September/October 2014

POINTING TO SAFER AVIATION

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Dreamliner Era Begins

Displaced Landing Thresholds

Error Management for Engineers

Prepare for Frost Protection

CAA
CIVIL AVIATION AUTHORITY
OF NEW ZEALAND
Te Mana Rererangi Tūmatanui o Aotearoa

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Cover: The unveiling of the 787-9's Air New Zealand livery in April 2014, at Boeing's factory in Everett, Washington. Photo courtesy of Air New Zealand.

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Dreamliner Era Begins

Packed with innovation, the Boeing 787-9 'Dreamliner' has captivated the aviation community and the public. The CAA's role is to make sure the aircraft can be operated safely and that we are able to provide effective oversight.

Almost as soon as Air New Zealand logged its order of 10 Dreamliners with Boeing in the mid-2000s, the CAA went to work on type acceptance.

Former CAA Air Transport Inspector, Bob Ellison, made his first of about 12 trips to Seattle, to help approve the new aircraft's maintenance schedule, as part of Boeing's Maintenance Review Board.

With Air New Zealand being the global launch customer of the new aircraft type, the Aircraft Certification Unit also began working early with Boeing and the FAA.

"It became apparent there would be a very slender timeframe between the FAA type certifying the aircraft and the CAA having to complete its type acceptance process," says the CAA manager of the 787-9 project, Geoff Connor.

"That included the receipt of the necessary documentation required to maintain and operate the aircraft safely, such as minimum equipment lists.

"What was also challenging about the 787-9, was all the new technology and novel features which we had little experience of. There was a much greater need to understand the design standards, how the 787-9 complied with them, and where it didn't comply with them.

"There were trips to Seattle, meetings with Boeing and the FAA, and plenty of teleconferencing. It was a lot of work in a short period. At the end of the project, there were just 15 days between the FAA issuing the type certificate and the CAA issuing the acceptance certificate."

Type acceptance of the 787-9 involved a number of firsts.

Instead of updates on the aircraft being carried out by people being physically at and on the aeroplane as in the past, the head of the CAA's information technology unit, Arthur Devitt, says updates on the 787-9 are done by wireless technology.

The 787 full-flight simulator includes dual head-up displays (HUD) and Electronic Flight Bags (EFB).

Photo courtesy of Boeing.

"It is the first time the unit has been involved in an operational certification activity. We looked at how sound Air New Zealand's security was going to be for doing software updates. We had to be able to assure the CAA's certification people that the encryption processes surrounding those updates was robust and secure."

Airworthiness Engineer Greg Baum says the certification process was a big learning experience, because of the technology involved, but it was also very exciting.

"It was great to see the finished aircraft in June, after seeing it in pieces at the end of the assembly line in March.

"It is the first large aircraft with carbon fibre skin through the whole fuselage and wings, rather than just in certain places," he says. "That makes it stronger but also lighter, so it uses less fuel and produces fewer emissions than previous aircraft of the same size."

Greg says passengers will also benefit from the composite construction because it improves the cabin environment.

"Cabin pressure is much closer to that of sea level, with twice the humidity of the 747. The cabin pressure is set at 6000 feet, instead of the typical 8000 feet on a long-haul flight.

"That means a more comfortable flight because the air in the cabin is not as drying. And because the cabin is pressurised to a lower altitude, it shouldn't be so tough on the body. That's great for the crew of course, because they're flying all the time."

Greg says the aircraft makes extensive use of advanced electrical systems.

"It generates twice the electricity of a traditional airliner. And rather than bleed air from the engine to pressurise the cabin, the 787-9 uses separate electrically-driven compressors, so there's no 'engine air' swirling around passengers."

Cabin Safety Inspector Mary Wallis was part of a team overseeing cabin crew training, procedures, and health and safety.

That began in January 2014 with Boeing training, and the arrival in Auckland of Air New Zealand's first 787-9 door trainer.

Among its innovations are animated window visuals – internal and external – simulating various outside conditions, including ditching (showing water), fire and land.

Mary was on board proving flights prior to and including the delivery flight.

She says the traditional pull-down window shades have been replaced.

"On the 787-9 there are electronically-controlled dimmable windows. Passengers can control them but that can be overridden by cabin crew when required. The windows will automatically clear on descent."

The number of proving flights was another first. It took 45 hours in all – including 10 hours of night operations – to prove the aircraft could function in a commercial environment.

The first test flight of the 787-9 took place in May 2014.

Photo courtesy of Air New Zealand.

There was even a 'ground' proving flight with up to 300 people on board, testing features as disparate as in-flight entertainment and refuelling.

CAA Flight Inspector Robin Campbell was on board to assess how the aircraft's leading edge communications system integrated with the Air New Zealand network.

"This plane is showering the world with data all the time," he says, "including maintenance health, which is monitored constantly."

Robin says the 787-9's flight displays are also an innovation.

"It can already land and take off in fog. After 30 automatic landings have been achieved by Air New Zealand, it will be able to carry out automatic landings down to the same weather conditions as other jets.

"It has a 'Head Up Display (HUD)' depicting vital navigation and flight instrumentation on a translucent video screen in front of the pilots.

"That information combines with the outside view to provide powerful visual cues when operating in limited visibility conditions. That will allow the aircraft to take off from certain airfields, such as Auckland, when there is just 75 metres of visibility."

Another 'new' in the 787-9 type acceptance process was CAA personnel working in concert with those from the FAA.

Greg Baum says it was good to see how the US regulator worked.

"If they had a problem with design and/or compliance we were able to see them working through that with Boeing, rather than us just hearing about the result further down the line.

"The other great thing about working together is the association we developed with the Boeing and FAA people. Now, if we have any issues, we know who best to contact and how. That will, without doubt, be of benefit."

The project also saw the CAA and Air New Zealand working closely together. Greg Baum and David Gill, Team Leader Airworthiness, were in Seattle for the aircraft delivery process, including the issue of the Airworthiness Certificate and approval of some unique modifications in the Air New Zealand aircraft.

The airline's Chief Pilot David Morgan says it was an honour to be asked by Boeing, in 2006, to be the launch customer.

"It was a reflection, I think, of Boeing looking for a mature airline and a mature regulator who could together successfully see the aircraft into commercial operation." ■

Boeing 787-9

Length:	63 metres long (206 feet)
Maximum cruise speed:	0.85 mach (510 knots)
Maximum loaded range:	8300 NM
No of seats:	302
Wing span:	60 metres (197 feet)
Service ceiling:	43,100 feet
Thrust of engine:	74,000 lbs
Height:	17 metres (56 feet)
First routes:	Auckland – Perth (October 2014) followed by Tokyo and Shanghai later in the year

Displaced Landing Thresholds

A recent serious accident at Feilding Aerodrome highlights why it's important to maintain approach height and land **after** a displaced landing threshold.

A displaced landing threshold is where a runway threshold marking (commonly referred to as the 'piano keys') has been inset to show a section of the runway is unsuitable for landing.

Usually, the landing threshold is displaced to provide arriving aircraft with clearance over any obstacles on approach, for noise abatement, or if a section of the runway can't take the continual impact of landing aircraft.

If you're intending to land at an airfield with a displaced landing threshold, watch your approach height, and cross the threshold marking at approximately 50 feet agl. As the following accident shows, there can be serious consequences if you don't.

Too Low on Approach

Following a dual training exercise, an aircraft arriving at Feilding aerodrome became too low on final approach for runway 10. That runway's landing threshold is displaced by 100 metres to give aircraft clearance over a road that borders the aerodrome.

At the time of the accident, the instructor had control and was discussing approach considerations with the student. It was the student's third instructional flight.

As the aircraft passed over the road on short final, it struck a digger which was being transported on top of a trailer towed by a truck.

The aircraft's aft fuselage and tail section separated and hit another vehicle on the road. Forward momentum carried the front half of the fuselage onto the runway.

Both the instructor and student sustained injuries but were able to get out of the wreckage.

Colin Grounsell, CAA Safety Investigator, says that when an aerodrome is designed, the threshold marking is positioned to ensure arriving aircraft clear obstacles on approach.

"Obstacle clearance calculations are based on prescribed performance criteria, and the assumption that aircraft will be crossing the threshold marking at a minimum of 50 feet agl.

"Before landing at any aerodrome with a displaced threshold, think about why that's the case and the risks associated with being lower than 50 feet at the threshold," says Colin.

In contrast, when departing, it's important to remember that a displaced landing threshold doesn't restrict the runway available for takeoff.

A temporarily displaced runway (overseas example).

Temporarily Displaced Thresholds

A displaced landing threshold can be established temporarily.

In that situation, the aerodrome operator can identify the displaced threshold using a temporary displaced threshold marking (example right), or with wing bars, cones, or marker boards outside the runway edge.

Temporary displaced thresholds are notified by NOTAM – available free at www.ifis.airways.co.nz, "Briefing – Area or Specific Briefing".

Permanently Displaced Thresholds

Permanently displaced landing thresholds are indicated on aerodrome charts in *AIP New Zealand* by three adjacent circles on a runway (see AIP excerpt below), accompanied by a leader-line which shows the threshold's inset distance. A quick flick through the Aerodrome Charts in *AIP New Zealand, Vol 4*, indicates a significant number of aerodromes with permanently displaced thresholds.

Runway Edge Lighting

At an aerodrome with runway edge lighting, the runway end lights may not coincide with the displaced landing threshold.

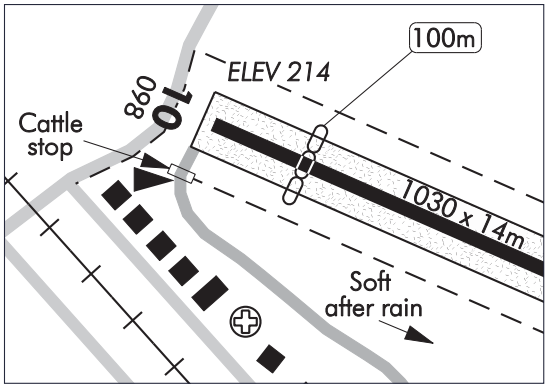
In that situation, red uni-directional runway edge lighting, between the threshold marking and the runway end lights, will be visible from the approach direction.

On non-precision approach runways, the displaced landing threshold may be indicated by a wing bar display of lights. This landing threshold lighting is normally uni-directional green, visible from the approach direction. ■

Runway Markings

A temporary displaced threshold can be indicated by a transverse stripe and row of arrows, 6 metres before the threshold marking. The runway section that's unsuitable for landing will contain arrows pointing to the displaced threshold.

A permanently displaced threshold runway marking.



This excerpt from *AIP NZ* shows Feilding Aerodrome's displaced landing threshold. Operational data on the following page of *AIP NZ* indicates the difference between the runway landing and takeoff distances.

Photo: istockphoto.com/DraganSaponjic

Error Management for Engineers

Human errors in aircraft maintenance can't be totally eliminated. But their incidence and severity can be reduced by understanding the underlying conditions causing errors, and ensuring safety nets are in place to catch them.

According to the FAA, about 80 per cent of maintenance errors involve human factors, and if not detected, could lead to accidents.

The "GA Defects" pages from previous *Vectors* provide examples:

> *"Extensive maintenance investigation found... work around the engine mount area... appeared to have disturbed the soldered connections in the oil pressure system."*
>
> *"The screws were subsequently found on the engineer's toolbox."*
>
> *"The nuts had seized... due to either over-tightening or over-stressing."*

Given the training requirements and system checks we have in place, why do maintenance errors, many of which seem simple, keep occurring?

While we should try to prevent errors, it will never be possible to eliminate them altogether.

Error management, a facet of human factors, can be used to manage the risk of error so it remains at an acceptable level. It's one step towards the implementation of a Safety Management System (SMS) and achieving a robust safety culture.

Where Do Errors Occur?

Error management requires that errors be identified, reported, and analysed, so they can be proactively controlled.

The qualities of aircraft maintenance can, however, make that a difficult task. Maintenance errors may lie dormant for significant periods before surfacing. Additionally, even when errors are caught before they cause harm, they aren't always reported internally.

The following list (Graber and Marx 1992) shows the top eight maintenance errors, in order of occurrence:

1. Incorrect installation of components
2. The fitting of wrong parts
3. Electrical wiring discrepancies
4. Loose objects left in aircraft
5. Inadequate lubrication
6. Cowlings, access panels, and fairings not secured
7. Fuel/oil caps and refuel panels not secured
8. Landing gear ground lock pins not removed before departures.

To reduce error frequency, we need to manage the underlying conditions that cause them.

Restricting cellphone use in maintenance areas can help reduce errors.

Underlying Conditions

The following list, the "Dirty Dozen", was developed by Gordon Dupont for Transport Canada.

Complacency

Has routine desensitised you? You may be missing some important signals.

Expect to find errors when inspecting, and don't sign off if you didn't complete the work.

Lack of Knowledge

Research has estimated that a lack of familiarity with the task may result in a 17-fold increase in the risk of error.

Don't be afraid to ask questions, and always use up-to-date manuals.

Lack of Teamwork

Discuss how the job should be done and make sure everyone is on the same page.

Distraction

If you get distracted during a task, go back three steps in the process to prevent any omission. Use detailed checklists.

Fatigue

Studies have shown that fatigue affects your ability to perform in a similar way to alcohol. Fatigue and distraction also go hand-in-hand – the more fatigued you are, the greater the risk of distraction.

Have others check your work. Always monitor yourself and others for signs of fatigue.

Lack of Resources

Order parts in advance, and have a backup plan for equipment loaning. Ensure there are enough staff assigned to complete the job in the time frame required.

Pressure

Set reasonable expectations of your team, communicate any concerns about the time available to do the job, and ask for extra help when you need it.

Lack of Assertiveness

Don't compromise your professional integrity. Put safety first and say "no" when you need to.

Lack of Communication

Research shows that in general, only 30 per cent of verbal communication is received and understood by either side in a conversation.

Never assume anything, and always document your work. During a shift change handover, consider providing written instructions if the message is complex.

Norms

Norms refer to both good and bad workplace rules of behaviour (usually undocumented) which have been adopted by an organisation.

It's important to always follow best practice.

Stress

Be wary of the effects of stress on your performance.

If you start feeling overwhelmed, stop, take a breather, and look rationally at the problem. Exercise is a great way to relieve stress.

Lack of Awareness

A lack of awareness can be described as a failure to recognise a situation, its subtleties, and predict the possible results.

Avoid tunnel vision and make sure you think about the 'big picture'. Always ask the question, "what if…?".

Although not specifically listed in the Dirty Dozen, the element most commonly attributed to maintenance-related aircraft accidents is a failure to follow recommended procedures for a given task.

Error Classification

Categorising errors will allow us to view them in an organisational context.

James Reason, renowned human factor expert, uses two basic categories – unintended actions and intended actions – to classify error types (see diagram on page 10).

When we say that the action was intended, in most cases we do not mean that the person intended harm.

Errors (as opposed to violations) involve unintended deviations from some optimum performance. The type of error committed is identified by where the individual's thought process went wrong.

Slips

Slips occur during normal routine maintenance when our auto-pilot engages. We fail to pay attention to our surroundings, and then incorrectly execute what would have otherwise been a good plan.

> *After reading a torque value from the job card, it was transposed 26 to 62.*

Lapses

Lapses are also referred to as omissions or memory failures, for example, forgetting to replace oil caps. They normally follow an interruption. Consider the following New Zealand example:

> *During a commercial transport operation, the helicopter's engine emitted a loud bang, shortly followed by an immediate loss of engine power. The pilot made an autorotational landing on a nearby river bed.*

A subsequent safety investigation into the maintenance provider identified the most probable cause as the exhaust valve rocker shaft retaining plate hardware not being tightened after a 300-hour valve clearance check.

The maintenance provider had performed this task many times before without incident, and had a defined methodology and checking procedures in place. But on this particular day, these systems failed.

The mostly likely cause was distraction due to cell phone use and supervision duties.

As a result, cell phone use has been prohibited while carrying out maintenance in the hangar, and more robust checking procedures have been introduced before an aircraft can be released to service.

Mistakes

Rule-based

According to Reason, rule-based mistakes result from the misapplication of good rules, or the application of bad rules. The mistake occurs when the rule no longer fits the situation, or the situation is misinterpreted.

A mechanic did not check the position of the flap lever before he pushed in a cockpit circuit breaker that provided electrical power to a hydraulic pump. When the pump started, the flaps began to retract automatically. This could have caused damage to the aircraft, or injured other workers.

Knowledge-based

Knowledge-based mistakes occur when an individual encounters an unusual situation for which training or experience has not provided a pre-packaged (rule-based) solution.

An apprentice was spraying solvent to clean an engine with the AC power on. The solvent ignited over engine and into oil-soaked drip tray. The apprentice had never been told of the dangers of solvent cleaning.

Violations

A violation occurs when a deliberate deviation is made from safe practices, procedures, standards, or regulations.

Despite the perceived implications of a violation, in most cases violations are made in an attempt to keep a job moving along, not because the engineer wanted to purposely break a rule.

"I signed the log as 'sumped tank', knowing that there was still about 60-120 litres of fuel in the tank. I did not want maintenance to take a delay."

Error Capture

Effective error management requires a 'data-driven' approach and a safety culture of open reporting.

Data on errors, incidents, and accidents should be captured within an organisation's SMS. It should influence such things as training, procedures, technology, and the introduction of safety nets, or the modification of existing safety nets.

For more on SMS, see page 22.

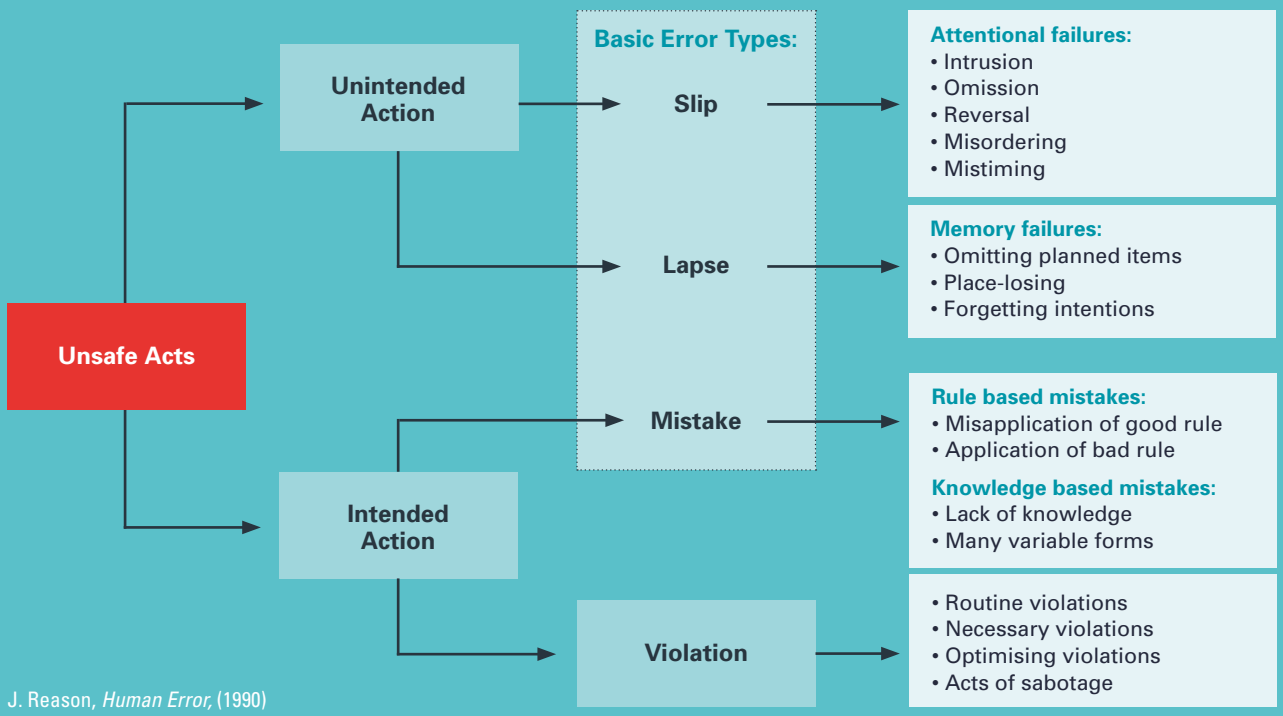
This article gratefully acknowledges material from the Australian Civil Aviation Safety Authority (CASA).

Further Reading:

Vector "Tool and Hardware Control" – March/April 2014

Vector "Reporting Occurrences" – May/June 2013. ■

Unsafe acts, errors, and violations



J. Reason, *Human Error*, (1990)

The Height of Safety

The number of complaints received by the CAA about low flying aircraft increased seven-fold from 2012 to 2013. The Auckland region saw the highest increase in low flying complaints, followed by the Waikato, Canterbury, and Wellington regions.

Under rule 91.311(a) *Minimum heights for VFR flights,* you must not fly less than 1000 feet above any congested area of a city, town or settlement, or over any open air assembly of persons. Additionally, you must maintain a horizontal distance from those areas or people of 600 metres from the point immediately below the aircraft. Aerodrome noise abatement procedures listed in *AIP New Zealand* may specify a higher minimum height.

For any other area, you must not fly VFR less than 500 feet above any structure and persons, while also maintaining a horizontal distance of 150 metres. It may help to imagine that as a virtual cylinder or no-fly zone around each structure and person.

There are also a number of exceptions: takeoffs and landings, aircraft operating in low flying zones, agricultural aircraft operations, emergencies, and when the bona fide purpose of the flight requires the aircraft to be flown at a lower height – such as police operations.

It's important to note, however, that there is no rule allowing VFR flight below minimum height under stress of weather.

Public Concerns

One of the CAA's responsibilities is to investigate low-flying aircraft when concerns are raised.

Low Flying Complaints	
2011	1
2012	6
2013	42
2014	23*

*At the time of print.

Recently, there have been a number of helicopters reportedly flying below 1000 feet over built-up areas in Auckland's Cockle Bay suburb.

Helicopter operators need to remember that rule 91.311 also applies to them.

Complaints are normally made when a ground observer judges that an aircraft is low enough to pose a threat, or if an aircraft is causing a disturbance. A number of the complainants also express their concern for the safety of the pilots flying low-level near terrain and buildings. Always consider the privacy of others, even if you have a bone fide reason to be flying under the minimum height requirement.

An aircraft operating over or near the same spot on repeat occasions, even while maintaining the required minimum height, can become a noise nuisance. A number of complaints mention distressed livestock or pets.

Terrain Clearance

Maintaining a reasonable height above the ground will give you a chance to react in the event of an engine failure, or any other malfunction. Remember, you can always set greater personal height minimums to further reduce the risk of the unexpected.

Beware of terrain changes eating into your safety margin. You must not be lower than the minimum required height above any elevated structure, not just the surrounding flatter land.

When using Visual Navigation Charts, the two or three-digit numbers that appear on the grid quadrangles are called Maximum Elevation Figures (MEFs). They provide a terrain clearance height, rounded up, for each quadrangle. The MEF height does not include the 500 or 1000 foot buffer required under rule 91.311 (see excerpt from VNC).

The large figure(s) are thousands of feet of altitude, the smaller figure, hundreds. For example, "12^{5}" means 12,500 feet.

Rule 91.311 *Minimum heights for VFR flights* is available on the CAA web site, www.caa.govt.nz, under "Rules". ■

Here's how you can visualise the no-fly zone around congested areas (example is not to scale).

Prepare for **Frost Protection**

To accommodate increased helicopter movements during early spring, Woodbourne's airspace can be temporarily split into six sectors at the discretion of Air Traffic Control.

From September through to November (and sometimes early December) frosts occur when air temperature drops below five degrees Celsius. Frosts can damage the young buds, flowers, and leaves on plants.

The Marlborough region actively produces 79 per cent of New Zealand's total wine – worth more than a billion dollars a year in sales. To protect their produce, some growers hire helicopters to provide frost protection.

By flying in inversion layers, helicopters use their rotor down-draft to push warmer air onto the vines.

If you intend to operate in the Woodbourne control zone during this period, make sure you have the current aerodrome charts (Vol 4), Visual Navigation Chart (VNC), and that you are familiar with control zone procedures (including the visual reporting points). Your aircraft must have a serviceable transponder – select ALT.

Pre-planning

Before operating in Woodbourne airspace, you must be familiar with the Special Supplement that has been issued because of unforeseen circumstances. The 2014 frost protection air traffic management procedures within the Woodbourne control zone (WB CTR/D) will be initially promulgated by Special Supplement WBFP1/14 available online only, effective from Thursday 18 September 2014. A NOTAM will be issued referring pilots to this Special Supplement.

An AIP Supplement 105/14, effective Thursday 16 October 2014, will replace the Special Supplement.

We'll highlight some of the key airspace changes and procedures associated with frost protection activity, but remember that the AIP Supplements give you the complete and official information.

Temporary Airspace Changes

To contain frost protection activities and maintain safety, Woodbourne Tower may activate six temporary control zone sectors.

If you want to programme your GPS, airspace coordinates are listed in the Air Navigation Register (available at www.aip.net.nz).

To advise sector activation, Woodbourne Tower will broadcast the message, "Frost procedures effective", on 122.8 MHz.

Woodbourne's ATIS will also include the message, "Frost procedures effective".

When the temporary sectors are effective, VFR flights other than the frost protection helicopters, will be issued with route and level instructions allowing them to be at least 500 feet above the temporary sectors – other than the Aerodrome Sector. No circuit training will be available when the temporary sectors are active.

General traffic information will be provided to VFR and IFR flights about the numerous helicopters operating in the temporary sectors.

Omaka VFR transit lane NZT654 will remain active during daylight hours. Be aware that numerous helicopters may be operating within the transit lane.

Woodbourne Tower can deactivate the temporary sectors when they are no longer necessary by a general broadcast on 122.8 MHz, and an ATIS update.

IFR Flights

The Woodbourne RNAV (GNSS) RWY 24 approach, the RILEY ONE, and the SPRING TWO departures will not be available when the temporary sectors are effective.

Opening Watch

When opening watch in the morning, Woodbourne Tower will make an on-watch broadcast on unattended frequency, 122.8 MHz.

Helicopters operating within the Aerodrome Sector, and all other non-frost protection aircraft operating in the control zone, will need an ATC clearance to continue operating.

A second frequency, 118.1 MHz, is available as a backup.

Operating Outside of Watch

When frost protection operations commence overnight, Woodbourne Tower will be off-watch (check the AIP Supplement for hours of service), and the airspace will be uncontrolled.

Outside the hours of watch, the CTR will revert to Class G (uncontrolled) airspace.

For safety, continue to monitor 122.8 MHz at night and avoid operating near the final approach path – aircraft may be arriving via the instrument approach.

If operating within the boundaries of the Aerodrome Sector, land or vacate the area immediately if informed an IFR aircraft is on final approach to, or preparing for takeoff from, Woodbourne Aerodrome.

Fuel Availability

With so many aircraft involved, congestion at the Woodbourne fuel supply can be a problem – delays can be expected. Priority will be given to regular passenger transport aircraft. Hot refuelling won't be available.

Helicopter operators can reduce congestion by having fuel on site.

If you intend to store fuel for the season, make sure it is kept safe from water contamination, and that it is in a suitable container. Care should be taken to correctly identify the type and quality of the fuel as it can go stale.

For more information on helicopter frost protection, see the CAA web site, www.caa.govt.nz, "General Aviation – Helicopter Frost Protection". ■

Photo: Ned Dawson (HeliOps Magazine).

I Learned About Flying From That

Veteran helicopter pilot, John Funnell, shares his experience of a ship loading operation that went wrong and how better communication may have prevented it.

On 1 April 2012, John Funnell was flying equipment between the Department of Conservation (DoC) station on remote, north-east Raoul Island and the 39-metre long, steel vessel *Braveheart,* anchored about 500 metres offshore.

John had spent the day making several two-kilometre return trips ferrying equipment from the vessel to the station and, latterly, slinging back to the ship, the personal gear of five DoC staff returning to Tauranga.

Tropical Cyclone Daphne was approaching from the north-west, but the operation progressed without incident for about six hours.

Around 3 pm, a 700-kilogram no-longer-required generator from the DoC station arrived above the deck of *Braveheart*, slung beneath John Funnell's Squirrel helicopter.

As he was lowering the generator into an open top container on the deck, the vessel was hit by a large wave causing it to pitch and roll. The generator, still attached to the helicopter, hit the rim of the container, then swung clear of it, lurching across the deck and pinning a crewman to the bulkhead, crushing his pelvis.

A subsequent CAA investigation found that the deteriorating sea conditions, among other factors, contributed to the accident.

John Funnell says in hindsight he probably could have postponed the operation until there were more promising conditions, conceding the job would have been safer and easier in better weather.

But a decision to suspend the operation at that point, he says, was not considered necessary, because he had carried out similar activities before, in similar conditions, successfully and safely.

The CAA investigation also identified a series of communication breakdowns as factors in the accident.

There had been problems with the radio headsets especially acquired for the operation. There were many "say agains" during the day, and staff on the vessel and those on the island were never able to establish direct communication, possibly due to the island's topography, condition of the radios or the selected channel turning out to be unsuitable.

Although staff on the island and on the vessel could speak directly to the helicopter, the noise generated by the Squirrel as it hovered over *Braveheart*, and other interference, made even their communication difficult.

All parties had been cognisant of safety considerations. Prior to the operation there had been four safety briefings and one safety plan drawn up, taking into account all known possible hazards.

John Funnell is very experienced working around vessels and was one of the main operators removing cargo from *MV Rena* after it grounded on Astrolabe Reef off Tauranga in October 2011.

Photo courtesy of John Funnell.

John says in the safety plan, and during the last briefing, he emphasised the importance of the ship's crew staying away from the loads he was lifting from the island to the ship, until those loads were safely on the deck.

But, as he now says, everyone may have become too relaxed as the day progressed.

Another breakdown in communication appears to be whether or not the generator was to be loaded at all.

In his evidence to the CAA investigation, John Funnell maintains DoC staff told him to backload what he could, when he could, of station rubbish and decommissioned goods. The retired generator was moved out of a shed the night before the operation, to be flown out to *Braveheart,* when possible.

A subsequent instruction to John Funnell during the operation that the generator should not, after all, be flown to the ship, was sent but never received.

John therefore picked up the generator from the island and radioed the vessel to say it was on its way. He is, now, not sure however, if they properly understood that.

Up until then, the crew had been relatively easily dealing with the light possessions of the Tauranga-bound DoC staff, and it is not clear they were prepared for the generator's arrival.

However, John Funnell is not sure whether their knowing or not knowing its arrival was imminent, would have changed anything.

His mistake, he says, was in not ensuring the crew members were out of harm's way as he dropped each load on to the deck of *Braveheart*.

"I had briefed them on keeping out of the landing zone," says John Funnell, "but as the operation rolled on, both they and I became over-confident about what we were doing.

"The distance between the crew on deck and the lowering loads became shorter and shorter, and I did not appreciate the risk of that.

"Also, I couldn't see out the left hand side of the helicopter and that's where the crewman was. He was in my blind spot, so I should have kept repeating to the guys they needed to be out of the way as I lowered the gear down."

The CAA investigators said it was also a lack of communication that meant crew remained in the area as the generator was being lowered into the open top container.

They said John Funnell should have made sure everyone had moved to a safe place at least six metres away, before lowering it, and that the crew knew where to 'escape' to in any emergency.

They believed that given the poor radio communications, an "all clear", perhaps using hand signals, should have been established between John and the crew.

John Funnell agrees that his role in the accident centred on his assumption the men on deck were keeping at a safe distance.

"You have to be aware that, as what seems like a routine operation like this rolls on, people will put less margin in [between the loads and themselves].

"The thing I needed to be was vigilant that those on deck were well out of the way while the helicopter was hovering over them.

"And there should have been more effective co-ordination between all of us. It clearly would have been better had I, the ship and the crew all known what was going on during each step of the operation." ■

Aviation Safety Coordinator Courses

'Popular as', and not just because of the free lunches.

Do you have a trained Aviation Safety Coordinator in your organisation? If not, or it's been a while since your safety manager got up to speed with what's needed, despatch them to an Aviation Safety Coordinator course.

The CAA's Aviation Safety Coordinator (ASC) course begins with the rationale for proactively identifying hazards, assessing their risks, and implementing appropriate mitigation – the heart of a Safety Management System (SMS).

Beyond the obvious, there are lesser acknowledged pay-offs, such as that on the bottom line. A robust SMS can save money in many ways, and that should make any CEO smile.

A hole in the ground, road safety principles, humans' deep-seated aversion to 'a loss' and the upturning of posters are used to illustrate accident prevention and safety awareness.

Course participants are shown how to regularly identify hazards and mitigate their risks. They're introduced to the tools to do that, and how to keep the process fresh.

But the course is also heavy on human psychology because encouraging people to be safe is effective only to the point they believe you, and in you.

The RNZAF's Danelle O'Keeffe who "swung spanners" for 20 years before becoming an air force civilian 12 months ago, attended the June course in Palmerston North as a self-initiated professional development exercise. Danny said while she and her colleagues did work in an ethos of safety, it was to a certain extent, unconscious.

"That means complacency can creep in," she reflected, "and safety can become a box-ticking exercise."

Danny said while the course did not present anything startlingly new to her, it did bring an outside (non-military) perspective to safety principles that raised them to a conscious level for her.

Aviation Safety Coordinator Course

Auckland

13 to 14 November 2014

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

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

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

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

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

She was returning to work recommending that her colleagues also attend an ASC course.

A number of participants in the June course commented on how the huge undertaking of running a flying operation can overwhelm the intention of putting safety front and centre.

Louise (Lulu) O'Donnell, an aviation auditor with Air Nelson, said it was easy to get carried away in "big picture stuff" and the course took her back to basics.

"It's easy to go off track a bit and the course reminded me of the fundamentals. It's as relevant to Air New Zealand as it is to a two-person operation. I've learned a huge amount."

Chris Popperwell of Wanaka Flight Training agreed there was so much overarching information needing to be absorbed in running an aviation company, there was a danger of being lost underneath it all.

"The seminar showed me where to focus my energy."

The course teaches that it is not enough to have just one person tracking down hazards and dealing with them. Much of it is focused on creating a 'culture' of safety.

That means a climate where all employees are willing to report every incident and problem – without fear of heavy-handed discipline or job loss – as part of what is known as 'just culture'.

"For me that was the most beneficial aspect of the course – how to create a system to encourage employees to report the seemingly small incidents," says Chris Popperwell.

Apurva Bhatia and Michael Godfrey, instructors with Flight Training Manawatu, said their company was so keen to have everyone involved in an SMS that, although just one person managed the system, every staff member was expected to attend an ASC course. So far, five of them (half the staff) had.

When you talk a safety culture, you talk human psychology.

The course looks at risk-taking behaviour, leadership styles, attitudes, change management and workplace personality types. Many of the participants in the June course agreed the exercise to determine their own workplace personality type and how to engage with people possessing the other three, was one of the most interesting, and fun, parts of the course.

Mike Groome, General Manager of Taupo Airport Authority, regards his operation as being "ahead of the game" in implementing an SMS.

But he said, "I thought of risk management as a stand-alone concept but I appreciate now how much personality types are tied into that."

The courses are not about just sitting and being talked at. There's plenty of participant-presenter interaction, DVDs, group and pairs work, feeding and watering. And chocolate.

A great way to look afresh at aviation safety!

Information and Resources

Go to our web site, www.caa.govt.nz, See "Seminars and Courses" for the date of the next course, and "SMS" for all SMS resources (see also page 22). ■

"The course taught me that refreshing posters helps keep safety at the forefront of people's minds," says Wellington Aero Club captain Amy Dreverman, who attended the CAA's ASC course in Palmerston North in June.

ACAG – Keeping it Real

The Aviation Community Advisory Group (ACAG) is a representative industry body working with the CAA on regulatory issues affecting aviation safety.

ACAG provides advice, technical expertise and input into the CAA's issue assessment process and policy projects.

"ACAG is our touchstone into the aviation community – they keep us real during the policy development process," says CAA's Principal Policy Adviser Lisa Sheppard.

Issue Assessment Process

When issues with the aviation regulatory system arise, the CAA analyses the problem's root cause, and develops options and actions to resolve it. This is the Issue Assessment Process.

ACAG Chairperson, Mike Groome, says, "ACAG provides suitable people with experience in the particular issue to assist the CAA with the assessment."

ACAG has helped the CAA reduce the issues backlog numbers from 190 to 20 open issues raised in the current year.

Policy Projects

Lisa says, "The three big policy issues in the next decade are the modernisation of aviation infrastructure, automation of the aviation fleet, and shifts in the CAA regulatory approach to be more responsive to changing risks in the system."

New Southern Sky

The move to satellite-based systems, digitalisation, and automation in aviation infrastructure will change the operating environment over the next 10 years.

ACAG contributed a member to the industry peer review group that helped develop the National Airspace and Air Navigation Plan. ACAG will continue to assist in the development of policy and rules to implement the plan. This project is now called "New Southern Sky".

Remotely Piloted Aircraft Systems (RPAS)

An interim approach to the management of RPAS has been approved by the Government. ACAG will continue to assist with the development of rule changes, communication, and longer-term integration strategy for this project.

Safety Management Systems (SMS)

The Government recently agreed to proceed with SMS rule-making. ACAG has been actively involved throughout the consultation on this project (see page 22).

Other Projects

ACAG has also been working with the CAA on a number of other policy projects, such as the emergency location of aircraft (see page 21), and the review of engineer licensing.

Funding Policy

A Triennial Funding Review is under way with input from ACAG.

This process examines the CAA's fees, charges, and levies, and is in two stages: a review of the principles guiding funding, followed by a review of the actual funding levels.

More information on all these projects is available on the CAA web site, www.caa.govt.nz, "Policy and Rules".

Call for Nominations

Here's an opportunity to get involved in the work that ACAG does. The ACAG annual election will be held on 11 December 2014, at the Wellington Airport Conference Centre.

ACAG has 12 members, with nine representatives from permanent member organisations (see the illustration) and three elected from the wider aviation community.

The three elected members have a term of three years. Currently, ACAG has one member whose term is ending. Nominations are invited for this role.

Contact Chairperson, Mike Groome, tel: 027 493 4701 to nominate someone.

You can keep up with ACAG happenings by subscribing to our free email notification service:

www.caa.govt.nz/subscribe

Gisborne Airport
Rail Signals Mothballed

A Grumman TBF Avenger waits on runway 32 while Gisborne City Vintage Railway's train, headed by the 1897 locomotive WA 165 crosses in its path. Gisborne Aviation Preservation Society Open Day 2 June 2013.

Photo courtesy of The Gisborne Herald.

Air traffic controllers at Gisborne Airport say pilots on approach should not be alarmed by the absence of the long-established signals telling them a train is about to cross the runway.

For the past 20 years, horizontal red flashing lights on large white boards adjacent to the sealed north-south runway at Gisborne Airport have warned pilots a train crossing was imminent and the runway was closed.

Steady green lights signalled the runway was open.

Both sets of lights have now been mothballed.

Featuring in a number of web sites dedicated to the 'world's strangest airports', it's believed the rail line was established well before local authorities decided in the mid-1940s the site was also the best for an aerodrome.

Air traffic controllers have always had to juggle train crossings and aircraft landings, although since KiwiRail scrapped its Gisborne-Napier service, the only trains now using the runway crossing belong to the local vintage train club.

"We're talking about very few crossings," says Chief Controller Hadley Cave, "long weekends, that sort of thing."

Controllers are now treating the train as they would any other vehicle on the runway, and it will need a verbal clearance to cross the runway.

"Aircraft will still have priority," says Hadley Cave. "It's just a question of sequencing the train crossings between landings."

There were a number of reasons for doing away with the lights, including the "significant" cost of maintaining them.

"There will be no additional risk to aircraft, with the lights gone," says Hadley Cave.

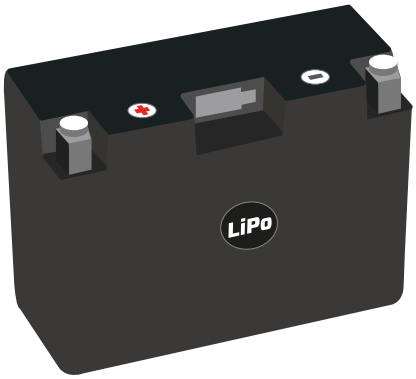
"The trains will operate only when air traffic control is on watch." ■

Lithium Battery Warning

Lithium batteries are everywhere – they're in laptops, tablets, cellphones, and toys. This warning has been prompted by incidents in Australia involving amateur-built and microlight aircraft, but the messages relate to everyone, whether they're a passenger, pilot, engineer, or aircraft builder.

Lithium Ion and Lithium Polymer batteries have been attractive to amateur builders because they are lighter than the traditional lead-acid batteries, and provide more current for cold starting.

But the risks are over-heating, fire, and gas emission. The type of charging system is critical, but even when using the recommended system, there can be problems.



Always follow the recommendations of your engine manufacturer in regard to batteries and charging systems.

Some Tips

- Act immediately if you detect any over-heating in a battery.
- Always protect the terminals from shorting.
- Use only the recommended charging system.
- If dropped or damaged, stop using, and dispose of responsibly.
- This is a reminder to travellers to keep their laptops in their carry-on baggage, and alert crew if they detect any overheating.

For More Information

"Lithium Batteries" *Vector* Jan/Feb 2012, page 19

Videos produced by the UK CAA, www.youtube.com/ukcaa ■

Director's Awards 2014

The winners of this year's awards for an outstanding aviation safety ethos are a veteran examiner, a quiet achiever, and a company with an "exceptional" CEO. The awards were announced in Wellington in July by the Director of Civil Aviation, Graeme Harris, at the gala dinner of Aviation New Zealand's Aviation Leadership Summit.

Individual Award

Graham Leach

In presenting the veteran trainer and examiner Graham Leach with the 2014 Individual Award, Graeme Harris paid tribute to his immense contribution to "the safe and professional pathway for flight crew into New Zealand commercial aviation".

Graham, who is already being tempted back from recent retirement by people wanting mentoring and tuition, has spent most of his adult life training and examining.

The Director said that was illustrated by his 9,000 hours as a flight examiner – about 150 flight test candidates every year for 34 years!

Graham looks back on a career he has found very satisfying.

"There are few jobs where you look forward to going to work each day and having so much fun."

But it clearly wasn't just "having fun" that Graham was doing.

The Director said Graham had exercised his responsibilities in a truly professional manner, providing sound advice and guidance to a generation and a half of aviators.

"His unflappable manner and quiet but firm approach has endeared him to candidate, instructor, manager and regulator alike, and he has become one of the most respected professionals in New Zealand flight training."

"I'm delighted with the award," Graham says.

"It's an endorsement of what we old experienced guys are trying to achieve – passing on what it is to be a professional, and teaching good basic habits, like the old stick 'n rudder skills. You still have to be able to land in a crosswind!"

Organisation Award

Helicopters Otago

Kevin Gale of Helicopters Otago received the Organisation Award on behalf of his father, Graeme Gale, who was overseas.

"You listen to the client, you deliver what they want, and you make it as safe as possible."

That's the award-winning philosophy of Graeme Gale, CEO of Helicopters Otago, which took out the 2014 Director's Award for an Organisation.

There isn't much the company doesn't do, from firefighting, filming and animal tracking, to training, agricultural operations and rescue missions.

Graeme Harris described Graeme Gale as an "exceptional" CEO who leads by example, sets very high standards and leads a continual exploration of opportunities to enhance services in a safe and efficient manner.

As an example of its innovative spirit, the company was instrumental in introducing Night Vision Goggles to New Zealand which are now used by many emergency rescue helicopter operators. It is currently working on an IFR project to strengthen its annual 600-plus rescue missions.

Graeme Gale says the Director's Award is a tribute to his 30 staff.

"I've surrounded myself with some great people. They're dedicated and they believe in what we are doing."

But it is not just his staff that earned the award. Graeme leads from the front. There isn't a job in the company he cannot do himself, and he is disciplined about business principles.

"I decided early on that if the day came that I could not afford to put new parts in a helicopter, I would be out."

Graeme Gale believes safety is a moving target.

"The day you say 'we're okay now, we're safe, we don't have to worry any more', that is when you most have to watch out. It's dangerous."

All photos courtesy of Clive Wilkinson.

CAA Flight Instructor Award

Jeremy Anderson

If Jeremy Anderson, Chief Flying Instructor with Nelson Aviation College, had known what was about to happen during the awards dinner, he probably wouldn't have turned up!

A quiet achiever who avoided attention, Jeremy had, according to Graeme Harris, largely escaped the recognition he really deserved.

That was fixed, however, when Jeremy was presented with the 2014 CAA Flight Instructor Award – Graeme Harris saying Jeremy just "quietly gets on with doing the job and doing it very well."

Jeremy says the award was really humbling. "The awards are given out to some real heavyweights of aviation and I feel I still have a long way to go, in comparison."

However, Graeme Harris said Jeremy was highly respected in the industry and that he set, maintained and demanded high standards.

Jeremy says that probably comes from his father, Charlie Anderson, a long-time agricultural pilot, and from Penny Mackay, his former boss at Nelson Aviation College.

"Both of them have a great commitment to safety," says the 37-year old. "They had such a big influence over me, it was just natural to feel the same way."

"There's a notice hanging at the college," says Jeremy, "saying 'near enough is not good enough'. I'm constantly reassessing what we do, to make sure the students themselves stay safe and that they are absorbing that safety message."

Humble as always, Jeremy says his award is a tribute to the whole team.

"Giles and Katrina (Witney, owners of the college) are great to work with. Clearly, without them I wouldn't have the opportunities I now have to do my best by the students." ■

Locating Aircraft in an Emergency

The CAA is currently reviewing New Zealand's policy on locating aircraft in an emergency – this is your opportunity to get involved.

Background

Since the disappearance of Malaysia Airlines flight MH370, there has been increased interest in the various ways of locating aircraft in an emergency.

The International Civil Aviation Organisation and the International Air Transport Association are examining whether technologies such as flight tracking should be required internationally to locate aircraft in emergency situations.

Domestic Operations

The CAA review, that began in February 2014, focuses on domestic operations. It looks at New Zealand's objectives for the emergency location of aircraft, and the roles that current and alternative technologies could play in achieving those.

Aircraft emergency location technologies:

- activate and broadcast a signal to search and rescue service providers when the aircraft becomes distressed;
- can provide aircraft location to an accuracy of a three-kilometre radius;
- can alert search and rescue service providers within five minutes, with no human intervention required;
- can provide global coverage;
- have the capability to broadcast a distress position for a significant time after the incident/accident, and;
- meet a minimum performance standard issued by a competent regulator.

The CAA wants your input and feedback on the discussion document, including the draft objectives, available on the CAA web site, www.caa.govt.nz, "Policy and Rules".

The consultation is open until 15 October 2014, so make sure you have your say.

For more information, contact CAA Policy Adviser, Catherine de Montalk, email: consultation@caa.govt.nz. ■

SMS Nationwide Roadshow Launches

The CAA is seeking feedback from certificated organisations about the proposed rules governing Safety Management Systems.

The CAA has hit the road to find out how you think planned changes underpinning Safety Management Systems (SMS) will affect what you do.

At the time of *Vector* going to print, a Notice of Proposed Rule Making (NPRM) was being prepared and it will be published as soon as it is approved.

CAA Principal Standards Specialist, Paul Elton, wants the consultation to count.

"We want management teams to really give thought to the implications of the rule changes, including what they would have to do differently to comply, and let us know their conclusions."

The proposed rules detail the framework of an effective SMS to be woven into an organisation to minimise risk and manage safety.

The proposed rule changes will affect all parts relating to certificated organisations.

"We will be listening to, and taking in, what we hear," says Paul Elton. "That doesn't mean that we can accommodate every response we get, but it does mean we will genuinely take it into account."

Advisory Circular AC00-4 will also be updated – a draft will be published with the NPRM.

To receive an email when details are announced, subscribe to our free email notification service. See the SMS page on the CAA web site.

New Products

SMS Industry Case Studies

The CAA has released four case studies to encourage organisations to implement Safety Management Systems.

- Case Study One
  Air New Zealand
- Case Study Two
  Oceania Aviation
- Case Study Three
  Taupo Airport
- Case Study Four
  Massey University School of Aviation

The CAA defines an SMS as "a systematic approach to managing safety, including the necessary organisational structures, accountabilities, policies and procedures".

We're providing the case studies to demonstrate examples of that systematic approach.

The case studies highlight the benefits of introducing an SMS to your business even before the rules come into effect.

From case study one, for example, Air New Zealand has recently implemented an online reporting system. For the first time, all staff and crew are using the same system to submit safety reports.

We hope other organisations will be able to use observations and experience from the four case studies to help them establish an effective SMS.

All the information you need is on our web site:

- NPRM and AC
- Subscribe to the email notification service
- Read the case studies ■

www.caa.govt.nz/sms

New PASO Senior Coordinator

In May 2014, Roy Barnett was appointed Senior Coordinator of the Pacific Aviation Safety Office (PASO), based in Port Vila, Vanuatu.

PASO is a regional international organization providing aviation regulatory safety and security services to 10 Pacific Island states. New Zealand is a PASO member, but rather than using PASO's services, it provides technical assistance as required.

Roy has more than 40 years' experience in a variety of aviation roles, including regulatory roles in the US Federal Aviation Administration (FAA). Most recently, he was the FAA's Middle East representative, based in Abu Dhabi.

A stint with ICAO between 1996 and 2004 saw Roy in auditing and training roles. During that time he was one of the principal architects of the ICAO Universal Safety Oversight Programme (USOAP). Roy was a member of the ICAO audit team that carried out New Zealand's first USOAP audit in 1999.

Chris Lamain, at that time CAA's Team Leader – Design, recalls that during the audit, Roy had an uncanny ability of selecting the files of the most "difficult" clients to see how the CAA was applying ICAO standards.

Roy is committed to building regional capacity and regulatory oversight skills, as well as developing extensive training programmes to strengthen and empower PASO member states. ■

How to Get **Aviation Publications**

AIP New Zealand

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

Pilot and Aircraft Logbooks

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

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.

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

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

CAA Cut-off Date	Airways Cut-off Date	Effective Date
13 Oct 2014	21 Oct 2014	8 Jan 2015
10 Nov 2014	17 Nov 2014	5 Feb 2015
22 Dec 2014	29 Dec 2014	5 Mar 2015

See **www.caa.govt.nz/aip** to view the AIP cut-off dates for 2014.

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.

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Report Safety and Security Concerns

Available office hours (voicemail after hours).

0508 4 SAFETY
(0508 472 338)
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
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, "Accidents and Incidents".
Some accidents are investigated by the Transport Accident Investigation Commission, www.taic.org.nz.

ZK-FJN Gippsland GA200C

Date and Time:	18-Nov-13 at 18:16
Location:	Esk Head Station
POB:	1
Injuries:	0
Damage:	Substantial
Nature of Flight:	Agricultural
Pilot Licence:	Commercial Pilot Licence (Aeroplane)
Age:	45 yrs
Flying Hours (Total):	4072
Flying Hours (on Type):	3119
Last 90 Days:	142

The aircraft was returning to the strip following a sowing run, when the engine began surging. The pilot shut down the engine and carried out a forced landing. The aircraft landed heavily on the left main gear, causing it to collapse and the left wing to strike the ground.

During maintenance investigation, the fuel control unit and both magnetos were removed for inspection and testing. When the shipping blank was removed from the fuel control unit fuel inlet fitting, it was noticed that there was contamination present in the form of small amber-coloured particles and a small amount of grit. The inlet fitting and filter assembly was removed and further contamination was found. Identification of the contaminant proved inconclusive. The inlet filter was replaced.

The fuel control unit was rig-tested and found to operate normally. No other contamination was found. All settings were found to be within the manufacturer's test limits.

The magnetos operated normally on bench test, although the e-gap settings on both were found to be too far advanced by 8 to 9 degrees.

It was not conclusively determined whether the contamination found in the fuel control inlet filter contributed to the engine power loss.

CAA Occurrence Ref 13/5781

ZK-HLZ Robinson R44

Date and Time:	29-Sep-12 at 7:20
Location:	Hastings
POB:	1
Injuries:	0
Damage:	Substantial
Nature of Flight:	Agricultural
Pilot Licence:	Private Pilot Licence (Helicopter)
Age:	29 yrs

During an orchard spray operation, the pilot was focused on clearing trees in the spray area and failed to recall that a wire was also in the area. The tail rotor struck the wire and control was lost, resulting in the main rotor striking the trees. The helicopter struck the ground and rolled over.

CAA Occurrence Ref 12/4269

ZK-LTT Pacific Aerospace Cresco 08-600

Date and Time:	26-Jan-13 at 9:15
Location:	Ohura
POB:	1
Injuries:	0
Damage:	Substantial
Nature of Flight:	Agricultural
Pilot Licence:	Commercial Pilot Licence (Aeroplane)
Age:	40 yrs

The pilot discussed the topdressing job with the client the night before, but neither mentioned the possibility of stock on the airstrip, which was owned by a third party. On arrival overhead, the pilot noticed sheep on the strip, and after landing, asked the client to shift them to the far corner of the airstrip paddock.

The property manager arrived at the strip, and briefed the loader driver on his plan to move the sheep to another paddock. This required the sheep to be driven across the airstrip. The loader driver radioed the plan to the pilot, who continued operating in the belief that he could monitor the stock movements while he was airborne. The sheep were out of sight from the loading area, however, and on takeoff with the 15th load, the aeroplane collided with several sheep. The pilot flew the substantially damaged aeroplane back to their maintenance base.

CAA Occurrence Ref 13/288

ZK-MYS Piper PA-31-350

Date and Time:	11-May-11 at 13:01
Location:	Nelson
POB:	2
Injuries:	0
Damage:	Substantial
Nature of Flight:	Test
Pilot Licence:	Airline Transport Pilot Licence (Aeroplane)
Age:	53 yrs
Flying Hours (Total):	16000
Flying Hours (on Type):	200
Last 90 Days:	80

The nose landing gear of a Piper PA31-350 Navajo Chieftain jammed in a partially retracted position during a training flight at Nelson Aerodrome. The nose landing gear could not be extended again, and in the subsequent landing the aeroplane sustained substantial damage. Neither of the two pilots, the only occupants, was injured.

The subsequent TAIC investigation determined that the nose landing gear jammed as a result of wrong parts and incorrect maintenance.

This synopsis is an abridged section of the TAIC report executive summary. The full report (11-004) is available on the TAIC web site, www.taic.org.nz.

CAA Occurrence Ref 11/2105

ZK-KAL Cessna 182P

Date and Time:	29-Jun-13 at 12:20
Location:	Parakai
POB:	1
Injuries (Minor):	1
Damage:	Destroyed
Nature of Flight:	Parachuting
Pilot Licence:	Commercial Pilot Licence (Aeroplane)
Age:	48 yrs
Flying Hours (Total):	987
Flying Hours (on Type):	100
Last 90 Days:	8

The aeroplane was returning from a parachute drop, when the engine stopped on final approach, coincident with the pilot lowering the flaps. Faced with a macrocarpa tree line, the pilot had no option but to deliberately aim the aircraft at the thinnest-looking part. Although the aircraft was destroyed in the collision with the trees, the pilot was able to extricate himself with only minor injuries.

The aircraft had standard long-range fuel tanks and a Continental IO-550 engine, and it was being operated with at least the legal minimum fuel on each sortie. The fuel system was later bench-tested and found serviceable.

A precise cause of this accident could not be determined, but it is most likely to have been due to unporting of the fuel tank outlets with the attitude change as flap was lowered. An already low fuel state and the larger long-range fuel tanks were probable contributing factors.

An article describing a virtually identical situation in a similar aircraft type, and two related incidents, was published in the November/December (Issue 7) 1999 *Vector*. This is still available on the CAA web site, www.caa.govt.nz, under "Publications".

CAA Occurrence Ref 13/3228

ZK-LAW Cessna 207A

Date and Time:	02-Aug-13 at 22:42
Location:	Von Valley
POB:	2
Injuries (Serious):	2
Damage:	Destroyed
Nature of Flight:	Training dual
Pilot Licence:	Commercial Pilot Licence (Aeroplane)
Age:	64 yrs

The crew were carrying out training at a remote airstrip. On approach, the aircraft struck a small rise in the terrain about 150 m short of the threshold. It appears that the exercise was a flapless approach, and the aircraft had been inadvertently allowed to descend below profile.

Site evidence suggests the crew may have realised the mistake at the last moment and tried to go around, but the aircraft clipped the terrain, causing it to collide heavily with the ground after a further 40 m and overturn.

It is believed that the nature of the terrain (barren tussock-covered ground), lighting from behind, and the high nose attitude on the approach were contributing factors.

CAA Occurrence Ref 13/3789

ZK-HCS Guimbal Cabri G2

Date and Time:	03-Oct-13 at 16:30
Location:	Eyrewell
POB:	2
Injuries (Serious):	1
Injuries (Minor):	1
Damage:	Substantial
Nature of Flight:	Training dual
Pilot Licence:	Commercial Pilot Licence (Helicopter)
Age:	32 yrs
Flying Hours (Total):	1270
Flying Hours (on Type):	173
Last 90 Days:	90

The purpose of the flight was final revision for the student's C-category instructor rating flight test next day. Pedal-jam scenarios were being practised, and on the third, the student demonstrated the exercise to the B-category instructor.

The initial approach was with the wind on the left, and as airspeed reduced, the nose yawed to the left. In an attempt to prevent the yaw, the student increased airspeed, but the yaw continued at an increasing rate. Application of right pedal had no effect. The instructor attempted to control the yaw rate but during the third revolution, the engine and rotor rpm decayed markedly. The helicopter descended and stuck the ground heavily in a tail-down attitude. The front skid cross-tube broke in the impact, and the rear cross-tube dislocated, resulting in a 45-degree rollover.

The student suffered a fractured pelvis as a result of the hard landing.

CAA Occurrence Ref 13/4881

ZK-CSD Diamond DA20-C1

Date and Time:	09-Jul-13 at 16:10
Location:	Cambridge
POB:	1
Injuries:	0
Injuries (Minor):	1
Damage:	Substantial
Nature of Flight:	Training Solo
Pilot Licence:	Private Pilot Licence (Aeroplane)
Age:	20 yrs
Flying Hours (Total):	114

The pilot was returning to Hamilton after a solo navigation exercise, when the aircraft engine surged and stopped. He carried out trouble checks, made a MAYDAY call, and attempted a forced landing into a paddock about 4.5 km south-west of Cambridge.

The left wing struck a tree on approach, and the aircraft rolled over and slid for a short distance after touchdown. The pilot was able to vacate the aircraft, having sustained only minor injuries.

Site examination of the aircraft established that the engine had stopped due to fuel exhaustion. A contributing factor was a late aircraft change before the flight, without its fuel state being positively established.

The training organisation has subsequently conducted a review of its sign-out and supervision procedures.

CAA Occurrence Ref 13/3389

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, "Accidents and Incidents".

Key to abbreviations:

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

Aerospatiale AS 350B2

Tail rotor pitch control cable

Part Manufacturer:	Eurocopter
Part Number:	704A34130184
ATA Chapter:	6720

The pilot reported that tail rotor pedals were locking up during a spray operation.

Engineering investigation found that the tail rotor pitch control cable inner had worn against the outer sheath at the forward end, causing it to bind up.

The outer sheath passes through a ball joint, which allows a small amount of movement to maintain the cable alignment as the pedals are moved. This ball joint was found to be seized, causing the inner cable to load up against the outer sheath, and resulting in cable wear.

The ball joint was lubricated and the tail rotor pitch control cable was replaced.

CAA Occurrence Ref 14/1709

Grob G103A Twin II Acro

Rudder pulley

Part Manufacturer:	Grob
Part Number:	102C3-2016
ATA Chapter:	2721
TTIS Hours:	7213

Entering a spin to the left during a dual flight, the crew heard a "bang", and the left rudder pedal moved fully forward. After landing, inspection found that a plastic pulley in the left rudder tensioning circuit had deteriorated to the point of failure. New pulleys supplied from the factory are of aluminium construction. Investigation revealed that there were no instructions from the manufacturer regarding the replacement of the plastic pulleys with new metal ones.

Further investigation found this was not restricted to this model, and other Grob gliders could be affected. The CAA wrote to all operators of Grob gliders, highlighting this issue. EASA was informed and has subsequently issued an Airworthiness Directive (2014-0067).

CAA Occurrence Ref 13/6190

Cessna 172S

RH balance cable

Part Manufacturer:	Cessna
Part Number:	0510105-365
ATA Chapter:	2711
TSI Hours:	97.1
TTIS Hours:	7761

Severe wear and fraying was found on the RH aileron balance cable during the first inspection carried out by the maintenance provider. The cable was found routed underneath obsolete pulley brackets in the wing, rather than above them as normal. The cable was remanufactured and replaced.

This is a timely reminder of the importance of ensuring the correct installation of control cables and the carrying out of duplicate inspections.

CAA Occurrence Ref 13/6070

Robinson R44 II

ATA Chapter:	2800

An operator reported frequent intermittent operation of the low fuel warning light. This is believed to be due to issues with the fuel flow between the auxiliary and main tanks after the installation of bladder tanks.

The operator believes that pilots are ignoring the light, and this has become 'learned behaviour'; also, that other operators are aware of the problem and their pilots are doing the same. No other occurrences of this nature have been reported to the CAA.

CAA Occurrence Ref 14/1966

NZ Aerospace FU24-954

Pitch trim mechanism

ATA Chapter:	2732

The pitch trim was set to full nose-up for takeoff as was the pilot's usual practice. After takeoff, the trim would not move from the full nose-up position. The pilot completed a successful landing.

Investigation found the pitch trim had been jammed by two shims, which had come loose and been pulled into the bush assembly by the threaded rod. The shims were in place to reduce backlash between the bevel gears. The maintenance provider said that the shims should not have been there, and added that if the bevel gear bush was found to be worn it should have been replaced.

A fleet check was carried out by the maintenance organisation and no further instances were found. When and where the shims had been introduced could not be determined.

CAA Occurrence Ref 14/584

Hughes 369D

Oil cooler blower shaft pulley

Part Model:	369D
Part Manufacturer:	MDHI
Part Number:	369D25630
ATA Chapter:	6320
TSO Hours:	10.3

During takeoff, the pilot heard a change in the helicopter sound. He landed and called engineering personnel to inspect the helicopter. They discovered that the oil cooler blower shaft had sheared the drive splines, causing the loss of drive to the blower impeller.

On further disassembly, it was found that a spacer washer had been missed out from under the drive pulley during recent maintenance, allowing the retaining nut to bottom out. It was thought that this was due to inconsistencies between the AMM (Aircraft Maintenance Manual) and the IPC (Illustrated parts Catalogue), as the engineer stated that the AMM does not show the spacer.

A serviceable oil cooler blower assembly was installed.

CAA Occurrence Ref 14/556

Bell 206B

Cargo hook manual release

Part Model:	BELL 206B
Part Manufacturer:	Bell Helicopter Textron
Part Number:	206-072-903-001
ATA Chapter:	2550

The operator reported an uncommanded load release.

The suspension frame section of the manual release cable P/N 206-072-903-001 was found with a sharp kink in the inner cable causing excessive friction in the manual release system. This prevented the hook from returning to the fully-locked position after the last operational check.

The cable was replaced. The operator identified the likely cause of the cable damage as being incorrect attention to the stowage of the hook assembly while it was not fitted to the helicopter.

CAA Occurrence Ref 14/2701

Pacific Aerospace Cresco 08-600

Cable

Part Manufacturer:	Aeromotive
Part Number:	MIL-W-83420B-1/8x7x9
ATA Chapter:	2711
TTIS Hours:	540

There have been several reports of control cables wearing at about half their expected life. The subject cables have been traced to manufacturer and source, and no connection has been made so far. Further reports of worn cables will be reviewed to see if any common factors can be found.

CAA Occurrence Ref 13/6105

Hughes 369E

Tail rotor teeter bolt

Part Model:	500E
Part Manufacturer:	MD Helicopters
Part Number:	369A1602-3
ATA Chapter:	6400
TTIS Hours:	9074.4

The pilot made a precautionary landing after a sudden onset of tail rotor vibration.

Engineering personnel discovered that the tail rotor teeter bolt was broken and the hole at the bush end of the respective TT (tension-torsion) strap was found to be oversized.

The hub must be removed at least every two years for access to the tail rotor swashplate for greasing. If the correct installation/removal procedure is not used, the threads of the teeter bolt abrade the teeter strap, resulting in an oversize hole. The bolt must be installed with the correct 'bullet' to prevent this condition.

If the hole is oversized, when the bolt is stretch torqued, the bolt is loaded at the point between the bush and the teeter strap assembly. This is due to the chamfer missing at the strap hole, causing the bolt to be point loaded.

This is the likely reason for the failure in this case.

CAA Occurrence Ref 13/6220

Hughes 369HS

Tail rotor swashplate tee

Part Number:	AM369H1801
ATA Chapter:	6720
TSI Hours:	70.9
TTIS Hours:	9447

During investigation of excessive wear in the tail rotor swashplate tee, damage to all of the bronze insert splines was discovered. This insert is where the swash plate is driven from the tail rotor gearbox output shaft.

The fractures in the splines were grainy with no sign of distortion or wear on the splines. This has been seen before by the engineer, but only on high-time splines in D models. A definitive reason for the excessive wear was not determined, but the engineer who discovered this thought that it could be related to inherent dynamic/harmonic vibrations.

CAA Occurrence Ref 13/6340

McDonnell Douglas 500N

Tunnel mounted control rod

Part Manufacturer:	MD
Part Number:	369A7012-9
ATA Chapter:	6700

During a 100-hour inspection, the lateral cyclic tunnel-mounted control rod lower rod end rivet was found sheared. The jam nut was also found loose.

The rivet was replaced as per CSP-HMI-2, Ch 67-10-00. The other control rod jam nuts were check torqued as a precaution.

CAA Occurrence Ref 13/6218

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