing a compressor wash, and neglect to wash the compressor turbine.

## Washing Advice

Warren Hadfield, another CAA Air Transport Inspector (Airworthiness), is concerned about what a poor washing



Gas path of a PT6A: It's important that the compressor turbine in the very centre is washed.



# Washing

technique and/or routine can result in. "There have been a number of engines damaged due to a lack of washing, or because the wash has been done incorrectly.

"Compressor washes should be done after the last flight of the day, followed by drying runs in accordance with the maintenance manual.

"There is a concern that some of those that are washing, are only washing the compressor part of the engine (the easy part), without washing the compressor turbine.

"All that does is move the salt into the interior part of the engine.

"We really want to stress the importance of following the manufacturer's recommendations, particularly regarding the compressor turbine and vane ring."

P&WC's Stephan Heep says the average PT6A engine ingests

more than 8,000 cubic feet of air in one minute. "In flying through a salt-laden environment, you get a build-up of salt deposits on the compressor rotating components, and corrosive elements, throughout the gas path."

"If you just rinse water on the compressor side, all you're doing is washing those salt deposits off the compressor and onto the compressor hot section – exactly where you don't want them!

"How often you wash the engine is something you're going to need to evaluate, based on the frequency recommendations in the maintenance manual, knowledge of your routes, and close monitoring of engine condition," says Stephan.

Blenheim-based Craig Anderson, Chief Pilot of Sounds Air, says the airline operates engines on an extended time before overhaul (TBO). They've run several engines right out to their limits, but haven't had any issues with corrosion.

Craig previously held the role of Chief Engineer at Sounds Aero Maintenance.

"Our PC-12s (Pilatus) are operating up in the higher altitudes, a lot of the time to Taupo. Even though that region is still classed as a highly corrosive area, it's completely different to the coastal environment at lower altitudes, where we operate the Caravans (Cessna). However, we still choose to wash the PC-12s on the same schedule as the Caravans.

"Our engines are washed daily, and our pilots are put through a maintenance training procedure as part of their initial type rating. The pilots certify their own maintenance, under company authorisation.

"When an engine comes in for a borescope inspection, we can see if it's been washed regularly."

The borescope is an optical tool, used for remote visual inspection. It consists of a tube, usually long and often flexible, a lens on one end and an eyepiece on the other.

A borescope inspection is required every 400 hours. However, Sounds Aero's C208 maintenance programme requires inspection every 300 hours – a prudent move given their operating environment.

"You can see the salt deposits building up on the compressor blades, even in the very early stages," says Craig.

## Water Usage

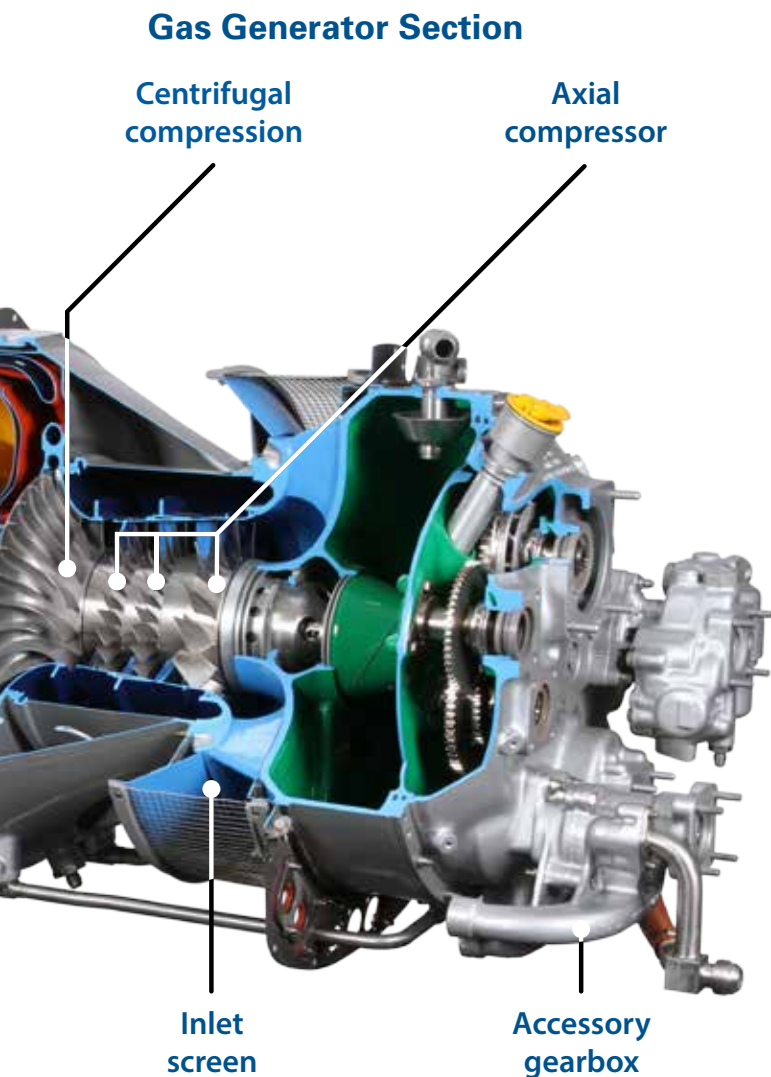
P&WC's Stephan Heep says the amount of water in the wash is also critical.

"Once again, when problems occur, it's normally a case of the operator not thoroughly reading the maintenance manual.

"I've seen examples of both ends of the stick, where they've used too much, or not enough, water. If you're on the 'too little' end, you may as well forget it; the wash isn't going to help.

"One customer I was working with had significant corrosion on their engine, and he swore up and down they were washing regularly.

*Continued over >>*



» Continued from previous page

"It turned out that he was using a five-litre garden sprayer bottle that probably put two litres of water through his engine in the 30-second motoring cycle. If you look in the maintenance manual, you need a flow rate of 7.6 to 11.3 litres per minute to effectively rinse the corrosion, including elements, from the gas path surfaces.

"Conversely, we've had operators who overdo it, and end up with contamination in the fuel control unit (FCU) because they've put copious amounts of water through without adequately isolating the P3 unit air to the FCU. That's why it's so important for the customer to review the maintenance manual, ascertain their wash rate, determine how to produce that amount of water, check the recommended amount of water is actually going through the engine, and most importantly, isolate the P3 line to the FCU," says Stephan.

### Drying

Stephan Heep continues, "In the drying run, your aim is to get rid of any moisture sitting in joins and cavities to avoid corrosion.

"We see some operators following the washing process very well, but never doing the drying run, or taking a long time between the wash and drying run.

Craig Anderson from Sounds Air describes such an experience.

"I did some work with a Caravan operator in Dubai who had a lot of corrosion issues. It turns out they were washing the plane at night and then giving it a drying run in the morning. You don't want that salty water, that's mixed with sand, sitting in the engine overnight."

### The Devil's in the Detail

"It's just as important to record what you're doing, as actually doing it. They go hand in hand," says Craig.

"Sounds Aero has an approved maintenance form for release-to-service that pilots can use to record their washing activities.

"At one stage, our pilots were doing the washes, but weren't recording them. If we have any issues downtrack, we need the ability to go back and identify why we're seeing what we're seeing.

"We used to record the wash on the flight or maintenance log, but that's very time-consuming and tedious for a job that's required daily.

"We've got an approved form now (the wash is a maintenance requirement so it needs to be released to service), so all the pilot has to do is write the registration, record their name and approval number, then sign it. That makes the paperwork very quick and easy." ■



Sounds Air pilot, Steve Love, performing a gas path wash. Make sure you follow the engine manufacturer's rinse or wash recommendations.

Photo courtesy of Sounds Air

# Aviation Safety Coordinator Course

## Auckland

18 to 19 February 2016

Sudima Auckland Airport  
18 Airpark Drive  
Airport Oaks,  
Mangere, Auckland



Take a step on the ladder to SMS

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 understand the role of a safety coordinator, and to refresh and re-inspire existing ones –

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

## FAA Acceptance of NZ Design Changes Updated

New Zealand's Bilateral Aviation Safety Agreement with the FAA has been changed to allow mutual acceptance of additional Supplemental Type Certificates for aircraft and products.

Within the bilateral agreement is an annex, the Implementation Procedures for Airworthiness (IPA), that specifies the framework for acceptance of all aspects of aviation design between New Zealand and the United States.

The IPA has been expanded to include Supplemental Type Certificates (STCs) for non-US State-of-Design aircraft (such as Airbus Helicopters, Bombardier, Diamond Aircraft), and STCs for normal and transport category helicopters.

Four years' work, that involved the FAA reviewing examples of CAA-approved STCs, culminated in the updated IPA being signed in Washington on 4 December 2015.

Shaun Johnson, CAA Manager Aircraft Certification, says these changes represent a significant step forward in the FAA/CAA working relationship.

"In simple terms, the changes to the IPA allow New Zealand companies to obtain FAA STCs in the new areas on the strength of the New Zealand STCs, and vice versa.

"For New Zealand companies, these changes significantly reduce time and cost.

"The CAA's capability and competence with the certification of aircraft design changes, as well as that of our design delegation holders, has been recognised." says Shaun.

STC holders interested in applying to have their STC validated by the FAA need to apply through the CAA, not directly to the FAA.

We're currently working with the FAA on a procedure for initial applications, and a test one is underway, but it may take a little time before further applications can be accepted. ■

# Birds Can Invade Your

If you think you're safe from sneaky birds' nests in your aircraft because you fly it every day, and keep it in a hangar overnight, you have another think coming.

**J**ohn Harwood, CFI at Kapiti Aero Club, says they recently discovered a bird's nest that appeared literally overnight in an aircraft that was hangared.

"A piece of straw hanging out of a Cessna 152 alerted us, and when we looked in deeper, there was a rather large nest inside. No birds, but a very large nest.

"Going flying with that could've ended badly."

John immediately issued a notice to all club members reminding them of the importance of pre-flight checks, and being extra vigilant for birds' nests.

"Even if your aircraft is hangared this is still a danger," reiterates John. "Ours was hangared but they still got in. Any little gap can be filled, they are quite persistent."

Any aircraft can have birds nesting in it. It doesn't matter whether it's a big or small aerodrome, or whether the aircraft is parked in a hangar, or out in the open. Birds can get into surprisingly small spaces. A thorough pre-flight inspection is essential.

## Clues

Birds often leave signs they're nesting in your aircraft. Bird droppings on and underneath the aircraft are an obvious sign. You might even hear the chirping of chicks.

Usually, the first indication is vegetation on the ground or snagged on some part of the aircraft. And this can appear between the first flight and later that day!



# Plane Overnight

Your inspection should be more than a quick walk around the aircraft. You need to check inside the wings, fuselage, engine cowl, and tailcone.

Any small opening has the potential to allow birds to get in. You should remove as many of the cowls as possible, and perform a thorough inspection, especially if the aircraft hasn't been used for a long while.

## Dangers

Birds' nests inside an aircraft pose a very real danger to flight safety in many ways.

If the nest is close to the engine, especially the exhaust system, it could result in a fire. If the nest disrupts the airflow into the engine oil cooler, the engine may overheat and possibly seize.

The electronics can be affected by the bird activity, or the obstruction of the nest.

Nests built in the fuselage or wing can disrupt the control

cables needed to move the rudder, elevator, ailerons, and flaps, leading to jammed controls.

Where there are birds, there are highly acidic bird droppings. If they aren't cleaned out they can corrode metal anywhere on the aircraft.

## Prevention

You can do a few things to deter birds from making their home in your aircraft. The most common method is to use bungs to cover the air inlets for the engine. These should be clearly identified with a "remove before flight" ribbon. Always use these, whether your aircraft is stored in a hangar or outside.

But there are other openings that are often overlooked, such as a slot for the elevator control. It's unlikely you will have commercial bungs for this type of space, so you may have to make your own out of foam, or use tape. Again, make sure you identify every gap-stuffer so they will all be removed before flight. ■

This nest appeared overnight in a hangared aircraft at Kapiti Aero Club.



# Beaver Rush

This is my story of rush, of failing to follow procedure, of being terrorised by a senior into acting against that ‘gut feeling’, and of ignorance. It’s not the first story of its kind – sadly, it won’t be the last.

**M**y logbook had just passed 700 hours total time and I was on my way to building enough flight time to join a regional airline.

I was flying for a small Part 135 outfit (cargo and people) and had been hired early that summer to fly Cessna 180s, 185s, and 206s in and out of a 1400-metre uncontrolled airfield with both seal and grass strips.

For weeks I’d seen the big DHC-2 Beavers coming and going, their Pratt & Whitney R-985 roaring on takeoff with 450 hp of power, spacious interiors, and sitting in a three point stance well above the ground.

I was envious of their pilots chatting in the airport café about how well the planes handled in all phases of flight, and their payload capability. I dreamed I would get to fly one.

That dream finally became reality when the boss, Jack – who we called “Screaming Jack” behind his back – said, “Here are the pilot notes for the Beaver. Study up tonight and we’ll go through the numbers in the morning and get you checked out”.

That night I did my homework, getting the limitations and basic systems operation straight in my head. I knew I was ready...



Photo: Gavin Conroy

The next morning, my ecstasy while pulling the orange Beaver out of the hangar was rudely interrupted by Screaming Jack bursting out of his office and barking urgent tasks at us.

He yelled that the day's plans were out the window as more charters had come through. "I'll let you know when I figure out what you're doing today, now fuel and oil everything".

As he finished, I carefully raised my right hand in a questioning manner and he stared at me and barked, "WHAT?"

"Would you like me to fuel and oil the Beaver?" I figured the question would remind him of the planned checkout he had scheduled for the morning, and allow a pre-flight to be started on the aircraft.

"No!" he shot back, "I got it ready last night. Get the two 185s ready to go and meet me back at the Beaver in 30 minutes."

I sorted the fuel and oil on the two Cessnas, and tried dressing the interiors for the pilots coming to pre-flight before their busy day's schedule.

I hurried the tasks as if a thumb was pushing me squarely in the back. The self-induced rush was uncomfortable, but I was focused on that orange Beaver.

As several of us were pushing a Cessna back to a parking spot, I saw Screaming Jack about 50 metres away, pulling the

propeller through on the Beaver. Apologising for abandoning them, I broke away from the others, running up to the aircraft as Screaming Jack was closing the cap of the forward belly fuel tank on the left side of the aircraft.

He said sharply, "Climb in the left seat, and strap yourself in. See where everything is, get comfortable and I'll finish the pre-flight. You know the 985 (the engine), so be ready to start once I'm in. You have a charter at 12 noon".

I really wanted to get to know the aircraft prior to flying it, but I knew that, with his experience, Jack would get it all done thoroughly. After all, I was going to fly a Beaver, legendary bush plane and aircraft extraordinaire. I had a charter at noon! Learning the pre-flight could wait till after the flying.

I climbed up into the spacious cabin and slid into the left seat. The study from the night before and previous after-work forays into the cockpit helped me become quickly familiar with the layout. I was beginning to relax when the left cabin door slammed closed and a voice exploded from behind me.

"Start the engine," Jack said as he slid into the right seat, "We don't have time for this!"

"Chocks in?" I queried.

"Feet on the brakes, no chocks."

Checklist sitting on my left knee, I ran through it in a blur,



De Havilland Beavers at a 2010 agricultural aircraft reunion in Gisborne.

Continued over >>

calling out each item and required position. I yelled "CLEAR" out the left window, making a great effort not to look at Jack who was fighting with his seatbelt harness and completely disengaged from what I was doing.

I hit the starter, and the whine converted to blade rotation, and two blades later, the reliable R-985 rumbled noisily into life in a swirling cloud of white smoke. Set 1000 RPM, oil pressure steadily came up and passed 50 psi. I pushed the prop to fine and proceeded to complete the after-start checklist, verifying all was in order from the trim to the fuel selector.

I took my time, knowing we needed oil temperature of 40°C to do the run-up.

It worked well until we hit 30°C when Jack looked at his wristwatch and shouted, "Do the run-up now!"

"The book says 40°C to do the run-up," I said, pointing to the oil temperature gauge.

"We'll have 40°C once you've done it, and I own the aeroplane," Jack fired back.

So without hesitation, and feet on the brakes with the stick back, I performed the run-up as per the checklist, trying to maintain a sensible pace. As I marked off the last item in the checklist, the oil temperature was just approaching 40°C.

"Now let's go!" Jack demanded, pointing to the grass vector about 50 metres ahead.

"Can I taxi to the end for full length?" I asked sheepishly.

"When has a Beaver ever needed full length?" he barked back.

I added some power and began to taxi forward, turning the nose slightly to the left to see if anyone might be departing the grass vector or turning final.

I did a control check with the yoke and called, "full and free". When I pushed left and right on the rudders, they felt as if they had very limited travel. It seemed extremely odd for rudder pedals to move so little. I stopped the aircraft at the edge of the vector.

"The rudder's travel is really limited, is that normal?"

"Yup, Beavers have really sensitive rudders, doesn't take much. Let's go!"

I put that morsel of DHC-2 Beaver knowledge away in my 'good things to remember' box, just like that 40°C is not required to do a run-up, even though the Flight Manual says so.

I increased power, and using the brakes, lined up midfield into the wind. Jack quickly and calmly talked me through using the flap selector and pumping the flaps down to takeoff position.

He looked at his watch again, and said, "Ahead of schedule, three touch and goes. Let's go."

I smoothly increased power up to about 24 inches to get an initial feel of the aircraft. I found that the rudder input to compensate for torque and P-factor needed a smooth application of the opposite brake.

The tail came up quickly, and soon we were trundling along on the main gear, and I pushed the throttle on up to 30 inches. While not alarming, the control harmony of the legendary Beaver was not nearly as nice as advertised. It felt a bit crossed up and uncomfortable, which I passed off as me being new to the aircraft. I eased back on the yoke and the aircraft leaped into the air.

I pitched up to maintain 75 mph into climb attitude, and symptoms that had developed during the takeoff roll became more exaggerated.

The aircraft had a distinct yaw to the left, with right rudder input, a small right aileron input with a few degrees right wing low to keep going straight.

I looked at the needle and ball and it was showing I needed more right rudder. We were climbing straight ahead, in reasonable control, and at this point that was all that mattered. I climbed to 1000 feet agl, levelled off, and turned an uncoordinated left crosswind.

In my peripheral vision, I saw Jack look at me meaningfully as he stated, "I bet I left the rudder lock in".



A rudder lock like this, mistakenly left in, almost led to disaster.





*I looked at Jack, "This is a 'throw over' yoke, would you like to have control?"*

I envisioned the possibilities.

"Is it from the lower back or up near the balance tab?"

"Two pieces of wood with a bolt up near the balance tab."

The air load in flight would keep it in place. Shaking it loose was not an option. I thought about the little bit of travel I did have from the rudder pedals was the control force being applied at the bottom of the rudder and twisting the whole rudder slightly into the breeze. I decided reducing the rudder pedal pressure to minimal would be best and achieve the same limited result.

I looked at Jack, "This is a 'throw over' yoke, would you like to have control?"

He hesitated, "Nope, I don't have any brakes on my side, and you know how it feels."

"Got any ideas?" I asked.

"Long final, little torque at low power, glide approach, land, taxi in, remove the lock."

I thought for second. "I agree with all of that, but let's briefly see how she handles."

We continued straight ahead, slowly climbing to 1500 feet agl, then levelling off at 70 mph. What we had planned was simple, but we both acknowledged a practice would help us know what pitfalls might exist.

It also would allow an exploration of handling if a 'go around' was required. So after a brief review, I reduced the power to 1000 rpm and Jack slowly pumped in the flaps to takeoff. Landing flap was not required for the ample length of the grass vector and would lessen the drag in the event of a go around.

I brought the airspeed back to 65 mph and the Beaver descended, tracking straight ahead and true. We descended to 1000 ft agl and levelled off, retracted the flaps and set power for 70 mph.

We both got our eyes back outside and turned towards the airfield. Announcing our intentions on the radio we entered the circuit and extended our downwind for a three-mile final.

We turned a good wide base and onto a nice long final.

Jack told me that after we landed and stopped, he'd get out, get the control lock and jump back in.

I told him we should worry about that once we were on the ground. I was concentrating.

"Belts tight, shoulder harness tight?" I said and we both checked they were snug.

"Flaps?" he asked.

"Nearly forgot them, flaps to takeoff."

"Takeoff set." he said looking up at the vector about a mile ahead.

The Beaver flew a perfect profile with the power set and the propeller moved to fully fine. At a half mile to go, we both noted the windsock said five knots straight down the vector. The touchdown was a tail low wheeler that resulted in an arrow straight rollout. It was an anti-climax to the whole experience.

I used the brakes to slowly taxi off the vector and come to a stop. Jack, as promised, jumped out, looked around, made sure no one was looking, and removed the rudder lock, before jumping back in.

We taxied without a word to the aircraft park.

I thought Jack's mind had to be racing the same as mine, with 'what if's'.

He never said so, of course, that was not his style. But in the next few hours I detected a 'Let's start over and do it correctly this time' attitude in him.

We had a coffee. We reviewed the DHC-2 Flight Manual, and went over the limitations and systems of the aircraft.

We completed an extensive pre-flight, internal and external, and fuelling and oiling. And why control lock removal is so important.

We did a proper type rating, which was our penance for doing it half-arsed in the first place.

Jack and I never spoke of it, ever, but our flying improved from that day on. ■

# Ballooning Safety P

It was, at the time, the world's deadliest single hot air ballooning disaster\* but operators and the CAA say it has forever changed – and for the better – ballooning safety in New Zealand.

**T**he Carterton tragedy at 7:22 am, 7 January 2012, took the lives of the 53-year old pilot, Lance Hopping, and his 10 passengers after ZK-XXF made contact with power lines on a rural Wairarapa road, and incinerated.

CAA's Special Flight Operations and Recreational Aviation manager, Rex Kenny, says while Carterton was a terrible tragedy, its aftermath has been positive for the industry.

"Operators were horrified by what happened. It was the strongest possible message about risk-taking that you could ever hope to send. A man with almost 1100 flying hours, and held in high regard by the sector, tried this ridiculous manoeuvre (trying to outclimb an entanglement with power lines), something just beyond belief, and it had catastrophic consequences."

"I think Carterton had everybody looking hard at their operations," says Martyn Stacey of Aoraki Balloon Safaris in Methven.

"Everyone was checking their expositions, and making sure that what they said they were going to do, they and their pilots were actually doing. Then they could either say 'yeah we're OK' or 'we've got to make changes to the way we do things, like how we fly around power lines.'"

Mark Brown of Hamilton-based Kiwi Ballooning Company had just completed a flight with passengers when he heard of the accident, about an hour after it happened. "It was not easy to carry on with the traditional post-flight bubbles and snacks. The crew and I were quite distraught," he says.

But he agrees Carterton focused the attention of balloonists everywhere.

"After the accident I reflected on how quickly things can change during flight and I reviewed every aspect of my flying to determine there was no room for error."

Martyn, who was president of the Ballooning Aviation Association of New Zealand (BAANZ) at the time,

\* February 2013, Luxor Egypt – 19 deaths

\* August 1989, Alice Springs, Australia – 13 deaths, when two balloons collided.

# Post-Carterton

says Carterton also gave private operators pause for thought.

"They said, 'Wow, these things can happen.' And they looked at themselves and how they were flying, and I think they just take a bit more care now.

"If every pilot is really honest with themselves, somewhere along the line they've hit a wire fence, or a telephone line. Or even worse. Carterton was a wake-up call in that respect."

Commercial ballooning is not as lucrative as it was before 2008 and the advent of the global financial crisis. But both operators say it's hard to know if that's because some prospective passengers feel they can't afford a ride, or whether it is, latterly anyway, the 'Carterton effect'.

Mark Brown says some tourists continue to talk about the tragedy but most seem to have moved on.

"The fear remains a bit with those who were unsure anyway about the safety of going up. You will probably never get them up in a balloon now."

He says that generally, however, people seem to regard ballooning as pretty safe.

The nature of ballooning puts safety largely in the hands of the operator. There isn't a lot that can go mechanically wrong with such a simple aircraft. While that's reassuring to

the public, it also means little control if something goes wrong. It puts the onus on the pilot to fly as expertly as possible.

Mark Brown says he flies as safely as he possibly can.

"I don't think I could do it any more carefully than I do post-Carterton. I think twice about flying now, say, when the weather is more unstable than normal, and with maybe borderline higher wind conditions.

"I just call it off. There's always another day."

Martyn Stacey says passengers ask a lot more questions now, especially New Zealanders.

"How many hours has the pilot flown? Is their medical certificate current? They're questions anyone can, and should, ask anyway. Pilots have to carry their licences and medical certificates when they fly," he says.

The new rules covering Adventure Aviation – Part 115 – had been in play for three months by January 2012 but companies had been given six months to comply with it. Lance Hopping's Early Morning Balloons had yet to begin that certification process.

Martyn says Part 115 has done "amazing things" for the adventure aviation sector, including ballooning.

*Continued over >>*

Martyn Stacey says since Carterton, wherever he is a balloon fiesta flight director, he reiterates safety procedures when flying near powerlines.

» Continued from previous page

Mark Brown says because of Carterton, he's more ready to call a balloon flight off if conditions are not good.

"There's always another day," he says.



"For instance, training used to be quite random, but each operator now has a very robust, thorough, formalised programme to get people to the standard where they can fly as a single pilot with passengers. The ground crew also has set training."

The Transport Accident Investigation Commission (TAIC), which found the accident was due to pilot error, could not discount the possible effect on Lance Hopping's judgement, of a small amount of cannabis found in his system. TAIC said the quantity was consistent with Hopping having smoked the drug four to six hours before the fatal flight.

Rex Kenny said that finding, and an earlier one that two skydiving instructors who died with seven others in the 2010 Fox Glacier accident, also had cannabis in their systems, led to Part 115 being beefed up.

"It's now mandatory for each operator under 115 to have a drug and alcohol testing programme."

Both Mark Brown and Martyn Stacey say they were shocked by the revelation that Hopping had cannabis in his system, with Martyn observing that formalising drug and alcohol testing, as part of the rule, can only be a good thing.

"I've always had testing in my company, but some family businesses weren't bothered. But now we all have to do it. You just accept it as part of the operation.

"It also gives the public confidence in what we do."

Rex Kenny still shakes his head in disbelief at Lance Hopping's decision to try to outclimb the power lines with which the Cameron A210 balloon came into contact, rather than use the recommended rapid descent procedure.

Martyn says since the Carterton tragedy, as the flight director of balloon fiestas around the country, at every pre-flight briefing he has reiterated safety procedures when flying near powerlines.

"The safety message has always been there, but now we're making sure they really do know what to do about power line contact or pre-power line contact."

The media made much of the fact that Hopping didn't have a current medical certificate. But there appears to be agreement that it would've had no material effect on the Carterton flight. But as TAIC said, "It did show a disregard for complying with the rules."

Rex Kenny says it's still the responsibility of the operator to keep their medical certificate current. However, as part of increased CAA auditing, inspectors do check.

"I'd had quite a bit to do with Lance professionally, he was always at the fiestas and at least one year he was safety officer. He was never backward in pointing the finger at other operators if he thought they were flying unsafely and the sector held him in high regard.

"What happened with Lance Hopping really was down to 'human factors'. We can't check every flight and every pilot every time they go up, and the sector would not want us to."

However, Rex is confident Part 115 is doing its job. "When it first came in, we did have a couple of companies – one of them a long-standing operator – that couldn't make the grade. And they were ones we were always a bit concerned about. Part 115 does give us the ability to follow through on operators we have issues with."

Since 115 came in and the demise of those two operators, a fresh ballooning company has entered the market, taking the commercial ballooning community to just four (there are close to 70 private balloonists in BAANZ).

Mark Brown says he occasionally talks to other commercial operators about safety issues. That was particularly so after the Carterton accident.

"As a group we came to the conclusion that in similar circumstances we would have more than likely 'vented and dropped the balloon' rather than try to rise up and go over." ■

# Maintenance Engineer Licence Limitations

You may feel you have the skills and knowledge to do so, but actually, you cannot perform an avionic repair or installation without the relevant licence categories and ratings.

**P**icture this: you're approached by an aircraft owner who wants to replace an aged transponder with a more capable Mode S model. It's a fairly straightforward job with technical data available from the manufacturer.

But are all your ducks in a row?

The answer depends on the licence categories and rating privileges you hold. You don't have the privilege to perform the maintenance if you hold only an aeroplane, rotorcraft, or powerplant rating – regardless of your electrical wiring and instrument plumbing prowess. To carry out and release to service the initial installation of the transponder, you need the relevant electrical, instrument, or radio licence categories and ratings. In addition, installations often require specialist test equipment and associated training.

This example also holds true for other avionic installations, such as audio panels, intercom systems, and encoders. The crux of the matter is that non-

avionics rated Licensed Aircraft Maintenance Engineers (LAMEs) cannot certify a release-to-service for the installation of avionic equipment, unless it's specifically listed in Part 66 Appendix C – regardless of the technical data available.

## Rule Requirements

Maintenance engineer privileges are detailed in Part 66 Appendix B *Group and Type Ratings* and Appendix C *Additional Privileges*. Advisory Circular AC43-14, *Avionics, Installations – Acceptable technical data* contains further information on licence privileges.

"If you're a mechanical LAME, please take the time to check that the task you are asked to carry out is within your privileges," says Bob Jelley, CAA Aviation Safety Adviser.

"Remember that in addition to Part 66 Appendix C, you need to comply with rule 43.53 *Performance of maintenance requirements*."

## Part 145 Company Authorisations

To perform and certify maintenance using a Part 145 Company Authorisation, rule 145.60 *Authorisation procedures* details that to be issued an authorisation to release an aircraft to service, a person must hold either a LAME licence, equivalent qualification, or a CAA maintenance approval.

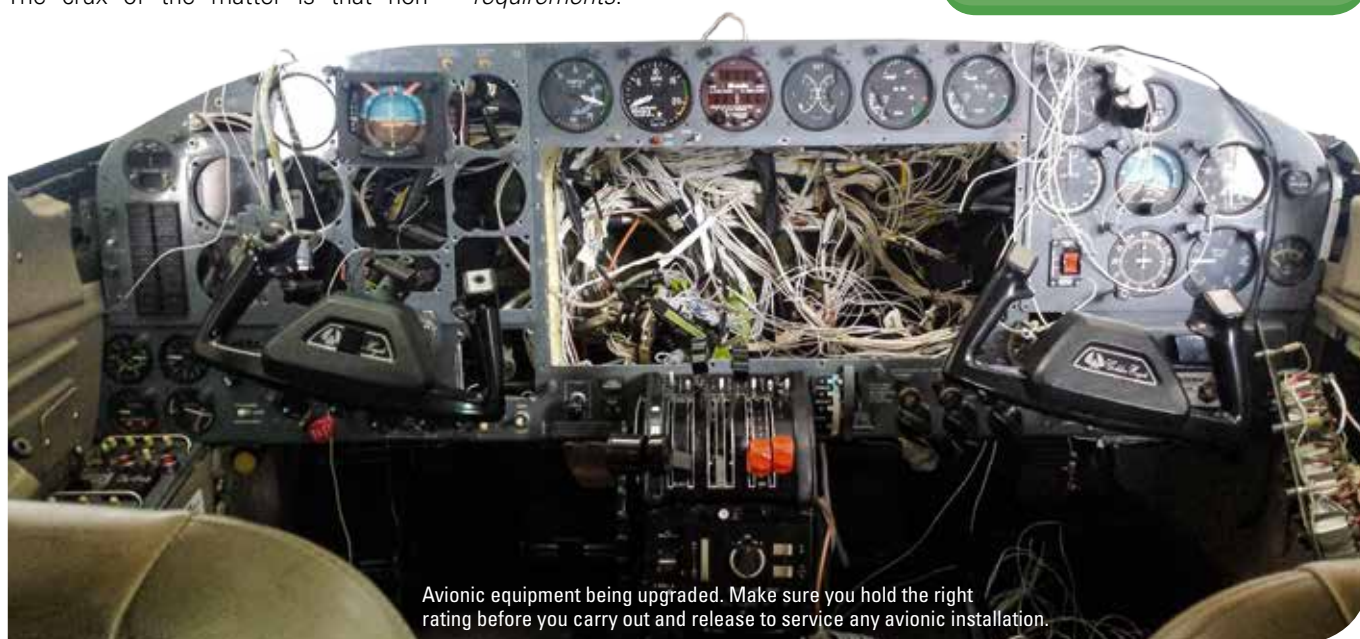
## Part 66 Review

The CAA is reviewing the Part 66 licensing regime. That includes a review of the group and type ratings, system structure, along with additional privileges.

We expect to seek your further feedback on a draft revised rule in 2016.

Keep up to date by subscribing to our email notification service. ■

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



Avionic equipment being upgraded. Make sure you hold the right rating before you carry out and release to service any avionic installation.

# A New Way to Invest

Rather than study a single event, or even group of events, a newly-created team of investigators is going 'big picture' to identify and mitigate safety risks. And you're going to be part of it.

**Y**ou're going to hear quite a bit about 'themes and systems' investigation from now on.

A new team of investigators, using what's known as Themes and Systems Investigation Techniques (TASIT) is looking at the entire New Zealand aviation system, and even outside it, to discover what influences might be affecting safety in difference sectors.

That includes examining how the CAA, as part of the 'system', influences safety performance. That could be the rules or how the CAA engages with industry.

"The defining characteristic of the new approach is that the safety investigators will be asking for the insights and knowledge of participants to help it determine what may be the threats to safety," says team member Matt Harris.

The traditional safety investigation tries to find answers after an event. A safety investigator produces a report on why the event happened, focusing on things like the aircraft involved, the prevailing conditions, and human factors elements like decision making.

Ultimately the report reflects what the investigator determines the causes were, in that specific occurrence.

A safety analyst then gathers that information with data from other occurrences, to identify whether a trend is emerging in a particular sector and location.

That form of safety investigation, and analysis, will continue.

But TASIT will go further, aiming to identify, define and explore what issues in the wider system may also be contributing to repeated occurrences.

The work is an example of the 'systems thinking' approach coming to the fore in global aviation safety. The air navigation safety body, Eurocontrol, says:

*"Most problems and most possibilities for improvement belong to the system. It is a mistake to assume that if everybody does his or her job right, it will be all right. The whole system may be in trouble."*

*Improving system performance – both safety and productivity – therefore means acting on the system."*

"A simple way to understand systems thinking," says Matt Harris, "comes from an American Professor of Management Science, Dr. Russell Ackoff. If you considered a car as a simple system, and took the best engine, the best gearbox, and the best chassis, and put them together, you wouldn't necessarily have the best car. The parts may not work or fit together as they should and the car not work properly.

"Investigating why the car won't get you from A to B by testing each part on its own, will show only that each part is operating fine. But investigating the system as a whole, and looking at how one part influences the other – for example, is the engine providing power to the gearbox – will identify the problem.

"Building on this, the car itself is part of a bigger system,

which involves the road it is travelling, the driver, the environmental conditions, and the road rules.

"Let's say a number of car accidents occurred where the cars had left the road at a particular bend. We may determine that all the cars were taking the corner too quickly, therefore driver decision making and speeding were the root causes. But looking from a systems

thinking view, we may find that before the corner where the accidents were occurring, an advertisement billboard was installed. This advertisement had a lot of text on it,



# Investigate Safety Risks

and required a reasonable amount of focus to read it all. The drivers' attention was thus drawn away from the approaching corner, and the ability of the driver to make the appropriate adjustment in speed was impaired.

"Therefore the outcome of the investigation may be to recommend better positioning of billboards at critical points.

"That's systems thinking."

## Prototype Investigation

The first of TASIT's investigations is in full swing. It's focused on the steady and relatively high number of light helicopter occurrences in New Zealand.

On average, since 2010 there have been 13 accidents a year. Fourteen years of occurrence data has been analysed, which has uncovered a number of underlying themes and causes.

One of those themes is that many occurrences have involved the performance capabilities of the aircraft being pushed towards, or beyond, its limits.

To be sure their methodology is robust, the team has asked some overseas experts to scrutinise the way they have come to those conclusions, in this prototype investigation.

The next task for the team is to take the conclusions and explore what might be the underlying influences.

That is where collaboration comes in.

"It's the aviation participants themselves – the 'field experts' – who have the best knowledge about what those influences are. They live this work every day.

"The investigators want their input as it is their expertise that will provide the answers we need, and help us improve the system.

"The most effective and efficient way to get that information is to survey participants."

The survey is aimed at the helicopter sector – owners, pilots, and other relevant people like company chief executives and quality assurance managers.

The investigators have worked to make

sure the online survey is straightforward and quick to answer. All responses will be anonymous.

To complete the survey, please go to [www.caa.govt.nz/helisurvey](http://www.caa.govt.nz/helisurvey).

The survey will also be emailed to all helicopter sector participants.

The executive officer of the Agricultural Aviation and Helicopter Associations, John Sinclair, says the TASIT project is a "refreshingly" new approach to the investigation of risks to safety.

"There's a wealth of accident and incident information on CAA's database. The TASIT team is using that in a proactive way to minimize repetitive accidents.

"The TASIT team is trying to identify, in a scientific way, the factors sitting behind certain safety issues, and that really is great news for the sector.

"For that reason," says John, "I hope everyone in the helicopter community gives serious thought to completing the survey, and giving honest answers." ■

The first of TASIT's investigations is focused on light helicopter occurrences in New Zealand.

\* Systems Thinking for Safety: Ten Principles. A White Paper, Eurocontrol.  
[www.skybrary.aero/index.php/Toolkit:Systems\\_Thinking\\_for\\_Safety:\\_Ten\\_Principles](http://www.skybrary.aero/index.php/Toolkit:Systems_Thinking_for_Safety:_Ten_Principles)

# Is Your **Mode S** Correct?

Your Mode S transponder address is unique to your aircraft – changing it is not a big job, but you will need to consult an avionics LAME.

**M**ode S is a form of secondary surveillance, providing other aircraft and air traffic control with information about you. When the system is ‘interrogated’ by either a ground or air based unit, it replies with a 24-bit address that is unique to your airframe.

“A common misconception is that the Mode S address goes with the registration mark,” says Andrew Rooney, Airworthiness Engineer (Avionics) at the CAA. “But actually it is unique to the individual aircraft.”

“So if you’re importing an aircraft you’ll need to have the Mode S reset to transmit the correct aircraft address, including the New Zealand state code. Likewise, if you’re shifting the transponder between aircraft, the address will need updating to reflect the new airframe it is fitted to.”

You should apply for your Mode S address for a new aircraft, prior to registration. You can check codes for any registered aircraft on the CAA web site at [www.caa.govt.nz](http://www.caa.govt.nz), “Aircraft Register”.

Rule 91.247(b) outlines the requirement for use of Mode S, and AC91-2 provides guidance material on it.



The faceplate of a Garmin GTX-330 transponder, an example of a Mode S digital transponder (courtesy of Garmin).

## Changing Your Mode S Address

You can request a Mode S address from the CAA, and an appropriately qualified LAME can put it in. A LAME is needed because specialist test equipment is used to check that the address is correct.

“Your request needs to include the registration mark, the make and model of the aircraft, the date of manufacture, the aircraft serial number, and your details,” says Andrew.

Requests can be emailed to [aircraftregistrar@caa.govt.nz](mailto:aircraftregistrar@caa.govt.nz) – no specific form is needed to be filled in.

## Turn It On

Carlton Campbell, CAA Aviation Safety Adviser, says you should turn your transponder on every time you fly.

“Many pilots think they don’t need to turn it on unless they’re in controlled airspace. But your transponder is how other aircraft know you’re there. It keeps you both safe from a collision.” ■

## Funding Review Feedback Needed

The Civil Aviation Authority of New Zealand is seeking feedback from the aviation sector for phase two of the CAA’s triennial funding review. The phase two discussion document outlines the proposed funding framework for regulatory services from 2016 to 2019.

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

Submissions close 5 pm on 19 February 2016. ■

## GA Flight Examiners Conference 2016

The next GA Flight Examiners Conference will be held 16 to 17 August 2016 at the Brentwood Hotel, Wellington. So mark this date in your diaries now.

These biennial conferences began in 2005, and are an exciting opportunity for GA Flight Examiners to keep up with the latest developments and discuss current issues in the field. They’re also a chance to meet and network with other GA examiners from around the country.

More details will be sent to participants in early 2016. ■

## SMS Rules Signed

The Safety Management Systems rules were signed in December 2015 and become effective 1 February 2016. We’ll have more information in future issues of *Vector*, but in the meantime keep informed by following the web page, [www.caa.govt.nz/sms](http://www.caa.govt.nz/sms) and subscribe to receive email updates. ■



## Auckland **Busy Spot**

An operator has drawn our attention to the Auckland City MBZ as a busy spot, especially in summer. The volume of traffic seems to grow each year.

The locals are familiar with the requirements, but visiting pilots should make sure they are up to date with the airspace, and are familiar with the latest AIP Supplements and NOTAMs.

Make clear radio calls at the appropriate times, especially before entering the sector.

In the MBZ, if equipped with lights, make sure they are on, and it is transponder mandatory above 1500 ft.

'Hot spots' that have been identified are: Musick Point/ Browns Island, North Head, Mangere Bridge/ Pikes Point. ■

## 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).

## *Vector* for **RPAS Operators**

We'd like to get our safety messages out to as many aviation participants as possible, especially those who may be unaware of the Civil Aviation Rules, such as RPAS (drone) users.

So if you know anyone that might benefit from reading *Vector*, suggest they visit the CAA web site and read the PDF version.

We've made this easier for them because they can now subscribe to receive an email when *Vector* is put on the web site.

The "Email Notification Service" can be accessed from the CAA home page, [www.caa.govt.nz](http://www.caa.govt.nz).

Existing subscribers will need to add *Vector* to their subscriptions – there's a link at the bottom of the page.

See "Publications" for all issues of *Vector*. ■

## 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
15 Feb 2016	22 Feb 2016	28 Apr 2016
14 Mar 2016	21 Mar 2016	26 May 2016
11 Apr 2016	18 Apr 2016	23 Jun 2016

### Visual Navigation Charts 2016 (scheduled dates for change requests)

19 Mar 2016	21 Apr 2016	10 Nov 2016
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See [www.caa.govt.nz/aip](http://www.caa.govt.nz/aip) to view the AIP cut-off dates for 2016.

### **Address for Aircraft and Airlines Applications**

Please send your applications for aircraft certification, air transport maintenance, and air transport flight operations to: [airlines@caa.govt.nz](mailto:airlines@caa.govt.nz)

## 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)

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)

### **Carlton Campbell** (South Island)

Mobile: +64 27 242 9673

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

### **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)

## **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".*

# 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-CNI Piper PA-28-140

Date and Time:	26-Dec-2014 at 13:35
Location:	Raglan
POB:	3
Damage:	Destroyed
Nature of flight:	Private other
Pilot Licence:	Recreational Pilot Licence (Aeroplane) Private Pilot Licence (Aeroplane)
Age:	23 yrs
Flying Hours (Total):	349
Flying Hours (on Type):	40
Last 90 Days:	34

Following a normal engine run-up and takeoff from RWY 05 at NZRA, the aircraft suffered a complete engine power loss at approximately 150 feet. There were no warning signs or indications prior to the power loss occurring. The immediate actions in the event of an engine failure were carried out apart from changing the fuel tank selection due to a lack of time. However, there was sufficient fuel available in both fuel tanks prior to takeoff. Engine power was not restored and the pilot manoeuvred the aircraft over the Raglan estuary to avoid people, and then successfully ditched the aircraft.

The pilot and front seat passenger were able to vacate the aircraft quickly, however the passenger in the rear seat was having difficulty, and had to be assisted out of the aircraft which by then had submerged. All three persons were assisted to shore by local bystanders who came to their aid.

A thorough maintenance investigation was later conducted with emphasis on the fuel system and engine controls. No defects were found that could account for the engine power loss. As the aircraft was operating from a grass runway, it is possible that a foreign object (blade of grass, grass seed or insect) may have lodged in the carburettor, interrupting the fuel flow to the engine. With the submersion of the aircraft in the estuary, this object could have been flushed from the carburettor before the examination.

[CAA Occurrence Ref 14/6081](#)

## ZK-NOL Tecnam P96 Golf

Date and Time:	28-Oct-2014 at 17:00
Location:	Kerikeri
POB:	1
Damage:	Substantial
Nature of flight:	Private other

The Tecnam Golf P69 was taxiing to depart on a local VFR flight from NZKK. The pilot reported that while backtracking along

RWY33 for a RWY15 departure, a gust of wind pushed him to the left, and he had no choice but to apply full power and takeoff.

The aircraft collided with the RWY 33 PAPI light box nearest the runway, causing substantial damage to the rear right hand side of the fuselage and to the PAPI light box. The aircraft was able to land without further incident.

No witnesses were present during the event, and the pilot stated that it all happened too quickly to remember exactly. Lack of ground marking on the grass adjacent to the runway and the direction of impact on the PAPI suggest the aircraft became airborne on the runway, deviated left, and turned back towards the runway, colliding with the inner PAPI light box.

The Bay of Islands Aero Club operates microlight aircraft under the Part 149 certificate of the Recreational Aircraft Association of New Zealand.

Until this event, the procedure for a club member to sign out an aircraft was simply to sign a piece of paper saying that their documentation was up to date. The CFI reports that the club procedures are being reviewed, and that the club committee is supportive of better oversight of club operations.

As an immediate response, the club is requiring all pilots to submit their documentation for inspection before flying a club aircraft.

[CAA Occurrence Ref 14/5069](#)

## ZK-EMW NZ Aerospace FU24-954

Date and Time:	31-May-2015 at 07:03
Location:	Oparau, near Kawhia
POB:	1
Damage:	Substantial
Nature of flight:	Ferry/positioning
Pilot Licence:	Commercial Pilot Licence (Aeroplane) Private Pilot Licence (Aeroplane)
Age:	23 yrs
Flying Hours (Total):	990
Flying Hours (on Type):	392
Last 90 Days:	252

On the first landing of the morning into the airstrip, the pilot landed the aircraft to the left of the centreline. This was in line with a washout further up the airstrip, which the pilot did not detect due to the dull and gloomy weather conditions. When the pilot realised, he initiated a go-around. The left wheel dropped into the washout and the left wing contacted the boundary fence. This caused substantial damage to the wing, aileron, rear spar and elevator. Getting airborne, the pilot coaxed his aircraft over a set of power lines, then continued a left hand circuit to land again on the same airstrip.

[CAA Occurrence Ref 15/2707](#)

# 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

## Pacific Aerospace Cresco 08-600

### Centre rear spar web

Part Manufacturer:	Pacific Aerospace
Part Number:	08-30027-1
ATA Chapter:	5510
TSI Hours:	140.05
TSO Hours:	1454

During scheduled maintenance, the horizontal stabiliser spar web was found cracked, the crack having initiated from a countersunk rivet hole in the web. The maintainer replaced the spar assembly with a new assembly.

This is a known issue with these webs due to stress loading from the PT6 propeller slipstream. The original web thickness was 0.040 in, which when the cracking was identified, was increased to 0.050 in. Due to further cracking, the manufacturer has eliminated all countersunk rivet holes from the spar web.

CAA Occurrence Ref 15/596

## Hughes 269C

### Crankshaft

Part Model:	HIO-360-D1A
Part Manufacturer:	Lycoming
Part Number:	78134
ATA Chapter:	7100
TSO Hours:	400
TTIS Hours:	6112.6

During agricultural spraying operations, the engine started to vibrate, associated with a reduction in available power. The load was dumped, and a normal landing made straight ahead.

Maintenance investigation revealed significant metal in the filters. The engine was disassembled to reveal a broken crankshaft through the No.4 con-rod journal. The crankshaft had been previously ground to M10 (minimum) tolerance in the USA. Inspection of the fracture area revealed that the failure had originated in the outer radius of the bearing journal. A stress riser caused by undercutting the web radius during the crankshaft grinding process was the most likely cause. The engine was repaired by installing a replacement crankshaft and associated parts.

CAA Occurrence Ref 15/3571

## Robinson R44 II

### ELT Velcro® securing strap

Part Model:	406AF
Part Manufacturer:	Kannad
Part Number:	146075
ATA Chapter:	2560

Found ELT Velcro securing strap in very poor condition and ripped apart when slight tension applied. On these helicopters the manufacturer mounts the ELT in close proximity to rotating mechanical components (tail rotor drive shaft).

The age of the Velcro strap was possibly 7 years since installation. The ELT is mounted in a hot location on these helicopters and therefore the Velcro is most probably subjected to earlier degradation. Strap replaced with P/N 014075.

CAA note: Continuing Airworthiness Notice (CAN) 23-002 406 MHz Emergency Locator Transmitters (ELT) Mounting was published in November 2012. This CAN highlights the FAA Special Airworthiness Information Bulletin (SAIB) HQ-12-32 that raises the concern regarding the ability of Velcro-style fasteners to retain their desired capability to restrain the ELTs in the event of an accident and also the degradation that occurs to the fasteners over time.

The CAA recommended that operators and maintainers accomplish the specified inspections and corrective actions as required.

CAA Occurrence Ref 15/2388

## Pacific Aerospace Cresco 08-600

### Attachment bolts

ATA Chapter:	5510
TTIS Hours:	9375

Incorrect type bolts were fitted to the horizontal stabilizer during installation following a 2-year inspection of the tail plane.

AN4H7A bolts were fitted as per the IPC when the correct bolts to be used for the installation are NAS6604-23 (or -24, or -27 depending on the fuselage to horizontal stabilizer configuration) as per PACSB/CR/024 or PAC/CR/0411. Correct bolts p/n NAS6604-24 are now installed.

The maintenance provider noted that the primary cause of the defect was due to the aircraft manuals being out of date.

A new engineer unfamiliar with the aircraft followed the IPC to determine the part to draw from the store.

Cresco 08-600 IPC ch 55 fig 5 item 8: AN4H7A. The engineer fitted the horizontal stabilizer using the bolts as listed in the IPC. Several SIL, SB and a modification have been issued since the revision date of the IPC but no follow-up action to amend the IPC had been carried out.

CAA Occurrence Ref 14/6278



# What happened here?

## Sifting the lessons from the wreckage

A wise person once said, “mistakes are lessons”. That is never more true than in aviation.

Through accident investigation, the CAA and TAIC sift the causes of aircraft accidents and incidents. There are no new accidents – learn from those that have flown the paths before you.

This year’s AvKiwi Safety Seminar looks at selected accidents and incidents that highlight the importance of having a sound ‘plan B’ and evaluating it; knowing your aircraft; the fatal consequences of commercial pressures; and whatever happens, keep flying the aircraft.

**AvKiwi Safety Seminars are free to attend and you don’t need to book.**

**Keep an eye on the CAA web site, [www.caa.govt.nz/AvKiwi](http://www.caa.govt.nz/AvKiwi). North Island venues will be added soon.**

